Calibrate and Adjust Alarm Set-point and Perform Loop Test for Moore SPA

Tank Farm Maintenance Procedure

MAINTENANCE

USQ # GCX-2

CHANGE HISTORY (≤ LAST 5 REV-MODS)

<table>
<thead>
<tr>
<th>Rev-Mod</th>
<th>Release Date</th>
<th>Justification</th>
<th>Summary of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>11/29/2018</td>
<td>Update to comply with the new DOE-0359 changes.</td>
<td>Added “additional exemptions to EEWPs are located in” to step 3.1.1.</td>
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<tr>
<td></td>
<td></td>
<td>Conform to writer’s standard.</td>
<td>Changed 3.1.2 from &quot;If a lock and tag is required during the performance of this procedure, perform in accordance with DOE-0336, Hanford Site Lockout/Tagout Procedure Program.&quot; to &quot;IF Lockout/tagout is required, ENSURE lockout/tagout and overlocking requirements have been satisfied per DOE-0336, Hanford Site Lockout/Tagout Procedure.&quot;</td>
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<tr>
<td></td>
<td>04/07/2015</td>
<td>Included in step 3.1.2.</td>
<td>Deleted step 4.3.3 &quot;IF Lockout/tagout was applied, ENSURE lockout/tagout and overlocking requirements have been satisfied per DOE-0336, Hanford Site Lockout/Tagout Procedure.”</td>
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<tr>
<td></td>
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<td>Ongoing effort to remove CHAMPS as it is no longer the work control management process.</td>
<td>Removed CHAMPS from section 5.8</td>
</tr>
<tr>
<td>A-1</td>
<td>02/05/2013</td>
<td>DOE Standard</td>
<td>Replaced references to document TFC-ESHQ-S-STD-03, Electrical Safety with DOE–0359, Hanford Site Electrical Safety Program.</td>
</tr>
<tr>
<td>A-0</td>
<td>07/23/2012</td>
<td>ECN # 11-001620</td>
<td>New Procedure</td>
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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for Calibrating and adjusting the Alarm Set-Point of Moore Industries Model SPA Alarm Trip Unit and to perform system loop test.

1.2 Scope

This procedure applies to the Moore Industries Model SPA Alarm Trip Unit.

2.0 INFORMATION

2.1 General Information

2.1.1 Section 5.2-Perform Loop Test may be performed “Stand-Alone” if only the Loop test is required.

2.1.2 Password Security is not used.

2.2 Terms and Definitions

- DMM - Digital MultiMeter
- SPA - Site Programmable Alarm

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 An Energized Electrical Work Permit is not required when working energized parts that operate at less than 50 volts potential; additional exemptions to EEWPs are located in DOE–0359, Hanford Site Electrical Safety Program. The maximum voltage encountered when connecting and disconnecting from terminal strips is approximately 24 VDC.

3.1.2 IF Lockout/tagout is required, ENSURE lockout/tagout and overlocking requirements have been satisfied per DOE-0336, Hanford Site Lockout/Tagout Procedure.

3.1.3 Radiation and Contamination Control

3.1.4 Work in radiological areas will be performed using a radiological work permit following review by Radiological Control per the ALARA Work Planning procedure TFC-ESHQ-RP_RWP-C-03.
4.0 PREREQUISITES

4.1 Special Tools Equipment and Supplies

The following supplies may be needed to perform this procedure:

- Digital Multimeter (Optional for continuity check)
- Digital Multimeter (for mA check if current source is not calibrated)
- 4 – 20 mA current source
- Lifted/Landed Lead Record (A-6001-159)
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- Moore Industries SPA manual 224-715-00 B

4.3 Field Preparation

4.3.1 NOTIFY Operations to configure system to allow performance of this procedure.

4.3.2 REQUEST Operations assistance to reset Alarm latch (after trip) by operating HS-K1-320 at ENCL 301 AND

INFORM Operations that alarm may be tripped several times while testing.
5.0  PROCEDURE

NOTE - Section 5.2-Perform Loop Test may be performed “Stand-Alone” if only the Loop test is requested.

5.1  Obtain As-Found Values for Zero, Full Scale and Alarm Trip

5.1.1 ENSURE Operations has configured system to allow performance of this procedure as requested in Step 4.3.1.

5.1.2 REFER to SPA “View Mode” Figure 3 for instructions on scrolling through the “View Menu”.

5.1.3 IF “ZERO SCALE” (4.0 mA) is not showing on the display, PRESS the “VIEW” button until “ZERO SCALE” mA is showing AND RECORD that value in the “As-Found” column on the Data Sheet.

5.1.4 PRESS the “VIEW” button to advance to “FULL SCALE” (20.0 mA) AND RECORD that value in the “As-Found” column on the Data Sheet.

NOTE - Relay #2 is not used.

5.1.5 PRESS the “VIEW” button to advance to “Trip Point 1 Hi Alarm Setting” (18.40 mA) for Relay #1 AND RECORD Hi Alarm Trip 1 Setting in “As-Found” column on Data Sheet.

5.1.6 IF As-Found Zero, and Full Scale are not within specified tolerance per Data Sheet, GO TO Section 5.3, AND/OR

IF As-Found Alarm Trip Point is not within specified tolerance per Data Sheet, GO TO Section 5.4.

5.1.7 IF As-Found Zero, Full Scale and Hi Alarm trip point are within specified tolerance, RECORD As-Found Zero, Full Scale and Hi Alarm Trip value in their As-Left column on Data Sheet AND

GO TO “Perform Loop Test”, Section 5.2.
5.2 Perform Loop Test

5.2.1 **DISCONNECT** current source field wires at terminals T1 (+) and T2 (-), top left front of SPA (see Figure 1).

5.2.2 **TAPE AND IDENTIFY** the bare ends of lifted leads for reconnection on Lifted/Landed Lead Record (A-6001-159).

5.2.3 **CONNECT** test current source to terminals T1 (+) and T2 (-) observing polarity (see Figure 1).

5.2.4 **IF** current source is not calibrated, **ENSURE** milliamp meter is connected in series with the negative current lead and Terminal T2.

5.2.5 **IF** not already warmed up, **ALLOW** instrument to warm-up a minimum of five (5) minutes to stabilize.

5.2.6 **SLOWLY INCREASE** input value per Data Sheet **UNTIL** Hi Alarm trip point is activated.

5.2.7 **RECORD** the Alarm Trip Point 1 As-Found display value on Data Sheet.

5.2.7.1 **VERIFY** HI/HI Differential Pressure Alarm, PDAHH-K1-320 activates at VCS HMI AND **RECORD** results on Data Sheet.

5.2.7.2 **VERIFY** HI/HI Differential Pressure Alarm Light PDAHH-K1-320 is lit at Enclosure K1-ENCL-301 AND **RECORD** results on Data Sheet.

5.2.8 **IF** Alarm Trip Point actuated within tolerance and the following took place:
- HI HI DP Pressure Alarm PDAHH-K1-320 activates at VCS HMI
- HI HI DP Pressure Alarm Light PDAHH-K1-320 illuminates.

**RECORD** the As-Left value and trip actions on Data Sheet.

5.2.9 **NOTIFY** Operations to reset Alarm latch by using HS-K1-320 at ENCL 301.
5.3 Calibrate Zero and Full Scale

5.3.1 IF relay does not reset, STOP WORK AND NOTIFY FWS for resolution.

5.3.2 GO TO Restoration, Section 5.5.

OR

IF the Alarm Trip Point is not within tolerance specified per the Data Sheet
GO TO Section 5.4

5.3.3 IF not already connected, CONNECT test current source to terminals T1 (+) and T2 (-) observing polarity (see Figure 1).

5.3.4 IF not already done, TAPE AND IDENTIFY the bare ends of lifted leads for reconnection on Lifted/Landed Lead Record (A-6001-159).

5.3.5 IF current source is not calibrated, ENSURE milliamp meter is connected in series with the negative current lead and Terminal T2.

5.3.6 IF not already warmed up, ALLOW instrument to warm-up a minimum of five (5) minutes to stabilize.

5.3.7 IF desired, REFER to Attachment 1 for additional Calibration instructions.

5.3.8 FROM the Main Menu, (Figure 2) USE the up or down arrow buttons to scroll to the “APLY INPT” screen.

5.3.9 PRESS “SELECT” to go to the “Bench Scaling Menu” (Figure 4) AND
USE the up or down arrow buttons to scroll to the “SAVE ZERO” screen.

5.3.10 PRESS “SELECT” AND
APPLY the minimum input value per Data Sheet.

5.3.11 WHEN the Alarm Trip Unit displays “4.00 mA” value, PRESS “SELECT” to capture that value in memory.

5.3.12 USE the up or down arrow buttons to scroll to the “SAVE FULL” screen.

5.3.13 PRESS “SELECT” AND
APPLY the maximum input value per Data Sheet.
5.3 Calibrate Zero and Full Scale (Cont.)

NOTE - When Alarm Trip Setpoint is reached (18.40 mA) “K24” relay picks-up and latches alarm circuit.

5.3.14 WHEN the Alarm Trip Unit displays “20.00 mA” value, PRESS “SELECT” to capture that value in memory.

5.3.15 USE the up or down arrow buttons to scroll to the “EXIT INPT” screen AND PRESS “SELECT” to return to the Main Menu.

5.3.16 NOTIFY Operations to reset Alarm latch by operating HS-K1-320 at ENCL 301.

5.3.17 APPLY “Zero” and “Full Scale” values (Figure 4) per Data Sheet AND CHECK output values for tolerance.

5.3.18 IF values are within tolerance per Data Sheet, RECORD As-Left values on Data Sheet AND PERFORM the following:

5.3.18.1 NOTIFY Operations to reset Alarm latch by using HS-K1-320 at ENCL 301.

5.3.18.2 GO TO the applicable Section 5.4 or 5.2.

5.3.19 IF values are not within tolerance per Data Sheet, REPEAT Steps 5.3.8 through 5.3.18 until values are within tolerance

OR

IF unable to bring values into tolerance NOTIFY FWS for resolution.
5.4 Adjust Alarm Trip Setpoint

5.4.1 IF not already connected, CONNECT test current source to terminals T1 (+) and T2 (-) observing polarity (see Figure 1).

5.4.2 IF not already done, TAPE AND IDENTIFY the bare ends of lifted leads for reconnection on Lifted/Landed Lead Record (A-6001-159).

5.4.3 IF current source is not calibrated, ENSURE milliamp meter is connected in series with the negative current lead and Terminal T2.

5.4.4 IF not already warmed up, ALLOW instrument to warm-up a minimum of five (5) minutes to stabilize.

5.4.5 USE up or down arrow buttons to scroll to the “CONF ALRM” screen AND PRESS “SELECT”.

NOTE - The alarm trip unit has two alarms outputs; only alarm one is used.

5.4.6 PRESS “SELECT” again to access set-up parameters for first alarm.

5.4.7 REFER to Figure 5 for “Configure Alarm Menu”.

5.4.8 USE the up or down arrow buttons to scroll to “APLY TRIP” screen AND PRESS “SELECT”.

NOTE - The display will flash the input value present at the current input terminals.

5.4.9 ADJUST current source to “SETPOINT TRIP” value per Data Sheet AND PRESS “SELECT” to capture that value in memory.

5.4.10 USE the up or down arrow buttons to scroll to “ALRM EXIT” THEN PRESS “SELECT” to exit “CONF ALRM” Menu and return to the Main menu.

5.4.11 NOTIFY Operations to reset Alarm latch by operating HS-K1-320 at ENCL 301.

5.4.12 APPLY “Alarm Trip” value per Data Sheet AND CHECK output value for tolerance.
5.4 Adjust Alarm Trip Setpoint (Cont.)

5.4.13 IF Alarm Trip is within tolerance per Data Sheet, RECORD As-Left values on Data Sheet AND

GO TO Section 5.2.

5.4.14 IF values are not within tolerance per Data Sheet, REPEAT Steps 5.4.5 through 5.4.13 until values are within tolerance

OR

IF unable to bring values into tolerance NOTIFY FWS for resolution.
5.5 Restoration

5.5.1 IF any problems were encountered with calibration, INFORM FWS.

5.5.2 IF not already disconnected, DISCONNECT AND REMOVE the Test Equipment.

5.5.3 RECONNECT wiring to original configuration per the Lifted/Landed Lead Record.

5.5.4 RECORD the Test Equipment information and calibration status on Data Sheet.

5.5.5 CHECK equipment restoration by observing indications are consistent with expected conditions.

5.5.6 IF relay is not already reset, NOTIFY Operations to reset Alarm latch by operating HS-K1-320 at ENCL 301.

5.5.7 NOTIFY Operations that testing is complete and system may be returned to desired configuration.

5.6 Acceptance Criteria

Acceptance Criteria has been met when Steps in this procedure have been satisfactorily performed and As-Left values meet the specifications and tolerance(s) per the Data Sheet.

5.7 Review

5.7.1 INFORM FWS test is complete.

5.7.2 FWS REVIEW AND ENSURE the following:
   • Completed Data Sheets meet the acceptance criteria
   • Comments sections are filled out appropriately
   • Work requests needed as a result of this procedure are identified and generated
   • Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Comments/Remarks section of the Data Sheet (if applicable).
5.8 Records

The performance of this procedure generates no records. However PM Data Sheets associated with the procedure are record material and are maintained in the work package as record material.

The record custodian identified in the Company Level, Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.
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Figure 1 – Test Equipment Hook-Up
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Figure 2 – SPA Main Menu
Figure 3 – SPA View Mode
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Figure 4 – SPA Bench Scaling Menu
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Figure 5 – Configure Alarm – Apply Trip Menu
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Attachment 1 – Applying Input: Bench Ranging the SPA

NOTE With this method of calibrating input to the SPA, the inputs are “captured” at their zero and full scale levels.

Figure 1 shows the setup required for applying and capturing input scaling for the HLPRG SPA. After the connections shown in the diagram have been made, apply appropriate power and allow approximately 5 minutes for unit warm-up/stabilization.

Figure 4 shows the SPA bench scaling menu used in this procedure.

[1] From the “APPLY INPT” point of the HLPRG SPA Main Menu, press SELECT.
[2] Use the arrow buttons to bring up the desired parameter, Save Zero, Save Full, or Exit Input to abort the Bench Ranging procedure.
[3] When the appropriate display for the parameter to be input is showing on the LCD, press SELECT.
   The display will show the engineering units selected in the Configure Options menu, discussed earlier in this section.
[4] Vary the input to either the zero or full scale level from the intended application.
[5] When the display shows the appropriate readout press SELECT to capture the value in the HLPRG SPA memory.
[6] Repeat steps 2 through 5 until both the zero and full scale values from the intended application have been captured.
[7] If the SPA has been set up to operate in Linear Mode and no analog output option is present go to step 10.
[8] If the SPA has been set up to operate in Linear Mode and an analog output option is present go to step 11.
[9] If neither step 7 or 8 apply, use the arrow buttons to bring up the “EXIT INPT” display from step 5, and press SELECT to return to the Main Menu at the Scale Display point.
[10] Use the arrow buttons to bring up the “EXIT INPT” display from step 5, and press SELECT to return to the Main Menu at the Configure Alarm(s) point.
[11] Use the arrow buttons to bring up the “EXIT INPT” display from step 5, and press SELECT to return to the Main Menu at the Scale Output point.