WinFrog Device Group:	**ELEVATION**
Device Name/Model:	**AML Micro Pressure Sensor**
Device Manufacturer:	APPLIED MICROSYSTEMS LIMITED 2071 Malaview Ave. W., Sidney, British Columbia, CANADA V8L 5X6 Tel: +1-250-656-0771 Toll Free: 1-800-663-8721 Fax: +1-250-655-3655 Email: sales@AppliedMicrosystems.com www.AppliedMicrosystems.com
Device Data String(s) Output to WinFrog:	See below
WinFrog Data String(s) Output to Device:	See below
WinFrog Data Item(s) and their RAW record:	ELEVATION 372

DEVICE DESCRIPTION:

This device measures pressure relative to sea level, i.e. 0 dBars at sea level, which can be converted to a depth. The configuration allows you to choose between two methods to calculate the depth.

a) UNESCO formula

b) Using observed density

In either case, the latitude is required to compute the acceleration of gravity. (In the later case you can also enter a fixed gravity value thus allowing a different gravity formula to be used.) (See below for formulae.) The UNESCO formula method also allows you to add one of the regional corrections described by Leroy and Parthoit in the Journal Acoustical Society of America Vol. 103, No. 3 March 1998. Both methods use the same international gravity formula. The observed density method also allows you to apply the free air anomaly to increase gravity with depth. There are three choices here: 1) to an entered depth, this matches what may be available on a spread sheet for this instrument, but is not recommended, 2) to the sensor depth or, 3) to half the sensor depth. If the density entered is a harmonic mean from measurements through the water column then the gravity value used to calculate the depth should probably be the midpoint of the depth of the sensor. The UNESCO formula incorporates an increase of gravity with depth, but it is in terms of pressure to half the depth. This device also supports this adjustment to gravity as a fourth option when using observed density to compute the depth.

NOTE: This device must be configured for use with WinFrog using a terminal program such as HyperTerminal®. Details on the configuration are given below.

DEVICE CONFIGURATION INSTRUCTIONS

DEVICE CONFIGURATION:

The default mode of the AML Micro Pressure unit involves two settings that are not conducive to operation with WinFrog. First, it defaults to auto-sensing of the interface baud rate. Secondly, it defaults to requiring an input to initiate the output of data. These settings must be changed prior to using the sensor with WinFrog. In addition, the data type to output must be set to ensure that it is correct.

The commands that must be sent to configure the unit are as follows. Note that the first is not included in the Micro Pressure Sensor User's Manual.

SET STARTUP MONITOR	This sets the sensor to automatically start outputting data when it is powered up.
SET DETECT nn	This sets the sensor to a specific baud rate that will be used upon power up and disables the auto baud. nn is an index specifying the baud rate as follows: Index Baud Rate 1 600 2 1200 3 2400 4 4800 <Default 5 9600 6 19200 7 38400
REAL	This sets the sensor to output pressure data in milliBars.
SET S 1 S	Output observations at 1 Hz
MON	This immediately starts the sensor sending observations continuously.

When configuring the device it should be set to a baud rate of 4800.

For further details on the communications with the Micro Pressure sensor for the purpose of configuring it, refer to the manufacturer's User's Manual.

NOTE: If using a terminal program to transfer a file containing the above commands to the sensor, the transfer process must be configured to include a delay (e.g. 3-5ms) between characters. This is because the sensor uses half duplex communications. Each character sent to the sensor is echoed back immediately. Since the same pair of wires is used for transmitting as receiving, you cannot send another character until the echo is received, otherwise a collision will occur.

WINFROG I/O DEVICES > EDIT I/O:

Micro Pressure Sensor Serial Parameters
The sensor supports RS-232C communications, though it can be configured for RS-485 at the factory.

Baud Rate	Configurable, 600 to 38400[1]
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	None

[1] The device defaults to auto baud detection. The configuration of the unit involves overriding this feature and setting the baud rate to match WinFrog's setting.

WinFrog
WinFrog supports interfacing to the unit using either serial or TCP/IP sockets.

Serial

Configurable to match the sensor.

TCP/IP

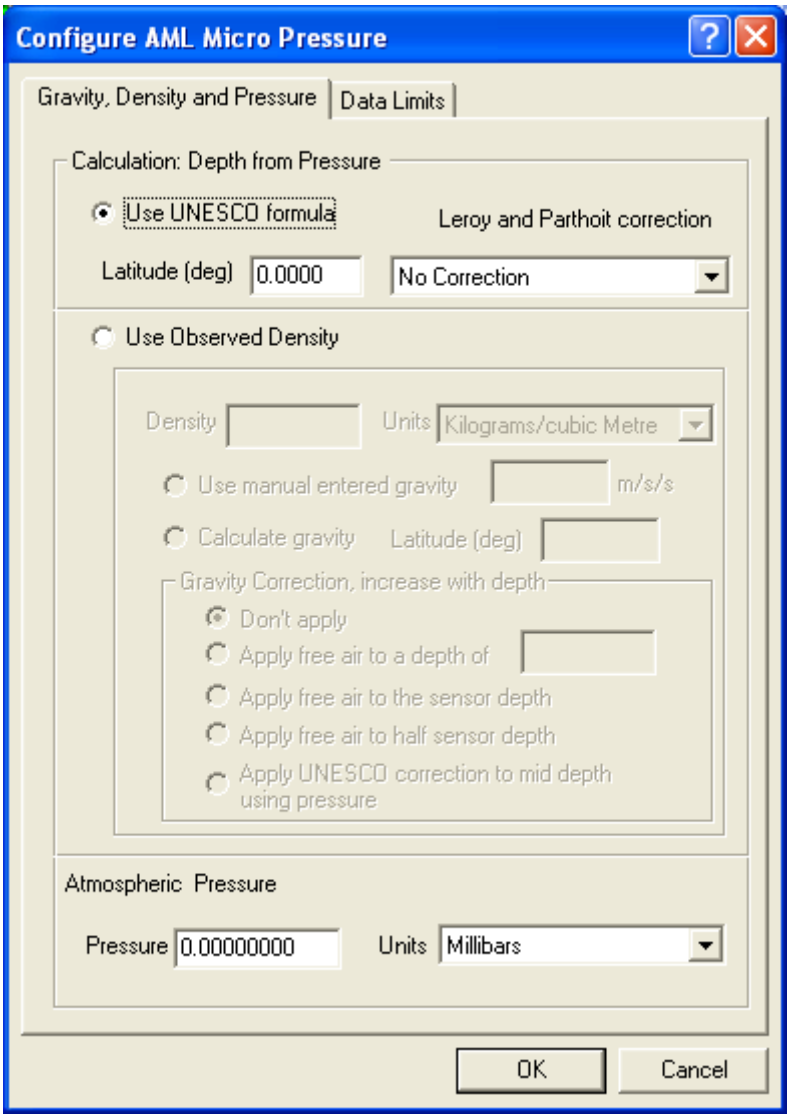
Configurable. Note that the serial to IP converter used must be configured to match the sensor. In addition, when configured for TCP Client, a Timeout for outgoing connections can be configured. If WinFrog detects that the connection has been idle with respect to received data for this period, it will check the connection by attempting to write to it. If this check fails, the connection will automatically disconnect and revert to attempting to connect.

WINFROG I/O DEVICES > CONFIGURE DEVICE:

The device configuration involves selection and configuration of the algorithm to use to convert the pressure to a depth, and specifying the expected maximum depth to assist data validation.

Gravity, Density and Pressure Tab

This tab is used to set the method of converting pressure to depth.



UNESCO Formula
Based upon the equation of state (EOS80) taken from the UNESCO technical papers in marine science 44, Algorithms for Computation of Fundamental Properties of Seawater. See below for the formula.

Latitude
Enter the latitude for the area you are working. This is used to compute gravity.

Leroy and Parthoit Correction
This allows you to select certain corrections for various areas of the world. Some have a fixed latitude that will be entered for you, others allow you to enter a latitude. This is from Depth-pressure relationships in oceans and seas Leroy and Parthoit, Journal of Acoustical society of America, Vol. 103, No. 3, March 1998.

Observed Density
If a density profile is available, the harmonic mean can be used to compute the depth.

Density
Enter the density.

Units
Select the units from the list.

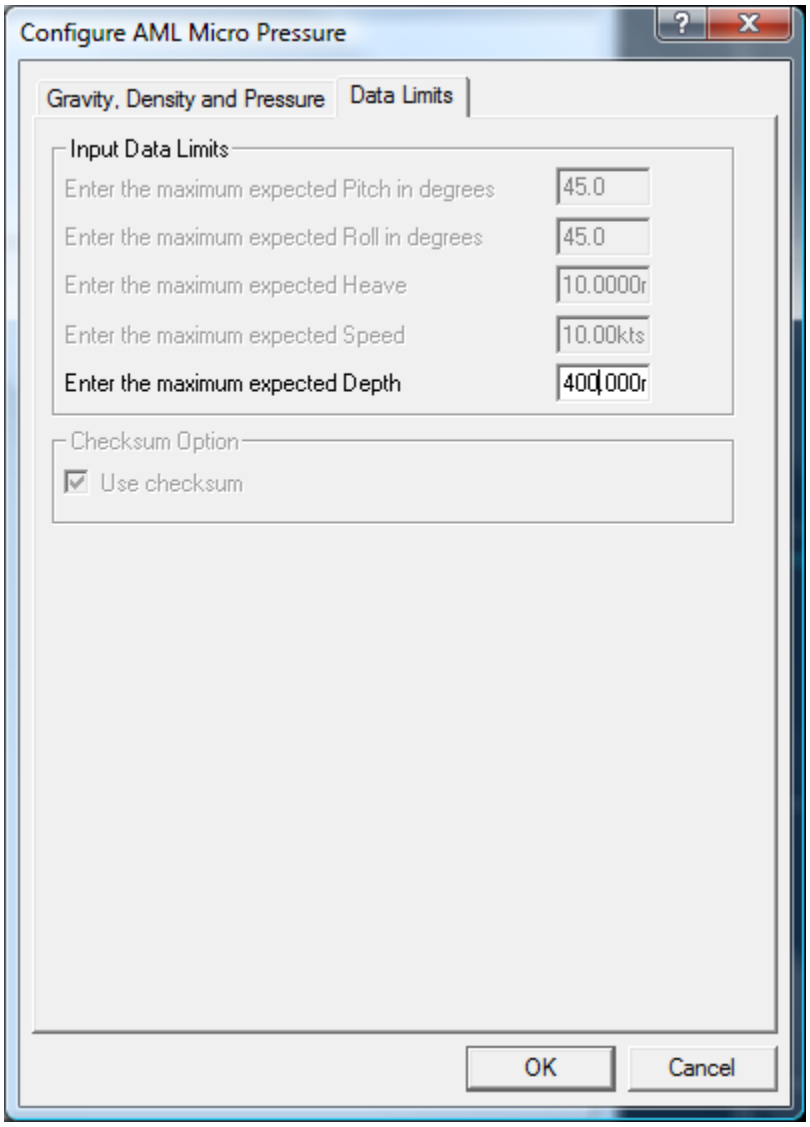
Manual Gravity
If you have a value that you want to use rather than the calculated one, select this radio button and enter the value in metres/sec$_2$.

Calculate Gravity
Select this radio button to use the international formula (see below) and enter the latitude in decimal degrees.

Gravity Correction
Here you can apply a correction for depth using the free air anomaly or the same correction used by the UNESCO formula. See formula below. Applying the free air correction to an arbitrary depth is not recommended, but is included so you can compare the results to third party calculations that may support this. The free air anomaly can also be applied to the depth of the sensor or to half the depth. This is done iteratively. The correction to gravity used by the UNESCO formula uses pressure and is to half the depth. It varies slightly from the free air anomaly.

Atmospheric Pressure
The default is 0 because the sensor measures pressure relative to sea level. If a value is entered, it is subtracted from the observed pressure when calculating the depth. It is recommended that this be left as 0.

Data Limits Tab
This tab is used to the maximum expected depth to assist with data validation.



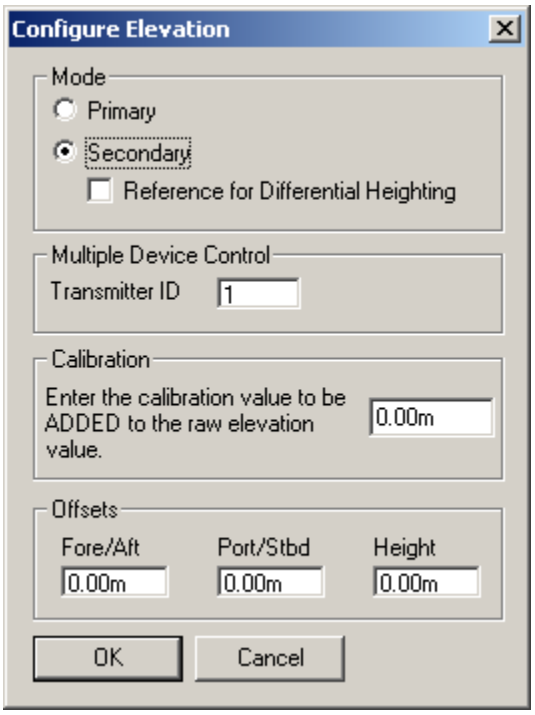
Input Data Limits
Enter the maximum expected depth. WinFrog will use these to test the calculated depth and only allow it to be passed to the vehicle if it is less than or equal to this limit.
Note: This is the only Data Limit option supported for this device.

WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Adding the AML Micro Pressure device creates one data item: ELEVATION. Once the data item is added to the vehicle, it must be edited to suit the application.

Data item: ELEV, AML Micro Pressure, ELEVATION

Add the ELEVATION data item to the vehicle that the device is physically on. Edit the data item to get the following dialog:



Mode
Set the mode to primary if this device is to determine the vehicle's depth. The default is secondary. Other devices that can also determine depth need to be set to primary or secondary depending upon which you want to use to determine the depth.

Reference for Differential Heighting
Leave this unchecked as it applies to long baseline (LBL) acoustics only.

Multiple Device Control
Leave Transmitter ID set to 1. This device only supports the output of one depth.

Calibration
Enter a calibration value if one is available. This can be used to account for atmospheric pressure or other instrument errors if it is not zeroed out of the device. See the device manual for information to zero out the sensor. This value is added to the observed value. Note: elevation is used as the terminology and as a result, if the point is below sea level the elevation is negative. Depth is considered positive below sea level and this device is measuring depth. An elevation calibration value will be combined to an observed depth as described below:

Elevation = -(observed depth value) + calibration value
And
Vehicle depth = -elevation
Both these values can be displayed in the Vehicle Text window.

To zero out atmospheric pressure you would enter it as a positive number. For example, say at sea level the sensor read a depth of 10 metres. Enter 10m in the dialog then if the sensor was at depth of 1 metre it would read 11 and the result would be:
Elevation = -(11) + 10 = -1
Vehicle depth = -elevation = 1

Offsets
Offsets can also be entered to relate the depth (pressure) sensor of the sensor to the CRP of the vehicle. If an attitude sensor is available, the data from it will be used to correct the offsets.

TELGRAM SPECIFICATION:

REAL data output: depth message, ASCII characters
<LF>±dddd.dd<CR>

dddd.dd Pressure in mBars

WIRING

Wiring (non-standard 5 pin), for the standard pins see the device manual.

1 +12VDC
2 Power ground
3 RS485 A
4 RS485 B
Guide pin not connected

For RS485 wiring with a VLink

Micro P Pin		VLink Serial Port Pin
3	A	4
4	B	3

For general wiring sat to a B&B Electronics RS232<>RS485

Micro P Pin		Converter Pin
3	A	TDA (-) and jumper to RDA(-)
4	B	TDB (+) and jumper to RDB(+)