ATTACHMENT 10

"Charge Converter, Junction Box & Signal Conditioning," Test Procedure, GE Report 26A6485, Revision 2, dated April 22, 2005

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1.0 SCOPE

This document describes the procedure for functional testing portions of the data collection system and associated components that will be used for steam dryer vibration data collection at the Exelon Quad Cities 2 plant. The components to be tested include signal conditioning amplifiers for strain gages, dynamic pressure sensors and accelerometers that are part of the data acquisition system as well as the charge converter boxes and the junction boxes containing bridge completion boards.

This testing is to be performed at GE-NE's sub vendors location.

2.0 REFERENCE DOCUMENTS

a. Data Acquisition System Specification – 26A6366
b. Signal Conditioning Enclosure - 105E3903
c. Wiring Diagram, 105E3902
d. Junction Box - 234C6957
e. Charge Converter Enclosure - 234C6958
f. Instruction Manual for Kyowa Signal Conditioner Model MCD-16A.
g. Instruction Manuals for Vibro-Meter (VM) Signal Conditioner UVC689, Charge Converter IPC629 and Galvanic Separator GSI 130.
h. Instruction Manual for Vibro-Meter Charge Generator Model TSU 109.

3.0 TEST EQUIPMENT AND ACCESSORIES REQUIRED

NOTE: Testing equipment that will be used to checkout the systems shall be calibrated against standards traceable to the National Institute of Standards and Technology (NIST).

a. Digital Multi-Meter (DMM)
b. Vibro-Meter Charge Generator, Model TSU 109
c. Oscilloscope, Dual Channel

d. Cabinet with Signal Conditioning Components for Pressure Transducers/Accelerometers (Vibro-Meter UVC 689 and ABE-022 with input/output cables, transducer interconnecting cable, Galvanic Separation Unit GSI-130) installed.

e. Cabinet with Strain Gage Signal Conditioning Components (Kyowa MCD-16A with Monitor DPE-71A, Strain Gage Amplifier DPM-71A, input/output cables) installed.

f. Charge Converter boxes with Charge Converters (VM IPC-629) installed.

g. Junction boxes with Strain Gage Printed Circuit (PC) boards and straight through PC boards installed.

h. Jumper cables to connect between cabinets and junction boxes.

i. Simulated Strain Gage Test Fixtures.

j. 12 Volt DC Power Supply

4.0 STRAIN GAGE CHANNELS CHECKOUT PROCEDURE

4.1 The strain gage channels will be tested one channel at a time. The set-up for checking the strain gage channels is shown in Figure 1. The procedure is as follows:

a. Place the Junction box for the steam dryer sensors with the strain gage PC boards next to the strain gage signal conditioning cabinet. Connect the simulated half bridge with 120 ohm resistors to the bridge completion board for the first channel to be tested.

b. Complete the connections as shown in Figure 1 for the strain gage channel to be tested.

c. Set the switches on all DPM-71A on MCD-16A as follows:

- Range switch to OFF
- Monitor switch to the Right (not monitoring) except the first channel (to the Left for monitoring the amplifier output on the DPE-71A monitor)
- Filter switch to F

d. Set the amplifier output monitor DPE-71A switches as follows:

- Meter monitor switch to DC
- Bal-Cal switch to the Left (unlock).

e. Turn the MCD-16A power on. After a few minutes, connect the MCD-16A output to an oscilloscope and a DMM (set for DC Voltage mode).

f. Turn the Range switch of DPM-71A (first channel only) to 50 X 100 με range and push the Balance button twice quickly to balance the bridge. The output of the amplifier should be +/- 10 mV or less. Now change the Range setting through each range until set to 5 X 100 με. Balance the bridge and the output shall be less than +/-10 mV. Further balance can be achieved by adjusting the Zero Potentiometer. The output can be read from the Monitor, Oscilloscope and the DMM.

g. Set the DC Power supply to +12 Volts and connect the 12 V source to the PC board to activate the relay for applying the shunt calibration resistor across the strain gage. The output shall be 0.6 +/- 0.2 VDC. Record the value (Table 1). If the recorded value does not fall within the limits indicated, notify the Responsible Engineer for troubleshooting assistance.

h. Turn off the power to the shunt cal resistor relay and the amplifier output shall be less than +/-10 mV. Record the value (Table 1 or similar format). If the recorded value does not fall within the limits indicated, notify the Responsible Engineer for troubleshooting assistance. This completes the checkout for the first channel.

i. Turn the Range switch to OFF. Turn the next channel monitor switch to the Left (Monitoring enabled) and the first channel monitor switch to the Right (not monitoring).

j. Repeat steps 4.1.a through 4.1.i for the rest of the steam dryer strain gage channels.

k. To test the main steam line strain gage channels and the junction box, use the 350 Ohm quarter bridge strain gage simulator instead of the 120 ohm half bridge simulator. In this case, when shunt calibration is active, the amplifier output shall be 1.8 +/- 0.4 VDC. Record the value (Table 1 or similar format). If the recorded value does not fall within the limits indicated, notify the Responsible Engineer for troubleshooting assistance.

5.0 PRESSURE TRANSDUCER CHANNELS CHECKOUT PROCEDURE

5.1 The pressure transducer channels will be tested one channel at a time. The signal conditioning components for the pressure transducers and the accelerometers are made by Vibro-Meter (VM) and are the same except the amplifiers used for accelerometer channels have additional features for double integrating the acceleration signals to obtain displacement. The set-up for checking the pressure transducer channels is shown in Figure 2. The procedure is as follows:

a. Place the charge converter box and the junction box with the straight through PC boards next to the signal conditioning cabinet containing pressure transducer and accelerometer signal conditioning amplifiers.

b. Connect the charge converter, straight through PC board and galvanic separator module to the VM rack input as shown in Figure 2 for the first channel to be tested.

c. Set the VM UVC 689 Position switch to 1, Gain potentiometer to 1.0 and Multiplier switch to X 1. Turn on the Power to the VM Rack and connect the first channel output to the Oscilloscope and to a DMM (set for AC Voltage mode).

d. Connect the portable Charge generator to the charge converter. Set the charge generator dial and multiplier so that it outputs 15 pC pk (ie. Pico-Columb peak) at 50 hz sine wave.

e. Apply the charge by pushing the momentary switch and watch the Oscilloscope and DMM. The output shall be 0.75 +/- 0.1 V pk at 50 hz sine wave. Record the value (Table 2 or similar format). If the recorded value does not fall within the limits indicated, notify the Responsible Engineer for troubleshooting assistance.

f. Follow the procedure for the rest of the channels by repeating 5.1a through 5.1e. Note: 25 of the 27 pressure transducer channels are for VM pressure transducer CP 104. The remaining two (P13 and P14) are for VM pressure transducer CP 211. When testing the two CP 211 channels, the output on the Oscilloscope will be 1.50 +/- 0.2 V pk for the same charge input. Record the value. If the

recorded value does not fall within the limits indicated, notify the Responsible Engineer for troubleshooting assistance. This completes the pressure transducer channel checkout.

6.0 ACCELEROMETER CHANNELS CHECKOUT PROCEDURE

6.1 Checking the accelerometer channels is similar to checking the pressure transducer channels. The connections are the same (Figure 2) as those for the pressure transducer channels. The signal conditioning amplifiers for accelerometer channels, VM-UVC689, have additional features for double integration. The procedure is as follows:

a. Follow steps 5.1a through 5.1e, which completes the first step of check out.

b. Set the charge generator output frequency to 31 Hz and keep the charge output amplitude the same at 15 pC pk. Apply the charge by pushing the momentary switch. The output should be the same as before at 0.75 +/-0.1 V pk. Record the value (Table 2). If the recorded value does not fall within the limits indicated, notify the Responsible Engineer for troubleshooting assistance.

c. Change the Position switch on UVC 689 to position 3.

d. Apply the charge. The amplifier output should again be the same (0.75 +/- 0.1 V pk). Record the value (Table 2 or similar format). If the recorded value does not fall within the limits indicated, notify the Responsible Engineer for troubleshooting assistance.

e. Repeat steps 6.1a through 6.1d for the rest of accelerometer channels. This completes the testing of accelerometer channels.

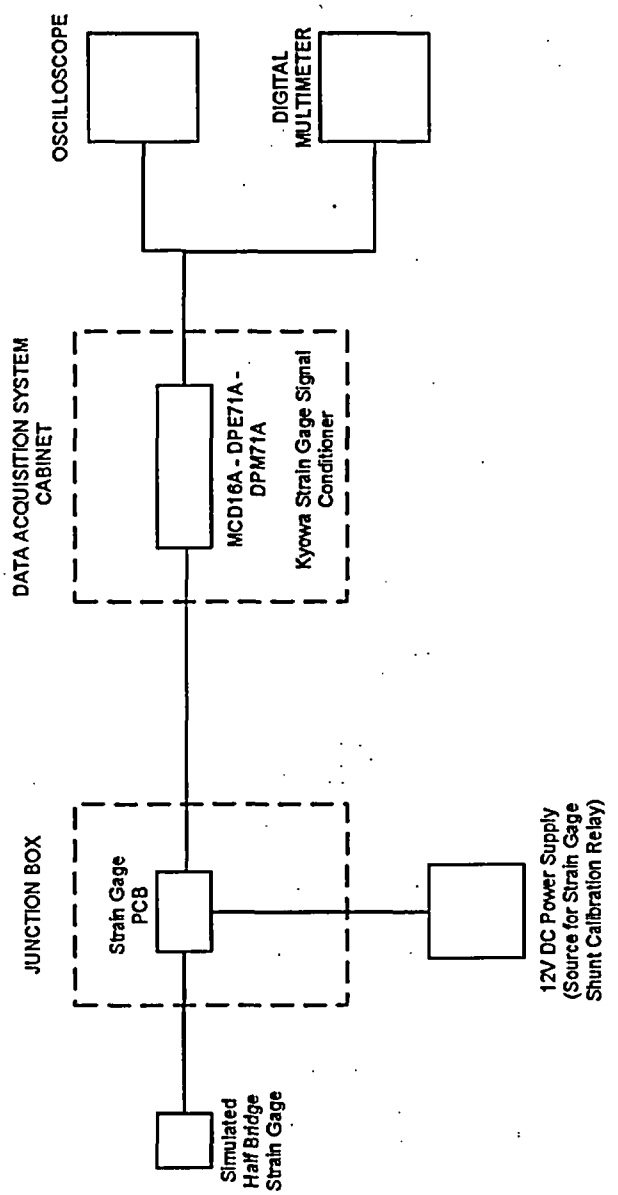

FIGURE 1 - STRAIN GAGE CHANNEL CONNECTION

Figure 1 – Strain Gage Channel Connection

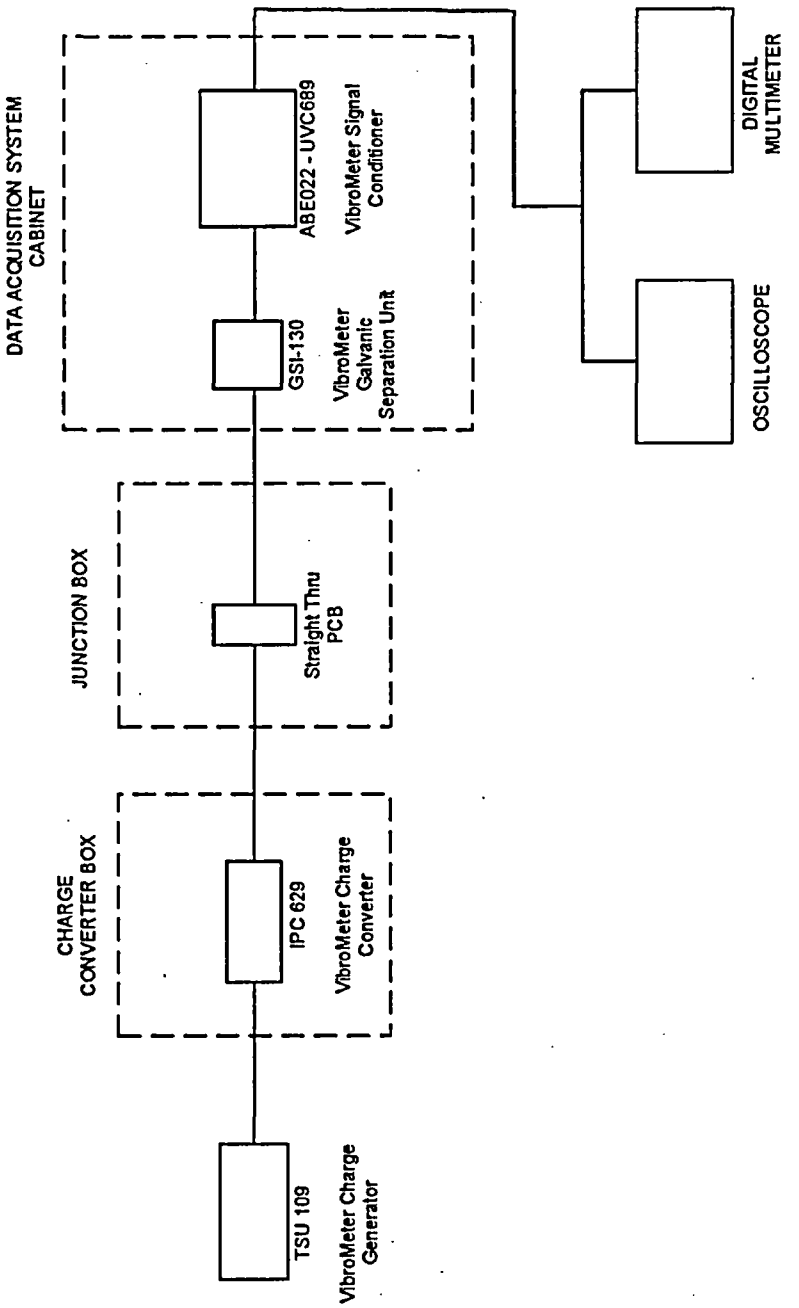

FIGURE 2 - PRESSURE TRANSDUCER AND ACCELEROMETER CHANNEL CONNECTION

Figure 2 – Pressure Transducer and Accelerometer Channel Connection

Strain Gage Signal Conditioning Channel Checkout

Channel	Strain Gage Channels		Comments
	With Shunt Cal Resistor	Without Shunt Cal Resistor	

Data Collected By: ________ **Signature:** ________

Verified By: ________ **Signature:** ________

Date Performed: ________

Test Equip., Serial No. & Calibration Due Date: ________

Table 1 – Strain Gage Channel Checkout Data Collection Form

PT and Accelerometer Signal Conditioning Channel Checkout

Channel	Pressure Transducers	Accelerometers			Comments
	50 Hz, Position 1	50 Hz, Position 1	31 Hz, Position 1	31 Hz, Position 3	

Data Collected By: ________________ **Signature:** ________________

Verified By: ________________ **Signature:** ________________

Date Performed: ________________

Test Equip., Serial No. & Calibration Due Date: ________________

Table 2 – Pressure Transducer and Accelerometer Channel Checkout Data Collection Form