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Production Array Imager (PAI) Surface Test

By Farhan Amran

Software Needed

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- Sondex Warrior v8.34 or later
- Warrior Key license (P10V5)
- PAI service file

Interface & Tool Combinations

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- UltraWire Telemetry Controller for toolstring communication
- Simultaneous operation with other UltraWire Logging tools
- Bottom end tool or bullnose is required for UltraWire termination

Gas Array Sensor (PAIGAT) Config Setup (1)

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- Apply a Isopropyl Alcohol (IPA) Spray or water to each of the six Gas Array sensor tips in turn.
- In the Warrior software, open the PAIGAT Monitor window.
- Select the “Raw” tick box and monitor the Gas Array Sensors mean raw value (PGMNRx) in air, where x is the sensor number.
- The acceptable minimum PGMNRx air values are:
  - For biconical tips - 0.07. Typical values are between **0.07 and 0.12.**
  - For conical tips - 0.2. Typical values are between **0.2 to 0.5.**

A low PGMNRx value can indicate that the tips are covered by debris and will require a further clean.

- Continue to clean the GAT Sensor Tips until PGMNRx values reach the maximum possible value. If the value remains low after a thorough clean, replace the GAT Sensor Tip.

Gas Array Sensor (PAIGAT) Config Setup (2)

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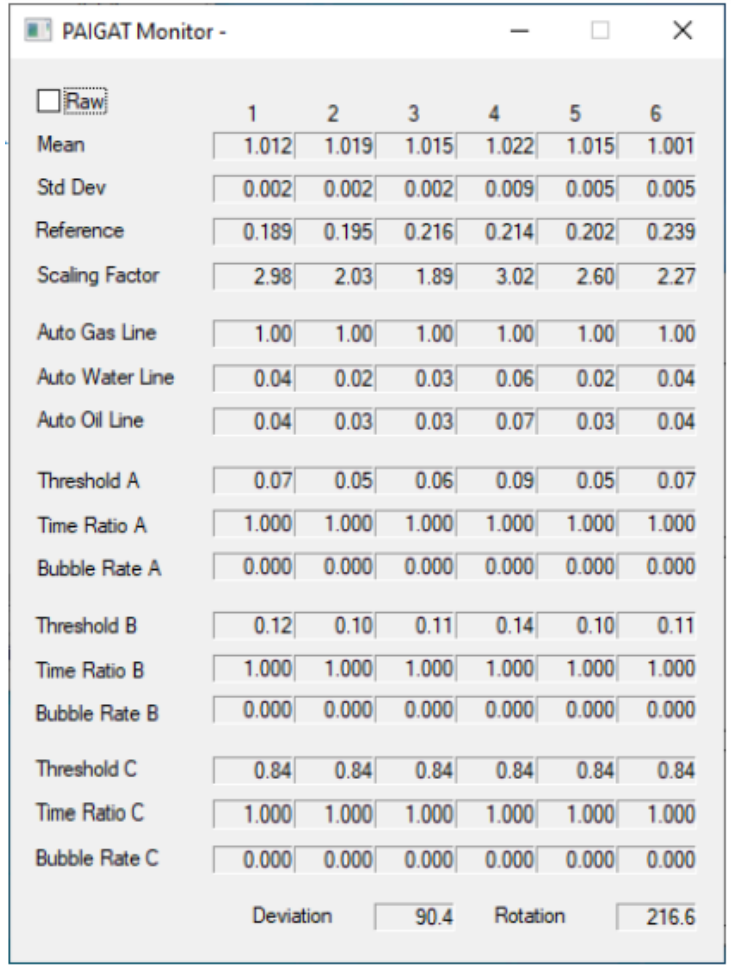
- Un-tick the “Raw” tick box in the PAIGAT Monitor window to view the normalised Gas Array Sensor mean value (PGMNx) in air. The acceptable values for PGMNx in air is between **0.90 to 1.05**.
- If the PGMNx value does not fall between the acceptable range, perform re-normalization in air.
- If the PGMNx value is < 0.9 it can indicate that the tool requires a further clean

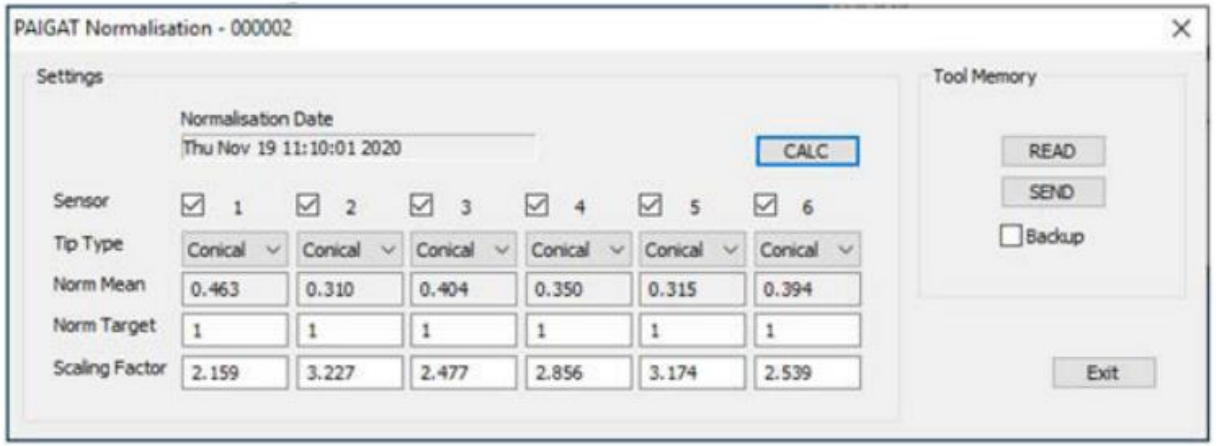


	1	2	3	4	5	6
Mean	1.012	1.019	1.015	1.022	1.015	1.001
Std Dev	0.002	0.002	0.002	0.009	0.005	0.005
Reference	0.189	0.195	0.216	0.214	0.202	0.239
Scaling Factor	2.98	2.03	1.89	3.02	2.60	2.27
Auto Gas Line	1.00	1.00	1.00	1.00	1.00	1.00
Auto Water Line	0.04	0.02	0.03	0.06	0.02	0.04
Auto Oil Line	0.04	0.03	0.03	0.07	0.03	0.04
Threshold A	0.07	0.05	0.06	0.09	0.05	0.07
Time Ratio A	1.000	1.000	1.000	1.000	1.000	1.000
Bubble Rate A	0.000	0.000	0.000	0.000	0.000	0.000
Threshold B	0.12	0.10	0.11	0.14	0.10	0.11
Time Ratio B	1.000	1.000	1.000	1.000	1.000	1.000
Bubble Rate B	0.000	0.000	0.000	0.000	0.000	0.000
Threshold C	0.84	0.84	0.84	0.84	0.84	0.84
Time Ratio C	1.000	1.000	1.000	1.000	1.000	1.000
Bubble Rate C	0.000	0.000	0.000	0.000	0.000	0.000

Deviation 90.4 Rotation 216.6

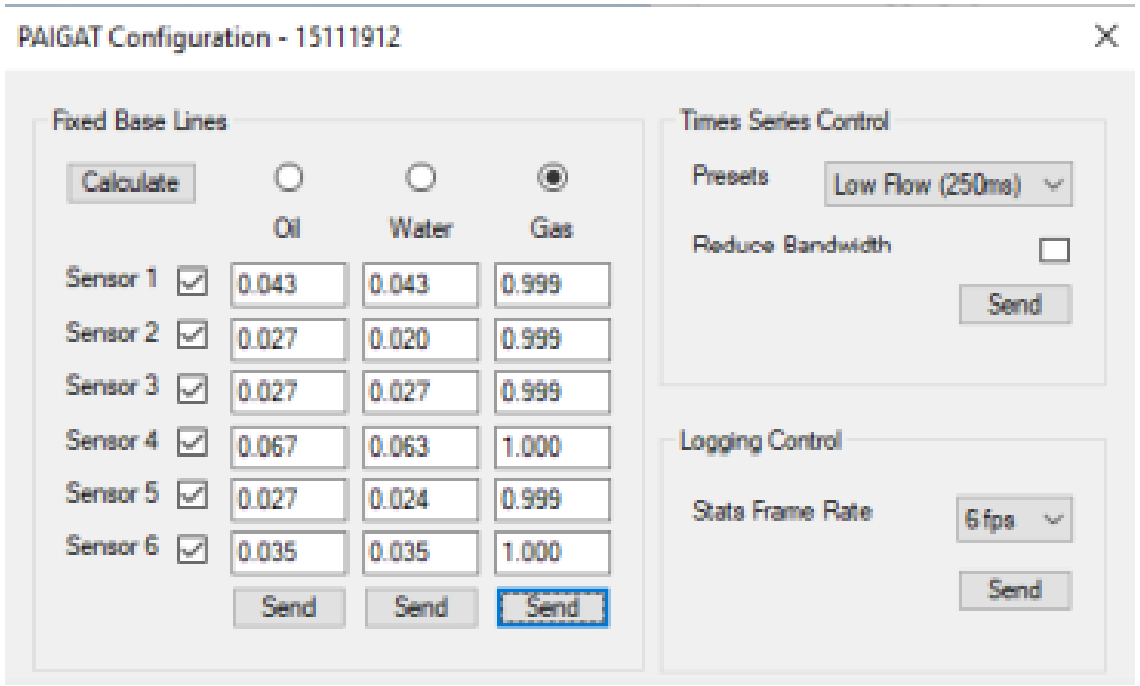
PAIGAT Normalisation

- Run Warrior software and open the PAIGAT Normalisation window (Action > Calibrate > PAI_PAIGATX Normalisation).
- Tick the Sensor tick box for all sensors which require re-normalization.
- Select the Tip type for each of the sensors.
- Check the Norm Target value is ‘1’.
- Press the CALC button to calculate “Scaling Factor” value
- Press SEND button in the Tool Memory area to send and store the updated “Scaling Factor” value to the tool memory. DO NOT tick the Backup box.
- Verify in the PAIGAT Monitor window that Mean PAIGAT (PGMNx) value for each sensor is between 0.90-1.05.



PAIGAT- Air Measurement

- In the Warrior software, open the PAIGAT Configuration window
- Select “Gas” and Tick all the sensors - “Sensor 1” through to “Sensor 6”.
- Click the “Calculate” button. This will store the current PAIGAT measurements to the selected column. Ideal value is between **0.90-1.05**.
- Click the “Send” button below the “Gas” column to store the Gas measurements to the Tools memory



PAIGAT - Water Measurement

- Select “Water” and the Sensor to be tested. The example above shows “Sensor 1” selected.
- Submerge the required PAIGAT tip inside water. Recommended to use a straw filled with water that is sealed at one end with your fingers to keep the water in place. PAIGAT measurement < **0.1** for biconical tips and **0.35-0.55** for conical tips.
- Once the required PAIGAT tip is submerged into water, click the “Calculate” button to store the selected PAIGAT tips measurement to the Tools memory.
- Repeat steps for all the Sensors that remain. Only perform this process one Sensor at a time.
- Once all PAIGAT measurements have been calculated, tick all Sensors and click the “Send” button at the bottom of the column to store the Water measurements in the Tools memory.

PAIGAT - Oil Measurement

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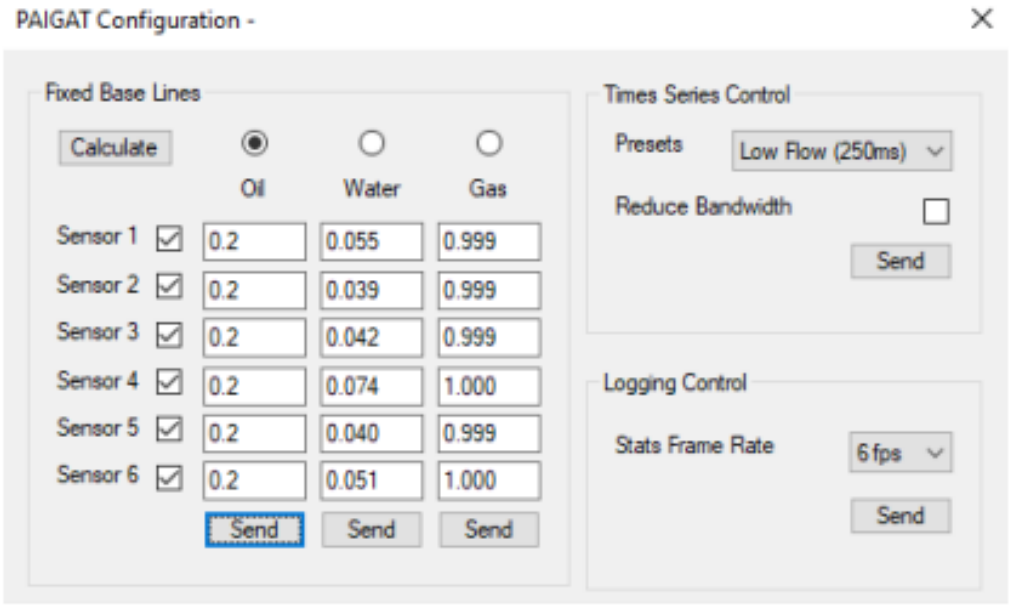
For all Biconical Tips:

- Manually set the fixed base line measurements for “Oil” to 0.2.
- Tick all the Sensors and click the “Send” button at the bottom of the column.

For all Conical Tips:

- The fixed base line for Oil is set the same as Water. Therefore manually type in the “Oil” column the same values as the “Water” column for all the Sensors.
- Tick all the Sensors and click the “Send” button at the bottom of the column



PAIGAT – Set Threshold

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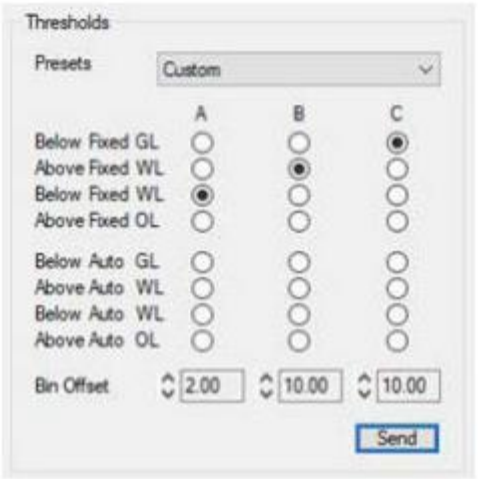
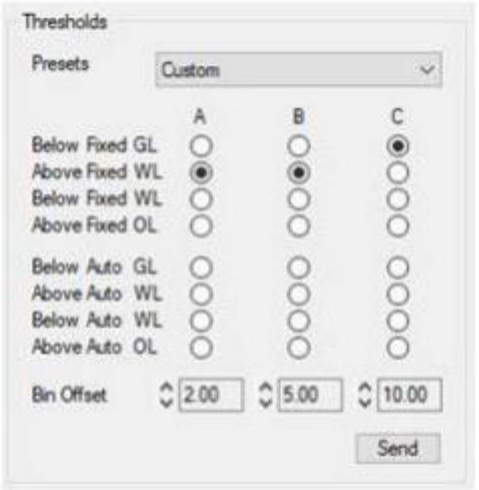
For all Biconical Tips:

- Select “Custom” in the “Presets” drop down box.
- In column A: Tick “Below Fixed WL” and set the Bin Offset to 2.
- In column B: Tick “Above Fixed WL” and set the Bin Offset to 10.
- In column C: Tick “Below Fixed GL” and set the Bin Offset to 10.
- Click the “Send” button



For all Conical Tips:

- Select “Custom” in the “Presets” drop down box.
- In column A: Tick “Above Fixed WL” and set the Bin Offset to 2.
- In column B: Tick “Above Fixed WL” and set the Bin Offset to 5.
- In column C: Tick “Below Fixed GL” and set the Bin Offset to 10.
- Click the “Send” button



Resistance Array Sensor (PAIRAT) Config Setup (1)

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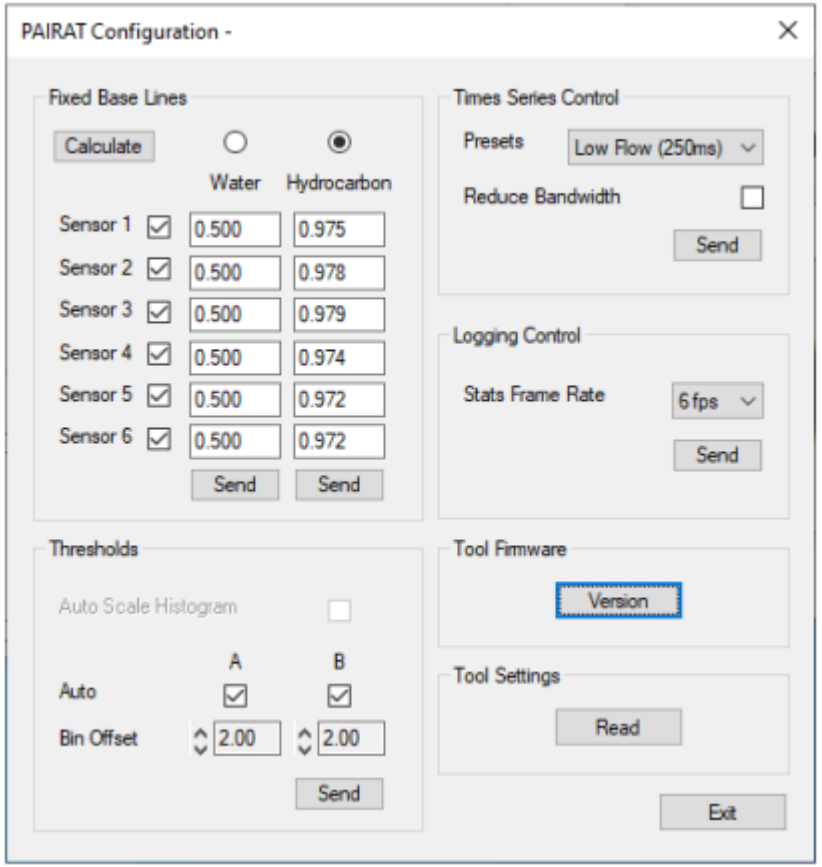
- In the Warrior software, open the PAIRAT Configuration window.
- When the tool is at the surface:
  - Select the “Hydrocarbon” column in the Fixed Base Lines area.
  - Make sure all the Sensors are ticked.
  - Click the “Calculate” button.
  - Click the “Send” button at the bottom of the “Hydrocarbon” column.
- When the tool is in air, the sensors can be set for under water:
  - Select the “Water” column in the Fixed Base Lines area.
  - Make sure all the Sensors are ticked.
  - In the “Water” column, manually type 0.5 in all the value boxes for all the Sensors.
  - Click the “Calculate” button.
  - Click the “Send” button at the bottom of the “Water” column.



Resistance Array Sensor (PAIRAT) Config Setup (2)

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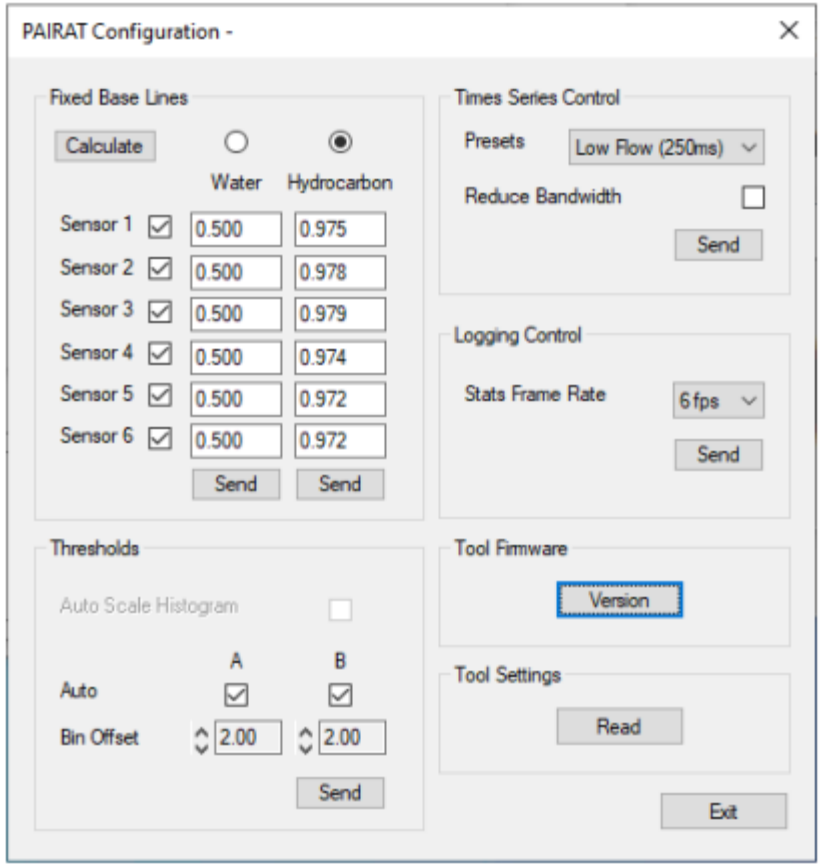
- In the Time Series Control area:
  - Select “Low Flow (250ms)” in the “Presets” pull down box.
  - Click the “Send” button to store the values in the Tools memory.
- In the Thresholds area:
  - Tick “A” and “B” for “Auto”.
  - Set the Bin Offset to 2.
  - Click the “Send” button to store the values in the Tools memory.



PAIRAT Check Sensor

- Cover each of the PAIRAT tips sensor with a wet tissue.
- Make sure the measurements are between the air and fixed water base line values.

Spinner Array Calibration

- Not supplied with the tool as it is best performed in the well.
- Plots must be made of tool measurements against cable (tool) velocity

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Thank you !

Questions and Answering Session