McIntosh
MAC 1900

OWNER'S MANUAL

THE MAC 1900 SOLID STATE AM FM/FM STEREO RECEIVER

Price $1.25

Your MAC 1900 AM-FM/FM stereo receiver will give you many years of pleasant and satisfactory performance. If you have any questions concerning the operation or maintenance of this receiver please contact:

CUSTOMER SERVICE

McIntosh Audio Division
2 Chambers Street
Binghamton, New York 13903
Our telephone number is 607-723-3512

Take Advantage of 2 years of FREE Factory Service . . . Fill in the Application NOW.

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GUARANTEE

McIntosh Laboratory Incorporated guarantees this instrument to be capable of performance as advertised. We also guarantee the mechanical and electrical workmanship and components to be free of defects for a period of 90 days from date of purchase. If such defects occur. McIntosh Laboratory or one of its authorized agencies will repair the defect at no cost to the purchaser. This guarantee does not extend to components damaged by improper use nor does it extend to transportation to and from the factory or service agency.

TWO YEAR FACTORY SERVICE CONTRACT

An application for a FREE TWO YEAR FACTORY SERVICE CONTRACT is included with this manual. The terms of the contract are:

For Two Years from date of purchase —

1. 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. The SERVICE CONTRACT is given to purchasers who live in the 50 United States or Canada only.
6. For your protection McIntosh selects its dealers carefully. Only one dealer in ten qualifies for a McIntosh franchise. To receive the SERVICE CONTRACT your purchase must be made from a McIntosh franchised dealer.
7. Your completely filled in application for a SERVICE CONTRACT must be postmarked within 30 days of the date of purchase of the instrument.
8. To receive the SERVICE CONTRACT all information on the application must be filled in. The SERVICE CONTRACT will be issued when the completely filled in application Is received at McIntosh Laboratory Incorporated in Binghamton, New York. If the application is not received at McIntosh Laboratory, only the service offered under the 90-day guarantee will apply.

Adequate ventilation extends the trouble-free life of electronic instruments. It is generally found that each 10° centigrade (18° F) rise in temperature reduces the life of electrical insulation by one half. Adequate ventilation is an inexpensive and effective means of preventing insulation breakdown that results from unnecessarily high operating temperatures. The direct benefit of adequate ventilation is longer, trouble-free life.

Allow at least 16 inches deep by 16 inches wide by 6½ inches high for mounting the MAC 1900. Always allow for air flow by either ventilation holes or space next to the bottom of the receiver and a means for a warm air to escape at the top. With adequate ventilation the MAC 1900 can be mounted in any position.

To prepare for installation, remove the plastic protective covering from the MAC 1900. Turn it upside down so that it rests on its top on the shipping pallet. Remove the four plastic feet fastened to the bottom of the chassis.

The design of the mounting template allows you to position or locate the cutout from the front or rear of the panel to which the instrument is to be mounted. Position the plastic mounting template over the area of the panel to be cut out for installation. The MAC 1900 must rest on a shelf behind the cabinet panel.

If the cutout is to be located from the front of the panel, begin at step 2. If the cutout is to be located from the rear of the panel, begin here.

1. On the back of the cabinet panel, scribe a vertical centerline through the exact center of the area in which the cutout is to be made.

   Place the template against the back of the panel and match the template centerline with the centerline on the cabinet panel.

   Make sure that the bottom of the template rests on the shelf on which the MAC 1900 will sit.

   Mark the two locating holes ("B" holes on the mounting template).

   Drill the two "B" locating holes. Be certain the drill is perpendicular to the panel.

   Now position the template on the front of the panel by aligning the "C" locating holes on the template with the drill holes.

2. If the cutout is to be located from the front of the panel:

   With the template in place against the cabinet panel, mark the four small holes "A" that identify the corners of the cutout. Join the corner marks with a pencil. The edge of the template can be used as a straight edge.

   With the saw on the INSIDE OF THE PENCIL LINES carefully cut out the rectangular opening. The bottom of the cabinet panel cutout should be even with the top of the shelf.

   Fold the PAPER SHELF TEMPLATE along the dotted line. The Paper Shelf Template is used to locate the ventilation cutout and mounting holes in the shelf. Put the dotted line against the front of the cabinet panel. Align the center line of the PAPER SHELF TEMPLATE with the center of the cabinet panel opening. Mark the ventilation cutout outline and cut it out. Secure the MAC 1900 to the shelf with two machine screws.

How to Connect

1. CONNECTING TAPE RECORDERS

To Record:

Connect a cable from the L TAPE OUT 1 jack to the left high level input of a tape recorder.

Connect a cable from the R TAPE OUT 1 jack to the right high level input of the tape recorder.

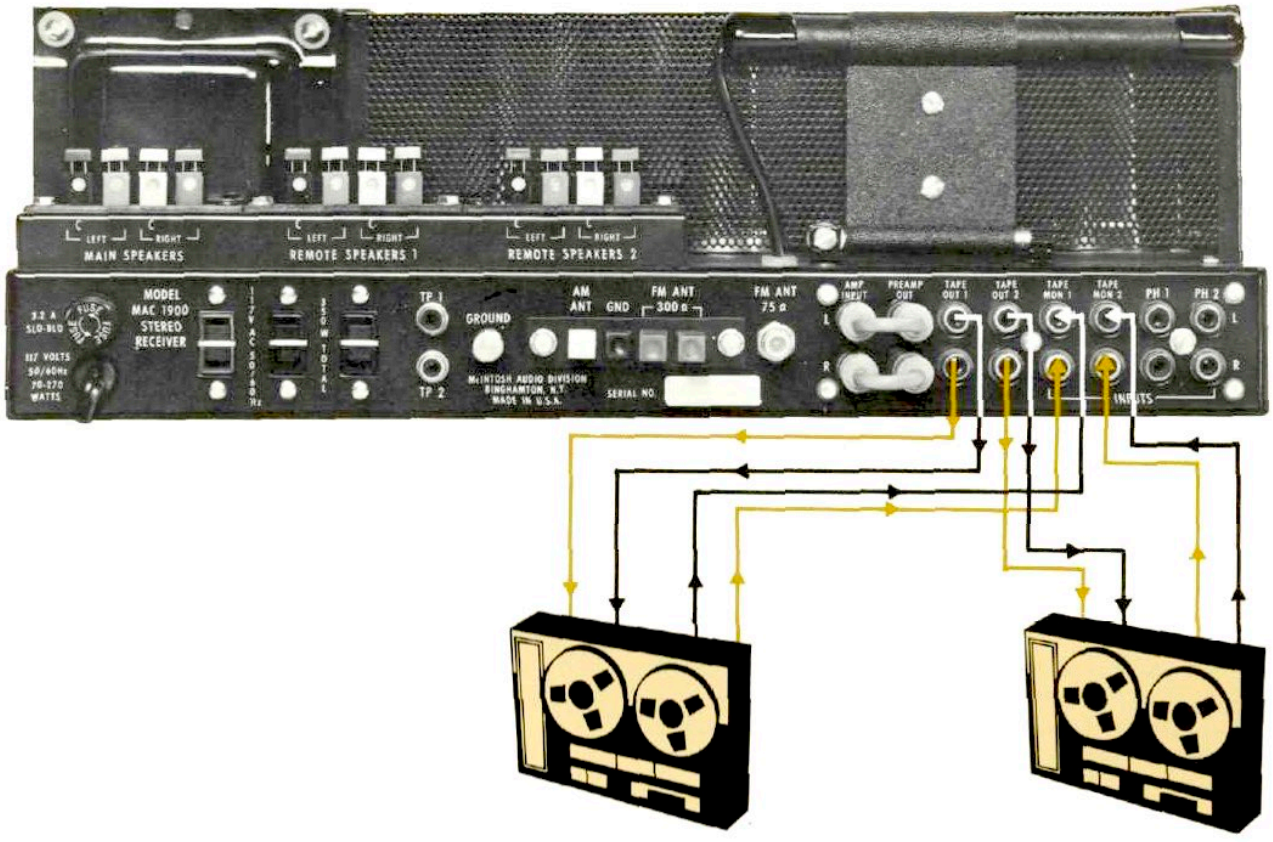
Connect a second tape recorder in the same way to the L and R TAPE 2 OUTputs.

To Playback/Monitor:

Connect a cable from the "left" channel output of a tape recorder to the L TAPE MONitor 1 input.

Connect a cable from the "right" channel output of a tape recorder to the R TAPE MONitor 1 input.

Connect a second tape recorder in the same way to the L and R TAPE MONitor 2 INput.



TAPE RECORDER #1

TAPE RECORDER #2

2. CONNECTING RECORD PLAYERS

The MAC 1900 has been shipped with shorting plugs in the phono inputs. Remove the shorting plugs only from the jack that will be used.

Connect a cable from the "left" channel of a record player into the "L" PHONO 1 input jack.

Connect a cable from the "right" channel of a record player into the "Ft" PHONO 1 jack.

PHONO 2 is provided for the use of a second record player.

Connect a second record player in the same way to the L and R PHONO 2 INput jacks.

3. GROUND CONNECTION:

A ground post is provided. Grounds for turntables, record changers, tape decks, etc. should be connected to this post. To prevent hum, make sure the ground wire does not make any connections to the shields of the left and right program cables between the program source and the MAC 1900. The left and right program cables and the ground wire from that source should be wound or twisted together.

CONNECTING AN FM ANTENNA

One of three antenna systems can be used: (1) an outdoor FM antenna, or (2) a VHF-TV antenna, or (3) the indoor dipole supplied.

An outdoor antenna is recommended for optimum performance in all areas. In fringe (outlying) areas, best results will be obtained with a highly directional FM antenna used in conjunction with a rotator. Rotate the antenna until the best reception is obtained. If the antenna uses a 300 ohm lead, connect it to the 300 Ω ANT (red) push connector.

A VHF-TV antenna is often effective when it is designed for both FM and TV reception. Connect the two leads from the VHF-TV antenna to the 300 Ω ANT (red) push connector.

CONNECTING AN INDOOR DIPOLE ANTENNA

The flexible folded dipole antenna (300 ohm) is for use in urban or high strength signal areas.

Connect the two leads from the dipole to the 300 Ω ANT (red) push connector. The flexibility of the thin flat 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. This should be done before it is permanently located.

Avoid locating the antenna next to other wires or metal objects. This antenna may not prove effective in houses having metal siding or metal foil insulation.

CONNECTING A 75 OHM ANTENNA

An unbalanced 75 ohm antenna can be connected to the MAC 1900. A "type F" connector is used to connect the 75 ohm coaxial cable to the back panel FM ANT 75Ω input.

AM ANTENNA

For most local and moderately distant AM reception the built-in ferrite loopstick antenna may be used. The AM loopstick antenna is on a swivel base. It must be rotated for best reception.

Better long distant reception is possible with the use of a copper antenna wire 50 to 150 feet in length. Suspend the wire in a straight line as high as possible. Attach the wire at each end with suitable glass or ceramic insulators. Connect a lead-in wire at any convenient point on the antenna. It is recommended that a lightning arrester be used with an outdoor AM antenna. The arrester should be well grounded to a suitable water pipe or copper or aluminum rod sunk into the ground.

Connect the lead-in wire to the AM ANT (white) push connector on the antenna terminal strip on the back panel.

CONNECTING A MAXIMUM PERFORMANCE INDICATOR

The McIntosh MAXIMUM PERFORMANCE INDICATOR is connected to the TP 1 and TP 2 jacks on the back panel of the MAC 1900. Use the procedures as directed in the MAXIMUM PERFORMANCE INDICATOR owners manual.

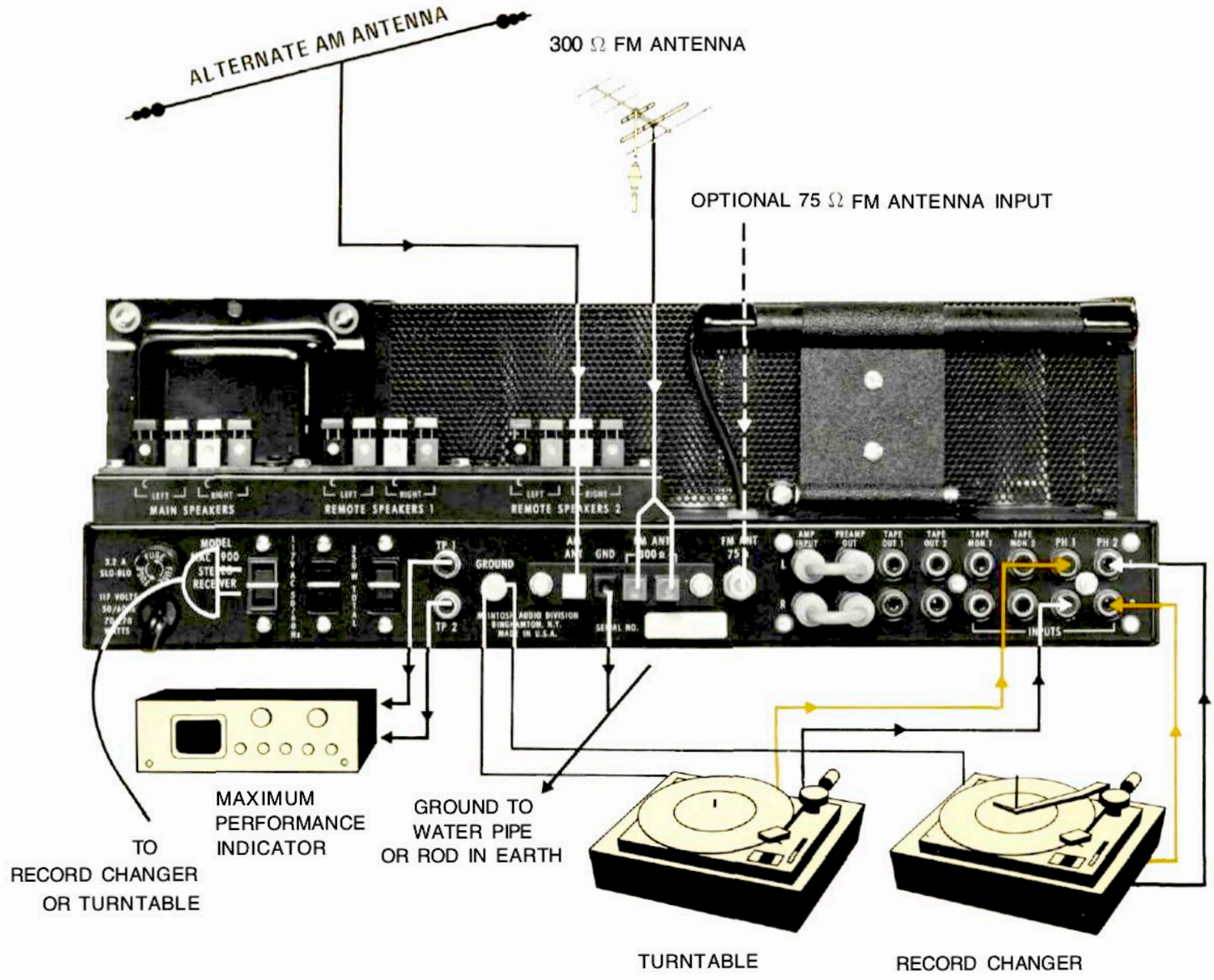
FUSE

A 3.2 AMP "SLO-BLO" fuse protects the receiver circuits. This fuse does not protect additional equipment connected to the back panel AC outlets.

AC POWER OUTLETS

There are 2 black and one red AC power outlet. The power to the black outlets is controlled by the front panel AC power switch on the VOLUME control. Use these outlets for a power amplifier, or tape recorder, etc. The red receptacle is on at all times. Use the red outlet for a turntable or record changer. The turntable is protected by this arrangement. It is necessary to turn off the turntable or record changer with its own AC power switch.

Connecting - Record Players
Maximum Performance Indicator
Antenna and Ground



CONNECTING LOUDSPEAKERS:

The MAC 1900 Power Amplifier is designed for stereo connection only. Do not connect the MAC 1900 for monophonic (one loudspeaker) operation. Damage to the loudspeaker or the power amplifier may result.

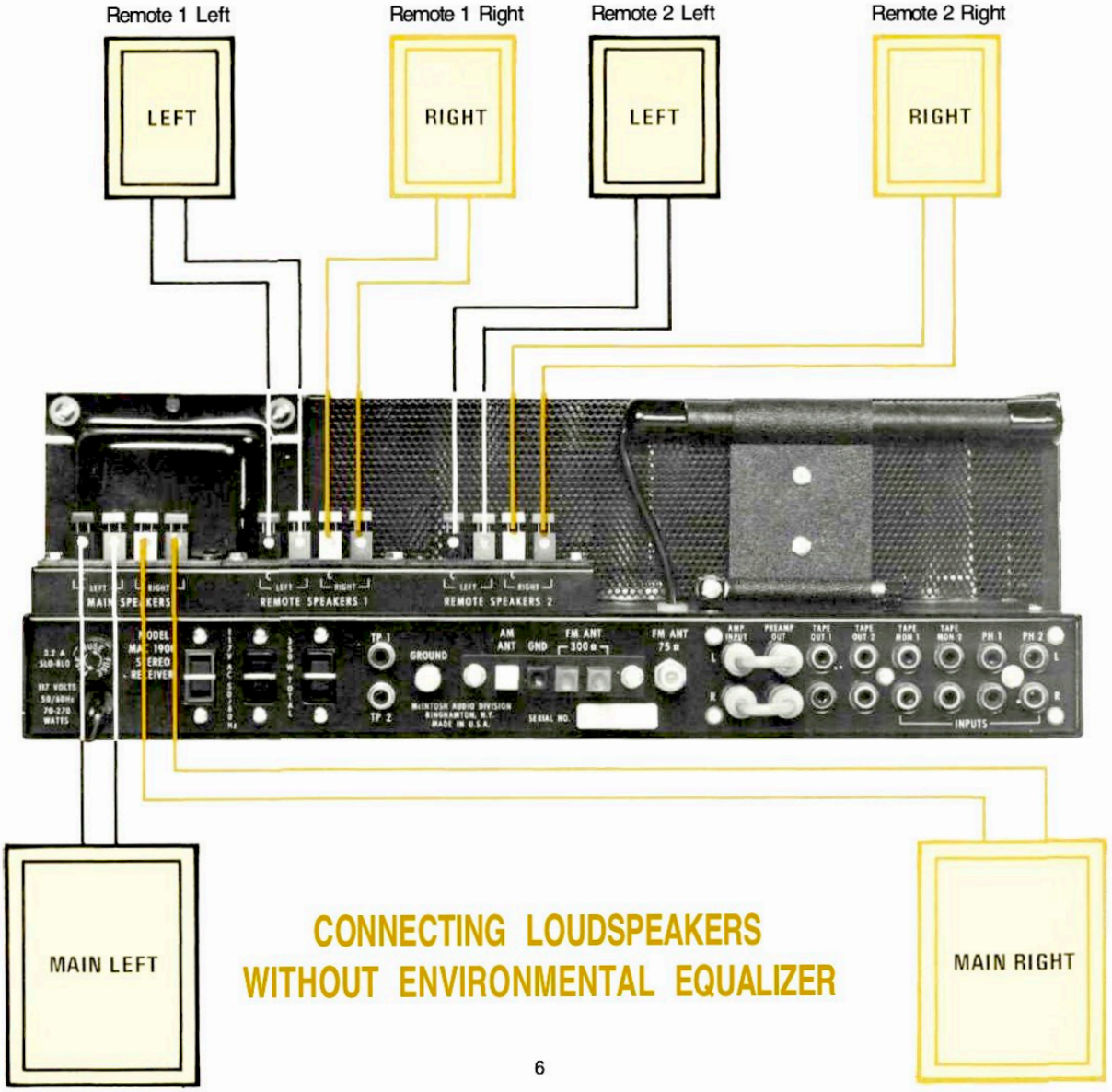
Both main and remote speakers are connected to the push connectors on the back panel of the MAC 1900.

When the output of the power amplifier and the speakers have been connected to the proper push connectors on the back panel, the front panel push-buttons turn the speakers ON or OFF.

Connect the lead from the left MAIN loudspeaker to the LEFT MAIN SPEAKER push connector. Connect the lead from the right MAIN loudspeaker to the RIGHT MAIN SPEAKER push connector. Use lamp cord, bell wire, or wire with similar type of insulation to connect the speakers to the amplifier. For the normally short distances of under 50 feet between the amplifier and speaker, #18 wire or larger can be used. For distances over 50 feet between the amplifier and speaker use larger wire.

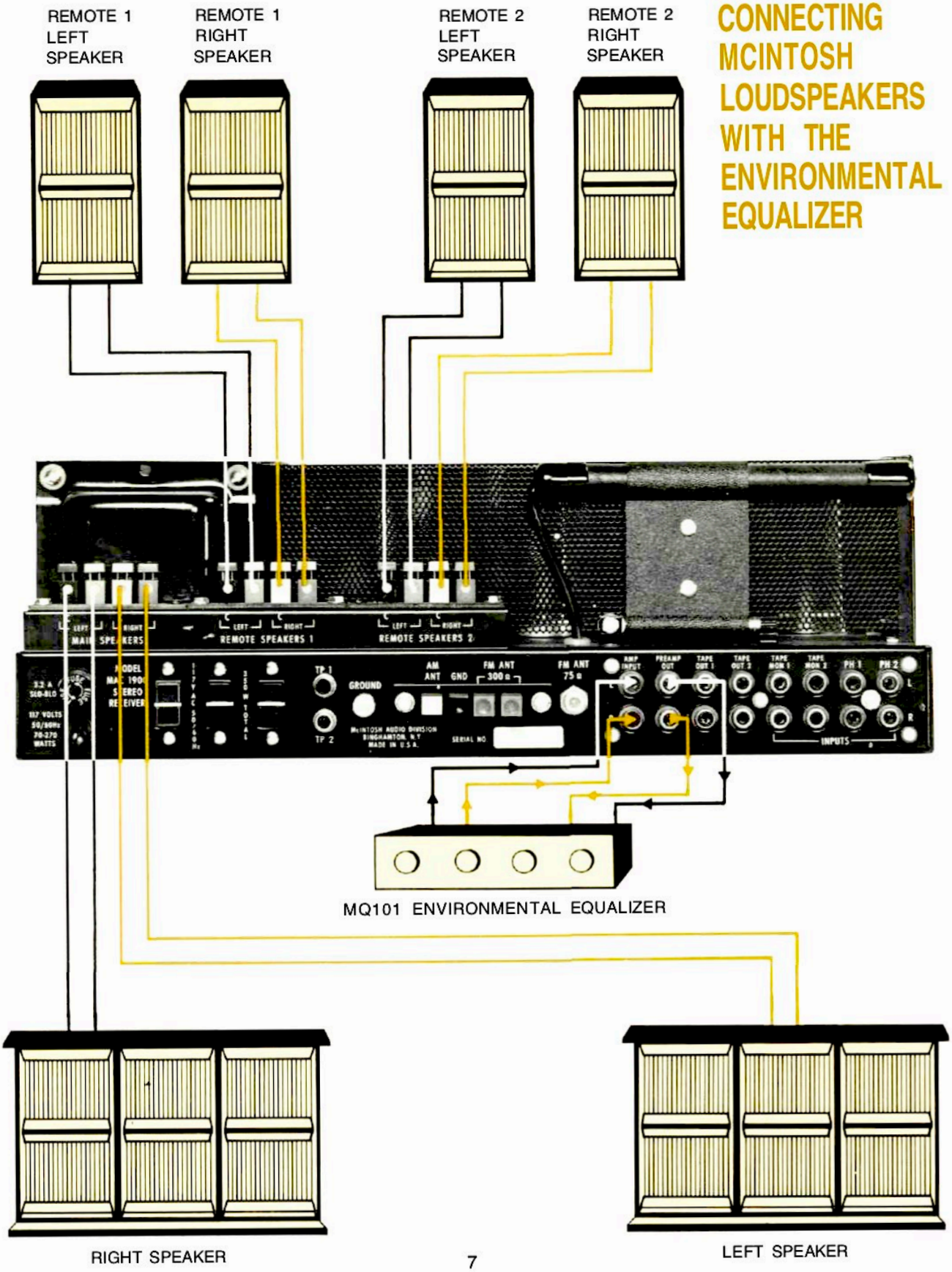
CONNECTING McINTOSH LOUDSPEAKERS WITH AN ENVIRONMENTAL EQUALIZER

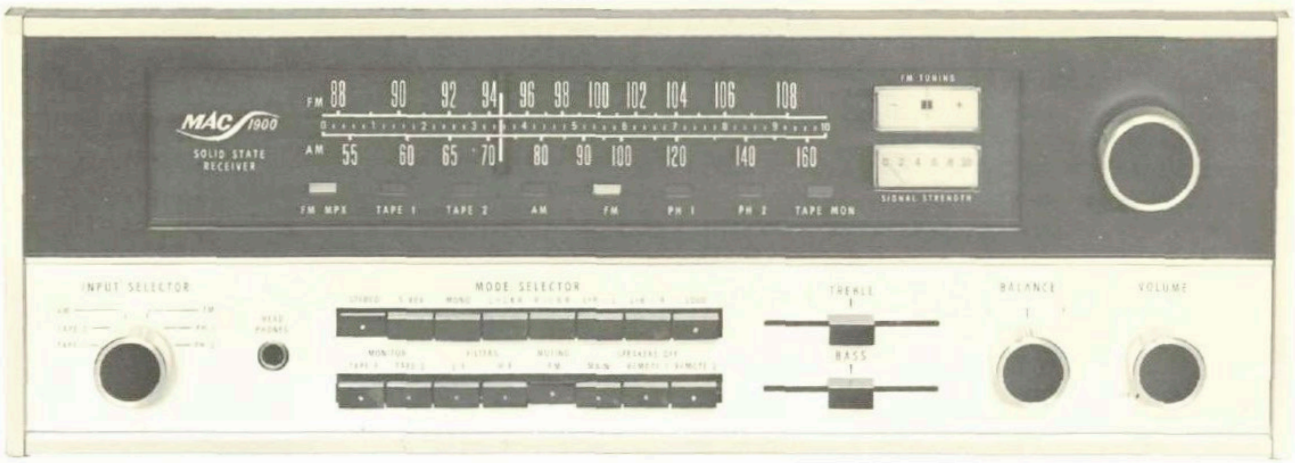
Remove the jumper cables between the PREAMP-OUT jacks and AMP INPUT jack. The environmental equalizer is connected using these jacks. Connect PREAMP-OUT to equalizer in - Connect equalizer out to AMP INPUT. Follow the standard loudspeaker connecting procedure.



CONNECTING LOUDSPEAKERS WITHOUT ENVIRONMENTAL EQUALIZER

CONNECTING MCINTOSH LOUDSPEAKERS WITH THE ENVIRONMENTAL EQUALIZER





What the Controls Do and How to Use Them

VOLUME ON/OFF:

The VOLUME control regulates the loudness in both channels. The VOLUME control has been precision tracked throughout the listening range {0 to —65 dB) for accurate stereo balance. When rotated to the counterclockwise position the AC power to the MAC 1900 is turned off.

BALANCE:

The BALANCE control adjusts for unequal loudness in either the left or right channels. The loudness of the channels can be varied relative to each other without affecting their combined loudness.

Left . . . turning the control to the left accents the left channel by reducing the right channel output.

Right . . . turning the control to the right accents the right channel by reducing the left channel output.

TONE CONTROLS:

The tone controls on the MAC 1900 are slide controls with a center detent to indicate the flat positions. Sliding the knob to the left decreases response and to the right increases response in both channels.

TREBLE:

Sliding the TREBLE control left decreases high frequency response up to 16 dB at 20,000 Hz.

Sliding the control right increases high frequency response up to 16 dB at 20,000 Hz.

BASS:

Sliding the BASS control left decreases low frequency response up to 16 dB at 20 Hz.

Sliding the control right increases low frequency response up to 16 dB at 20 Hz.

HEADPHONES:

The front panel HEADPHONE jack has been designed to feed low impedance dynamic headphones. Electrostatic headphones generally require higher power than dynamic headphones. They must be connected to the LEFT and RIGHT MAIN SPEAKER push connectors on the back of the MAC 1900.

Plug headphones into the front panel HEADPHONE jack. Adjust the front panel VOLUME control for comfortable headphone listening.

The headphone output is not affected by the SPEAKER switches.

INPUT SELECTOR:

TAPE 1: Connects the output from a tape recorder that has its own playback electronics to the high level amplifying stage of the MAC 1900. In the TAPE 1 position the MAC 1900 has flat amplification.

TAPE 2: Connects the output from a tape recorder that has its own playback electronics to the high level amplifying stage of the MAC 1900. In the TAPE 2 position the MAC 1900 has flat amplification.

AM: Connects the AM tuner portion of the MAC 1900 to the amplifiers and loudspeakers.

FM: Connects the FM tuner portion of the MAC 1900 to the amplifiers and loudspeakers.

PHONO 1: Connects the output of any magnetic phono cartridge to the low level amplifying stages. The response has been shaped to compensate for RIAA characteristics. The input impedance is 47,000 ohms.

PHONO 2: Same as PHONO 1.

Using the Tuning Dial

TUNING DIAL

The MAC 1900 has three dial scales:

1. AM - Marked 55 to 160 kHz
2. FM-Marked 88 to 108 MHz
3. Logging scale - Marked 0 to 100

The logging scale can be used to accurately retune any station. You may find it easier to keep a record of your favorite stations by use of the logging scale.

A small portion of dial pointer has been illuminated to increase the ease of tuning.

INDICATORS

There are three indicators on the MAC 1900 dial panel. They are: FM MPX indicator, SIGNAL STRENGTH meter, and the TUNING meter.

STEREO INDICATOR (FM MPX)

The FM MPX indicator lights red when the dial pointer is tuned to or crosses a FM station broadcasting the 19,000 Hz carrier for stereo. The special circuit used will light only when the 19,000 Hz multiplex carrier is present in the signal. The indicator will not light on noise pulses or interference.

FM TUNING METER

An FM station is correctly tuned when the meter needle is in the black area of the FM TUNING meter.

SIGNAL STRENGTH METER

When tuning FM the SIGNAL STRENGTH meter indicates the strength of the signal as received from the antenna. The higher the indication, the stronger is the signal. For AM tune for the maximum indication on the meter.

Using the Pushbuttons

MODE SELECTOR

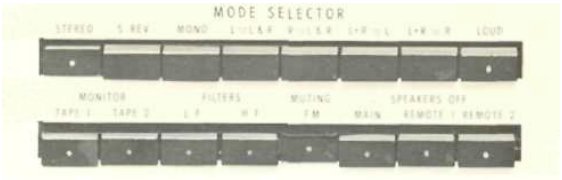
Connects the program to the loudspeakers in the following seven ways:

STEREO: Connects the "left" input to the "left" loudspeaker and the "right" input to the "right" loudspeaker.

S. REV: Connects the "left" input to the "right" loudspeaker and the "right" input to the "left" loudspeaker.

MONO (L + R): adds the "left" input and the "right" input and then connects the L + R program to both amplifiers and loudspeakers.

L to L & R: Connects the "left" input to both loudspeakers.



R to L & R: Connects the "right" input to both loudspeakers.

L + R to L: Connects the "left plus right" program to the "left" loudspeaker only.

L + R to R: Connects the "left plus right" program to the "right" loudspeaker only.

LOUD:

The LOUDNESS control automatically provides the correct amount of bass required to compensate for the change in response of the human ear at low loudness levels.

When the volume is reduced, the music will seem to lose much of its bass and some of its treble. This effect is due to the sensitivity characteristic of human hearing. The response of the human ear to bass and treble pitch decreases more rapidly than its response to pitch centered in the mid-tonal range. The LOUDness switch converts the volume control to a loudness compensated control. Use LOUDness-IN to listen at low volume and still hear full-frequency range.

MONITOR

The MONITOR pushbuttons make it possible to instantaneously compare recorded material with the source signal from either of two tape recorders used with the MAC 1900. The recorders used with the MAC 1900 should have separate record and playback heads and separate record and play amplifiers.

When either TAPE MONITOR pushbutton is in the MONITOR position a rectangle is lighted in the dial area. When the light is on only the tape can be heard. To listen to any other program source the light must be off.

With the button pushed in, the signal source becomes the program as recorded and is fed through the main preamplifier to the power amplifiers and loudspeakers.

MONITOR TAPE 1: Connects the output from a tape recorder that has its own playback electronics to the high level input stages of the MAC 1900.

MONITOR TAPE 2: Connects the output from a tape recorder that has its own playback electronics to the high level input stages of the MAC 1900

The TAPE MONITOR switches are mechanically interlocked to prevent simultaneous monitoring from two tape recorders. If one button is at the IN position, it must be pushed again to release it to the OUT position before the other button can be pushed.

IMPORTANT: When the MAC 1900 is operated with either MONITOR pushbutton in the IN position, signal from any other source will not be heard from the loudspeakers. To hear any other source, make sure the pushbutton is in the OUT position.

USING ONE TAPE RECORDER

The output of a tape recorder can be connected to either TAPE MONITOR 1 or TAPE MONITOR 2 input. The corresponding tape output of the MAC 1900 should then be connected to the input of the tape recorder. Any source can be recorded without being affected by the tone control or volume control settings. The playback of the tape recording can be monitored by pushing the corresponding tape monitor pushbutton.

TWO TAPE RECORDERS

Two tape recorders can be used with the MAC 1900. Recordings can be made from recorder 1 to recorder 2, or from recorder 2 to recorder 1.

Example: Connect the output of recorder 1 to TAPE MONITOR 1 input on the MAC 1900. Connect the TAPE 1 OUTput on the MAC 1900 to the input of recorder 1. In the same way, connect the output of recorder 2 to TAPE MONITOR 2 input on the MAC 1900. Connect TAPE 2 OUTput of the MAC 1900 to the input of recorder 2.

By setting the MAC 1900 INPUT selector switch at TAPE 1, a recording can be made on tape recorder 2 from a tape playing on tape recorder 1. The recording can be monitored by pushing the MONITOR TAPE 2 button.

The tape recorder functions can be reversed by setting the INPUT selector switch at TAPE 2. A recording can then be made on tape recorder 1 from **a** tape playing on tape recorder 2. The recording on tape recorder 1 can be monitored by pushing the MONITOR TAPE 1 button.

The MAC 1900 can also be used with one recorder for recording other program sources while playing tapes from a second recorder.

Example:

A recording from FM, AM, PHONO 1 or PHONO 2 can be made on tape recorder 2 if the INPUT selector switch is set to the corresponding source position. The recording on tape recorder 1 can be monitored for playback by pushing the MONITOR TAPE 2 button. At the same time, the MAC 1900 can be used to play a tape from tape recorder 1 by releasing the monitor button for TAPE 2 and pushing the monitor button for TAPE 1. The signal of tape recorder 1 will then go to the loudspeakers without affecting the recording being made on tape recorder 2.

Tape recordings can be made simultaneously on two tape recorders by using PHONO 1, PHONO 2, FM, or AM as a program source.

Example:

Set the INPUT selector switch to the desired source. The recording on either tape recorder can be monitored for playback by pushing the appropriate tape monitor button. CAUTION: When recording with two tape recorders at the same time from the same program source, mutual interference of the recorder bias oscillators can result. This can be heard as a howl or squeal in the background when the recordings are played back. This noise is caused by insufficient filtering of the bias oscillator circuits in the tape recorders. A test run should be made for the particular recorders intended for this use.

FILTERS

L F (LOW FREQUENCY)

Use the L F filter switch to reduce objectionable low-frequency noise created by a turntable or record changer or acoustically coupled feedback.

OUT . . . filter disconnected.

IN . . . low-frequency signals below 50 Hz are reduced when the switch is pushed to the IN position.

H F (HIGH FREQUENCY)

Use the H F filter switch to reduce objectionable high-frequency noise such as record scratch.

OUT . . . filter disconnected.

IN . . . rolls off response sharply at 7000 Hz.

MUTING

The muting circuit suppresses all noise between FM stations. It suppresses all weaker stations not strong enough to override the background noise.

The muting threshold setting determines the strength of the signal which can be heard with muting in operation. The muting threshold is carefully ad-

justed to optimum at the factory using precision test instruments.

OUT . . . MUTING disconnected.

IN . . . between station noise suppressed on FM.

SPEAKER

When the speakers have been connected to the proper push connectors on the back panel, the pushbuttons turn the speakers ON or OFF.

If the program is to be heard from the main speakers only, the REMOTE pushbuttons are pushed IN. This turns off the remote loudspeakers.

if the program is to be heard from the remote speakers only the MAIN pushbutton is pushed IN. This turns off the main speakers.

To hear program from both main and remote speakers, both the MAIN and REMOTE pushbuttons must be in the OUT position.

MAIN

PUSHBUTTON OUT . . . the program material is heard from the MAIN speakers.

IN . . . the MAIN loudspeakers are turned OFF.

REMOTE 1 or 2

PUSHBUTTON OUT . . . the program material is heard from the REMOTE loudspeakers.

IN . . . the REMOTE loudspeakers are turned OFF. (These pushbuttons do not affect the headphone jack.)

Balancing your Stereo

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 room acoustics, furniture placement, room shape, small differences in loudspeakers, etc. Factors that effect proper stereo balance are correct phase for both channels and equal program loudness.

TO ADJUST PHASE

1. Press the MODE pushbutton to the MONO position.
2. Turn the BALANCE control to the 12 o'clock position.
3. Stand about 10 feet in front of and midway between the loudspeakers. The sound should appear to come from directly 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

1. Press the MODE pushbutton to MONO.
2. Play a familiar recording.
3. Turn the BALANCE control to the 12 o'clock position.

   While the program is playing, stand between the two loudspeakers. Listen for a difference in loudness between speakers. If there is then a difference in loudness turn the BALANCE control toward the speaker that is not as loud. Adjust the BALANCE control until the sound is balanced between both speakers.

Listening to Your Stereo

LISTENING TO A STEREO RECORD

Turn the INPUT SELECTOR to PHONO 1 or PHONO 2, whichever is connected to the record player you wish to hear.

Make certain the MODE pushbutton is in the STEREO position.

Adjust the VOLUME control to desired volume.

LISTENING TO A MONOPHONIC RECORD

Turn the INPUT SELECTOR to PHONO 1 or PHONO 2, whichever is connected to the record player you wish to hear.

Push the MODE pushbutton IN to MONO.

Adjust the VOLUME control to desired volume.

LISTENING TO A STEREO TAPE RECORDER

Turn the INPUT SELECTOR to TAPE 1 or TAPE 2, whichever is connected to the record player you wish to hear.

Set the MODE pushbutton to STEREO or MONO, depending on the program on the tape.

Adjust the VOLUME control to desired volume.

Two tape recorders can be used with the MAC 1900. Recording and monitoring can be done with both tape recorders.

To monitor while recording your tape recorder must have separate record and playback heads and electronics for each. The TAPE MONitor pushbutton lets you monitor the quality of tape recordings made during the recording process. When the TAPE MONitor pushbutton is in the IN position it will play the sound from the tape as it passes the playback head, a moment after it is recorded. The recording process

continues as usual. When the switch is in the OUT position normal program from the source is heard.

HOW TO COPY TAPE

1. Put the tape to be copied on the recorder connected to TAPE 1 input.
2. Turn the input selector to TAPE 1.
3. The signal available at the TAPE OUTPUT jacks is the playback of TAPE 1.
4. Record on the recorder connected to TAPE 2. The recording can be monitored by pressing in the TAPE 2 pushbutton. Instantaneous comparison of the recorded program with the original can be heard.

LISTENING TO AM

Turn the INPUT SELECTOR to AM.

Rotate the tuning knob of the station of your choice.

Adjust the volume to a comfortable level.

LISTENING TO FM or FM STEREO

Turn the INPUT SELECTOR to FM.

Push the STEREO MODE selector pushbutton in.

Rotate the tuning knob to the station of your choice.

Adjust the volume to a comfortable level.

The MAC 1900 uses a McIntosh developed automatic mono-stereo switching circuit. The switching is electronic without switching clicks or transients.

The circuit switches smoothly and silently when the 19,000 Hz multiplex pilot signal is present. When the FM MPX indicator is lit, the station is broadcasting a 19,000 Hz pilot carrier. This signal causes the automatic circuit to switch the MAC 1900 to stereo. If a station is not broadcasting a 19,000 Hz pilot signal for stereo, the FM MPX indicator will remain off and the tuner will automatically switch to mono.

The muting circuit suppresses all noise between stations. It suppresses all weaker stations not strong enough to override the background noise. The muting threshold setting determines the strength of the signal which can be heard with muting in operation. The muting threshold is carefully adjusted to optimum at the factory.

While tuning you may notice that the tuning indicator will show a station yet no program is heard from the speakers. The muting circuit in the tuner has rejected the station because there is objectionable noise with the weak signal from the station. Push the MUTING pushbutton to the OUT position and the station will be heard. Most programs that can be tuned in this manner are of poor quality due to interfering noise.

Performance Limits

PREAMPLIFIER AND POWER AMPLIFIER SECTION

POWER OUTPUT: 55 RMS watts continuous per channel into 4 or 8 ohms both channels operating 20 Hz to 20,000 Hz.

30 RMS watts continuous per channel into 16 ohms both channels operating 20 Hz to 20,000 Hz.

HARMONIC DISTORTION: Does not exceed 0.20% at rated power output from 20 Hz to 20,000 Hz with both channels operating. Typical performance is less than 0.1% at rated power. Distortion decreases as output power is reduced.

INTERMODULATION DISTORTION: Does not exceed 0.20% if instantaneous peak power output is twice rated power or less per channel with both channels operating for any combination of frequencies 20 Hz to 20,000 Hz.

DAMPING FACTOR: 50 across 8 ohm load

FREQUENCY RESPONSE: ±0.5 dB 20 Hz through 20,000 Hz

INPUT SENSITIVITY AND IMPEDANCE:

Power Amplifier: 2.5 volts, 100k ohms
Phono 1 and Phono 2: 2.0 mV, 47k ohms
Tape 1 and Tape 2: 250 mV, 250k ohms

TOTAL NOISE:

Power Amplifier: 95 dB below rated output
Tape Input: 90 dB below rated output
Phono Input: 76 dB below 10 mV input

TAPE OUTPUT:

Tuner: 1.0 volt
Tape: 250 mV with rated input from low level inputs
Phono: 1.2 volts with 10 mV input at 1,000 Hz
Preamp Output: 2.5 volts with rated input

BASS CONTROLS: ±16 dB at 20 Hz

TREBLE CONTROLS: ±16 dB at 20,000 Hz

L. F. FILTER: Active filter, 12 dB per octave roll off below 50 Hz, down 18 dB at 20 Hz

H. F. FILTER: Active filter, 12 dB per octave roll off above 7,000 Hz, down 18dB at 20,000 Hz

AM TUNER SECTION

SENSITIVITY: 75 μV IHF (external ant.)

SIGNAL TO NOISE RATIO: 45 dB minimum IHF; 55 dB at 100% modulation

HARMONIC DISTORTION: Does not exceed 1% at 30% modulation

FREQUENCY RESPONSE: 3500 Hz at —6 dB down

ADJACENT CHANNEL SELECTIVITY: 30 dB minimum IHF

IMAGE REJECTION: 65 dB minimum, 540 kHz -1600 kHz

FM TUNER SECTION

USEABLE SENSITIVITY: 2.5 microvolts at 100% modulation (±75 kHz deviation) for 3% total noise and harmonic distortion

SIGNAL TO NOISE RATIO: 70dB below 100% modulation

HARMONIC DISTORTION: Mono: Does not exceed 0.3% at 100% modulation ±75 kHz deviation
Stereo: Will not exceed 0.7%

AUDIO FREQUENCY RESPONSE: ±1 dB 20 Hz to 15,000 Hz with standard de-emphasis (75μsec.) and 19,000 Hz pilot filter

CAPTURE RATIO: 1.8 dB

SELECTIVITY: 55 dB alternate channel selectivity IHM minimum

SPURIOUS REJECTION: 90 dB IHF minimum

IMAGE REJECTION: 80 dB; 88 to 108 kHz (IHF)

STEREO SEPARATION: 34 dB at 1,000 Hz

SCA FILTER: 50 dB rejection from 67 kHz to 74 kHz. 275 dB per octave slope

POWER REQUIREMENTS: 120 volts, 50/60 Hz, 40 watts at zero signal output, 300 watts at rated output

FACILITIES AND FEATURES

BASS: Slide control with mechanical detent for flat -16 dB to +16 dB at 20 Hz

TREBLE: Slide control with mechanical detent for flat -16 dB to +16 dB at 20,000 Hz

LOUDNESS: Pushbutton . . . for loudness compensated or flat response

BALANCE: Natural balance at center position, attenuation of left or right channel by rotating control.

VOLUME: Precision "tracked" at all listening levels. (0 to -65 dB.) Does not change stereo balance as loudness is changed. The AC power ON/OFF switch is coupled with this control.

INPUT: Six positions - TAPE 1, TAPE 2, AM, FM, PHONO 1, and PHONO 2.

MODE: Pushbutton - Left channel only to both speakers. Right channel only to both speakers, Stereo Reverse, Stereo, Mono, L+R, L+R to right speaker only, and L+R to left speaker only.

TAPE MONITOR: Two pushbutton switches. Either of two tape recorders can be monitored by selecting the TAPE MON. 1 pushbutton or TAPE MON. 2 pushbutton. They are mechanically interlocked to accept only one pushbutton at the IN position at one time.

SPEAKER: Main-Switch the MAIN loudspeaker system ON or OFF without affecting the performance of REMOTE speakers.

Remote 1 - Switch one REMOTE loudspeaker system ON or OFF without affecting the performance of MAIN speakers.

Remote 2 - Switch a second REMOTE loudspeaker system ON or OFF without affecting the performance of MAIN speakers.

HEADPHONE JACK: For listening with low impedance dynamic stereo headphones.

TRANSISTOR COMPLEMENT: 53 silicon field effect or bipolar transistors, 39 diodes, 3 integrated circuits, 4 thyristors.

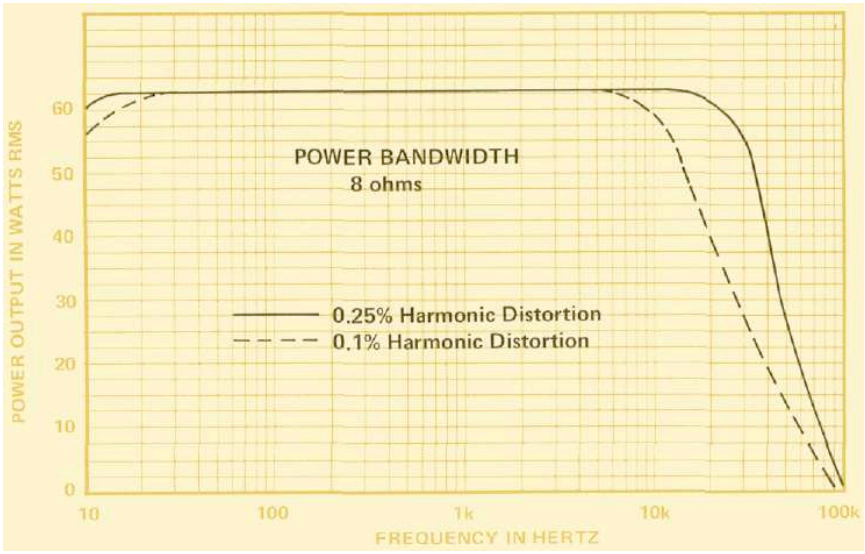
MECHANICAL INFORMATION

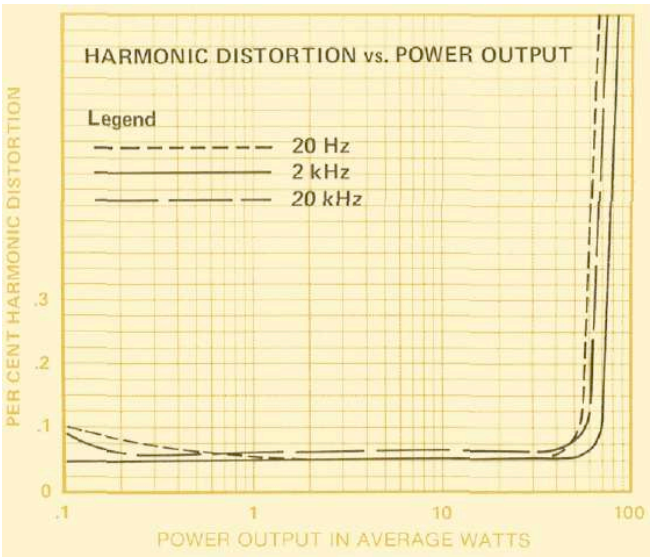
SIZE: Front panel measures 16 inches wide (40.64 cm) by 5½ inches high (13.97 cm). Chassis measures 15 inches wide (38.1 cm) by $5^{1}/_{8}$ inch high (13.02 cm) by 15 inches deep (38.1 cm) including back panel connectors. Knob clearance required is 1½ inches (3.81 cm) in front of mounting panel.

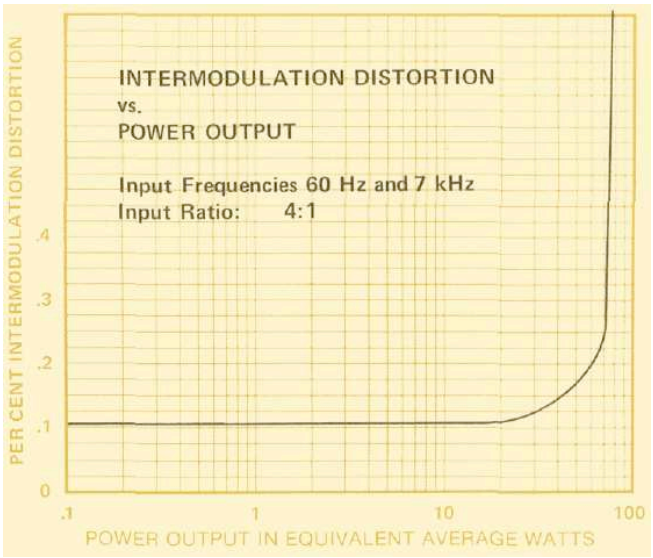
FINISH: Front panel is anodized gold and black.

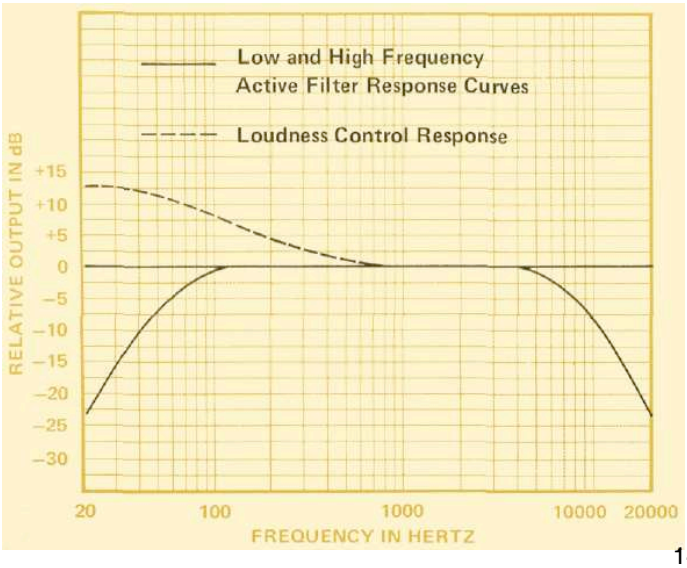
WEIGHT: 33 pounds (14.97 kg) net, 46 pounds (20.87 kg) in shipping carton.

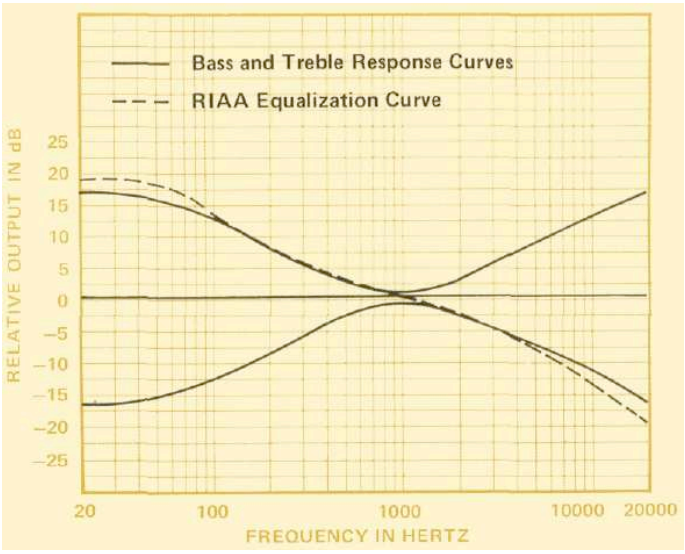
Typical Performance Charts

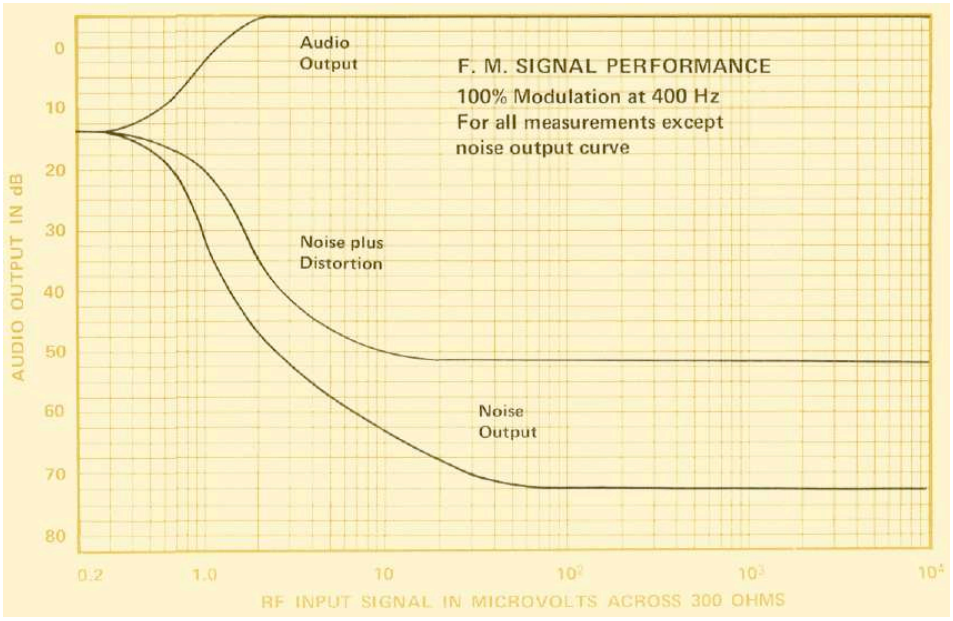


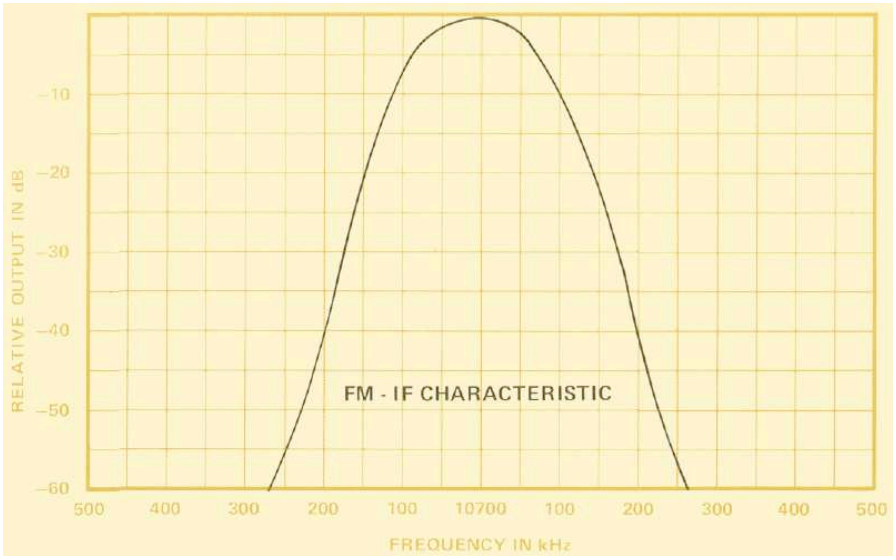


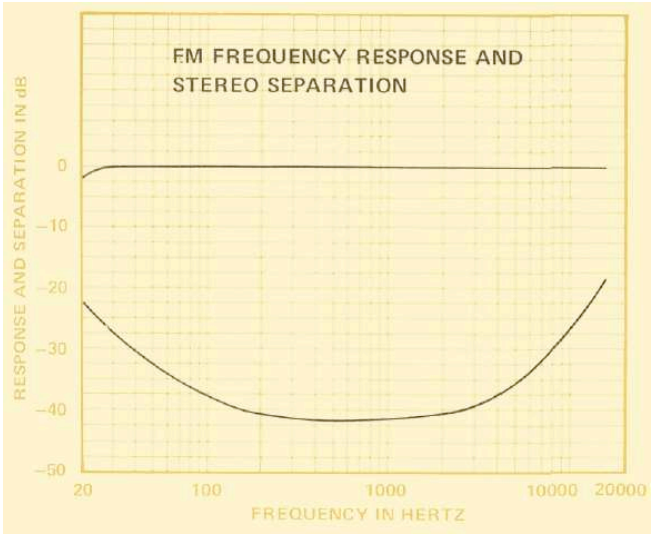


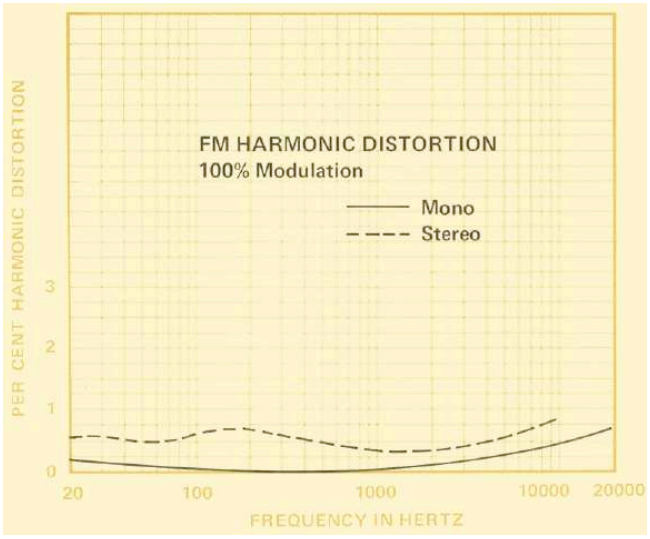


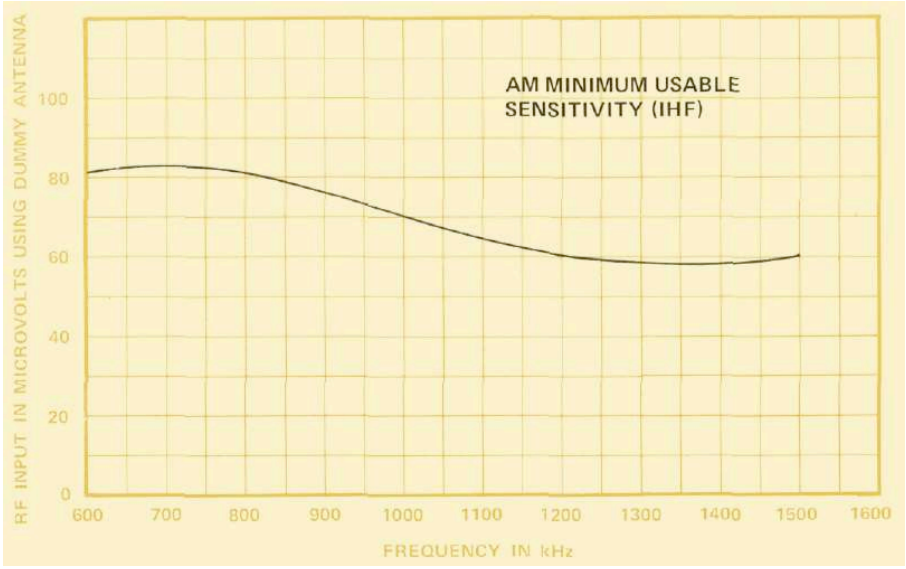


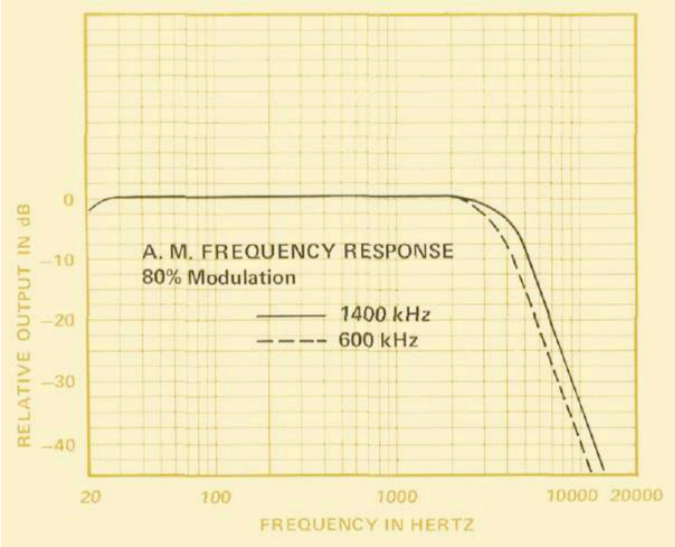

F. M. SIGNAL PERFORMANCE
100% Modulation at 400 Hz
For all measurements except
noise output curve
Audio
Output
Noise plus
Distortion
Noise
Output
AUDIO OUTPUT IN dB
0
10
20
30
40
50
60
70
80
0.2
1.0
10
10^2
10^3
10^4
RF INPUT SIGNAL IN MICROVOLTS ACROSS 300 OHMS

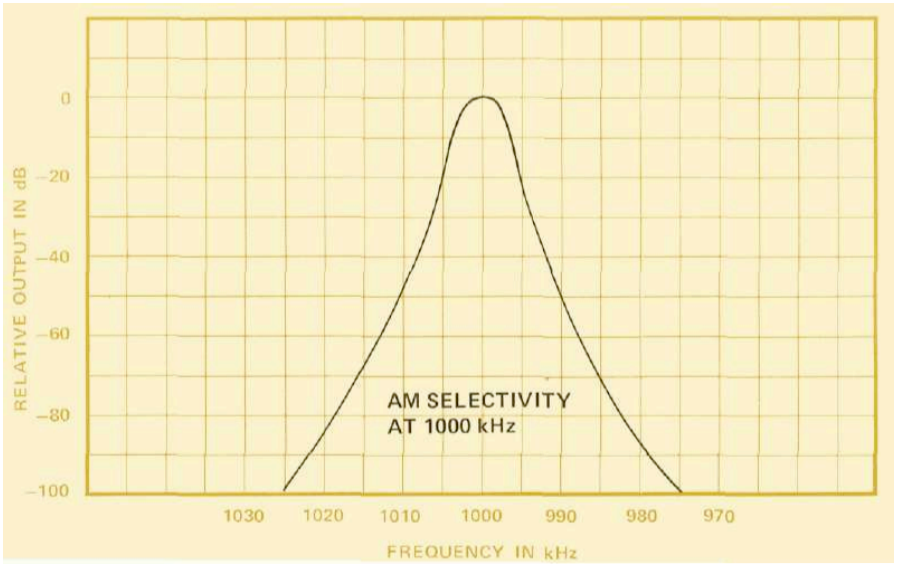

FM - IF CHARACTERISTIC
RELATIVE OUTPUT IN dB
−10
−20
−30
−40
−50
−60
500
400
300
200
100
10700
100
200
300
400
500
FREQUENCY IN kHz


FM FREQUENCY RESPONSE AND
STEREO SEPARATION
RESPONSE AND SEPARATION IN dB
0
−10
−20
−30
−40
−50
20
100
1000
10000
20000
FREQUENCY IN HERTZ


FM HARMONIC DISTORTION
100% Modulation
Mono
Stereo
PER CENT HARMONIC DISTORTION
3
2
1
0
20
100
1000
10000
20000
FREQUENCY IN HERTZ


AM MINIMUM USABLE
SENSITIVITY (IHF)
RF INPUT IN MICROVOLTS USING DUMMY ANTENNA
100
80
60
40
20
0
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
FREQUENCY IN kHz


A. M. FREQUENCY RESPONSE
80% Modulation
1400 kHz
600 kHz
RELATIVE OUTPUT IN dB
0
−10
−20
−30
−40
20
100
1000
10000
20000
FREQUENCY IN HERTZ


AM SELECTIVITY
AT 1000 kHz
RELATIVE OUTPUT IN dB
0
−20
−40
−60
−80
−100
1030
1020
1010
1000
990
980
970
FREQUENCY IN kHz

Technical Description

AUDIO SECTION

Each channel of the MAC 1900 has four basic sections. They are: phono or low level amplifier, tape or high level amplifier, filter amplifier, and power amplifier.

PHONO AMPLIFIER

There are three transistors in each channel of the phono amplifier. The input transistors are carefully selected for low noise and high gain. High gain transistors are used in the other stages of the phono amplifier to achieve high overall open-loop gain. With high open-loop gain a larger amount of negative feedback can be used around the phono amplifier which reduces noise and distortion. The feedback network also provides precision RIAA frequency compensation required for magnetic phonograph cartridges.

Feedback remains in effect even at 20 Hz where higher gain is required for RIAA compensation. The output of the phono amplifier provides a low impedance output for the tape output jack and the input of the high level preamplifier.

Input sensitivity of the phono amplifier is 2.0 millivolts. The gain of the amplifier is 42 dB at 1000 Hz. The phono amplifier has very wide dynamic range. At 1000 Hz the phono input circuit will accept 100 millivolts without overload, a voltage far greater than the output of any current magnetic phono cartridge. Phono input overload is virtually impossible.

A signal level of 10 millivolts at the phono input at 1000 Hz will produce 1.2 volts at the tape output. The tape output has a source impedance of 200 ohms. For most efficient signal transfer the tape output should operate into a load impedance of 47k ohms or greater.

HIGH LEVEL

At the input to the high level amplifier the signal passes through the mode selector switch through the balance control and volume control into the amplifier. Loudness taps are provided on the volume control. With the loudness switch in the circuit, the low frequency output (below 400 Hz) is increased when the volume control is at 50% of rotation or below.

A differential amplifier configuration is used at the input of the tape amplifier. The tone controls are in a negative feedback loop around the amplifier stages to give excellent low noise and low distortion characteristics. With the tone controls in the feedback around the tape amplifier, the negative feedback remains in effect even at the maximum boost setting of either bass or treble controls.

The slide tone controls and their associated components have been mounted on a double sided, plated through, printed circuit board. This complete tone control module is mounted to the front panel for ease in operation and maintenance. A mechanical detent has been provided at the electrical and mechanical center of the sliding bass and treble controls. The tone controls provide smooth gradual boost or cut of output levels giving minimum change at mid frequencies and maximum change at the audio spectrum extremes 20 Hz and 20,000 Hz. With the tone controls in the center position the gain of the tape amplifiers is 20 dB. The output of the tape amplifier feeds directly to the filter amplifier.

FILTER AMPLIFIER

Each channel of the filter amplifier has two transistors connected in compound emitter follower configuration. To maintain low distortion and noise and present a uniform input impedance the resistive and reactive elements which make up the filters are in a feedback path. The Low Frequency (rumble) filter starts to roll off at 50 Hz at a rate of 12 dB per octave, reducing the output at 20 Hz by 18 dB.

The High Frequency (scratch) filter starts to roll off at 7,000 Hz at a rate of 12 dB per octave, reducing the output at 20,000 Hz by 18 dB. Filter components have been mathematically selected in value to give the desired frequency rolloff characteristics. Close tolerance components used assure uniformity in filter response. The filter amplifier output is an emitter follower with a source impedance of 200 ohms. The output is fed to jacks on the rear at the MAC 1900. In the normal operation, both filters out, the filter amplifier has a gain of 0 dB.

POWER AMPLIFIER

The input impedance of the power amplifier is 100,000 ohms and requires 2.5 V RMS to drive the amplifier to rated output. The short jumper cables in

the rear of the MAC 1900 connect the filter amplifier output (PREAMP out) and power amplifier input (AMP input).

At the input of the power amplifier, two transistors are connected as a differential amplifier. The two input signals to the differential amplifier are the input signal (output of the filter amplifier), and the negative feedback signal from the output of the power amplifier. The use of a differential amplifier permits the best use of larger amounts negative feedback to maintain low noise and distortion. The combined output of the differential amplifier feeds a linear voltage amplifier which in turn drives two medium power driver transistors. The driver transistors drive the output stages.

The output section is arranged as a direct coupled series push-pull amplifier. The power transistors used in the output circuit are selected for their high power dissipation capability, wide frequency response and large "safe operating area."

The power transistors are mounted on large black anodized heat sinks to assure that under normal operation the transistors will operate at a low temperature. If operating temperatures should increase due to a shorted speaker, or restricted ventilation, an automatic sensing device turns the AC power off to the MAC 1900. The MAC 1900 will turn on again when the temperature has returned to normal limits. This additional protection assures you of the complete reliability of the MAC 1900 even under the most extreme operating conditions.

To further insure reliability a special power output SENTRY MONITORING CIRCUIT prevents failure of the power output transistors due to excessive mismatch or shorting of the output. When the MAC 1900 operates normally the SENTRY MONITORING CIRCUIT has no effect on signals passing through the power amplifier. If the power dissipation in the output transistors should rise above normal design limits, the SENTRY MONITORING CIRCUIT restricts the drive to the output stage which reduces the dissipation in the output transistors. The SENTRY MONITORING CIRCUIT acts instantaneously for any input signal or load combination. This arrangement assures circuit reliability. Only Mclntosh gives you this degree of protection.

The direct coupled series push-pull amplifier circuit places the output at ground potential when there is no signal input which eliminates the use of a coupling capacitor in the output circuit. The available low frequency power output is restricted in other circuits that require a coupling capacitor in the output. The MAC 1900 Power Amplifier is all direct coupled to insure maximum low frequency performance. In direct coupled circuits failure of any transistor in the power amplifier could cause a DC potential to appear in the output. To assure that no damaging or interfering DC appears across the output terminals, a protector circuit (Patented) has been designed into the MAC 1900. This circuit constantly monitors the output circuit and if at any time a constant DC level appears, the circuit "crowbars" a short across the output to ground. The protective circuit is very fast (it reacts in milliseconds} and the short will remain across the output until the cause has been fixed. This extra protection prevents damage to your speakers. Under normal operating conditions the protective circuit has no effect on the operation of the output circuit. This is another example of the continuous protection Mclntosh provides.

POWER SUPPLIES

Two high current power supplies, a positive 40 volt and negative 40 volt DC, are used to drive the output power amplifier. Very large capacitors (9300 microfarads) are used to store a large amount -of energy to provide good filtering, and excellent voltage regulation. Good low frequency response and negligible low frequency distortion in the power amplifier stages depends on the regulation of the power supply.

A second power supply provides the power for the power amplifier drivers. It is a high voltage full wave rectified and filtered supply.

Two additional electronically regulated power supplies are used in your MAC 1900. A regulated 16 volt power supply furnishes voltage to the AM and FM circuits. A regulated 75 volt power supply with an accessory filter chain provides 75VDC and 20VDC to the phono and tape amplifier circuits. Both electronically regulated power supplies are low impedance series regulated transistor circuits using tight tolerance zener diodes as references. Hum and ripple reduction has been a major design consideration on the MAC 1900 power supplies.

FM SECTION

The Radio Frequency (RF) Section houses the complete FM-RF front end and part of the AM-RF circuitry. A seven section variable capacitor is the heart of the RF section. Four sections of the variable capacitor are used for FM and the remaining three are in the AM section. By interleaving the sections (AM-FM-AM-FM, etc.), spurious responses have been significantly reduced. The use of the latest "state of the art" in field effect transistors and a well designed variable tuning capacitor has provided a high degree of RF selectivity and excellent spurious response rejection. Image rejection and spurious responses has been brought to a minimum in the RF section of the MAC 1900.

A dual insulated gate metal oxide silicon field effect transistor (MOS-FET) is used as the first RF am-

plifier. Each gate of the transistor is internally protected by zener diodes against incoming transients that may occur due to external conditions. Use of the MOS-FET greatly enhances the cross modulation performance over a wider dynamic range. A wider dynamic range permits the input circuit to accept extremely strong signals without overload.

For greater signal gain a second tuned RF amplifier has been designed in the MAC 1900.

The second RF amplifier consists of a junction field effect transistor (JFET) in a common gate configuration. Since both first and second RF amplifiers have negligible internal feedback, external neutralization is not required and a more stable RF amplifier circuit is achieved.

A mixer has been designed that uses a JFET for high sensitivity and freedom from overload. Low temperature co-efficient components were selected for the FM local oscillator to prevent frequency drift. The frequency stability inherent in the local oscillator makes automatic frequency control (AFC) unnecessary. The rate of drift of the local oscillator is less than ten parts per million per degree centigrade.

From the mixer emerges the FM signal at the 10.7 MHz IF frequency. The first stage of IF amplification is in an integrated circuit within the RF module. Additional gain of the 10.7 MHz IF within the RF shielded enclosure assures a better signal to noise ratio. A better signal to noise ratio gives your MAC 1900 the characteristic that "it listens quieter." The integrated circuit used as the IF amplifier in the RF front end is a monolithic silicon differential/cascode amplifier. The circuit is used in a cascode amplifier configuration.

For optimum signal transfer and lower distortion, a special matching transformer has been designed to interface the FM-RF to the FM-IF amplifier. This matching transformer considerably enhances the linear phase characteristics of the IF amplifier.

All of the RF circuitry and the AM sections of the variable capacitor are encased in a metal module. Within the metal module each FM-RF section is separated by metal shielding. This extreme shielding gives protection against radiation or interference. The RF circuits of the MAC 1900 exceed the FCC requirements for suppression of oscillator radiation.

Antenna connections for either 300 ohm twin lead transmission line or 75 ohm coaxial cable are provided on the rear apron of your MAC 1900. The normal input impedance of the RF amplifier is 75 ohms. Impedance match to 300 ohms is provided by a McIntosh designed balun transformer which has negligible losses. Connections for a 300 ohm line are made with new push type terminals. No tools are required. A type F male connector is furnished for 75 ohm coaxial cable.

The FM-IF consists of two integrated circuits and two quad-tuned, link coupled, filters. They combine to give a total gain of over 120 dB (the signal is amplified to over 1,000,000 times its original level.) Each integrated circuit contains 16 transistors, 3 zener diodes, 5 diodes and 23 resistors, all on a single monolithic silicon chip. The response curve has nearly linear phase characteristics. The skirts of the response curve are very steep. The maximum width is 170 kHz at —3.0 dB and 500 kHz at —60db. The response curve is symmetrical each side of the center frequency. The filters are permanently sealed and do not require adjusting. The IF cannot drift nor vibrate out of adjustment. The exceptionally high gain of the two integrated circuits assures "hard limiting" at very low levels of input signals.

A "phase" or "Foster Seeley" discriminator has been designed to complement the integrated circuit IF section. The detected output signal of the discriminator is extremely low in distortion content. De-emphasis of the discriminator output restores the frequency amplitude characteristics to the same level they were before transmission.

FM STEREO MULTIPLEX SECTION

McIntosh Laboratory has developed a special detecting circuit in the multiplex section. A particular advantage of this circuit is the elimination of the critical adjustments necessary with commonly used matrixing circuits. The circuit detects L - R sidebands, then automatically matrixes the recovered information with the L + R main carrier signal. This yields the left and right program output with maximum separation.

The 19,000 Hz pilot signal is filtered from the composite stereo input signal, amplified by a special limiting amplifier, doubled to the 38,000 Hz carrier frequency, and then amplified again by a limiting amplifier. The composite signal minus the 19,000 Hz pilot is combined with the 38,000 Hz carrier signal. The new combination of signals is fed to the special detector circuit mentioned above. Balanced full wave detectors are used to cancel the 38,000 Hz components in the output.

The SCA (Subsidiary Communication Authorization) signal must be removed from the composite output. This is accomplished by the use of a new "Image Parameter" band elimination filter that has been computer designed. The SCA filter rejects SCA signals without impairing stereo performance.

FM muting in the MAC 1900 operates by detecting ultra-sonic noise which is present when tuning between stations or when receiving a weak station. The muting circuit can be activated or defeated by the use of the muting pushbutton on the front panel.

When the 19,000 Hz carrier of a stereo signal is re-

ceived, the automatic FM stereo switching circuit activates the multiplex decoding circuit. This lights the stereo indicator. The circuit switching is all done electronically with no clicks. The automatic stereo switching can be defeated by depressing the mono pushbutton. (In this position the stereo indicator will still light to indicate the presence of a stereo signal). On monophonic transmissions the stereo switching is inactive at all times, assuring a greater signal to noise ratio. The stereo switching circuit has been designed so that noise will not activate it. De-emphasis of the signal out of the multiplex decoding circuit restores the frequency amplitude characteristics to the same level they were before transmission.

AM SECTION

The AM-RF amplifier circuit includes a three section variable tuning capacitor in the metal enclosed shielded RF module which also houses the FM-RF front end. A three section variable capacitor is used for greater spurious rejection. The RF amplifier is unique. The circuit has constant sensitivity constant selectivity, high image rejection across the complete AM band. Ordinary AM-RF circuits cannot do all of these simultaneously. This circuit design achieves equal sensitivity even down to the low end of the band. Spurious, image, and intermediate frequency rejection are all superior. The same circuit delivers equal selectivity across the entire band. The McIntosh circuit is unique in a superhetrodyne AM receiver.

In addition, there is no loss of audio frequency response at the low end of the band commonly known to AM receivers. Another advantage of the McIntosh circuit is freedom from cross modulation and overloading by strong local stations.

A high-quality loopstick antenna is provided. It can be rotated for maximum performance, optimum signal rejection or minimum interference. In each MAC 1900 the loopsticks are individually tuned for optimum performance. After tuning the loopstick is then sealed. This custom matching of the loopstick to the AM-RF front end maximizes the performance of the loopstick antenna. The antenna is rotatable through nearly 180 degrees in all directions. With this mobility you will not suffer loss of sensitivity regardless of the angle at which the instrument is mounted. A back panel antenna connector is provided for connecting an external antenna if desired.

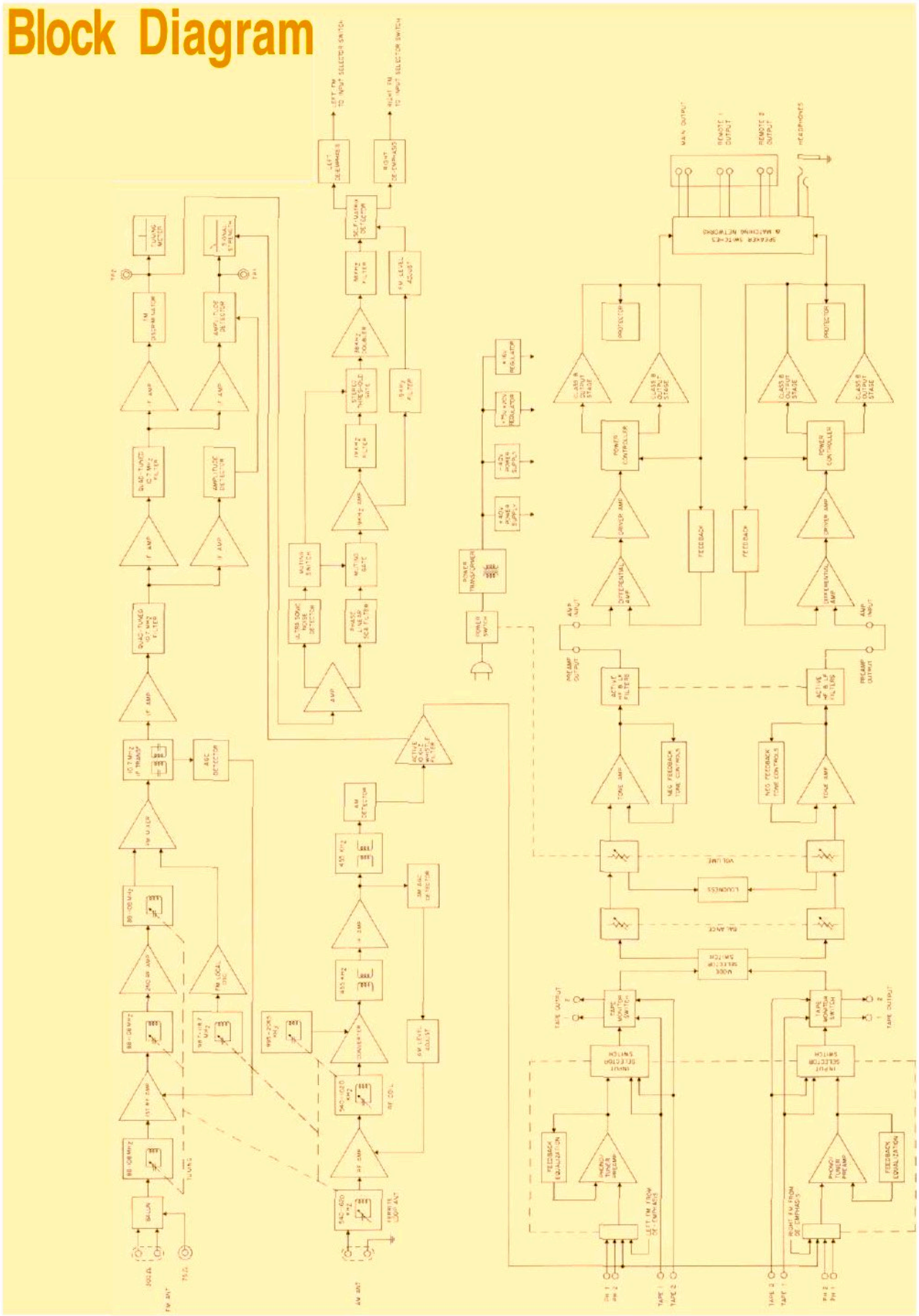
To maintain the excellent image rejection and lack of spurious cross modulation of the AM-RF amplifier an autodyne converter circuit was used for the AM-IF.

AM-IF uses two double tuned IF transformers designed to obtain a high degree of selectivity yet allowing good audio fidelity.

A 10,000 Hz active filter eliminates the 10,000 Hz whistle and irritating "Monkey Chatter" caused by an adjacent station. The frequency response of all stations is nearly flat from 20 Hz to around 3,500 Hz then roll off begins. Because an active filter is used, the output level at 10,000 Hz, or the whistle frequency, is down over 30 dB or one thousandth of what it would be without filtering. With the select button IN, the active filter cutoff frequency is lowered. The filter then effectively suppresses the 5,000 Hz whistle from nearby television receivers.

The AVC (automatic volume control) system was designed to prevent bursting or thumps when the AM is tuned through a strong signal. Distortion at low audio frequencies is minimized by using two AVC filter sections instead of the conventional one.

Block Diagram



McINTOSH

McINTOSH LABORATORY INC.

2 CHAMBERS ST., BINGHAMTON, N. Y. 13903

607-723-3512

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