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# CARVER

ECS-U Owner's Manual  
Electronic Speaker Control System

CARVER



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 prévenir les chocs électriques ne pas utiliser cette fiche polarisée avec un prolongateur, un prise de courant ou une autre sortie de courant, sauf si les lames peuvent être insérées à fond sans laisser aucune partie à découvert.

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.

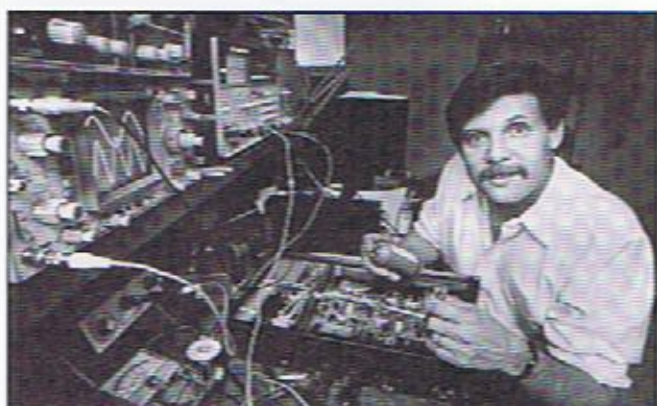
# Introduction

## A Message from Bob Carver

Congratulations on purchasing a Carver ECS-U Speaker Control System. It is a virtual "bag of tricks" for optimizing speaker performance and increasing listening enjoyment.

First, there are two special controls which can be used to adjust treble and bass speaker output. Neither of these is anything like a conventional equalizer or tone control. Each is intended solely for the special demands of speaker systems.

The Sub-Bass circuit on the ECS-U restores low bass harmonics which have become attenuated in the recording, mastering and duplication processes. Mind you, it doesn't "synthesize" them. A bass note has to be there, albeit very faint, for the Sub-Bass circuit to act. But if a note is present, the circuitry can restore it to realistic listening levels. A word of caution, though: If there is already ample bass (as with



many CD's), this circuit can have too much effect.

The Gundry Perspective is a remarkable equalization feature which can control your "distance" from the musical event. It is explained in detail farther on.

Finally, there's Sonic Holography®. Important note: This is an implementation of Sonic Holography® which is designed to work best with bi-polar or spacially reflecting speakers. It will not have as much effect as our H-9AV outboard Generator or Sonic Holography® preamplifiers when used with traditional box speakers.

However, when used with Carver Amazing Loudspeakers, other bi-polar designs, electrostatics or "direct reflecting" speakers, it will be impressive indeed. My patented 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. The ambience or acoustic signature of a recording's location, which is vital to the sound of a 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.

To get the most from your ESC-U, be sure to read all safety, installation, and operating information that follow in this manual. Again, let me thank you for choosing Carver. I am proud to present to you the best in craftsmanship and design found in the Carver ECS-U.

Robert W. Carver  
President, CARVER CORPORATION

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## 1. Unpacking and Paperwork

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1. Inspect the outside of the carton for damage. If you do encounter what may be signs of damage, contact your CARVER dealer before proceeding further. If not...

2. Remove the ECS-U from the packing material.

3. At this time, check for any visible sign of damage. If you do encounter what appear to be signs of damage, contact your CARVER dealer before proceeding further.

4. Make a note of the serial number which is located on the back of the Electronic Control System.

Record this number in the space provided for convenient reference. You will need the number in the event you require service or for insurance purposes.

Model: **ECS-U**

Serial Number: \_\_\_\_\_

Purchased from: \_\_\_\_\_

Date: \_\_\_\_\_

5. Also make sure to keep the sales receipt from your CARVER dealer. It, too, is necessary for service and insurance purposes.

6. Fill out and mail the Warranty Card which is packed in a separate envelope with the Limited Warranty. It must be returned to validate any repair work performed during the Warranty period.

## 2 Connecting the Electronic Control System

**Description** The Carver Electronic Speaker Control System is an active line-level equalizer and signal processor which, when connected between the pre- and power amplifier (or in a tape monitor loop), provides: A) user-variable equalization, B) subharmonic bass enhancement and, C) Sonic Holography® processing.

The variable equalization consists of two rotary controls and two buttons, allowing frequency optimization of tonal balance to suit both listening material and listening room environment.

We'll explain each control in depth farther on in this section.

**IMPORTANT NOTE:** Because the ECS-U contains integral parts of the Amazing Loudspeakers' internal signal processing circuitry, it should always be used when the speakers are operating.

**Placement in Your System** As shown in Figure 1, the ECS-U 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 ECS-U. 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 ECS-U **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. The ECS-U will accept signals up to 4 volts.

If you are in any doubt about matching the ECS-U to your components, consult your CARVER dealer.

Because the ECS-U requires very little power, it may be connected to a switched convenience receptacle on your preamplifier, integrated amplifier or receiver. If no such

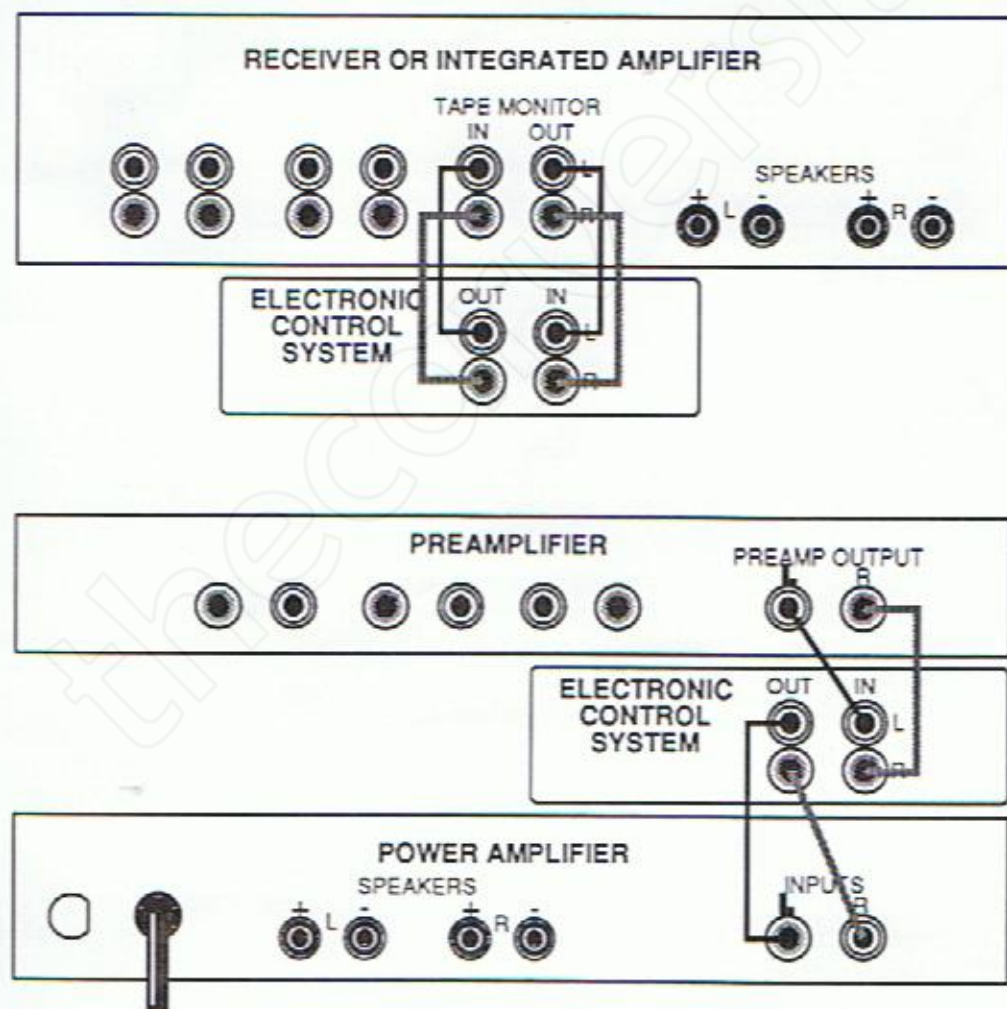


Figure 1

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 page 1 for other considerations and cautions.

### 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 ECS-U.
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 ECS-U.
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 ECS-U.
6. Take care to observe correct left and right channel orientation when making connections.
7. Plug the ECS-U 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 ECS-U.
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 ECS-U.
5. Connect a set of cords from the LEFT and RIGHT OUT sockets on the ECS-U to the LEFT and RIGHT INPUT sockets on your amplifier.
6. Take care to observe correct left and right channel orientation when making connections.
7. Plug the ECS-U power cord into a switched convenience socket or wall receptacle.

### ECS-U front panel functions

Figure 2 indicates each ECS-U control function.

#### 1. & 2. BASS "Q" and HIGH FREQUENCY TRIM

An ideal speaker system must have very low and high frequency response if the true character of music is to be accurately conveyed. Although this information is often present on quality modern recordings, it is often lost (or exaggerated) by room acoustics, speaker placement and playback component interaction. The ECS-U corrects many of these problems with two rotary controls.

BASS "Q" allows you to vary low frequency damping. It is normally set to the center position, corresponding to a "Q" of 0.7 at which the Amazing

Loudspeaker is damped for flattest response. A higher "Q" (clockwise rotation) increases bass richness and bandwidth; a lower "Q" (counter-clockwise rotation) produces a drier, tighter bass sound. Adjust this control initially using a recording you are familiar with which has a natural, ample bass sound.

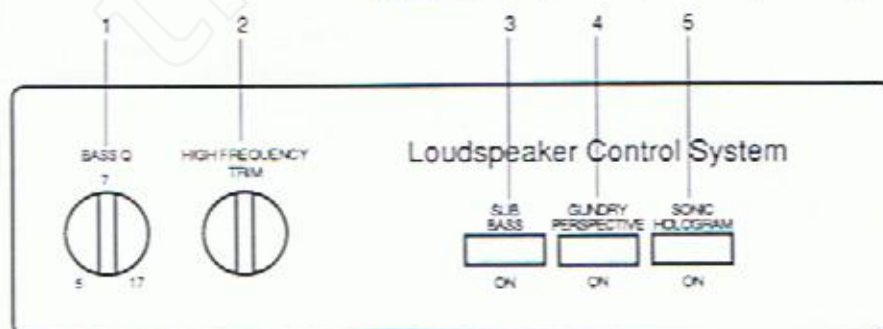


Figure 2, ECS-U control functions.



Fig. 3 - Shelving bass tone control



Fig. 4 - Bass Q control

Careful adjustment of BASS "Q" can help create a more natural, ample low end without exaggerating non-linearities in the speakers bass response.

HIGH FREQUENCY TRIM addresses the problems of treble balance. Due to the changing nature of recording technology and producer's tastes, compact discs and phonograph records vary widely in the amount of high frequency information present. In addition, the acoustics of a listening room play a large role: Carpets, drapery and upholstered furniture absorb treble; bare floors, walls and windows reflect high frequencies causing the sensation of treble boost.

Unlike BASS "Q", HIGH FREQUENCY TRIM is a shelving control. It has essentially the same effect as an L-pad adjustment, but without the potential power loss and distortion. When HIGH FREQUENCY TRIM is left at the center setting, the loudspeaker's output above 3kHz is unchanged. Clockwise rotation increases treble output, resulting in a brighter, sharper sound. Counter-clockwise rotation progressively attenuates high frequencies if they are conspicuously overpowering to the listener.

SUB BASS (3) is designed to enhance low frequencies in recordings which lack fundamental bass. Signal losses during actual recording, mixing and mastering can often attenuate low bass 20 dB or more, especially on phonograph records and cassette tapes. The ECS-U's SUB BASS control restores bass information extending to as low as 20 Hz. It should not be mistaken for a "bass synthesizer" which can result in unnatural growling and tubbiness. Instead, the SUB BASS circuit detects existing, attenuated low bass and restores it to a more realistic level.

The GUNDRY PERSPECTIVE control (4) modifies upper midrange spectral energy distribution, changing the apparent nearness of performers in a musical selection. Years ago, the BBC commissioned a speaker designer to create a monitor speaker which could be used in the close confines of a radio control booth, and yet which would provide a sense of space and distance between the sound source and the listener. During the design process, Mr. Gundry repeatedly compared the sound of a live, symphonic performance with the same sound through his prototype speaker system by literally running back and forth between the concert hall and recording booth. He ultimately established that the ear receives its distance cues from a narrow frequency band centered around 3.3kHz. If this frequency is attenuated approximately 5dB, a sound source seems to psychoacoustically recede from the listener. Yet there is no perceptible loss of overall frequency balance.

The ECS-U's GUNDRY PERSPECTIVE circuit takes advantage of this phenomenon to provide the listener with increased options. It is especially useful with many modern recordings where microphones are placed inches away from an instrument, resulting in a gigantic "in-your-face" sonic image which may or may not be realistic. A good example is a close-miked symphonic recording where the musicians seem to be right between the speakers. When the GUNDRY PERSPECTIVE circuit is engaged, the performers will seem to be located farther back, in acoustic space extending behind the speakers.

The SONIC HOLOGRAM GENERATOR (5) incorporated in the ECS-U has been optimized for use with Carver Amazing Loudspeakers or other bi-polar, electrostatic or spacially reflecting speakers. Its effect will not be as pronounced when it is used with conventional box-type speakers. Instead, we recommend the Carver H-9AV. The following section will help you get the most from Sonic Holography®.

### 3. CARVER Sonic Holography®

#### Principles of Sonic Holography®

Sonic Holography® will greatly increase your listening pleasure and enjoyment by bringing a completely new perspective to your favorite music, as well as an exciting 3-dimensionality to video movie and concert soundtracks.

For years, sophisticated stereo recording and reproduction systems have been offered that are supposedly capable of further enhancing the "you-are-there" feel of a musical performance or movie audio track. However, certain inherent problems with conventional stereo playback have always limited this "enhanced realism" to the space between the loudspeakers. Even with the addition of digital delay or other ambience-restoring equipment or loudspeaker systems, perceived realism was still a problem.

First, let's consider conventional stereo. A pair of speakers create a "stereo image" by reproducing two slightly different "pictures" of the same musical event. Your ears are tricked into perceiving these two sound arrivals as a single musical event happening between the two speakers. This is the phenomenon we've become accustomed to. Not because it is particularly realistic, but because we enjoy music. Bob Carver, however, does not believe that the ultimate goal of a sound system is to merely play back good sounding music. He is committed to the ultimate sound system goal: Re-creating an actual performance.

Bob began by researching the way people perceive sound and then applied the findings to the stereo listening experience. When a musician performs in front of you, each ear receives a slightly different version of the sound event. Your ear-brain neural system processes this and you perceive the reality of live music (Fig. 5). The key to our accurate perception is the fact that each ear receives ONE sound arrival from the musical source.

In theory, the concept of re-creating the same experience with two speakers is a valid one, but there is an inherent problem: Both ears receive TWO sound arrivals, one from each speaker (Fig. 6). Your ear-brain neural processor gets confused. The best it can create with this conflicting information is a relatively flat, two dimensional sonic image between the two speakers.

Through a patented process, CARVER Sonic Holography® cancels the extra set of sound arrivals which muddy conventional stereo. It paints a sonic picture which is remarkably believable and convincing (Fig. 7). A listener can actually pinpoint the location of individual artists and instruments far beyond the limits of the standard left/right speaker arrangement. At times, sound can even seem to come from outside the listening room's walls! The result is that your favorite



Figure 5 Live musical event with timing and phase cues.



Figure 6 Conventional stereo timing cues are lost due to multiple arrivals.



Figure 7 Sonic Holography restores realism complete with timing, phase and amplitude cues.

music or movie sound track becomes a full, 3-dimensional experience of unparalleled realism. You are suddenly there.

## System Verification

As was previously noted, making Sonic Holography® work to its fullest requires attention to several factors which are usually not as critical for normal stereo playback. In order to finetune your speakers' best position for Sonic Holography®, it is recommended that you perform a listening test.

1. With the entire system turned off, visually check and confirm the following:

- System phase. Make sure that all your components are connected in phase with all left channel outputs are connected to left channel inputs, etc. including those running to and from the ECS-U.
- Speaker polarity. Check and confirm that your speakers are properly wired with RED (+) terminals connected to the RED speaker (+) output of your amplifier or receiver, and BLACK connected to the BLACK (-) output terminals.
- Speaker position. Make sure that each speaker is "toed-in" one inch and that the distances from the middle of each ribbon element to the center of your listening chair are equal within 1/4".
- Phono stylus condition. If you are using a turntable for the System Verification, make sure that the stylus is not overly worn. Other than possibly damaging your valuable LP's, a worn cartridge/stylus can upset the balance of the recording before it gets to the stereo system. This can simulate certain acoustic problems which cause strong, one-sided imaging.

2. Set the BALANCE control on your preamplifier, integrated amplifier or receiver to the center position. Make sure that any tone control settings, LOUDNESS buttons or other such circuits are not engaged.

If there are other sound processing devices such as graphic equalizers, Dolby™ decoders or dynamic expanders in the signal chain, switch them out of the signal path.

3. On the ECS-U, set the BASS "Q" and HIGH FREQUENCY TRIM to their center (12 o'clock) positions. Make sure that the SUB BASS and GUNDRY PERSPECTIVE circuits are OFF.

4. Turn the SONIC HOLOGRAPHY® circuit ON.

5. Select a recording which you are familiar with. If you have selected older LP or CD recordings, be sure to check the liner notes to confirm that they have actually been recorded in stereo. Recordings labeled "re-channeled for stereo playback" will not create a successful Holographic image during first-time listening tests.

6. Turn on your stereo system, play the selection and settle into your listening chair.

## What to Listen For

If you have correctly set up your speakers, you should get a Holographic image. Sonic Holography® requires a brief period of time for you to "learn to hear" its full effect and may also require a few minor adjustments to fully optimize the listening room's acoustics.

Musical instruments and other sound sources will be spread out in a 45° to 90° arc in front of you. Sound images will exist to the far left and right well beyond the limits of the speakers. You will be able to perceive a sonic sound stage depth of 10 to 20 feet with sound images clearly floating behind and, from time to time, in front of the loudspeakers.

### **Finetuning the Holographic Image**

Because Sonic Holography® is a totally unique and pleasurable experience, it is worth the time spent to maximize its effects. If you are not experiencing a dramatic change in the size of the sound image when the SONIC HOLOGRAM circuit is switched on (and you are using the correct type of speakers for the ECS-U's Hologram Generator), some minor adjustments should rectify the problem. Sonic Holography® makes use of complex interactions between the loudspeaker and listening room.

### **Tilt-back Angle**

Increasing the tilt-back angle will often enhance the effects of Sonic Holography®. If too much high frequency energy is being absorbed and/or being reflected by the carpet, the Holographic image can suffer. Adjust the glides by retracting them equally towards the speaker base, resulting in more tilt-back.

### **Distance from the Back Wall**

In order to generate a three-dimensional sonic image, space must be allowed between the back wall and your speakers. This is not just a characteristic of panel speakers, but of all fine loudspeakers with pinpoint imaging. When the rear wall reflection is returned 3 or more milliseconds after the first sound arrival, they combine to create a spectacular illusion of 3-dimensional space behind and beyond the speakers. Since the speed of sound is about one foot per millisecond, a three-foot space between wall and speaker, will result in a 6 millisecond delay. Experiment with increasing this distance (equally for both speakers) to enhance the effects of Sonic Holography®.

### **Toe-in Angle**

The toe-in angle will predominantly change the width of the soundstage. Because bi-polar type speakers direct sound both forward and back, your individual room will determine whether more or less toe-in produces the maximum stereo sound stage size and full Sonic Holography® effect. A major component of perceived image size is the spatial timing cues our ear-brain hearing system receives. These cues are modified by even minute changes in toe-in angle.

### **Acoustic Treatments**

In some instances, undesired room reflections may cause the Hologram to perform poorly. Acoustically absorbant material such as thick carpet, heavy drapes and over-stuffed furniture can reduce reflections. The position of open doorways or hallways in relation to speaker placement will also affect holographic imaging. Feel free to experiment with furniture placement and position of the speaker and listener areas relative to openings such as doorways.

### **Achieving Precision Imaging**

Whether or not you are listening with Sonic Holography®, precise imaging requires EXACTLY equal toe-in and tilt-back angles, speaker-to-sidewall and speaker-to-listener distances.

We suggest the use of a tape measure or un-stretchy string to determine these angles and distances within one centimeter of each other.

An easy way to match tilt-back angles is to measure from the top of each speaker to the back wall.

For speaker-to-listener measurements, measure from the center of each ribbon element to the center of your breastbone or nose while sitting in the listening chair.

## 4. Technical Information & Service Assistance

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**Care of the ECS-U** A light dusting with a soft cloth is the only regular care which the CARVER Electronic Control System requires. If the control knobs or front panel become soiled, they may be cleaned using a soft cloth moistened slightly with mild liquid soap.

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

If your CARVER ECS-U should require service, we suggest you first contact the Dealer from whom you purchased your speakers. Should the Dealer be unable to take care of your needs, you may contact the CARVER Service Department by phoning (206) 775-6245, or by writing CARVER CORPORATION, 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 us 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.

**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. Patents pending for the Amazing Loudspeakers are 942,879; 928,853.

**Electronic Control System Specifications (Nominal)**

- Frequency Bandwidth: **5 Hz to 80 kHz**
- Total Harmonic Distortion: **0.1% THD**
- Signal-to-Noise: **less than 90dB, IHF A-weighted**
- IM Distortion: **less than .001%**
- TIM Distortion: **Un-measurable**
- Rated Output: **2V RMS**
- Maximum Output: **4V RMS**
- Operating voltage: **117 V AC**
- Weight: **5 lbs. 8-1/2 oz.**
- Dimensions: **2.5" H x 9" W x 7" D**

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 présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de class a/de class B (selon le cas) prescrites dans le règlement sur le brouillage radioélectrique édicté par les ministere des communications du Canada.

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