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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for preventive maintenance, calibration, and servicing instructions for INDELAC motorized actuators and valves.

1.2 Scope

This procedure involves the INDELAC actuators, AMC-100/101 controllers, and valves installed in the AY/AZ Ventilation and Cooling System.

2.0 INFORMATION

NONE
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 If it is necessary to perform tasks on, or in the vicinity of energized equipment, follow electrical safety practices in DOE-0359, Hanford Site Electrical Safety Program.

3.2 Equipment Safety

CAUTION - If installation or removal of jumpers is required, power must be disconnected from the unit. Damage to the unit may occur if jumpers are set with power on.

CAUTION - Actuator failure may occur if the Deadband adjustment is set to allow continuous hunting. This can cause excessive wear of motor bearings, gear train, dynamic brake, and potentiometer. Hunting can also cause the internal temperature of the actuator housing to rise and exceed the maximum rating of 60° C.

3.3 Radiation and Contamination Control

Work in Radiological Areas will be performed using a Radiation Work Permit following review by Radiological Control per the ALARA 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:

- 4 - 20mA dc current source
- Milliammeter
- Voltmeter
- Shell Alvina #2 grease or equivalent, as required.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- Certified Vendor Information CVI-22525.
5.0 PROCEDURE

5.1 Actuator Controller and Transmitter Output Verification

**CAUTION**

If installation or removal of jumpers is required, power must be disconnected from the unit. Damage to the unit may occur if jumpers are set with power on.

NOTE - Once the actuator has been installed it requires no maintenance. The gear train has been permanently lubricated and in most cases will never be disturbed. In the event it becomes necessary to open gear box, grease should be changed.

- Valve should be inspected and cleaned before beginning calibration.

5.1.1 **DISCONNECT** actuator control input leads.

5.1.2 **CONNECT** test equipment to actuator as specified on Data Sheet.

5.1.3 **APPLY** input signals to actuator as specified on Data Sheet.

5.1.4 **RECORD** valve position and transmitter output in "As-Found" column of Data Sheet.

5.1.5 **IF** transmitter output values at “FULL OPEN” and “FULL CLOSED” valve positions are within tolerances specified on Data Sheet, **RECORD** values in "As-Left" column of Data Sheet **AND**

**GO TO** Section 5.4, Restoration.

5.1.6 **IF** transmitter output values at “FULL OPEN” and “FULL CLOSED” valve positions are not within tolerances specified on Data Sheet, **PERFORM** Sections 5.2 and 5.3.
5.2 Valve Actuator Calibration

5.2.1 POSITION valve actuator midway between, OPEN and CLOSED positions.

5.2.2 CHECK feedback voltage between pins 4 and 5 on J1 (Figure 2 and Figure 3) is approximately 5 Vdc.

5.2.3 IF voltage is not correct, PERFORM the following:

5.2.3.1 DE-ENERGIZE valve actuator.

5.2.3.2 DISCONNECT feedback potentiometer from J1 (pins 4, 5, and 6, Figure 2 and Figure 3).

5.2.3.3 ADJUST feedback potentiometer for approximately 500 ohms (1/2 of potentiometer resistance).

5.2.3.4 RECONNECT feedback potentiometer to J1 AND ENERGYZE valve actuator.

5.2.4 APPLY minimum input signal per Data Sheet to valve actuator.

NOTE - The limit switch should activate and stop motor at valve actuator FULL CLOSED position.

5.2.5 ADJUST Zero potentiometer on AMC-100/101 (Figure 2) so actuator moves to desired CLOSED position (GREEN LED ON while motor is driving).

CAUTION

Actuator failure may occur if the Deadband adjustment is set to allow continuous hunting. This can cause excessive wear of motor bearings, gear train, dynamic brake, and potentiometer. Hunting can also cause the internal temperature of the actuator housing to rise and exceed the maximum rating of 60° C.

5.2.6 IF actuator is hunting for position, TURN Deadband potentiometer clockwise until hunting stops.
5.2 Valve Actuator Calibration (Cont.)

5.2.7 IF actuator is not hunting for position, TURN Deadband potentiometer counterclockwise until hunting begins.

5.2.7.1 TURN slightly clockwise until hunting stops.

5.2.8 CHECK valve and limit switch positions.

5.2.9 IF valve actuator is not at FULLY CLOSED position, PERFORM the following:

5.2.9.1 DE-ENERGIZE AC power to actuator.

5.2.9.2 ADJUST closed limit switch cam (Figure 4) until switch just trips.

5.2.9.3 POSITION (manually), valve actuator to FULL OPEN.

5.2.9.4 ADJUST FULL OPEN limit switch cam (Figure 4) until switch just trips.

5.2.9.5 ENERGIZE AC power to actuator.

5.2.10 APPLY maximum signal input to valve actuator.

NOTE - The Zero adjustment is an offset setting rather than an absolute setting. Should the Zero adjustment be changed, the Span adjustment should be checked for the desired Open position. Setting of the Span adjustment has no affect on the Zero adjustment.

- The limit switch should activate and stop the motor at valve actuator full open position.

5.2.11 ADJUST Span potentiometer on AMC-100/101 (Figure 1) so actuator moves to desired OPEN position (Red LED on).

5.2.12 CHECK valve and limit switch positions.
5.2 Valve Actuator Calibration (Cont.)

5.2.13 IF valve actuator is not at FULLY OPEN position,

5.2.13.1 DE-ENERGIZE AC power to actuator.

5.2.13.2 ADJUST open limit switch cam (Figure 4) until switch just trips.

5.2.13.3 ENERGIZE AC power to actuator.

5.2.14 REPEAT Steps 5.2.4, 5.2.5, 5.2.10, and 5.2.11 until no further adjustments are required for actuator to repeat at desired OPEN and CLOSED positions.
5.3 Transmitter Output Calibration

5.3.1 APPLY minimum input signal to valve actuator.

5.3.2 ADJUST zero potentiometer on XMA-103 circuit (Figure 1) for minimum output signal.

5.3.3 APPLY maximum input signal to valve actuator.

5.3.4 ADJUST span potentiometer on XMA-103 circuit (Figure 1) for maximum output signal.

5.3.5 REPEAT steps 5.3.1 through 5.3.4 until no further adjustments are required for transmitter to repeat at minimum and maximum outputs.

5.3.6 APPLY input signals to actuator as specified on Data Sheet.

5.3.7 RECORD final readings in As-Left column of Data Sheet.
5.4 Restoration

5.4.1 DE-ENERGIZE AC power to actuator.

5.4.2 DISCONNECT all test equipment.

5.4.3 CONNECT input and output signal wires to valve actuator.

5.4.4 ENERGIZE AC power to actuator.

5.4.5 ENSURE Monitoring and Control System (MCS) readings are normal.

5.5 Acceptance Criteria

Certification that the Calibration Records meet the Recall System's specifications and tolerances constitutes the acceptance criteria for this procedure.

5.6 Review

5.6.1 ENSURE comments relating to all failures during performance of this procedure are recorded in COMMENTS Section of Recall Data Sheet(s) in sufficient detail to write a work request.

5.6.2 IF repairs or replacements are required, INITIATE a work request.

5.6.3 RECORD in Comments/Remarks section of data sheet work request number(s) of any work documents generated as a result of this instruction.

5.7 Records

The performance of this procedure generates no records. However, PM Data Sheets associated with the procedure, are records 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.
Figure 1 - Hook Up Diagram

NOTE: J2-4 on the AMC-100/AMC-101 MUST be isolated from the (-) terminal of the 4-20mA Monitor when using a 4-20mA control signal with the AMC-100/AMC-101.
Figure 2 - Electrical Connections

AMC-100/101

ELECTRICAL CONNECTIONS

To Motor

J1

OPEN OUTPUT 1
NEUTRAL 2
CLOSE OUTPUT 3
GND 4
WIPER 5
+10V 6
To Feedback Pot

To AC Power

J2

L2 NEUTRAL 1
L1 LINE 2
EARTH GND 3
SIGNAL GND (-) 4
1-5V / 4-20mA (+) 5
0-10V 6
+10V 7
+24V 8
To Signal

INPUT SIGNAL

<table>
<thead>
<tr>
<th>INPUT SIGNAL RANGE</th>
<th>J1 JUMPER PLUG</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10V</td>
<td>INSTALL</td>
</tr>
<tr>
<td>1-5V</td>
<td>REMOVE</td>
</tr>
<tr>
<td>4-20mA</td>
<td>INSTALL</td>
</tr>
</tbody>
</table>

LOSS OF INPUT SIGNAL

<table>
<thead>
<tr>
<th>OUTPUT STATE</th>
<th>JUMPER PLUG</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOTH OFF</td>
<td>JP2</td>
</tr>
<tr>
<td>OPEN ON</td>
<td>JP3</td>
</tr>
<tr>
<td>CLOSE ON</td>
<td>JP4</td>
</tr>
</tbody>
</table>
The actuator and feedback potentiometer are connected to J1 as shown. Pin 1 should be connected to the motor winding that moves the actuator toward the open position and pin 3 is connected to the winding that moves the actuator toward the closed position.

The feedback potentiometer wiper must be connected to pin 5 of J1. One end of the potentiometer is connected to pin 4 and the other is connected to pin 6. The potentiometer should be connected so that when the actuator moves toward the open position, the resistance between pins 4 and 5 will increase. This can also be measured as a voltage - the voltage between pins 4 and 5 should increase when movement is toward the open position. If the actuator is wired incorrectly, the typical response of the unit will be to run to the full open or closed position (the appropriate output indicator will remain on) regardless of the command signal input.

The actuator should be configured for fail in place mode for loss of signal.

**Figure 3 - Wiring Block Diagram**

![Wiring Block Diagram](image-url)
Figure 4 - Limit Switch CAMs and Set Screws