



# MAC 4300V

FM/AM RECEIVER

# McIntosh®

OWNERS MANUAL

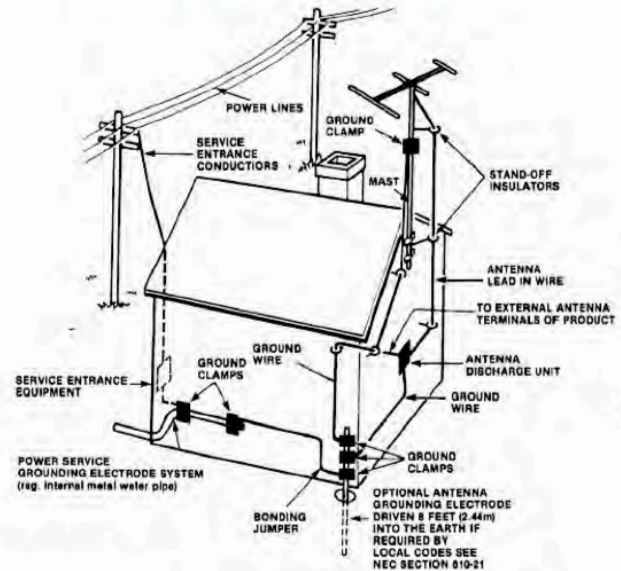
# IMPORTANT SAFETY INSTRUCTIONS

THESE INSTRUCTIONS ARE TO PROTECT YOU AND THE McINTOSH INSTRUMENT. BE SURE TO FAMILIARIZE YOURSELF WITH THEM.

1. Read all instructions - Read the safety and operating instructions before operating the instrument.
2. Retain Instructions - Retain the safety and operating instructions for future reference.
3. Heed warnings - Adhere to warnings and operating instructions.
4. Follow Instructions - Follow all operating and use instructions.

**WARNING: TO REDUCE RISK OF FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE THIS INSTRUMENT TO RAIN OR MOISTURE.**

5. Power Sources - Connect the power supply only to the type described in the operating instructions or as marked on the unit.
6. Power-Cord Protection - Route power-supply cords so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the instrument.
7. Ventilation - Locate the instrument for proper ventilation. For example, the instrument should not be placed on a bed, sofa, rug, or similar surface that may block ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet, that may impede the flow of air through the ventilation openings.
8. Heat - Locate the instrument away from heat sources such as radiators, heat registers, stoves, or other appliance (including amplifiers) that produce heat.
9. Wall or Cabinet Mounting - Mount the instrument in a wall or cabinet only as described in the owners manual.
10. Water and Moisture - Do not use the instrument near water - for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
11. Cleaning - Clean the instrument by dusting with a dry cloth. Clean the panel with a cloth moistened with a window cleaner.
12. Object and Liquid Entry - Do not permit objects to fall and liquids to spill into the instrument through enclosure openings.



13. Power Lines - Locate any outdoor antenna away from power lines.
14. Outdoor Antenna Grounding - If an outdoor antenna is connected to the antenna terminal, be sure the antenna system is grounded to provide some protection against voltage surges and built up static charge.  
In the U.S.A., section 810 of the National Electrical Code, ANSI/NFPA No. 70-1987, provides information on the proper ground for the mast and supporting structure, ground for the lead-in wire to an antenna discharge unit, and size of ground conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.  
For ground wire:
  - a) Use No. 10 AWG (5.3 mm<sup>2</sup>) copper, No. 8 AWG (8.4 mm<sup>2</sup>) aluminum, No. 17 AWG (1.0 mm<sup>2</sup>) copper-clad steel, bronze wire, or larger as ground wire.
  - b) Secure antenna lead-in and ground wires to house with stand-off insulators spaced from 4 feet (1.22 meters) to 6 feet (1.83 meters) apart.
  - c) Mount antenna discharge unit as closely as possible to where lead-in enters house.
  - d) Use jumper wire not smaller than No. 6 AWG (13.3 mm<sup>2</sup>) copper or equivalent when separate antenna grounding electrode is used.

15. Nonuse Periods - Unplug the power cord from the AC power outlet when left unused for a long period of time.
16. Damage Requiring Service - **Service must be performed by qualified service personnel when:**
  - A. The power supply cord or the plug has been damaged; or
  - B. Objects have fallen, or liquid has been spilled into the instrument; or
  - C. The instrument has been exposed to rain; or
  - D. The instrument does not appear to operate normally or exhibits a marked change in performance; or
  - E. The instrument has been dropped, or the enclosure damaged.
17. Servicing - Do not attempt to service beyond that described in the operating instructions. All other service should be referred to qualified service personnel.
18. Grounding or Polarization - Do not defeat the inherent design features of the polarized plug. Non-polarized line cord adaptors will defeat the safety provided by the polarized AC plug.

**19. CAUTION: TO PREVENT ELECTRICAL SHOCK DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.**

Note to CATV system installer:

This reminder is provided to call the CATV system installer's attention to Article 820-22 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

**ATTENTION: POUR PREVENIR LES CHOCS ELECTRIQUES PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR, UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.**



The lightning flash with arrowhead, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



**CAUTION: TO PREVENT THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.**



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

The serial number, purchase date, and McIntosh Laboratory Service Contract number are important to you for possible insurance claim or future service. Record this information here.

Serial Number

Purchase Date

Service Contract Number

Upon application, McIntosh Laboratory provides a Service Contract to the original purchaser. Your McIntosh Authorized Service Agency can expedite repairs when you provide the Service Contract with the instrument for repair.

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Your MAC4300V FM/AM Receiver will give you many years of satisfactory performance. If you have any questions, please contact:

### CUSTOMER SERVICE

McIntosh Laboratory Inc.  
2 Chambers Street  
Binghamton, New York 13903-9990  
Phone: 607-723-3512

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

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### McINTOSH THREE YEAR SERVICE CONTRACT

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

The terms of the contract are:

1. If the instrument covered by this contract becomes defective, McIntosh will provide all parts, materials, and labor needed to return the measured performance of the instrument to the original performance limits free of any charge. The service contract does not cover any shipping costs to and from the authorized service agency or the factory.
2. Any McIntosh authorized service agency will repair all McIntosh instruments at normal service rates. To receive the free service under the terms of the service contract, the service contract certificate must accompany the instrument when taken to the service agency.
3. Always have service done by a McIntosh authorized service agency. *If the instrument is modified or damaged as a result of unauthorized repair the service contract will be cancelled. Damage by improper use or mishandling is not covered by the service contract.*
4. The service contract is issued to you as the original purchaser. To protect you from misrepresentation this contract cannot be transferred to a second owner.
5. Units in operation outside the United States and Canada are not covered by the McIntosh Factory Service Contract, irrespective of the place of purchase. Nor are units acquired outside the USA and Canada, the purchasers of which should consult with their dealer to ascertain what, if any, service contract or warranty may be available locally.

McIntosh has earned world renown for its technological contributions for improved sound. When you bought McIntosh, you bought not only high technology, you bought technological integrity proven by time. The McIntosh MAC4300V Receiver is the newest evidence of McIntosh technological integrity.

Music reproducing instruments that carry the McIntosh name have always been designed to maintain the McIntosh reputation for best sound, for durability, and for long life. McIntosh has always earned its reputation for quality performance. McIntosh has provided user oriented facilities and appearance and McIntosh design always provides for ease of maintenance or repair. These fundamental elements are incorporated in the McIntosh MAC4300V Receiver.

You will derive the greatest enjoyment you understand its operations and its functions. Your time invested now to read this manual will return added value to you because then you will get the best results from your MAC4300V.

The MAC4300V has many useful features to enhance your listening and video enjoyment. The McIntosh infrared Remote Control System provides unusual versatility with operating simplicity. It provides remote control in the main listening area and can be expanded to provide control from two additional areas. In each of these three areas:

- 1) you can turn the AC power on or off;
- 2) you can select the listening sound source (tuner, compact disc, tape recorder, etc.);
- 3) you can adjust the volume;
- 4) when the tuner section is the sound source, you can select the stations you wish to hear on either AM or FM, or select the preset stations on either AM or FM;
- 5) when a McIntosh compact disc player is the sound source, you can put the CD player in the play mode, shift to the next track or the preceding track on the disc or stop play from the disc; or
- 6) you can turn on or off up to 3 connected speaker pairs, and more.

Your listening commands are executed by pressing buttons on the hand-held remote controller. When you press a button the controller transmits, via an infrared beam, a bicyclic twelve bit command signal. The receiver for these signals is an infrared sensor in the MAC4300V or a McIntosh R607 Remote Sensor.

Remote sensors can be installed in two additional areas. Ordinary video distribution cable, RG-59/U, connects the remote sensor to the MAC4300V.

The advanced FM/AM tuner design of the MAC4300V displays the station frequencies digitally. The display serves a double function, it shows the input selected or the frequency to which the tuner is adjusted. Stations are selected easily either by use of the manual tuning knob, by the scan up or down feature on either band or by use of the preset buttons in either FM or AM.

SIGNAL LOCKED LOOP TUNING SYSTEM (SLL) guarantees center channel tuning at all times regardless of any variations of the frequency of the broadcast station.

Once tuned, AUTOMATIC FREQUENCY LOCK assures rock solid adherence to the center of the station's broadcasting frequency by tracking any variations that might occur on either FM or AM.

The ease of FM tuning has been extended to AM with a new, McIntosh AM automatic center station tuning circuit. As in FM, when using the preset touch-buttons, the auto-tune circuit searches for the center of the AM broadcast frequency. When there, AM-AFL locks to that center point for drift-free, distortion-reducing, center channel tuning.

A Phase Locked Loop Multiplex decoder delivers STEREO FM with lower distortion, lower noise and better separation.

High quality FM broadcasts can be tape recorded without the interference that stereo transmissions can cause. Carefully designed suppression circuits eliminate the potential for stereo carrier noise when making "off the air" tape recordings.

The antenna input circuit allows you to use whatever AM antenna system that will suit your particular installation. In noisy AM locations, a shielded loop will provide improved input signal. In a remote location, a conventional 'long wire' antenna can be used, and in strong signal areas, a simple short piece of wire (6') will be adequate.

High level inputs accommodate the traditional as well as all the latest audio sources such as compact disc players and the high-quality audio from video disc players. A specially designed low noise switching system uses a pair of cascaded field effect transistors (FET) to operate the inputs. The inputs leads are very short, one-twentieth (1/20) of the length of previous

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## INTRODUCTION 3

designs. Advantages include, source-to-source isolation, lower distortion, and freedom from hum, noise, and interference from high-power TV and radar signals.

Any one of six input sources can be selected with the electronic switching. These inputs are identified as Compact Disc, TV/AU, FM, AM, LASER disc and PHONO.

Electronic tape monitor switches for two audio tape recorders, allow either recorder to be heard from the main output. These switches can also select the audio from two video recorders, or one audio recorder and the audio from one video recorder.

Volume is adjusted by an electronically switched, precision, ladder attenuator. The level of volume, is changed by C<sup>2</sup> MOS transistors which select from highly accurate deposits of resistive material. Left/right tracking accuracy is controlled to a fraction of a dB. Any misalignment or potential performance compromise is eliminated.

Three SPEAKER touch-buttons switch three sets of loudspeakers to provide program to three listening areas.

An active circuit loudness control is electrically independent of the volume control. Reproduction that has close conformity to the Fletcher-Munson equal loudness curves can be attained regardless of the volume setting.

A five-band program equalizer permits the adjustment and improvement of the loudness contrast of the five most important frequency ranges. Musical balance of source material can be adjusted to compensate for room recording differences or listener preferences.

Rear panel signal switching jacks provide output and input facilities for signal processing equipment.

Program is always available at the front panel headphone jack. All front panel controls are active when using the headphone jacks.

Technological leadership is shown in the full power McIntosh amplifier which will deliver its maximum power output to three pairs of loudspeakers. The quality of the sound reproduction and the quality of your speakers are protected by the patented\* McIntosh Sentry Monitor circuit and McIntosh Power Guard circuits. The Sentry Monitoring circuit constantly monitors the output signal. At signal levels up to rated output this circuit has no effect. If the power output exceeds design maximum, or in the event of a short circuit or severe impedance

mismatch, the Sentry Monitoring circuit protects the output transistors from failure.

The Power Guard waveform comparison circuit detects waveform differences between the input and the output signal. A sampling of the program material at the output of the amplifier is constantly compared with the program material at the amplifier input. Should the differences reach 0.5%, Power Guard goes to work. In only a fraction of a millisecond Power Guard dynamically reduces input level to prevent amplifier overload yet permits the amplifier to deliver its absolute maximum power output without extra distortion. The operation of the Power Guard circuit is absolutely silent. There is not even "soft" clipping. There is simply no clipping!

Additional protection is provided by temperature sensing devices on each output heat sink. The MAC4300V will perform reliably under the most rigorous operating conditions. The reserve power and complete protection of the output circuit allows safe operation with any speakers, dynamic or electrostatic!

All in all, your selection of the McIntosh MAC4300V FM/AM Receiver will be reinforced by your day-to-day use of this superb instrument. Good listening.

\*McIntosh research, engineering and design has developed circuits covered by these U.S. Patents: 3,965,295; 4,048,573; 3,526,847; and 3,526,846.

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## 4 INTRODUCTION

The MAC4300V may be used on a shelf or table top or may be installed in a custom cabinet. In any method of use provide adequate ventilation.

The trouble-free life of any electronic instrument is greatly extended by providing sufficient ventilation to prevent the build-up of heat that causes deterioration of component parts. Allow enough clearance so cool air can enter at the bottom of the receiver and be vented from the top and rear. To allow reasonable ventilation, the feet on the bottom of the receiver must be left in place. Should temperatures increase due to restricted ventilation or speaker mismatch, an automatic temperature sensing device turns the speakers off. The thermal sensor operates automatically so the speakers will turn on again when the temperature has returned to normal limits. This additional feature assures complete reliability under the most extreme operating conditions.

### INSTALLING THE MAC4300V IN A CUSTOM CABINET

For the MAC4300V, the space needed behind the cabinet panel is 15" (38.1 cm) deep, 18-1/2" (47 cm) wide, and 6" (15.2 cm) high. The cabinet panel must be cut out 5-1/16" (12.9 cm) high by 17-5/16" (44 cm) wide. Make this cutout carefully. The receiver's front panel has a 1/8" (0.32 cm) overhang on both sides and a 3/32" (0.24 cm) overhang on the top and bottom. (see Fig. 1).

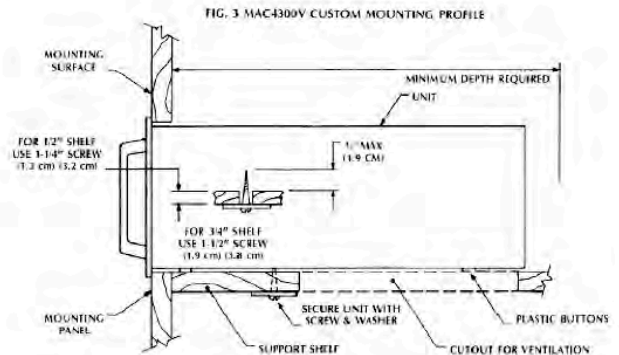
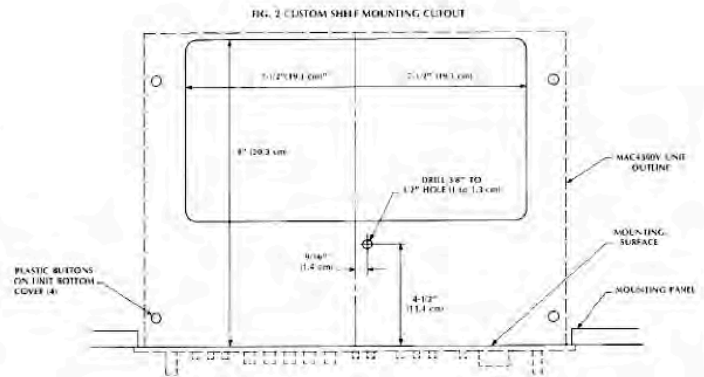
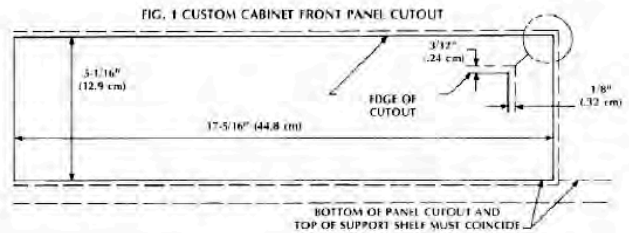
The weight of the receiver must rest on a shelf in the custom cabinet with a 15" (38.1 cm) X 8" (20.32 cm) ventilation hole cut out. (see Fig. 2) In addition, a single 3/8" to 1/2" (1 cm to 1.3 cm) diameter hole (see Fig. 2 and Fig. 3) must be drilled in the shelf. A screw inserted through this hole secures the receiver after installation. The top of the shelf must be flush with the bottom of the custom panel cutout.

Fig. 1 Custom Cabinet Front Panel Cutout

Prepare the MAC4300V for custom mounting by removing the wood sides and feet:

1. Remove 4 screws; two from each wood side panel and remove the panels. Replace the four screws which hold the MAC4300V top cover to the chassis.
2. On the bottom of the receiver are 4 plastic feet held on by screws. Remove these feet. Do not attempt to remove the 4 plastic button glides as these rest against the shelf. (see Fig. 2 and 3) At this point the receiver is ready to be installed. From the front of the cabinet, thread the power

cord through the opening in the cabinet panel and slide the MAC4300V on to the shelf. Adjust the position to evenly cover edges of the panel cutout. Lock the unit in place with a screw and washer inserted through the drilled hole in the mounting shelf (see Fig. 3). Use a 1-1/4" (3.2 cm) screw for a 1/2" (1.3 cm) shelf or a 1-1/2" (3.8 cm) screw for a 3/4" (1.9 cm) shelf. Do not use longer screws since they will contact electrical circuits which can lead to equipment failure and possible injury.



## INSTALLATION 5

The back cover folds out to show photographs of the front and rear panels of the MAC4300V. Fold it out to assist you in identifying and locating the connectors. The numbers refer to the paragraphs that follow.

Use shielded cables to interconnect the source equipment and the receiver. To minimize the possibility of hum or noise, the shielded cables should be of parallel construction or, if not, then loosely twist the left and right cables together. Locate them away from the speaker connecting cables and AC power cords. Be certain to use good quality shielded cables for all interconnections. Your dealer can advise you on the kind and length of cable that will best serve your installation.

The appropriate length and size of the loudspeaker cable for your installation will help to preserve the high quality of sound emanating from the loudspeakers. If undersize wire is used, its resistance reduces the damping factor, modifies the frequency response and reduces the power output. Your dealer's advice will serve you best for your installation.

The chart below shows the recommended minimum wire size for the length of wire between the receiver and the loudspeakers.

#### **SPEAKER CABLE LENGTHS AMPLIFIER TO SPEAKER**

for 4 ohm load		for 8 ohm load		Wire Guage
Feet	Meters	Feet	Meters	AWG
15	4.6	30	9.1	18
25	7.6	50	15.2	16
40	12.2	80	24.4	14
60	18.3	120	36.6	12
100	30.5	200	61.0	10

#### **1. HOW TO CONNECT LOUDSPEAKERS**

Gold plated rear panel barrier terminals are provided for three pairs of stereo speakers. The corresponding front panel push-buttons can activate or deactivate the speaker pairs.

Connect the leads from the left main loudspeaker to SPEAKER 1 Left and Common screw terminals.

Connect the leads from the right main loudspeaker to SPEAKER Right and the Common

screw terminals. Connect a second and third pair of speakers to SPEAKER 2 and 3 barrier strip similarly.

#### **2. HOW TO CONNECT A TURNTABLE**

Connect the left channel cable of the turntable to the INPUT Phono Left jack. Connect the right channel cable of the turntable to the INPUT Phono Right jack. Connect the turntable's ground wire to the ground (GND) terminal.

#### **3. CONNECTING PROGRAM SOURCE GROUNDS**

A GND post is used to connect the grounds from record changers, tape decks, etc. To prevent hum pick-up, the left and right program cables and the ground wire from that source should be loosely wound or twisted together. Be sure the ground wire does not make any contact with the shields of the left and right program cables.

#### **4. HOW TO CONNECT A LASER DISC PLAYER**

The audio from a laser vision video disc player can be connected to the MAC4300V's LASER INPUT. Connect the cable from the laser disc player's left channel audio output to the INPUT LASER Left jack. Connect the cable from laser disc player's right channel audio output to the INPUT LASER Right jack.

#### **5. HOW TO CONNECT TV AUDIO**

Audio from a TV monitor or any other high level source is connected to the TV/AUX INPUT. Connect a cable from the left audio input channel of a TV monitor or another high level source to TV/AUX INPUT Left. Connect a cable from the right channel audio output to the TV/AUX INPUT Right. When the MAC4300V's input is TV/AUX, the MESSAGE CENTER will display AU.

The output of a monophonic TV set can be connected to both the left and right channel inputs via a "Y" connector.

#### **6. HOW TO CONNECT A CD PLAYER**

Connect a cable from a Compact Disc player's left channel output to the CD INPUT Left jack. Connect a cable from the CD's right channel output to the CD INPUT Right jack.

A DIN connector is provided to interconnect

## **6 HOW TO CONNECT**



the MAC4300V with a McIntosh Compact Disc player. When so connected, the HR4300 remote control for the MAC4300V will operate these functions of the Compact Disc player:

- 1) turn the player on or off
- 2) play a disc
- 3) move to the next track
- 4) back up a track
- 5) raise or lower the volume in the local area, or
- 6) stop the disc.

#### 7. HOW TO CONNECT TAPE RECORDERS

Connect a cable from the left channel output of a tape recorder to the inputs  $\frac{\text{VCR 1}}{\text{TAPE 1}}$  Left jack. Connect a cable from the right channel output of a tape recorder to the INPUTS  $\frac{\text{VCR 1}}{\text{TAPE 1}}$  Right jack. Connect a second tape recorder in the same manner to the INPUTS  $\frac{\text{VCR 2}}{\text{TAPE 2}}$  jacks.

Connect a cable from the MAC4300V VCR/TAPE OUT 1 Left jack to the tape recorder's left input. Connect a cable from the VCR/TAPE OUT 1 Right jack to the recorder's right input. Connect a second recorder to the VCR/TAPE OUT Left and Right 2 jacks like the first.

#### 8. VIDEO SELECTOR: (optional accessory)

The McIntosh VIDEO SELECTOR, MVS-1, is designed to enable the MAC4300V to control video programs as well as audio. The MVS-1 connects to the VIDEO SELECTOR computer-type 15 PIN connector. Follow the instructions with the MVS-1 for connecting the video cables.

#### 9. HOW TO CONNECT A McINTOSH EQUALIZER OR OTHER SIGNAL PROCESSOR

Use the PREAMP OUT/POWER AMP IN jacks to add a McIntosh Environmental Equalizer, a noise reduction device or any audio signal processing device. Be sure to match the left to left and right to right channels when connecting external processors.

The POWER AMP IN jacks have switching contacts which allow the signal to pass through them when nothing is plugged into the jacks. When an external processor is used, the program is routed to the external processor from the PREAMP OUT jacks and back by the POWER AMP IN jacks.

**WHEN AN EXTERNAL PROCESSOR IS USED, THE PROCESSOR MUST BE TURNED ON FOR THE PROGRAM TO BE HEARD THROUGH THE SYSTEM.**

#### 10. CONNECTING THE FM ANTENNA

The antenna input impedance is 75 ohms. The im-

put connector is a "Type F" which mates with cable company feed lines and coaxial cable. Interference rejection and low signal loss are among the benefits of coaxial cable.

Any one of four different FM antenna systems can be used with your MAC4300V.

- 1) an outdoor FM antenna,
- 2) an all channel (UHF-VHF-FM) antenna,
- 3) a cable input from your local cable company, or
- 4) the indoor dipole supplied.

A 75-ohm outdoor antenna designed for FM reception is recommended for optimum performance in all areas. In fringe areas, best results will be obtained with a highly directional FM antenna used with a rotator. Adjust the direction of the antenna until the best reception is obtained.

A 75-ohm indoor dipole antenna supplied with your MAC4300V may be used in urban or in high signal strength areas. The flexibility of the thin wire assembly permits it to be placed under a rug, tacked behind the stereo, or placed in any other convenient location. In some cases, it may be necessary to position the antenna for best signal reception. Avoid locating this antenna next to other wires of metal objects. An indoor antenna may not prove effective in houses having metal siding or metal insulation.

Although a 75-ohm coaxial cable provides the best noise and multipath reception, many antennas use 300-ohm twin lead. In this case, use a matching transformer (balun) to convert a 300-ohm antenna to the 75-ohm input impedance of the tuner.

#### 11. AM ANTENNA/GND

The AM antenna input on the MAC4300V is unusual in that it will accept almost any type of antennas. For example: in a location of moderate signal strength and little interference (few fluorescent lights, motors, TV sets, etc.), a piece of wire as short as 6 feet will give good performance. In a rural area, an outdoor long wire might be desirable. For the best overall performance use a shielded loop antenna.

A shielded loop antenna is made from a length of single conductor shielded wire; microphone cable, coaxial cable, etc., arranged in a single loop.

To prepare an antenna from the shielded cable, strip  $\frac{3}{4}$  of an inch of outer insulation from each of the cable ends. From one end, completely remove

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# HOW TO CONNECT 7

the exposed  $\frac{3}{4}$ " of mesh shielding. Then remove  $\frac{3}{8}$  of an inch of insulation from the center conductor. Insert the exposed center conductor into the AM



ANT push connector. Make sure the cut off mesh shield does not come in contact with anything. On the other end, leave the mesh shield intact and strip  $\frac{3}{8}$  of an inch of insulation from the center conductor. On this end only, twist the exposed center conductor and mesh shield together.



Insert the twisted shield and center conductor into the ground (GND) push connector.

For best reception, orient the loop vertically. It may be attached around the frame of a window behind a curtain, on the back of the equipment cabinet, or in some similar way. Signal strength is proportional to the size of the loop; the larger the loop, the greater the received signal.

#### 12. AREA SENSORS 1 and 2: (optional accessory)

Connectors are provided to add two additional McIntosh R607 infrared sensors. This added convenience permits complete control of the stereo system from areas remote to the location of the MAC4300V.

Should the front panel infrared sensor be hidden from view when installed, as in a cabinet, then a R607 Remote Infrared Sensor can be used. A McIntosh R607 Remote Sensor can be fitted in an ordinary electrical switch box and installed in the ceiling or wall. The R607 Remote Sensor is connected to the AREA SENSOR connector with up to 300 feet of RG-59/U cable and a type F connector. Choose a location for the remote sensor that will not be obstructed by furniture, drapes, etc. and will not be exposed to excessive amounts of daylight. Obstructions will interfere with the "line of sight" infrared transmission from the hand-held controller, while excessive infrared from daylight can affect the performance and sensitivity of the Remote Control Sensor.

13. Planning for the future, McIntosh has included the REMOTE VOLUME DIN connector. It will be used for an additional accessory still in Product Planning.

#### 14. FUSE

A 5-amp fuse protects the MAC4300V circuits. The fuse does not protect additional equipment connected to the rear panel AC power outlets.

#### 15. AC POWER

Plug the receiver's power cord into a 120 volt 60Hz wall outlet. The plug blades are polarized. It is important that the plug is fully inserted in the wall outlet.

**CAUTION: TO PREVENT ELECTRIC SHOCK, DO NOT USE THE POLARIZED PLUG ON THIS UNIT WITH AN EXTENSION CORD, RECEPTACLE, OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.**

There are two types of AC power outlets provided on the MAC4300V, one is red and the others are black. Total power capacity for these outlets is 1000 watts.

#### 16. BLACK

The black outlets are switched On or Off when the MAC4300V is activated or deactivated. These should be used to provide AC power to items like CD players, tape recorders, or other accessories.

#### 17. RED

The red outlet is on at all times and is used with accessories that have their own power switches. For example, a VCR plugged into this outlet can record a TV program even when the audio system is turned off.

#### HOW TO CONNECT ADDITIONAL POWER AMPLIFIERS

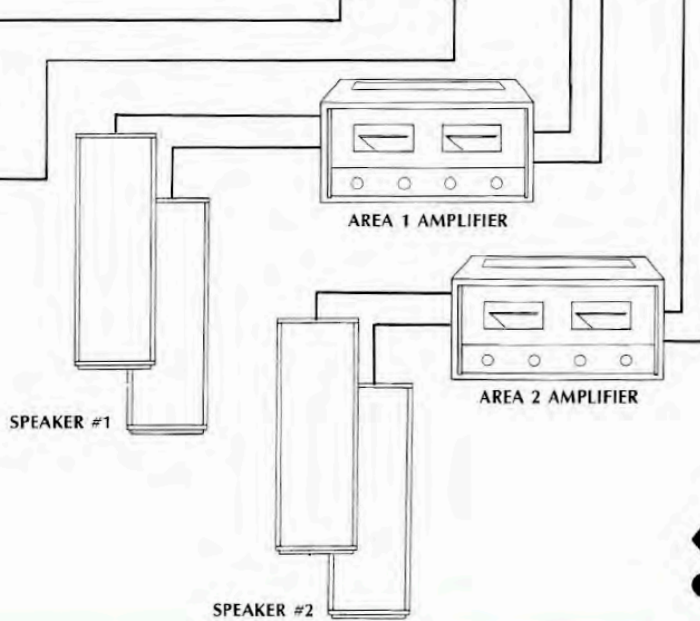
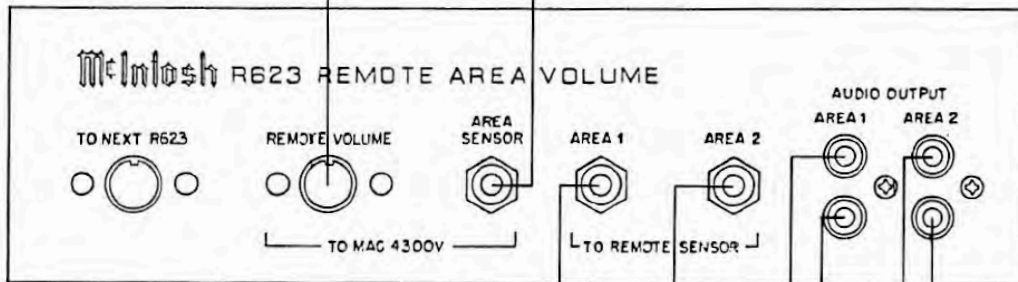
External power amplifiers may be fed from the MAC4300V in two ways:

- 1) Connect a shielded cable from the Left and Right PREAMP OUT jacks to the Left and Right input of the power amplifier. The PREAMP OUT jacks are affected by the VOLUME, EQUALIZER, BALANCE and LOUDNESS controls. Both the MAC4300V amplifier and the additional amplifier will be fed from the preamplifier. If the MAC4300V amplifier is not going to be used, insert a pair of phono plugs in the POWER AMP IN jacks to disconnect it from the preamplifier output.
- 2) The VCR/TAPE OUT 1 or VCR/TAPE OUT 2 jacks may be used to drive an external amplifier which has its own controls. The output of these jacks is not affected by the VOLUME, EQUALIZER, BALANCE and LOUDNESS controls

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## 8 HOW TO CONNECT

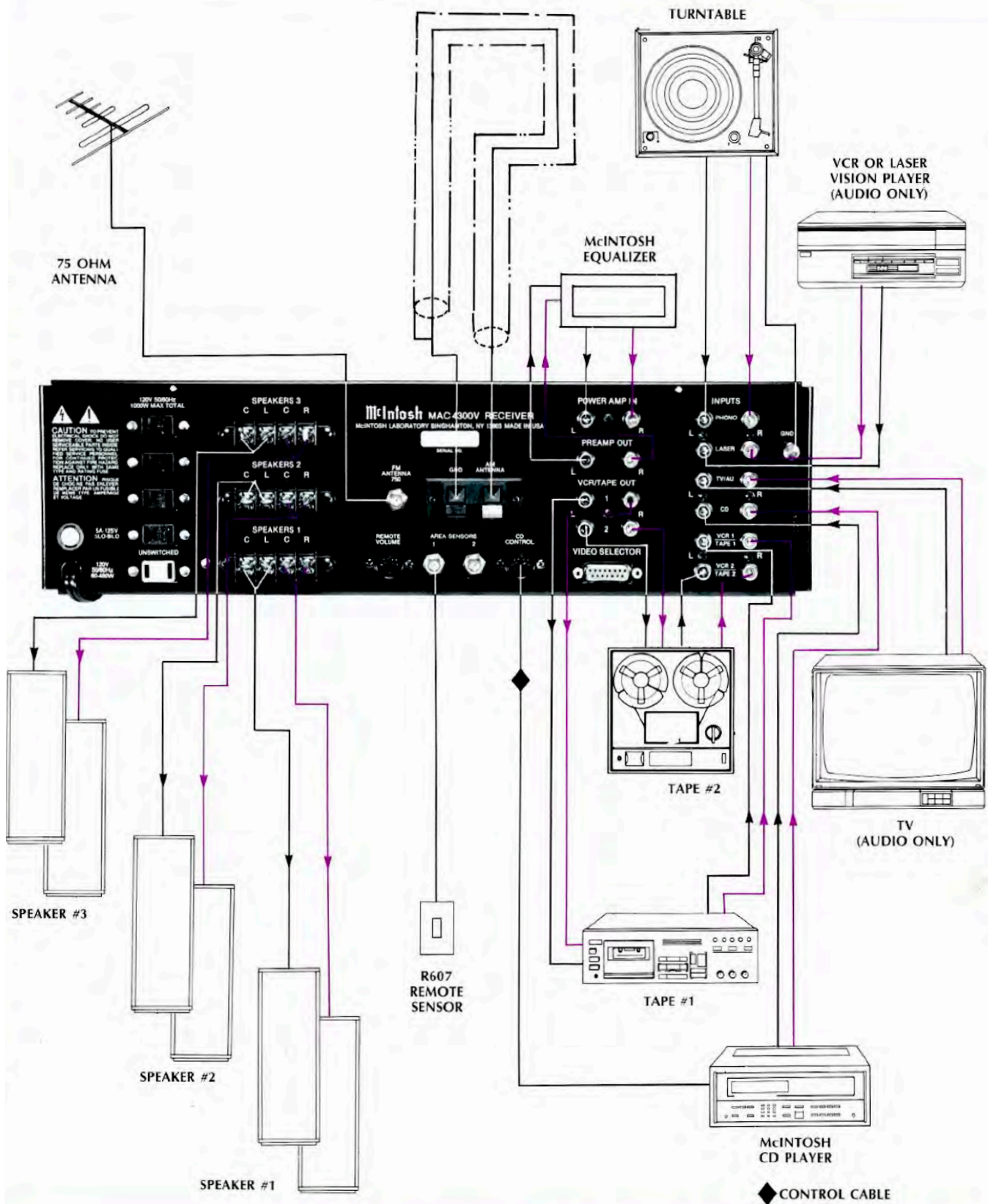
on the receiver. A suggested use would be to feed an amplifier in a remote location where volume and tone requirements need to be controlled independently at the remote amplifier. In this configuration, the TAPE OUT connections can not be used for a tape recorder.



◆ CONTROL CABLE

● RG/59-U SENSOR CABLE

# 10 HOW TO CONNECT



# HOW TO CONNECT 11

## FRONT PANEL CONTROLS

The black cover folds out showing the front and rear panels of the MAC4300V. Fold it out to assist you in identifying and locating the receiver's controls. The letters refer to the following paragraphs dealing with various elements on the front panel.

The message center of the MAC4300V is located at the upper left hand area of the front panel. Various displays which show the amount of power developed by each channel, the station's broadcast frequency, or, when not listening to radio, the selected source, tape facilities in use, operating speakers, FM center channel tuning, strength of the received station, the FM stereo (MPX) indicator and the infrared sensor which accepts information from the HR4300 hand held remote.

The anodized aluminum panel contains the touch buttons and controls for:

- 1) PROGRAM INPUT selection
- 2) select from six preset stations on either FM or AM, SCAN ▲ or ▼ or MANUAL tuning
- 3) EQUALIZER FREQUENCY controls for five frequency bands
- 4) audio and video tape selection (video capability with accessory McIntosh MVS-1 Video Switcher)
- 5) speaker selection for three areas
- 6) LOCKOUT to prevent tape recording interruption from a remote area
- 7) AC POWER ON/OFF
- 8) VOLUME up▲ and down▼ touch buttons
- 9) system BALANCE
- 10) LOUDNESS control
- 11) HEADPHONE jack

All these functions can be activated by the HR4300 infrared handheld remote control, except the five EQUALIZER FREQUENCY controls, BALANCE, and LOUDNESS controls, the TAPE COPY, LOCKOUT, MANUAL tuning and MONO touch button.

### B. MESSAGE CENTER POWER OUTPUT INDICATORS

The amplifier POWER output indicators are to the left of the station display area. There are two vertical columns of red Light Emitting Diode (LED) bar indicators; one for each channel.

The left column represents the output from the left channel and the right column the right. Each row is independent of the other. As power output increases, more bar indicators are turned on. The power indicators provide constant and instant information on the amount of power being fed to your

speakers.

When the POWER GUARD\* circuit is activated, the top bar on each side will light with greater brightness than the rest.

POWER GUARD\* assures that the amplifier can not be overdriven so amplifier output clipping is eliminated. Clipping is caused when the amplifier is asked to produce more power output than it can deliver with low distortion. Amplifiers are capable of delivering large quantities of heating power when they are driven to clipping but do so with up to 40% harmonic distortion. The extra heating energy content of the clipped signal will damage most speakers. A McIntosh advancement helps to protect your speaker from this kind of damage. The POWER GUARD\* circuit compares the wave shape of the input signal with the output signal. If the non-linearity between the two signals exceeds 0.5% the POWER GUARD\* circuit operates to prevent clipping.

### C. MONITOR 1 and 2

When lighted, these LED's indicate that the tape recorder connected to INPUT TAPE 1 or 2 has been selected as the sound source.

**IMPORTANT:** When the MAC4300V is operated in MONITOR mode with MONITOR 1 or 2 lighted in the message center, the program heard will be that from the tape recorders only. Any other source will not be heard from the loudspeakers.

### D. TAPE COPY 1►2, 2►1

When lighted, these LED's show that the tape recorders have been interconnected in the MAC4300V to copy from one to the other.

### E. SPEAKERS 1-2-3

When lighted, these LED's indicate that the output of the MAC4300V is being fed to the speakers connected to the corresponding number.

### F. LOCKOUT

When lighted, this LED indicates that all functions of the MAC4300V can only be changed by use of the receivers controls. All remote areas are LOCKED OUT from making any adjustments.

### G. MONO

When lighted, this LED indicates that the FM circuits have been switched to MONO. In this mode of operation, reception of stations that are weak, distant, or noisy may be improved.

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# 12 FRONT PANEL

## H. SIGNAL/TUNING INDICATOR

### SIGNAL (STRENGTH) INDICATOR

The SIGNAL indicator is at the right of the message center. The vertical row of LED indicators, shows the relative strength of an FM or AM station being received. The greater the number of dots illuminated, the greater the received station's signal strength.

### TUNING INDICATOR

Three LED's ►▲◄, two horizontal arrows and one vertical arrow, located below the SIGNAL indicator, make up the TUNING indicator. A station is precisely center channel tuned when the center arrow, only, illuminates.

The exclusive McIntosh developed Automatic Frequency Lock (AFL) circuit makes precise tuning almost automatic. Because the AFL circuit locks to and prevents any departure from the precise center tuning of the station, it must be turned off for SCAN or MANUAL tuning. When using these tuning methods on FM, the AFL circuit is turned off until the center tuning arrow lights and the horizontal arrows are off. Then the AFL circuit locks precisely to the broadcast station frequency preventing any detuning or drift. The locking action of the AFL circuits makes tuning easy. AFL turn off and on occurs automatically when in the SCAN mode or when using the preset touch buttons for station selections. McIntosh AFL will give the best FM and AM reception with lowest background noise, lowest distortion, and highest FM stereo channel separation.

When tuning manually, the tuner can be tuned slightly off the station's frequency without degrading the program material. The "near" tuning can cause the station to be 'lost' when power is turned off and then turned on again. You can prevent this by always rotating the MANUAL tuning knob until only the center tuning arrow is lighted.

All FM stereo broadcasts will cause the FM MPX bar indicator to illuminate. It is located above the SIGNAL and TUNING indicators. The MPX LED bar will be turned off and the MONO indicator turned on when the MONO touch button is pressed.

## I. STATION FREQUENCY DISPLAY

The ¾" high LED digital display of station frequency on both FM and AM provides a high degree of accuracy and is easy to read. In many receivers, only the odd numbered frequencies are tunable and displayed. This prevents center tuning on some cable

system rebroadcasts or in the event of station inaccuracy. The MAC4300V tunes and displays all FM frequencies 88.0 to 108.0 MHz and all AM frequencies.

## J. POWER

The red touch button on the MAC4300V and the POWER button on the remote control turn the AC power on or off. When turned on, the message center will display the source that has been selected and any special operating modes.

## K. PROGRAM INPUT

1. CD: To listen to a compact disc player. The message center will show Cd.
2. FM: To listen to FM stereo radio broadcasts. The message center will show the FM station frequency in megahertz.
3. AM: To listen to AM radio broadcasts. The message center will show the AM station frequency in kilohertz.
4. TV/AU: To listen to any high level source such as a TV monitor or tape recorder. The message center will show AU.
5. Laser: To listen to a laser vision player or other high level source. The message center will show Ld.
6. Phono: To listen to a phonograph record. The message center will show PH.

## L. EQUALIZER FREQUENCY CONTROLS

Each of the five EQUALIZER FREQUENCY controls raises or lowers the volume of a band of frequencies whose center frequency is marked above the control. Both left and right channels are affected by each control. The center or flat response position has a detent for easy reference. When the controls are in the detent position the equalizer is removed from the preamplifier circuits and the response is perfectly flat with the equalizer circuits removed from the signal path.

Use the EQUALIZER FREQUENCY controls to modify the tone balance of program material. Here are some suggestions with which to start.

Adjustment To:	Equalizer Adjustment:
Make deep bass louder	Raise 30
Make all bass louder	Raise 30 and 150
Reinforce Voices	Lower 150 and Raise 500
Brighten Violins and Trumpets	Raise 1500
Emphasize Cymbals	Raise 10k

#### M. MONITOR-VCR/T1-VCR/T2

**IMPORTANT:** When the MAC4300V is operated in MONITOR mode with MONITOR 1 or 2 lighted in the message center, the program heard will be that from the tape recorders only. Any other source will not be heard from the loudspeakers.

The MAC4300V is designed to be used with two tape recorders, either audio or video, or one audio and one video recorder.

The MONITOR switches are electronically interlocked to prevent simultaneous monitoring from two tape recorders.

The four touch buttons, MONITOR VCR/T1, VCR/T2, TAPECOPY, 1▶2, 2▶1, control the signal input and output of these recorders. They permit recordings to be monitored while recording, or copying of tapes and listening to a separate program or the playback of either recorder.

MONITOR VCR/T1 touch button: When MONITOR 1 is lighted in the message center, signal from a tape recorder plugged into INPUT VCR 1  
TAPE 1 is fed to the power amplifiers and heard through the loudspeakers.

MONITOR VCR/T2 touch button: Functions similarly to MONITOR VCR/T1 from the INPUT VCR 2  
TAPE 2 inputs.

#### N. TAPE COPY:

1▶2 touch button: connects the output from tape recorder 1 to the input of tape recorder 2 and lights 1▶2 in the message center without affecting the program being heard from the speakers. In this position, a copy of the program on tape recorder 1 can be made on tape recorder 2. To monitor the original, use MONITOR VCR/T1 touch button and to monitor the copy, use MONITOR VCR/T2 touch button.

2▶1 touch button: connects the output from tape recorder 2 to the input of tape recorder 1 and lights 2▶1 in the message center without affecting the program being heard from the speakers. In this position, a copy of the tape program on recorder 2 can be made on recorder 1. To monitor the original, use MONITOR VCR/T2 touch button and to monitor the copy, use MONITOR VCR/T1 touch button.

#### O. LOCKOUT

Touch the LOCKOUT touch button to prevent any remote area from changing the selected operating functions of the MAC4300V in the main listening area. Suggested use would be while making a tape recording only the main controls on the receiver

would be in operation. The remote area would hear only the program and volume selected by the receiver controls. When in LOCKOUT mode, the LED under LOCKOUT in the message center will be illuminated.

#### P. MONO

The MONO touch button changes the audio output of the receiver from the STEREO mode to MONO when listening to FM. When the MONO button is in, the program will be mono, and the program at the TAPE OUT jacks is MONO.

#### Q. SPEAKERS 1, 2 And 3

When these touch buttons are pressed, the receiver's output is fed to the pair of speakers connected to the corresponding rear panel SPEAKER connectors. SPEAKERS 1, 2, and 3 can be selected either individually, in combinations or all at once.

As each SPEAKER touch button is pressed an LED will light above the corresponding SPEAKER number in the message center to indicate the loudspeaker is operating.

#### R. VOLUME

Volume can be adjusted by using the VOLUME ▲ or VOLUME ▼ touchbuttons on the front panel or on the remote control. Volume adjustment is performed by an electronically switched, precision, ladder attenuator. The entire range of volume adjustment is 68 dB in 2dB increments. Left and right tracking is accurate to a fraction of a dB. In contrast to the usual voltage controlled attenuators, the McIntosh precision ladder attenuator maintains its distortion-free performance throughout its range.

#### S. LOUDness/BALANCE

The BALANCE and LOUDness controls are concentric. Adjusting the BALANCE control (large outer knob) changes the volume of the channels relative to each other and does not change the overall volume of sound in your listening room.

#### LOUDness

The LOUDness control (small center knob) contours the frequency response to compensate for the hearing characteristic of the human ear at lower listening levels. The contour is accurately modeled after the family of "equal loudness" curves identified by Fletcher and Munson. At the fully counterclockwise detented position, the LOUDness compensation is out of the circuit, so the response is electrically

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## 14 FRONT PANEL



flat. As the control is turned clockwise, both bass and treble frequencies increase in the correct proportion to each other. The contour is not affected by different settings of the VOLUME control.

#### **T. HEADPHONES**

Plug headphones into the front panel HEADPHONE jack. Adjust the front panel VOLUME control for comfortable headphone listening. Signal to the headphone jacks is not affected by the SPEAKER switches. The circuits feeding the HEADPHONE jacks are designed to feed low impedance dynamic headphones.

#### **U. MANUAL (knob)**

The MANUAL touch button activates the manual tuning knob. The red indicator above the knob will turn on. Rotate the tuning knob until the frequency of the desired station shows in the message center area.

An FM station is correctly tuned when only the center arrow (▲) of the TUNING display lights. On each side of the center arrow are horizontal display (► ◄) arrows. One of these will light as a station is approached to indicate tuning above or below the center frequency of the FM station. FM stations broadcasting in stereo light the MPX bar indicator at the top of the SIGNAL strength column. On AM, the TUNING display is not lighted.

A momentary press on any of the numbered touch buttons, or SCAN in either direction activates that tuning method and deactivates the manual tuning knob. Although the MAC4300V can be tuned very slightly off the station's frequency without distorting the program, this near tuning can cause a station to be lost when the power is turned off and then on. In order to prevent this, always rotate the manual tuning knob until just the center arrow is illuminated.

#### **V. SCAN**

Use SCAN to automatically tune to the next station either up or down the selected broadcast band. The arrow beside the touch button indicates the direction of scan. In the SCAN mode, between-station noise and distant, weak stations are automatically muted.

#### **W. ENTER**

The ENTER touch button and any one of the seven momentary touch buttons is used to insert into the electronic memory the tuned FM or AM station. Six FM and six AM stations can be preset.

To enter a station in the memory tune to the desired station with either the manual tuning knob or SCAN tuning. Then, while pressing the ENTER touch button, press touch button 1. Release both touch buttons, and the station tuned will be recorded in the electronic memory for instantaneous recall when touch button 1 is pressed. Repeat the procedure for each of the six buttons on FM and on AM.

#### **X. MANUAL (touch button)**

The MANUAL touch button causes the manual tuning knob to be activated as indicated by the lighted red LED above the tuning knob.

#### **Y. PRESET STATION SELECTING TOUCH BUTTONS**

A momentary press on one of the touch buttons marked 1 thru 6 will recall from the electronic memory the preset FM or AM station assigned to that touch button.

#### **BALANCE YOUR STEREO SYSTEM**

The performance and enjoyment of a stereo system is greatly increased when the sound is properly balanced. The balance of the stereo system is affected by many things including the phase relationship of the loudspeakers, room acoustics, furniture placement, room shape, small differences in loudspeakers, ect.

#### **TO ADJUST LOUDSPEAKER PHASE**

While listening to a FM station, press the MONO touch button. Turn the BALANCE control to 12 o'clock. Stand about ten feet in front of and midway between the loudspeakers. The sound should appear to come directly from in front of you. If the sound is not directly in front of you, reverse the leads on one of the loudspeakers only. When the sound comes from the midpoint between the speakers they are in phase.

#### **TO BALANCE LOUDNESS**

While listening to an FM station, press the MONO push button. Turn the BALANCE control to the 12 o'clock position. While the program is playing, stand between the two loudspeakers. For any difference in loudness between speakers, turn the BALANCE control toward the speaker that is not as loud. Adjust until the sound is equal in loudness from each speaker.

### USING THE HR4300 REMOTE CONTROL

Most all of the touch button controls on the MAC4300V front panel are duplicated on the keyboard of the HR4300 hand held remote control unit. Exceptions are PHONO, SCAN down, TAPE copy LOCKOUT, and MONO. In addition, the HR4300 keyboard can control the operation of a McIntosh Compact Disc Player in the PLAY, NEXT, BACK, and STOP functions.

The remote controller runs on two AA, 1.5 Volt batteries. Slide open the cover on the back of the remote control and insert the batteries in the battery compartment, as shown in the diagram, then slide the cover closed again.

Battery life is normally about one year. Remove the batteries as soon as they are dead to prevent damage by possible battery leakage. The batteries should be removed, as well, should the remote control not be used for a length of time.

An INFRARED control signal transmits from the hand held unit to a sensor located in the MESSAGE CENTER of the receiver. Operating range is about 30 feet, however, there must be an unobstructed line of sight path. Direct sunlight shining on the MAC4300V panel should be avoided as it will reduce the control range or possibly prevent remote control operation.

When AM or FM is selected, stations may be selected by the 1 thru 6 buttons, or by the SCAN button. The SCAN initiates scan tuning upward in frequency. When the top of the frequency range is reached the tuning jumps to the low end of the band and scans upward again.

The VCR/T1 and VCR/T2 buttons allow you to listen to, or monitor a video or tape recording. Pushing the button once allows you to hear the video or tape program. Pushing a second time returns you to the original program source.

The SPKR button in combination with the 1, 2, and 3 buttons allows you to turn on and off speakers 1 to 3. To turn on or off speakers, push the SPKR button and then push button 1, 2, or 3 within 1.5 seconds. After the 1.5 seconds time the buttons return to their normal function. (Buttons 4, 5, and SCAN will be inactive during the 1.5 seconds.)



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## 16 REMOTE CONTROL

## PERFORMANCE LIMITS

Performance limits are maximum deviation from perfection permitted for a McIntosh instrument. We promise you that when you purchase a new MAC4300V 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. McIntosh is the only manufacturer that makes this statement.

### AMPLIFIER SECTION

#### STEREO POWER OUTPUT

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

#### POWER BANDWIDTH

20 to 20,000 Hz

#### TOTAL HARMONIC DISTORTION

0.02% maximum at any power level from 250 milliwatts to rated power per channel, 20 to 20,000 Hz, both channels operating.

#### INTERMODULATION DISTORTION

0.02% maximum if instantaneous peak power output does not exceed twice the rating or less per channel with both channels operating for any combination of frequencies, 20 Hz to 20,000 Hz.

#### FREQUENCY RESPONSE

+0, -0.5 dB from 20 to 20,000 Hz at rated power

#### INPUT SENSITIVITY

Phono—2.5 mV produces rated output  
Tape, Aux—250 mV produces rated output  
Power Amp—1.5 V produces rated output

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

Power Amp—100 dB below rated output  
Tape, Aux—90 dB below rated output  
Phono—80 dB with 10 mV input

#### MAXIMUM INPUT SIGNAL

Phono—90 mV  
High level—9 V

#### INPUT IMPEDANCE

Phono—47k ohms, 47pF  
Tape, Aux—30k ohms  
Power Amp—22k ohm

#### DAMPING FACTOR

Greater than 40

### TAPE OUTPUT

Phono—250 mV with rated input  
Tape—250 mV with rated input  
Tuner—0.8 V at 100% modulation (FM)

### PROGRAM EQUALIZER

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

### FM SECTION

#### USABLE SENSITIVITY

13 dBf which is 1.22 $\mu$ V across 75 ohms

#### 50 dB QUIETING SENSITIVITY

Mono—17 dBf which is 2.0 $\mu$ V across 75 ohms  
Stereo—37 dBf which is 20 $\mu$ V across 75 ohms

#### SIGNAL TO NOISE RATIO

Mono—75 dB  
Stereo—70 dB

#### FREQUENCY RESPONSE

Mono—+0, -1.0 dB from 20 to 15 kHz  
Stereo—+0, -1.0 dB from 20 to 15 kHz

#### HARMONIC DISTORTION

Mono—0.08% at 100 Hz  
0.08% at 1k  
0.12% at 10k  
Stereo—0.08% at 100 Hz  
0.08% at 1k  
0.12% at 10k

#### INTERMODULATION DISTORTION

Mono—0.08%  
Stereo—0.12%

#### CAPTURE RATIO

1.5 dB

#### ALTERNATE CHANNEL SELECTIVITY

55 dB

#### SPURIOUS RESPONSE

100 dB

#### IMAGE RESPONSE

80 dB

#### STEREO SEPARATION

45 dB at 100 Hz  
50 dB at 1k  
35 dB at 10k

#### SCA REJECTION

65 dB

## AM SECTION

### SENSITIVITY

35  $\mu$ V (External Antenna)

### SIGNAL TO NOISE RATIO

50 dB at 30% modulation

60 dB at 100% modulation

### HARMONIC DISTORTION

0.5% maximum at 30% modulation (0.2% typical)

### FREQUENCY RESPONSE

+0, -6 dB 20 Hz to 4 kHz

### ADJACENT CHANNEL SELECTIVITY

40 dB minimum IHF

### IMAGE REJECTION

65 dB minimum

### IF REJECTION

65 dB minimum

## GENERAL INFORMATION

### SEMICONDUCTOR COMPLEMENT

118 Silicon Diodes

7 Varactor Diodes

41 Light Emitting Diodes

4 Seven Segment LED Displays

96 Bipolar Transistors

40 Field Effect Transistors

45 Integrated Circuits

### AC POWER OUTLETS

4 Black, switched, 1 Red, unswitched,  
1000 watts, total

### POWER REQUIREMENTS

120 volts, 50/60 Hz, 60 to 480 watts

## MECHANICAL INFORMATION

### SIZE

Width: 18-9/19 inches (47.1 cm); with walnut wood sides removed: 17-9/16 inches (44.6 cm).

Height: 6-1/16 inches (15.4 cm); with the feet removed 5-1/4 inches (13.3 cm).

Depth: 14 inches (35.6 cm) from the mounting surface to the rear panel, including connectors. Knob and handle clearance required is 1-1/16 inches (2.7 cm) in front of the mounting surface.

### FINISH

Front panel is brushed black anodize with gold anodize trim. Side panels are machined solid walnut with satin lacquer finish.

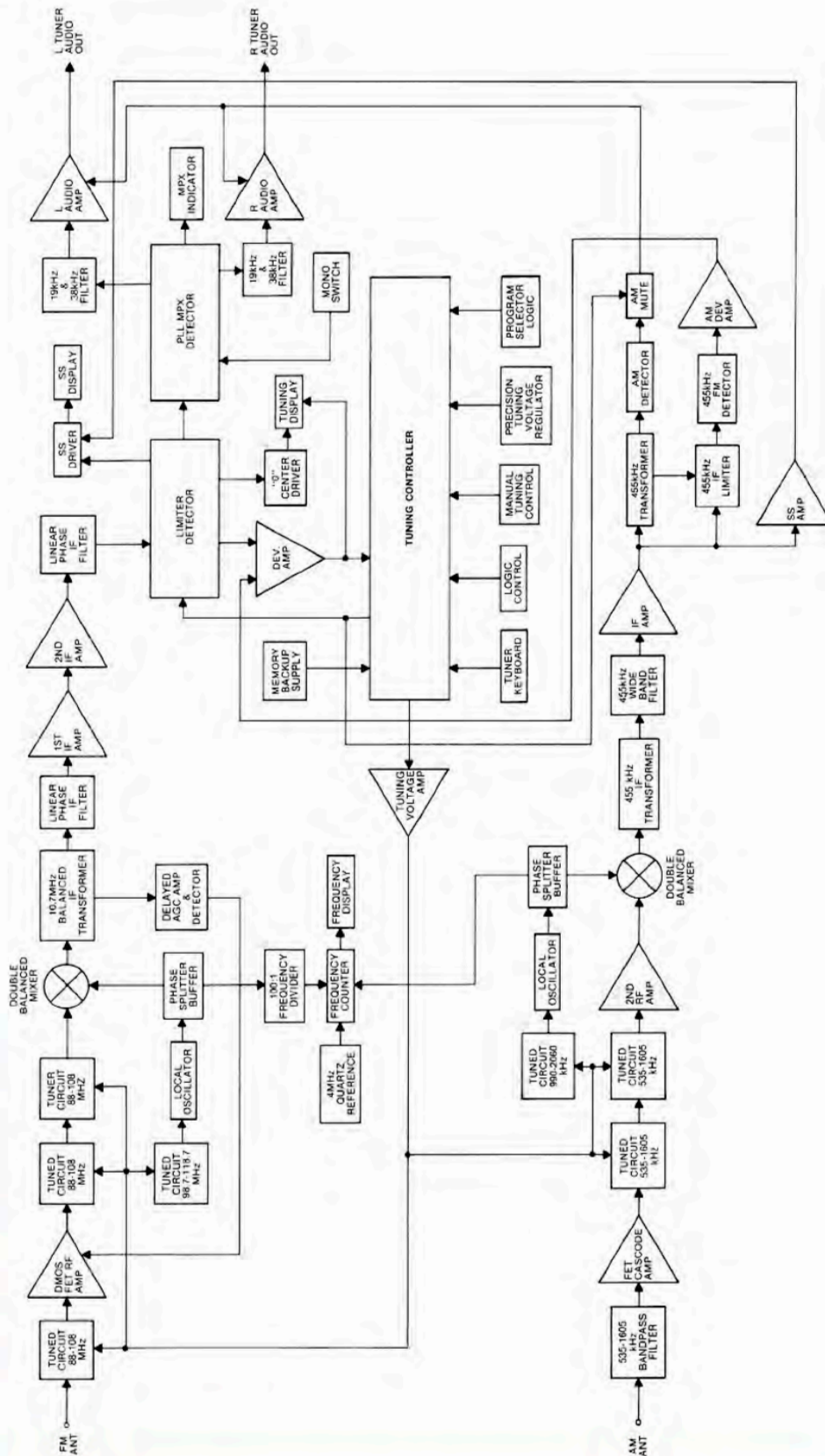
### WEIGHT

34.5 pounds (15.6 kg) net, 48.5 pounds (22 kg) in shipping carton.

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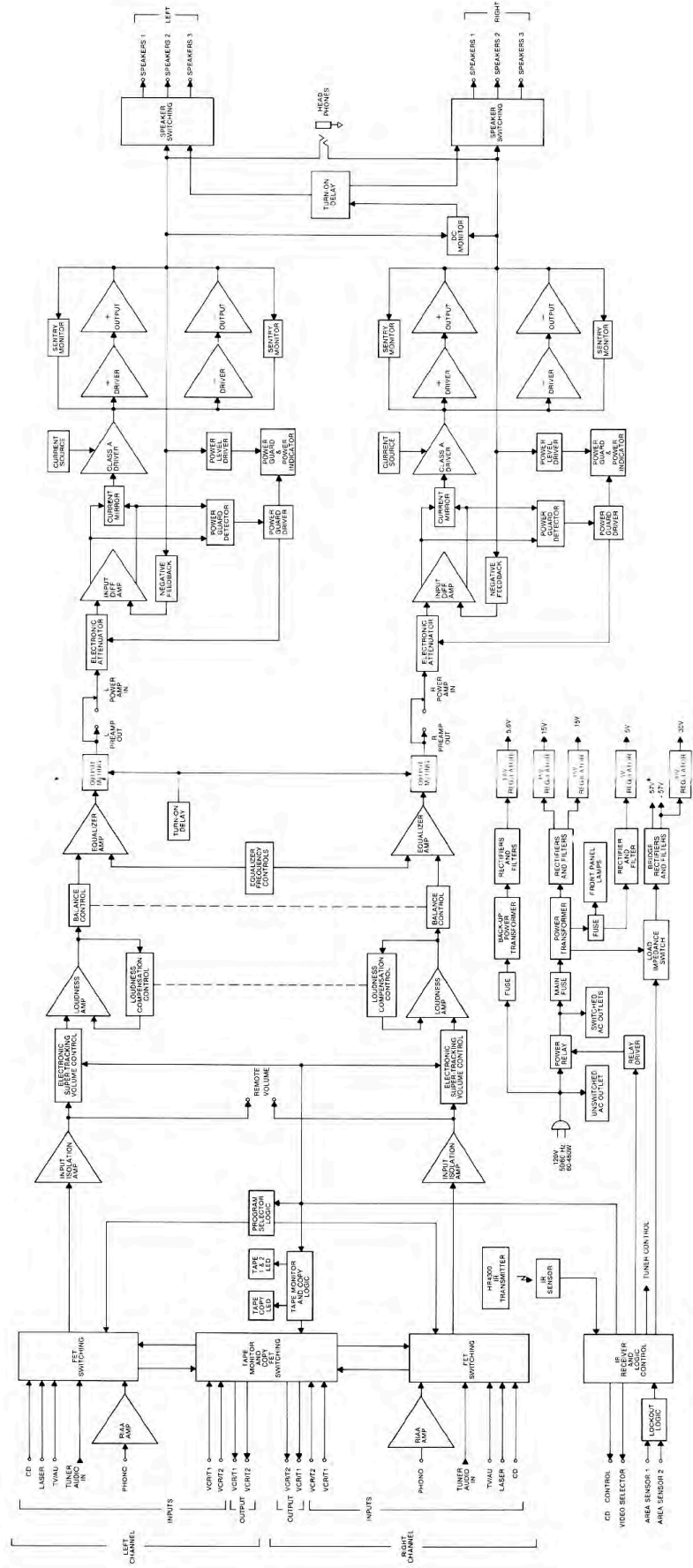
# 18 PERFORMANCE LIMITS

MAC-4300V FM/AM RECEIVER



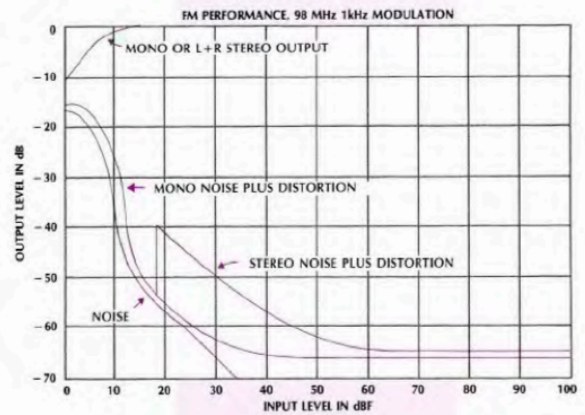
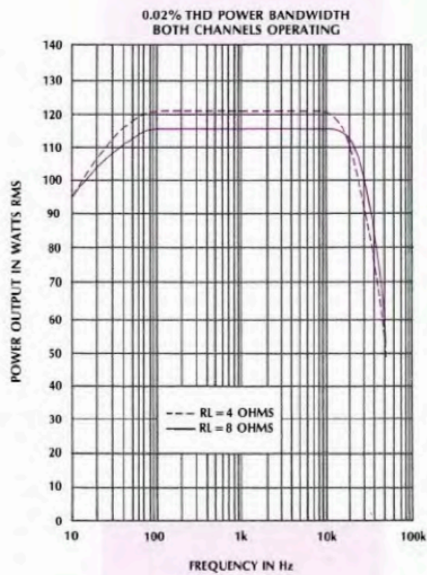
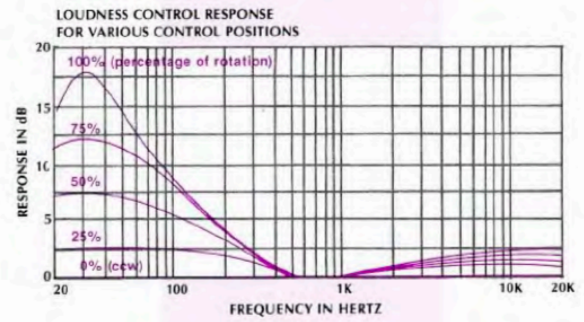
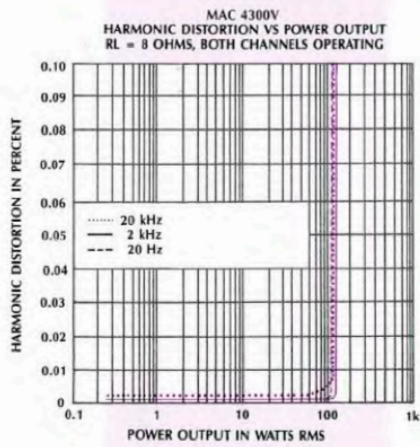
BLOCK DIAGRAM 19

MAC4300V FM/AM RECEIVER



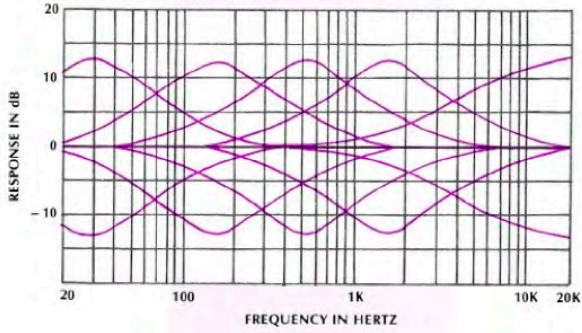
20 BLOCK DIAGRAM

BLOCK DIAGRAM 21

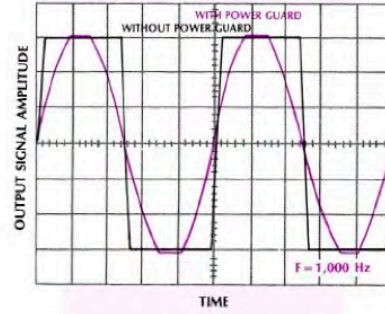


## 22 PERFORMANCE CHARTS

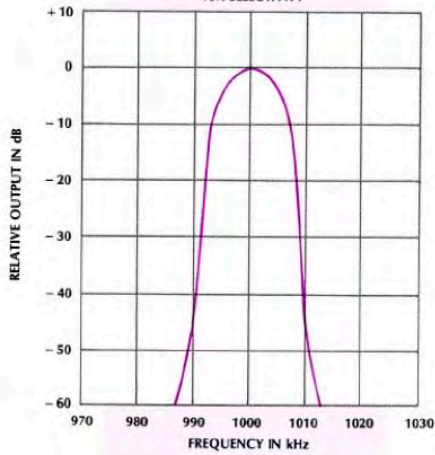
EQUALIZER FREQUENCY RESPONSE CONTROLS  
SET AT MAXIMUM AND MINIMUM



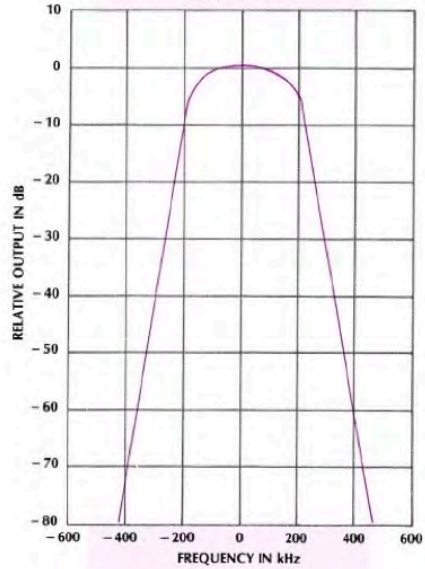
OUTPUT SIGNAL WAVEFORM SHOWING ACTION  
OF POWER GUARD TO ELIMINATE OUTPUT SIGNAL  
CLIPPING. POWER AMPLIFIER INPUT IS OVERDRIVEN BY  
20 dB FOR BOTH OSCILLOGRAM TRACES.



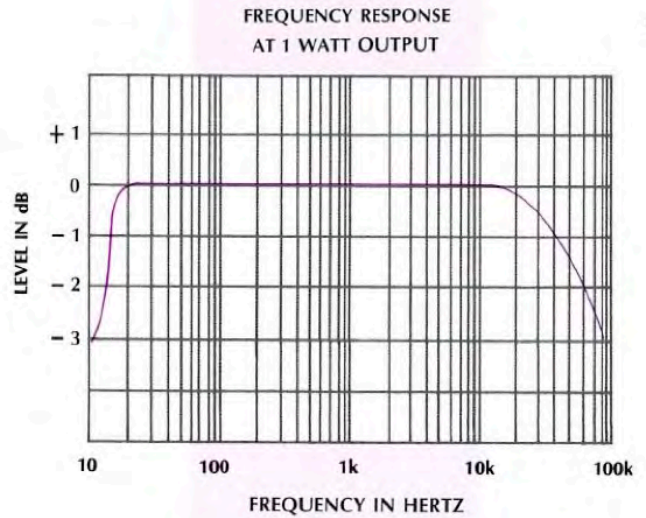
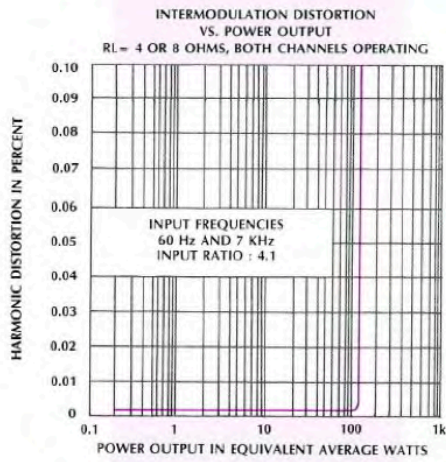
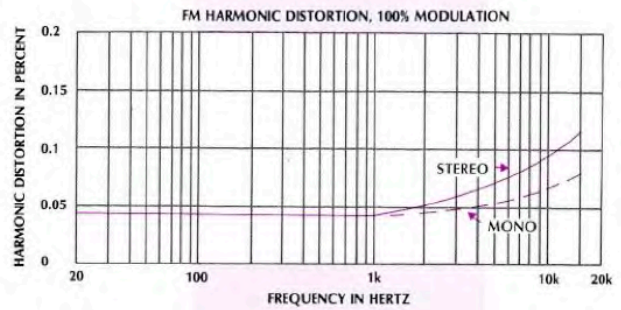
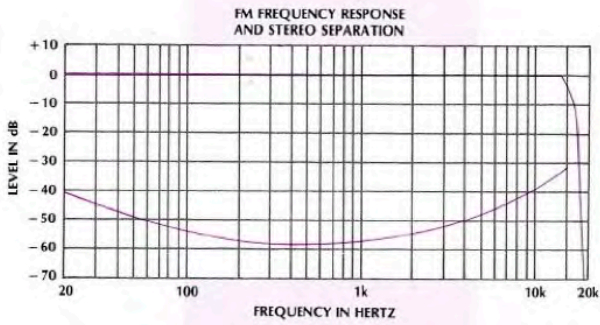
AM SELECTIVITY



FM SELECTIVITY







# 24 PERFORMANCE CHARTS

### TUNING SYSTEM

Today's FM electronic tuning systems can generally be classified as either a Phase Locked Loop (PLL) Synthesizer System or Voltage Synthesizer, Signal Locked Loop System (SLL).

The MAC4300V uses the voltage Synthesizer, a Signal Locked Loop (SLL) System which locks the MAC4300V to the incoming signal of the FM station. When the tuner is tuned to the incoming station frequency, correction voltage is generated by the "zero" crossing detector. The voltage from this device is zero when locked to the station. Above or below the station the voltage is positive or negative respectively. The tuner, mixer, local osc., IF, etc. are inside the tuning loop so that accurate tuning is assured. As long as the station transmits within the tuning range of the MAC4300V regardless of frequency, the SLL system will lock on to the station and remain center channel tuned.

The performance of the Signal Locked Loop System made it the obvious choice for the demanding performance required of the MAC4300V.

Three modes of tuning are provided: MANUAL, SCAN, and PRESET. In the MANUAL mode, a regulated and temperature compensated reference voltage is fed to the tuning potentiometer. A portion of this voltage is selected by the position of the potentiometer and is fed to the controller integrated circuit (IC). It is then amplified, filtered and applied to the tuning varactors to adjust the tuner to the incoming station frequency. Since the output of the FM detector at zero crossing is fed to the S curve input of the IC controller accurate tuning is assured. If a voltage deviation is caused by a shift in tuning or station drift, the controller generates a correction voltage and combines it with the voltage being fed to the tuning electronics to maintain accurate tuning. When a SCAN pushbutton is pressed, a tuning voltage ramp is generated, rising for SCAN up, decaying for SCAN down. The ramp continues until the zero crossing of the detector S curve is sensed at the input of the controller indicating the presence of a station. It then stops and the voltage is maintained with any necessary correction voltage added the same way as in MANUAL tuning mode. During the SCAN mode, an output from the controller is used to lower the tuner sensitivity, thus, weak noisy stations are not received.

The tuning voltage present at the output of the controller may be put into any of the six memory

push button locations. Pressing the ENTER button causes an Analog to Digital conversion of the tuning voltage to take place. Then, while still holding the ENTER button, pressing one of the six numbered buttons stores the information, in digital form, within the control IC memory. A momentary press of a preset station push button will instantaneously recall the tuning voltage retained in the electronic memory. To insure proper tuning, a search and find operation takes place. The tuning voltage is moved up and down from its nominal value in increasing steps until the correct station zero crossing signal is received from the detector. The station frequency is then captured and once again the tuning voltage is maintained with any necessary correction added. Each time a preset pushbutton is pressed, a mute pulse suppresses any noise that may occur during the tuning process.

A small power supply maintains the memory for as long as the receiver is plugged in. If there should be a power interruption or the location of the receiver is to be changed, necessitating pulling the power plug, a storage cell maintains the memory for more than four hours.

### FM TUNER

A type F connector is provided on the rear panel for connection to a 75 ohm antenna or cable system.

Following the antenna matching circuit is an RF tuner of exceptional performance. It uses a DMOSFET RF amplifier, a double balanced mixer, and circuits that are tuned by matched varactor diodes, all of which produce high spurious rejection and great sensitivity. This circuit combined with a high tuning voltage eliminates RF intermodulation distortion caused by diode non linearities.

The FM IF section uses 1 transistor, 2 linear phase piezoelectric filters, and 2 integrated circuits. They combine to provide over 120dB of gain and a selectivity greater than 55 dB. Limiting, muting, signal strength drive, and FM detection are all functions of the last integrated circuit.

A phase locked loop(PLL) stereo decoder IC is the heart of the multiplex section. It has a high signal to noise ratio, low distortion, high channel separation, and high SCA rejection. The PLL eliminates the need for inductors thereby minimizing drift. Integral lamp driving capability to indicate the presence of the 19 kHz stereo pilot, and transient free mono/stereo switching are also provided.

Following the PLL MPX decoder a dual LC tuned notch filter is used to prevent bias interference to tape recorders. It is terminated to provide the necessary filter input and output impedances for the best 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 AM input section is band-pass filter. It passes all the AM broadcast stations and rejects others. A J FET-Transistor cascode amplifier follows. This amplifier, with its J FET input 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 and a double balanced mixer are next. This type of mixer has excellent image and IF rejections.

The mixer's 455kHz output feeds a matching transformer for the following wide band linear phase piezoelectric 4 element lattice filter, then the IF amplifier, another transformer, and finally the AM detector, filter and muting circuits. The AM also has a quadrature detector to derive the zero crossing signal for the tuning controller.

#### **ANTENNA INPUTS**

FM - The MAC4300V 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 readily available.

AM - The AM antenna input on the MAC4300V 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.) a piece of wire 6 feet long will give good performance. In a rural area an outdoor long-wire might be desirable. However, the best overall

performance can be obtained by using a shielded loop antenna.

To construct a shielded loop antenna, use single conductor shielded wire, microphone cable, coaxial cable, etc., and arrange it in a loop. The loop may be attached around the frame of a window under the curtain or on the back of the equipment cabinet or a table. Signal strength is proportional to the area 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's transmitting antenna lies in the same plane as the loop. Minimum signal pickup is perpendicular to the plane of 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 loop null.

#### **AUDIO INPUT SWITCHING**

The MAC4300V has electronic input switches. This low noise system employs cascaded FETs at the input jacks to select program sources. This keeps input leads short to provide better source isolation, less hum and noise pickup and freedom from stray RF interference.

#### **PHONO AMPLIFIER**

The phono amplifier uses a high technology integrated circuit's operational amplifier. Its differential input stage has been optimized for low noise and low distortion performance. The integrated circuit's open loop gain 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, provides in addition, RIAA frequency compensation. Components in the network are 1% metal film resistors and 5% polypropylene film capacitors.

The phono amplifier has a very wide dynamic range. At 1000Hz the phono input circuit will accept 90 millivolts. This is a voltage far greater than the output of any currently used magnetic phono cartridge, assuring protection from overload. 10 millivolts at the phono input at 1000Hz will produce

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## **26 TECHNICAL DESCRIPTION**

1 volt at the tape output. The tape output source impedance is 500 ohms, designed to operate into a load impedance of 10,000 ohms or greater.

#### **VOLUME CONTROL**

The volume control is an electronically switched ladder attenuator with tracking accuracy better than .5dB over a 68 dB range. It has no moving parts therefore it will never become noisy or wear out even after many years of use.

#### **LOUDNESS COMPENSATION**

The loudness compensation is controlled by a potentiometer that is independent of the volume control. Any degree of compensation may be used at any volume setting. You may set the control precisely for the degree of loudness compensation that your particular system and music needs.

#### **EQUALIZER AMPLIFIER**

The equalizer amplifier uses integrated circuit operational amplifiers with the output stage optimized for the best transient performance and minimum distortion. Four other operational amplifiers are arranged in a circuit configuration equivalent to a series tuned circuit, one at each of four center frequencies. A passive network shapes the 10K contour. Each control potentiometer inserts the contour circuit in either the input or feedback section of the operational amplifier. This provides a boost and cut of 12dB for each band of frequencies. When the potentiometer is in the center or detent position it is out of the circuit completely.

#### **POWER AMPLIFIER SECTION**

The MAC4300V power amplifier requires 1.5 volts RMS to drive it to rated output and its input impedance is 22,000 ohms. The input stage, a differential amplifier, permits the best use of negative feedback for low noise and low distortion performance. Its outputs are combined in a current mirror that provides the input to a linear voltage amplifier which drives two medium power driver transistors. The driver transistors feed the output stage.

The output stage is arranged as a fully complementary, direct coupled, push/pull amplifier. The power transistors used are selected for their high power dissipation capability, wide frequency response, and large safe operating area.

All power transistors have limits for the maximum amount of heat they can tolerate. The MAC4300V uses a highly efficient amplifying circuit which pro-

duces relatively little heat for the output power produced. Its oversized heat sinks, keep the output transistors well below their safe temperature limits under normal conditions. If ventilation is restricted by improper mounting or if amplifier efficiency is destroyed by operating it into a short circuit or a very low impedance, extra heat will be produced. Therefore, thermal sensors are provided that will disconnect the power if the output devices become too hot. All power transistors have limits for the maximum amount of electrical current they can handle, the MAC4300V output circuit and the power supply have been designed to allow very high current flow into a properly matched load impedance. Should a short circuit or very low value of load impedance be applied to the output of the MAC4300V destructive currents could be reached if they were not controlled by the SENTRY MONITOR (US Patent #3526846) circuit. The circuit senses the dynamic operating conditions of the amplifier output stages and controls the current flow, confining it to safe limits. The SENTRY MONITOR circuit does not limit the power output available from the amplifier nor does it have any effect on signals passing through the amplifier when operating conditions are normal.

A power amplifier which does not use output transformers to bypass DC (direct current), can overheat loudspeaker voice coils should there be a failure within the amplifier. The MAC4300V has a DC detecting circuit connected to the output of each channel. If DC is present, this circuit reacts in milliseconds to open the speaker circuits. The speakers remain disconnected until the cause of the DC has been corrected. Under the normal operating conditions the DC protective circuit has no effect on the operation of the output circuit.

#### **POWER GUARD**

POWER GUARD (U.S. Patent #4048573) is a unique feature of McIntosh amplifiers assuring that each channel of the MAC4300V delivers full power free of clipping distortion. Clipping is caused when an amplifier is asked to produce more power output with low distortion than its design characteristics permit. Amplifiers driven to clipping can deliver large quantities of power that will have more than 40% harmonic distortion. This causes the sound to be grossly distorted. Also, the extra energy content of the clipped signal can damage loudspeaker voice

coils, particularly high frequency speakers. The McIntosh POWER GUARD circuit protects your ears and your speakers from this kind of damage. The red POWER GUARD indicators at the top of the POWER column illuminate when the amplifier is driven beyond its maximum output capacity. The POWER GUARD circuit compares the wave shape of the amplifier input and output signals. Normally there is no disparity between these signals and the comparison produces no output. When the amplifier is driven beyond its maximum power capacity a difference will develop. If the disparity exceeds 0.5% (equivalent to 0.5% total harmonic distortion) the difference will then cause the POWER GUARD bar indicators to light. If there is a further increase in the disparity, the difference output controls a fast acting (microseconds) electronic attenuator that reduces amplifier gain. Therefore, the amplifier output is held to its maximum undistorted value regardless of the degree of overdrive. The amplifier must be overdriven by 20dB before the output distortion exceeds 2%.

The comparison is achieved by utilizing the amplifiers own differential amplifier. Its output is fed to a full wave detector, amplified, and then fed to a control circuit for the POWER GUARD indicators and to the electronic attenuator at the amplifier input. The attenuator is a light emitting diode/light dependent resistor network selected for its characteristics of low distortion and correct operating time constants.

#### **TURN ON DELAY**

The MAC4300V turn on/off characteristics is free of transients. It is time controlled by an IC which energizes the speaker circuits approximately one second after the AC power switch is turned on. The same circuit has a short turn off time constant which de-energizes the speaker circuits before the receiver's main power supply has a chance to discharge.

#### **POWER SUPPLY**

Two high current power supplies, a positive 54 volt and a negative 54 volt DC are used to drive the output power amplifier. Two filter capacitors, 12,000 microfarads each, are used to store the large amount of energy necessary for good filtering and precise voltage regulation. A stable well regulated power supply is required for low frequency response and

minimum low frequency distortion.

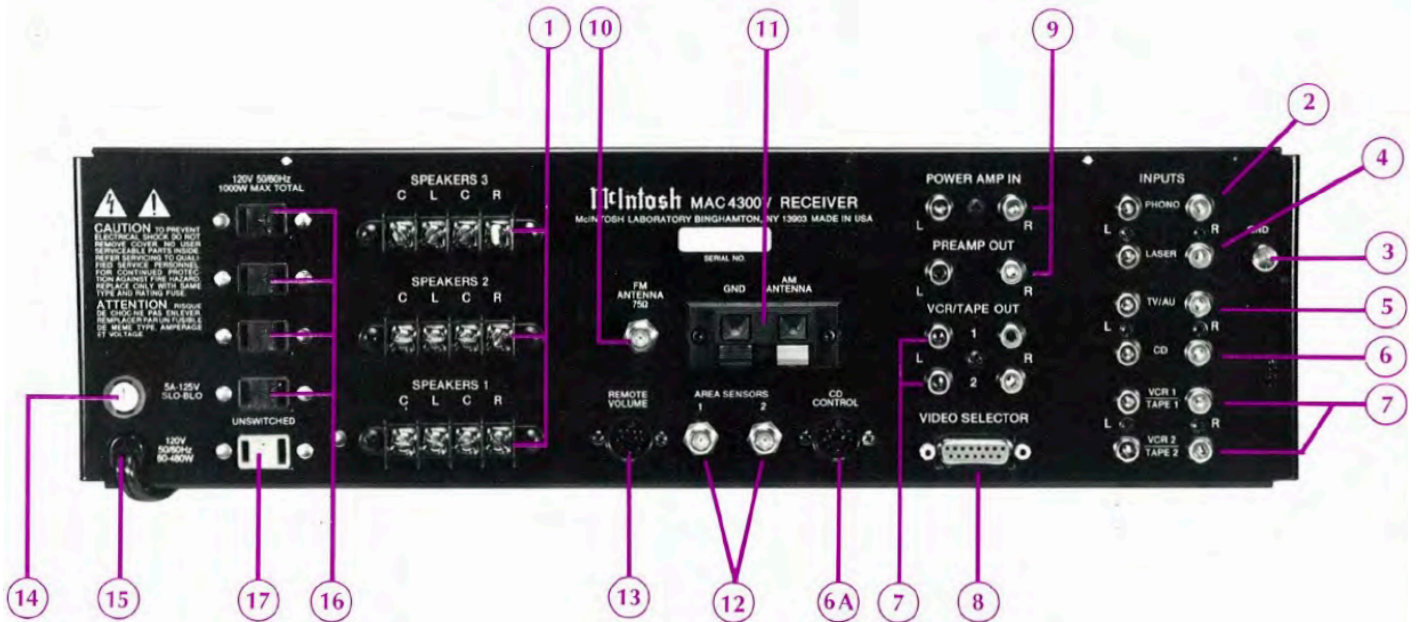
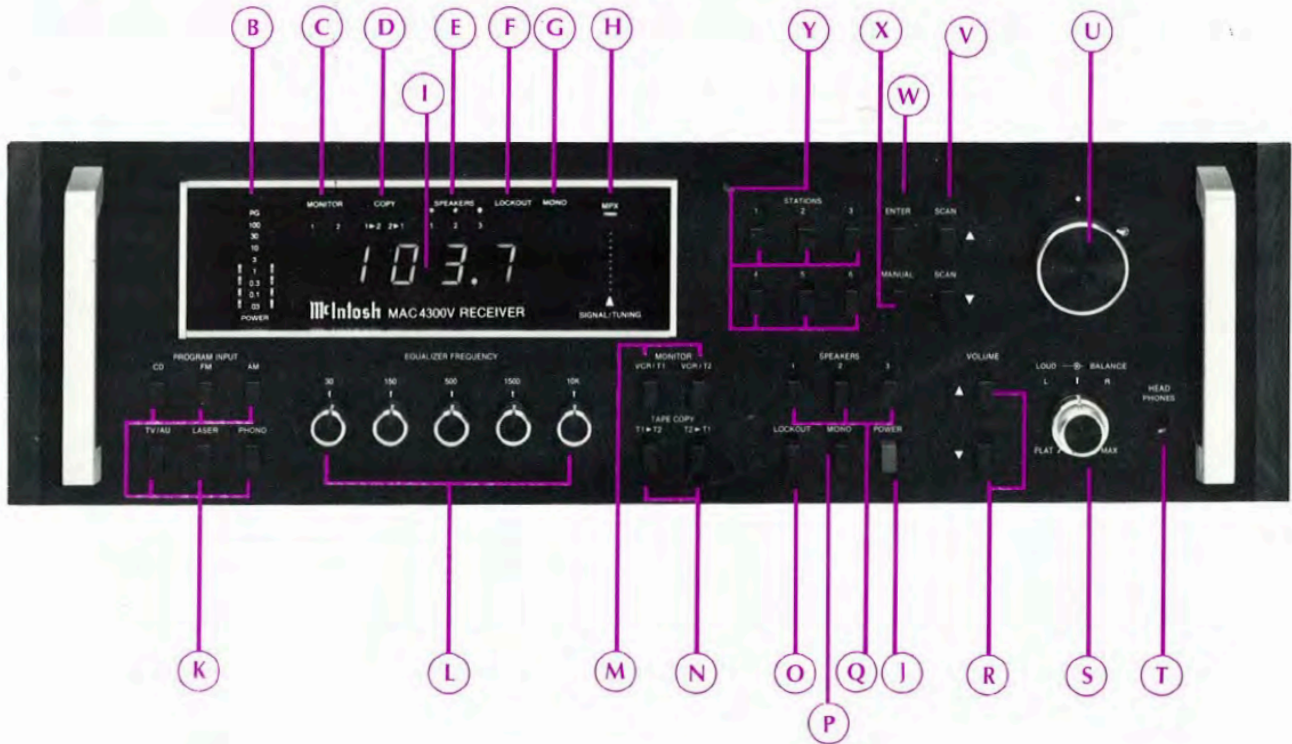
A unique feature of the MAC4300V power supply section is its ability to automatically adjust for a particular load impedance. As speaker pairs are added or removed, the DC drive voltage is changed for most efficient operation. Low voltage supplies are electronically regulated by IC's.

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# THE LOCATION OF CONTROLS AND PUSHBUTTONS

The numbers and letters correspond to the paragraphs on pages 6 thru 15.





**McIntosh<sup>®</sup>**

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