Equipment Report

McIntosh C-8 Audio Compensator and Mc-30 Power Amplifier—B-J Phono Pickup Arm—General Electric Al-901 Record Filter

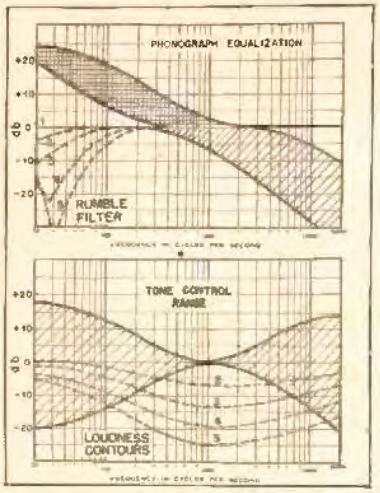

Fig. 1. Performance curves for the McIntosh C-8 Audio Compensator.

Fig. 2. The Audio Compensator, Model C-8.

PROVIDING an almost unlimited variety in response curves, the McIntosh C-8 Audio Compensator is one answer to a desire to accommodate any present or probable future recording curve, as well as to adjust for the acoustics of the listening room, deficiencies in the speaker system, or practically any other condition that may arise.

This unit—which is available either to work with the entire line of McIntosh power amplifiers or with its own small power supply—is equipped with the usual bass, treble, selector, and volume controls, and has in addition a rumble filter control, a loudness compensator switch, five switches to control the turnover frequency, and five switches to control rolloff. That may seem like unduly complicated for the average listener, but there are many who are of the opinion that this unit is the only one which can provide a range of control which is sufficiently wide for the most critical listener. The Compensator is designed to mount in an existing panel, using an opening 10 1/16 x 3 5/8 in., or it may be installed in a small cabinet as shown in *Fig.* 2 and used on a table top, if desired. When feeding a McIntosh amplifier, it draws operating power from sockets built into the power amplifier chassis; if used with the D-8 power supply (in this form, the Compensator is known as C-8P) it will furnish a 2.5-volt output to any other power amplifier.

Referring to the schematic, *Fig.* 3, it will be seen that there are five input channels. The first two have input impedances of 0.66 meg, and are designed to accommodate high-level inputs, working down to a minimum of 70-mv input for full output. The third channel is designed for low-level inputs, with a minimum of 10 mv for full output. The input impedance of this channel is 0.1 meg. These three channels provide flat amplification from 20 to 20,000 cps, and all panel controls except that for turnover are effective.

Channel 4 is designed for a high-level magnetic cartridge, and is terminated for use with the Pickering models. Changing resistors R_4 and R_7 will permit the use of G.E., Audak, or most other "low-level" cartridges, since normal output may be obtained from an input signal of 10 mv. Channel 5 is equipped with a variable load resistor to accommodate any of the low-level cartridges without any internal changes. The gain is sufficient that full output can be obtained with an input of

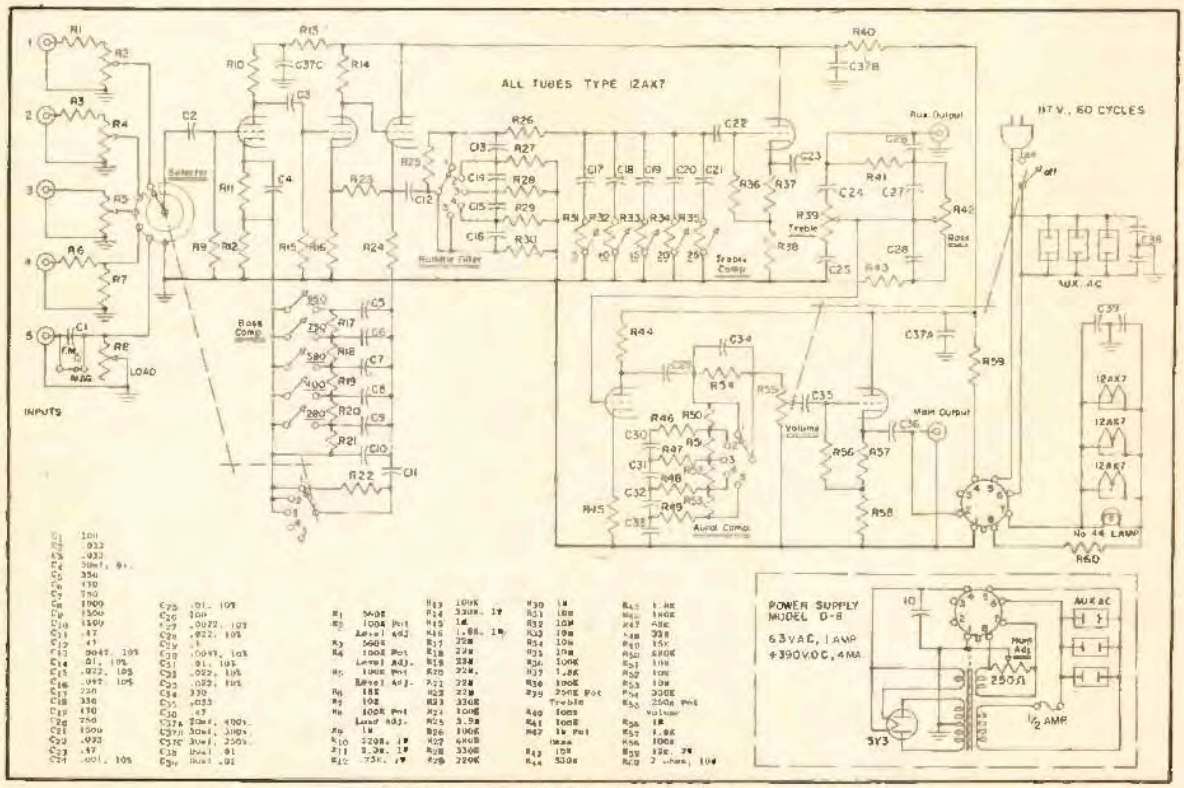

Fig. 3. Schematic of McIntosh Audio Compensator.

Fig. 4. The McIntosh Mc-30 Power Amplifier.

10 mv, which is adequate for Audak and G.E., or for Leak, Fairchild, or Electro Sonic pickups when used with an input transformer. The input impedance may be varied from zero to 0.1 meg, and by operating a slide switch on the rear apron to "F.M." and the load switch to "100"—representing 0.1 meg—the input will accommodate amplitude-responsive cartridges such as ceramic and crystal types and the Weathers FM pickup. All panel controls are effective with both channels 4 and 5.

The Bass Compensation switches work only with the last two channels, and provide a number of turnover frequencies in discrete steps when only one switch is operated, or for a somewhat wider range when two or more are used. Note that all stages of the compensator are used for all inputs, the signal being reduced in level to apply a maximum of 10 mv. to the grid of the first tube. The selector switch eliminates the frequency-selective components from the feedback around the first tube when set for channels 1, 2, or 3.

Treble compensation is accomplished by adding capacitors to the circuit by means of slide switches—one for each capacitor. Both compensation circuits employ the slide switches, and by this means almost any degree of correction may be obtained by simply operating two or more switches. The phonograph compensation curves are shown in *Fig.* 1, and while there are five discrete curves available for both bass and treble, the range obtainable is best shown by the shaded portion which indicates a very wide variety of curves.

The Auxiliary output is connected at the cathode of the stage prior to the tone and volume controls, and is therefore not affected by them, although compensation and rumble-filter controls are in the circuit, making it possible to dub from phonograph records to tape, for example, with the proper equalization.

The main output—also from a cathode follower—can be influenced by the aural or loudness compensator as well as the volume, bass, and treble controls. The curves for the rumble filter indicate that this would be useful in applications where bass response from a high-quality speaker system made the rumble objectionable. Tone-control and loudness-compensation curves are also shown in *Fig.* 1.

The Compensator is equipped with three a.c. outlets for phono motor, tape recorder, power amplifier, or any other devices intended to operate with the input unit.

Figure 4 shows the power amplifier, Model Mc-30. Performance curves for this model are not shown, since frequency response is (naturally) flat from 20 to well over 20,000 cps and no controls are provided, and IM distortion remained below 0.4 per cent to over 40 watts output (equivalent sine-wave output, which is the method used in all of these Equipment Reports). This value is well beyond the limits of our standard graph sheets.

By now, most audio fans are familiar with the McIntosh amplifier circuit. *Figure* 5 is the schematic of the Mc-30, with the output transformer which provides load for both plate and cathode. Since the transformer has a 1:1 ratio, the same signal voltage exists at both ends of each of the two windings—one being connected to the plates and the other to the cathodes. Note also that the screens are connected to the opposite plates. Thus the *signal* on the screen and cathode of either output tube is identical, which means that the screens are perfectly bypassed to the cathodes—a condition wherein pentodes and tetrodes operate best. At high powers, the signal on the cathodes is quite high, which necessitates the use of a tube which will withstand a high cathode-heater potential.

The stage line-up in the amplifier consists of a single-ended amplifier tube, followed by a "long-tailed pair" phase splitter, a push-pull amplifier stage, and a cathode follower stage which drives the output tubes.

Feedback from a tertiary winding on the output transformer returns to the cathode of the first stage, and the output is taken from a fourth winding, with 4, 8, and 16-ohm taps being available. A 600-ohm output is provided, being taken from taps on the cathode winding of the output transformer. This output is likely to be several volts above ground (d.c.) since it is taken from a winding in which current is flowing, but for most applications this would not be important.

Construction of these two units is neat and compact, with ready accessibility to all parts. While most high-quality equipment in the audio field seems to show a minimum of need for part replacement, there is always the possibility that such a need may arise, and it is well not to have to "unbuild" the amplifier any more than necessary if a resistor or capacitor has to be changed. Most small components are mounted on resistor boards; in the C-8 both sides of the resistor board may be reached by removing the top and bottom of the unit simultaneously, while in the Mc-30 the resistor board is mounted in a vertical position, and all components may be reached readily when the bottom cover is removed. Octal sockets are used to make interunit connections as well as for output circuits, so that a plug-in installation can be made readily. This offers advantages when the user has occasion to use an amplifier in more than one location—he can simply unplug it and plug it in again whenever he has need to move it.

The first McIntosh amplifiers—50-watt units—were noted for their performance and efficiency. The new 30-watt model seems to live up to that reputation, and it does give excellent listening quality. With the C-8 Audio Compensator, sufficient flexibility is available for any application likely to be encountered.

THE B-J PHONO ARM

Anyone who has ever read anything about the requirements for good phonograph reproduction, minimum distortion, low record and stylus wear, and reduced noise has noted that it is considered desirable for the axis of the pickup to be tangent to the record groove at all times. With conventional arms this is impossible, and it is likewise impossible with any simple arm whose pivot is not at an in-

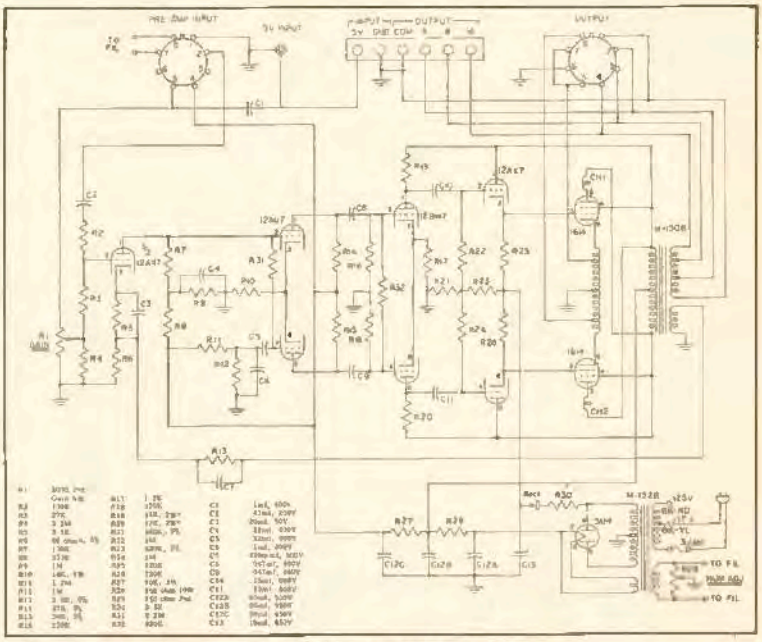

Fig. 5. Schematic of the Mc-30.

Fig. 6. The B-J Phono Arm, designed to maintain perfect tangency throughout the record area.

finite distance from the center of the record.

The B-J arm, a British design that was recently introduced into the U. S., is claimed to accomplish just this, however, and the means by which the feat is accomplished appears to be so simple that we undertook to prove to ourselves just how it was done. We made a full-size drawing of the basic elements of the arm (*Fig. 7* is a reproduction of this drawing) and actually made a check at several points to see just how close it came to doing what was claimed for it.

In the figure, the two fixed pivots correspond to the two in the stationary assembly—that triangular section at the right in *Fig.* 6. This entire unit remains fixed to the motor board, and does not turn as the record is played. These pivots are needle-pointed screws seating in holes in the tubular arms, and are readily adjustable and equipped with locking nuts. They are clearly visible in *Fig.* 6.

The two arms—both of gold-anodized aluminum tubing—are represented in *Fig.* 7 by heavy lines. The long arm is bent slightly to clear the pivot of the short arm in the rest position, which is the position shown by the heavy lines. The two pivots on the head, also needle-pointed and readily adjustable, are shown as single circles, with the position of the stylus projected forward from the center of the line between the head pivots.

By laying out the loci of the two head pivots and scaling off the proper distances between them, one obtains the axes at various positions of the arm, and from these the stylus positions can be drawn. Outside grooves for both 10- and 12-inch records were drawn, as well as a circle with a radius of 2 in. which may be considered the absolute minimum. Two additional positions were drawn intermediate through the recorded portion of a typical record.

Tangency at the point of contact is equivalent to a 90-deg. angle between the center line through the pickup and the radius of the record passing through the stylus. This angle was measured carefully, using a drafting machine for the reference angles, with the results shown in the figure. Note that the angle is 88 deg. at the outside of the 12-in. record, and 89 deg. at the 2-in. radius, while for the remainder of the arm travel, the angle measured 90 deg. exactly. It is possible that a slight mismounting of the drawing with respect to the center of the record might cause a difference of one or two degrees, but as accurately as we could measure readily it appears that there is no greater than ±1 deg. variation from tangency throughout the entire playing time. Thus while we have to admit some skepticism at the possibility of maintaining tangency with a relatively short arm, we must also admit that the arm *does* do just that.

General Description

The B-J arm consists of a fixed base which supports the rear assembly—the triangular section at the right in *Fig.* 6. This unit is also moulded, and carries the fixed pivots. The two arms carry at their forward end the moulded plastic head assembly, which mounts any conventional cartridge. A thin section at the front may be cut out with a pocket knife to make room for the turnover knob on such cartridges as Pickering, E-V, Shure, Sonotone, and others which are operated from the front end of the head. A punchout plate in the top will permit the use of the G.E. Triple-Play cartridge. Stylus force is adjusted by adding or removing triangular-shaped weights from the bottom of the stationary assembly.

The needle bearings used throughout are sufficiently free that even with the four required for the lateral movement, there is no apparent resistance. Mounting is accomplished accurately by the use of a template which indicates the exact points for locating the mounting screws in relation to the record spindle.

Since the correct mounting location is important in maintaining tangency throughout the playing of the record, the cardboard template is obviously a necessity, but when the arm is properly mounted, there is no question but that nearly perfect tangency is maintained over the entire range that should be encountered with ordinary phonograph records.

Any opinion as to improvement in sound reproduction with the B-J arm would be subjective, but there is no gainsaying the obvious advantage of having the stylus always tangent to the groove with an arm which is short enough to be practical in a home system. Broadcast and studio equipment has normally relied on a long arm to approach a minimum tracking error, and many a music lover has insisted on using the long arm for this reason. But many users have been restricted heretofore to a short arm, due to space limitations, and they might well find that the B-J arm will provide the tangency that is considered most desirable.

GENERAL ELECTRIC A1-901 RECORD FILTER

While most preamplifiers provide many curves suitable for the present wide variety of record characteristics, many users have been limited to a single bass compensation curve such as that furnished by such preamplifiers as the G.E. UPX-003A which provides only a fixed boost at the low end, with the turnover usually set at around 500 cps. This is satisfactory for the average LP characteristic, and is nearly correct for the RIAA curve, but does not match any of the foreign curves, nor does it give completely correct equalization for 78-rpm records. Furthermore, as the user's system is improved, he may find that increased high- and low-frequency response may show up other defects, such as rumble or needle scratch, or even possibly some increased distortion from records which may not be entirely free from higher-frequency distortion products.

The A1-901 Record Filter, shown in

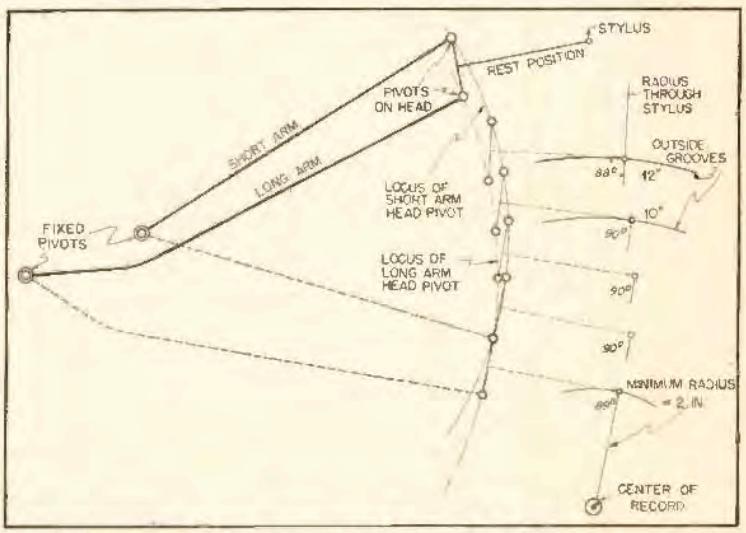

Fig. 7. That tangency is maintained over the full recorded area of a 12-inch record is shown by this diagram which represents the B-J arm in various playing positions.

Fig. 8, is a convenient answer for this situation, when the cartridge used with the music system is of the familiar G.E. variable reluctance type. The record filter is constructed in a small moulded plastic case, so that it may be used separate from the normal installation or perhaps with an inexpensive record player, for those who might wish to mount the unit permanently in a cabinet, the chassis and front panel may be removed from the case and mounted in any other desired panel up to ¾ in. thick. The filter does not require any power supply, nor does it use any tubes—being what is called a "passive" equalizer.

However, when used with a preamplifier that already provides a fixed turnover of approximately 500 cps and a bass boost of 17 db at 50 cps—the usual equalization for a non-variable preamp—the filter provides six different characteristics as well

Fig. 8. The New General Electric Record Filter in its plastic cabinet.

as low- and high-pass filtering action. The center or COMPENSATOR control adjusts the response to flat, European 78, London LP, Old AES, RIAA, and Columbia LP characteristics. The panel is etched to show the characteristic in use, as well as the amount of rolloff at 10,000 cps—since this is the usual manner of indicating the high-frequency characteristic. Thus on FLAT there is no rolloff, or 0; for EUR 78 the response is down 6 db at 10,000 cps; for LON LP, it is down 10; for OLD AES, 12; for RIAA, 14; and for COL LP, 16. The turnover frequency is changed simultaneously, together with the bass rolloff required for COL LP and LON LP. The various curves are shown in *Fig.* 9.

The filter section is particularly interesting, since it provides flat transmission at both high and low ends, or three degrees of cutoff at each end. In the 80-cps position, practically any rumble and even some 60-cps hum is reduced appreciably, with the 40- and 60-cps positions providing somewhat less low-end cutoff. Similarly, the high-end cutoff reduces transmission above

(*Continued on page 66*)

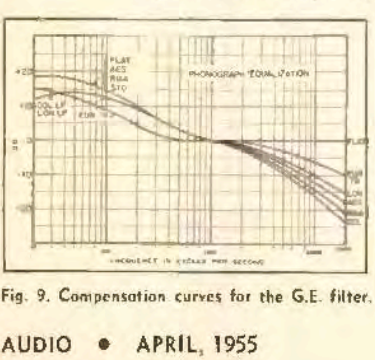

Fig. 9. Compensation curves for the G.E. filter.

EQUIPMENT REPORT

(from page 49)

9000, 5000, and 3000 cps respectively. This is useful in eliminating scratch or high-frequency distortion occasionally found in some of the poorer records. The filter curves are shown in *Fig.* 10.

Figure 11 shows the circuit of the filter. Note that there are three separate controls —the low-frequency cutoff at the left, the compensator at the center, and the high-frequency cutoff at the right. The left control introduces a series capacitance of 4, 2, or 1 μf, together with a shunt inductance

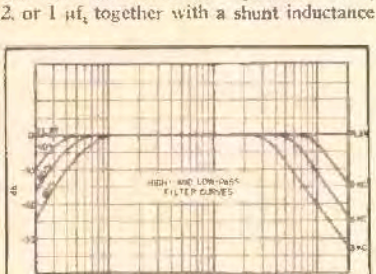

Fig. 10. Low- and high-frequency cutoff curves for the filter section.

and a suitable terminating resistance for the three positions of the switch. The two 2-μf capacitors are paralleled to make 4 μf, one is used singly to make 2μf, and the two are in series for the 1-μf position. Similarly, the high-frequency cutoff control introduces shunt capacitors with suitable terminating resistors to provide 12-db-per-octave cutoffs at the desired frequencies. The two sections of the compensator control vary the series capacitance together with the terminating resistance to provide the desired curves.

The audible effects from this filter unit are quite satisfactory, and it serves well to make the simple UPX-003A preamplifier nearly as flexible as many of the more elaborate—and more expensive—preamplifier control units. This filter is designed for use with the G.E. pickups, and would not provide the indicated compensations for other makes.

We are especially pleased to note one line in the instruction book accompanying this filter—a phrase we have often used in these pages in the nature of advice about phono equalization: Provide adequate flexibility in the reproducing system controls, and then adjust the controls so the reproduction sounds best

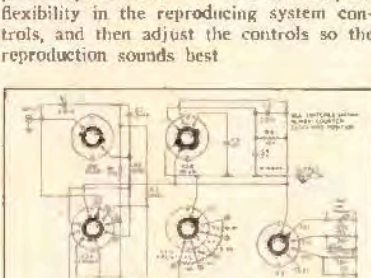

Fig. 11. Schematic of the A1-901 Record Filter.