INSTRUCTIONS FOR USING THE CARVER C-4000 SONIC HOLOGRAPHY TEST RECORD

Note: Although intended primarily to aid in setting up systems that include a Carver C-4000 Sonic Holography/Autocorrelation Preamplifier, the tests and information on this record will also benefit users of ordinary stereo playback equipment. Most of the tests require no special test equipment—just careful listening.

Before playing the record, set your system's controls for stereo operation. Set your tone controls for flat response and switch out or disconnect all signal-processing accessories, such as equalizers (unless required for proper operation of your loudspeakers) and expanders. C-4000 features, such as the Autocorrelator, the Peak Unlimiter, and the Time Delay, should also be switched out unless the announcer on the record indicates otherwise.

— SIDE ONE —

Band 1 — Introduction

A self-explanatory introduction to the record.

Band 2 — Loudspeaker Phasing

This test enables you to check the relative phasing of your loudspeakers. If your speakers are properly connected to your amplifier, their outputs will reinforce each other. If the speakers are connected with opposite polarities, their outputs will tend to cancel (especially in the bass), resulting in thin sound and poor imaging. This can be corrected by reversing the leads to one of the speakers.

Band 3 — Internal Cartridge Phasing and Frequency Response

This band consists of six laterally cut (L + R) tones at frequencies of 1 kHz, 15 kHz, 10 kHz, 5 kHz, 100 Hz, and 50 Hz. To check the relative phasing of your cartridge's channels, connect your preamp's right-channel output to the horizontal input of an oscilloscope and its left-channel output to the vertical input. A perfect cartridge, with a relative phase angle of 0° between channels across the audio band, would generate a straight, 45° line on the oscilloscope at all six frequencies. In practice, a very good cartridge will yield a narrow loop at most frequencies, especially below 5 kHz. Lesser cartridges will make wider loops on the scope and will produce a more diffuse sonic image.

You can also use the tones to check frequency response. Connect a voltmeter to your preamp's output and measure the level of the 1-kHz tone. The levels of the other five tones should be the same (or nearly so). Check each channel individually; the results should match closely. If, as is commonly the case, your cartridge has slightly more output on one channel than the other, you may want to use a different balance setting for phono than for other sources.

Band 4 — Cartridge Absolute Phase and Electrical Balance

The tone in this band is a vertically cut stereo difference signal (L − R), obtained by recording only the left- and right-channel positive outputs.

To check cartridge phasing, play the tone and switch your preamp back and forth between stereo and mono. You should hear a significant difference in level between the two modes. If the sound does not go almost completely away in the mono mode, reverse the hot and ground leads to your cartridge for *one channel only.* Then return to Band 2 and recheck your loudspeaker phasing.

You can also use the L − R tone to electrically balance your phono playback system. Return your preamplifier to its mono mode, play the tone, and rotate the balance control to obtain minimum sound. If the control does not end up pointing to the same index mark found in Band 3 with the aid of the ACTVM, the vertical output of the cartridge is not identical. The latter is not unusual or serious; it is more important that the lateral balance obtained in Band 3 be maintained.

If, after you have electrically balanced your system, mono sound images are not localized midway between your speakers, your speakers differ in efficiency or (more likely) your room has an acoustical imbalance that requires a compensating offset of the balance control.

Band 5 — Autocorrelator Adjustment

Rumble and intermittent hiss have been added to the announcer's voice to help you learn to adjust the C-4000's Autocorrelator noise-reduction system.

Manual Threshold Adjustment — Rotate the Correlation Threshold knob until the hiss is slightly reduced. Turning the pot too far counterclockwise will eliminate all of the hiss, but it may also attenuate the high frequencies in the announcer's voice.

Automatic Threshold Correlation — When engaged, this control automatically tunes the Autocorrelator response to the program for lowest hiss.

LF Cal (Low-Frequency Calibration) — The rumble behind the announcer's voice is much louder than normal. Do not attempt to reduce it with the LF Cal Control. Instead, use the silent grooves at the end of this band.

With the stylus in the silent grooves, turn the volume up and use a small screwdriver to rotate the LF Cal Control counterclockwise until the residual rumble from the record and the turntable disappears.

Band 6 — Peak Unlimiter Adjustment

Recordings are often compressed and peak-limited to fit within the dynamic-range limitations of the medium (disc, FM, etc.) without noise or distortion. Unfortunately, this practice can result in lifeless, unnatural sound. The Peak Unlimiter works to restore the natural dynamic shadings and contrasts,of live music.

The two tones in Band 6 are designed to highlight the effect of the Peak Unlimiter, but the device should be calibrated using music. Engage the switch, and rotate the control clockwise until the red LED flickers on the highest musical peaks.

Band 7 — Time Delay and Echo Density

This band is self-explanatory. The left channel contains only information that has been delayed either 35 or 50 milliseconds. The longer delay produces a greater sense of spaciousness, but the shorter one is generally better for most listening rooms. The last section of the band includes the effect of the Echo Density Control.

Optimum playback level for the delay channels varies with the recording. For best results with the Sonic Hologram™ engaged, they should be barely audible (often they will not even be necessary).

Band 8 — Trim Control

This band is also self-explanatory. Use the Trim Control when the sound is unnaturally heavy with the Sonic Hologram™ engaged. The control can also help compensate for the increase in bass output that often results from placing bookshelf loudspeakers on the floor. The Trim and bass-cut controls have also been designed to combat the harmful effects of standing waves in the listening room.

Band 9 — Introduction to Side Two

Follow the announcer's instructions. Remember to engage the Sonic Hologram™ and to depress the Holographic Injection Ratio Switch.

Even if you do not have a C-4000 preamplifier, you can use Band 10 to find the acoustic center between your speakers. Engage the mono switch and return to your preferred listening position. Adjust your listening chair, speakers, or balance control until the center image is directly in front of you.

— SIDE TWO —

Band 10 — Sonic Holography ™

The noise bursts in this band are better for setting up the listening room than music, because they are far more sensitive to placement. When your chair and loudspeakers are within two inches of their correct positions, the Sonic Hologram™ will "click in." The exact positions will vary according to the room, but to start, try placing your speakers about four to five feet apart and at least six feet from the nearest wall. Your listening chair should also be away from any walls and about eight to nine feet in front of the speakers.

If you can't satisfy the above requirements, compromise as best you can. Early reflections from walls or other surfaces near the speakers or your head can interfere with the Sonic Hologram™. Moving your head and speakers closer together than is usual for stereo listening and away from reflective surfaces tends to minimize the effect of these harmful echoes. It also improves ordinary stereo imaging, although less dramatically.

When you have moved the noise bursts outside of the right or left speaker, slowly adjust your listening room until you hit the "sweet spot," where the noise bursts seem to come from positions that are the same distance from each speaker as the noise switches from channel to channel. The bursts should not appear to come from between the speakers, but from about 20° to 90° to the extreme right and left.

The noise bursts can also be played back at different speeds to help assess the performance of the system and listening room at different frequencies.

Band 11 — Music

If your room is properly set up, the electric piano will appear to be centered about five feet behind the speakers. The soprano saxophone will appear as recorded, about 45° to the left of the left speaker, and the flute will seem to come from slightly to the right of the right speaker. The Sonic Hologram™ will enable you to follow the musicians as they move about during the recording.

Band 12 — Holographically Encoded Music

The music on this band has been Holographically encoded, so that the effect can be heard with the Sonic Hologram™ turned off. Disengage the Sonic Hologram Generator Switch. The wind instruments (channels) are reversed; the saxophone should now be coming from the right speaker.

The announcer's voice is mainly recorded in mono. By disconnecting the phono input to one channel and switching in the Sonic Hologram™, his voice will be thrown outside of the speaker. It can also be used to help set up the listening room, but, like music, it is a less sensitive indicator than the noise bursts in Band 10.

Producer - Foster's Supply; **Technical Production** - Scott Kent, BKM/AFKA; **Cover Photograph** - Michael Pierce; **Music** - Roberto Mighty Ensemble: Electric Bass Guitar - Tim Ingles; Flute - Earl Grant-Lawrence; Soprano Saxophone - Keith Fiddmont; Tenor Saxophone - Keith Fiddmont; Drums - Webb Thomas; Electric Piano - Roberto Mighty. **Songs:** Band 7 - "Sepia Tone"; Bands 11 & 12 - "Streak".