

C.P.D. ENGINEERING, INC.
CALIBRATION UNCERTAINTIES
FOR
HOLT INSTRUMENT LABORATORIES
MODEL 20
COAXIAL THERMAL VOLTAGE CONVERTERS

AC-DC difference tests are made at C.P.D. Engineering, Inc. on Thermal Voltage converters with the uncertainties shown in the table on the following page. Two factors are stated as follows.

C.P.D.: The AC-DC differences given in the attached certificate are obtained by averaging the results of a series of comparisons between the instrument under test and standards tested by the U.S. National Institute of Standards and Technology. Statistical tests of this data indicate that there is no more than a 1% probability that the value given on this test report will vary from the average of an infinite series of such comparisons by more than the 4R value shown in parts per million designated "CPD" in the table on the following page.

Where:

$$4R = 2.698 \sqrt{\frac{\sum d_m^2}{n(n-1)}}$$

d_m = The deviation of any individual reading from the mean of the group.

n = The number of readings made to obtain the value on this test report.

NIST: The AC-DC differences of C.P.D. Engineering reference Thermal Converters have been determined by the National Institute of Standards and Technology and reported per the test reports on the following page, subject to the uncertainties stated in "AC-DC Difference Calibrations", Special publication 250-27 of the National Institute of Standards and Technology May 1989. The factor designated "NIST" in the table on the following page is the uncertainty of data reported to C.P.D. by NIST.

C.P.D. ENGINEERING, INC.

126 Mott Street, Oconto, Wisconsin 54153

Certificate of Calibration

Holt Instrument Laboratories
 THERMAL VOLTAGE CONVERTER
 Model 20 S/N 0943500000738

2 VOLT P/N 81200-002

This Thermal Voltage Converter was tested during the week of Dec. 16, 1991 to determine AC-DC difference. These determinations were made by comparison against a group of Thermal converters previously tested by NIST and corrected to absolute AC-DC differences. The corrected differences are given in the table below. A positive sign signifies that more alternating voltage was required than the mean of the reversed DC voltages to obtain the same output emf. These differences are taken from the center of a GR874T Connector plugged into the test instrument. The voltage at the front plate of the test instrument may be computed by adding $0.8 \times 10^{-4} f^2$ where f is in Megahertz.

The AC-DC Difference is given below in Parts Per Million

Temperature	79°F	Relative Humidity	16%
Frequency	AC-DC Difference		
10 Hz	-9		
50 Hz	-17		
50 KHz	+21		
10 MHz	-313		
30 MHz	+210		
100 MHz	-194		

For calibration uncertainties see pages 2 and 3.

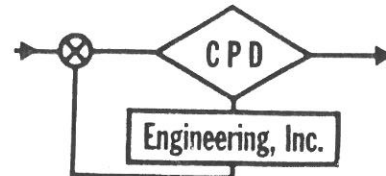
Calibrated For:

Defense Electronics Supply Center

Dayton, OH 45444

Customer P.O. DLA900-91-M-ZX13

Calibration Date December 1991



Certificate No. 2949-28

C.P.D. DeWitt

C. P. DeWitt, P.E.