

**MODEL HF 52
50 WATT INTEGRATED
HIGH FIDELITY AMPLIFIER**

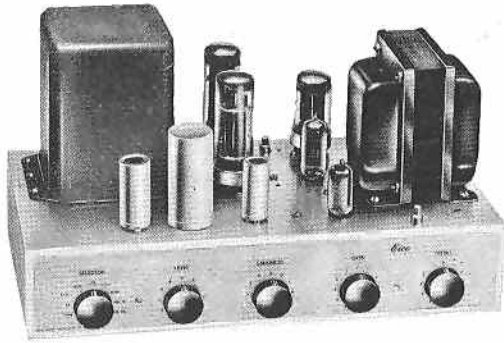
MANUAL OF INSTRUCTIONS



**ELECTRONIC INSTRUMENT CO., INC.
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Price \$1.00

HF 52-1



MODEL HF 52

50 WATT INTEGRATED

HIGH FIDELITY AMPLIFIER

general description

GENERAL

The Model HF52 is the least expensive means of achieving the highest audio quality, resulting from high power obtained without distortion throughout the full audio spectrum, virtually absolute stability, and flawless transient response. Despite the fact that the preamplifier-control section is placed on the same chassis with a high power amplifier, engineering of the layout has eliminated any

undesirable couplings. The hum and noise level achieved is on a par with that of well-designed lower power integrated amplifiers and will be found entirely satisfactory even by critical listeners. The output stage and the output transformer, the type of power amplifier circuit, and the power supply components are identical to that used in the Model HF50 power amplifier.

FEATURES

1. Extremely low distortion preamplifier-equalizer circuit, equalizing entirely by feedback. Selection from five equalizations permits correct compensation for practically any microgroove or 78 rpm recording.
2. Extremely low distortion printed circuit feedback bass and treble tone controls. These controls do not affect the volume or interact with each other, and also provide a true "flat" position. Turnover frequency in both bass and treble varies with the degree of boost or cut, making it possible to bring up the extreme lows or extreme highs affecting the mid-range as well.
3. DC superimposed on all tube filaments to eliminate cathode-heater leakage as a source of hum.
4. A Centralab printed-circuit, prewired loudness control (Compentrol) plus a separate level control, both on the front panel, permits an infinite selection of loudness "contours" at any desired listening level. By pre-setting the panel level control as instructed, the loudness control will automatically provide correct Fletcher-Munson loudness compensation at the setting which gives the desired listening level.
5. Four high level and two low-level inputs enable this amplifier to accommodate tv, tape recorder, AM-FM tuner (or separate AM and FM tuners), ceramic or crystal cartridge, as well as any leading magnetic or FM phono pick-up without the necessity of component changes. No cross-talk; selector switch grounds all inputs but one selected.
6. Low impedance cathode follower tape-output unaffected by any controls.
7. The use of a cathode follower at the high level inputs makes it possible to provide the high input impedance required for flat frequency response and high output from the new, high quality, self-equalizing ceramic cartridges.
8. The output of the preamplifier-control section and the input to the power amplifier section have been brought out to separate receptacles on the rear chassis apron for the use of people who wish to employ an electronic cross-over network and an additional amplifier (or amplifiers).
9. The level control is placed at a low-impedance point in the amplifier (after the tone controls) so that the square wave response is unaffected by the level setting. This is possible because the cathode follower input circuit will not distort the signal even at peak signal voltages far in excess of the value of signal that will develop rated output power. Another benefit of this arrangement is a high signal-to-noise ratio in the tone control stage.
10. The power amplifier features a cathode-coupled phase inverter, which provides drive for the output stage from equal and comparatively low impedances and direct coupling from the preceding first voltage amplifier stage. The importance of the cathode-coupled phase inverter is that it provides forced balance over the entire frequency and dynamic range.
11. EL34/6CA7 output pentodes in a push-pull Ultra-Linear output stage operating with fixed bias.
12. Extremely high quality output transformer*, employing grain-oriented steel, extensively interleaved windings, and fully potted in a seamless steel case. 4, 8, and 16 ohm speaker connections are provided. (*Chicago Standard)

13. Heavy-duty power transformer. 125 and 117 volt primary taps permit trouble-free operation in high line voltage areas.

14. Extra-rugged GZ34 rectifier tube with indirectly heated cathode to eliminate high starting voltage on electrolytic filter capacitors, and to delay the application of the full B+ voltage to the amplifier tubes until they have warmed up.

15. Fuse and panel mounted fuse holder.

16. Control of bias voltage for output tubes.

17. DC balance adjustment of output tubes; convenient metering terminals provided.

18. Switched and unswitched convenience outlets.

19. Heavy gauge cadmium plated steel chassis; baked metal-lustre statuary bronze finish. Brushed brass control plate.

20. Premium quality audio and rectifier tube types used exclusively.

21. Optional matching decorative cover.

SPECIFICATIONS

Output Power: 50 watts continuous; 100 watts peak

* IM Distortion (60 & 6000 cps at 4 : 1): below 1% at 50w; 1/2% at 20w

* Total Harmonic Distortion: below 1% 20 cps - 20kc within 1 db of 50w

* Frequency Response: 1w: ± 0.5 db 6 cps - 60kc; ± 1.5 db 6 cps - 100kc
50w: ± 0.5 db 15 cps - 60kc; ± 1.5 db 15 cps - 100kc
 ± 0.1 db 20 cps - 30kc at any level from 1mw to 50 watts
No peaking or raggedness outside the audio range.

* Square Wave Response: 20 cps - 20kc essentially undistorted; 3.5 us rise-time.

Inverse Feedback: 20db

Stability Margin: 15db (virtually absolute stability)

Damping Factor: above 12, 20 cps - 20kc; 17 at 1kc.

Speaker Connections: 4, 8, and 16 ohms.

Tone Control Range: at 10kc - 15db boost and 15db cut; at 50cps - 15db boost and 15db cut.

Phono Equalizer Curves: RIAA (New AES, NARTB, ORTHO, RCA), Columbia (original LP), London, American 78, European 78.

Sensitivity: Phono (magnetic) — 8 millivolts for rated output on PHONO LO input; 27 millivolts on PHONO HI input.
Tuner, TV, Tape, Auxiliary — 0.6 volt for rated output.

Input Impedances: PHONO LO & PHONO HI - 47K; AUX, TUN, TV, TAPE - 2.2 meg.

Tape Recorder Output: 1000 ohms; unaffected by tone, loudness, or level controls.

Hum & Noise Level: Mag. Phono — ** 60db below rated output (RIAA, max. gain, and tone controls set at flat position).
Tuner, etc. — 75db below rated output (max. gain and tone controls set at flat positions).

Power Source: 117V, 60cps; draws 150VA at no signal, 200VA at signal developing rated 50w output; 250VA at signal developing peak 100w out (overload).

Tubes: 2- EL34/6CA7, 2- ECC83/12AX7, 1- ECC90/6C4, 1- 6CG7, 1- GZ34.

Size: HWD: 8 1/2" X 15" X 10".

Weight: 30 lbs.

* Measured from high level inputs with tone controls set at "flat" positions and loudness control at maximum (no effect).

** Includes effect of 16db boost at 60cps due to RIAA compensation.

mechanical installation

GENERAL

a) **HEAT DISSIPATION (VENTILATION):** In common with other electronic equipment, the HF-52 produces a great deal of heat in normal operation. Unless continuous and adequate air flow is obtained around the heat producing elements, these elements will over-heat and their useful life will be greatly curtailed.

It is useful to understand the process of convection where-by heat is removed in judging the suitability of a location. Air heated by the heat-producing elements expands and rises; cool air is drawn from beneath to take the place of the heated air. In this manner, a stream of air is set in motion which continually removes heat from the amplifier. (In particular, we are mainly concerned with the major heat-producing elements; the two EL34 output tubes and the GZ34 rectifier tube.) If there is any impediment to or constriction of the air flow, the essential process of heat removal will be adversely affected.

Adequate ventilation will be provided if the amplifier is installed in an open-back console provided that the top of the amplifier is spaced at least two inches below any shelf mounted above it. If the cabinet is enclosed at the rear, provide several large holes or slots as low down and as high up in the cabinet back as possible. As an alternate, holes may be provided in the sides, bottom, or top of the cabinet. The important thing to remember is that effective ventilation requires provision for cool air to enter at the bottom and hot air to leave at the top.

If the amplifier is not installed in a console, it should be situated preferably on an open surface, not on a shelf of a bookcase. An attractively finished matching cover* for the HF-52 is available which will provide a "finished" appearance as well as protection when the amplifier is not installed in a console. Four rubber feet are also provided so that the amplifier will not mar the surface of furniture on which it is placed. (*Model E-1)

b) **EASY ACCESS TO CONTROLS:** Mount the amplifier at a height which will permit easy manipulation of the controls. Tuner controls should be located nearby.

c) **ACCESSIBILITY TO PARTS:** Tubes are the most frequently replaced items in electronic equipment. If the amplifier is installed in a console, sufficient space should be allotted to reach and remove any tube in the amplifier. Furthermore, input and output terminals of the amplifier should be accessible to permit easy interchanging of system components for comparison, and connection or disconnection of a portable tape recorder which is stored away when not in use. If antennas are strung around the back of the console in which the amplifier is installed, arrange them so they will not interfere with access to the amplifier.

d) **ACOUSTICAL ISOLATION:** If amplifier and speaker are installed in the same cabinet (not recommended), pro-

vide sufficient separation to minimize mechanical speaker vibration reaching the amplifier. The minimum separation is about one foot.

CONSOLE MOUNTING

a) Operations on console front panel preliminary to amplifier mounting: (1) Tape the panel template provided to the face of the console so that the top of the mounting surface line on the template is level with the top of the amplifier mounting shelf. (2) Use an awl or a nail to pierce the centers of the five 5/8" diameter holes for the controls and the two small holes for mounting the control plate, to transfer their locations to the console panel beneath. (3) Remove the panel template. (4) Drill the holes for the panel controls only (the two small holes which have been marked are for wood screws).

b) Amplifier mounting in console: (1) Pull off the control knobs (a second set of knobs with long shanks has been provided for console installation). (2) Remove the control plate, which is attached to the chassis apron by two screws. (These may be discarded since they are unsuitable for attaching the control plate to the console panel and two #4 X 3/8 wood screws have been supplied for this purpose.) (3) Fasten the control plate to the console panel with the 2 #4 X 3/8 wood screws. (4) If the rubber feet have been inserted in the bottom plate, remove them. (They may be pried out with a thin screwdriver.) (5) Place the unit on the mounting shelf and slide it as far forward as possible, so that the controls penetrate the panel holes as far as possible. (6) Place a long shank knob on each control, pressing each knob toward the chassis firmly so that each control shaft enters fully into its knob. (7) Draw the chassis back evenly and carefully until the back rims of all the knobs are equally spaced from the control plate about 1/8". (8) With a sharp pencil, placed with its point directly against the edge of the lower surface of the bottom plate, draw the outline of the bottom plate on the chassis shelf. (9) Now remove the knobs and take the chassis off the shelf. (10) Remove the 10 screws which fasten the bottom plate to the chassis. (11) Place the bottom plate exactly in the outline drawn on the shelf (bumps facing up) and mark the positions of the two holes on the left side and the two holes on the right side. (12) Remove the bottom plate and drill each of the marked holes on the shelf to a diameter of 1/4". (13) Refasten the bottom plate to the chassis, with the 6 #8 X 3/8 screws previously removed, using the 3 holes at the rear and the 3 holes at the front of the chassis. (14) Replace the chassis on the shelf, positioning it exactly in the outline previously drawn, and restore the knobs. This time make sure that the indicator dot on each knob agrees with the control position. (15) From the bottom side of the shelf, insert a #8 X 1" screw with a 1/2" flat washer against the head through each of the four left and right side holes. These screws engage the stamped nut over each hole on the chassis flange and when tightened secure the chassis to the shelf.

electrical installation

GENERAL

a) **SPEAKER CONNECTIONS:** To connect your speaker to the amplifier properly, you must know its rated impedance. This may be read off the speaker nameplate. Connect one speaker lead to the terminal on the rear apron marked "G" and the other speaker lead to the nearby terminal designated by the rated speaker impedance (4, 8, or 16 ohms). Plastic-covered lamp cord may be used for distances up to 50 ft. with little power loss. For shorter distances, TV antenna lead can be used, particularly if it is desired to run the speaker lead under a rug.

If it is desired to use two similar or identical full-range speakers of the same rated impedance (either 8 or 16 ohms only) for better sound distribution, connect one speaker lead of each pair to "G" and the two remaining leads to the terminal with a number equal to half of one of the speaker's rated impedance. (It may be necessary to "phase" the two speakers by reversing both of the leads from one of the speakers.) This may not be done if each of the speakers is designed for reproduction of a different part of the audio spectrum (woofer-tweeter combinations) in which case a cross-over network is required which connects to the amplifier with only one pair of leads.

b) **PHONO INPUT:** The shield lead from your phonograph should be provided with a shielded "phono-type" plug. The input jack on the amplifier into which this plug should be inserted depends on the type of cartridge employed. Specific instructions follow.

GE Variable Reluctance or Professional, Audak, Recoton, Electrosonic & transformer, Fairchild & transformer, Electro-Voice 84SM: Connect to LO phono input.

All Pickering, Miracord, Fentone, Weathers & Adaptor plug P631 (Weathers): Connect to HI phono input.

Sonotone 3P or 3T, Electro-Voice EV84S, or any high quality ceramic or crystal cartridge self-equalizing as per the RIAA curve: Connect to AUXiliary phono input. Note that the equalizer preamplifier circuit is not effective in this case.

c) **HIGH LEVEL INPUTS:** Four high level input jacks designated as Tuner, TV, Tape, and Auxiliary are provided for connection of tuners, tv receivers, tape recorded playback, and ordinary or RIAA equalizing crystal or ceramic phono cartridges without adaptor. A shielded cable with a shielded "phono-type" plug should be used to connect each of these sources to the corresponding amplifier input jack. Unless the source has a low-impedance output such as a cathode follower (with which up to 50 ft. of cable can be used), use the shortest possible connection and low capacity shielded cable (cable having as low as 25 mmfd capacitance per foot is available).

If the tuner employed has a volume control to adjust the output, set this control as follows. Turn the amplifier

LEVEL control to minimum and the LOUDNESS control to maximum. Play any recording on your phonograph and turn up the level control to obtain an ordinary listening level. Without touching the LEVEL or LOUDNESS controls, turn the SELECTOR to TUNER and adjust the volume control on the tuner to obtain approximately the same loudness level as was obtained from the recording. In the case where the tuner has no output level control and also in the case of the other high level inputs, the independent LEVEL control on the front panel of the amplifier permits adjustment of the level when changing inputs.

c) **TAPE OUTPUT:** A shielded cable (up to 50 ft. may be used) with a shielded "phono-type" plug should be used to connect from the TAPE OUTPUT jack to the input of the tape recorder. Any input chosen by the SELECTOR is fed out to the tape recorder through this jack. Phono inputs fed in at PHONO LO and PHONO HI are of course equalized according to the equalization selected but none of the inputs are affected by the level, loudness, and tone controls.

d) **POWER CONNECTIONS:** The power cord of the turntable and tuner may be inserted in the convenience outlets provided on the rear chassis apron. The receptacle marked 117 VAC is intended for use primarily with a phonograph and provides 117 VAC regardless of whether the power switch of the amplifier is turned on or off in order to protect the phonograph mechanism. The receptacle marked 117 VAC Switched 150 watts is "live" or "dead" depending on whether the amplifier power switch is turned on or off and is intended primarily for use with tuners. Equipment drawing in excess of 150 watts should not be plugged into this outlet.

HUM ADJUSTMENT

a) After checking the amplifier for proper operation, remove all input cables to the amplifier and make the following control settings which hold throughout the process of hum adjustment: SELECTOR at RIAA, LEVEL & LOUDNESS to 10, TREBLE control at -5, BASS control at 0. Next proceed as follows: With your ear held close to the speaker, insert the amplifier power plug into the wall outlet and listen to the hum level. Now pull out the plug and reinsert it with the prongs reversed and listen again. Choose the prong position which gives the least hum. Now connect the tuner input connector to the amplifier input jack, and with tuner set between stations and the tuner volume control set a minimum, do the same with the power plug of the tuner, using the 117 VAC SW convenience outlet on the amplifier if desired. Finally connect the phono input connector to the amplifier PHONO LO or PHONO HI input as is required (turntable off and pickup arm at rest position) and do the same with the power plug of the turntable, using the 117 VAC convenience outlet on the amplifier if desired. When all of this is completed, adjust the hum balance control on top of the amplifier chassis for least hum.

operation

PRELIMINARY: Be sure all tubes are firmly seated in their sockets and that the tube shields are making good contact with their bases. As initial adjustments, set these controls as follows: LEVEL at zero, LOUDNESS at ten, BASS at zero. Turn the amplifier on by turning the TREBLE control clockwise from OFF and set it at zero initially. Note that the LEVEL, LOUDNESS, BASS and TREBLE controls have no effect on the TAPE OUTPUT.

LISTENING TO PHONOGRAPH: Set the SELECTOR to one of the record equalization positions on the dial. Doing so automatically selects the phonograph input plugged into the PHONO LO or PHONO HI input. For help in choosing the recording curve appropriate to any particular record, refer to the chart titled "RECORD EQUALIZATION SELECTION". When in doubt as to which equalization is most appropriate, use RIAA, which is the best compromise for all records. Keep in mind that while the positions offered cover most recording curves likely to be encountered, additional separate and variable bass and treble response adjustments are necessary for fully satisfactory results. These may be necessary to compensate for the over-all characteristics of your audio system (including room acoustics), inexact matching of the actual recording characteristic by any of the equalizations provided, and above all, the particular tastes of the listener.

LEVEL & LOUDNESS CONTROLS: Simply stated, the purpose of the LOUDNESS control is to provide compensation for the increasing inefficiency of the human ear in hearing bass and treble with decreasing volume level. The LOUDNESS control, as it is turned counter-clockwise from maximum clockwise rotation, not only decreases the volume but increasingly emphasizes the bass and treble according to the Fletcher-Munson curves (curves developed from a statistical study of this effect). An uncompensated LEVEL control is also provided to "set" the LOUDNESS control for proper operation in any system, and also for the purpose of adjusting the listening level when going from quiet program material to loud program material or the reverse without occasioning a change in the loudness compensation. To "set" the LOUDNESS control at any time, perform these operations in the order given to avoid blasting or possible damage to speakers of low power-handling capacity: a) Turn the LEVEL control to zero; b) Turn the LOUDNESS control to ten; c) With high level orchestral program material being fed to the amplifier from your phonograph or tuner, advance the LEVEL control setting until a relatively loud listening level is obtained. d) Turn down the LOUDNESS control until your normal listening level is obtained with the LEVEL control set as just described. Proper loudness compensation should now be obtained at any listening level adjusted to with the LOUDNESS control. The same reference LEVEL control setting will be suitable for both phonograph and tuner listening if the volume control of the tuner has been adjusted as described in the "High Level Inputs" sub-section of the "Electrical Connections" section. When selecting inputs which do not have level

adjusts, such as tv or a crystal cartridge connected to the AUX. input, it may be desirable to set the LEVEL control to zero beforehand and then bring up the LEVEL control to obtain the desired listening level to avoid blasting.

BASS CONTROL: The plus sign on the right side of the dial indicates that clockwise rotation from the mid-point (0) increases (boosts) bass response; the minus sign on the left side indicate that counter-clockwise rotation from the mid-point decreases (cuts) bass response. There is no interaction with the TREBLE control. Start all adjustments with this control set at the mid-point (0), which is called the "flat" position since bass response is neither cut nor boosted at this setting.

TREBLE CONTROL: The plus sign on the right side of the dial indicates that clockwise rotation from the mid-point (0) increases (boosts) treble response; the minus sign on the left side indicates that counter-clockwise rotation from the mid-point decreases (cuts) treble response. There is no interaction with the BASS control. Start all adjustments with this control set at the mid-point (0), which is called the "flat" position since treble response is neither cut nor boosted at this position.

LISTENING TO TUNERS, TV, TAPE RECORDERS: With the SELECTOR switch set at TUNER, TV, TAPE or AUXILIARY, the corresponding high level input from a radio tuner, tv, tape recorder, second tuner or crystal cartridge will feed through the amplifier. Adjustment of the volume control on each source is discussed in the "Electrical Connections" section under "High Level Inputs" and again under "Level & Loudness Control" in this section.

MAKING RECORDINGS: Tape recordings may be made by connecting the recorder to the TAPE OUTPUT jack. See "Tape Output" under "ELECTRICAL CONNECTIONS". With the output of the recorder connected to the TAPE INPUT jack, turning the SELECTOR switch to TAPE readies the amplifier for playback of the recording.

RECORD EQUALIZATION SELECTION

Records are made with boosted volume in the treble range to mask surface noise and reduced volume in the bass range to conserve groove space and reduce distortion. As there was no universally accepted standard of treble boost and bass cut in recording before Spring 1954, records of which the masters were made before this date may require any one of several different equalizations (amounts of bass boost and treble cut) by the amplifier to restore the original balance. The specific equalization required depends upon the brand of the record, and the equalization which should be used for each record brand (for recordings made before 1954) is listed in the first column to the right of the company's name in the chart below. In some cases, additional adjustment is required with the BASS control to match the

