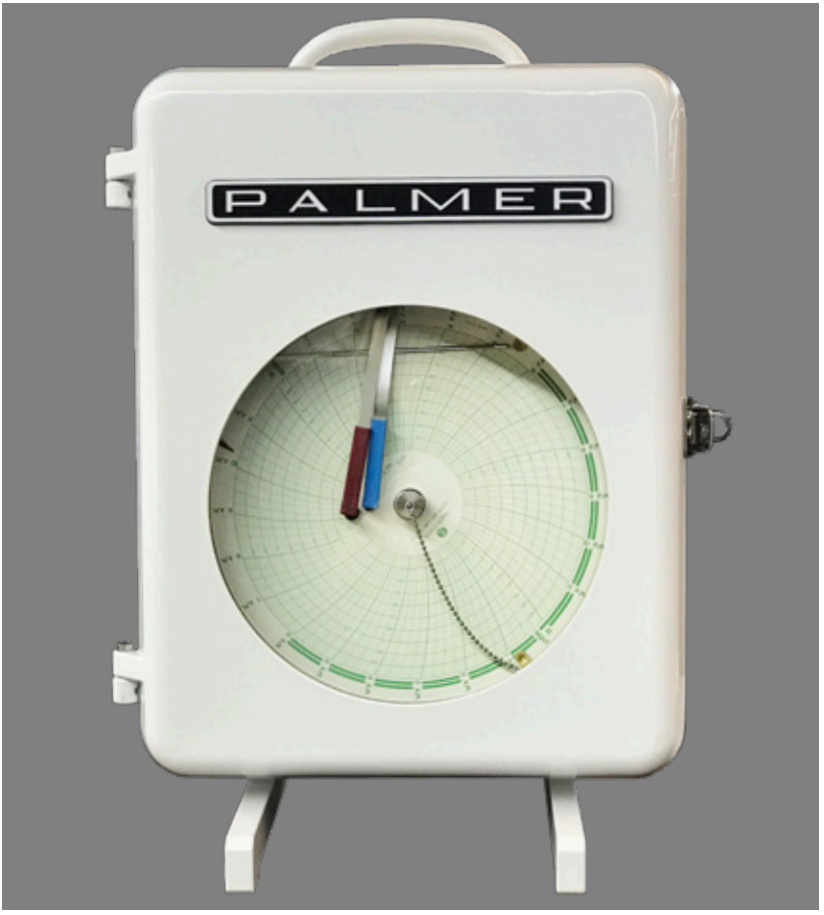
Serial No. _____

PALMER

PRESSURE, TEMPERATURE, and PRESSURE and TEMPERATURE RECORDERS USER MANUAL



MNW-004 Rev. K
Revised March 24, 2022

Reorder Stock No. PD1013

Palmer Wahl Instruments, Inc.
234 Old Weaverville Road
Asheville, NC 28804
Toll Free: 800-421-2853
Phone: 828-658-3131
Fax: 828-658-0728
Email: info@palmerwahl.com

TABLE OF CONTENTS

Thank you for purchasing a Palmer Circular Chart Recorder.
We appreciate your business.

All our Recorders are high quality, functionally sensitive instruments, proudly made in the USA, and shipped from our factory as a calibrated system.

GENERAL INFORMATION

All Recorders have front doors that open for changing the charts, pens, or batteries and winding of mechanical clocks, if equipped.

For proper operation, the recorder must be installed (or used as the portable model) with the case in an upright position. The interior of the case should be kept clean and free of dust. Dust may prevent the pens from marking clearly, and can interfere with the free movement of pivots and linkages.

MERCURY FILLED TEMPERATURE SYSTEMS CONTAIN MERCURY. DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE OR FEDERAL CODES. DO NOT DISPOSE OF IN LANDFILL!

For Disposal Center nearest you, visit AERC Recycling at www.aercrecycling.com.

MNC Manufactured in North Carolina

MADE IN THE USA

IP55 COMPLIANT

CALIBRATION TRACEABLE TO NIST

THREE YEAR 3 WARRANTY

ISO 9001:2015 CERTIFIED QUALITY MANAGEMENT SYSTEM

INSTALLING RECORDER CHARTS

To install a chart, unscrew the thimble and remove it from chart hub. (Figures A and B)

Figure A

Thimble and Chart Hub

Chart Hub

Thimble

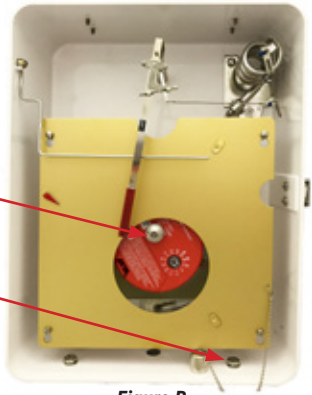


Figure B

Next, slightly raise the pen arm(s) using the pen arm lifter.

Straight Style – place finger behind bend of pen arm lever as shown below in Figures C or D and gently lift.

Figure C - Straight Style Pen Arm

Lift pen arm lever here

Figure D

Place finger behind bend and gently lift.

Specifications and included accessories subject to change without notice.

Place chart on hub and slide under chart guide on top right side of chart plate. The top pen should indicate the present time. Additional pens should be as close as possible to the present time and to one another. Replace the thimble on the chart hub and tighten.

The pen lifter may now be lowered in order to place pen pointer into contact with the chart.
Be sure to line up the top pen on the Arc line. Additional pens should be as close as possible to the Arc line and to each other.

The thimble can then be replaced on the chart hub as shown in Figure E.

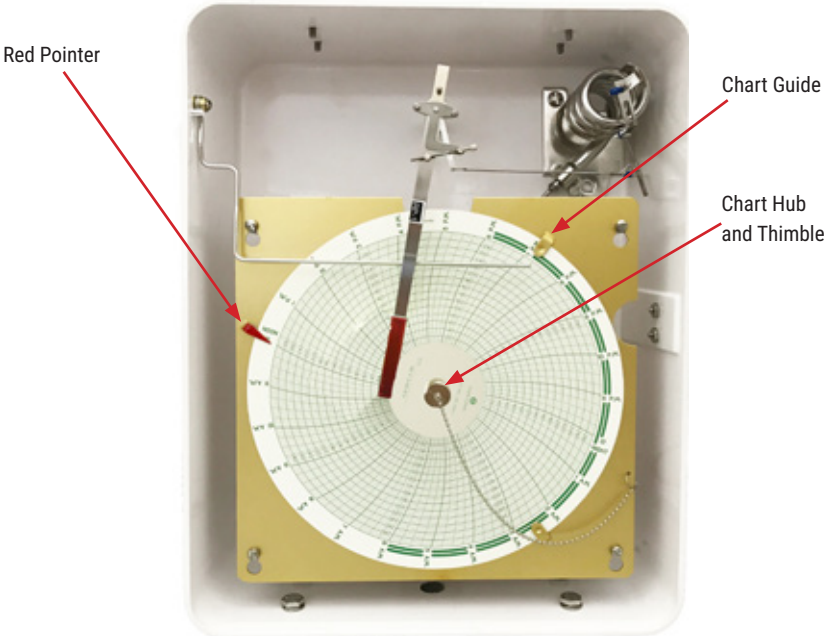


Figure E

REPLACING A RECORDER PEN

Pens should be checked periodically for cleanliness and sufficient ink. Replace as necessary.
To change a Recorder pen grasp the pen arm and gently pull the pen off the arm. Slide the new pen onto the pen arm by inserting the pen arm into the grooves on the underside of the pen as in Figure F.
Remove the protective cap from the pen tip. Lay the pen arm back down and be certain it lines up with the arc line on the chart. Top pen should always track the arc line and indicate the current time. Make adjustments as needed by sliding the pen on the pen arm.

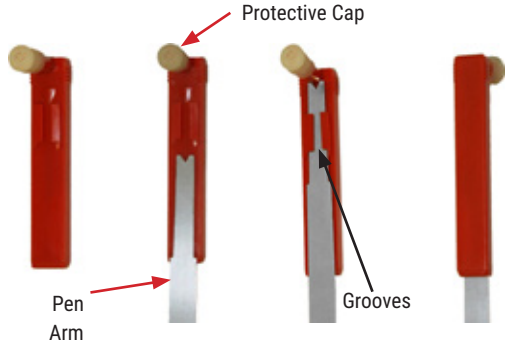


Figure F

HOW TO ORDER RECORDER PENS

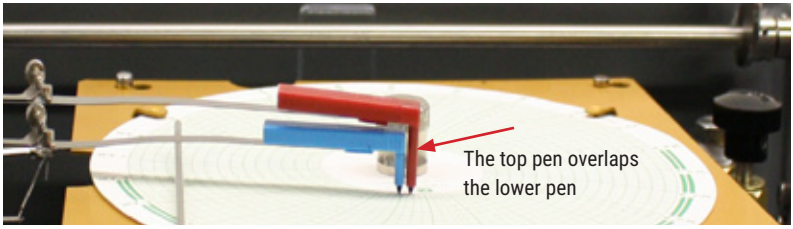


Figure G

The Pen tips or Nibs, are different heights and are installed on separate Pen Arms which are different lengths and heights. The Pen Arms move independently of each other, enabling the pens to operate while overlapping each other as shown above. Be sure to order the correct size pen for the desired position. Standard colors are Red, Blue, and Green. Black and Purple are also available. See below for details.

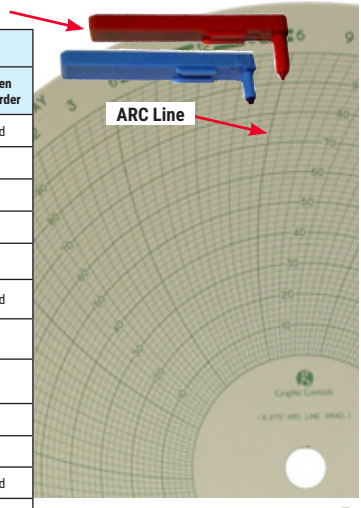
1 PEN RECORDER:
ONLY PEN
Order: #RP-2, Red - #AR-3714-06-6 (Standard)

2 PEN RECORDER:
TOP PEN, Order: #RP-2, Red - #AR-3714-06-6 (Standard)
BOTTOM PEN, Order: #RP-1, Blue - #AR-3714-04-6 (Standard)

NIB Heights:
#RP-3 = 0.813"
#RP-2 = 0.533"
#RP-1 = 0.253"

3 PEN RECORDER:
TOP PEN, Order: #RP-3, Red - #AR-3714-11-6 (Standard)
MIDDLE PEN, Order: #RP-2, Blue - #AR-3714-09-6 (Standard)
BOTTOM PEN, Order: #RP-1, Green - #AR-3714-03-6 (Standard)

ARC Line: The ARC Line is the distance between the pen pivot and the pen tip (6-3/8"). This is important when changing a pen in the field to be sure the Top Pen follows the arc line as shown on right. Pen can be adjusted as needed to follow the arc line.



RECORDER PEN ORDER INFORMATION						
Pen Arm #	**Pen Position**	**Color**	**Part Number**	**1 Pen Recorder**	**2 Pen Recorder**	**3 Pen Recorder**
RP-3	**TOP PEN** on 3 Pen Recorder	Red	**AR-3714-11**			Std
		Blue	**AR-3714-14**			
		Green	**AR-3714-13**			
		Black	**AR-3714-12**			
RP-2	**ONLY PEN** on 1 Pen Recorder **TOP PEN** on 2 Pen Recorder **MIDDLE PEN** on 3 Pen Recorder	Red	**AR-3714-06**	Std	Std	
		Blue	**AR-3714-09**			Std
		Green	**AR-3714-08**			
		Black	**AR-3714-07**			
RP-1	**BOTTOM PEN** on 2 or 3 Pen Recorder	Red	**AR-3714-01**			
		Blue	**AR-3714-04**		Std	
		Green	**AR-3714-03**			Std
		Black	**AR-3714-02**			

CHART DRIVES

There are three types of drives: Multi-Speed Battery Operated (Standard), Spring Wound, and Electric.

Quartz Multi-Speed Battery Operated Chart Drives (BOCD) – feature a rugged rotation speed selector available in two models:

Using a screwdriver, simply turn dial to desired rotation

PC-11 Chart Drive: Intrinsically safe, 1.5 volt "C" cell powered eleven speed motor, switch selectable: 60 min., 96 min., 12 hr., 24 hr., 48 hr., 7 day, 8 day, 14 day, 16 day, 31 day, or 32 day recording intervals.
With "OFF" option.

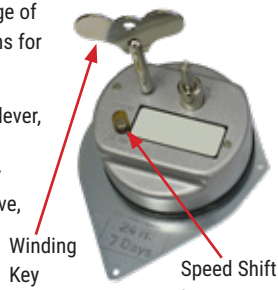
PC-12 Chart Drive: Intrinsically safe, 1.5 volt "C" cell powered twelve speed motor, switch selectable: 30 min., 60 min., 2 hr., 4 hr., 6 hr., 8 hr., 12 hr., 24 hr., 3 day, 4 day, or 7 day recording intervals.
No "OFF" Option.

Rotation is set at factory to conform to your specifications. Verify that the drive is set properly. These battery operated drives are UL Listed: Class I, Groups C and D, Intrinsically Safe, CSA Certified, and are powered by a 1.5 volt "C" cell alkaline battery. It is recommended that the batteries be checked every three (3) months by a voltage meter.

This drive is good for operating temperatures of -40˚ to 160˚F(-40˚ to 71˚C). For longer battery life at temperatures below 10°F, use 3.6Volt "C" size Lithium Thionyl Chloride battery from Tadiran, model TL-2200.

Inaccuracy and battery corrosion will develop if batteries are not replaced properly. See page 7 for directions for replacing a battery.

An "OFF" position saves battery life. When "ON", a pulsating red status light indicates that the unit is working, eliminating the need to double check the chart movement. This is particularly valuable in applications requiring slow rotational speeds. A body pilot pin is used to locate the BOCD on the mounting plate. Removing 3 screws permits exchange of chart drive. No recalibration is necessary. See page 7 for directions for changing a chart drive.



Spring Wound Chart Drive: is a dual speed type. By use of a shift lever, the Standard drive can be set for 24 hour or 7 day rotation. Other options are available. Rotation is set at factory to conform to your specifications. Verify that the drive is set properly. To wind the drive, remove chart and use the winding key furnished with the recorder.

Standard: 24 hr / 7 day
Special Order: Call for options.

Electric Chart Drive: When installing, check to verify that proper voltage and frequency are used.

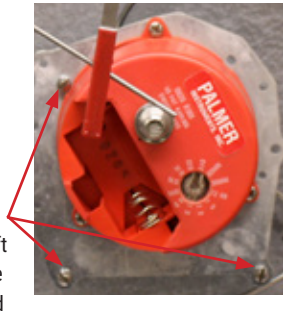
Standard: 7 day, 110 V/120 V - 60 Hz
Optional: 12 hr, 24 hr
Special Order: 220 Volt / 50 Hz - Call for options.

REPLACING A BATTERY OPERATED CHART DRIVE

Lift the pen arm to allow for clearance under the pens. Unscrew the thimble from the chart hub and remove the chart. Loosen the four screws holding the chart plate, Figure H, and gently push up on the plate. Lift the chart plate off the screws and pull the chart plate at the bottom to slide it out from under the pen arm. **DO NOT REMOVE THE CHART DRIVE FROM THE MOUNTING PLATE!** Unscrew the 3 screws from the universal mounting plate under the chart drive, Figure I. Remove the entire universal mounting plate with the chart drive attached. Use a small adjustable wrench to loosen and remove the three posts, replace with the posts provided. Replace the new chart drive (which comes attached to the universal mounting plate) in the same position by lining up the 3 holes in the mounting plate to the new posts behind it. Replace the 3 screws using the 6-40 screws provided, and tighten. Replace the chart plate, the chart, and the thimble. Lower the pens back in place, lining the top pen on the Arc line.

Loosen 4 screws and push up on chart plate

Figure H



Remove 3 Screws and lift universal mounting plate with chart drive attached

Figure I

REPLACING THE BATTERY IN BATTERY OPERATED DRIVES

Lift the pen arm to allow for clearance under the pens. Unscrew the thimble from the chart hub and remove the chart. Loosen the four screws holding the chart plate, Figure J, and gently push up on the plate. Lift the chart plate off the screws and pull the chart plate at the bottom to slide it out from under the pen arm.

Remove the battery cover as shown in Figure K, and replace battery and battery cover. Replace the chart plate, the chart, and the thimble. Gently lower the pens back into place.

Loosen 4 screws and push up on chart plate

Figure J

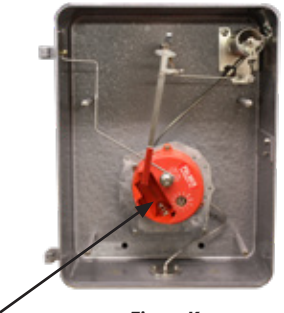


Figure K

Battery Compartment

Specifications and included accessories subject to change without notice.

REPLACING THE WINDOW

To replace the window in an Aluminum case recorder, remove screws to replace window.

8 inch case – 4 Screws
12 inch case – 4 Screws

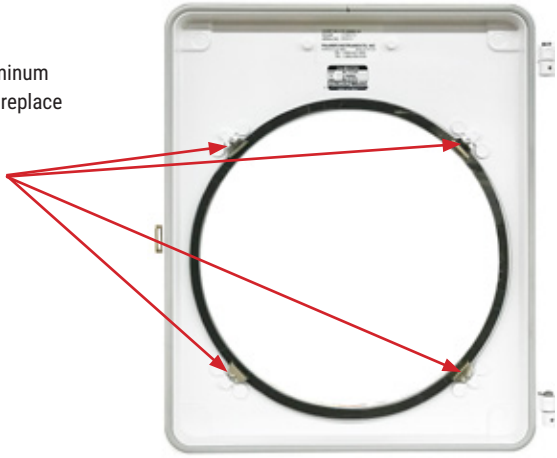


Figure L

PRESSURE SYSTEM - CALIBRATION INSTRUCTIONS

The sensing element of the pressure measuring and recording system must be properly installed in order to achieve maximum accuracy.

The pressure sensing device and attached linkages and pen(s) have been correctly set prior to shipment, so recalibration should not be required. However, if calibration is needed, proceed by performing the following steps:

Zero Setting Adjustment for Pressure System: Check zero by disconnecting external pressure source. Pen should return to zero, indicating the recorder is properly calibrated. If not, adjust the pen arm position to the correct reading using the pen arm zero setting adjustment. See Figure M.

Pen **below** zero – Turn zero adjustment counterclockwise to move pen point up.
Pen **above** zero – Turn zero adjustment clockwise to move pen point down.

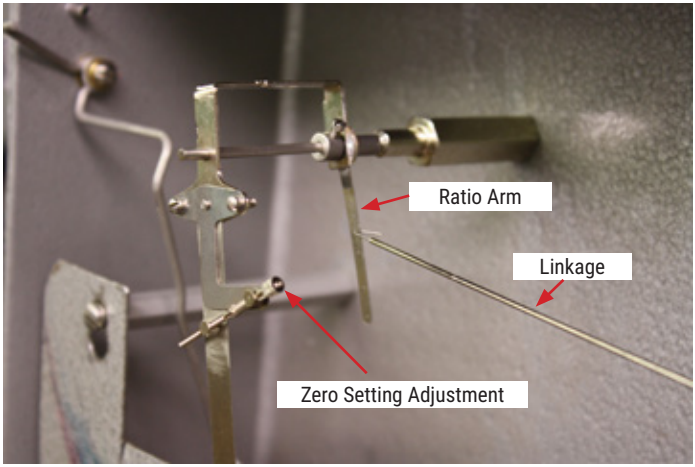


Figure M

PRESSURE SYSTEM - SPAN ADJUSTMENT

Span Adjustment for Pressure Systems:

Apply maximum pressure to element, using a dead weight tester or precision test gauge. If the reading on the chart agrees with the test equipment, the recorder is properly calibrated. If not, make a span adjustment by loosening the locking screw that holds the linkage adjustment tab on the span adjustment arm. (Figure N) This will allow the adjustment tab to be moved toward or away from the pressure element by turning the rotating span adjustment nut in the desired direction.

To **increase** span: Turn span adjustment nut to move linkage adjustment tab away from element.
To **decrease** span: Turn span adjustment nut to move linkage adjustment tab toward element.

Be sure to re-tighten the locking screw after this adjustment. Check at zero. Repeat zero and span adjustments as necessary until zero and full scales agree with test equipment. The readings should be within 1% of span of the calibration checkpoint pressures.

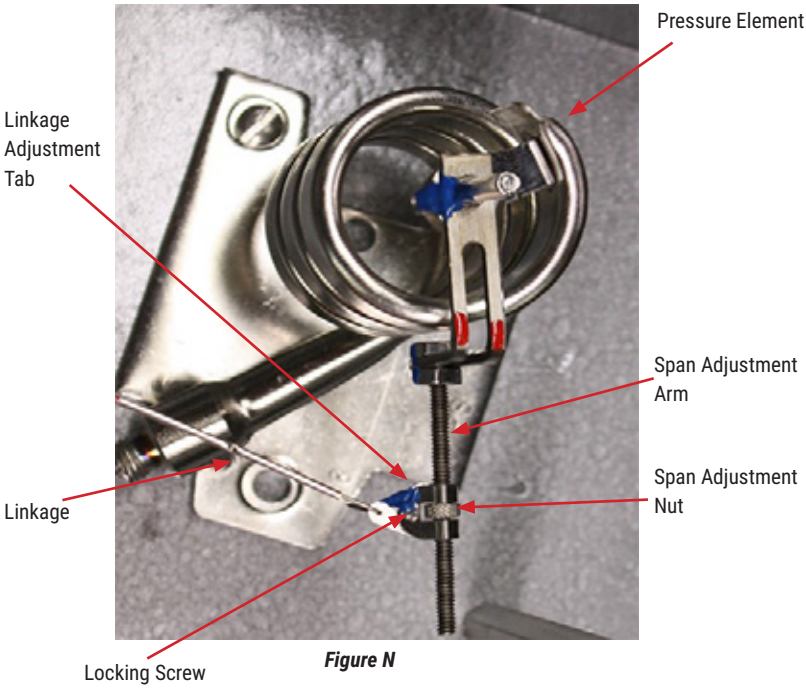


Figure N

TEMPERATURE SYSTEM - CALIBRATION INSTRUCTIONS

The sensing element of the temperature measuring and recording system must be properly installed in order to achieve maximum accuracy. The complete bulb must be exposed to the environment being monitored. If installing the sensing element in a thermowell, allow the recorder to reach operating temperature before tightening the threaded connection on swivel nut. Temperature recorders are case compensated for ambient temperatures.

To check calibration it is best to use precision thermometers, traceable to the National Institute of Standards and Technology (NIST), and two fixed temperature points such as 32°F and 212°F for example. Consult your chart for appropriate calibration points for the low and high temperature. Such calibration checks may be required by the user and can be done by following this simple procedure:

Zero Setting Adjustment for Temperature System: Place the temperature bulb in a 32°F temperature bath in an insulated container packed tightly with shaved or crushed ice, preferably made from distilled water. Fill the container with distilled water to fill the air gaps in the ice. There should be no free floating ice. This will give 32°F or 0°C. Wait until pen arm has completely stopped moving and compare the reading of the recorder with the temperature reading of the reference thermometer in the bath. If the reading on the chart agrees with the bath thermometer reading, the recorder is properly calibrated. If not, adjust the pen arm position to the correct reading using the pen arm zero setting adjustment. See Figure O.

Pen **below** 32°F reading – Turn zero setting adjustment clockwise to move the pen arm upscale.
Pen **above** 32°F reading – Turn zero setting adjustment counterclockwise to move pen arm down scale.

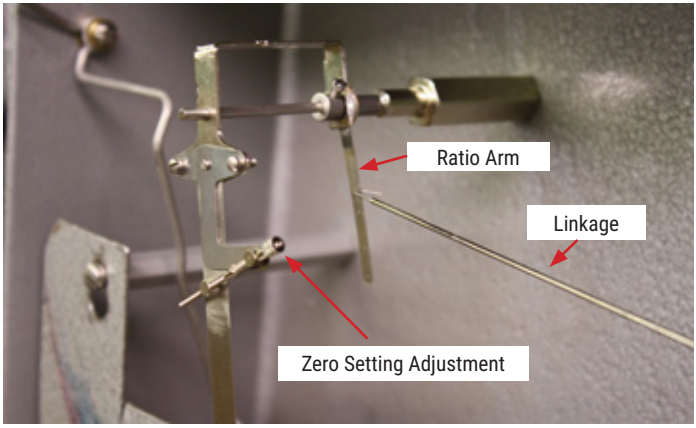


Figure O

TEMPERATURE SYSTEM - SPAN ADJUSTMENT

Span Adjustment for Temperature System:

Check span by placing temperature bulb in an agitated, mixed bath with a reference thermometer which indicates the lowest and the highest measurable points in the range of the recorder. (Note: Water boils at 212°F/100°C only at sea level. The boiling point drops about 2°F for each 1000 feet above sea level.) If the reading on the chart agrees with the bath thermometer reading, the recorder is properly calibrated. If not, make a span adjustment by loosening the locking screw that holds the linkage adjustment tab on the span adjustment arm. (Figure P) This will allow the adjustment tab to be moved toward or away from the temperature element by turning the rotating span adjustment nut in the desired direction.

To **increase** span: Turn span adjustment nut to move linkage adjustment tab away from element.
To **decrease** span: Turn span adjustment nut to move linkage adjustment tab toward element.

Be sure to re-tighten the locking screw after this adjustment. Check at 32°F. Repeat zero and span adjustments as necessary until low and high temperature readings agree with reference thermometer. The readings should be within 2% of span of the calibration checkpoint temperatures.

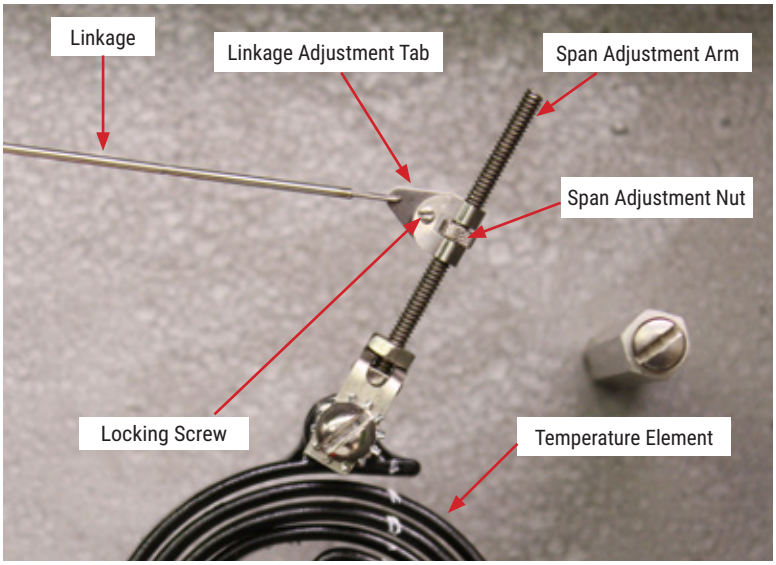


Figure P

Palmer / Wahl
BEYOND THE SCALE

234 Old Weaverville Road
Asheville, NC 28804
Email: info@palmerwahl.com

Toll Free: 800-421-2853
Phone: 828-658-3131
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