	<b>Technical Procedures</b>		
	<b>Part Number:</b> 77R91-0000-PR		
	<b>Revision:</b> A	<b>Effective Date:</b> 1-30-12	Page 1 of 7
<b>Title:</b> CALIBRATION PROCEDURE FOR PRESSURE AND TEMPERATURE RECORDERS			

REVISIONS				
REV	ECO	DESCRIPTION OF CHANGE	DATE	AUTHOR
A	11447	PRODUCTION RELEASE	10/18/11	CAP

## 1. PURPOSE

- 1.1. The purpose of this procedure is to thoroughly explain the process of calibrating a Heath Chart Recorder.

## 2. SCOPE

- 2.1. The scope of this procedure is to give a step-by-step detailed process for calibration of Heath Chart Recorders.

## 3. REFERENCES

- 3.1. **Low Pressure Bellows Drawing**
- 3.2. **Helical Pressure Element Drawing**
- 3.3. **Helical Temperature Element Drawing**

## 4. DEFINITIONS/ABBREVIATIONS

## 5. MATERIALS/EQUIPMENT

- 5.1. **Heath Chart Recorder, 8" or 12"**

## 6. PROCEDURE

### 6.1. Low Pressure Bellows Calibration (Figure 7.1)

- 6.1.1. Set slide linkage pen (pen to pen) (A1, A2) from middle of the center pivot shaft (B1) to middle of pen shaft (B2).

**NOTE:** To adjust, loosen two screws (C1, C2) on adjustable link and adjust to proper link and adjust to proper length. Be sure to retighten screws after adjustment.

- 6.1.2. Apply pressure to 50% of the range of the element and set a 90-degree angle at adjustable link and driven arm.

<i>Heath Consultants</i>				<i>Technical Procedure</i>		
Title: CALIBRATION PROCEDURE FOR PRESSURE AND TEMPERATURE RECORDERS						
TP: 77R91-0000-PR	Rev. No.: A	Supersedes: N/A	Rev. No.: N/A	Effective Date: 1-30-12	Page 2 of 7	
<i>Official copy only if stamped with a valid date and Controlled Copy stated on procedure</i>						
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**NOTE:** To set the 90 degree angle, loosen hex screw (D) on multiplier on multiplier ratio arm and move driven arm to 90 degree angle. Retighten hex screw (D).

- 6.1.3. Release pressure. With pressure released, zero pen with micro adjust screw on pen arm. If more adjustment is necessary to zero pen, loosen nut (E) on pen shaft bushing and move shaft and arm to zero and retighten nut (E). (Fine adjust with micro adjust.)
- 6.1.4. Apply pressure to 100% of pressure element range and note where pen stops. If pen is low at 100%, loosen screw (F), and then adjust thumbnut (G) down. If pen is high at 100%, loosen (F), and then adjust thumbnut (G) up. Retighten screw (F). (Approximately two turns per adjustment.)
- 6.1.5. After making the 100% adjustment, release pressure and re-zero pen (as in Step 6.1.3).
- 6.1.6. Continue Steps 6.1.4 and 6.1.5 until proper span is achieved
- 6.1.7. When span is achieved, pressure up element to 50% range and pen should be at 50% of the chart scale.
- 6.1.8. If pen is high or low at 50%, check to make sure there is a 90-degree angle between the slide link and driven arm. If not, repeat Step 6.1.2 through Step 6.1.5.
- 6.1.9. If pen is high or low at 50% and there is a 90-degree angle between the slide link and the driven arm, a linearity adjustment must be made. There is a course adjustment and a fine adjustment for linearity. In making linearity adjustments, maintain 50% pressure.

Course Adjustment – Loosen nut (H) and turn screw (I) in two complete turns if pen is high at 50%. Turn screw (I) out two complete turns if pen is low at 50%. Be sure to retighten nut. Repeat Steps 6.1.2 through 6.1.7.

**NOTE:** Drive screw pen tab (J) must be disconnected to turn screw (I).

Fine Adjustment – Loosen screws (C1, C2) on slide link. Lengthen slide if pen is high at 50%, shorten slide length if pen is low at 50%. (Slide length movement to pen movement approximately 20 to 1). Repeat Steps 6.1.2 through 6.1.7.

- 6.1.10. If element is not calibrated after last step, contact authorized service center of factory.

## 6.2. **Helical Pressure Element Calibration**(Figure 7.2)

- 6.2.1. Set slide linkage (pen to pen) (A1, A2) from middle of the center pivot shaft (B1) to middle of pen shaft (B2).

**NOTE:** To adjust, loosen two screws (C1, C2) on adjustable link and adjust to proper length. Be sure to retighten screws after adjustment.

- 6.2.2. Apply pressure to 50 % of the range of the element and set 90-degree angle at adjustable link and driven arm.

**NOTE:** To set the 90-degree angle, loosen hex screw (D) on multiplier ratio arm and move driven arm to 90 degree angle. Retighten hex screw (D).

<i>Heath Consultants</i>				<i>Technical Procedure</i>		
Title: CALIBRATION PROCEDURE FOR PRESSURE AND TEMPERATURE RECORDERS						
TP: 77R91-0000-PR	Rev. No.: A	Supersedes: N/A	Rev. No.: N/A	Effective Date: 1-30-12	Page 3 of 7	
<i>Official copy only if stamped with a valid date and Controlled Copy stated on procedure</i>						
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- 6.2.3. Release pressure. With pressure released, zero pen with micro adjust screw on pen arm. If more adjustment is necessary to zero pen, loosen nut (E) on pen shaft bushing and move shaft and arm to zero and retighten nut (E). (Fine adjust with micro adjust.)
- 6.2.4. Apply pressure to 100% of pressure element range and note where pen stops. If pen is low at 100%, loosen screw (F), and adjust thumbnut (G) down. If pen is high at 100%, loosen screw (F), then adjust thumbnut (G) up. Retighten screw (F). (Approximately two turns per adjustment.)
- 6.2.5. After making the 100% adjustment, release pressure and re- zero pen (as in Step 6.2.3)
- 6.2.6. Continue Steps 6.2.4 and 6.2.5 until proper span is achieved, pressure up element to 50% of range and pen should be at 50% of the chart scale.
- 6.2.7. When span is achieved, pressure up element to 50% of range and pen should be at 50% of the chart scale.
- 6.2.8. If pen is high or low at 50%, first check to make sure there is a 90-degree angle between the slide link (2) and the driven arm (3). If incorrect, repeat Steps 6.2.2 through 6.2.5. If there is a 90 degree angle, check to make sure the slide second link is pen to pen (A1, A2) from middle of center pivot shaft (B1) to middle of pen shaft (B2). **NOTE:** Remove slide-link and measure B2 to B1 and A2 to A1 with a ruler and compare. If the distances between the two points are not the same, readjust and repeat Steps 6.2.2 through 6.2.7.
- 6.2.9. If element is not calibrated after last step, contact authorized service center or factory.
- 6.3. **Helical Temperature Element Calibration**(Figure 7.3)
- To properly calibrate a Helical Temperature Element, it is necessary to have an accurate thermometer, a cold bath and a hot bath. An ice and water solution may be used for the cold bath and a pan of water on a heater may be used for the hot bath.*
- 6.3.1. Set slide linkage (pen to pen) (A1, A2) to be equal distance from the middle of the center pivot shaft (B1) to middle of pen shaft (B2).  
**NOTE:** To adjust, loosen screws (C1, C2) on slide link and adjust to proper length. Be sure to retighten screws after adjustment.
- 6.3.2. Place the thermometer and temperature bulb in the warm bath and raise the temperature to 50% of the value of the element. (Example: 0-150 degree Element-Raise temperature to 75 degrees). Allow time for the element to stabilize at the temperature and set a 90-degree angle at the connection point where the adjustable slide link (2) connects to the pen shaft driven arm (3). To properly adjust 90-degree angle, loosen screw (D) on multiplier arm, check and adjust to the 90-angle and retighten screw (D).

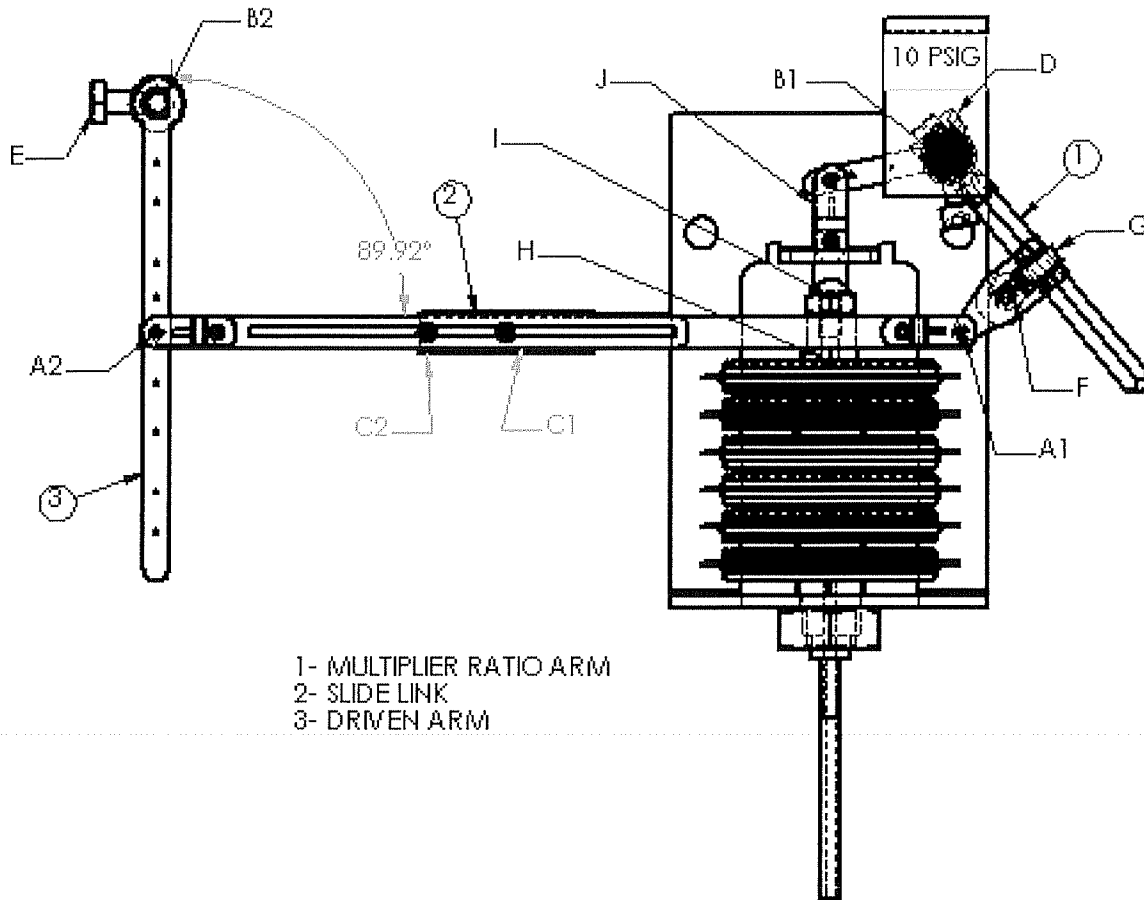
<i>Heath Consultants</i>				<i>Technical Procedure</i>	
Title: CALIBRATION PROCEDURE FOR PRESSURE AND TEMPERATURE RECORDERS					
TP: 77R91-0000-PR	Rev. No.: A	Supersedes: N/A	Rev. No.: N/A	Effective Date: 1-30-12	Page 4 of 7
<i>Official copy only if stamped with a valid date and Controlled Copy stated on procedure</i>					
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- 6.3.3. Adjust pen reading on chart to temperature reading on thermometer. To adjust pen, use fine-adjust screw on pen arm assembly. If more adjustment is needed, loosen nut (E) on drive arm, move pen to correct reading or retighten nut (E).
- 6.3.4. Raise the temperature in the hot bath to the upper range of the element noting pen reading on chart and thermometer.  
**NOTE:** Accurate calibration can be achieved on a standard 0-150 degree element by obtaining a 100% spread on the high and low check points.
- 6.3.5. The span adjustment is made by loosening screw (F) on multiplier shaft and turning thumbnut (G). If pen reading is high on the chart, turn (G) one rotation clockwise for each degree necessary to obtain correct reading. If chart reading is low on the chart, turn (G) counter clockwise to make correction. Tighten (F) screw to tighten flag to arm. Adjust pen reading to temperature reading on thermometer. To adjust pen, use fine-adjust screw on driven arm assembly. If more adjustment is needed, loosen nut (E) on drive arm, move pen to correct reading and retighten nut (E).
- 6.3.6. Submerge temperature bulb and thermometer in cold bath at lower range of element and adjust as in Step 6.3.5.
- 6.3.7. Repeat Steps 6.3.4, 6.3.5, and 6.3.6 until proper temperature is achieved both on high and low end of temperature scale.
- 6.3.8. If element is not calibrated after last step, contact authorized service center or factory.

<i>Heath Consultants</i>				<i>Technical Procedure</i>		
Title: CALIBRATION PROCEDURE FOR PRESSURE AND TEMPERATURE RECORDERS						
TP: 77R91-0000-PR	Rev. No.: A	Supersedes: N/A	Rev. No.: N/A	Effective Date: 1-30-12	Page 5 of 7	
Official copy only if stamped with a valid date and Controlled Copy stated on procedure						
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7. ATTACHMENT

7.1. Low Pressure Bellows Drawing

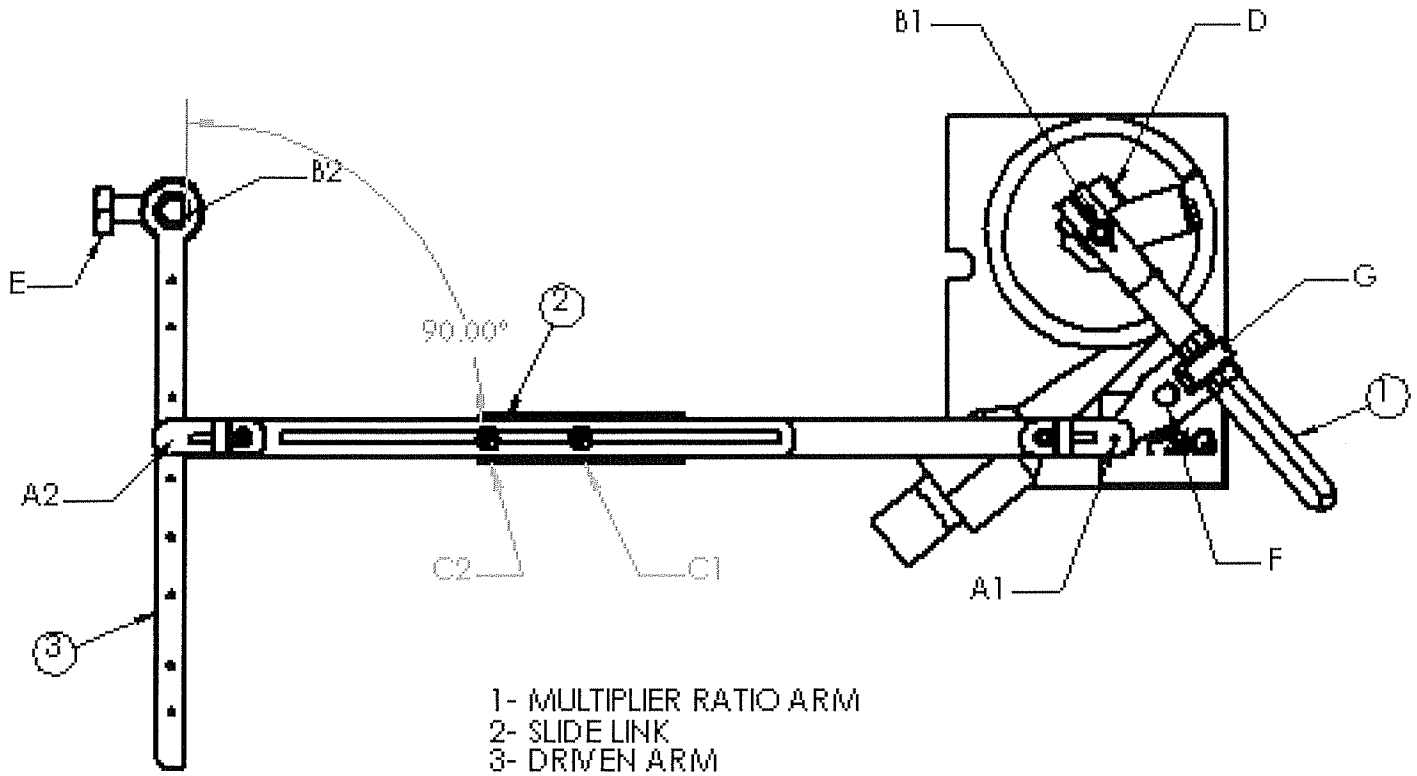


- 1- MULTIPLIER RATIO ARM
- 2- SLIDE LINK
- 3- DRIVEN ARM

LOW PRESSURE BELLOWS ASSEMBLY

<i>Heath Consultants</i>				<i>Technical Procedure</i>		
Title: CALIBRATION PROCEDURE FOR PRESSURE AND TEMPERATURE RECORDERS						
TP: 77R91-0000-PR	Rev. No.: A	Supersedes: N/A	Rev. No.: N/A	Effective Date: 1-30-12	Page 6 of 7	
<i>Official copy only if stamped with a valid date and Controlled Copy stated on procedure</i>						
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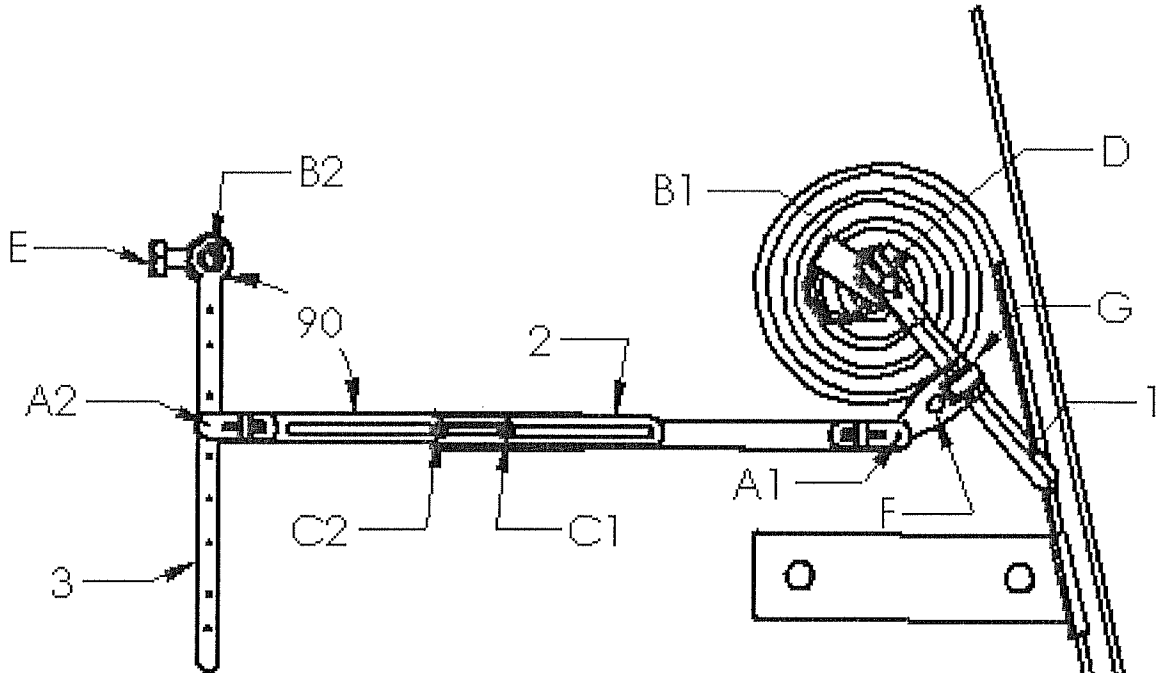
7.2. Helical Pressure Element Drawing



HELICAL PRESSURE ELEMENT ASSEMBLY

<b>Heath Consultants</b>				<b>Technical Procedure</b>		
Title: CALIBRATION PROCEDURE FOR PRESSURE AND TEMPERATURE RECORDERS						
TP.: 77R91-0000-PR	Rev. No.: A	Supersedes: N/A	Rev. No.: N/A	Effective Date: 1-30-12	Page 7 of 7	
Official copy only if stamped with a valid date and Controlled Copy stated on procedure						
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7.3. Helical Temperature Element Drawing



- 1- MULTIPLIER RATIO ARM
- 2- SLIDE LINK
- 3- DRIVEN ARM

HELICAL TEMPERATURE ELEMENT ASSEMBLY

<b>Approvers</b>	
Written By: Craig Pickett	Release Date: 1/24/12
Approved By: <u>Vineet Aggarwal</u>	Release Date: 01/30/12