

INSTRUCTIONS FOR PUTTING P.T.G.'s IN SERVICE

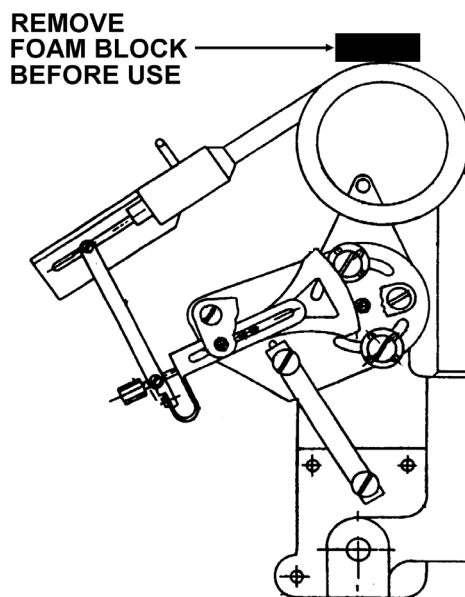
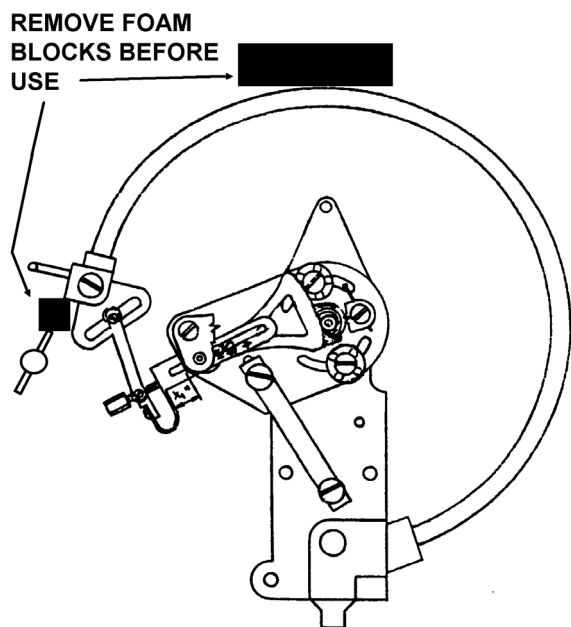
Remove gauge from container and check for shipping damage. If there is physical damage, notify the *carrier* and file a claim. Title to the product passes to the *buyer* when the goods are picked up by the carrier, so it is *your* responsibility to collect from the *carrier* if there is damage.

Before using the gauge you must remove the back cover and take out the foam pad that retains the bourdon tube, (and on "C" type tubes, a pad between the tube end piece and the low pressure stop). See the drawings below for locations. **Failure to remove these pads may cause a shift in calibration if the gauge is fully pressurized.**

Mount the gauge in its intended position and check the pointer for "ZERO". Due to handling, it may have shifted off zero. Insert a screwdriver through the zero adjust hole in the lens and reset the pointer to zero. When turning in one direction, go a little past zero, then back off the screw to put it in a "Dead Band" or "Back Lash" position. Tap the gauge to remove any friction in the adjustment linkage. It is important to start from a correct zero to insure proper readings.

Unless specified otherwise, all gauges are calibrated in a VERTICAL position using air up to 1000 PSI and distilled water above 1500 PSI. A gauge calibrated vertically but installed in a non-vertical panel may not read true.

Before changing any adjustments covered with yellow sealer, please contact the factory, as changing any of these adjustments will void the warranty on calibration.



CALIBRATION INSTRUCTIONS FOR PTG

MI-010

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1.0 Purpose

1.1 The purpose of this instruction is to establish guidelines for calibration of 3D Instruments Precision Test Gauge.

2.0 Scope

2.1 The scope of this instruction applies only to 3D Instruments gauges having Ni-Span Pressure/Vacuum sensors.

3.0 Tip Travel (Deflection)

3.1 Measure and record tip distance as in Figure 1, with zero pressure.

3.1.1 This is measurement A.

3.2 Apply full span pressure, measure and record tip travel.

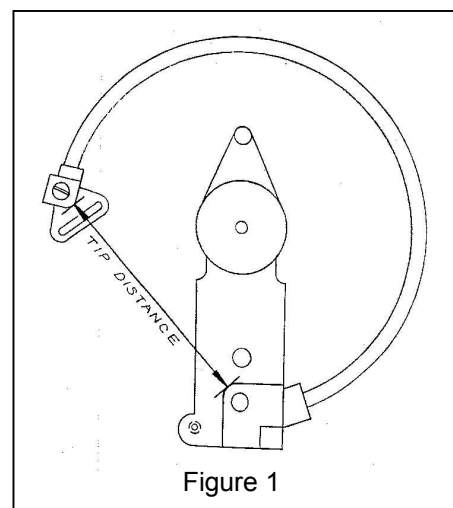
3.2.1 This is measurement B.

3.3 Tip travel is B minus A.

3.3.1 The limits are shown in Figure 2 for various gear trains.

Tip Travel		Movement Ratio to use
Min	Max	
.22"	.31"	13:1
.18"	.23"	16:1
.13"	.19"	19:1

Figure 2



3.4 Check for leaks at this time.

3.4.1 Pressurized to full scale reading - pneumatic use snoop to check for leaks.

3.4.2 Hydraulic - look for water.

4.0 Check movement and interior of case visually for cleanliness.

4.1 Should gauge require cleaning, this will be done outside of Calibration Room.

5.0 Assemble gauge to pump manifold and tighten with two wrenches.

6.0 Check sector pinion engagement (limit is 10 to 12 teeth).

6.1 Adjust, if necessary, by loosening movement mounting screws and recal link screw; shift movement manually to correct position and retighten screws.



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6.1.1 If adjustment limits are exceeded, change recal link to suit.

7.0 Set Hairspring Tension

7.1 Disengage sector by applying finger pressure near bottom of sector to clear pinion slightly and turn pinion 1/8 to 1/4 counterclockwise.

7.2 Carefully reduce finger pressure on sector to mesh with pinion.

8.0 Set Maximum Stop

8.1 With gauge pressurized to 6 o'clock on scale, loosen stop set screw and adjust stop.

8.2 Set stop location to rest against end piece and tighten screw.

8.3 Release pressure to zero.

9.0 Set Minimum Stop

9.1 The correct setting of the minimum stop is determined by depressing end piece manually between zero and full scale.

9.2 Loosen stop set screw and adjust stop to rest against end piece and tighten screw.

10.0 Setting Zero

10.1 Place pointer at zero.

10.2 Turn zero adjustment in counterclockwise direction to determine total up-and-down pointer travel.

10.3 Turn zero adjustment in clockwise direction to mid point of total pointer travel.

10.4 At this point, the zero adjustment should be in a neutral or slack position.

11.0 Initial Span Adjustment

11.1 Apply exactly 50% of full span pressure to gauge.

11.2 By means of the micro-adjust slide, adjust the pointer to read approximately 50% on the dial.

11.3 Return the pressure to zero, remove pointer and replace it as before, indicating zero.

11.4 Go back to 50% pressure and adjust the micro-adjust slide as before.

11.5 Repeat these two steps until this 50% indication is within about .5% of correct.

12.0 Initial Linearity Adjustment

12.1 Apply full scale pressure if pointer goes beyond full scale (this is called "Plus Linearity").



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12.2 To correct this, loosen screw and slide linkage outward along the end piece.

12.3 If pointer is short of full scale, minus linearity, slide linkage inward on end piece.

12.4 Release back to zero pressure.

12.5 When variable accurate readings occur, you may change position of movement.

12.5.1 Do this by loosening the rezero link screw at movement and movement screws.

12.5.2 Reposition movement up will increase pointer travel and moving movement; down will decrease pointer travel.

12.5.3 Maintain sector pinion engagement between 10 to 12 teeth.

12.6 Replace pointer at zero as described in 10.0

12.7 Repeat steps 11.0 and 12.0.

13.0 Final Span Adjustment

13.1 Pressurize gauge to half scale, take a reading and then pressurize to full scale and take a reading.

13.2 Under normal conditions, the error at half scale will be one half of total error at full scale.

13.3 If this does not occur, then you must go back to steps 9.0 and 10.0.

13.4 If this does occur, you can use the micro-adjust screw.

13.5 If your half and full scale reading are past the reading, turn micro-adjust screw clockwise.

13.6 If readings are short of reading, turn screw counterclockwise.

13.7 Rezero with rezero adjustment screw and check half and full scale readings again.

14.0 Quarter Points

14.1 Check the 25% and 75% points.

14.2 It is normal for error at these two points to be approximately equal, but opposite (e.g. the pointer will read top of the gauge at both places).

14.2.1 Such a situation will show a plus error at 25% and a minus at 75%.

14.3 To correct this problem loosen dial mounting screws and raise dial; tighten screws.

14.4 If minus at 25% and plus at 75%, lower dial.



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15.0 Calibration Run (The zero, 25%, 50%, 75% and full scale points must be within calibration limits prior to this step.)

15.1 Place crystal and bezel on gauge.

15.2 Check to see if any static is within crystal.

15.2.1 If static is present, wipe crystal down with Armor-All.

15.3 This procedure consists of running a set of pressure points in 10% of full span increments, from 0% to 100% and then back down to 0%.

15.4 If the error for any point is more than 0.1% (or limits defined by M. O.) of full scale, then minor adjustments must be made as described above.

15.5 Keep doing this until gauge is within 0.1% of full scale.

15.6 Note: all readings are taken after light tapping to remove any friction.

16.0 Friction and Tube Hysteresis

16.1 At times there may be major differences in the pointer readings between increased and decreased pressure checks. This condition is caused by mechanical friction or tube hysteresis.

16.1.1 Check for mechanical friction by manually moving the pointer away from any pressure scale reading and carefully permit the pointer to return to the same reading.

16.1.2 The reading should be within .2% of full scale (with no tapping); if not the same, then there is friction.

16.1.3 Gauge must then be taken apart and fixed, and repeat calibration procedures.

16.1.4 Tube hysteresis is checked with pressure.

16.1.5 Place pointer at zero, raise pressure to half scale with tapping and record reading.

16.1.6 Raise pressure to full scale and slowly release pressure to half scale - with tapping and record reading.

16.1.7 A difference between the two readings is called "Tube Hysteresis".

16.1.8 If the tube hysteresis is more than 0.1% of full scale, the tube must be replaced.

17.0 Quality Control Inspection

17.1 When all calibration limits are met, put anti-tampering gel on micro-adjust screw, micro-adjust slide screws, maximum and minimum stops, re-zero link screw to movement and movement linkage to end piece (be sure not to get any gel on linkage).

17.2 A Quality Control Inspector will run a final calibration check.



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17.3 Quality Control Inspector will record calibration readings.

17.4 The gauge proceeds to final for cleaning.

17.5 Final Assembly Technician will enter calibration readings on Calibration Certificate (Form #EF-010).