

P R O J E C T



K2.S5500
OWNER'S REFERENCE



**K2**

OWNER'S REFERENCE CONTENTS

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PROJECT

**K2**

PREFACE

JBL wishes to thank you for selecting a Project K2 loudspeaker system. While the Project K2 loudspeakers are new developments, the goals behind them go back to the earliest days of the original James B. Lansing Sound Company. They represent the sum total of our research and development efforts in sound reproduction over the last half century.

With Project K2, we have labored to create loudspeaker systems with no acoustical or electrical limitations whatsoever. But it is your listening pleasure that ultimately determines how successful we are in this endeavor. It is solely in the interest of ensuring a perfect listening experience that we ask you to faithfully follow the setup and operation procedures outlined in the Project K2 Owner's Reference.

This manual exists for several purposes. As your owner's manual, it contains all necessary background information and detailed instructions for setting up your Project K2 loudspeaker system, including selecting the correct location, speaker wire, wiring scheme and amplification, and connecting the system to associated electronics. This information will be found in Chapters 3 through 7. In addition,

we have included a detailed description of your Project K2 loudspeakers (Chapter 2) so that you may become thoroughly acquainted with its unique design and technological features.

Although physically and materially imposing, the setup procedure of the Project K2 loudspeaker system is relatively simple. We urge you to read this manual thoroughly before you begin, and consult it frequently throughout the process. Considerations must be made in placing the speakers; their stature makes it imperative that you become familiar with the entire setup process in advance.

Also, we believe that the historical and technical information included will add immeasurably to your total enjoyment of the loudspeaker system. As loudspeakers, Project K2 systems are unparalleled in the field of sound reproduction. The story and principles behind Project K2 are an interesting, informative and fitting precursor to a lifetime of musical enjoyment.



LEGACY

**HISTORICAL DEVELOPMENT OF
JBL PROJECT LOUDSPEAKERS**

Of those few who seek perfection in sound reproduction, only a handful have actually achieved it. The price is always high. It is a rare occurrence indeed when an individual or group is able to triumph over the constraints of economic and technological reality just once.

At JBL, this has happened four times. In each case, the engineers were told to build the speaker system they had always wanted to build. Whatever resources were required would be made available. Thus began an ongoing investigation into new frontiers of sound reproduction, beginning mid-century in 1950 and continuing to the present day.

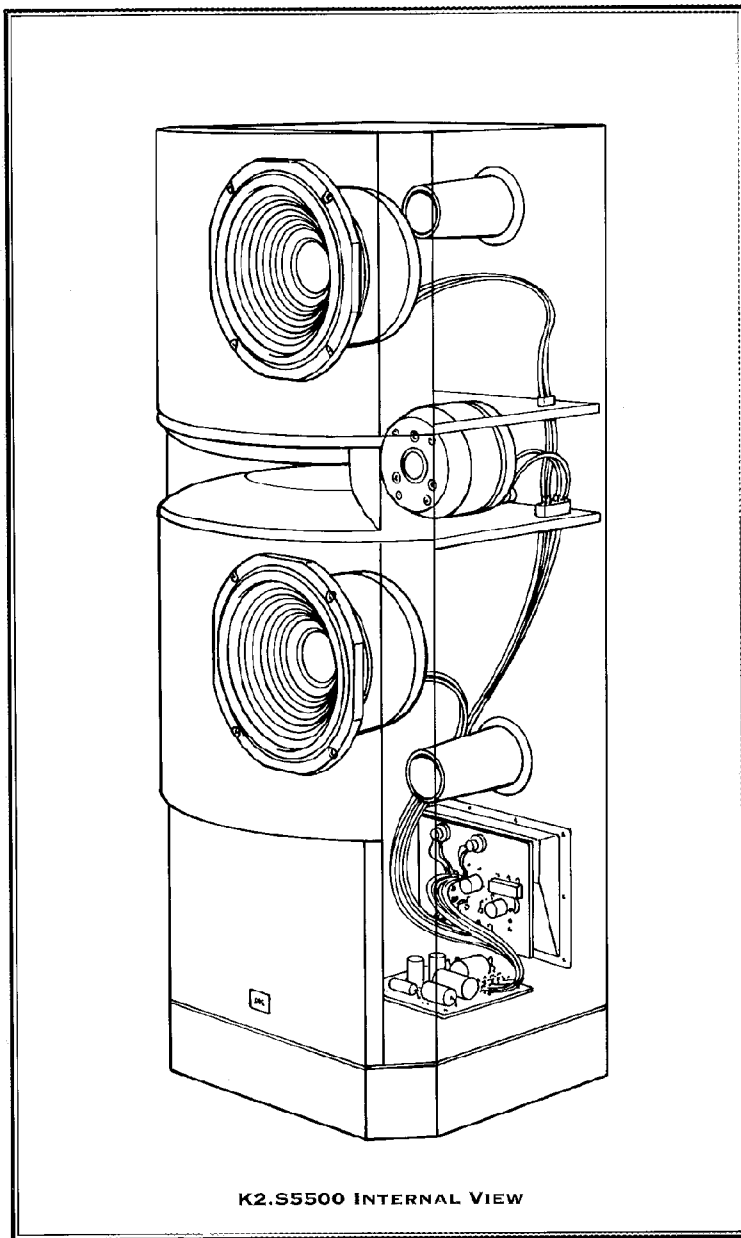
The products that have resulted from this venture are now known as the JBL Project loudspeakers. Each represents the absolute peak of every technological, material and engineering innovation available to the art and science of audio at that time, combined into a single system. For the convenience of music lovers, each has been given an easily-remembered name. They are Hartsfield, Paragon and Everest. The newest is K2.

When first introduced, the original Project K2 systems, models K2.S9500 and K2.S7500, shocked the audio world with their clarity, depth, visually stirring presence and obvious dedication to perfection in detail. Three years later, Project K2 has brought forth yet another equally impressive achievement, the K2.S5500. While less expensive than the earlier Project K2 models, this newest creation is imbued with the uncompromising commitment to perfection which has been the hallmark of all JBL Project loudspeakers.

Although differing in performance details and physical attributes, each of the Project loudspeakers has shared a common objective: to elevate sound reproduction to levels defined only by the limitations of existing materials and technology. And despite a spread of nearly forty years, all four Project loudspeakers have shared many common features—testimony to their foundation on the technology and manufacturing techniques upon which JBL was built.

**DEFINING THE PROJECT
CONCEPT**

The Hartsfield began a tradition at JBL that continues today. First, engineer a product as close to perfection as possible. When it


K2.S5500 INTERNAL VIEW

reaches that level, that is the time to make it better.

In 1954, the Hartsfield was significant not in that it represented new technology, but rather a new level of the all-technical manufacturing approach pioneered by James B. Lansing some twenty years before it. Like its Project series successors, it was a high efficiency system incorporating compression driver technology; one combining the qualities of high output, low distortion, exceptional imaging and fatigue-free listening. Most importantly, it was the first consumer-available listening system to do so.

In this respect, the Project K2 models are the most advanced and sophisticated loudspeakers in the world today. Yet their technology is deeply rooted in over 40 years of tradition. JBL's president in 1954, William Thomas, described the Hartsfield as "...the speaker system we have always wanted to build...the finest components ever made available to serious listeners."

He went on to describe the process behind his creation: "Most people who own and appreciate fine sound reproduction equipment look forward to the day when they will be able to assemble a system — without limitation — in just exactly the way they think it should be done. Periodically a manufacturer gets this same feeling. The science of acoustics has

provided us with basic principles —available to all—for achieving precision reproduction. It is only a matter of incorporating these methods into a system design, and then taking every bit of trouble necessary to build a system precisely to the design. It isn't easy, but that's the way it is done."

The Ranger-Paragon, JBL's second Project system, was the first serious attempt at a reflecting speaker system, and broke ground in the new concept of stereo imaging. Essentially two independent full-range speaker systems installed in a handsome curved cabinet nearly nine feet long, the Paragon's enclosure was treated as an extension of its transducers. In essence, the system had its own "built-in acoustics." In many respects the Paragon anticipated loudspeaker developments that would occur years—and even decades—later.

For nearly 30 years, the Paragon remained the most acoustically viable sound system for the home. Today, along with the Hartsfield, it is still the most sought-after speaker classic in the world.

In 1986, JBL introduced a new Project system that retained the Paragon's overall sense of musicality while upgrading its character by incorporating three decades of continuous development in every facet of its design. Its name reflected the pinnacle of achievement it represented: Project Everest.

For the first time, the rest of the sound reproduction chain—and not the loudspeaker or its transducers—would impose limits on overall system performance. Like the Paragon and Hartsfield, Project Everest was built around compression driver technology and addressed a more refined stereo image than was previously considered technically feasible.

Since Project Everest was introduced, sound recording technology has undergone a revolution of its own. Extremely demanding recorded signals are now the rule rather than the exception — the average source material used by the typical audio enthusiast today is superior to the best demonstration material of even just a few years ago. In overall dynamics and transient response, transducers are once again a potential weak link in the high-end audio reproduction chain.

It was in this environment that JBL set out to create its fourth project loudspeaker, Project K2, originally comprising the K2.S9500 and K2.S7500. As with Hartsfield, the puritan simplicity of a two-way system was considered the most promising design track. Advances in transducer design and low frequency alignment would make the construction of a two-way system of unprecedented physical and acoustical scale possible.

JBL engineers took the core components — the low and high

frequency drivers — and optimized them by redesigning their magnetic structures, diaphragms and framework for greater linearity, dynamic capability and transient response.

For the high frequency device, a very complex phasing plug was developed to enable more output with less interference.

Incorporating the largest titanium high frequency diaphragm ever made by JBL, the K2.S9500 and K2.S7500 are exceptionally smooth and fast, with very uniform response and virtually no coloration.

For the low frequency transducer, the extensive computer-aided engineering and design effort to develop the special port tuning employed in Project K2 low frequency modules resulted in a significant advance in the concept of state-of-the-art bass reproduction. Engineers had identified the commonly recognized advantages of a correctly designed vented, or reflex, system: namely, improved transient response, lower distortion and better control over design variables. The search to find the best possible balance of the various known tuning options led the development team to attempt to duplicate the filter response shape of the Bessel transformation. This alignment method would offer the best damping characteristics and provide extremely fast alignment, eliminating the typical "bass-reflex" sound of a ported system.



Both drive units were built using materials and precision manufacturing techniques refined from renowned JBL professional sound systems, and both are augmented by the use of neodymium magnets. The controlled coverage high frequency horn produces a pattern 60 degrees horizontally and 30 degrees vertically, and keeps this bi-radial pattern over most of its operating range.

Like Project Everest, the Project K2 systems are built around compression driver technology developed as far as permitted by present limits of the art. Advanced two-way systems in unique modular configurations, Project K2 systems, like the Hartsfield, Paragon, and Everest before them, combine the benefits of stereo imaging with clarity and definition in a loudspeaker that places no discernible limitations on the rest of the audio system. High power handling capability results in no restrictions on the types of source material. Project K2 systems have very high input sensitivity; even a relatively small high-end amplifier can provide full dynamic range without compression.

Despite its power and sophistication, Project K2 is a marriage of tradition and technology. Its two-way system approach and component design is purist simplicity. At the same time, Project K2 reflects the design, engineering and manufacturing expertise — derived and

refined through nearly six decades of experience—that are the exclusive province of one loudspeaker builder: JBL.

PROJECT K2.S5500: BROADENING THE REACH OF PERFECTION

Like the Hartsfield, Project Everest, and the K2.S9500 before it, the K2.S5500 is a two-way system. But, unlike Hartsfield and Everest, K2.S9500 and K2.S5500 utilize a “vertical twin” arrangement. That is, they employ two bass drivers per enclosure, one above and one below the high frequency driver and horn. This arrangement results in a remarkably stable acoustic center to each system, which, in turn, results in a very solid and secure stereo image.

Both of the Project K2 vertical twins are systems of high sensitivity, utilizing neodymium magnet compression drivers mounted to constant directivity horns and bass drivers with very high-powered magnetic motors. Both incorporate energy conducting bases to trap unwanted resonances, uncompromising network components and internal wiring, and are executed with an attention to detail that truly set new standards for the loudspeaker industry.

Yet, as similar as these two K2 vertical twin systems are, there are also profound differences between them. First, there is a difference in design intent. The K2.S9500 has been designed as the absolute peak of the loudspeaker designer’s art.

Nothing was spared to make this project the finest of the fine. Among the technologies that make this model the unique creation that it is are its 356 mm (14 inch) bass drivers with 100 mm (4 inch) edge-wound voice coils, vented-gap cooling, and neodymium magnets, and a beautiful and stable acrylic horn mounted to its massive compression driver — also furnished with neodymium magnets and 100 mm (4 inch) edgewound voice coil driving the unique titanium diaphragm with JBL’s exclusive diamond pattern surround. Its design, execution and performance are absolutely without limit, and its price leaves no doubt that it has achieved these lofty goals.

Hence, the development of the K2.S5500. For the first time, a JBL Project speaker has been developed that — while thoroughly steeped in the tradition of uncompromising excellence that graces every JBL Project design — moves ever so slightly toward greater affordability than did past Project systems. With the introduction of the K2.S5500, the power and beauty of K2, while still rare, can now be enjoyed by more enthusiasts than before — those who found the K2.S9500 so very desirable, yet

slightly out of financial reach.

LE125S LOW FREQUENCY DRIVER

The K2.S5500 features an all new 300 mm (12 inch) low frequency driver developed specifically for Project K2. Derived from JBL's legacy of highly powerful yet efficient bass drivers, the LE125S delivers full low frequency performance with a clarity and speed unprecedented among 12 inch units. The voice coil is 76mm (3 inch) in diameter and wound on edge from flat aluminum ribbon wire to a depth of 25 mm (1 inch)

on a thermoset composite™ form.

JBL's second generation Symmetrical Field Geometry (SFG™) is employed in the form of a copper sleeve around the pole piece. This sleeve not only reduces second and third harmonic distortion through induced flux control, but its copper composition is a more efficient conductor of heat, so it assists in dissipating heat away from the voice coil to extend power capacity. Cooling of the voice coil is further expanded with the use of a vented pole piece. The rigid frame is cast from aluminum

alloy, an excellent thermal conductor, which further acts to efficiently sink heat away from the coil and magnet assembly. The entire magnetic assembly is covered by a die cast aluminum alloy cover which is ribbed to enhance cooling efficiency even more. This combination of factors results in a bass driver remarkably free from dynamic restriction due to heat build up.

The diaphragm is fiberglass composite treated with Aquaplas for strength, speed and damping. Its outer rim is suspended by way of a half-roll polyether surround; its inner rim couples to a pleated fiber spider and the voice coil.

The magnetic circuit is composed of an oversized, extremely thick strontium ferrite main magnet coupled to a steel top plate which is 13mm (1/2 inch) thick, an unprecedented top plate thickness for a 12 inch bass driver. To eliminate the possibility of the magnetic circuit interfering with video displays, a second magnet is fixed behind the back plate to cancel the minimal amount of flux that may stray from the main magnet and magnetic circuit.

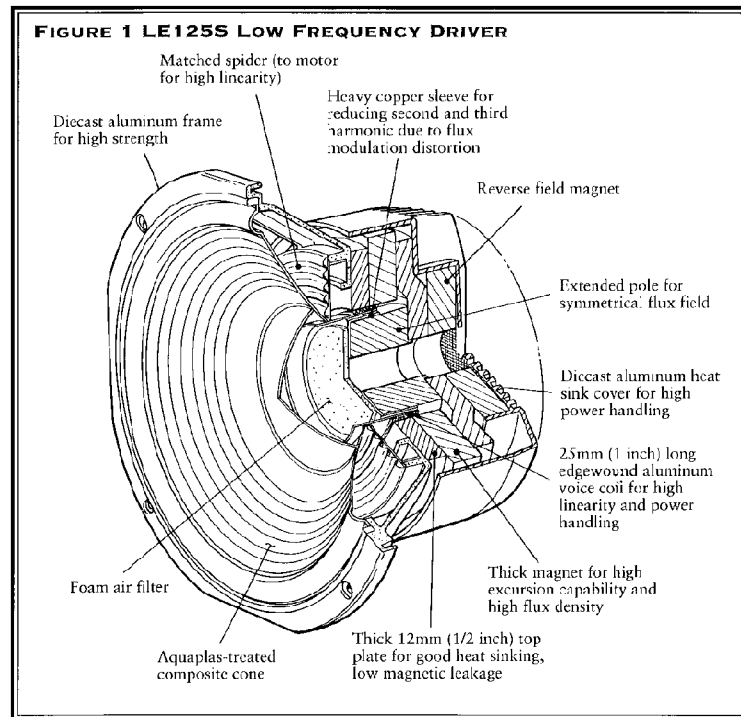
LOW FREQUENCY ENCLOSURE TUNING

Optimizing the balance of low frequency performance requires not only a properly designed and manufactured bass driver, but an intelligent and effective approach to enclosure tuning, or system alignment.

A proper system alignment takes into account the electrical analogues of the physical properties of the enclosure and vent and the physical and electrical properties of the bass driver to produce a predictable and desirable effect. JBL has decades of experience in system alignment, and many JBL loudspeaker scientists have contributed to the worldwide body of knowledge in this field. Of particular note are the historical JBL horn-loaded systems, the Hartsfield and Paragon, and the K2.S9500, which utilizes a Bessel tuning for minimum phase shift and its resulting benefit of superior low frequency transient speed.

With the introduction of the K2.S5500 comes a new approach to system alignment, developed directly out of the body of knowledge amassed by JBL, and particularly useful in the difficult task of aligning systems which utilize dual bass drivers. Known within JBL as IET — Imaginary Equivalent Tuning — this alignment method strikes a balance between the high speed of Bessel tuning and the flat frequency response qualities of Butterworth tuning.

The vertical twin arrangement of the K2.S5500 poses a unique set of challenges to the system designer. First, the benefit of such a design is a very solid acoustic center to the system. Consequently, the horn, which establishes the acoustic center, must be at a physi-



cal height which approximates the nominal position of the ear of a seated adult. When this need is balanced with good industrial design practice, the result is an upper enclosure which is smaller than the lower enclosure. IET was developed specifically to achieve an ideal balance of sound performance and visual congruity in vertical twin systems.

IET requires a bass driver with a high-energy motor, which can operate in both a large enclosure and small enclosure without becoming underdamped. IET is optimized when one enclosure is

20 to 25 percent larger than the mean value of the two enclosures, and the other is 20 to 25 percent smaller than the mean. This results in four different resonances, one for each of the two bass drivers and one for each of the two ports. The composite of these four energy sources is low frequency performance whose response characteristics exhibit both speed and extension.

275ND MID/HIGH FREQUENCY DRIVER

The 275Nd mid and high frequency compression driver is based on the professional JBL 2426

device. The most outstanding feature of this new driver is a rare-earth neodymium magnet structure which combines the attributes of efficiency, strength, compact size, and thermal stability for improved linearity and freedom from power compression at higher sound pressure levels. An additional benefit of employing neodymium magnetic technology is that the entire driver forms a closed magnetic circuit, eliminating the possibility of any stray magnetic fields interfering with other electromagnetic devices.

High frequency response has been extended well beyond the limits where compression drivers could typically be useful in the past. To accomplish this, a super-low-mass titanium diaphragm — 25 percent thinner than previous designs — has been developed specifically for the K2.S5500. The diaphragm is coupled to an edge-wound aluminum voice coil with a diameter of 45 mm (1¾ inch). The driver's pole piece is copper-plated to reduce inductance, thereby extending high frequency response. In addition, the most recent version of JBL's small format circumferential phasing plug has been employed to further improve high frequency output. The phase plug is cast from zinc.

In the K2.S5500, the compression driver's titanium diaphragm is dusted with a microscopically thin coating of Aquaplas to smooth response and minimize breakup

modes of the diaphragm. JBL's patented diamond pattern surround is incorporated in the driver for resonance control.

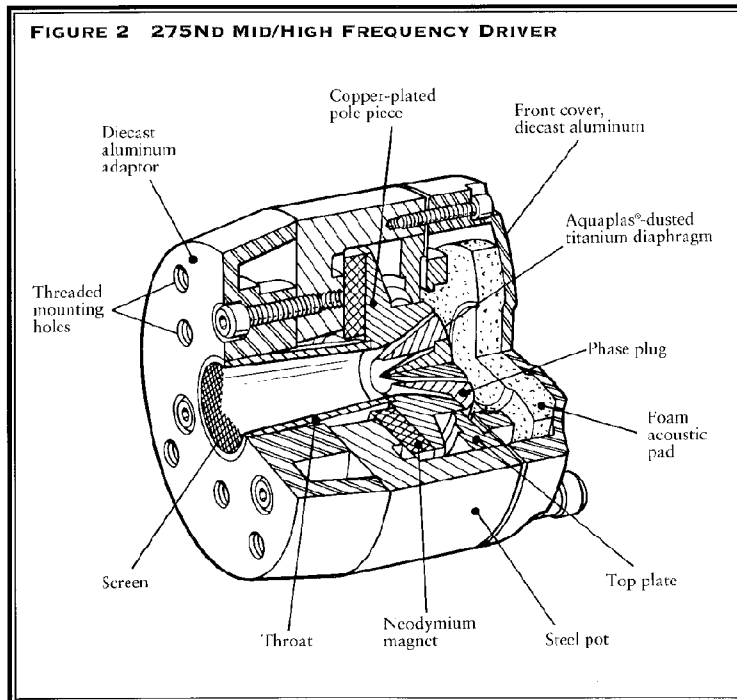
HORN DESIGN AND CONSTRUCTION

The horn utilized in the K2.S5500 is an original bi-radial design, a JBL innovation. Developed specifically for the K2.S5500, this new horn is constructed from an all new material never before used for audio. Coverage angle is sixty degrees horizontal, forty degrees vertical, and is constant virtually throughout the rated response of the high frequency section of the system.

The new horn material has been custom formulated specifically for JBL. It is a low profile surface, polyester based, glass fiber reinforced composite molding compound called JBL COMP-II.

Many of the characteristics of JBL COMP-II make it excellent for use as a horn. It has superb damping characteristics for resonance-free performance; its density is two and a half times as great as Medium Density Fiberboard (MDF), the wood composite used in the uncompromising and heavy K2.S5500 cabinets. The horn alone — without driver — weighs approximately 11 kg (25 lb). It is a precision material, making it ideal for consistent repetitive production of the new horn with its very tight tolerances and need for dimensional control.

FIGURE 2 275ND MID/HIGH FREQUENCY DRIVER



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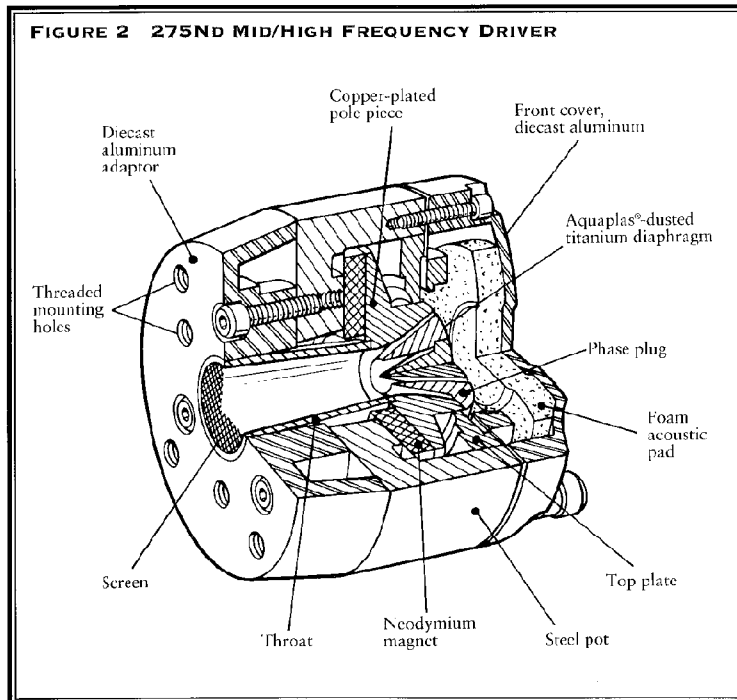
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FIGURE 2 275ND MID/HIGH FREQUENCY DRIVER



VERTICAL TWIN COMPONENTS ARRANGEMENT

The unconventional design of the K2.S5500 system is the platform for its equally unique acoustical attributes. The location of the high frequency driver is at the exact geometric center of the twin low frequency drivers. By placing the upper frequency source inside the phantom image point formed by the vertical coverage angles of the two bass drivers, full image coherency is maintained, resulting in an acoustically stable pinpointed stereo image. (Figure 3)

The acoustical point source produced by the Project K2 systems can be considered almost a microphone in reverse. During the recording process, a sound field of some dimension is drawn into a virtual pinpoint represented by the recording microphone. Project K2

vertical twin arrangement maintains this geometric and temporal relationship during sound reproduction, resulting in a playback image as accurate and stable as that of the original recording.

The K2.S5500 system uses a controlled coverage arrangement to precisely define the optimum listening area. It is a fixed angle system without regard to frequency. Careful horn design enables the loudspeaker to strictly adhere to a sixty degree horizontal/forty degree vertical coverage pattern. This minimizes room effects, allowing the listener to hear more of the speaker and less of the effects of room acoustics. At the same time, it provides a generous "sweet spot" for more comfortable critical listening sessions.

CHARGE-COUPLED LINEAR DEFINITION™ DIVIDING NETWORK (PATENTS PENDING)

The K2.S5500 is the first production loudspeaker to utilize this latest JBL innovation. By doubling both the size and number of capacitors in the dividing network, a voltage can be applied to the center point of the capacitor pairs. In so doing, the individual capacitors are charged, biasing the dielectric gap above or below ground potential without the D.C. biasing voltage appearing outside of the confines of the capacitor pair. When this occurs, the music signals driving through the capacitors never cross the dielectric zero point, resulting in far more linear operating than without charge-coupling. This is analogous to the difference between a "Class A" amplifier and a "Class B" amplifier, for far more natural musical performance.

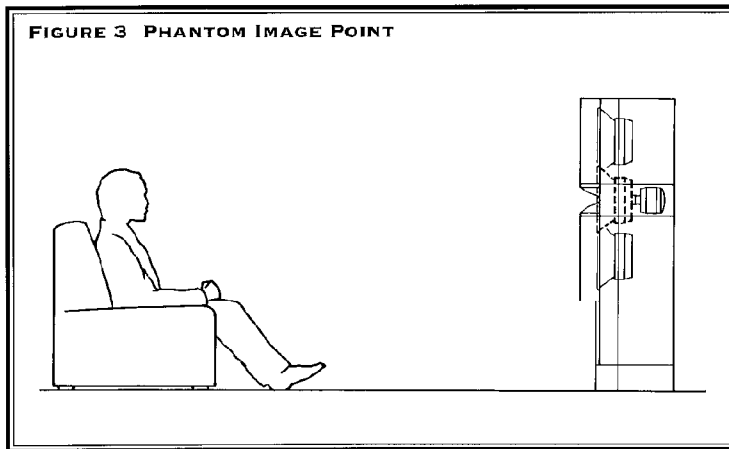
The source of the biasing voltage in the crossover network in the K2.S5500 is a nine-volt alkaline battery, which is housed under a removable access cover at the top of the network. The battery life is approximately that of its shelf life — nominally four to five years for an alkaline battery — and is no more difficult to replace than the battery in a typical infrared remote control handset.

The benefits of the Charge-Coupled Linear Definition technology lie in the nature of what applying a charge does to the capacitors

themselves. Crossover networks, of course, are composed of reactive and non-reactive components. The reactive components — coils and capacitors — are those components which are frequency sensitive, that is, they selectively control the flow of audio frequency signals to the various drivers in the system by changing their resistance (actually, reactance) to various frequencies. Non-reactive components — generally resistors, printed circuit boards, and wire — do not change their electrical nature with frequency. (The K2.S5500 is internally wired with Monster Cable® to assure completely non-reactive wire performance.)

Reactive components behave differently at different frequencies; this is the behavior that permits the dividing action of the crossover network. Along with this behavior come varying transient characteristics, which also change with frequency. In the case of inductors, two factors which affect transient response are called core saturation and hysteresis. Core saturation results in a rapid change in inductance value resulting in F.M. distortion. Hysteresis is a characteristic which deals with inductance change in the area of zero crossings; this results in an increase in F.M. distortion, which is highly audible in audio reproduction.

Core saturation and hysteresis are relatively well understood and controllable in the design and



selection of inductors. With capacitors, however, it is a different story. Capacitors are much more complex devices than coils, and their behavior in speaker crossover networks is far less understood.

Capacitors do not exhibit hysteresis, *per se*, but they have a behavior with similar results, called dielectric absorption. When an audio signal passing through a capacitor changes polarity, that is, it passes through zero volts, the current flow changes direction. But it does not do so immediately; due to dielectric absorption, the capacitor "remembers" its previous state and resists change. This leads to blurring of transients in the drive signal, a highly audible distortion.

A capacitor is fundamentally two conductive plates separated by a dielectric, or semi-insulator. Current flows through the capacitor by setting up different voltages on the two plates. The difference in the voltages and the frequency of the signal determine the amount of current flow. The impedance of a capacitor, that is, how much it resists the flow of current, is dependent on the signal frequency and the physical and electrical natures of the capacitor. In combination, these factors are called capacitive reactance.

Factors that determine the sound quality of a capacitor in a crossover network include the material composition of the conductive plates, the material compo-

sition of the dielectric, and the tightness of the winding of the capacitor. In general, "fast" capacitors, that is, those with technically high transient response, tend to sound sharp, while capacitors that sound smooth tend to have slower transient response. Charge coupling combines the positive natures of capacitors which are both smooth and fast, and does so in basically two ways: 1) by controlling and utilizing a capacitor's piezoelectric nature and 2) by biasing the capacitor above zero crossing.

It has been established that capacitors that are more tightly wound have better transient response than those that are wound more loosely. Applying a constant voltage to a capacitor results in a piezoelectric effect, which physically squeezes the capacitor tighter. At high power levels, the alternating current of an audio signal can cause a capacitor to exhibit substantial piezoelectric behavior, causing it to significantly expand and contract with the changing voltage. This behavior results in deterioration of linearity, as well as fluctuation in transient performance. By applying a constant voltage, the capacitor is "pre-squeezed," minimizing the amount of flexure possible from the driving signal.

The second method charge-coupling employs — biasing above zero crossing — probably has an

even greater result than controlling piezoelectric effects. By biasing the capacitors so that the signal does not reverse current flow through the capacitor, zero crossing distortion is eliminated. Just as with Class A amplifiers, charge-coupled capacitors operate within their linear range, so time delay or dielectric absorption is neutralized, resulting in less phase distortion for more natural sound qualities.

MODULAR DESIGN, UNIFIED CONSTRUCTION

The original Project K2 loudspeaker, the K2.S9500, consists of four modules: a molded concrete base, a foundation low frequency unit, a compression driver/horn unit, and a second low frequency unit. These units stack and lock together by a unique point-to-point energy transmission centering system that ensures vertical alignment.

The new K2.S5500, by contrast, is modular in its design, but produced in a unified enclosure, which is much easier to set up than the modular system. Still, many of the modular aspects and the resultant benefits of the original K2 design have been retained. Each bass cabinet is completely separated from the other, and a third enclosure, in which the horn/driver assembly is mounted, further isolates the two bass enclosures from each other.

The ten-sided enclosure geometry employed in the original K2

design has been slightly modified to an eight sided version in the K2.S5500. 25mm (1 inch) thick MDF panels are used throughout. This fact, combined with the modular nature of the enclosure design, makes for an extremely stiff and rigid assembly, resulting in dramatically low panel radiation and resultant freedom from coloration and distortion.

ENERGY CONDUCTING BASE

Rather than the separate concrete base which is used in the K2.S9500, a laminated MDF base has been constructed for the K2.S5500. Like the concrete base, this laminated MDF base is a massive energy sink. And, like the K2.S9500, the base is connected to the lower cabinet with stainless steel bolts. Rather than user-installed, however, the base is assembled to the cabinet at the JBL factory in Northridge, California, as it is necessary to employ the special equipment available only at the factory to precisely align the base to the cabinet which tunes the base for maximum energy transfer.



SETUP

UNPACKING THE SYSTEM

Because of the bulk and weight of the K2.S5500 system, it should be unpacked in the following manner: Stand the box vertically, so that the positioning arrows printed on the carton point up. Open the box flaps that cover the front of the carton by cutting the tape. Pull the flaps free; they have been glued down. Push back the side flaps, push the top flap back and pull the bottom flap out flat on the floor. Stand on the lower flap, grasp the cabinet edges, then slowly and carefully “walk” the cabinet and its end caps out of the carton. Once clear of the carton, remove the top end cap and fiber covering, then lay the speaker down onto a well-protected surface such as a thick carpet. Lift off the bottom end cap, and stand the cabinet upright.

UNPACKING AND INSTALLING THE GRILLES

There are two grilles per system, one upper and one lower. Upper and lower grilles are identical. They are packed in a second carton, separate from the main speaker enclosure. Carefully open the grille carton; avoid using sharp objects to open the carton. Remove the grilles and take them from their plastic bags. Once the final loca-

tion for the speaker systems has been achieved, install the grilles.

The grilles fasten to the cabinets through a damped friction fit apparatus. They are attached by aligning the four pins on each grille with the mating four grommets on the face of the upper and lower cabinet.

To remove each grille, hold the grille edges with your fingers and gently pull the grille away. Do not use any tools to pry the grille off; this will damage the finish of the cabinet. To replace the grille, position the mounting pins over the holes and gently press until the grille meets the enclosure.

As with any superior audio product, it is advisable to keep the original packing materials in case it is necessary to transport the Project K2 system.

BATTERY INSTALLATION

Before operating or connecting the system, it is necessary to install the biasing battery in the network. This is accomplished as follows:

- Remove the battery from its protective package.
- Unscrew the two screws that hold in place the battery access cover on the crossover network. It is located at the upper part of the crossover network, on the rear of

the speaker enclosure. (Figure 4)

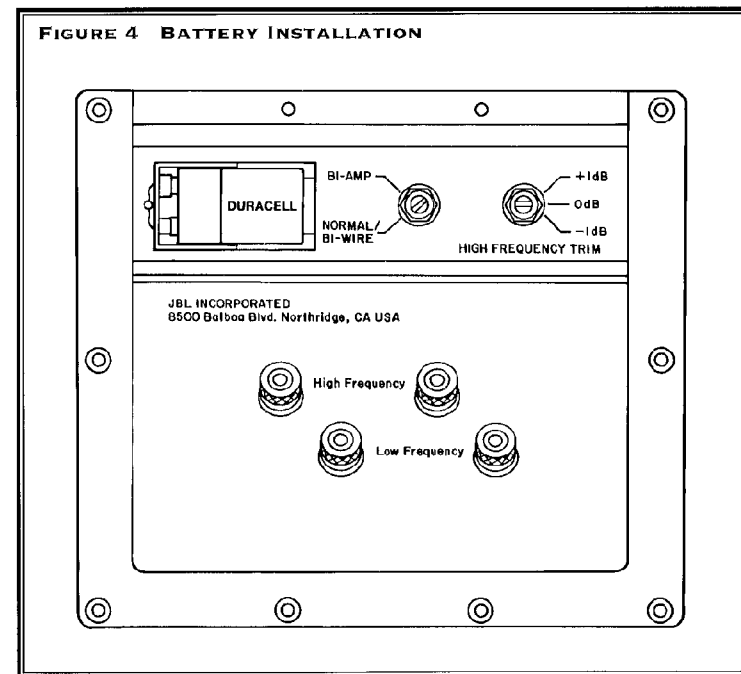
- Write today's date, including year, on an adhesive backed paper label, affix it to the side of the battery that will face outward when it is installed (terminals on your left, positive terminal up).
- Install the battery by aligning the battery terminals with the mating terminals in the network housing.

Align male to female, female to male terminals, then snap the connectors together, assuring a tight connection.

- Replace the battery access cover and install screws.
- Record battery installation date in Battery Replacement Record below:

BATTERY REPLACEMENT RECORD		
Date Installed:	_____	_____
	_____	_____
	_____	_____

FIGURE 4 BATTERY INSTALLATION





SELECTING CABLE

Speaker wire and interconnecting cables are an important component in any audio system. With a system such as the Project K2, they are even more critical.

Project K2 loudspeakers are internally wired with proprietary high quality copper Monster Cable, specially designed for JBL. The same care that was given to the selection of the Project K2 systems' internal wiring should be applied to choosing the cables that will connect Project K2 loudspeakers to other system components.

It is advisable to use high quality wire, such as Monster Cable, and to select the highest grade wire available from the manufacturer. We recommend using an audio-ophile quality speaker wire of not less than 16 gauge for connections up to 5 meters (15 feet) as a *minimum* requirement. (The lower the gauge number the heavier the wire.) If your connections will be longer, heavier gauge wire is recommended. Project K2 specialist dealers have the experience and knowledge to recommend suitable speaker wire to best complement a particular system.

The amount of speaker wire required will depend on the distance between the loudspeakers and amplifier(s), how many ampli-

fiers will be used, and the method you select for connecting the amplifier(s) and loudspeakers. For maximum signal purity, it is advisable to locate the amplifier(s) as close as possible to the loudspeakers. If the power amplifier and pre-amplifier are to be located more than four meters (13 feet) apart, consider using a preamplifier with balanced outputs and a power amplifier with balanced inputs. This will help to maintain signal integrity over long cable runs.

Both the left and right speaker/amplifier connections should be the same length. If the distance between one speaker and the amplifier(s) is greater than the other speaker and amplifier(s), use the longer length for both connections.

For bi-wire connections, the same type of wires may be used for both low frequency and high frequency sections to reduce wire effects (resistance, inductance, etc.) and to avoid intermodulation of low and high frequencies in the wires. Whatever wires are used, be sure that the low frequency wires are as short as possible and the left and right wires for each section are the same length.



AMPLIFIER RECOMMENDATIONS

No single type of amplifier is specified for use with Project K2 systems. The speakers are highly efficient and will operate adequately with an amplifier with as little as 70-100 watts.

However, the transient response and audio definition of a high-end system such as Project K2 will pick up all inefficiencies and distortion in an amplifier system. For full-range operation in most applications, the Project K2 system should not be used with an amplifier of less than 100 watts. Amplifiers of 100-500 watts will ensure optimum system performance. The selected amplifier(s) should have a very high current capacity and must be capable of driving a low-impedance load.

Although the power rating of the K2.S5500 is 150 watts, this is a technical power limit. It is unlikely that damage will occur when used with higher powered components.

For bi-wiring or bi-amplification applications, four identical amplifiers or two dual-channel units may be used. If four amplifier channels are used, the high frequency amplifier may be up to 6 dB less powerful than the low frequency amplifier. Due to the power versus frequency distribution of the music, the low frequen-

cy section requires approximately four times the power of the high frequency section.

Project K2 specialist dealers can recommend amplification to best suit individual needs. In all cases, the left and right amplifiers for each section must be identical. Make sure that the input sensitivity of the two amplifiers is equal or that input level controls are provided to maintain the proper low to mid/high balance. If two identical stereo amplifiers are chosen, each amplifier may be located near a loudspeaker and drive low frequency and high frequency sections through short wire runs.

The addition of a crossover network such as the JBL DX-1 Electronic Crossover will allow the direct connection of the low and high frequency components of the Project K2 system to frequency dedicated amplifiers, and is required if the system is to be bi-amplified. The DX-1 must be fitted with a crossover card specifically matched to the response characteristics of the K2.S5500. The DX-1 may be purchased from Project K2 specialist dealers, who are also capable of installing the proper crossover card.



PLACEMENT CONSIDERATIONS

Project K2 loudspeaker systems are designed to be less affected by room acoustics than conventional-imaging systems. However, they are sensitive to overall symmetry, and proximity to walls, ceilings and corners.

Ideally, any listening room should contain a combination of live surfaces (e.g., walls and windows) and absorbent surfaces (e.g., drapes, carpets, upholstery). If the distance between floor to ceiling is low, it is preferable if one surface has an absorbent covering. With Project K2.S5500, it is most important to be able to accommodate the optimum listening area that is defined by the 60 degree horizontal/40 degree vertical coverage pattern of the horn.

The listener should be centered in front of the speakers and furniture should be of an appropriate height so that when the listener is sitting, the ear level is on a vertical plane with the horn. If possible the distance between the speakers should be the same as the distance between each speaker and the listening area. Angle the speaker in toward the listener so that when seated, the listener could look straight into the center of the speaker. As the distance between the speakers increases, increase the

inward angle of the speaker.

The imaging qualities enable the speakers to be placed relatively far apart from each other. In addition, the IET alignment feature enables placing the speakers near or even in a corner without producing an objectionable character to the bass. This corner placement ability allows optimum performance even in small rooms.

The Project K2 system can operate fairly closely to the wall. Allow enough clearance between the back of each speaker and the wall to allow making the connections on the back of the speaker (approximately 45 cm/18 inches).

FLOOR REQUIREMENTS

The floor in the location selected for setting up K2.S5500 speakers must be capable of supporting a load of 95kg (210 lb). Because of the coupling effect of the laminated base, a flat, hard surface such as wood or linoleum is preferable. However, the design of the loudspeaker's coupling system, along with the speakers extreme weight, should result in excellent performance on carpet as well.



SYSTEM CONNECTIONS

AMPLIFIER CONNECTIONS

Important: Turn all amplifiers off before connecting or disconnecting Project K2 loudspeakers. Making connections while an amplifier is operating could seriously damage the loudspeaker system and void the warranty. All amplifiers must also be turned off before connecting or disconnecting cables at the amplifier or preamplifier inputs.

All connections between the amplifier(s) and the Project K2.S5500 speaker system are made

at the terminals located on the lower back of the enclosure (Figure 5). The left-hand terminals (black) are negative, and the right-hand terminals (red) are positive. These correspond to the negative and positive conductors in the speaker wire. Each speaker wire contains two conductors, one of which will have a stripe, color markings, or a ridge.

Assign one of the two conductors as the negative conductor and the other as the positive conductor. Use these same designations for all

FIGURE 5 AMPLIFIER TERMINALS

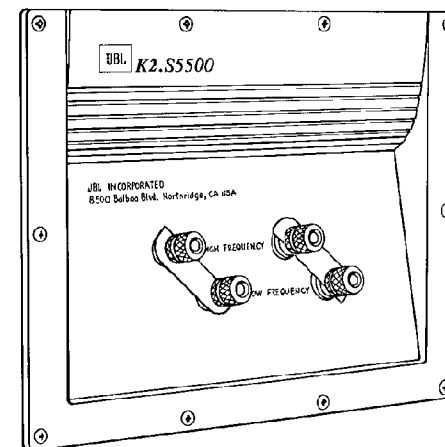


FIGURE 5A BARE WIRE CONNECTING METHOD

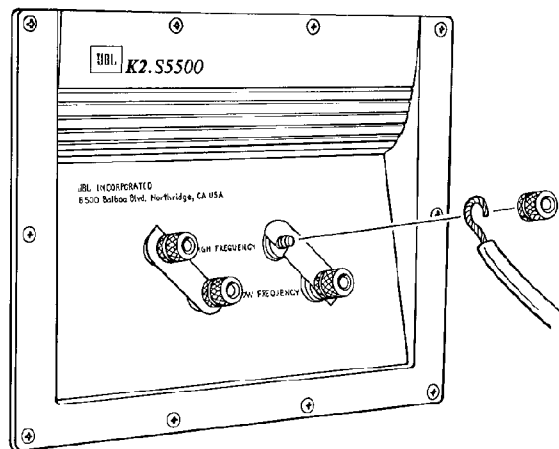
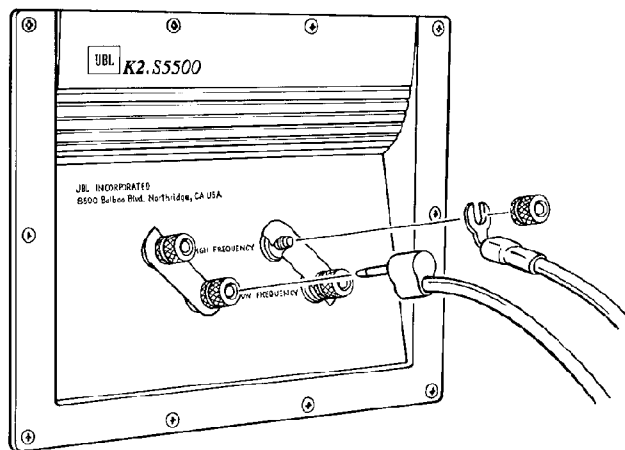


FIGURE 5B BANANA/SPADE CONNECTING METHOD



system wiring. Always connect the conductors of the speaker wire appropriately to the corresponding negative and positive terminals on all system components. This will ensure that all components will work together ("in phase"). Connecting the speakers out of phase will not damage them but will result in reduced low frequency output and impaired stereo effect.

Speaker wires may be fastened to the terminals by several methods. The most positive connection is made by directly connecting clean, bare conductors (exposed by stripping the ends of the wire) to the terminal posts.

For this type of connection, loosen the knobs on the terminals and wrap the exposed (bare) ends of each speaker wire around the appropriate (+ to +, - to -) terminal post (Figure 5A). Re-tighten the knob on each terminal so that a snug, positive connection over a maximum area of the wire is achieved. Do not apply excessive force and *do not over-tighten*. To avoid a short circuit, trim off any excess wire that is not in contact with the binding post contact surfaces.

Project K2 terminals are also designed to accept spade or banana-type connectors which are fastened to the ends of the wires and, in turn, are attached to the terminal posts (Figure 5B). Because the number of contacts should be

kept to a minimum, JBL recommends using the highest quality connectors, expertly integrated with the selected cables.

The Project K2 speakers may be connected to the amplifier(s) by one of three methods: passive, bi-wire, and bi-amp. Each method, described below, has its own advantages, and Project K2 loud-speaker systems will deliver superb performance with all methods.

Caution: Each speaker is shipped with external shorting straps in place, connecting the upper and lower terminal posts on the left and right sides. These straps must remain in place for passive connections but must be removed for all bi-wire and bi-amp connections. If the amplifiers are connected to the Project K2 loud-speakers in the bi-wire or bi-amp mode with the shorting straps still on, *the amplifier outputs will be shorted which could result in costly amplifier damage when power is switched on.*

PASSIVE CONNECTING METHOD (FIGURE 5C)

The passive method requires one amplifier and one set of wires. Connections are made to either the upper or lower pair of terminals (one black, one red). *Do not remove the shorting straps.* Connect the positive conductor to the right (red) terminal and the negative conductor to the left (black) terminal.

FIGURE 5C PASSIVE CONNECTING METHOD

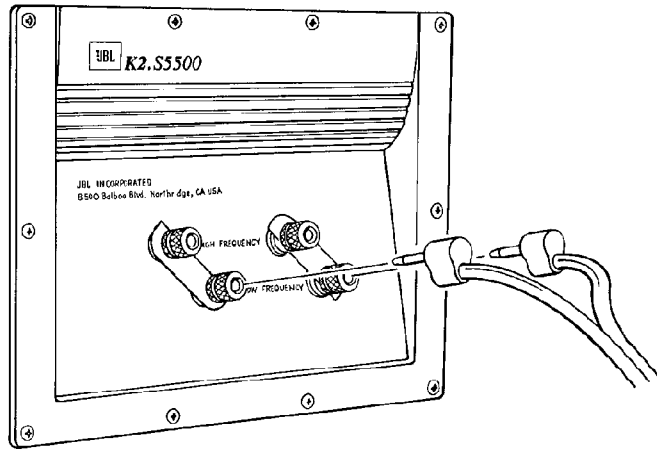
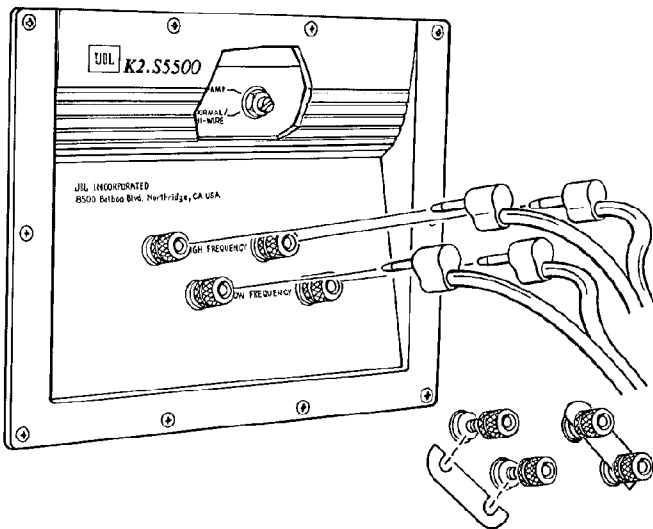


FIGURE 5D BI-WIRE CONNECTING METHOD/REMOVING SHORTING STRAPS

BI-WIRE CONNECTING METHOD
(FIGURE 5D)

The bi-wire connection method requires one amplifier and two sets of speaker wires. By removing the shorting straps, connections may be made to the individual network sections using four conductors, one for each of the four terminals.

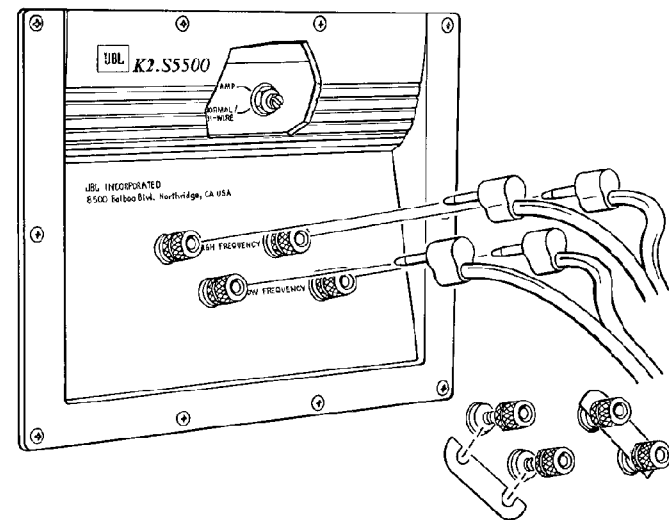
To remove the shorting straps, simply loosen the terminal caps and slide the bars off to the side (Figure 5D). Connect the two sets of wires (one set to the top channel and one set to the bottom) and retighten the terminal caps firmly, if appropriate.

BI-AMP CONNECTING METHOD
(FIGURE 5E)

The optimal method of powering the Project K2 system is with two amplifiers, one for the low frequency and one for the high frequency unit, and an active crossover network, such as the JBL DX-1. Since each amplifier drives only one speaker, this method allows the user to select amplifiers with the desired sonic character for low and high frequencies.

Four identical amplifiers (or two dual-channel units) may be used, although specialized low and high frequency amplifiers offer clear advantages. The Project K2

FIGURE 5E BI-AMP CONNECTING METHOD/REMOVING SHORTING STRAPS



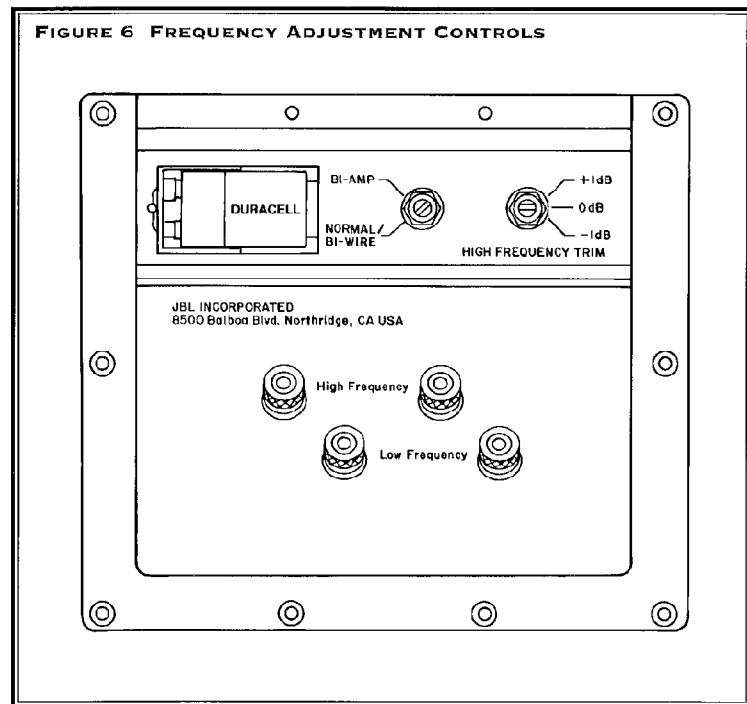
specialist dealer can recommend the amplification that will best suit individual needs.

In all cases, the left and right amplifiers for each section must be identical. Make sure that the input sensitivity of the amplifier for each section is equal, or that input level controls are provided to maintain the proper low-to-mid/high balance. If two identical stereo amplifiers are used, one may be located near each loudspeaker and drive low and high frequency sections through short wire runs.

To remove the shorting straps, simply loosen the terminal caps

and slide the bars off to the side (Figure 5E). Connect the two sets of wires (one set to the top channel and one set to the bottom) and retighten the terminal caps firmly, if appropriate.

Note: Input polarity must be the same for both the low and high frequency sections. Some amplifiers invert polarity. If the polarity is reversed to one section, a discontinuity in response will be apparent in the crossover region. If a problem is suspected, reverse the polarity to either low or high frequency sections of both loudspeakers. Amplifier polarity markings may



not ensure correct polarity connections.

ADJUSTING FREQUENCY CONTROLS

Once all system wiring is complete and inspected, the frequency adjustment controls must be set to the correct position before playing music on the Project K2 loudspeakers. Each of these controls is located under the removable panel located at the top of the crossover network. (Figure 6).

BI-AMP/NORMAL

If the system is wired in the bi-amp method, set the BI-AMP/NORMAL switch to BI-AMP position (Figure 5E). For passive and bi-wire connections, set switch to the NORMAL/BI-WIRE position (Figure 5D).

HIGH FREQUENCY TRIM

The HF TRIM control allows subtle adjustments in high frequency output to suit listening tastes. Experiment with this control (as described below) until the desired sound is achieved.

The HF TRIM switch adjusts the high frequency level up or down 1 dB from the zero (0) position. Desired adjustments may be made using a screwdriver. Begin with the switch at the zero (0) position. If, after listening to the speakers, less output from the horn is desired, adjust the switch to the -1 dB setting. If more horn output is preferred, set the switch to the +1 dB setting.

PROJECT K2 FINAL CHECKLIST

- Connect and plug in all other system electronics.
- Check all connections.
- Make sure frequency controls are correctly set.

THE SYSTEM IS NOW READY FOR USE

The Project K2 speaker system is fully functional as soon as it is set up. There are no restrictions on the amount of amplification that may be applied. There may be some subtle tonal changes in bass output over the first week to 10 days of operation. These are caused as the movement of the low frequency drivers becomes more fluid and the parts settle in. This process is completely normal and natural with transducers of this caliber.

The grilles on the Project K2 loudspeaker system have been designed for maximum acoustical transparency. For the most critical listening, however, JBL suggests removing the grilles. The grilles are connected by four pins inserted into four holes on the face of the upper and lower cabinet.

To remove each grille, hold the grille edges with your fingers and gently pull the grille away. Do not use any tools to pry the grille off; this will damage the finish of the cabinet. To replace the grille, position the mounting pins over the holes and gently press until the grille meets the enclosure.



PROJECT K2 MAINTENANCE AND SERVICE

Project K2 loudspeaker systems are finished in a polyester lacquer and require no maintenance other than occasional dusting with a soft, dry, lint-free cotton cloth. The horns may also be wiped with a soft cloth. Treat the lacquered surface very carefully to avoid scratching the finish. To remove fingerprints and smudges, apply a small amount of ammonia-free window cleaner to the cloth and gently clean the surface.

Never use any abrasive cleaners or chemicals to clean the enclosure or horn. If the enclosure becomes perceptibly scratched or otherwise damaged, consult a qualified furniture repair shop.

All wiring connections should be inspected and cleaned or remade periodically. The frequency of maintenance depends on the metals involved in the connections, atmospheric conditions, and other factors, but once a year is a minimum. Consult the Project K2 specialist dealer for specific recommendations.

Project K2 loudspeakers are designed to provide years of trouble-free service. The only maintenance required is battery replacement. Note the date of battery installation on an adhesive-backed paper label and affix it to the battery. Write the date of battery installation in the place provided on page 19 of this manual. Replace the battery every three years or more frequently with a fresh, alkaline nine-volt snap-top battery.

If a problem occurs, make sure that all connections are properly made and clean. If a problem exists in one loudspeaker, reverse the speaker wires to the left and right system. If the problem remains in the same speaker, then the fault is with the loudspeaker. In this event, consult the Project K2 specialist dealer for assistance. If the problem appears in the opposite speaker, the cause is in another component or cable.



PROJECT K2 SPECIFICATIONS

K2.S5500

Sensitivity:	95 dB 2.83 v @ 1 Meter
Impedance:	4 ohms
Power Handling:	150 watts
Maximum recommended amplifier power:	300 watts (2 x 300 for bi-amp)
Frequency response:	35Hz - 20kHz (-6dB) 48Hz - 18kHz (+/- 2.5dB)
Lower frequency driver(s):	(2) LE125S Combination fiberglass/Aquaplas diaphragm with 300 mm (12 inch) diecast aluminum chassis, 76 mm (3 inch) edgewound aluminum voice coil, copper sleeved vented pole piece, and shielded ferrite magnetic structure
High frequency driver:	275Nd compression driver with titanium diaphragm, copper plated pole piece, and neodymium magnetic system. Mounted to bi-radial horn molded from proprietary high-density polyester-based compound
Dividing network:	Charge-Coupled Linear Definition (Patent Pending) design, biased by nine-volt alkaline battery. Low-loss capacitors, low D.C.R. high performance inductors, third order crossover at 800 Hz
Internal wiring:	High purity copper Monster Cable®
Dimensions	
Height:	1251 mm (49 1/4 in)
Width:	499 mm (19 5/8 in)
Depth:	410 mm (16 1/8 in)
Net weight:	95 kg (210 lb)