AD-A179 978 DEVELOPMENT OF AN OPTICAL FEEDBACK BASED HIGH ACCURACY 1/1
BEAM TRANSMISSOMETER(U) SEA TECH INC CORVALLIS OR
R W SPINRAD 01 APR 87 N00014-86-C-0784

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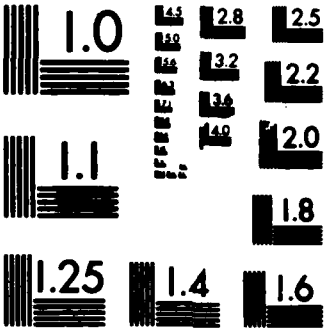

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PROGRESS REPORT
to
OFFICE OF NAVAL RESEARCH

1125 CA

CONTRACT NO.: N00014-86-C-0784

TITLE: Development of an Optical Feedback Based High Accuracy Beam Transmissometer

ITEM NO.: 0001AA

DATE: 01 APRIL 1987

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PROGRESS REPORT: Development of an Optical Feedback Based High Accuracy Beam Transmissometer

Sea Tech, Inc.
Contract No. N00014-86-C-0784
Item No. 0001AA, 87MAR31

Two initial aspects of the Phase I SBIR contract have been addressed. The technical details of mechanical and electrical configurations have been solved and some initial testing has been performed on the electrical components. The progress is described in more detail below.

COMPONENT SELECTION AND DESIGN TECHNIQUES

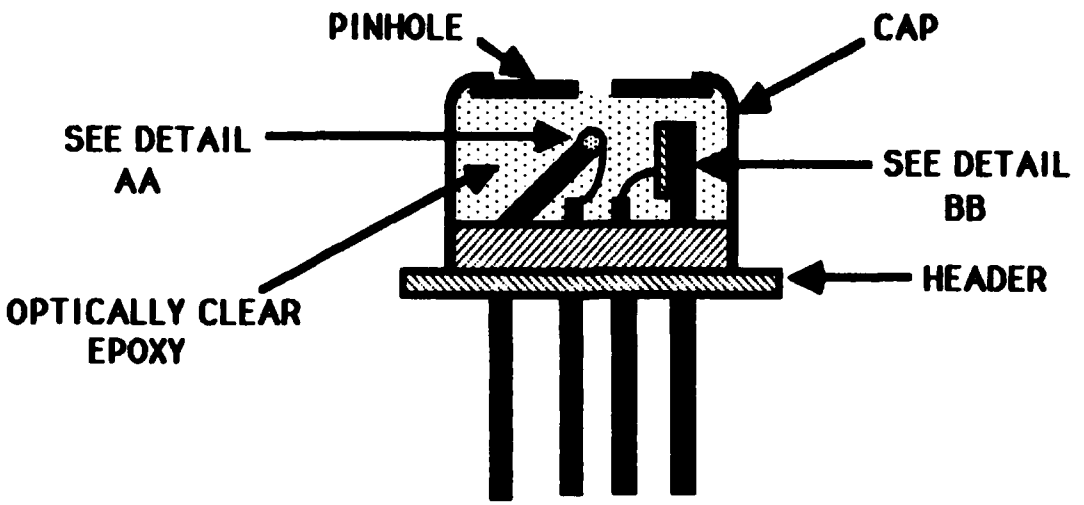
The technical problems of determining the best methods for building the optical feedback based light source have been solved through procurement of the optimal components and development of adequate design techniques. The detectors that have been selected and purchased are UV-100B, (chips) from EG & G Electro Optics division. These detectors exhibit good thermal stability at 660nm wavelength. The light emitting diodes (LED's) are elliptical devices with peak output of 660nm and a half-power bandwidth of 25nm. These are the same detectors and basically the same light source as presently used in the Sea Tech transmissometers except in chip form. Figure 1 shows the method which has been developed for the mounting and configuration of the source and detector. An elliptical LED has been chosen so as to present a circular cross section when placed at a 45° angle to both the detector and the source pinhole. Headers and caps have been purchased and a method for

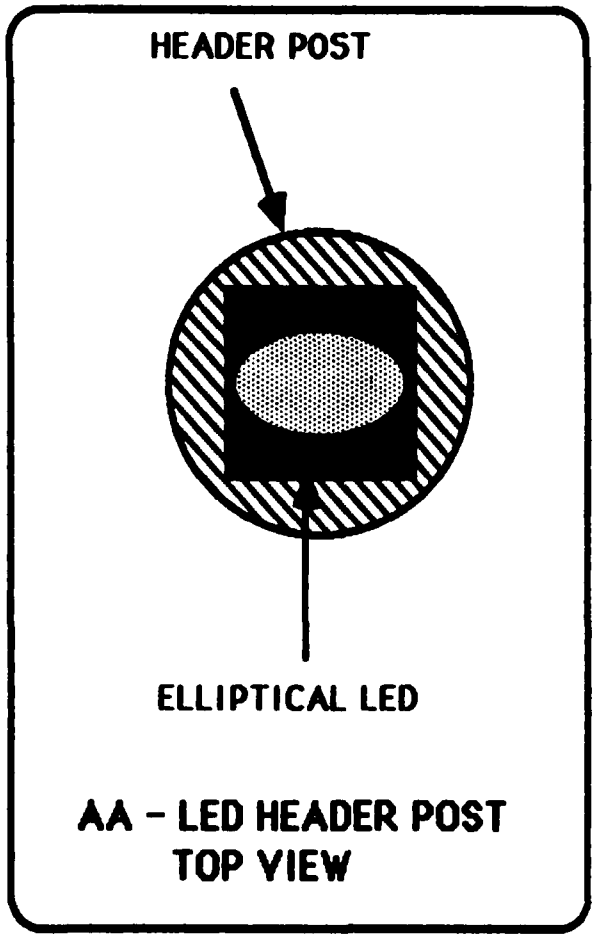
mounting the detectors has been developed. Silver epoxy of high viscosity will be used for mounting the chips. Tests of curing times and temperatures have been performed on this conducting adhesive to assure satisfactory mechanical and electrical integrity. Some progress has also been made on potting the entire assembly with an optically clear epoxy.

INITIAL TESTING

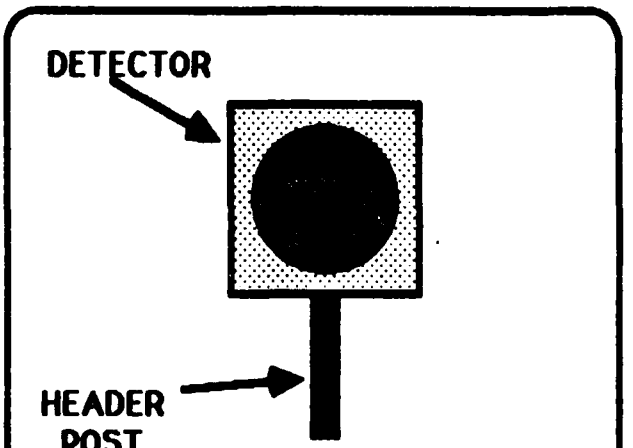
The prevailing concept of this Phase I SBIR contract is that the transmissometer accuracy can be greatly enhanced through the use of matched detectors in a feedback scheme with the light source. The degree of accuracy is therefore dictated by the matching of the detectors. An integral part of this research involves the testing of the detectors. Tests have been performed to determine the simultaneous response of two independent UV-100B detectors. Using an LED source identical to the one chosen for the final configuration the simultaneous output of the two detectors was monitored at varying temperatures. These tests show that the detectors are matched at 660nm to within 0.1% over the range of 0° to 20°C.

LED & DETECTOR DESIGN





AA - LED HEADER POST TOP VIEW



BB - DETECTOR FRONT VIEW

FIGURE 1

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