PINE Instrument
Construction Testing Equipment Group

101 Industrial Drive
Grove City, PA 16127, USA
tel: 724.458.6391
fax: 724.458.6418
www.pineinst.com

Service Instruction

1 Component: AFG2- Angle Sensor Maintenance

Gyratory Model: AFG2 (all variants)

2 Scope

Cleaning angle sensors, as part of a preventive maintenance program, or to repair a malfunction.

3 Tools Required

3/32" Hex Wrench (s/n 8001-8028)
3/16" Hex Wrench (s/n 8029+)
5/16" Nut Driver
5/16" open end wrench
WD-40
Rags
Long handle cotton swabs
Polishing Pad (Scotch-Brite™ or equal)

4 Hazards/Precautions

	**This procedure requires power to be applied to the compactor while servicing. Take extra car to keep hands and arms away from moving parts and pinch points.**
	**Always wear eye protection and steel toe shoes while servicing a gyratory compactor.** **Use proper lifting technique. Do not wear loose-fitting clothing items (*i.e.*, jewelry, ties, etc.) which may be caught in the moving parts of the compactor. Long hair should be tied back.**
	**Electronic components may be damaged by static electricity. Be sure to be properly grounded when handling static sensitive components.**

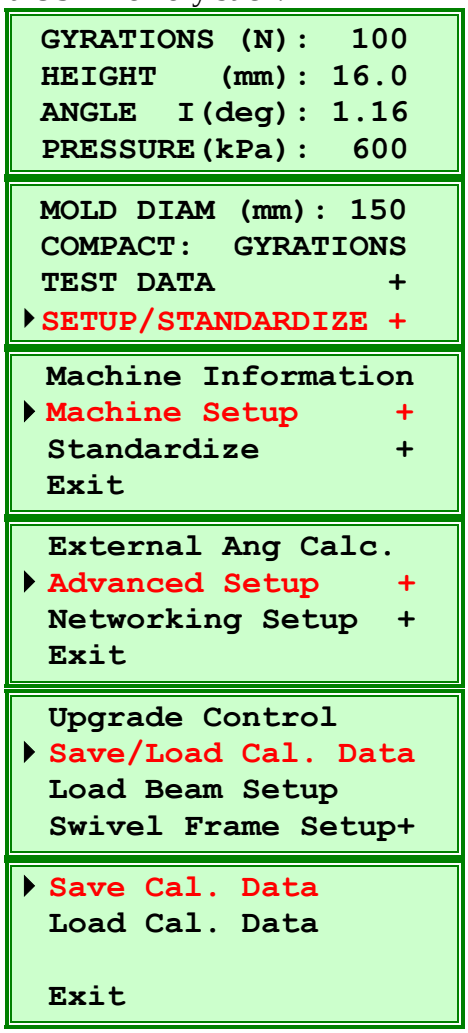
This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish and follow appropriate safety practices associated with the described tasks. If unsure about the required qualifications for performing this procedure contact Pine Instrument Company or seek qualified assistance.

5 Instructions

5.1 Save Calibration Data

Save a copy of the current configuration/calibration data to a USB memory stick.

- Navigate to the Save/Load Cal Data menu using the ▶ and ↵ buttons.
- Most sub-menus have two screens. Use the ▶ button to advance within each menu until the desired selection is available.
- Follow the instruction to place a copy of the calibration data onto the USB memory device.



- The following files will be placed on the device:

  Hours.cfg
  G2000.cfg
  G2setup.cfg
  G2network.cfg (v09.06b+)
  G2cal.cfg
  G2_xxxx.txt

The g2cal.cfg is the calibration data file.

5.2 Update software to v09.07a or newer

The maintenance procedure requires control software version 09.07a or a later release. If the AFG2 is operating on software released before June 2009, it must be updated prior to performing this procedure. Follow the upgrade instructions provided separately with the new control software.

5.3 Remove the access covers

Remove the front work surface, the left and right actuator guards, and the three access covers between the actuators.

5.4 Park the swivel frame

It is critical that the swivel frame be at the correct park position. Once the park position is achieved, the swivel frame should not be moved until this procedure is complete.

5.4.1 Parking a machine with NO Errors

If the machine is working properly and the sensors are being cleaned for preventative maintenance purposes, press the RAM DOWN button to park both the ram and swivel frame. Proceed to Step 5.5.

5.4.2 Parking a machine with Multiple Errors:

This generally indicates more than one angle sensor has malfunctioned. Contact the factory for additional instructions (724) 458-6391.

5.4.3 Parking a machine with an Error 443: Malfunctioning Angle Sensor

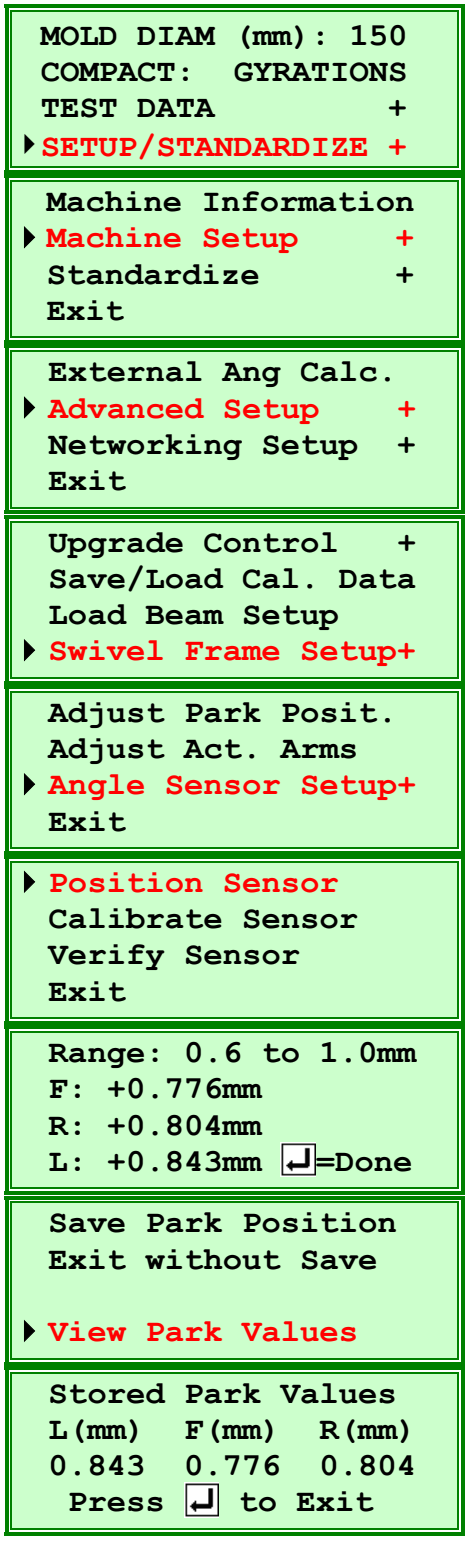
Error 443 generally indicates a problem with the Front Angle Sensor. The swivel frame will still park automatically with this condition. Press the RAM DOWN button to park the swivel frame. Once at the park position, the swivel frame should not be moved during this process. The Error 443 will be displayed. Press the ↵ button to clear. Proceed to Step 5.5.

5.4.4 Parking a machine with an Error 444: Malfunctioning Angle Sensor

If the machine fails to park and an error 444 is displayed, this may be due to a malfunctioning left or right angle sensor. If this condition occurs, the swivel frame must be moved to the park position using the manual move functions described on the following pages. Press the ↵ button to clear the Error 444 and proceed to Step 5.4.4.1.

5.4.4.1 DETERMINE SENSOR PARK VALUES

- Navigate to the Position Sensor menu using the ▶ and ↵ buttons.
- Most sub-menus have two screens. Use the ▶ button to advance within each menu until the desired selection is available.



Note: Each compactor will have unique sensor values different from those shown at right.

- Record the Stored Park Values for the Left (L), Front (F) and Right (R) angle sensors:

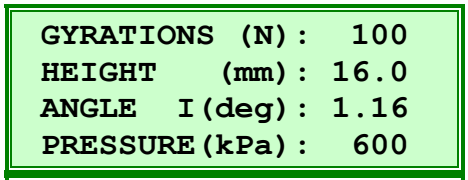
Left: _____(mm)
Front:_____(mm)
Right:_____(mm)

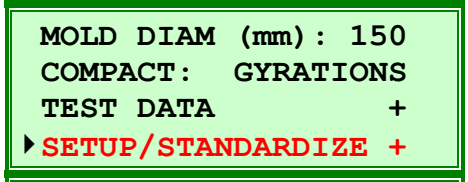
These values should be +0.800 ±0.200mm.

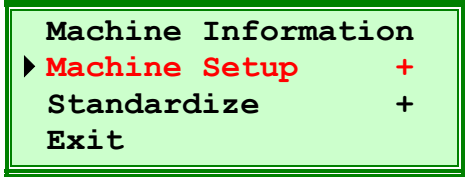
- Press ↵ to exit.

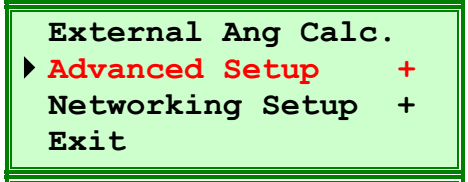
5.4.4.2 IDENTIFY MALFUNCTIONING SENSOR

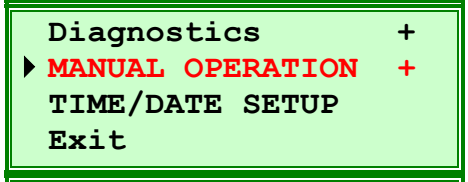
- Navigate to the Manual Gyration menu using the ▶ and ↵ buttons.
- Most sub-menus have two screens. Use the ▶ button to advance within each menu until the desired selection is available.

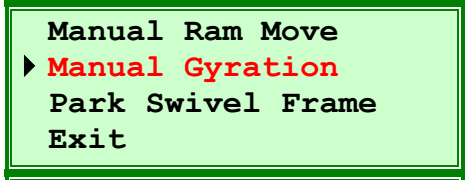




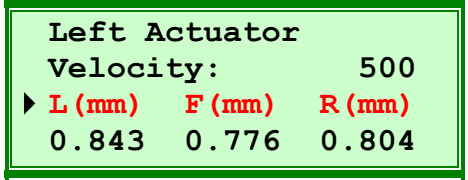




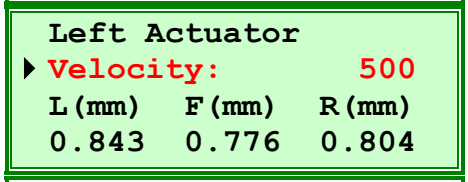




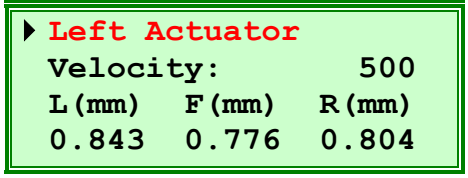
- Angle sensor outputs can be displayed in voltage or mm units. Press ▶ to position the cursor on line three, then press the + or − button to toggle to units of (mm).



- Press ▶ to position the cursor on line two, then press the + or − button to set the velocity to 500.



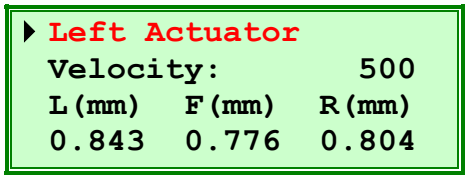
- Press ▶ to position the cursor on line one, then press the + or − button to toggle between the Left or Right Actuator. Only one actuator can be operated at a time.



- Press the yellow RAM UP and RAM DOWN operators to operate each actuator.

Left Actuator:

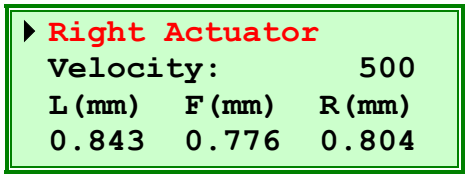
- With the left actuator selected, observe the left sensor reading as the actuator moves. All sensor readings should change as the actuator moves, provided the sensors are working properly. If the left sensor is working properly (as shown in the screenshot), position the swivel frame so the sensor is reading the value recorded in Step 5.4.4.1 (approximately +0.800mm).
- If the left sensor does not change as the left actuator is moved, the left sensor requires repair. Do not remove the sensor at this time; proceed to check the right actuator. A sensor requiring repair may have a negative value (i.e.: -1.900 mm)



Note: Actual values will vary.

Right Actuator:

- With the right actuator selected, observe the right sensor reading as the right actuator moves. All sensor readings should change as the actuator moves, provided the sensors are working properly. Position the swivel frame so the right sensor is reading the value recorded in Step 5.4.4.1 (approximately +0.800mm).
- If the right sensor does not change as the right actuator is moved, the right sensor requires repair. Do not remove the sensor at this time. Continue with swivel frame parking in Step 5.4.4.3.
- Press ↵ to exit.
- If more than one angle sensor is not functioning, contact the factory for alternate alignment instructions.



5.4.4.3 ORIENT ACTUATOR ROTATIONAL POSITION

The actuators' rotational positions at park must be confirmed. Observe the eccentric rotation motion of each actuator during manual operation. Position the left actuator with the eccentric offset to a clock position of approximately 7:30. Position the right actuator with the eccentric with the eccentric offset to a clock position of approximately 4:30.

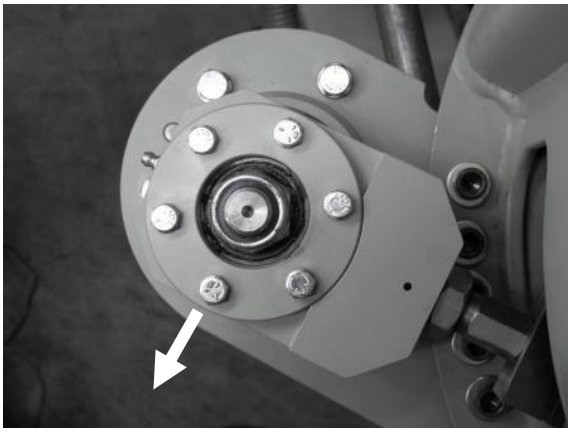


Photo 5.1: Left Actuator Park
eccentric offset at 7:30 clock position

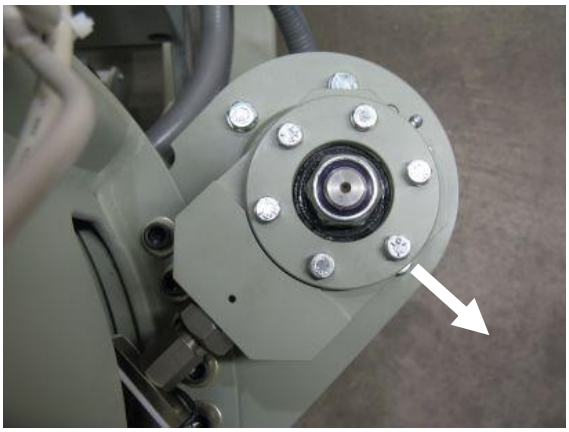
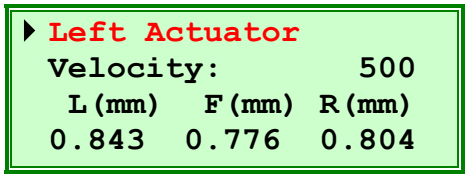
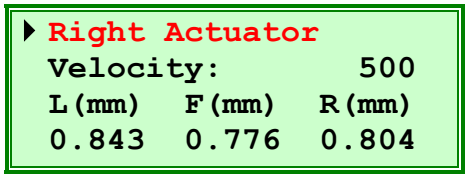


Photo 5.2: Right Actuator Park
eccentric offset at 4:30 clock position

5.4.4.4 POSITION SWIVEL FRAME

- Once the faulty sensor is identified (section 5.4.4.2, and the actuator rotation positions are approximately correct, (section 5.4.4.3), use the left and right actuators to align the swivel frame more precisely. The two functional sensors (Left and Front or Right and Front) will provide guidance. Position the frame so that readings from the functional sensors are as close to the values recorded in Step 5.4.4.1 as possible. This will require operating the left and right actuators alternately several times to obtain the most accurate result. Only one actuator can be operated at a time.

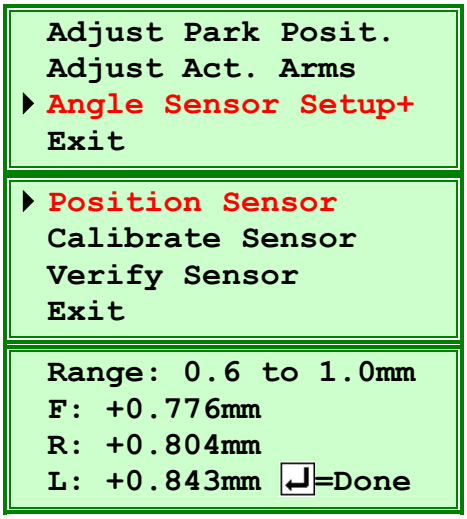




- Confirm both actuators are in the park position by visually comparing to Photo 5.1 and 5.2. If they seem 180° out of phase, return to Step 5.4.4.3 and re-align the actuators.
- Press ↵ to exit this menu.

5.5 Select "Position Sensor" Menu

- Navigate to the Position Sensor menu using the ▶ and ↵ buttons.
- Press the ↵ button.
- The sensor readings are viewed directly on the display.



5.6 Left Angle Sensor

5.6.1 Remove the left angle sensor.

There are two different mount block configurations utilized on the AFG2. A pair of 3/32" hex head set screws secure the angle sensors on s/n 8028 and below. A clamp collar with 3/16" hex head cap screws secures the sensors on s/n 8029 and above.

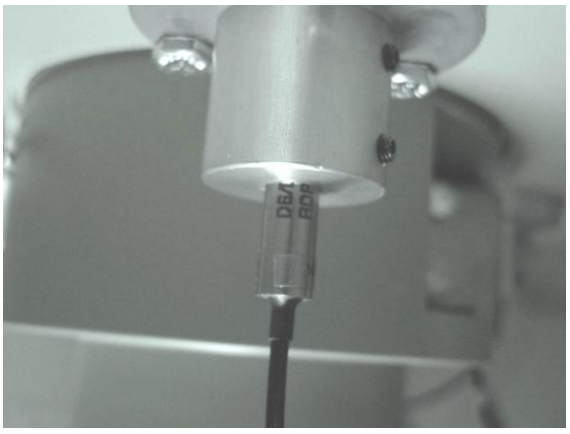


Photo 5.3: Set-Screw Style Mount

Photo 5.4: Clamp Style Mount

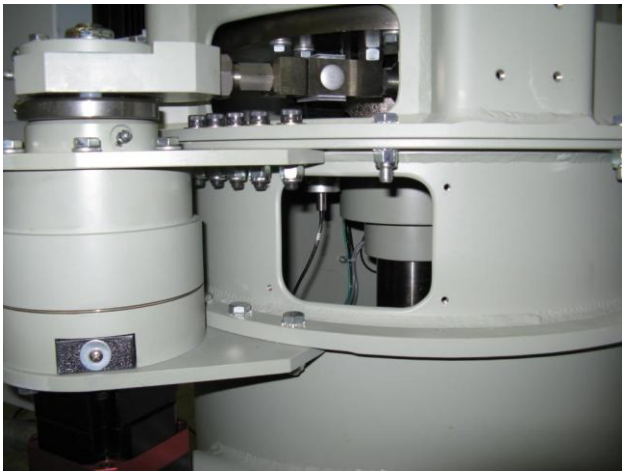


Photo 5.5: Left Sensor Mounted

Photo 5.6: Angle Sensor Removed

Loosen the angle sensor mounting screws and slide the sensor downward. A slight twisting motion might be necessary. Leave the mount secured to the frame.

5.6.2 Clean the sensor shaft

Clean the spring-loaded sensor probe with WD-40 and a clean soft rag. A polishing pad may be necessary to remove any buildup on the shaft. Spray WD-40 onto the sensor generously and be sure to work the spring-loaded shaft back and forth. The sensor should operate freely.

Photo 5.7: Angle Sensor Cleaned, Ready to Reinstall

Leave a coating of WD-40 on the shaft. No damage is done by WD-40 in the sensor body.

5.6.3 Clean the sensor contact surface

Use a long handle cotton swab (Q-tip) to clean inside the angle senor boot. Wet the tip then insert the swab through the angle sensor mounting hole until it contacts the angle sensor reference surface. Swirl the swab to clean the contact surface.

5.6.4 Reinstall the sensor

Place a small dab of anti-seize (ram foot lubricant) on the probe tip of the angle sensor. Re-install the sensor so that a reading of +0.800mm (±0.20mm) is displayed. The reading may shift slightly as the mounting screws are tightened.

If the sensor has a set screw mount, take care not to over tighten the screws as this may damage the sensor. These set screws should be snug, not overly tight. The clamp collar screws also need only be snug.

5.7 Front Angle Sensor

Repeat Section 5.6 for the Front Sensor

Photo 5.8: Front Sensor Mounted

5.8 Right Angle Sensor

Repeat Section 5.6 for the Right Sensor

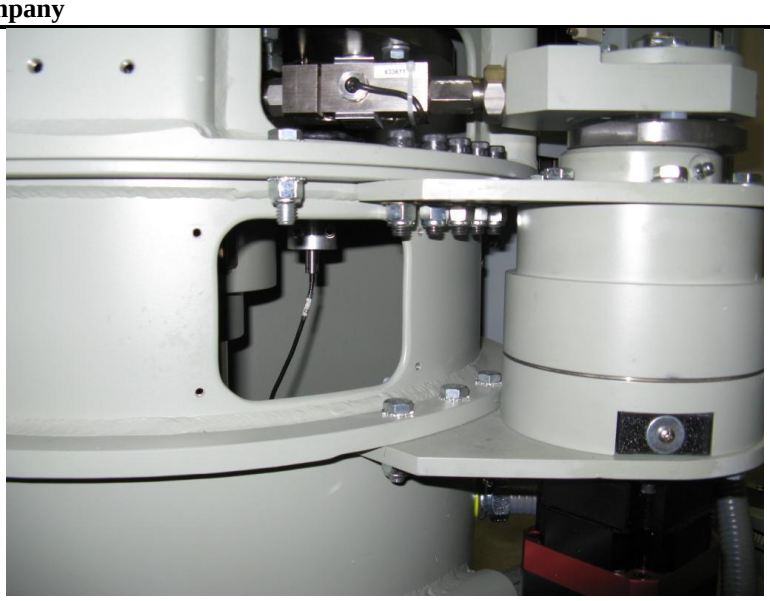
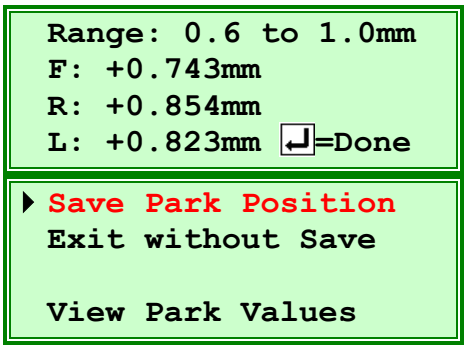


Photo 5.9: Right Sensor Mounted

5.9 Redefine Park Position

Note: ***It is extremely important to save the new readings as the park position!***

- Press the ↵ button to exit the Position Sensor menu.
- Select Save Park Position.
- Press the ↵ button to save the current sensor values as the park position.
- Press the — button to exit to the main menu.



5.10 Verify the Angle of Gyration (Internal and/or External)

The internal and/or external angle of gyration should be checked after this service. Small shifts may occur and recalibration of the angle may be needed. Follow the procedure for verifying the external angle and/or internal angle of gyration in the AFG2 Operator Manual. Angle Sensor calibration is not required.

6 Save Configuration/Calibration Data

Once this procedure is complete, save a copy of the new configuration/calibration data to a USB memory stick and store these files on a separate computer, network, or other digital storage media as a backup copy of the AFG2 calibration.