

INSTRUCTION MANUAL

McINTOSH MODEL C104

PRE-AMPLIFIER EQUALIZER

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PRE-AMPLIFIER EQUALIZER

(Serial Nos. 3500 and higher)

The McIntosh Pre-Amplifier Equalizer is a complete control unit for professional and home entertainment systems. Five input channels are provided; three which produce constant amplification over the audio spectrum of 20 cycles to 20,000 cycles, and two which are equalized for use with magnetic phonograph cartridges.

The C-104 Pre-Amplifier Equalizer requires an external power source. A McIntosh 50W-2, 20W-2, or A-116 Power Amplifier, or the D-101 power supply may be used for this purpose as shown in Figures 1 and 2.

PHYSICAL SPECIFICATIONS

<u>UNIT</u>	<u>OVER-ALL DIMENSIONS</u>	<u>WEIGHT</u>
C-104	10" x 3-1/2" x 7-1/2"	4 Lbs.
C-104a (C-104 in wooden enclosure)	11-1/2" x 4-1/4" x 8"	5 Lbs.

Silver engraved panels (L-109) and mahogany engraved panels (L-109a) are available for cabinet mounting of the C-104. These panels are supplied with mounting hardware and measure 11" x 4-1/4".

INSTALLATION WITH McINTOSH AMPLIFIERS (Fig. 1)

1. Connect speaker to output of amplifier.
2. Insert Power Amplifier line cord into socket labeled "PWR AMP" on C-104.
3. Insert inter-unit cable of C-104 into socket labeled "PRE-AMP" on power amplifier.

4. Turn the power amplifier volume control (50W-2 or 20W-2) to full volume setting. The volume control on the A-116, 30 watt power amplifier, is inoperative when the pre-amp socket is used and this step may be disregarded when using this amplifier.
5. Turn the volume control on the C-104 to "OFF".
6. Insert the power cord of the C-104 into a 117 V.A.C. power outlet.
7. Turn the selector switch of the C-104 to "5", Turn-Over to "HI", Bass fully clockwise, and Treble to central position.
8. Turn the volume control on the C-104 clockwise until the power switch is activated.
9. Allow thirty seconds for warm-up, then advance the volume control to full volume.
10. Adjust the hum centering potentiometer on the power amplifier for minimum hum.
11. Turn the volume control of the C-104 to a minimum and all other controls to the desired settings.
12. Insert inputs into their proper jacks at the rear of the C-104.

INSTALLATION WITH McINTOSH D-101 POWER SUPPLY (Fig. 2)

1. Connect speaker to power amplifier.
2. Insert power amplifier power cord in socket labeled "PWR AMP" on D-101.
3. Insert D-101 power cord into socket labeled "PWR AMP" on C-104.
4. Insert inter-unit cable of C-104 into socket labeled "PRE-AMP" of the D-101.
5. Connect "OUTPUT" of D-101 to the input of power amplifier (socket labeled "PRE-AMP" on McIntosh Power Amplifier). J-107 series cables may be used for this purpose.

6. Follow steps 4 through 9 above.
7. Adjust the hum centering potentiometer on the D-101 for minimum hum.
8. Follow steps 11 and 12 above.

INPUT CONNECTING PROCEDURE

The inherent hum and noise voltages applied to the input of the C-104 is -110 DBM, or less than 3 microvolts. To avoid lowering the signal to hum ratio of the C-104 by adding hum voltages to the input, extreme care must be taken in its installation. We offer the following recommendations as a guide to installation:

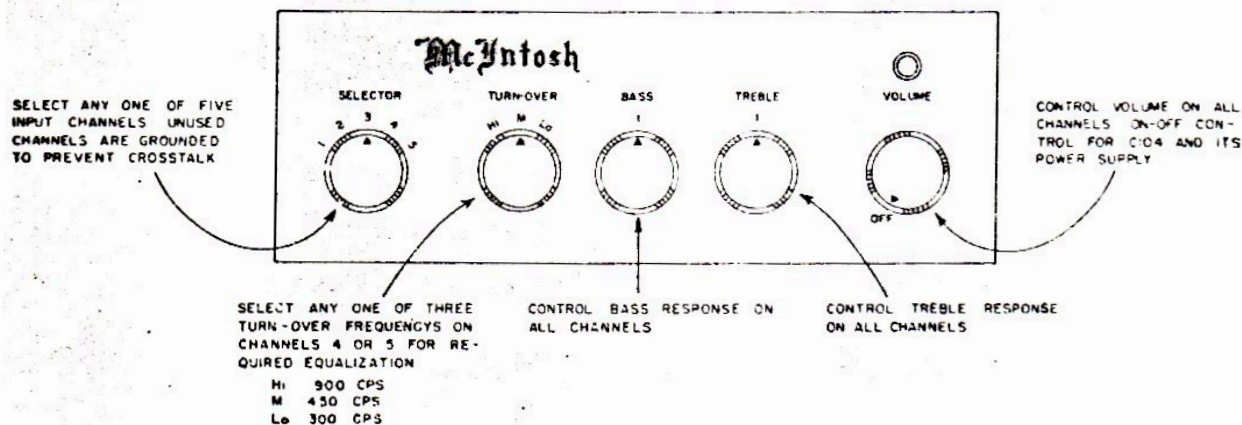
1. Connect inputs to C-104 as outlined on the table below.

CHANNEL	FOR USE WITH	INPUT (For 3 v. output)		GAIN	FREQUENCY RESPONSE (20-20,000 cps.)	REMARKS
		Min.	Max.			
1 & 2	AM-FM Tuner Wire Reproducer Tape Reproducer Crystal Pickup FM Pickup Crystal Microphone	.1 V	20 V	30 db	± .25 db	Input levels in excess of .1V should be reduced by potentiometer on back panel.
3	Low Impedance Microphone	12 MV.	60 MV.	40 db	± .25 db	Input not to exceed 60 MV.
4	High Level Magnetic cartridges. (Terminated for Pickering Cartridge)	30 MV.	.15 V.	40 db from Turn-over to 20,000 cps.	Rises at the rate of 6 db per octave be- low turn-over frequency to 20 cps.	Cartridge of other manufacturers may be used but input must be terminated as recommended by manufacturer. Alter R6 & R7 or R8.
5	Low Level magnetic cartridges. (Terminated for Audax polyphase cartridge.)	12 MV.	60 MV.	40 db from Turn over to 20,000 cps.		

2. The C-104 and magnetic phonograph cartridges should be mounted at least two feet from power transformers.
3. Inter-unit cables provide a complete ground system. Alternate ground wires create ground loops which will usually increase hum level.
4. The heaters of the 12AX7 tubes used in the C-104 are returned to ground through a hum balancing potentiometer in the power amplifier (or D-101 power supply if used). This control requires an initial adjustment for minimum hum, and should be readjusted each time one or more tubes are replaced.
5. Grounding the turntable motor frame to the C-104 chassis near the input jacks may reduce the hum level on the phonograph channels.

The output stage of the C-104 is a cathode follower. The generator resistance of this tube is 600 ohms, but should not be loaded with a capacitive reactance of less than 10,000 ohms at 20,000 cycles. This is the reactance presented by 750 micromicrofarads, and is equal to that of a cable 30 feet long and having a capacity of 25 mmf per foot. Under special circumstances where the C-104 must be connected to the power amplifier by a longer cable, either lower capacity cable must be employed, or the output must be reduced.

OPERATION



Channels 1 and 2:

Channels 1 and 2 are each terminated by a potentiometer. These potentiometers are screw driver adjustments on the back panel and should be used to reduce signal input to these channels if in excess of .1 volts. Correct adjustment occurs when the sound level of channels 1 and 2 is equivalent to that of channels

4 or 5. High impedance sources, such as crystal microphones and the detector output of tuners, may be connected directly to these channels since they have an input impedance of 660,000 ohms.

Channel 3:

Channel 3 is a high gain microphone channel having an input impedance of 100,000 ohms. The input to this channel should not exceed 60 MV. Low impedance microphones in conjunction with an input transformer, such as the McIntosh M-107 (ATI-1), may be used on this channel.

Channels 1, 2, and 3 provide flat amplification from 20 cycles to 20,000 cycles with the bass and treble controls in their central position. The response of these channels may be varied by the use of the bass and treble controls as shown in Fig. 3 (a).

Channels 4 and 5:

Channels 4 and 5 are equalized for use with magnetic phonograph cartridges. The frequency response on these channels with the bass and treble controls in their central position is shown in Fig. 3 (b).

High frequency equalization is provided by the treble control. Settings for reproducing the AES and NAB curves are marked on the panel. However, it has been common experience that these settings produce too much treble attenuation. A setting of approximately one-half these values produces a better tone balance. The final adjustment of this control is a matter of the listener's taste and will vary with each recording.

Bass equalization is provided by the switch labeled "Turn-Over". Three positions are provided giving turn-over frequencies of 900 cycles, 450 cycles, and 300 cycles. The bass control may be used to supplement the response of these settings, since it is an independent control.

The inputs of channels 4 and 5 have been terminated to give flat response from the Pickering and Audax Polyphase cartridges respectively. If cartridges of other manufacturers are used, the terminating resistors should be replaced by values recommended by the manufacturer. For example, the 47,000 ohm terminating resistance of channel 5 should be replaced by 12,000 ohms if the G. E. reluctance cartridge is used. If it is desirable not to alter the C-104 an 18,000 ohm resistor may be connected across the G. E. cartridge in the line to the cartridge.

An additional output jack has been provided at the rear of the C-104. This jack may be used for recording tape while the signal is being monitored by the power amplifier. The combined length of cable between the C-104 and the tape recorder; between the C-104 and power amplifier must not exceed the maximum as outlined on page 5. If the input impedance of the tape recorder is below 50,000 ohms, a bridging network must be used.

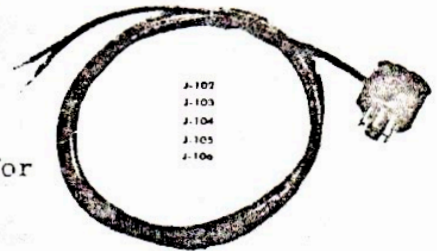
For convenience of installation, we have made the following connectors and cables available from your dealer.

- J-100 Output Plug
- J-101 Input plug
- *J-102 J-100 Output plug fitted with 6 foot length of two conductor cable, connected for 4 ohm output of McIntosh 50W-2 or 20W-2.
- *J-103 Same as J-102, but connected for 8 ohms.
- *J-104 Same as J-102, but connected for 16 ohms.
- *J-105 Same as J-102, but connected for 32 ohms.



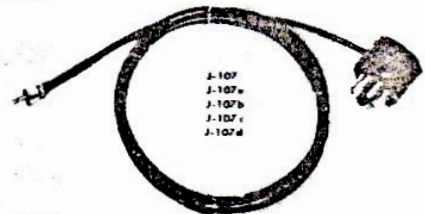
* For use with 20W-2 or 50W-2 Amplifiers only.

- J-109 J-100 output plug fitted with 6 foot length of two conductor cable connected for 4 ohm output of McIntosh A-116.
- J-110 Same as J-109, but connected for 8 ohms.
- J-111 Same as J-109, but connected for 16 ohms.
- J-106 Same as J-102, but connected for 600 ohms, for use with 50W-2, 20W-2 or A-116.



- J-107 J-101 input plug fitted with 6 feet of 25 MMF capacity per foot cable and phono pin jack. For 2.4V input of 50W-2, 20W-2, or A-116.

- J-107a Same as J-107, but 12 ft. long.
- J-107b Same as J-107, but 18 ft. long.
- J-107c Same as J-107, but 24 ft. long.
- J-107d Same as J-107, but 30 ft. long.
- J-108 Phono pin jack fitted with 6 feet of 25 MMF capacity per foot cable, with shield and center conductor stripped and tinned.



- J-112 Input plug fitted with 6 feet of 25 MMF capacity per foot cable and phono pin jack. For .5V input of A-116.



MODIFICATION OF C-104

The 6 db per octave rise filter of the C-104 allows a straight rise to 20 cycles on all but the "HI" turn-over position as shown on Fig. 3b. However, some turntables have too much rumble for this equalizing accuracy and it may be desirable to stop this rise at 40 or 80 cycles. The table below gives the information necessary for this modification as well as others which may be desired under some modes of operation.

MODIFICATION DESIRED

CHANGES

Stop 6 db/octave rise at 40 cycles on "M" and "LO" positions.

Add 4.4 Meg in series with .01 MF across C16.

Stop 6 db/octave rise at 80 cycles on all positions.

Add 5.6 Meg in series with .01 MF across C15.

Change turn-over frequencies to 700, 450, 270 cycles.

Add 2.2 Meg in series with .01 MF across C16.

Add 330 MMF across C15.

Change turn-over frequencies to 600, 400, 250 cycles.

Add 500 MMF across C15.

Add 200 MMF across C16.

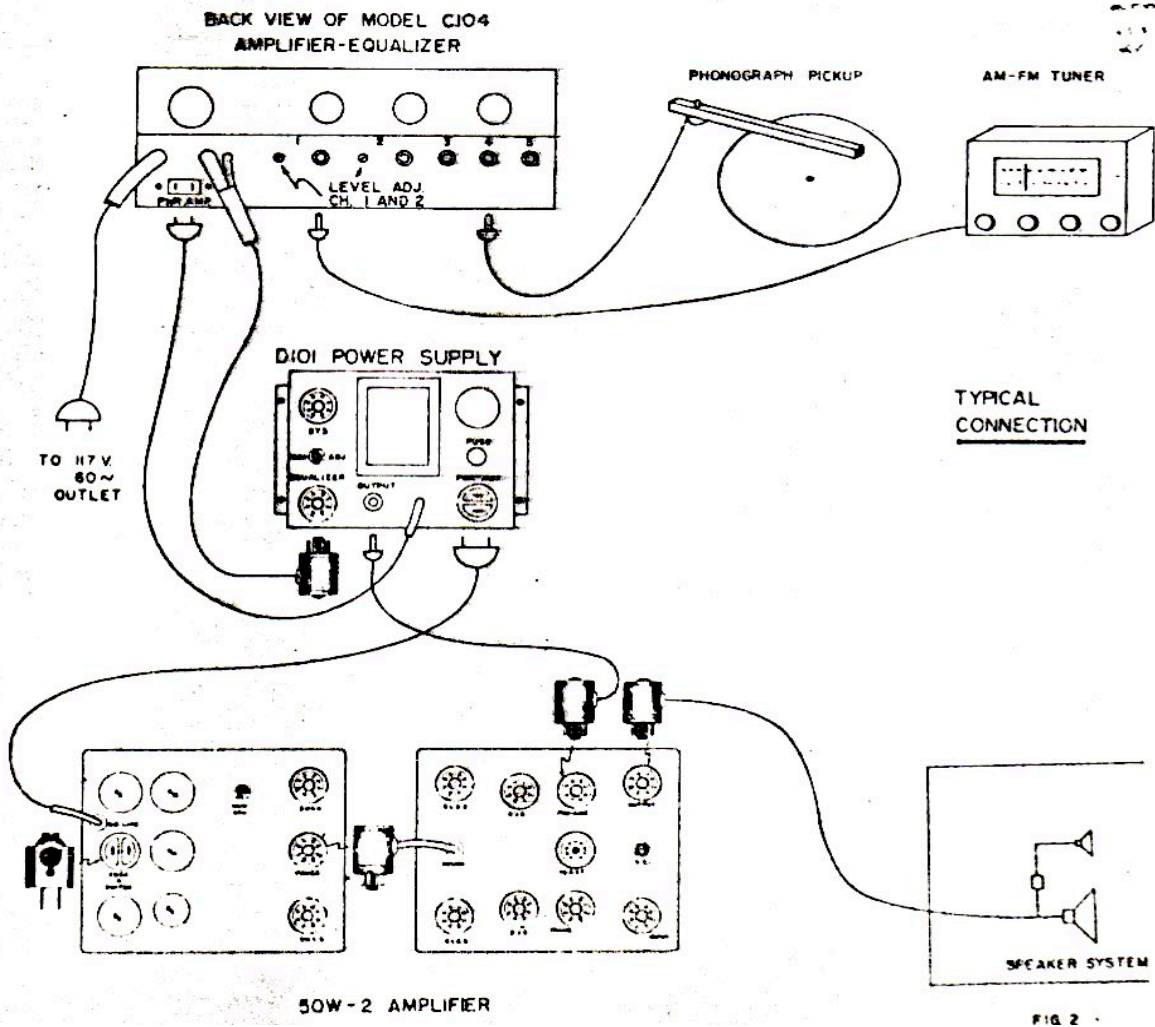
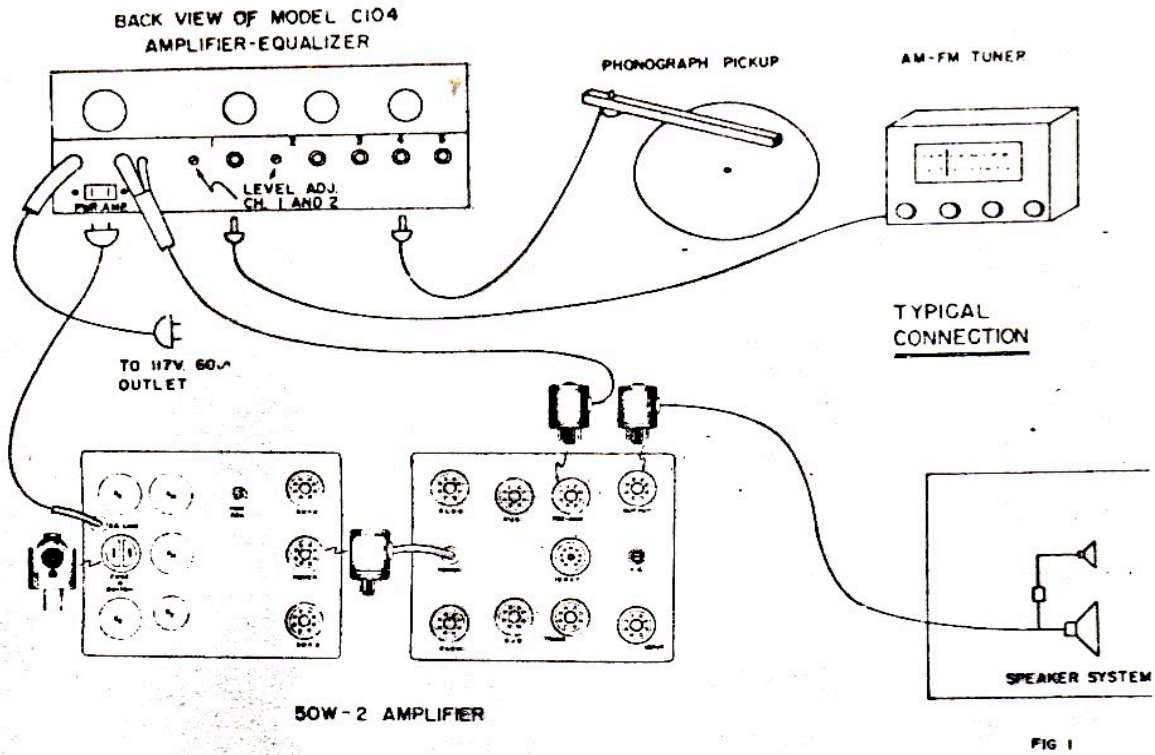
GUARANTEE

We guarantee the performance of the C-104 and the mechanical and electrical workmanship to be free of serious defects for a period of 90 days with the exception that we do not guarantee the tubes and filter capacitor beyond that of their manufacturers.

McINTOSH LABORATORY, INC.

320 Water Street

Binghamton, New York



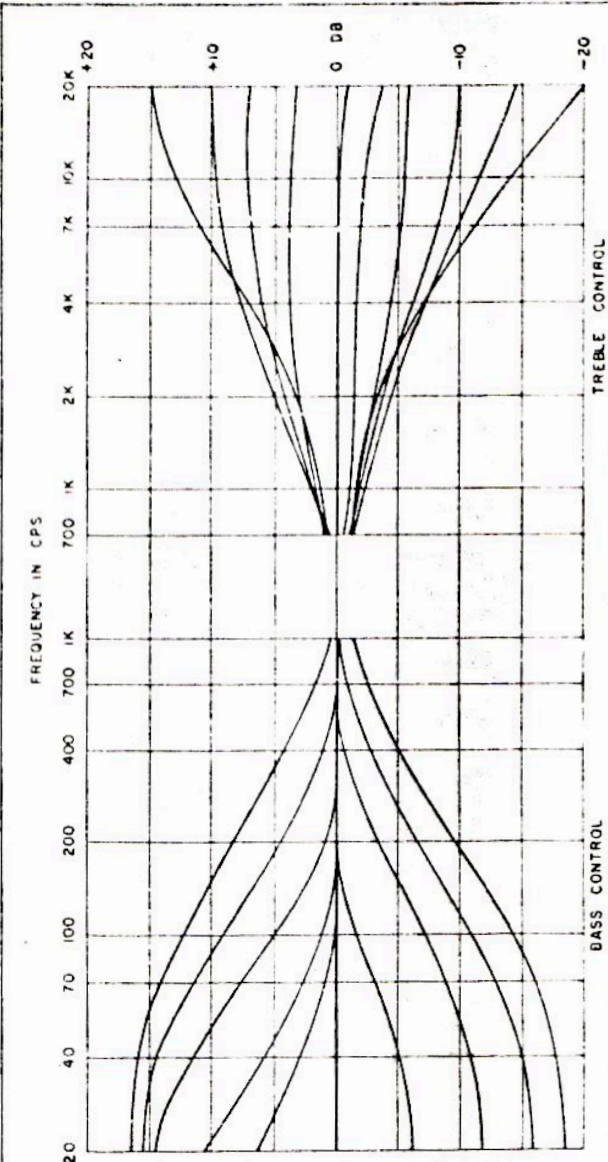


FIG. 3A

GRAPH ABOVE, FREQUENCY VS GAIN CHARACTERISTIC OF THE BASS AND TREBLE CONTROLS. CURVES ARE FOR MAXIMUM AND MINIMUM SETTINGS WITH EIGHT INTERMEDIATE SETTINGS.

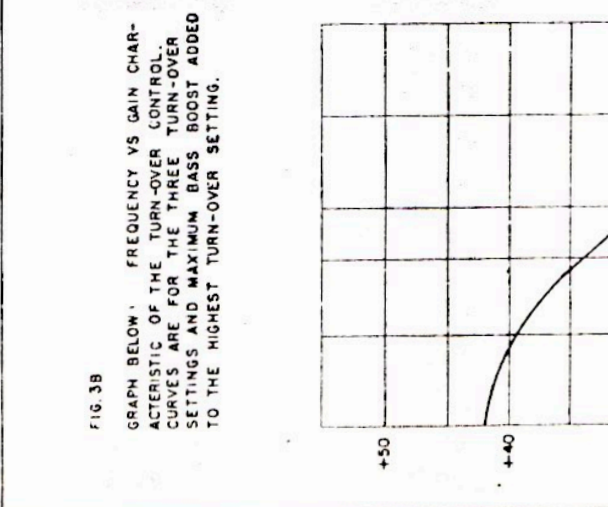
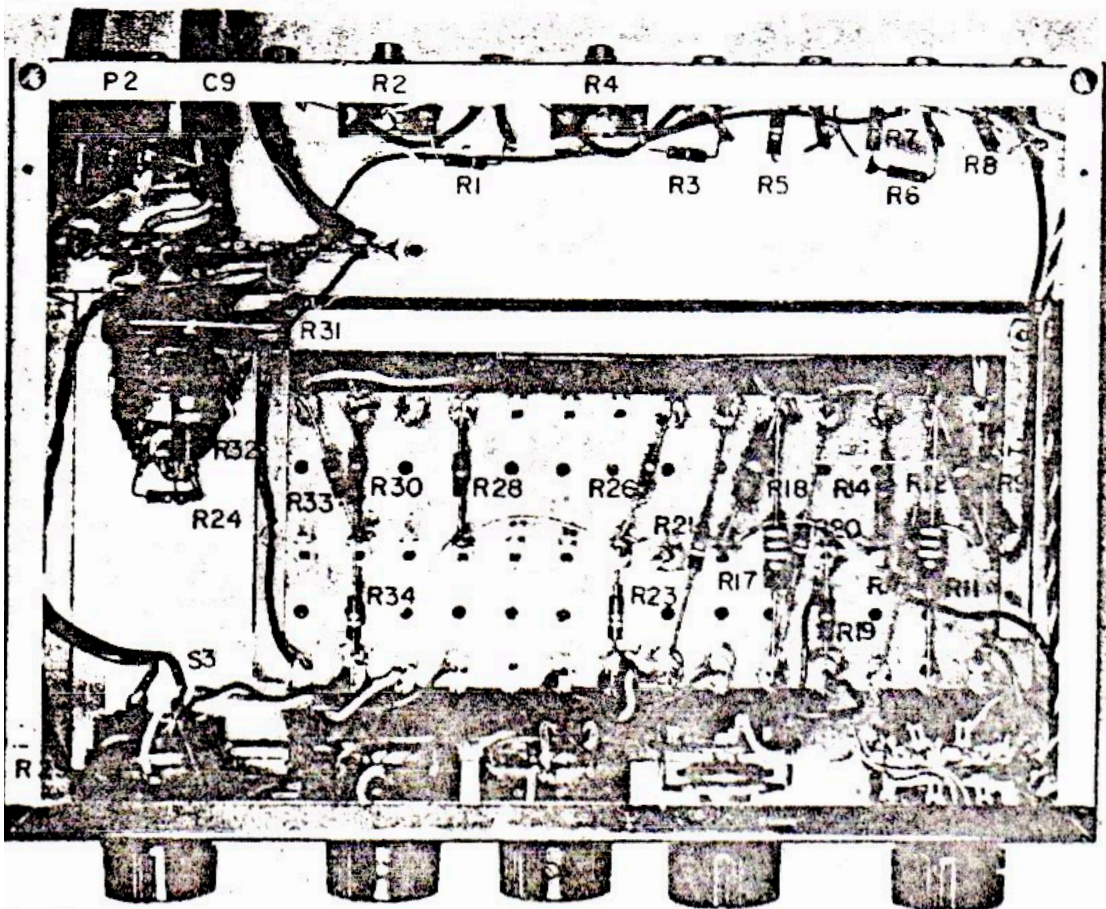
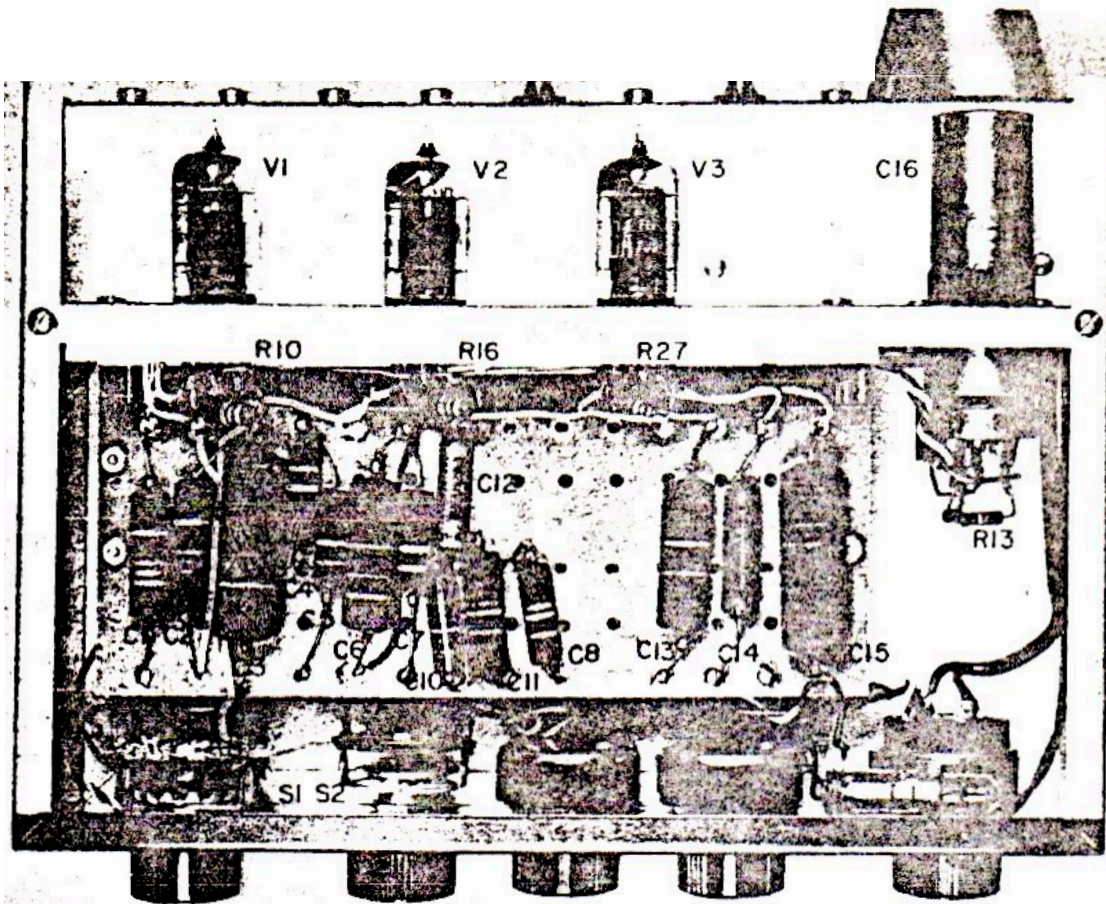


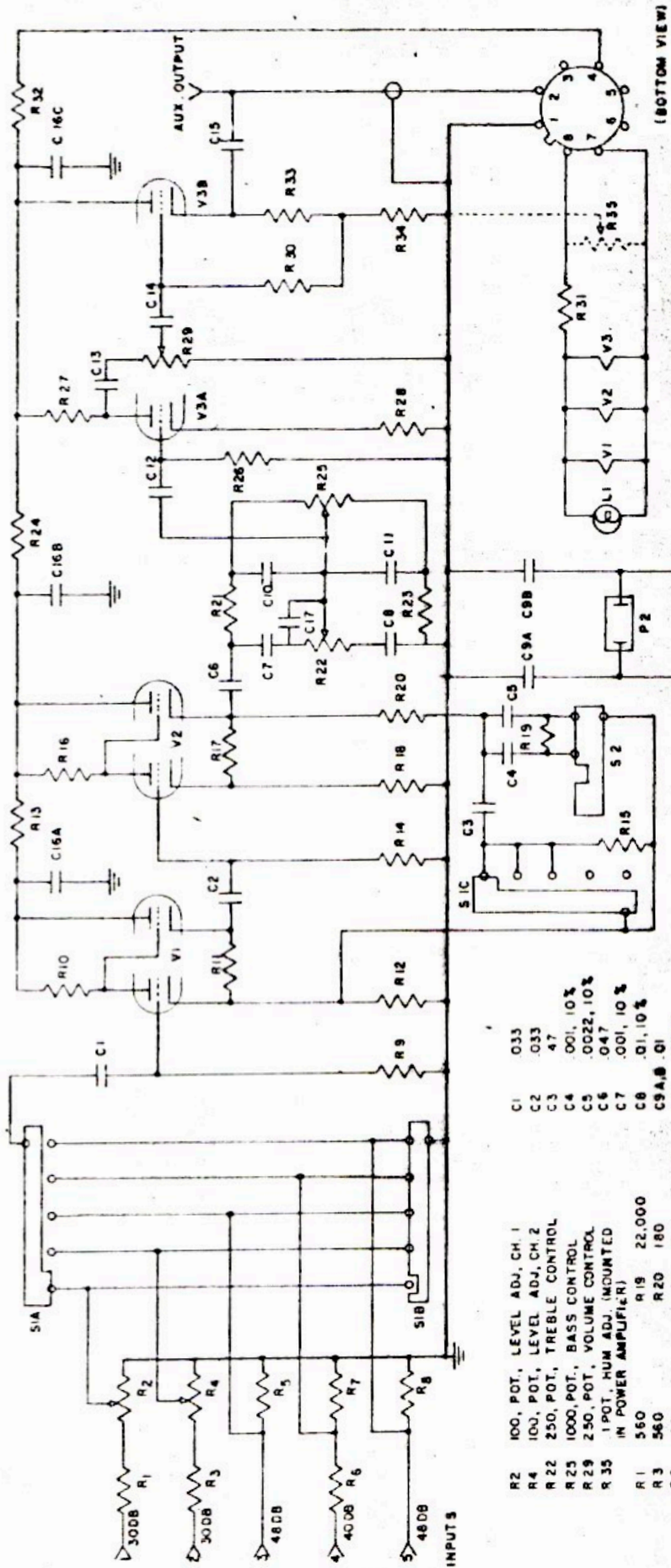
FIG. 3B

GRAPH BELOW, FREQUENCY VS GAIN CHARACTERISTIC OF THE TURN-OVER CONTROL. CURVES ARE FOR THE THREE TURN-OVER SETTINGS AND MAXIMUM BASS BOOST ADDED TO THE HIGHEST TURN-OVER SETTING.

MCINTOSH LABORATORY, INC.
320 WATER STREET, BINGHAMTON, NEW YORK

CONTROL CURVES FOR MODEL C104
PRE-AMPLIFIER EQUALIZER





- C1 0.33
- C2 0.33
- C3 47
- C4 .001, 10%
- C5 .0022, 10%
- C6 .047
- C7 .001, 10%
- C8 .01, 10%
- C9A, B .01
- C10 .0022
- C11 .022
- C12 .0033
- C13 .1
- C14 .0033
- C15 .47
- C16A 15, 300V
- C16B 15, 300V
- C17 2A, 10W
- CIUC 20, 400V
- C17 18
- C17 .0005

- R2 100, POT, LEVEL ADJ, CH. 1
- R4 100, POT, LEVEL ADJ, CH. 2
- R22 250, POT, TREBLE CONTROL
- R23 1000, POT, BASS CONTROL
- R29 250, POT, VOLUME CONTROL
- R35 1-POT, HUM ADJ. (MOUNTED IN POWER AMPLIFIER)
- R1 560
- R3 560
- R5 100
- R6 18
- R7 10
- R8 47
- R9 1000
- R10 330, 1W
- R11 330, 1W
- R12 1.8, 1W
- R13 180
- R14 1000
- R15 22,000
- R16 330, 1W
- R17 330, 1W
- R18 1.8, 1W
- R19 22,000
- R20 180
- R21 100
- R23 10
- R24 180
- R26 10,000
- R27 330
- R28 18
- R30 1000
- R31 2A, 10W
- R32 12.2W
- R33 18
- R34 100

- S1 5 POS, CHANNEL SELECTOR
- S2 3 POS, TURN-OVER SELECTOR
- S3 OFF-ON (MOUNTED ON R29)
- L1 NO 53 PILOT LAMP
- V1, 2, 3 12AX7
- P2 117V, 3A OUTLET

ALL RESISTANCE IN KILOHMS, 1/2 W, 10%, AND ALL CAPACITY IN UF, 400V, 20%, UNLESS SPECIFIED

MCINTOSH LABORATORY, INC.
MODEL C104 PRE-AMPLIFIER EQUALIZER

- P1 OUTPUT AND POWER PLUG
- PIN 1 GROUND
- PIN 2 OUTPUT
- PIN 4 +280 TO -380V, 6MA
- PIN 7 AND 8 6.3V, .9A

(BOTTOM VIEW)