

*The performance of
a loudspeaker system
depends as much
on the care with which
it is produced*



*as on the
design principles
by which
it operates.*



KLH RESEARCH AND DEVELOPMENT CORPORATION
30 CROSS STREET, CAMBRIDGE 39, MASSACHUSETTS



INSTRUCTION MANUAL

**KLH
Model
Nine**
dual full-range
electrostatic
loudspeaker



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INTRODUCTION

Your KLH Model Nine consists of a balanced pair of full-range, bi-laterally symmetrical electrostatic loudspeakers. It is intended to be used in stereo systems, but can also be used with a monaural electrical signal source by connecting the signal input terminals in parallel. Careful design, frequent and critical testing, and the use of only the finest materials insure prolonged physical integrity and trouble-free operation. The best overall performance obtainable from this extraordinary pair of loudspeakers will be most likely to ensue if you will read this instruction manual carefully.

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INSPECTING FOR DAMAGE

Your Model Nine is shipped in two separate cartons, the larger of which contains the two speaker panels, two AC cords, a set of two brackets, and two sets of wood screws (20 small brass screws for attaching brackets, and 12 large ones for mounting power supplies on the bases of the speaker panels). The smaller carton contains the two power supplies.

DO NOT THROW AWAY THE CARTONS OR PACKING MATERIALS. They should be saved in case the speakers should ever have to be returned for repairs, or transported elsewhere.

When you unpack your Model Nine, inspect it for damage. Each Model Nine leaves the plant in perfect condition. Therefore, any visible damage must of necessity have occurred in handling after it left our shipping platform. If any damage is evident, the following procedure should be followed.

1

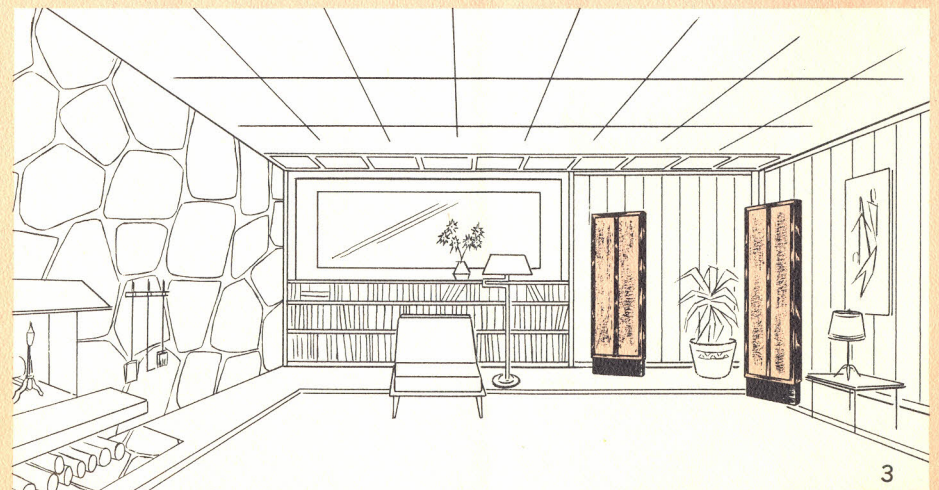
If the Model Nine was received via public transportation, please read the **SERVICING SECTION** of this manual, and follow instructions for returning equipment to the KLH factory for repairs.

2

If the Model Nine was received directly from a dealer (if it was not shipped to you via a public transportation agency), it should be returned to him for inspection and possible replacement or repair at KLH.

GENERAL

Each of the two full-range loudspeaker systems that comprise the Model Nine is different from all other loudspeakers, including other full-range electrostatics, in that it operates as a dipole acoustic source over the entire audible frequency range. In practical terms, this means that in comparison with other loudspeakers the acoustical properties of the listening room are less important in determining the overall response of the system that includes the pickup, amplifiers, loudspeakers, and listening room. The unique performance of these loudspeakers is, however, only partially attributable to this particular property. It is due to the magnitude of their radiating areas as well, which are large compared to all other loudspeakers, and to the absence of electrical, mechanical and acoustical resonances. The present design embodies a high degree of refinement of a number of new concepts, which originated with acousticians who are now at KLH. Some of these con-



cepts were used in the first full-range, push-pull electrostatic loudspeaker capable of producing high acoustic pressure levels, which was exhibited during a meeting of The American Physical Society in January, 1953.

The Model Nine introduces almost no distortion at all in the process of converting electrical signals to acoustic signals, throughout its very wide frequency range, and therefore tends to emphasize deficiencies in the performance of associated equipment. It is incumbent upon the user to employ only very high quality auxiliary equipment, and to insure that program material is of commensurate quality, if optimum enjoyment is to be derived.

NOTE

Low-frequency noise (turntable rumble, tape flutter, record "thumps"), even if it is inaudible, must be kept to a minimum. Whereas such noise will cause the voice coil of a good electrodynamic woofer to wander or bob around within its air gap, in the Model Nine it will tend to saturate the core of the signal step-up transformers. The acoustic result in both instances is the same, i.e., the response at low audible frequencies tends to become intermittently non-linear, and audible distortion tends to occur on high-level passages, when these include low-frequency components.

All parts of the Model Nine will operate satisfactorily and continuously under normal conditions in the home or studio. Care should be taken, however, not to expose any portion of the system to temperatures in excess of 110° Fahrenheit for prolonged periods of time. None of its component parts are affected by the moisture content of the air except when the relative humidity approaches 100% at temperatures near 100° Fahrenheit. Any Model Nine so exposed may suffer a temporary degradation of performance, but generally will need only to be left in a suitable environment for a short period of time to regain fully its original performance.

N. B. — Do Not expose the Model Nine to spray of any kind, including the mist from aerosol bombs or manually sprayed cleaning agents, insecticides, deodorizers, etc. If the rear grille needs cleaning, it should be done only with a damp cloth.

OPERATION



Figure 1: Installing the power supply on the terminal board at the base of the panel. Both locating pins (indicated by arrows) should be engaged at the same time.

Setting Up

A medium-size Phillips-head, and a small Phillips-head screwdriver are the only tools required for assembly. After each panel has been laid face down on a non-abrasive surface, such as a rug, so that the terminal board on the black base faces UP, the black satin-finish can which houses the bias supply and step-up transformer network can be installed with the large round-head wood screws that are packed within the top of the large carton.

NOTE

*The power supplies are interchangeable; however, the proper installation of the cans on each panel is such that the labels identifying "Right" and "Left" face UP when the panel is in an upright position. An inspection of the geometry of the base terminal board and the terminal boards in the cans will disclose clearly which panel is to be equipped with the can labelled "Right" and which one is to have the can labelled "Left" installed on its base. The mating of the plugs and sockets of the two terminal boards is automatic when the locating pins are inserted into the second hole from the upper end of the flange on each side of the can. Make sure that **BOTH** locating holes are over the locating pins before lowering the cans into place. **DO NOT PLUG IN THE AC CORDS TO ENERGIZE THE BIAS SUPPLY UNTIL AFTER THE CANS HAVE BEEN INSTALLED ON THE BASES OF THE PANELS.***

Placement

The set of brackets packed in the larger carton are to be used in attaching the pair of panels to each other in a flat 'V'. The long, narrow bracket ('boomerang') is installed on top of the frames, by using the pilot holes that

are to be found on one of the upper corner edges of each panel. The nearly-square, bent bracket ('rooftop') is attached to the rear of the inside, adjacent ends of the bases. Such a 'V' formation provides a high degree of physical stability, which may be desirable in the presence of children or in other situations in which there is a probability that isolated panels might be knocked over.

Although the 'V' arrangement provides good stability, most purchasers of the Model Nine will probably want greater physical separation between the two sound sources, to achieve a more enhanced stereo effect. Experience indicates that **NO SPECIFIC PAIR OF POSITIONS SHOULD BE EXCLUDED**. The optimum positions of the panels can be ascertained only by experimentation. It will depend on a number of factors, among which are the size and configuration of the room; the type, amount, and location of acoustically absorbent

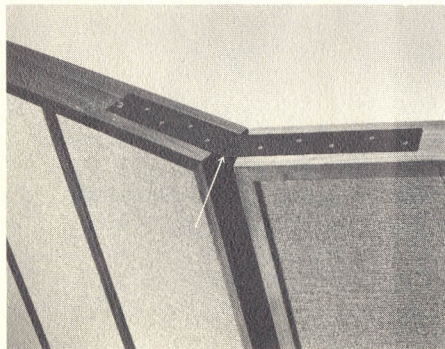


Figure 3: The 'boomerang' bracket (arrow) is mounted on the tops of the panel frames, using predrilled holes.

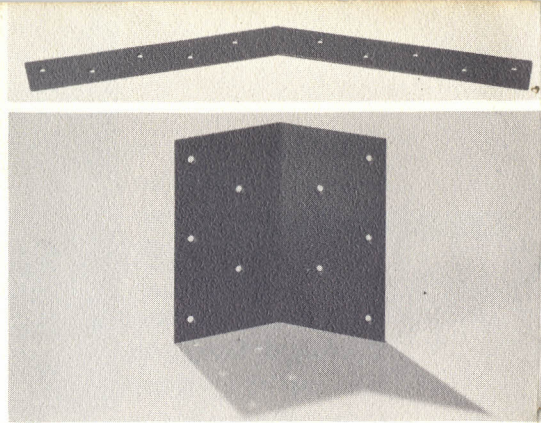


Figure 2: Brackets for joining the two panels in a flat 'V'.

materials; the position of the listener within the room; the type of program material, and the techniques used in recording and transmission; and very importantly, the individual preferences of the listener. In arriving at the best positions for the panels, it should be kept

in mind that the angle of each panel with respect to the listener is as important as its location.

A support is available on special order which provides greater stability when the Model Nine panels are separated.

Placement of a panel parallel with and close to a wall causes a loss of low-frequency response. This is usually, but not necessarily, undesirable. If the panels are set into a wall, however, with the back blocked, the response is necessarily degraded to such a degree that

no reason other than appearance could be advanced in argument for the purchase of so expensive a loud-speaker system. On the other hand, if the panels are set into walls (or a single wall) in such a way that each speaker is free to radiate both to the front and to the rear, without encumbrance, there is no degradation of response.

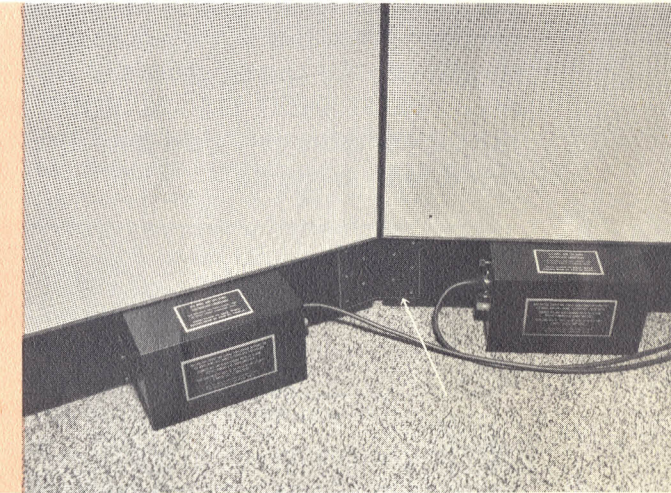


Figure 4: The 'rooftop' bracket (arrow) is mounted on the rear of the panel bases using predrilled holes.

NOTE

Although no special precautions need be taken other than those ordinarily imposed when high-impedance devices are placed in operation, it should be pointed out that the panels should be located so that they cannot be reached by rain or salt spray. For other essential precautions, see note on page 4.

When a first approximation to final loudspeaker placement has been made, connect the RED and BLACK input terminals of each can to the 16-ohm and ground (or common) terminals respectively of the stereo amplifier or amplifiers. For monaural operation, tie RED to RED and BLACK to BLACK, and connect to the 8-ohm output terminals of the amplifier, with BLACK going to ground (or common). When practicable, both AC cords, after having been plugged into the motor base receptacles located near the signal input terminals, should be plugged into a common extension cord, which in turn should be plugged into one of the switched outlets on the preamplifier or power amplifier. When this is not practicable, both cords can be plugged into the nearest outlet and left plugged in permanently. PLUG INTO 110-120 VOLT 50 to 60 CYCLE AC only. Within a very short time after turn-on the Model Nine is ready to operate.

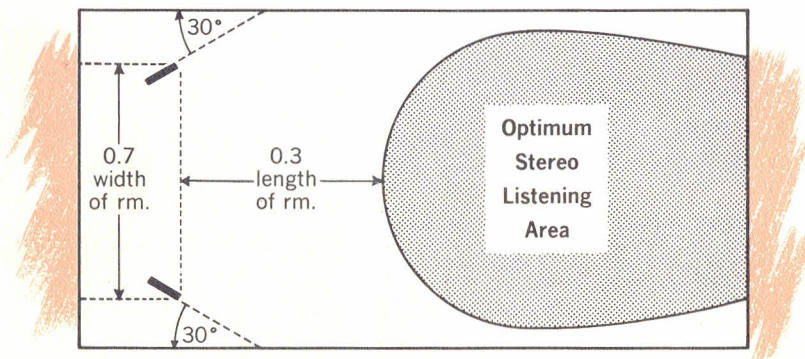


Figure 5: Diagram showing positions and angles of the two panels in a typical listening room for best stereo performance.

When the Model Nine is used with a "low-level" phonograph pickup (this is the case in most installations), a wire should be run from the preamplifier chassis to a good earth ground. A radiator, water pipe, or grounded electrical conduit will do. The wire need not be heavy or insulated. Its function is to prevent electrical feedback from the loudspeaker to the pickup circuit. Its installation is generally desirable regardless of the type of loudspeakers used,

but the probability of its being essential to the optimum performance of a system is greater when electrostatic loudspeakers are used, since they contain an additional stage of electrical amplification in the form of a signal step-up transformer.

A choice for the final placement of the two panels can be made by playing program material that is representative of that which will ordinarily be listened to. In general, if the panels are separated, the area of good stereo effect can be enlarged by "toeing in", as indicated by the sketch of a typical installation in Figure 5.

NOTE

Since each panel of the Model Nine operates uniquely as a dipole acoustic source throughout its full frequency range, the area in a given room within which a good stereo effect is produced is much greater than is the case when conventional non-dipole loudspeakers are used, and "toeing-in" merely serves further to enhance this effect.

Signal Power Requirements

A peak acoustic pressure level of approximately 105 db, which corresponds to the maximum level heard in about the fifth row of the orchestra in Symphony Hall in Boston, Mass., U.S.A., can be produced with a Model Nine in a room that is moderately lively, i.e., equipped with only a rug and drapery along one wall, having a volume of approximately 3,000 cubic ft., when each panel is connected to the 16-ohm output terminals of an amplifier that is capable of delivering 40 rms watts of undistorted output power into a 16-ohm resistive load. With this particular set of conditions as a reference, estimates of power requirements for one's individual taste can be deduced by considering that power requirements rise and fall with the required acoustic pressure levels, with the amount of acoustically absorbent material in the room, and with the

volume of the room. For each 3 db increase in required pressure level, the input power must be doubled; and a corresponding doubling of power is required, if room volume is doubled and a 3 db decrease in listening level is to be avoided. The quantitative effect of absorbing materials is less susceptible of definition. Because its effect is frequency selective, and because most absorbent materials are most effective in the upper regions of the audio spectrum in which the music power density is not a maximum, the presence of such material may require the careful setting of tone controls, but in general will not require an increase in power input.

NOTE

UNDER NO CIRCUMSTANCES SHOULD A POWER AMPLIFIER CAPABLE OF DELIVERING IN EXCESS OF 100 WATTS RMS (200 WATTS PEAK) INTO A 16-OHM RESISTIVE LOAD BE USED ACROSS THE INPUT TERMINALS OF EITHER PANEL OF THE MODEL NINE. ALTHOUGH GENERALLY NO DAMAGE WILL OCCUR EXCEPT TO THE WIRING (WHICH IS NOT DESIGNED FOR EXCESSIVE VOLTAGES) WHEN VOLTAGES IN EXCESS OF THE IMPLIED 40 VOLTS RMS (56 VOLTS PEAK) ARE APPLIED, THE NECESSARY REPAIRS WOULD REQUIRE THE RETURN OF THE PANELS TO KLH. REGARDLESS OF POWER AMPLIFIER CAPABILITIES, NO SINUSOIDAL SIGNAL IN EXCESS OF 12 VOLTS RMS SHOULD BE APPLIED FOR PROLONGED PERIODS ACROSS THE INPUT TERMINALS OF EITHER PANEL, SINCE THE CROSSOVER NETWORK COMPONENTS ARE NOT DESIGNED TO OPERATE WITH AN AVERAGE POWER INPUT IN EXCESS OF 10 WATTS (12 VOLTS RMS).

SERVICING

If upon delivery the Model Nine seems to be undamaged but fails to operate when set up in accordance with the foregoing instructions, please return it to your dealer for inspection and possible replacement or repair at KLH. However, if it was delivered to you via a public transportation agency, please follow the instructions given below for returning the system or parts thereof to the factory for repairs.

If your Model Nine works properly when first installed but appears to become defective at a later time, please re-read the OPERATION section of this manual. If the manual does not provide a clue to the cause of poor performance, or if the system has been damaged during or after installation, or does not work at all, please follow the procedure outlined below:

1

If the apparent defect occurs within the two-year warranty period, please write to KLH for a RETURN AUTHORIZATION. Our service department will promptly send you either an authorization to return the system or portions thereof for repairs, or advice that will result in the remedy of your difficulty.

All repairs that fall within the scope of KLH obligations under the terms of the warranty will be made free of charge. If our inspection clearly determines that any necessary repairs are not covered by the warranty, a minimal charge will be made. When such a repair charge covers damage in shipment, your claim for damage should be submitted to the shipper by following his instructions (see the INSPECTING FOR DAMAGE section of this manual).

2

If the apparent defect occurs after the end of the two-year warranty period, KLH will make repairs at a minimal charge if the system or portion thereof is shipped prepaid to our Service Department.

3

To insure freedom from damage in shipment, the system should always be packed as it was when it left KLH. If the original carton, liners, and polyethylene bags are available in good condition, ship the system or parts thereof in the original cartons. Our RETURN AUTHORIZATION will show the proper arrangement of the components and fillers in the carton. Ship by Railway Express, United Parcel Service, or other agency recommended by KLH. DO NOT SHIP BY PARCEL POST.

SPECIFICATIONS



A completely electrostatic loudspeaker system consisting of two complete full-range loudspeakers with built-in power supplies and step-up transformers. To insure adequate reproduction of very low frequencies, a total radiating area of 28 square feet is used (14 square feet in front and 14 square feet in the rear); a systematic reduction in area occurs automatically at higher frequencies to preserve an appropriate directivity at each frequency. Solid hardwood frames are less than 3" deep. Grille cloth is of unobtrusive natural boucle. Impedance is nominally 16 ohms, and is primarily resistive in audio range; max. 30 ohms, min. 16 ohms. Recommended amplifier power per section: at least 30 watts. Size: 70" H x 23½" W x 2⅞" D each section. Shipping weight: approx. 120 lbs.



WARRANTY

The Model Nine Dual Full-Range Electrostatic Loudspeaker was designed and built entirely by the KLH Research and Development Corporation. We warrant this system to be free of defects in performance, materials, and workmanship. KLH will replace free of charge any defective part and correct any defect in workmanship or performance without charge for labor. The obligation of KLH under the terms of this warranty is effective only if the defect develops in a normal installation and under normal use and service, and if the entire system, or such portion authorized by KLH, is returned intact to our factory at 30 Cross Street, Cambridge 39, Massachusetts, within two years from the date of purchase. KLH's obligation to repair without charge is effective only if the warranty card that accompanies this loudspeaker is mailed to KLH with a postmark dated not more than a week after date of purchase.

This warranty is effective only if the receiving system is properly installed and used in accordance with our written instructions. This warranty does not cover abuse, neglect, or accidental damage, and is void if our examination discloses wiring not installed at KLH or if any part of the loudspeaker has been taken apart, repaired, or altered outside our factory.

This warranty supplants any other stated or implied warranties.