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AFTER INSTALLATION DISPLACEMENT MEASUREMENTS FOR
LINEAR VARIABLE DISPLACEMENT TRANSDUCERS

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AFTER INSTALLATION DISPLACEMENT MEASUREMENTS FOR
LINEAR VARIABLE DISPLACEMENT TRANSDUCERS

1.0 SCOPE

The following requirements cover the procedure to be used in performing displacement measurements on the core support plate mounted LVDT's (linear variable displacement transducers) after installation.

2.0 PERFORMANCE OF TESTS

2.1 The displacement measurements shall be performed by Reactor Assembly with the cognizance of Sensor Application Engineering.

2.2 All data shall be verified by Quality Control and recorded as a permanent record in the displacement section of the applicable instrumentation history sheet. The recorded data shall be dated and initialed by the operator making the measurement.

3.0 REFERENCE SPECIFICATIONS

3.1 WANL-PS-294681, "Instrumentation, Reactor Installation, Transitioning, and Electrical Checkout."

4.0 TEST EQUIPMENT

4.1 Oscillator - frequency stability better than 0.1% - Optimization osc, Model RCD-1R or equivalent.

4.2 Power amplifier (DC) - voltage stability better than 0.1% - McIntosh power amp, Model MI-75 or equivalent.

4.3 AC differential voltmeter or DVM - accuracy better than 0.1% - Fluke AC-DC voltmeter, Model 803B or equivalent.

5.0 REQUIREMENTS

5.1 Upon completion of installing the LVDT assembly in accordance with the applicable assembly drawing, the LVDT shall be electrically connected to the equipment as specified in diagram 1, page 4.

NOTE: The locking device in the LVDT assembly shall not be deformed until completion of the displacement requirements.

5.2 The excitation source shall be set for 5.00 volts (rms) $\pm$.1% at a frequency of 5KC. The test equipment shall be permitted to warm up for a minimum of 30 minutes.

5.3 Upon completion of equipment warmup, the excitation voltage shall be checked to insure stability. Readjust if necessary. Record the input frequency and voltage.

5.4 Measure the AC output voltage (RMS) of the installed LVDT. Measurement shall be to ten thousandths of a volt (example 0.1148 volts, rms). Record this measurement as "actual output."

5.5 Obtain the calibration output voltage for the LVDT. This measurement will be furnished by Sensor Application Engineering upon request. Requests shall be with respect to the LVDT's serial number. Record this measurement as "cal output."

5.6 Obtain the AC null voltage for the LVDT. This measurement will accompany the calibration output voltage measurement from Sensor Application Engineering. Record this measurement as "AC null."

5.7 Calculate and record the displacement error. Calculate as follows. (Insure the proper sign (+ or -) of answer is observed and recorded.)

$$\text{Displacement Error (Inches)} = \frac{(0.100) \times (\text{measurement 5.4} - \text{measurement 5.6})}{(\text{measurement 5.5} - \text{measurement 5.6})} - (0.100)$$

Example: Assume 1) measurement 5.4 = 0.8333 volts (rms)
 2) measurement 5.5 = 0.8424 volts (rms)
 3) measurement 5.6 = 0.0773 volts (rms)

$$\text{Displacement Error} = \frac{(0.100) \times (0.8333 - 0.0773)}{(0.8424 - 0.0773)} - (0.100)$$

$$\text{Displacement Error} = \frac{0.0756}{.7651} - 0.100$$

$$\text{Displacement Error} = 0.0988 - 0.100 = -0.0012 \text{ inches error}$$

5.8 If the calculated displacement error exceeds ± 0.005 inches, the LVDT's position shall be readjusted as follows:

5.8.1 When the displacement error exceeds -0.005 inches, a shim shall be added between the LVDT container and locking device. The shim shall be as specified by the applicable assembly drawing.

Example: If the calculated displacement error equals -0.007 inches, the addition of a 0.010 inch thick shim should produce a displacement error of $+0.003$ inches which is within tolerance.

5.8.2 When the displacement error exceeds $+0.005$ inches, a shim shall be removed between the LVDT container and locking device.

Example: If the calculated displacement error equals $+0.007$ inches, the removal of a 0.010 inch thick shim should produce a displacement error of -0.003 inches, which is within tolerance.

5.9 When paragraph 5.8 is required, paragraphs 5.1 through 5.8 shall be repeated until the measurement is within the required tolerances (± 0.005 inch displacement error).

5.10 Upon successful completion of the displacement measurements the locking device shall be deformed in accordance with the applicable assembly drawing.

BLOCK DIAGRAM - LVDT DISPLACEMENT MEASUREMENTS

*LVDT ELECTRICAL SCHEMATIC

DIAGRAM 1