



TM

# ADVANCED TELEMETRICS

DIGITAL TANK GAUGE SYSTEM  
MODEL 1000S

## **LUFKIN - SAM WELL MANAGER CONFIGURATION**

Advanced Telemetrics ▪ 700 S. Tucker Ave ▪ Farmington, NM ▪ 800-382-1482

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# Using the Programmable Register Calculator function in LUFKIN SAM Well Manager with Advanced Telemetry Digital Tank Gauge Model 1000S

## Introduction

This guide covers operation and programming instructions for the LUFKIN SAM Well Manager unit for use with the Advanced Telemetry 1000S Tank Gauge. Both hard-wired and wireless Tank Gauge applications are covered.

## SYSTEM DESCRIPTION AND FUNCTION

This application uses a SAM Expansion Board Type 5 for RS485 communication to the Tank Gauges. The gauges (hardwired) or master radio controller (wireless), are terminated on this card as described below. The register calculator software feature of the SAMS Well Manager looks at individual Modbus registers for specific Modbus-addressed slave devices (gauges) and uses a mathematical calculation to output desired values based on gauge levels. SAM Well Manager uses one "Slave Device" profile per Modbus address on the line. Each device has multiple register outputs, of which the Advanced Telemetry Gauges use a possible 8 (typically 4 or 6), using dual-swapped-floating-point registers for each parameter (e.g., oil level, water interface level, degrees). In the Programmable Calculation Table menu, the SAM Well manager can be configured to output inches, fractional feet, or degrees Fahrenheit. Currently, the SAM Well Manager is limited to a total of 10 Programmable Calculation outputs per Well Manager unit. With this limitation, it is recommended to use the Well Manager with (5) Tank Gauges while monitoring Oil Level and Water Interface Level for each (for a total maximum of 10 programmable calculations), unless a specific application demands otherwise.

## Hardware

LUFKIN SAM Well Manager

LUFKIN SAM Expansion Board 5

ADVANCED TELEMETRICS Level Gauges

ADVANCED TELEMETRICS Wireless Master Controller (for wireless applications)

## Procedures

There are three main steps to use the SAM controller with Advanced Telemetry tank gauges:

- 1) Connect Gauges or Wireless Master Radio to Expansion Board Type 5.
- 2) Configure Modbus slave devices and registers.
- 3) Configure Programmable Calculations to output desired units of measure.

*Note: With respect to the SAM Well Manager, the Advanced Telemetry Wireless Master Radio behaves identically to the hardwired units. As long as Modbus addresses are assigned correctly during initialization and pairing of the wireless gauges on the SW-0230 program, the Well Manager should communicate with the Wireless Master Controller just as if it were communicating to hardwired units. Please refer to Advanced Telemetry install manual for detailed instructions on how to set up and address wireless gauges.*

### STEP ONE – Connecting Gauges or Wireless Master Radio to Expansion Board Type 5

Using Appendix A, connect your Advanced Telemetry Gauges or Master Wireless Radio to the appropriate RS485 com terminals on the SAMS Expansion Board Type 5. With hardwired units, it is recommended to connect RS485 to gauges before powering up the gauges themselves with 12VDC (DO NOT USE 24VDC WITHOUT 24V-12V CONVERTER).

### STEP TWO – Configuring Modbus Slave Devices and Registers

Using the 20-button number and arrow interface on the SAM Well Manager, navigate the menus and input settings according to your desired application. First, configure Modbus Slave Devices for the first parameter (e.g. , Oil Tank 1 Oil Level)

Use the following number keys in order : 2 – 5 – 2 – 3 – 1

This should bring up the Slave Device Configuration menu. Here, configuration for each Tank Gauge(one per slave device) enables communication and retrieval of data from the registers specified.

Select Device 1, and enter the following information:

RTU ADDRESS: Enter the Modbus address of Tank Gauge 1 here (e.g., 01 or 10)

DEVICE TYPE: Select Modbus Slave

BAUD RATE: 9600

DATA BITS: 8

STOP BITS: 1

PARITY: No Parity

DELAY BEFORE KEY UP: 0000

KEY UP TIME: 0000

KEY DOWN TIME: 0000

# FAILURES ALLOWED: 0010

TIMEOUT: 0300

STATUS: ENABLED\*

***\*Make sure to enable the device, or the Well Manager will not recognize this device!***

Select [NEXT] to go to Register Address Configuration:

Select the following Register Addresses\* for each Register Index:

\*It is not necessary to select 40005-40008 unless looking for temperature/wireless-high-level as one of ten possible outputs.

1 – 40001 (oil/product level 1/2)

2 – 40002 (oil/product level 2/2)

3 – 40003 (water interface level 1/2)

4 – 40004 (water interface level 2/2)

5 – 40005 (temperature F 1/2)

6 – 40006 (temperature F 2/2)

7 – 40007 (only used for wireless high-level state output)

8 – 40008 (only used for wireless high-level state output)

Use the [EXIT] button to go backwards in the menu tree and **repeat the above** for each device on the line, making sure to configure the correct Modbus address for each unit on the line and to enable each device.

### STEP THREE – Configuring Programmable Calculations to Output Desired Units of Measure

Go back to the main menu by pushing the [MENU] button.

Use the following keys in order: 2 – 7 – 3

Select Programmable Calculation 1, and enter the following:

#1

Input 1	Operation	Input 2
Slave (01)		Register Category (Constant)
Register (01)	(/)	Value (00012.00)
(Float)		

The above configuration tells the Well Manager to look at Tank Gauge 01 (Slave Device 01) and look at Oil Level (register 40001-40002) and convert inches to fractional feet. Next, **SAVE THE CONFIGURATION** and use [EXIT] to go back in the menu and select Programmable Calculation #2.

Enter the following:

#2

Input 1	Operation	Input 2
Slave (01)		Register Category (Constant)
Register (03)	(/)	Value (00012.00)
(Float)		

The above configuration tells the Well Manager to look at Tank Gauge 01 (Slave Device 01) and look at Water/Interface Level (register 40003-40004) and convert inches to fractional feet. Next, **SAVE THE CONFIGURATION** and use [EXIT] to go back in the menu and select Programmable Calculation #3.

Repeat the above steps changing values for Slave Address and Register number using the Register chart above to select desired outputs. To look at temperature, enter the following settings for desired device ID:

##

Input 1	Operation	Input 2
Slave (##)		Register Category (Constant)
Register (05)	(+)	Value (00000.00)
(Float)		

This will output Temperature for Slave Device ## in Fahrenheit.

Note – When all communication is functioning, all three COM lights on SAM Expansion Board Type 5 should be blinking.

#### **To View Configured Outputs:**

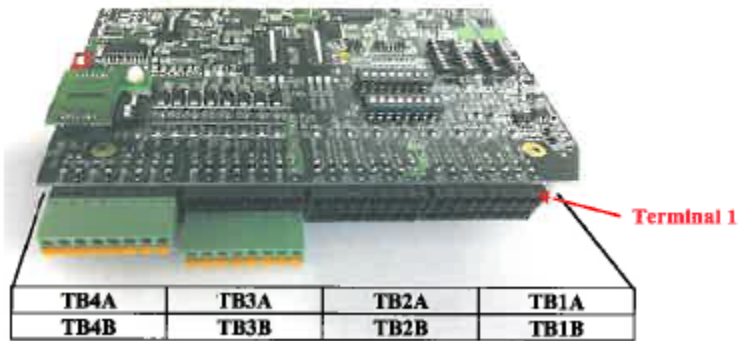
From the main menu, enter the following: 7 – 4 – 2

This is the Programmable Calculations table.

This screen displays raw register values for configured registers and calculation outputs based on the operations entered in the steps above. Here should be visible both inches (output by the sensor) and feet (which are the calculated outputs) for product and water interface levels.

APPENDIX A:

Facing the end of the board as shown, the connectors are labeled from RIGHT TO LEFT ( ← ) TB1 – TB4. There are two rows designated as A and B with the A being the top row. There are eight contacts on each connector block also numbered from RIGHT TO LEFT.



	Terminal 8 ←	← LEFT						RIGHT	Terminal 1
TB4A	DIO1	DGND	DIO2	DGND	DIO3	DGND	DIO4	DGND	
TB4B	TX1-	TX1-	RX1-	RX1-	EGND	EGND	EGND	EGND	
TB3A	DIO5	DGND	DIO6	DGND	DIO7	DGND	DIO8	DGND	
TB3B	TX2- TXD2	TX2+ RTS2	RX2- RXD2	RX2+ DGND	EGND	EGND	EGND	EGND	