McIntosh Laboratory, Inc., Binghamton, NY 13903
Design Engineering Department

PRODUCT PREVIEW

MC2301

TUBE POWER AMPLIFIER

Project 1336

Promotional Highlights

- 300 Watts Mono Power Output
- Balanced Design
- McIntosh Unity Coupled Output Circuit
- Multifilar Wound Output Transformers
- Low Distortion from 20Hz to 20kHz
- Wide Power Bandwidth
- Sentry Monitor Tube Protection
- Large Gold Plated Five-Way Binding Posts
- Two Balanced Inputs/Outputs
- Large Illuminated Output Wattmeter
- Stainless Steel Chassis
- Fiber Optic Light Diffuser Illumination
- Remote Power Control with Meter light control
- ½ Inch Thick Glass Front Panel With Tube View

Features and Benefits

BALANCED DESIGN

The MC2301 amplifier is fully balanced from input to speaker output. Two matched amplifiers operate in Push-Pull with their outputs combined in the Output Transformer. The balanced configuration cancels many distortion products. The Signal-to-Noise ratio is also superior.

MCINTOSH UNITY COUPLED OUTPUT CIRCUIT

Output power is taken from both the plate and cathode of the output tubes. Conventional designs only take output from the plate. This allows ½ the turns ratio, or ¼ the impedance transformation of conventional designs. The result is much lower distortion, wider bandwidth and increased loudspeaker damping factor.

MULTIFILAR WOUND OUTPUT TRANSFORMER

The Unity Coupled Output Transformer has two bifilar wound primaries, one for the cathodes and one for the plates. The secondary is wound together with the primary windings. This provides very close primary to secondary coupling. The result is flat frequency response and wide power bandwidth.

LOW DISTORTION FROM 20Hz TO 20kHz

Less than 0.5% THD over the entire audio band is uncommon for a tube amplifier.

WIDE POWER BANDWIDTH

Full power output is available well beyond the frequencies that can be heard by humans. The specified frequency range is 20 to 20,000Hz.

SENTRY MONITOR TUBE PROTECTION

Sentry Monitor protects the entire amplifier circuitry in the event that a mismatched load impedance or a failed Output Tube causes higher than normal current to flow. To prevent destruction, the MC2301 power is turned off.

LARGE GOLD PLATED FIVE-WAY BINDING POSTS

McIntosh gold output terminals deliver full

power output. You can connect large diameter wire directly to the post, use Banana plugs or large spade lugs.

TWO BALANCED INPUTS/OUTPUTS

The two Balanced XLR inputs can accept outputs from both a C1000 Preamplifier and a C1000 Tube Preamplifier. The Input/Output can also be used to daisy-chain the audio to another amplifier for Bi-Amping.

LARGE ILLUMINATED OUTPUT WATTMETER

The McIntosh MC2301 has a huge hand built Output Wattmeter that responds 95% full scale to a single cycle tone burst at 2kHz. A special circuit 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.

FIBER OPTIC LIGHT DIFFUSER ILLUMINATION

All front panel illumination is done with LED driven Fiber Optic Light Diffuser panels. The operational life of LEDs are many times that of incandescent light bulbs. Replacement may never be required during the life of the Amplifier.

REMOTE POWER CONTROL WITH METER LIGHT CONTROL

The MC2301 is equipped with a circuit that provides remote POWER CONTROL from your McIntosh Preamplifier or Control Center. When you turn on your Preamplifier, a 5-15V trigger signal operates the power.
The blue meter backlight may be turned off remotely when the MC2301 is connected to a preamplifier that also includes meter light control.

1/2-INCH THICK GLASS PANEL WITH TUBE VIEW

The heavy glass is exceptionally durable. The MC2301 will always maintain its quality look. The KT88 Output Tubes are visible through windows in the front panel.

Performance Specifications

POWER OUTPUT

300 watts into an 8, 4 or 2 ohm load is the minimum sine wave continuous average power output.

OUTPUT LOAD IMPEDANCE

Terminals for 8, 4 and 2 ohms

RATED POWER BAND

20Hz to 20kHz

TOTAL HARMONIC DISTORTION

0.5% maximum harmonic distortion at any level from 250 milliwatts to rated power output.

FREQUENCY RESPONSE

+0, -0.5dB from 20Hz to 20kHz
+0, -3.0dB from 10Hz to 100kHz

INPUT SENSITIVITY

1.7V Unbalanced
3.4V Balanced

A-WEIGHTED SIGNAL TO NOISE RATIO

117 below rated output

INTERMODULATION DISTORTION

0.5% maximum if instantaneous peak power output does not exceed twice the rated output, for any combination of frequencies from 20Hz to 20kHz

WIDE BAND DAMPING FACTOR

Greater than 15

INPUT IMPEDANCE

47,000 ohms

TUBE COMPLIMENT

2 - 12AT7 Voltage Amplifiers
8 - KT88 or 6550 Output Tubes

POWER REQUIREMENT

100 volts, 50/60Hz, 6.6 amps
110 volts, 50/60Hz, 6 amps
120 volts, 50/60Hz, 5.5 amps
220 volts, 50/60Hz, 3 amps
230 volts, 50/60Hz, 2.75 amps
240 volts, 50/60Hz, 2.75 amps
Standby 1W

DIMENSIONS

Height 12-5/16 inches (31.3cm)
Width 17-3/4 inches (45.1cm)
Depth 23 inches (58.4) including Front Panel

SHIPPING CARTON DIMENSIONS

Height 17-1/4 inches (43.8cm)
Width 31 inches (78.7cm)
Depth 28 inches (71.1)

WEIGHT

116 pounds (52.6kg)
141 pounds (64kg) in shipping carton

Front Panel Information

ILLUMINATED OUTPUT WATTMETER

The McIntosh MC2301 meter is backlit the famous McIntosh blue by long life LEDs The primary output calibration of the meter is from 3 milliwatts to 600W.

METER MODE SWITCH

The METER MODE switch has three positions:

WATTS

In the WATTS position, the meter needle indicates the variations in program loudness.

HOLD

In the HOLD position, the meter needle locks to the highest power peak in a sequence of peaks. The meter is driven to the maximum power indication, 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.

LIGHTS OFF

In the LIGHTS OFF position, the meter functions in the WATTS mode, with the illumination turned off

STANDBY INDICATOR

The red STANDBY indicator illuminates when the MC2301 is connected to AC power and is ready for operation. The indicator flashes on and off to alert that the Sentry Monitor has turned the MC2301 power off to protect the amplifier's circuits. The Protect Mode is reset to normal operation by cycling the POWER switch of the MC2301 to off and then back on.

POWER SWITCH

The POWER switch has three positions OFF, REMOTE and ON. The OFF position disconnects the main AC line. The REMOTE position is used when the amplifier is to be turned on via remote power control. The ON position bypasses remote control and turns the amplifier on.

Rear Panel Information

OUTPUT

The output mode is fully balanced providing both + and (-) speaker connections for each speaker impedance of 2, 4 and 8 ohms. Huge, gold plated five way binding posts allow great flexibility in the type of wires that can be connected.

INPUT/OUTPUT

Two XLR connectors are provided for the BALANCED INPUT/OUTPUT. Both a C1000 Preamplifier and a C1000 Tube Preamplifier can be simultaneously connected to the MC2301 and the desired preamplifier can be selected by the preamplifier controls. The two XLR INPUT/OUTPUT connections are available for Daisy Chain connection to another MC2301 for a Bi-Amped configuration.

INPUT MODE

The input mode slide switch selects between the Balanced or Unbalanced input connections.

POWER CONTROL

1/8" mini jacks are provided for both POWER CONTROL IN and POWER CONTROL OUT.

Technical Description

The MC2301 is a power amplifier designed to operate with loudspeakers having a nominal impedance of 2, 4 or 8 ohms. It features a fully balanced circuit design that holds harmonic distortion and noise to very low levels.

POWER AMPLIFIER

There are two different tube types used in the MC2301, two 12AT7 medium power high voltage dual triodes and eight KT88 or 6550 beam power amplifiers.

The MC2301 amplifier is fully balanced from input to speaker output. Two matched amplifiers operate in Push-Pull with their outputs combined in the Output transformer. The balanced configuration cancels many distortion products. The signal-to-noise ratio is improved by 3dB. The circuit operation description below is for each half of the balanced amplifier system.

Since the native topology of the MC2301 is Balanced, an Operational Amplifier Inverter stage is used to develop a balanced signal from the Unbalanced RCA input. The input mode slide switch selects between the Balanced or Unbalanced input connections.

The native input configuration of the MC2301 is balanced mode. The + and – inputs from the XLR input are unity gain buffered by a precision operational amplifier IC and then directed to the + and – power amplifiers. When the Unbalanced mode is selected, the + input is passed through to the + power amplifier. An operational amplifier unity gain inverter develops the – input for the – power amplifier.

There are two identical power amplifier channels operating in balanced configuration. Each amplifier supplies ½ of the 300 watts of output. The two outputs are combined in the output transformer to deliver the full 300 watts to the loudspeaker output. The following circuit operation applies to each of the amplifier channels. Low level amplification in the power amplifier stages is done by low noise precision IC operational amplifiers. The audio signal is applied to the + input of the first operational amplifier. The loudspeaker output is processed through a negative feedback network and connected to the – input of the same operational amplifier. A second operational amplifier inverts the phase of the output from the first operational amplifier. The outputs of the two operational amplifiers are boosted to high voltage levels by the 12AT7 push pull voltage amplifier.

The plates of this amplifier are bootstrapped to the output transformer primary to insure full drive for the output tubes, A push-pull transistor emitter follower circuit assures stable, wide bandwidth drive to the KT88 output tubes. They are connected in push pull parallel.

The output stage topology is the Patented McIntosh Unity Coupled Output Circuit. The Four output tubes deliver signal to the output transformer through two primary windings, one for the plates and one for the cathodes. These windings are wound bifilar, both wires together at the same time. The secondary winding consists of six windings wound together with the primary windings. These six windings are connected in parallel to present a very low series resistance to the speaker loads. This method not only guarantees good speaker damping, it also yields very tight coupling between primary and secondary. Flat frequency response and wide power bandwidth are thus insured. The transformer core is top grade grain oriented silicon steel. This allows full power output down to 17Hz.

POWER SUPPLY

The high voltage secondary winding feeds a bridge rectifier followed by a capacitor input filter. A filter choke followed by a large output filter capacitors assure that the high voltage DC reaching the tubes is pure. A low voltage secondary winding feeds the heaters of the tubes, panel illumination and other low voltage circuits.

PROTECTION CIRCUITS

Some manufacturers of power amplifiers advertise 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 circumstances. The MC2301 incorporates protection circuits to enhance its performance, assure its reliability and to protect loudspeakers.

SENTRY MONITOR TUBE PROTECTION

The output tubes have limits for the maximum amount of power they can handle. The MC2301 output stage and power supply have been designed to allow 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 MC2301, destructive current levels could be reached. The Sentry Monitor circuit prevents this. The circuit senses the dynamic operating

time, voltage, and current of the amplifier output tubes and confines it to nondestructive levels. Sentry Monitor does not limit the power output available from the amplifier.

Sentry Monitor also protects the entire amplifier circuitry in the event that a failed Output Tube causes higher than normal current to flow. To prevent destruction, the MC2301 power is turned off. The protection mode is indicated by the flashing of the red standby indicator on the front panel. The Protect Mode is reset to normal operation by cycling the MC2301 power off and then back on with the POWER switch.

TURN-ON DELAY

The MC2301 has a turn-on delay circuit that delays amplifier operation for about 10 seconds after the power is turned on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your loudspeakers. It also protects the output tubes by delaying the signal until they are warmed for operation.

POWER LINE INRUSH PROTECTION

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

From the McIntosh Design Engineering Department:

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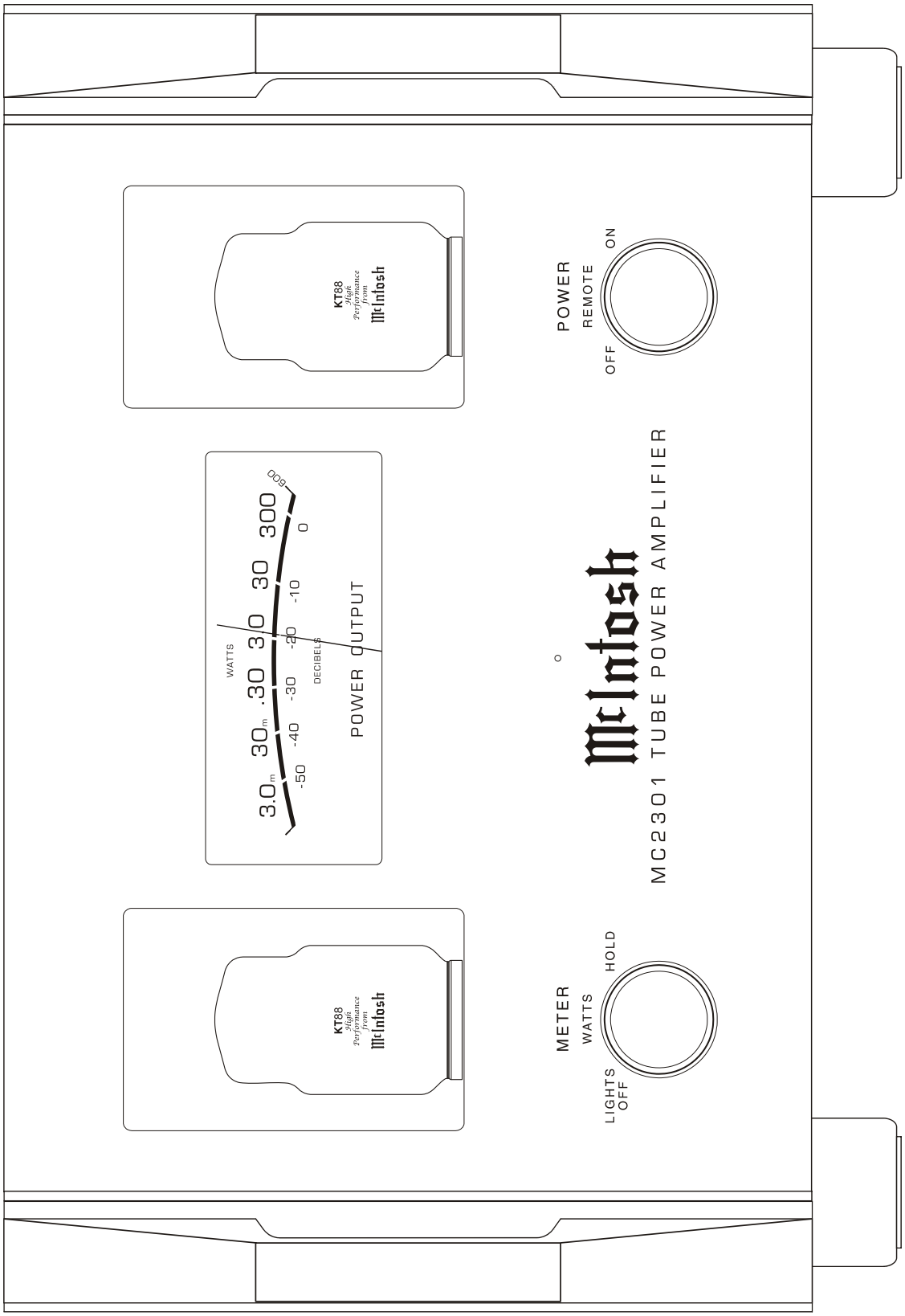
KT88
High
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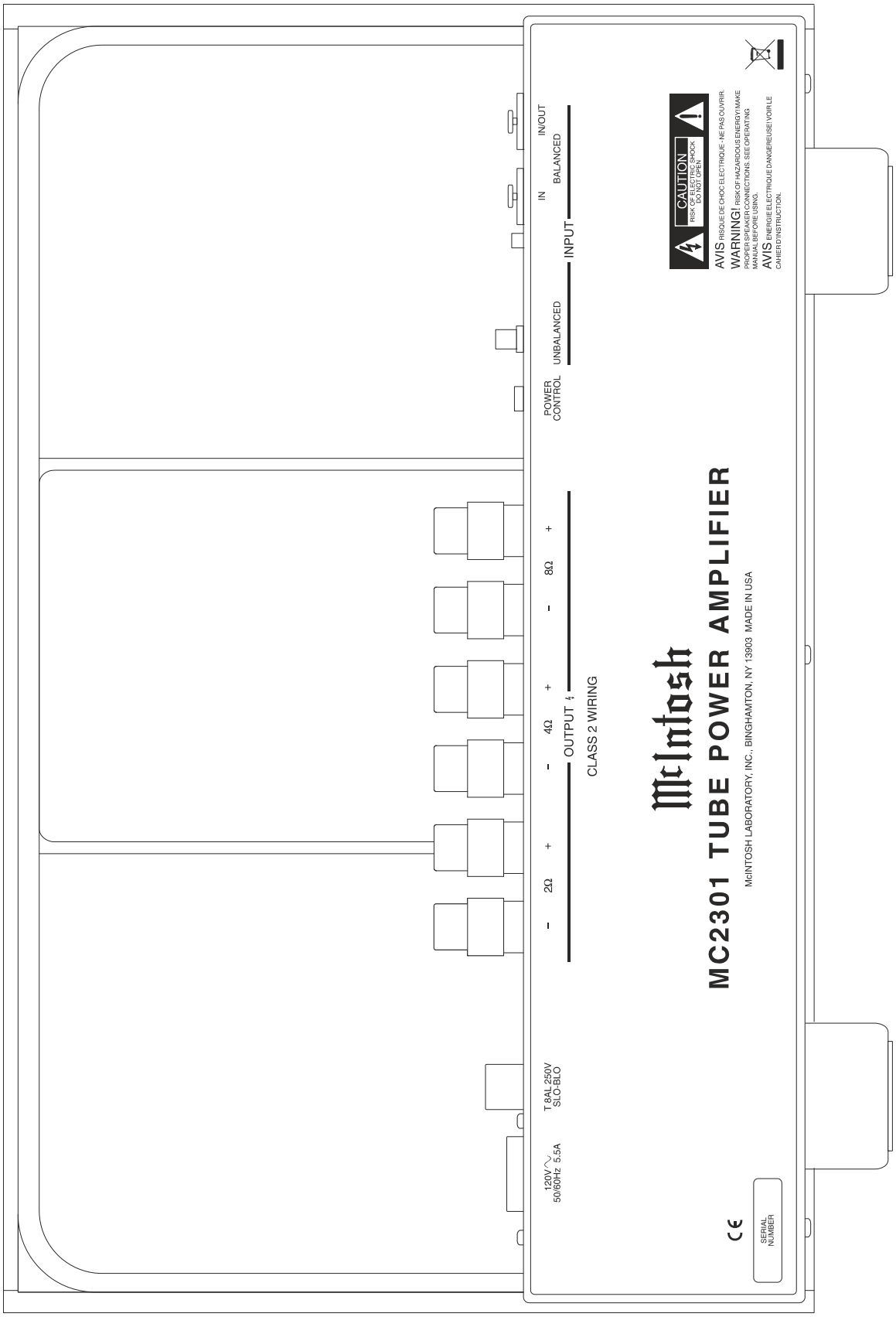
McIntosh
MC2301 TUBE POWER AMPLIFIER
METER
WATTS
HOLD
LIGHTS
OFF


MC2301 TUBE POWER AMPLIFIER
McINTOSH LABORATORY, INC., BINGHAMTON, NY 13903 MADE IN USA
CLASS 2 WIRING
OUTPUT
2Ω
4Ω
8Ω
INPUT
BALANCED
UNBALANCED
POWER CONTROL
IN/OUT
CAUTION
RISK OF ELECTRIC SHOCK DO NOT OPEN
AVIS RISQUE DE CHOC ELECTRIQUE - NE PAS OUVRIR.
WARNING! RISK OF HAZARDOUS ENERGY! MAKE PROPER SPEAKER CONNECTIONS. SEE OPERATING MANUAL BEFORE USING.
AVIS ENERGIE ELECTRIQUE DANGEREUSE! VOIR LE CAHIER D'INSTRUCTION.
120V 50/60Hz 5.5A
T 8AL 250V SLO-BLO
SERIAL NUMBER