CARVER

H-9AV Owner's Manual

Audio Video Sonic Hologram Generator with Precognition Matrix

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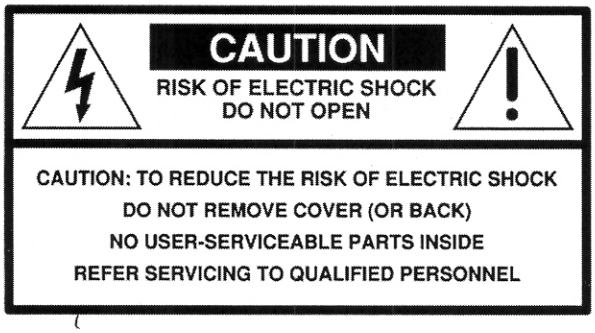
Powerful · Musical · Accurate



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Safety Instructions

1. Read Instructions — All the safety and operation instructions should be read before the Carver Component is operated.

2. Retain Instructions — The safety and operating instructions should be kept for future reference.

3. Heed Warnings — All warnings on the Component and in these operating instructions should be followed.

4. Follow Instructions — All operating and other instructions should be followed.

5. Water and Moisture — The Component should not be used near water - for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.

6. Ventilation — The Component should be situated so that its location or position does not interfere with its proper ventilation. For example, the Component should not be situated on a bed, sofa, rug, or similar surface that may block any ventilation openings; or placed in a built-in installation such as a bookcase or cabinet that may impede the flow of air through ventilation openings.

7. Heat — The Component should be situated away from heat sources such as radiators, or other devices which produce heat.

8. Power Sources — The Component should be connected to a power supply only of the type described in these operation instructions or as marked on the Component.

9. Power Cord Protection — Power-supply cords should be routed so that they are not likely to be walked upon or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit the Component.

10. Cleaning — The Component should be cleaned only as recommended in this manual.

11. Non-use Periods — The power cord of the Component should be unplugged from the outlet when unused for a long period of time.

12. Object and Liquid Entry — Care should be taken so that objects do not fall into and liquids are not spilled into the inside of the Component.

13. Damage Requiring Service — The Component should be serviced only by qualified service personnel when:

A. The power-supply cord or the plug has been damaged; or

B. Objects have fallen, or liquid has spilled into the Component; or

C. The Component has been exposed to rain; or

D. The Component does not appear to operate normally or exhibits a marked change in performance; or

E. The Component has been dropped, or its cabinet damaged.

14. Servicing — The user should not attempt to service the Component beyond those means described in this operating manual. All other servicing should be referred to qualified service personnel.

15. To prevent electric shock, do not use this polarized plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Pour prevenir les chocs electriques ne pas utiliser cett fiche polarisee avec un prolongateur, un prise de courant ou une autre sortie de courant, sauf si les lames peuvent etre inserees a fond sans laisser aucune pariie a decouvert.

16. Grounding or Polarization - Precautions should be taken so that the grounding or polarization means of the Component is not defeated.

PORTABLE CART WARNING

Carts and stands - The Component should be used only with a cart or stand that is recommended by the manufacturer.
A Component and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the Component and cart combination to overturn.

17. Internal/External Voltage Selectors — Internal or external line voltage selector switches, if any, should only be reset and re-equipped with a proper plug for alternate voltage by a qualified service technician. See an Authorized Carver Dealer for more information.

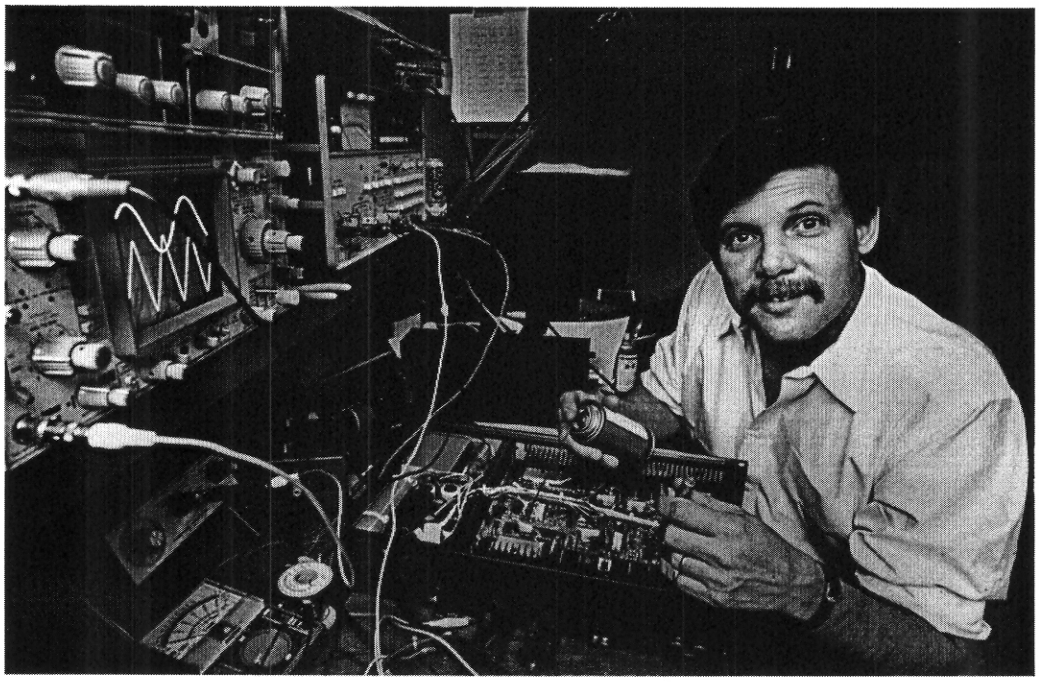
18. Attachment Plugs for Alternate Line Voltage (Dual voltage models only)— See your Authorized Carver Dealer for information on the attachment plug for alternate voltage use. This pertains to dual-voltage units only.

This digital apparatus does not exceed the Class A/Class B (whichever is applicable) limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant las limites applicables aux appareils numeriques de class a/de class B (selon le cas) prescrites dans le reglement sur le brouillage radioelectrique edicte par les ministere des communications du Canada.

Introduction

A Message from Bob Carver



Congratulations on purchasing a Carver H-9AV Sonic Hologram Generator. Sonic Holography® will increase listening pleasure and enjoyment by bringing a completely new perspective to your favorite music not possible till now.

For years, systems for recording and reproducing stereo have been offered as supposedly capable of further enhancing the "you-are-there" feel of a musical performance. However, certain problems with conventional stereo playback would always limit this "enhanced realism" to the space between the loudspeakers. Even with the addition of delay and other ambience restoring equipment or loudspeaker systems, perceived realism has still been a problem.

Needless to say, conventional stereo doesn't sound anything like a live, sonic event: Stereo reproduction is subject to fundamental distortions of spatial perspectives that just don't occur in real life. Everyone has become accustomed to the limits of stereo and has learned to listen to normal stereo imaging because they enjoy the music, not because it sounds like a real performance.

My patented Sonic Holography®circuitry brings an actual improvement in the quality of listening via complex processing of the stereo signals, and a change in relationships between the listener and loudspeakers. Now, instead of flat, between-the-loudspeaker imaging associated with conventional stereo, Sonic Holography paints a sonic picture that's remarkably believable and convincing. A listener can actually pinpoint the location of individual artists and instruments far beyond the limits of the left/right loudspeakers. At times, sound even seems to come from outside the listening room.

This sense of performance is heightened by a perceived depth, as well as width, of the sonic stage created by Sonic Holography®. The ambience or acoustic signature of a recording's location, which is vital to the sound of live music event but masked during conventional stereo playback, is restored. The total effect makes your favorite music a full, three dimensional experience of unparalleled realism and sense of being there.

In addition, we have enhanced the basic Sonic Hologram Generator circuitry for video soundtracks so that you can enjoy this remarkable effect in conjunction with today's high quality stereo movie sound and MTS stereo broadcasts.

To get the most from your H-9AV and Sonic Holography®, be sure to read all safety, installation, and operating information that follows in this manual. By carefully following the initial set-up instructions and recommendations you'll be experiencing the magic of Sonic Holography®in a relatively short period of time.

Again, let me thank you for choosing Carver. I am proud to present to you the best in craftsmanship and design found in the H-9AV.

Bob Carver

Robert W. Carver
President, CARVER CORPORATION

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1. Prior to Installation

Unpacking

Carefully unpack your H-9AV and keep the original carton and packing materials for moving, shipment, or long-term storage.

Upon opening the box, please check for any visible sign of damage that did not appear on the outside of the box. If you do encounter what appears to be concealed damage, please consult your Carver Dealer before proceeding to further unpack or install the unit.

Important Paperwork

Make sure to save your sales receipt. It is extremely important to establish the duration of your Limited Warranty and for insurance purposes.

Next, make a note of the serial number which is located on the back of the H-9AV. Record it in the space provided below for convenient reference.

Model H-9AV
Serial Number: 875
Purchased at: Stereo Advantage
Date: July 30/90

Finally, take a moment to fill out and return the Warranty Card that came with the H-9AV and return it to Carver.

2. Front Panel

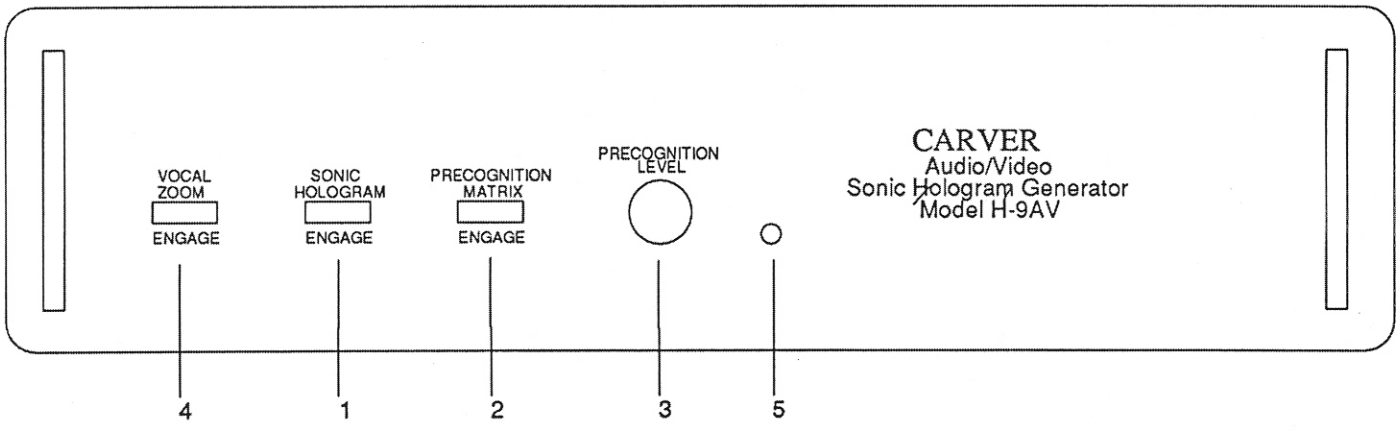

Figure 1 Front Panel

Product Description

The H-9AV is a line level signal processor designed to enhance and restore spacial cues lost in the traditional stereo process. It is intended to be installed in a tape monitor loop or external processor loop of a receiver, preamplifier or integrated amplifier. The H-9AV includes two special circuits, Precognition Matrix and Vocal Zoom to further enhance video soundtracks.

Front Panel Controls

1. Sonic Hologram. This button activates the Sonic Holography® inside the H-9AV. In the OUT position, the signal passes through the unit without any effect.

2. Precognition Matrix. This circuit is intended primarily for video purposes. It dynamically extends the width and height of the Holographic image while maintaining proper center channel vocal placement.

Sonic Holography® was originally designed to act as a linear processing circuit which provides the same amount of enhancement to all incoming levels of L-R ambient information. The result is that Sonic Holography® without the Precognition Matrix is best experienced by one or two listeners directly on the centerline of the sound field. In recent years, however, several new video media have become widely available which provide accompanying high quality audio soundtracks. These include VHS Hi-Fi, digital Laser Discs, CDV's and MTS stereo broadcast television. Dolby® Surround Sound rear channel effects are also encoded on an increasing number of new videocassette movie releases. Each of these technologies, along with larger television screens, have helped make the Home Video Theater a practical reality. Precognition circuitry has been developed to widen the effect of Sonic Holography® so that more persons may be seated side by side and still experience its dramatic spacial enhancements.

The H-9AV's Precognition circuit spreads out the spacial Sonic Hologram image dynamically for the duration of stereo information on the video

soundtrack. In other words, its widening effects work in direct proportion to the amount of stereo material present in the soundtrack or program. It is literally able to "think ahead" and expect the occurrence of stereo information before it has begun! The advance cues which Precognition circuitry uses to anticipate stereo information are slight changes in noise floor level as additional stereo tracks enter the mix. The change in noise level occurs milliseconds before the actual stereo information, allowing the Sonic Hologram Generator to widen its effects from the very beginning of the stereo segment.

Precognition may or may not be used for musical sources, depending on the program source and your own musical tastes. We suggest that you experiment with its effects on type of recordings and FM broadcasts.

3. Precognition Level. The effect of the dynamic Precognition circuitry is controlled with a rotary level control. In its fully counter clockwise position, no extra widening effect (other than that added by Sonic Holography®) takes place. As the control is advanced clockwise, the sound stage is progressively widened even more for off-axis listeners. Additionally the sound image becomes considerable taller, which also dramatically enhances the home theater movie experience.

4. Vocal Zoom. This equalization enhancement is designed to make center channel dialog information even more distinct. Its use is optional depending on the quality and mixing levels of a particular video soundtrack or TV program. If movie or TV dialog seems indistinct, pressing Vocal Zoom will provide more clarity through a slight boost at 3.5kHz. Vocal Zoom should not be used with musical sources.

5. Power LED.

3. Rear Panel

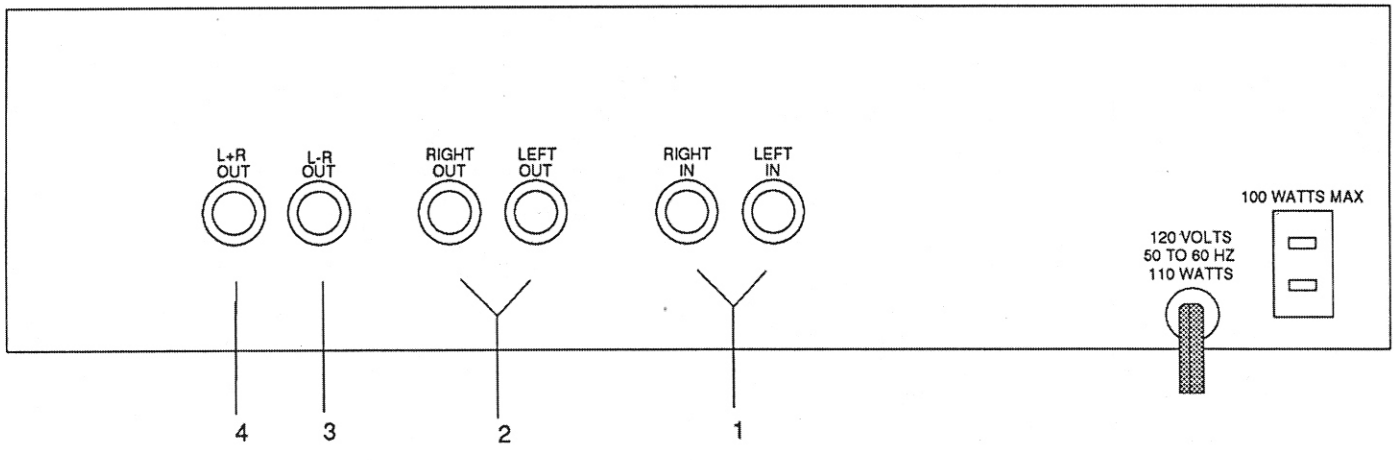

Figure 2 H-9AV Rear Panel

1. Input jacks. These are connected to the output of your receiver or preamplifier's tape monitor loop/external processor loop.

2. Output jacks. These are connected to your receiver/preamplifier's tape monitor or external processor loop inputs.

For normal operation, the input and output jacks are the only connections you will need to make. However, we have included two extra outputs for advanced home video theater use and experimentation.

3. L-R jack. This optional output provides summed stereo information which may be used as a rear ambient sound source to further enhance the effect of Sonic Holography®. For best results, it should be used with a power amplifier which has a volume control. One center channel or two rear corner speakers may be employed.

4. L+R jack. This output provides a summed mono (L+R) source which may be used for an addition front center channel speaker for optimal dialog centering on the screen. It is especially useful when the Precognition Matrix is set at a high position (which expands the sound field extremely wide). For best results, it should be used with a power amplifier which has a volume control and one small bookshelf speaker.

4. Installation

Placement

Regardless of how the H-9AV will be placed in your stereo system, just be sure it's near enough to the preamplifier, receiver or integrated amplifier so the signal cables will reach without excessive strain on the connections.

Heat, at least in normal amounts, shouldn't be any problem for the H-9AV. It doesn't generate much of its own and isn't sensitive to small amounts. But you should never mount or stack the H-9AV directly on top of power amplifiers. Unless your system uses Carver-designed Magnetic Field Amplifiers, conventional power amps can and do generate a lot of heat. In addition, the H-9AV's chassis could block vents on an amplifier necessary for proper cooling.

Connections

As shown in Figures 3 and 4 the H-9AV may be connected to your system in one of two ways:

1. In a tape monitor or signal processor loop on your preamplifier, integrated amplifier or receiver. Tape and signal processor inputs and outputs are literally "loops" which route a signal out to an external component and back in again. This is an ideal place for the H-9AV. Use the external processor loop if one exists. If you already have other signal processing components such as equalizers, surround sound generators or expansion units, place the H-9AV AFTER these components in the signal chain.
2. Between your preamplifier and power amplifier. Use this method if you are using a "straight wire" preamplifier which does not include tape monitor loops.

If you are in any doubt about matching the H-9AV to your components, consult your Carver dealer.

Because the H-9AV requires very little power, it may be connected to a switched convenience receptacle on your preamplifier, integrated amplifier or receiver. If no such outlets are available, it can be plugged directly to a wall socket and left on during normal stereo system use. Consult the Safety Instructions on pages 2 and 3 for other considerations and cautions.

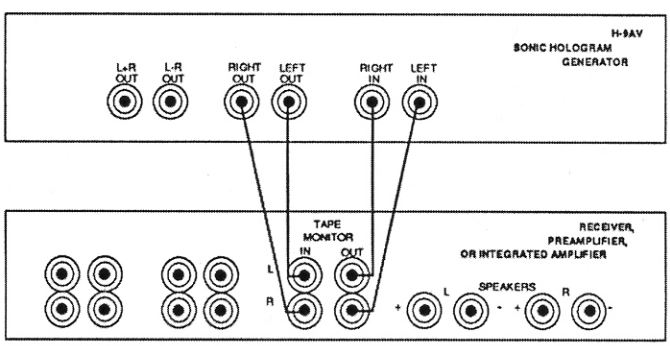

Figure 3 Inter-Component Connections, Method 1

Inter-component Connections - Method 1

1. Make sure that all stereo system components are TURNED OFF.
2. Locate the two pairs of connection cords provided with the H-9AV.

3. On the back of your preamplifier, integrated amplifier or receiver, locate the TAPE MONITOR inputs and outputs. There will be two sets of LEFT and RIGHT sockets marked either IN and OUT, REC and PLAY or LINE IN and LINE OUT. Signal processor inputs and outputs will be marked IN and OUT.
4. Connect a set of cords from the LEFT and RIGHT OUT sockets on the preamplifier to the LEFT and RIGHT IN sockets on the back of the H-9AV.
5. Connect a set of cords from the LEFT and RIGHT IN sockets on the preamplifier to the LEFT and RIGHT OUT sockets on the back of the H-9AV.
6. Take care to observe correct left and right channel orientation when making connections.
7. Plug the H-9AV's power cord into a switched convenience socket or wall receptacle.

Inter-component Connections - Method 2

1. Make sure that all stereo system components are TURNED OFF.
2. Locate the two pairs of connection cords provided with the H-9AV unit.
3. On the back of your preamplifier, locate the main OUTPUT sockets.
4. Connect a set of cords from the LEFT and RIGHT preamplifier OUTPUT sockets to the LEFT and RIGHT IN sockets on the back of the H-9AV.
5. Connect a set of cords from the LEFT and RIGHT OUT sockets on the H-9AV to the LEFT and RIGHT INPUT sockets on your power amplifier.

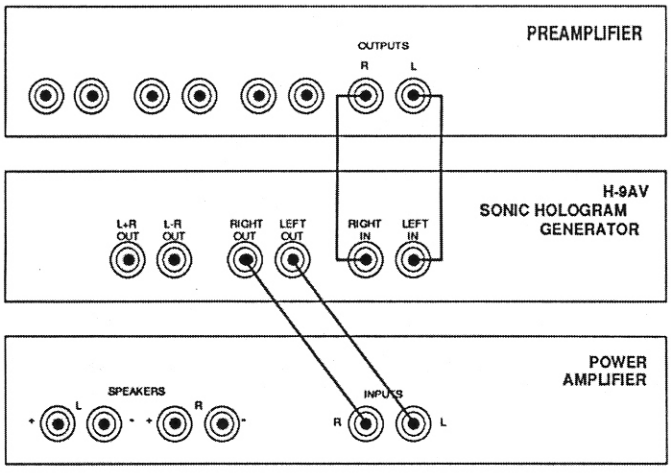

Figure 4 Inter-Component Connections, Method 2

6. Take care to observe correct left and right channel orientation when making connections.
7. Plug the H-9AV's power cord into a switched convenience socket or wall receptacle.

Installation

The H-9AV may be placed up to 20 feet from your main stereo system. If so, be sure to use high quality shielded interconnect cables. A faulty cord can degrade the performance of the best stereo components. If you have any question about the condition of a cable, the best policy is to replace it. Avoid using signal cables that exceed 20 feet in length: Longer cables can induce noise interference that will also degrade audio quality.

Never plug or unplug the H-9AV while operating your stereo system. The resulting transients can permanently damage the loudspeakers, and there is a chance of accidental electrical shock.

5. Set-Up for Sonic Holography®

After installing and connecting the H-9AV to the rest of your stereo system, you'll probably be tempted to begin playing music and playing around with controls. We urge you to resist this temptation for the moment. If you decide to try it anyway, not much will happen because you're only part way there. Successful Sonic Holography® depends on proper loudspeaker placement and other important factors. Read the following section and follow the instructions and recommendations exactly.

Initial Loudspeaker/ Chair Placement

Making Sonic Holography work properly requires attention to many factors that usually aren't problems or considerations for normal stereo playback. The two most important factors are 1) accurate relationships between the loudspeakers and listening chair, and 2) dealing with reflected sound off surfaces in the listening room.

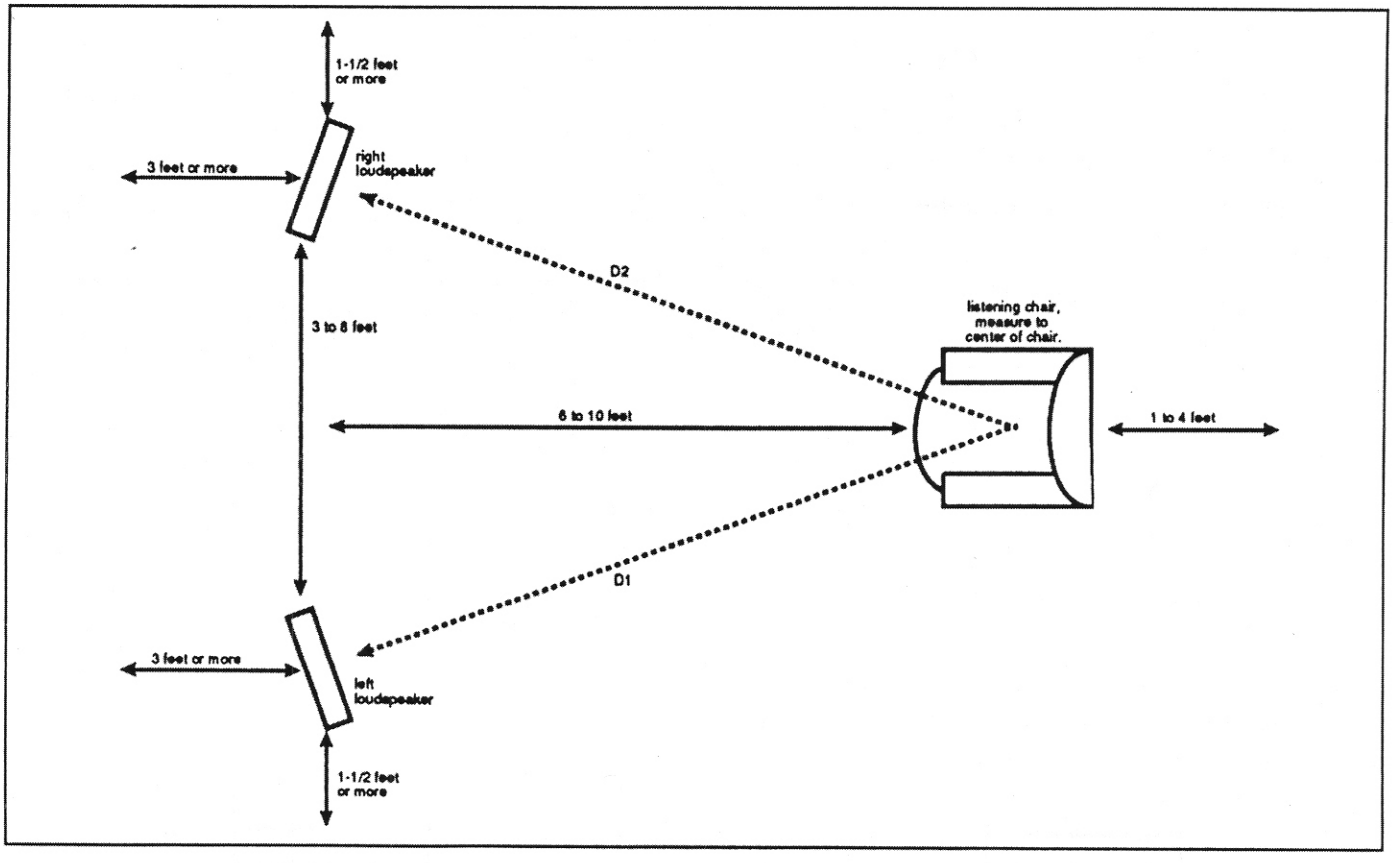

Figure 5 Initial Set Up

The real key to this process are the relationships between the loudspeakers and chair. While minimizing room reflections is almost as important, a musical image in Sonic Holography® will never occur unless the loudspeaker/listening chair relationship is achieved accurately and correctly.

It might seem impractical, or a lot of trouble and effort, but you'll be amply rewarded by the stunningly live imaging Sonic Holography® brings to your favorite music.

Basic Set-Up Steps

To perform the set-up, you'll need a steel tape measure and listening chair. Refer to Figure 5 and follow this 5-step procedure:

1. Make sure the loudspeakers are away from side and rear walls as indicated in the drawing.
2. Move the loudspeakers so they are exactly six feet apart and on direct axis with the listening chair with direct sound from both panels.
3. Adjust the toe-in of the speakers so that the inner edge is ONE INCH closer to you than the outer edge.
4. Place your listening chair so that it is not directly against the rear wall of the listening room.
5. Carefully measure the distance from the CENTER of the left speaker's top woofer to the CENTER of the listening chair. Repeat the measurement for the right speaker. Adjust the chair so that both distances (D1 and D2 in Figure 5) are exactly the same. Accuracy within 1/4 INCH is desired.

The goal of these steps has been to place the listening chair at a point equidistant from both loudspeakers. This places a seated listener on what can be called the "stereo axis." Being on this acoustic centerline is very important to hearing a musical image in Sonic Holography®. (It is less critical when the Precognition Matrix is engaged). If you've followed the above instructions, a seated listener in the chair should have a ready-made window for initial experiments with the Sonic Holography® Sound Processing System. You'll undoubtedly have to make some minor adjustments but this should get things going.

A Properly Functioning Image in Sonic Holography®

Before listening to some musical selections in Sonic Holography®, you should know what you will be listening for. With correctly positioned loudspeakers and listening chair, the Sonic Hologram Generator system should cause musical instruments and other sound sources to spread out in a large 45° to 95° arc in front of you. Sound images will exist to the left and right, extending well beyond the limits of the loudspeakers and, occasionally, all the way to the extreme left and right. You'll be able to perceive a sonic stage depth of 10 to 20 feet with sound images clearly floating behind and, from time-to-time, in front of the loudspeakers. You can actually turn your head and look at the sound images; these images will seem to stay put in space. Some sound images may even seem to clearly emerge from outside the walls of the listening room.

A "Test Flight"

So far, this manual has discussed the "nuts and bolts" of Sonic Holography.® If you've correctly established the initial relationship between the loudspeakers and listening chair, you should be able to experience Sonic Holography® almost right away.

First, take a couple of minutes to "preflight check" your stereo system:

1. Visually check out and confirm that all components are connected in phase (all left-channel outputs to left-channel inputs, right-channel outputs to right-channel inputs).
2. Check and confirm that the loudspeakers are properly wired in-phase (positive "+" loudspeaker outputs on the amplifier or receiver should be connected to the positive terminals on the loudspeakers; negative "-" outputs to negative terminals on the loudspeakers).

3. If your system employs an external equalizer to flatten room response, we recommend that you switch it out of the receiver's signal path. Wait until you've had a chance to experience and experiment with Sonic Holography® before re-equalizing the room. Room response will also be altered by any sound treatments used to reduce room reflections, so wait until all phases of the set-up are complete to save time and trouble.

4. If you are using a record for a sound source, inspect the phono stylus and cartridge for proper phasing, wear, and tracking. A cartridge/stylus in poor shape can upset the balance of the program material before it gets to the rest of the stereo system. This can simulate certain acoustic problems that cause strong one-side imaging, with weak imaging on the other.

5. Set your preamplifier, receiver or integrated amplifier's BALANCE control to "center." Set the tone controls to their center (12 o'clock) position.

6. Engage the TAPE MONITOR or EXTERNAL PROCESSOR loop into which the H9-AV is connected.

7. Press the H9-AV HOLOGRAM button.

8. Play a stereo recording with only a few instruments and the human voice for first-time attempts at Sonic Holography.®

You should now hear Sonic Holography® in action.

Fine Tuning

Carefully adjusting the following speaker parameters will result in the best possible holographic image:

1. Tilt-back angle and toe-in angles.

2. Distance of speakers and listening chairs from back walls.

3. Room reflections.

Tilt-back and toe-in angles. If you are in a seated position, decreasing the tilt-back angle of most typical speakers will result in more high frequency and less midrange energy at your listening position. It will also lower the soundstage closer to the ground. If you are in a standing position, these effects are reversed. Decreasing the tilt will result in less high frequency energy and will bring the midrange slightly forward.

It is possible to find a tilt-back angle that will allow the tonal balance to remain unchanged from sitting to standing. This specific angle may or may not result in the preferred tonal balance. We recommend that you determine your favorite tilt-back angle while seated. But remember, changing the tilt angle will also change the height of the sonic image. The less tilt, the higher the image. Increasing the tilt angle will, however, often enhance the dimensionality of the soundstage.

Toe-in (the lateral angle of the speakers) also affects Sonic Holography.® When experimenting with speaker angle, make sure that the speakers are equally toed in. This can be done by measuring the distance from the inner and outer corners to the back wall of the listening room.

Distance from back wall. The purpose of keeping the loudspeakers away from the walls is to provide a direct, speaker-to-ear sound path with a minimum of extra, unwanted reflections off surfaces in the room. Just as the second-sound arrivals confuse the ear in normal stereo playback, early arrivals of reflected sound can further confuse the issue and ruin attempts at creating holographic images. Always keep in mind the importance of accurate loudspeaker/ listening chair relationships, keeping the loudspeakers relatively close together (three to five feet, center-to-center).

Room reflections. For the best possible sonic hologram generation, the area around and behind your speakers should be relatively dead. If the back and side walls are too reflective, they may generate additional sound reflections which can interfere with Sonic Holography.®

The object of acoustically treating the listening room is to create what's known as a "live end/dead end" configuration. This design makes the area around the loudspeakers acoustically "dead," while the area around the listener is kept "live." Thus random sound reflections reach a listener long after the direct sound, establishing a uniform sound field. The reflections most in need of correction in your listening room are the usually strong, side-wall reflections that originate from surfaces near each loudspeaker. Any treatment should be applied to the wall extending two feet above and below the midrange and high-frequency loudspeaker elements, standing two to three feet from the leading edge of the loudspeaker cabinet. The treatment itself may be quite simple. Open,

full book cases or record shelves, heavy fabric hangings, or draperies made of heavy material will work well as an acoustic treatment for many situations. Sound panels made from cork or acoustical tile can be covered with a variety of other sound-absorbing materials, too. Since side-wall sound treatments are relatively small (usually less than four feet by four feet), you could use attractive grill cloths or foam panels to improve the appearance. However, loudspeaker grill cloths or covers are not, obviously, effective sound absorbers. Scrap carpeting can be effective when used with other sound-absorbing materials.

Be sure to deal with room reflections equally. If you eliminate the reflections from one wall and not the other, the resulting reflections will create an audible imbalance in the holographic image. The sound images will be well-defined on one side while smeared or fuzzy on the untreated side.

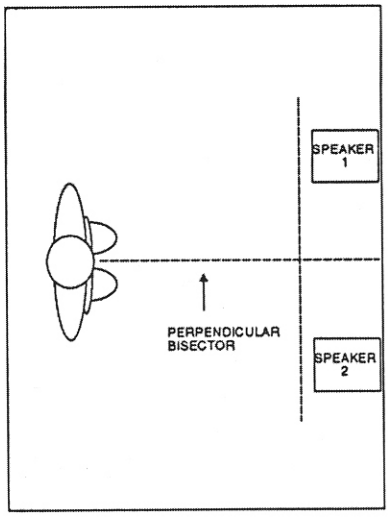

Figure 6 Room A

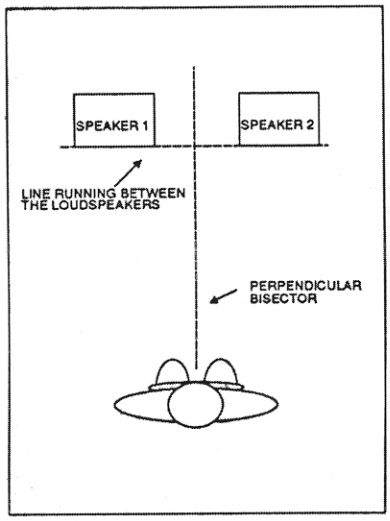

Figure 7 Room B

The wall directly behind the loudspeakers should also be as nonreflective as possible, particularly if loudspeakers have been placed a less-than-ideal distance away from it. If there's a large window between the loudspeakers, it should be covered with heavy draperies to reduce reflections off the glass. Of course, if there's no window to worry about, a wall can be treated with sound-deadening panels, or just book shelves and record cabinets extending vertically as high as possible, and completely between the loudspeakers.

Sound reflecting off a bare wood or tile floor can also reduce the Sonic Hologram effect even if the loudspeakers are properly elevated on stands. The only possible solution here is to cover the floor with shag or plush-pile carpeting. If installing wall-to-wall carpeting isn't on your agenda when installing your new Carver receiver, use a rug made from similar materials that extends from the base of each loudspeaker stand to a foot short of the listening chair. Upholstered, low furniture, placed somewhat in front of the loudspeakers can also break up floor reflections.

Room Examples

The first two sample rooms show the loudspeakers and listening chair in perfect positions for Sonic Holography.® But, as we've mentioned, it may not be practical to leave them there. It's your mission to find a point where considerations for successful Sonic Holography® can co-exist happily with the aesthetic considerations of room decor. Look at the diagram of Room A:

Here the loudspeakers project the long throw of the room, yielding a large front-to-back depth of the sonic stage. Room B, where the loudspeakers project the short span of the room, has exceptional sonic stage width and moderate front-to-back depth. Naturally the choice of positioning depends on your personal taste, as well as furnishings and overall room arrangement.

Sample Rooms C, D, E and F show configurations that won't work well with Sonic Holography,® though these same set-ups are often quite acceptable for conventional stereo playback. Other than poor loudspeaker placement, side/boundary-wall reflections will destroy chances of a good holographic image taking form.

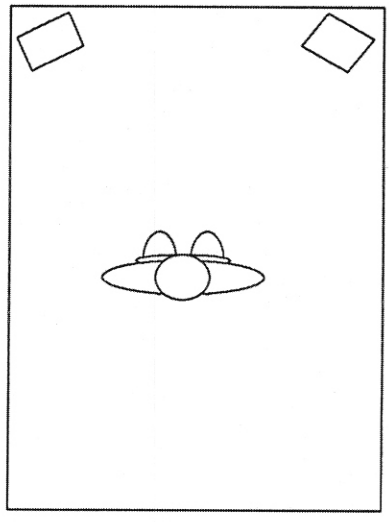

Figure 8 Room C

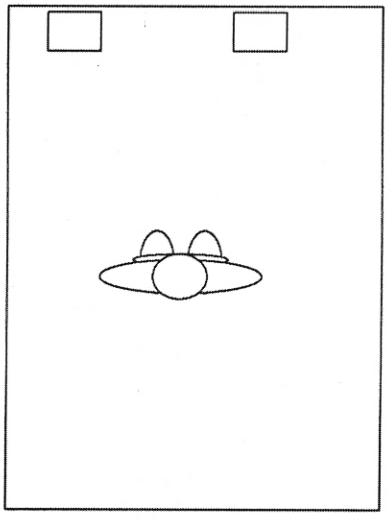

Figure 9 Room D

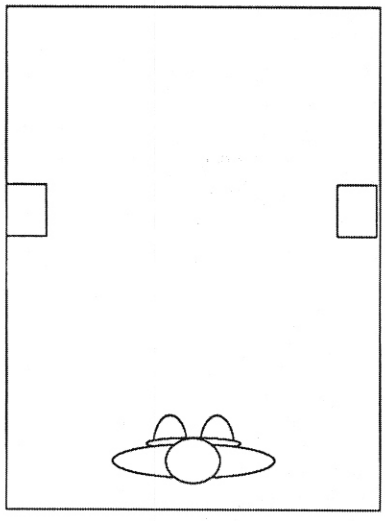

Figure 10 Room E

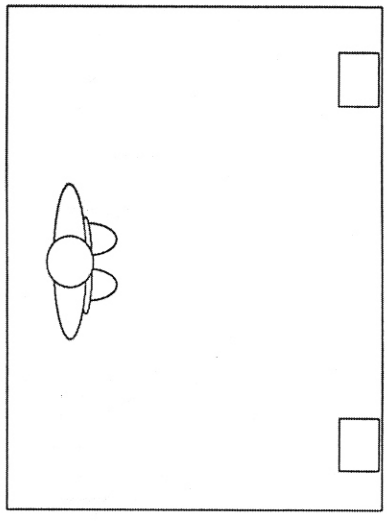

Figure 11 Room F

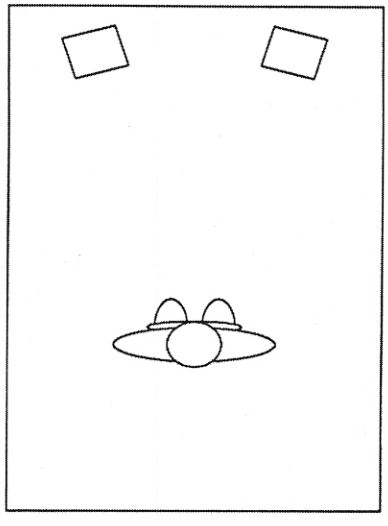

Figure 12 Room G

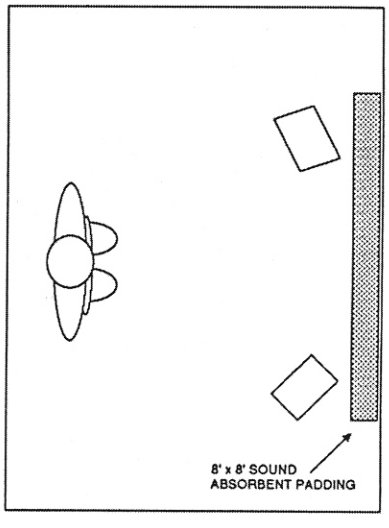

Figure 13 Room H

Better room arrangements are illustrated in Rooms G and H. Room H uses a "trick" to get the loudspeakers almost against the wall behind them. This consists of a sound-deadening panel placed behind the loudspeakers, right against the wall. We'll come back to Room H in a moment.

Refer again to the diagram of Room B which compares favorably to both Rooms G and H. What makes it so good for Sonic Holography®? First, as in the initial set-up, the loudspeakers are away from corners, side walls, and the wall behind the loudspeakers. The listener is seated with a reflective wall about one to four feet behind them. This places the listener in a sound field made up of direct sound from the loudspeakers and reflected sound from the rear wall.

In Room H, with the loudspeakers still away from the side walls and corners, the listener has a nearby rear wall to ensure front-to-back depth in the holographic image. As in any good placement for Sonic Holography,® the loudspeakers are toed-in toward the listening chair. This places the listener on-axis with direct sound from the loudspeakers, further reducing side-wall reflections at the same time.

Loudspeaker Designs and Early Reflections

The Sonic Holography® Sound Processing System uses signal delays of a fraction of a millisecond. In some loudspeakers, reflections with similar delays can be caused by protruding edge moldings, grillwork, or other front surface irregularities that might dilute an image in Sonic Holography.®

Most modern loudspeakers use sound absorbing materials, rounded corners, or even unconventional designs to reduce these early reflections. In all fairness, most loudspeakers with "conventional" front panels won't have any serious reflection problems that could hurt or weaken holographic images. However, if sound images remain fuzzy and unresolved, even with close attention to all other factors, there's a possibility it could be the result of early reflection off front-panel irregularities. The solution to this problem consists of placing a cut-out of acoustic felt around the various elements in your loudspeakers.

6. About Sonic Holography®

Sonic Holography® is a complex method of processing stereo signals which corrects the basic imaging flaw inherent in conventional stereo playback.

The problem with conventional stereo playback is that both ears hear the output of both loudspeakers. In order to understand why this is a problem, a comparison must be made between the way we hear a stereo recording of a live event played back through loudspeakers, as opposed to hearing an actual sonic event. Consider Figure 14.

Figure 14 Live musical event with timing and phase cues.

Figure 16 Sonic Holography restores realism complete with timing, phase and amplitude cues.

It shows what occurs during a live musical event. Each ear receives one sound arrival. The timing of these arrivals is processed by your brain and converted to information about where the music is coming from.

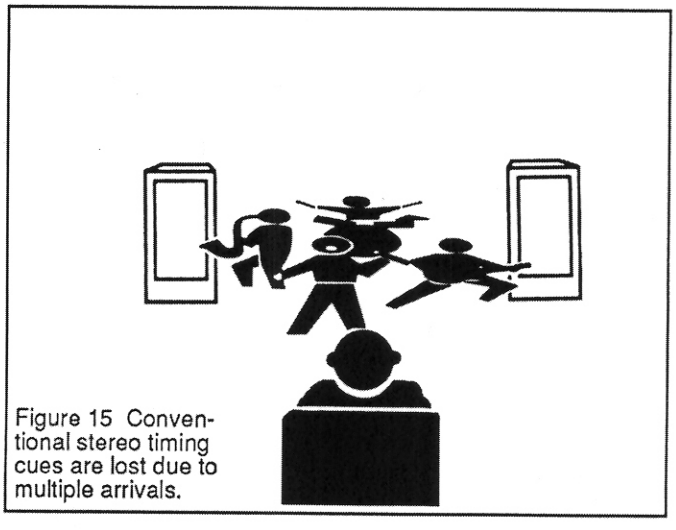

Figure 15 Conventional stereo timing cues are lost due to multiple arrivals.

Figure 15 represents conventional stereo. The recorded sound of the band is reproduced by both left and right loudspeakers. If your left ear ONLY got a sound arrival from the left speaker and your right ear ONLY got a sound arrival from the right speaker we wouldn't need Sonic Holography.® Unfortunately, each ear hears BOTH speakers. This results in each ear getting an extra, confusing sound arrival of information which contradicts the original position of the band. The best your brain can do is "construct" a fuzzy "stereo" image. This problem of FOUR total arrivals is, incidentally,

why stereo is so much more pronounced when you listen to isolated stereo headphones.

To review what we've covered so far, in real life a sonic event (such as the band in our illustration) can never create more than TWO sonic arrivals: One at the left ear and one at the right ear. Stereo playback through speakers causes FOUR arrivals. Those extra, second-sound arrivals confuse our ear/brain system, masking clues as to the exact positioning of the sound sources.

The H-9AV Sonic Hologram Generator eliminates the extra sonic arrivals that occur in conventional stereo playback. This is accomplished by cancelling out the unwanted second-sound arrivals from each loudspeaker to the opposite-side ear (Figure 16). Each ear is then free to concentrate its attention on the same-side loudspeaker. In other words, your left ear hears just the left loudspeaker; your right ear hears just the right loudspeaker.

This is accomplished by electronically-generated crosstalk signals from each stereo channel and feeds them to the opposite-side channel. The signals your new receiver generate are virtually identical to the unwanted acoustic second-arrivals that confuse our ear/brain systems. The difference is that they're phase inverted. When these mirror-image signals are reproduced by the loudspeakers, they cancel the acoustic cross talk signals arriving from the opposite loudspeaker. Of course, this is a very simplified explanation of how the Sonic Holography® Sound Processing System works. In addition to the electronic crosstalk-signals, the H-9AV uses delay timing and filtering circuits for creating the same types of filtering and delay caused by our heads.

7. Technical Information and Service Assistance

Specifications

Rated Output: 2V rms
Maximum Output: 4V rms
Total Harmonic Distortion: less than 0.05% (20Hz to 20kHz)
IM Distortion: less than 0.05% (SMPTE)
TIM Distortion: less than .001%
Noise: less than 90dB, IHF A-weighted
Image Resolution: 5 horizontal, 20 vertical
Size: 1.75" H x 19" W x 3.88" D
Weight: 3.5 lbs.

Patent Notice

The circuitry and application of the CARVER Sonic Holography® Sound Processing System are protected by United States Patent 4,218,585 and corresponding foreign patents.

Cleaning

You'll want to wipe off the H-9AV's front panel and chassis from time-to-time with a soft, dry cloth. If you have coming stubborn to remove, use a mild dish soap or detergent sparingly applied to a soft cloth; don't use alcohol, ammonia, or other strong solvents.

Troubleshooting

If you're having trouble or suspect a problem, try some simple trouble shooting first. More likely than not, the problem lies elsewhere in the system — not with the H-9AV.

Replace any suspect cables and/or inspect connections between the preamplifier or receiver, control settings, the power amplifiers, and the H-9AV.

IMPORTANT: Confirm that the TAPE MONITOR or EXTERNAL PROCESSOR button is pushed in. This is the most common source of problems after outboard signal processors have been added to a system.

Make sure the H-9AV plugged into a working outlet. If the front panel Power-on LED still fails to light-up, remove for service inspection.

Inspect speaker wires and terminals on the amplifier and loudspeakers for disconnects or possible shorts, etc.

Service Assistance

We suggest that you read the LIMITED WARRANTY completely to fully understand what your service coverage constitutes and its duration. You MUST promptly complete and return the WARRANTY REGISTRATION CARD to validate your LIMITED WARRANTY.

If your H-9AV should require service, we suggest you first contact the Dealer from whom you purchased it. Should the Dealer be unable to take care of your needs, you may contact the CARVER Customer Service Department by phoning (206) 775-6245, or by writing CARVER CORPORATION, Customer Service Department, P.O. Box 1237, Lynnwood, WA 98046. We will then direct you to the nearest in our national network of Authorized Warranty Service Centers, or give you detailed instructions on how to return the product to use for prompt action.

We wish you many hours of musical enjoyment. If you should have questions or comments, please write to us at the above address.