AEA LD 2020 STEREOSCOPE

"winkie-blinkie" Quick Start Guide

POWER:

The display typically will run for more than eight hours on one 9-volt alkaline battery. (The battery compartment is on the back of the unit.) A front panel pushbutton selects between the internal battery and external power, and can be used to turn the unit on and off when operating from the battery. An external 120VAC "wall wart" power supply is provided.

INPUTS:

Balanced, 1/4" phone jacks for line-level left and right signals are on the left side of the chassis. If you want to use it with unbalanced signals, just use mono 1/4" plugs or short the ring to ground.

SENSITIVITY:

Front panel gain controls provide full deflection with a 120 mV signal at maximum sensitivity; minimum sensitivity is full off. Simply adjust these controls until you like the size of the display.

MODES:

In the L-R Mode, the "winkie blinkie" will emulate a conventional XY 'scope display. Switch to the more intuitive PANorama Mode, and it will show an in-phase mono signal — much like a panpot: the display forms a straight line that leans to the left, goes straight up the middle, or leans to the right as the signal is panned from hard left to hard right. See Figures 1 and 2 for illustrations.

DISPLAY:

The matched-intensity 400 LED dancing light show is easy to read across a room. When no audio is present, a central LED will illuminate to tell you the unit is turned on.

SETUP:

Turn it on. Apply audio signal to the inputs. Set the Mode switch for your viewing pleasure. Adjust the Sensitivity controls until the display has

good deflection and the channels are well balanced. Hint: to precisely match the gain between channels, input an equal level, in-phase mono signal, view in the PANorama mode, and adjust for a single vertical column of LED's.

ENJOY!

AEA LD 2020 STEREOSCOPE USER'S GUIDE

What is Stereo?

How do you monitor the *"stereoness"* of your program signal? This has been pondered by audio engineers since the pioneering days of stereo in the 1930's. At the heart of this question lies another: What exactly, is *stereo?* Surely it is more than just two channels of audio ...

"The word *stereophonics* was derived by combining two Greek words: *stereo,* which means solid, and implicates three spatial dimensions (depth, breadth, and height), and *phonics,* which means the science of sound." [1] Thus, stereo as we know it, is a sonic *illusion* representing three-dimensional space. While in current practice stereo is generated and conveyed to the listener via two signals, it is the technical nature of these two signals (or channels) which defines the *sonic image.*

The human hearing process relies on two fundamental criteria for spatial recognition: *intensity* and *phase.* The brain interprets the minute differences in intensity and phase (i.e. time of arrival) of a sound as it reaches each of our two ears, and uses these differences to determine the direction and distance of the source of the sound. To make successful stereo, it is necessary to capture, preserve, and reproduce these significant differences.

There are many techniques employed by recording engineers to create stereophonic illusions, and there are numerous texts where the interested reader can find articles detailing these methods. "Accurate stereo imaging is the foundation for the art of stereo recording. Experience with the basic techniques and knowledge of their attributes are essential for anyone working in stereo formats. The *art* of recording lies in manipulating illusions. The *science* of recording involves the tools and techniques used to create these illusions." [2]

[1] The New Stereo Soundbook, F.A. Everest and R. Streicher, TAB Books, 1992, pg. 1

[2] Basic Stereo Microphone Perspectives — A Review, R. Streicher and W. Dooley, JAES vol 33, no. 7/8, 1985 July/August, pp. 548

The LD 2020 Stereoscope from Audio Engineering Associates is a new and useful tool to aid the conscientious engineer in the pursuit of good stereo imaging. With its simple, easy to read display for monitoring *intensity* and *phase,* these two critical electrical fundamentals can be maintained in the proper relationships to provide a successful and pleasing sonic illusion.

Stereo waveform display

Given that stereo is comprised of two signals, each can be defined by a vector — a line having magnitude and direction. Further, each of these signals represents an event in time which, as discussed above, has two properties: intensity and phase. An oscilloscope is a complex test instrument ideal to observe these, for it shows signals on two axes: intensity and time (another way of describing phase). The vertical axis of the display indicates intensity, and the horizontal axis, time. Most commonly, the waveform of the signal is shown on the 'scope screen. However, it can also be used to display the two channels of a stereo signal; by convention, the left channel is shown on the vertical axis and the right channel on the horizontal axis. [Refer to Figures-1a and b]

<<< Insert Figure-1 here >>>

When these two signals are equal and displayed together, the result is shown in Figure-1c; because the two channels are equal and in phase, this also is a classic *monophonic* signal. If the two signals are equal but *180° out-of-phase* the result is shown in Figure-1d. This is another "classic" case, but is one to be avoided whenever possible, because if transmitted in mono, the signals will cancel each other, and no output will result.

Because stereo involves sound signals in "real space" the elements of intensity and phase are generally not equal between the two channels: usually there will be some difference in one or both of these characteristics. Phase differences will appear as a divergence from the simple lines shown, for example Figure-1e, which shows still equal signals, but with a phase difference of 90° between them. Once the signal intensities also begin to differ, the display becomes more scrambled, and the familiar *Lissajous* figures result, as shown in Figures 1-f, g, and h. Note that the directional tendencies of these still bear a resemblance to the in-phase, out-of-phase, and random-phase displays shown earlier.

By watching this stereo display, the engineer can easily and quickly "see" the characteristics of the sonic image: whether it is narrow or wide; in or out of phase; properly balanced or weighted to one side or the other.

<<< insert Figure-2 here >>

The AEA LD 2020 Stereoscope

As noted earlier, an oscilloscope is commonly used to display stereo signals. However, a 'scope is often too bulky, heavy, or expensive to be used conveniently in the production environment. Audio Engineering Associates has developed the LD 2020 Stereoscope to meet this need. This portable, battery-operable package, weighing in at less than one pound, is specifically designed to provide a visual monitor of stereo signals. With a minimum of controls and a 400 LED matrix display, it is easy to setup and use any time, anywhere.

Two balanced 1/4" jacks and two Sensitivity controls receive the stereo signals. The pushbutton Battery/External power switch selects the powering option, and the L-R/PANorama pushbutton determines the display mode. That's all there is to it.

To setup the display, first generate a monophonic signal at "normal" operating level on both channels of your signal source. Connect the outputs to the two inputs of the LD 2020 and turn the unit on. Use the Sensitivity controls to adjust the size of the display; for best results, these controls should be set about equally. You are now ready to begin monitoring stereo signals.

In the L-R mode, the signals will be displayed as shown in Figure-1. However, for a more intuitive interpretation of the way stereo is heard, we have incorporated a PANorama mode. As can be seen in Figure-2, a Left-only signal slopes to the left, a Right-only signal slopes to the right, and a monophonic, in-phase signal is a vertical line. Because the stereo program follows these same directions, you have an instant and easy to understand view of your stereo program content.

Placement of elements, channel balance, and control of width are obvious, and any out-of-phase problems immediately become evident. Once you have viewed your signal via the LD 2020's PANorama mode, you'll probably never want to go back to a regular 'scope display again.

Specifications

Inputs:	1/4" balanced, TRS jacks
Impedance:	>20K-ohms
Sensitivity:	120mV for full-scale deflection at maximum gain
Powering:	Internal 9V battery (Duracell MN-1604 or equivalent) External 6—15 VDC power supply, 50 mA
Battery life:	greater than eight hours with Duracell battery
Dimensions:	7 1/2" (h) x 4" (w) x 1 1/4" (d)
Weight:	approximately 14 ounces with battery
Supplied with:	120 VAC “wall wart” power supply Operations Manual

This user’s guide is a first edition. We would appreciate your comments, whether positive or negative, about this manual and our products.

AEA also manufactures a custom stereo bar for coincident and near-coincident microphone arrays, collapsible 15-foot aluminum microphone stands, battery powered headphone amps with a Mid/Side decode mode, MS stereo processors both with and without microphone preamplifiers, and a variety of accessories for the Coles 4038 studio ribbon microphone.

Since 1981 we’ve acted as the US agent for Coles Electroacoustics, manufacturers of the 4038 studio ribbon microphone and the 4104B, a “lip” mic for voice-over work in high noise environments. We sell and service the mics and stock spare parts.

In North America we represent CB Electronics, a leading worldwide supplier of machine control equipment to the sound-for-film industry. Their products specialize in professional control of and translation between bi-phase, 9-pin serial and time code machines. Their new SR line provides low cost multiple machine remote controls for RS-422, Sony, and Tascam DA88 protocol machines.

Our Audio Test Department buys, sells, trades, and rents new and used audio test gear. Audio Precision, B&K, Hewlett Packard, Galaxy, Goldline, Neutrik, and Amber are among the lines we maintain in stock for audio measurements of Level, Polarity, Phase, THD and IMD distortion, W&F, SPL, and spectrum RTA.

Audio Engineering Associates
1029 N. Allen Avenue, Pasadena, CA 91104
Phone: (818) 798-9128 Fax: (818) 798-2378