Micro SVTP Sensor

User's Manual

Version 1.1
Nov. 2003

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1 INTRODUCTION

This manual describes the Applied Microsystems Ltd. Micro SVTP Sensor. If additional items such as sensors or software are used in conjunction with the Micro SVTP Sensor the manuals for these items should also be consulted. Examples of additional manuals commonly supplied are:

SmartTalk software manual
Transmissometer sensor manual
Dissolved oxygen sensor manual

This manual covers the standard specifications, operation, use, communication, troubleshooting, and maintenance of the Micro SVTP Sensor. In addition, appendices at the back of the manual detail any unique configurations for the instrument. Unique configurations include such things as calibration coefficients, additional sensors, custom communication formats and custom wiring configurations. Also included in Appendix G is a quick reference guide that describes the basic operating procedures on one sheet for ease of use in the field.

1.1 THE INSTRUMENT

Figure 1.1: The Micro SVTP Sensor

The standard Micro SVTP Sensor is a three parameter, self contained, intelligent sensor. The basic configuration includes the following:

sound velocity sensor and electronics
temperature sensor and electronics
pressure sensor and electronics
communications electronics
data logger electronics
waterproof pressure case
connector cable

The exact configuration of the instrument is detailed in Appendix A.

The sound velocity sensor is a short pathlength, Time of Flight, proprietary design which offers fast response times and extremely low thermal hysteresis. The signal conditioning electronics feature thermal compensation, ratio metric A/D conversion to provide accurate and stable operation over the operating range. The sound velocity sensor uses a dedicated RISC microprocessor to control the sensor excitation and communicate with the data logger electronics. The sound velocity sensor ground is capacitively coupled to the water to reduce noise.

The temperature sensor is a precision, aged thermistor within a Beryllium Copper (BeCu) capillary tube to eliminate pressure effects while still allowing fast time response. The temperature sensor uses a dedicated RISC microprocessor to control the sensor excitation and communicate with the data logger electronics.

The pressure sensor is a semiconductor strain gauge protected by a stainless steel diaphragm. Various pressure ranges from 2 to 1000 bar are available. The pressure sensor is fully temperature compensated over the range of -2 to 32°C. The pressure sensor uses a dedicated RISC microprocessor to control the sensor excitation and communicate with the data logger electronics.

The data logger and power control electronics use a RISC microprocessor running at 19.6 MHz to control the sampling and power program as well as to communicate with the sensors and communications interface board.

The communications interface board is normally an RS-232C board. Optional communication boards include RS-485 and TTL. Through the communications board, the instrument will on power up, automatically detect baud rates from 2400 to 38400 baud. The baud rate is automatically determined when the sensor receives an <**ENTER**> or <**RET**>. The data output may be configured to display either unprocessed integers, or computed engineering values. The Micro SVTP Sensor has the option of sampling on command or monitoring continuously with programmable sampling rates. The latter is not available with the binary protocol. The RS-485 binary protocol option allows the instruments to be individually addressed permitting multiple instruments to be daisy-chained together.

1.2 THE USER

This manual has been written with the following assumptions:

- The user has had some exposure to MS Windows compatible computers, and is moderately computer literate with a working knowledge of computer operation and terminology.

- The user is familiar with the operation and function of standard communications packages.

While it is possible to operate the Micro SVTP Sensor without these qualifications, some computer experience will greatly assist the user to pass through the learning curve more rapidly.

2 STANDARD SPECIFICATIONS

Note: If the instrument has a custom configuration the additional specifications will be listed in Appendix A.

Sound Velocity:	Time of Flight
Range:	1375 - 1600 m/s
Accuracy:	0.05 m/s from 1400 to 1550 m/s
Resolution:	0.01 m/s
Time constant:	40 ms
Temperature Sensor:	Precision aged thermistor in beryllium copper housing
Accuracy:	±0.005ºC
Resolution:	0.001ºC
Time constant:	225 ms (optional 85 ms)
Pressure Sensor:	Semiconductor strain gauge
Range:	0 to 2, 5, 10, 20, 50, 100, 200, 400, 600 and 1000 bar
Accuracy:	±0.05 % full scale
Resolution:	0.1 dbar for ≥ 100 bar FS sensors, 0.01dbar for <100 bar FS sensors
Time constant:	10 ms
Output format:	
Standard:	RS-232C autobaud communications
Baud rate:	2400 to 38400, 8 data bits, no parity, 1 stop bit.
Data type:	ASCII text
Optional:	RS-485 autobaud communications
Baud rate:	2400 to 38400 baud, 8 data, no parity, 1 stop bit.
Data type:	Addressable binary network format
Sample Rate:	On command or continuous. Continuous has programmable sampling rates from 25 scans / second to 1 scan per day.
Power:	
Standard:	External power
Range:	8 to 16 volts D.C.
Nominal:	12 volts D.C.
Current:	100 mA
(electronics are galvanically isolated from the water)	
Memory:	
Standard:	No memory
Options:	16, 24, 32 and 64 Mbytes

Pressure Housing:

Material:	acetal (standard)
Max Pressure:	500 meters
Optional:	T-316 Stainless steel (optional)
Max Pressure:	4500 meters
Dimensions:	50.3 mm (1.98 in) Ø 297 mm (11.7 in)

Weight:	400 g (0.88 pounds) in air for Acetal 0 g (0.0 pounds) in water for Acetal
Environment:	operating: -2 to 40ºC (28 to 104ºF) storage: -40 to 60ºC (-40 to 140ºF)

Connectors:

Bulkhead connector:	IMPULSE^{tm} MCBH-8FS with 24 AWG
Dummy plug:	IMPULSE^{tm} MCDC-8-MP
Shorting plug:	IMPULSE^{tm} MCDC-8-MP/S, pins 6 and 7 are shorted, molded red
Com cable connector:	IMPULSE^{tm} PMCIL-8MP, pins 6,7 and 8 are shorted, 2 meter cable length, 22 AWG with DB-25 connector
Retainer ring:	IMPULSE^{tm} DLSMC-F
Materials:	Stainless Steel, neoprene, polyurethane, acetal

3 DESCRIPTION

3.1 FUNCTIONAL DESCRIPTION

The Micro SVTP Sensor has three separate sensors, refer to figure 3.1, each of which responds to a specific property of the water environment. The sound velocity sensor measures the transit time of an acoustic pulse across a fixed distance. The pressure sensor responds to pressure by monitoring the stress on a silicon chip exposed to the ambient pressure. The silicon chip is fabricated as a Wheatstone bridge and the differential voltage output across the bridge is a function of the stress exerted by the ambient pressure. The temperature sensor responds to the ambient temperature by passing a very small constant current through the thermistor junction and measuring the resulting voltage developed across the junction. The voltage is inversely proportional to the ambient temperature.

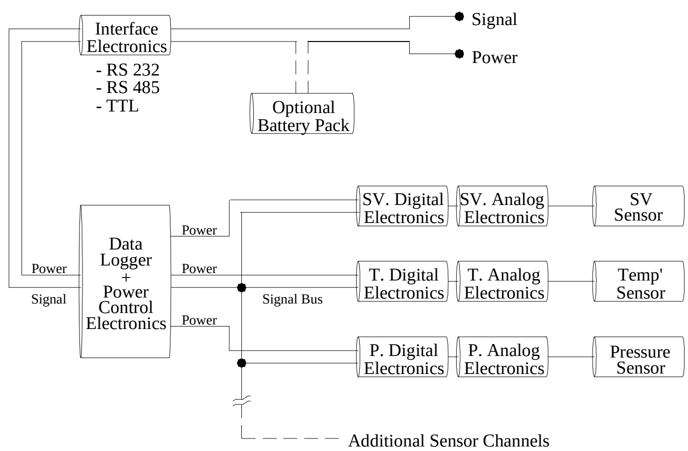


Figure 3-1 Micro SVTP Sensor Block Diagram

Each sensor requires an excitation signal and synchronous sampling of the sensor output voltage. The sound velocity and pressure sensors also incorporate thermal compensation. The output voltage must be converted to a digital signal (raw output) and then the calibration coefficients must be applied to calculate the output in engineering units. All of these requirements are controlled by a dedicated microprocessor for each sensor. Each sensor has a dedicated electronics board to provide this functionality. Each board is composed of an analog section and a digital section. Refer to figure 3.1.

All of the sensor boards, including any additional sensors, plug into the data logger board. The data logger has a common signal bus for communicating with the sensor boards and individually controlled power supplies to each of the primary sensors. A microprocessor on the data logger board controls all the communications and power to the sensors, collates the sensor data with a date/time stamp and supply voltage, stores the data to flash memory if required, and outputs the data to the external world via the communications board.

The communications board converts the incoming commands from, and the outgoing data to, the chosen external communications format. The standard external format is RS-232C ASCII, which is also the standard serial communications protocol for personal computers.

4 PREPARATION FOR USE

4.1 INSPECTING THE INSTRUMENT

At AML we do our best to package our instrumentation to avoid damage during shipping, as should the user. However accidents do happen, so an inspection of the Micro SVTP Sensor before each use will assist in spotting problems that could lead to inaccurate data or possible failure. Examine the outside of the shipping case for evidence of heavy impacts during transport. If signs of damage are visible continue with the inspection as follows and notify the carrier and the factory of any damage found. Check that the communications and power connector is not loose and that there is no dirt or grit in the connector(s). Examine the cable for cuts or wear and check the connector ends for visible damage. Also check for a cracked or chipped sound velocity sensor, as this will change the calibration of the sensor. Check the temperature probe for signs of damage to the capillary tube.

4.2 CONNECTION TO A COMPUTER

The user communicates with the Micro SVTP Sensor via any IBM or compatible computer or data collection device. An AML supplied data cable will link the two. Refer to the wiring diagram in appendix C. At one end of the cable is a DB25 or DB9 female connector that plugs into the computer's serial port and at the other end is an 8 pin plug that is inserted into the communications port of the Micro SVTP Sensor. When this connection has been made and 12 volts applied, the instrument is powered up and ready to communicate with the computer.

WARNING:

A plug or cable must be installed in the connector at all times when the instrument is immersed in water. Failure to do so will cause corrosion to the connectors and may cause water damage in the electronics housing.

4.3 POWERING THE MICRO SVTP SENSOR

4.3.1 External Power

The Micro SVTP Sensor is normally powered externally via the communications cable. Refer to the wiring diagram in Appendix C. If an AML data cable is used attach the red wire to the positive side of the power supply and the black wire to ground. The power should be a DC voltage between 8 and 16 volts, measured at the instrument. The instrument has reverse voltage protection but the instrument will not function if the power leads are connected with reverse polarity.

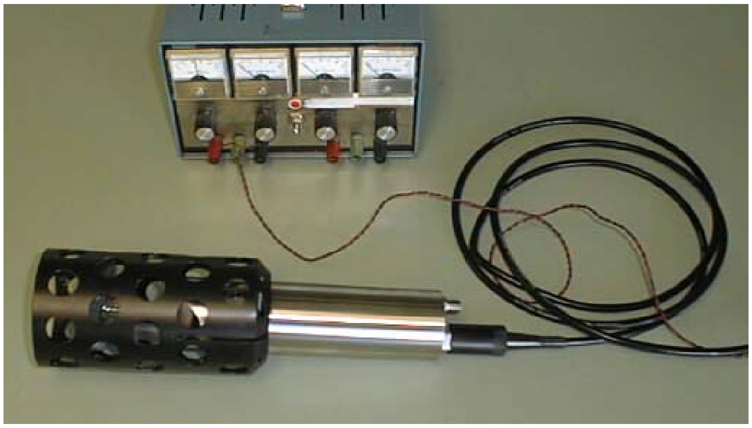


Figure 4.3.1 Micro instrument connected to an external power source

4.3.2 Micro SVTP logging option

If the Micro SVTP has been purchased with the logging option it will be equipped with internal memory and an external battery pack. Refer to the wiring diagram in Appendix C. If the battery pack is used, the instrument is connected to either connector on the battery pack with an interconnect cable. The remaining connector on the battery pack is then connected to the data/power cable, which is connected to the computer. For logging data when not connected to the computer the red shorting plug must be inserted into the battery pack to turn the power on to the instrument. Power for the Micro SVTP sensor is turned off if the there is no shorting plug or data/power cable plugged in to the battery pack.

Figure 4.3.2 Micro instrument with battery pack and external sensor connected to an external power supply

4.3.2.1 Micro Battery Pack

Figure 4.3.2.1 The Battery pack

The replacement batteries should be three, good quality, C size, lithium, 3.6 volt batteries. Saft, LSH 14, C cell, 3.6 volt, lithium batteries are recommended. For more details on battery recommendations refer to section 7.2 .

Insert all three batteries into the brass housing positive end first. Replace the battery cap on the brass housing.

Check the O-ring seals. The O-rings should be clean, have no nicks, and should be lightly greased. Slide the battery assembly back into the pressure case and screw down the retaining ring.

4.4 SOFTWARE SETUP

If SmartTalk or ISS software has been supplied with the instrument refer to the appropriate manual for the installation and configuration of these programs. Both of these programs are supplied with Install Shield to simplify installation.

If a terminal emulation program such as Hyperterminal (Windows 95) or Procomm (DOS) is to be used launch the program. Select the appropriate com port (to which the instrument is connected), set the communications format to 8 bits, no parity, 1 stop bit and select a baud rate between 2400 and 38400 baud. Apply power to the instrument and press the <**enter**> key. The standard Micro SVTP Sensor will respond with its header information. Note that some units may be configured for custom outputs and may not respond with a header. This header identifies the sensor type, serial number and firmware version. The sensor is then ready to accept commands. If the sensor does not respond refer to the trouble-shooting guide in section 6.3 or the instrument configuration in Appendix A.

The command summary for communicating with the instrument is given in section 5.

5 COMMUNICATIONS

5.1 RS-232 ASCII COMMUNICATIONS

5.1.1 Standard Output Data format

The standard data format is for RS-232C ASCII based sensors. Custom data outputs and formats are listed in appendix A. The Micro SVTP Sensor can output data in Raw or Real modes. The mode can be changed by supplying the appropriate command. Refer to section 5.1.2 for commands.

5.1.1.1 Header Output

When a standard Micro SVTP Sensor is first powered up it monitors the communications line. If a data cable is connected the instrument will monitor the signal line for a carriage return/line feed (i.e. the <**enter**> key) from the external computer. The instrument automatically determines the baud rate and configures itself to match. The instrument then responds with the header information. The header identifies the sensor type, firmware version and serial number of the instrument.

Example header:
Micro SVTP Sensor V1.0 SN:4426-SVTP
Copyright 2003, Applied Microsystems Ltd.

5.1.1.2 Real Output Mode

The Real mode outputs only the final calculations of date/time and sensor readings in engineering units. The output is sent as space delimited ASCII characters in the following format:

Date (Month/Day/Year) Time (hh:mm:ss:and hundredths of seconds), pressure (in dbar), sound velocity (in m/s), temperature (in °C) and a carriage return/line feed (end of scan).

Example scan:
03/05/03 14:23:06:02 000.40 1523.74 11.793

The above example reads

Date:	Month/Day/Year
Time of scan:	2:23 pm and 6.02 seconds
Pressure:	0.4 dbar
Sound velocity:	1523.74 m/s
Temperaure:	11.793°C

Note: a positive sign is not displayed for positive temperatures.

5.1.1.3 Raw Output Mode

The Raw mode shows the outputs from the analog to digital converters for each sensor. No compensation or manipulation of the data is performed in Raw mode. Refer to section 8 and appendix B to convert the raw data values to engineering data. The raw counts for Npt, Np, Nl, Nsv, Nh, and Nt are integers between 0 and 65535. The output is sent as space delimited ASCII characters in the following format:

Date(Month/Day/Year) Time (hh:mm:ss:and hundredths of seconds), Npt, Np, Nl, Nsv, Nh, Nt and a carriage return/line feed (end of scan).

Example scan: 04/14/03 14:23:08.06 63002 15032 15283 22544 65897 13487

5.1.2 Command Summary

All commands are in the form of standard English words. Commands can be entered in upper or lower case letters followed by an <**ENTER**>. The minimum letters of the command that the instrument will recognize are enclosed in brackets.

Command: **RAW [R]**

This command will set the instrument to output RAW uncorrected data when using the MONITOR or SCAN commands.

Command: **REAL [RE]**

This command will set the instrument to output Real corrected engineering data when using the MONITOR or SCAN commands.

Command: **/ [/]**

This command is used to toggle RAW and REAL modes of operation.

Command: **SCAN [S]**

This command outputs one scan of data.

Command: **MONITOR [M]**

This command sets the instrument to output multiple scans continuously at the scan rate set by the “SET” command. To discontinue the monitor command the break key or the space bar can be depressed. Note: this command is not available with the binary format instruments.

Command: **SET [SE] SAMPLE RATE [S]**

This command sets the rate at which the instrument will take samples (or scans). The sample rate is in the form of a number followed by the time units. The allowable time units are listed below:

CONTINUOUS [C]
/SECONDS {/S]
SECONDS [S]
MINUTES [M]
HOURS [H]

The following examples demonstrate some of the possible permutations of this command.

SET SAMPLE 6 HOUR	This will set the sample rate for one sample every 6 hours.
SE SA 30 SEC	This will set the sample rate for one sample every 30 seconds.
SET S 5 S	This will set the sample rate for one sample every 5 seconds.
SE S CONTINUOUS	This sets the sample rate at the maximum of 25 scans per second.

Command: **SET INCREMENT [INC]**

This command sets the pressure increment that the Micro SVTP uses when logging data. Units are in dBars. (Note: dBars are approximately equal to meters).

Example:

SET INC 10	This will set the instrument to log a scan of data into memory every 10 dBars.
SET INC .5	Log every 0.5 dBars.

Note: Care should be exercised when setting both the SAMPLE RATE and the pressure INCREMENT. For example, if the Sample rate is set to 1 minute and the pressure increment is set to 1 dBar, every 1 minute the instrument will check for a 1 dBar change in pressure.

Command: **TIME [T]**

This command sets the real time clock in the instrument. This command uses the 24 hour clock with a format of hh:mm:ss.hh
Example:
TIME 13:44:12

Command: **DATE [DA]**

This command sets the date using the format mm/dd/yy.
Example:
DATE 03/14/03 (March 14, 2003)

Command: **VERSION [V]**

This command displays the current version of the firmware, instrument type and the serial number of the instrument

Command: **DIS S**

This command displays the current scan rate.
Example:
>DIS S sample rate is 1 seconds

Command: **DIS INC**

This will display the current pressure increment setting

Command: **DUMP**

This command dumps the instrument's logged data from memory. The data will be dumped as REAL data and is in the following format.

Example:
>DUMP [ret]

New Cast
03/05/03 14:23:06:02 000.40 1523.74 11.793
03/05/03 14:23:07:02 001.40 1523.75 10.232
03/05/03 14:23:08:02 002.00 1523.77 09.567
03/05/03 14:23:09:02 002.40 1523.78 08.573
>

Command: **INIT**

This command clears the instruments memory.

5.1.3 Advanced Commands

5.1.3.1 Display commands

Command: **DIS SCAN [D SC]**

This command will display the current scan options.
Example:

>dis scan
Scan delay is 100
Display time: yes
Display date: no

Command: **DIS STARTUP [D ST]**

This command will display the current startup options.
Example:

>dis startup
Logging timeout is disabled
Startup delay is 0
Header is displayed
Start up in prompt mode
Characters reception is enabled

Command: **DIS MEMORY [D M]**

This command will display the current memory status.
Example:

>dis m
Memory is not installed

Or if there is memory

>dis m
Memory is 005.00% used

NOTE: Use the VER command to display total memory available to the system.

5.1.3.2 Set commands

Command: **SET SN** nnnn

This command sets the serial number of the instrument. To display the instruments serial number use the VER command.

Example:

>set sn 1234

To display the serial number,

>ver

SVTP Micro Sensor V2.01 SN:1234-SVTP
Copyright(C) 2003, Applied Microsystems Ltd.
32MB of Memory

Warning: Changing the instruments serial number will adversely effect the operation of Smart Talk or ISS software.

Command: **SET DETECT ab [SE D ab]**

Where

a = a Hex number between 0-F
b = a Hex number between 0-F

This command sets the detection mode of the instrument on power up.
The DETECT command can be used to set the Micro SVTP to start up in the *Auto baud mode* or to set the instrument to default to a specific baud rate at power up.

The ‘a’ value represents how many times the Micro SVTP will try to determine the baud rate (when the enter key is pressed) before it defaults to the baud rate set by the value of ‘b’. If a = 0 the Micro SVTP will not auto baud and will default to the baud rate specified by the value of ‘b” at each power up.

Specific values of ‘b’ and the corresponding baud rates are outlined in the table below.

b value	Baud rate
1	1200
2	1200
3	2400
4	4800
5	9600
6	19200
7	38400

Example 1:

>set detect a7

In the above example, the Micro SVTP will try 10 times to auto baud. If the instrument is not able to establish a baud rate, it will default to 38400 baud.

Example 2:

>set detect 05

In the above example, the Micro SVTP will *not* try to auto baud, but will simply default to 9600 baud on power up.

Command: **SET DEFAULT [SE DEF]**

This sets the instrument to its original factory default settings.

Command: **SET RXOFF**

This command will disable the reception of characters at the next power up.
The RXOFF command will instruct the Micro SVTP to ignore any communications from the computer and is used to assure spurious signals due to external noise or long cable lengths do not interrupt the Micro SVTP.
On power up, the Micro SVTP will wait for 200ms before entering into the RXOFF mode and during this time sending a carriage return will disable the RXOFF features.
To exit the RXOFF mode, hold down the carriage return key and power up the unit, then from the prompt, issue the SET RXON command.

Command: **SET RXON**

Enable reception of characters at the next power up.

Command: **SET TIMEOUT nn [SE T nn]**

Where ‘nn’ is time in minutes and represents an integer value from 0 to 30
This command instructs the Micro SVTP to enter a logging mode after a specified time interval has passed in which the instrument has been idle. A time interval of 0 will deactivate the command. Use the DIS ST command to view the timeout value.

Example:

>set timeout 10

The above example will instruct the Micro SVTP to enter the logging mode if it sits idle at the command prompt for more than ten minutes.

>set timeout 0 *(disable the timeout feature)*

Note: Power the Micro SVTP off, then on to exit the logging mode.

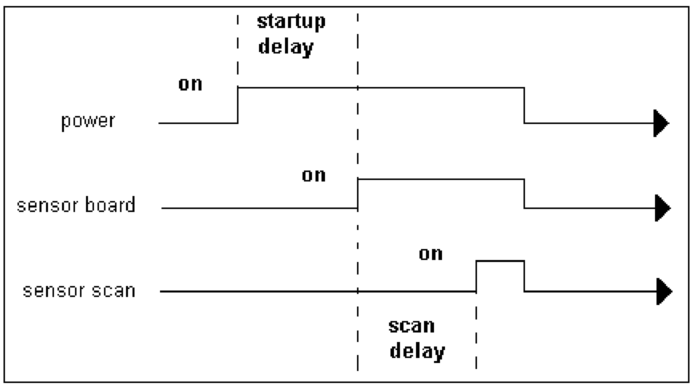
5.1.3.3 Set scan options

Command: **SET SCAN DELAY nnn [SE SC D nnn]**

The *scan delay* is defined as the time between the sensor board power up and a scan of data. The time (nnn) is entered in 0.02-second intervals. Maximum *scan delay* is 255, or 5 seconds.
This command is used for sensors that have a slower power up response time.

Example:
>set scan delay 200 (sets the scan delay to 4 seconds)

In the above example, the Micro SVTP would power up the sensor boards, wait 4 seconds then take a scan of data.



Micro SVTP **power up timing diagram**

Command: **SET SCAN TIME [SE SC T]**

This command enables the displaying of time during a data scan.

Command: **SET SCAN NOTIME [SE SC NOT]**

This command disables the displaying of time during a data scan.

Command: **SET SCAN DATE [SE SC DA]**

This command enables the displaying the date during a data scan.

Command: **SET SCAN NODATE [SE SC NOD]**

This command disables the displaying of the date during a data scan.

5.1.3.4 Analog board commands

The Micro SVTP can be configured for two additional analog channels if the optional Micro analog board is installed. These channels may be used to incorporate additional sensors such as Ph, Do2 or any other sensor outputting a voltage. When the Micro SVTP is equipped with an analog board, the following commands can be used to configure the extra channels.
Note: Data will not be logged from an analog channel that is turned off.
Please refer to section 1.2 for information on the Micro SVTP's channel configuration.

Command: **SET ANALOG ON [SE A O]**

This command enables the displaying of the analog channel/s.

Command: **SET ANALOG OFF [SE A OF]**

This command disables the displaying of the analog channel/s.
Data from the analog board will not be logged.

Command: **SET ANALOG 1 [SE A 1]**

This command will enable the displaying of analog channel #1 when the analog board has been enabled with the SET ANALOGON command.
Analog channel #2 data will not be displayed or logged.

Command: **SET ANALOG 2 [SE A 2]**

This command will enable the displaying of analog channels #1 and #2 when the analog board has been enabled with the SET ANALOGON command.

5.1.3.5 Set startup options

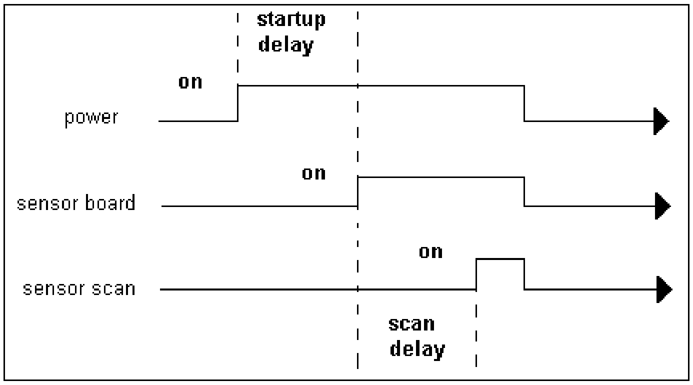
Command: **SET STARTUP DELAY nnn [SE ST D nnn]**

The Startup Delay time is defined as the time difference between the logger board powered up, and when the sensor boards are powered up. The time (nnn) is entered in 0.02-second intervals. Maximum *startup delay* is 255, or 5 seconds.
This command may be used for a "gentle power on", to power up the instrument in stages thus avoiding large power up current spikes that may result when using long cables or batteries with high internal resistances.

Example:

>set startup delay 200 *(set the startup delay to 4 seconds)*

In the above example, 4 seconds after the Micro SVTP is powered up the sensor boards will be powered up.



Micro SVTP power up timing diagram

Command: **SET STARTUP HEADER [SE ST H]**

Display the header at power on.

Command: **SET STARTUP NOHEADER [SE ST NOH]**

Do not display the header at power on.

Command: **SET STARTUP MONITOR [SE S M]**

This command sets the Micro SVTP to automatically output scans at power on.
If the auto baud feature has not been disabled, the Micro SVTP will wait for a *carriage return* before it outputs data. (See SET DETECT command).

The following example set the Micro SVTP to output data at power up with a baud rate of 9600.

>set detect 05 *(disable the auto baud and default to 9600 baud at power up)*
>set startup noheader *(do not display a header at power up)*
>set startup monitor

At power up the Micro SVTP will continuously output Real data at 9600 baud.

Note: To return to the prompt, hold down the RETURN key while powering up the Micro SVTP. Use the SET STARTUP PROMPT command to return the Micro SVTP to the prompt mode.

Command: **SET STARTUP SCAN [SE S S]**

This command sets the Micro SVTP to automatically output one scan of data at power on. If the auto baud feature has not been disabled, the Micro SVTP will wait for a *carriage return* before it outputs data. (See SET DETECT command).

Example:

>set detect 05 *(disable the auto baud and default to 9600 baud at power up)*
>set startup noheader *(do not display a header at power up)*
>set startup scan

03/05/01 14:23:06:02 000.40 1523.74 11.793
>

Command: **SET STARTUP PROMPT [SE S P]**

This command instructs the Micro SVTP to display a prompt at power on.
If the auto baud feature has *not* been disabled, the Micro SVTP will wait for a *carriage return* before it outputs a prompt. (See SET DETECT command).
The following example instructs the Micro SVTP to go directly to a prompt at power up.

Example:
set detect 07*(disable the auto baud feature and set the baud rate to 38400)*
set startup noheader (disable the header)
set startup prompt (places the Micro SVTP in the prompt mode)

5.1.3.6 Accessing the calibration coefficients
Refer to Section 8 and appendices A and B for more information.

The instruments calibration coefficients are stored in the Micro SVTP's memory. Accessing the coefficients for viewing or editing can be achieved by talking to the individual sensor boards using the TALK command. The addresses of the sensor boards are as follows,

Sensor board	**Address**
Pressure & Temperature	200
Sound Velocity	203
Analog	202

Once communications is established with the individual sensor board, the user can view or edit the calibration coefficients by using the DIS COEFFICIENTS or SET commands.

Command: **TALK n [TA n]**

This command, used in conjunction with the DIS or SET commands, allows access to the instruments calibrations coefficients for viewing or editing. "n" is the address of the sensor board as described below. To exit the *talk mode*, use the CTRL C command.

Sensor board	**Address**
Pressure & Temperature	200
Sound Velocity	203
Analog	202

Example:
>talk 200 (talk to the pressure and temperature board)

Note: while in the talk mode other commands such as MONITOR, VERSION and SCAN may be used.

Command: **DISPLAY COEFFICIENTS [DIS C]**

This command, used in conjunction with the TALK command, will display the sensor's calibration coefficients. To exit the *talk mode*, use the CTRL C command.

Example:

>talk 203 *(enter talk mode with the Sound Velocity board)*
Entering talk mode
Sound Velocity Micro Sensor V1.40 SN:0002-SV

>dis c *(display the Sound Velocity sensor coefficients)*
Sound Velocity
A=7.361894E-04 B=-7.438164E-056 C= 1.07834E-06 D=-5.791932E-07

Command: **CTRL-C**

This command exits the talk mode.
(Press the 'ctrl ' key and the 'c' key at the same time)

5.1.3.7 Editing the Calibration Coefficients

The instruments calibration coefficients are stored in the Micro SVTP's memory. Accessing the coefficients for viewing or editing can be achieved by talking to the individual sensor boards using the TALK command. The addresses of the sensor boards are as follows,

Sensor board	**Address**
Pressure & Temperature	200
Sound Velocity	203
Analog	202

Once communications is established with the individual sensor board the user can view or edit the calibration coefficients by using the DIS COEFFICIENTS or SET commands.
The following describes the method to edit the Calibration coefficients for each parameter of the Micro SVTP using the SET command. Refer to the TALK command for accessing the coefficients.

<u>Sound Velocity</u>

Command: **SET n = c**

Where n = the coefficient letter a,b,c,d,
c= calibration coefficient

Example:
>talk 203 *(enter talk mode with the sound velocity board)*
Entering talk mode
Sound Velocity Micro Sensor V1.40 SN:0002-SV

>set a=7.361894E-04 *(set the a coefficient)*

>dis c *(display the sound velocity sensor coefficients)*
Sound Velocity
A=7.361894E-04 B=-7.438164E-056 C= 1.07834E-06 D=-5.791932E-07

Press ctrl-c to exit the talk mode

Pressure and Temperature

Pressure

Command: **SET Pn=c**

Where n = coefficient letter a,b,c,d,e,f,g,h,i,j,k,l
c = calibration coefficient

Example:
>talk 200 *(enter talk mode with the Pressure and Temperature board)*
Entering talk mode
Pressure and Temperature Micro Sensor V1.30 SN:0001-PT

>set pa=1.234567E+00 *(set the a coefficient)*

>dis c *(display the calibration coefficients)*
Pressure
A= 1.234567E+00 B= 1.234567E+00 C= 0.000000E+00 D= 0.000000E+00
E= 0.000000E+00 F= 0.000000E+00 G= 0.000000E+00 H= 0.000000E+00
I= 0.000000E+00 J= 0.000000E+00 K= 0.000000E+00 L= 0.000000E+00
Temperature
A=0.000000+00 B=0.000000+00 C=0.000000+00 D=0.000000+00
E=0.000000+00 F=0.000000+00 G=0.000000+00

Press ctrl-c to exit the talk mode

Temperature

Command: SET Tn=c

Where n = coefficient letter a,b,c,d,e,f,g
c = calibration coefficient

Example:
>talk 200 *(enter talk mode with the Pressure and Temperature board)*

Entering talk mode
Pressure and Temperature Micro Sensor V1.30 SN:0001-PT

>set ta=1.234567e+00

>dis c *(display the calibration coefficients)*
Pressure
A= 1.234567E+00 B= 0.000000E+00 C= 0.000000E+00 D= 0.000000E+00
E= 0.000000E+00 F= 0.000000E+00 G= 0.000000E+00 H= 0.000000E+00
I= 0.000000E+00 J= 0.000000E+00 K= 0.000000E+00 L= 0.000000E+00
Temperature
A=1.234567+00 B=0.000000+00 C=0.000000+00 D=0.000000+00
E=0.000000+00 F=0.000000+00 G=0.000000+00

Press ctrl-c to exit the talk mode

Analog board

Refer to Appendices A and B for instrument channel configurations.

Analog channel 1

Command: **SET 1n=c**
Where n = coefficient letter a,b,c,d
c = calibration coefficient

Analog channel 2

Command: **SET 2n=c**
Where n = coefficient letter a,b,c,d
c = calibration coefficient

Example:
>talk 202 *(enter the talk mode with the analog board)*
Entering talk mode
Analog Micro Sensor V1.30 SN:0003-A

>set 1a=1 *(set the a coefficient of channel 1)*
>set 2a=2 *(set the a coefficient of channel 2)*

>dis c *(display the calibration coefficients)*
Channel 1
A= 1.000000E+00 B= 0.000000E+00 C= 0.000000E+00 D= 0.000000E+00
Channel 2
A= 2.000000E+00 B= 0.000000E+00 C= 0.000000E+00 D= 0.000000E+00

Press ‘crtl-c’ to exit the talk mode.

5.1.3 Logging data

If the Micro SVTP Sensor has been configured with the “Logging Option”, the instrument will have the capability of storing data in its non-volatile memory. A typical logging sequence would be as follows.

- Connect the Micro SVTP to a computer via the communications cable (If not connected through an external battery pack then 12 VDC power must be applied through the data/power cable)
- Using a terminal program, establish communications with the Micro SVTP
- Program the instruments logging parameters
- Unplug the communication cable from the Micro SVTP. Connect the Micro SVTP to the external battery pack and insert the red shorting plug into the battery pack.
- Deploy and recover the instrument
- Remove the shorting plug and connect the instrument to a computer via the communications cable (If not connected through an external battery pack then 12 VDC power must be applied through the data/power cable)
- Use ISS or SmartTalk to download the data. A terminal program can also be used, capture the logged data by using the Micro SVTP’s DUMP command

Note: The Micro SVTP Sensor will not log data into its memory unless the instrument’s SV sensor detects that it is in water and the shorting plug is inserted into the battery pack.

5.1.4 Using Integrated System Software (ISS)

Integrated System Software is a comprehensive, MS Windows 95™ based program that allows the user to program the instrument, view, log, edit, graph, analyze, export and print the data from multiple instruments. Refer to the ISS on-line help for detailed instructions on the use of this program.

5.1.5 Using SmartTalk

SmartTalk is an easy to use, MS Windows 95™ based program that allows the user to program the instrument, view data, log data to the computer’s hard drive, and export data for use in other programs such as MS Excel™.

Refer to the SmartTalk manual for detailed instructions on the use of this program.

5.1.6 Using a Terminal Emulation Program

Terminal emulation programs (such as HyperTerminal, ProComm or Commo) can be used to communicate with the Micro SVTP Sensor. The terminal emulation programs can communicate with RS-232 equipped Micro SVTP Sensors or with the Smart Network Controller to communicate with RS-485 Micro SVTP Sensors.

Connect the Micro SVTP Sensor to a serial port on the computer (refer to section 4.2).

Launch the terminal emulation program and select the communications port to which the instrument is attached. Select 8 bits, no parity, 1 stop bit and the desired baud rate. Power the instrument and then press <**enter**>. The instrument will respond with an identification header and then a prompt. Commands can then be sent to the instrument as desired.

Appendices have been added to this manual to describe the use of several common terminal emulation programs.

6 PRECAUTIONS AND TROUBLESHOOTING GUIDE

6.1 PRECAUTIONS

6.1.1 Sound Velocity Sensor Precautions

For best accuracy the sound velocity sensor should be allowed to soak in some water for several minutes before taking a sound velocity reading. This allows the water to wet the transducer face and better acoustic coupling to the water is achieved.

Prior to storing the Micro SVTP, the sound velocity sensor must be washed thoroughly in fresh water before the sensor is allowed to dry. This will prevent the build up of salt deposits on the sensor. Any deposits on the transducer face of reflector plate will cause a shift in the calibration. If deposits are present, soak the sensor in warm fresh water.

Do not allow any objects, debris or bubbles between the sound velocity transducer and reflector plate. Doing so will cause errors in the data. To avoid bubbles on the transducer face, tilt the sensor slightly when immersing the unit in the water.

6.1.2 Pressure Sensor Precautions

Though the pressure sensor can survive pressures of 1.5 times the full-scale pressure rating of the sensor a recalibration of the sensor will be required.

Caution, the burst pressures of the sensors are as follows:

0 to 200 bar full scale sensors	**3000 PSI**
400 to 1000 bar sensors	**15000 PSI**

6.1.3 Optional Sensor Precautions

DO_2 Sensor Precautions

The YSI DO_2 sensor must be properly stored when not in use and re-calibrated and maintained regularly to compensate for sensor drift. Refer to the YSI sensor manual for details.

The DO2 sensor must not be exposed to pressures greater than 70 dbar (100 psi).

pH Sensor Precautions

The pH sensor must be properly stored in a buffer solution when not in use. The sensor should be re-calibrated and maintained regularly to compensate for sensor drift. Refer to the pH sensor manual for details.

The pH sensor must not be exposed to pressures greater than 2000 dbar (2900 psi).

Optical and Acoustic Sensor Precautions

These sensors must be kept clean and the sensing volume must be kept clear of obstructions. Any objects within the sensing volume will cause errors in the sensor's output. The sensing volume is shown in the sensor manual.

6.2 SENSOR INTERACTIONS

The Micro SVTP Sensor does not have any interaction between sensors in the standard configuration. Since additional sensors can be added to the Micro SVTP Sensor, or other machinery and sensors can be located near or electrically connected to the Micro SVTP Sensor, care should be exercised to ensure that interference is minimized.

6.2.1 Electrical Interference

All Micro Sensors that are electrically coupled to the water, such as conductivity, DO_2 and pH sensors, are power and signal isolated to ensure there are no DC connections to the water. This will eliminate the majority of electrical interference problems.

Some sensors such as the sound velocity sensor are AC coupled to the water to reduce low frequency electrical noise in the environment. High frequency electrical noise can sometimes cause errors in the data.

6.2.2 Acoustic Interference

The standard configuration of the Micro SVTP Sensor has one acoustic sensor operating at 4 MHz. 4MHz sound waves are quickly attenuated in water and the sensor is highly directional. The sensor input is also filtered and gated to minimize acoustic interference.

6.2.3 Magnetic Interference

The standard configuration of the Micro SVTP Sensor has no magnetic sensors and is therefore immune to low frequency magnetic interference. Strong, nearby, high frequency magnetic fields may induce noise in the electronic circuitry and thus create noise in the data readings. Placing the Micro SVTP Sensor near this type of interference source is not advised.

6.2.4 Radio Interference

Due to the small board size of the Micro sensors they are less susceptible to radio interference than many other instruments. However, they are not immune. Tests show the Micro SVTP can withstand a 5 Watt, 144 MHz RF transmitter operating 2 metres away from the instrument without any degradation in performance.

6.3 TROUBLESHOOTING GUIDE

The following section outlines some of the most common problems encountered by users of the Micro SVTP Sensors. A brief list of suggested solutions has been provided. If the difficulties persist, please do not hesitate to contact the Applied Microsystems Ltd. service staff.

Phone: 250-656-0771
Fax: 250-655-3655
E-mail: service@aml.bc.ca
Mail: Applied Microsystems Ltd.
2071 Malaview Avenue
Sidney, BC
Canada
V8L 5X6

Problem:

Micro Sensor does not communicate with the computer.

Solutions:

• Incorrect power is being applied to the instrument. Check with a volt meter for proper supply voltage and polarity. The voltage range is from +8 to +16 VDC. Please refer to the appendix 'C' Electrical Wiring Diagram.

• The serial port chosen is incorrect. Most IBM computers have only one serial port, therefore the user should choose the COM1 setting. However, if a COM2 port exists, the user must take care in determining which port the cable has been connected to and choose the appropriate baud rate/port combination.

• The communications set up of the computer is incorrect. The Micro Sensor will be factory set to no parity, 1 stop bit, 8 data bits and will automatically determine the baud rate after the reception of an <**Enter**> or <**Ret**>.

• The baud rate of the computer was changed after the sensor was powered up. Turn the power supply for the sensor off for at least 2 seconds and then back on. Hit the < **Enter** > key. The instrument should then return a header.

• The communications cable has been inserted incorrectly. Check the cable connections at the computer and the sensor. Examine the pins on the sensor connector for bent or corroded pins.

Problem:

The instrument communications are intermittent.

Solutions:

• The communications cable has been inserted incorrectly. Check the cable connections at the computer and the instrument. Examine the pins on the instrument connector for bent or corroded pins.

• The communications cable has a fault. Check the continuity of the cable with an ohmmeter while flexing the cable. Short cables (< 3 meters) should have less than ½ ohm from end to end on each conductor. The cable should have a short between pins 6,7 and 8. Refer to the wiring diagram in Appendix B. If any of these conditions are not met replace the cable.

• Incorrect power is being applied to the instrument. Check with a volt-ohm-meter for proper supply voltage. The voltage range is from +8 to +16 VDC. Please refer to the appendix 'C' Electrical Wiring Diagram.

Problem:

The sensor readings are noisy.

Solutions:

• There are nearby electromagnetic noise sources. Move the instrument to a new location or move the noise source. Refer to section 6.2.

• If only one sensor reading is noisy determine which sensor channel it is and refer to the "____ sensor readings are incorrect" section for that sensor, which are listed below.

• The power supplied to the instrument is noisy. Change the power supply to a more regulated power supply or use a battery.

Problem:

The sound velocity sensor readings are incorrect.

Solutions:

• The sound velocity sensor has a bubble or debris between the transducer and reflector plate. Clear the obstruction.

• The sound velocity sensor has completely dried out and has not been allowed to wet before use. Wipe the transducer face while submerged in water to remove tiny air bubbles and allow the transducer to soak for several minutes.

• The sound velocity sensor is faulty. Examine the sensor for cracks in the epoxy. If cracked the sensor must be repaired and re-calibrated. Examine the sensor for deposits of dirt or marine growth . Clean the sensor.

Problem:

The pressure sensor readings are incorrect.

Solutions:

• The pressure range of the sensor may have been exceeded. The pressure sensor may require re-calibration or replacement. Contact the factory for support.

• The pressure sensor is faulty. Examine the stainless steel diaphragm of the pressure sensor for dents or scrapes. If any are found the sensor will have to be replaced. Contact the factory for support.

Problem:

The temperature sensor readings are incorrect.

Solutions:

• The temperature sensor is faulty. Examine the capillary tube of the temperature sensor for bends, pits or cracks. If any are found the sensor will have to be replaced. Contact the factory for support.

7 MAINTENANCE

7.1 GENERAL MAINTENANCE

The Micro SVTP Sensor has been designed to minimize user maintenance. To keep the instrument in top condition the following maintenance is required:

- After each deployment, the Micro SVTP Sensor case should be washed thoroughly with distilled or fresh water.

- Dry all electrical connections and replace the dummy connector prior to storage.

- The electrical connector should be lightly sprayed with 3M silicon spray, or equivalent, periodically depending on use.

7.2 REPLACING THE BATTERIES

Note: For custom battery configurations please refer to Appendix C

Figure 7-2 Battery compartment

Note: The end cap contains o-rings. Take care to avoid scratching or getting dirt on the o-ring surfaces.

Wipe dry the battery pack if it is wet to avoid dripping water into the battery pack. Remove the cables or shorting plug from the bulkhead connectors on the battery pack end cap.

<u>Do not</u> remove the stainless steel circlip on the battery pack. Unscrew the acetal retaining ring. This removes the battery assembly from the pressure case. Unscrew the battery cap from the brass housing. The spent batteries can be removed by tipping the assembly and allowing the batteries to slide out of the brass housing.

The replacement batteries should be three, good quality, C size, lithium , 3.6 volt batteries. Saft, LSH 14, C cell, 3.6 volt, lithium batteries are recommended.

Insert all three batteries into the brass housing positive end first. Replace the battery cap on the brass housing.

Check the O-ring seals. The O-rings should be clean, have no nicks, and should be lightly greased. Slide the battery assembly back into the pressure case and screw down the retaining ring.

7.2.1 Battery considerations for the Micro SVTP

Care should be observed when choosing replacement lithium batteries for the Micro SVTP. Battery characteristics such as physical size, current capacity, voltage capacity and maximum current sourcing capability should be considered.

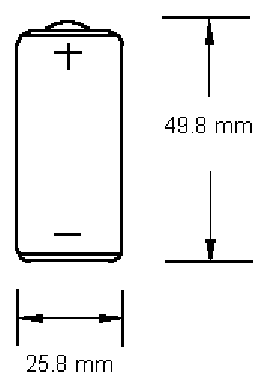
The Micro SVTP is shipped with lithium batteries manufactured by SAFT.
Internet: http://www.saftbatteries.com

7.2.2 Recommended Battery rating for the Micro SVTP

Battery size: C cell
Voltage capacity: 3.6v
Amp hour rating: 5.5Ah or better
Maximum continuous current rating: 800ma or better

Please refer to the battery specifications outlined in the following documentation when considering a replacement lithium battery for the Micro SVTP.

7.2.3 Battery dimensions



Due to the space constraints of the Micro SVTP battery assembly close attention to the battery size must be observed. Dimensions can very from one manufacture to another. The diagram shows the recommended size of the lithium batteries for the Micro SVT.

7.2.4 Voltage capacity

A nominal voltage of 3.6 volts is recommended but battery voltage will vary with temperature, usually the lower the temperature the lower the voltage output by the battery. Typically, lithium battery voltage will remain fairly constant until they are near the end of their capacity. When the voltage starts to drop off rapidly it is a good indication that the batteries need replacing very soon.

7.2.5 Current Capacity

The nominal current capacity of lithium batteries will be specified in Amp Hours (Ah) and this figure is used to indicate how long the batteries will last. The higher the Amp Hour rating, the longer the battery will last and the more it will cost. Current capacity not only varies with temperature, but also with the load (how much current the instrument draws).
A rough calculation for battery life is hours = Ah/load.
Where

Hours = hours of battery use
Ah = Amp Hour rating of the battery
Load = how much current the instrument draws in Amps

7.2.6 Maximum Current sourcing capabilities

The maximum current sourcing capabilities of a lithium battery defines how much current the battery can source before its voltage will drop significantly. Batteries with a low rating of Maximum recommended continuous currents (below 800ma) may produce a sharp voltage drop when the Micro SVTP demands a burst of current such as when it powers up or when an optional sensor or pump is turned on. If the voltage drops below the Micro SVTP’s operational voltage, the instrument may reset itself or behave erratically.

8 CALIBRATION

The instrument was calibrated at the factory at the time of manufacture. This should remain within published specifications for periods of 1 to 2 years, depending on the amount of use and other conditions occurring in the deployment environment. The sensor accuracies are also dependent upon proper care and maintenance by the user. Applied Microsystems Ltd. recommends recalibrating the instrument annually, however some standards agencies specify semi-annually for all sensors used in bathymetry work. Re-calibration of these sensors must be done at the factory or an authorized service facility. Contact the factory for the location of the nearest facility.

The Micro Sensors are calibrated by recording the instrument's raw data at known reference points. This data is applied to a curve fitting algorithm to produce calibration coefficients. Each set of coefficients are permanently stored in the instrument's memory.

Calibration coefficients are not interchangeable. Each set is unique to each instrument. The calibration coefficients for the instrument to which this manual belongs are listed in Appendix `B'. The user will need these coefficients if the instrument is to be used in the RAW mode for post processing purposes.

8.1 SOUND VELOCITY

The sound velocity sensor is calibrated against a distilled water reference. The following equations are used to convert raw data to engineering units:

$C_r = 1/(A + B*R + C*R^2 + D*R^3)$

Where: R = (Nh-Nsv)/(Nh-Nl)

Nh , Nsv, Nl = raw values

A through D are calibration coefficients determined at the factory.

8.2 TEMPERATURE

The temperature electronics use the following formula to convert raw data to engineering units (ºC):

$T = A + B*Nt + C*Nt^2 + D*Nt^3 + E*Nt^4 + F*Nt^5$

Where: T = temperature in ºC.

Nt = raw value

A through F are calibration coefficients determined at the factory

8.3 PRESSURE

The pressure electronics use the following formula to convert raw data to engineering units (dbar):

$P = A+B*Npt+C*Npt^2+D*Npt^3+(E+F*Npt+G*Npt^2+H*Npt^3)*Np+(I+J*Npt+K*Npt^2+L*Npt^3)*Np^2$

Where: P = pressure in dbar.

Npt, Np = raw values

A through L are calibration coefficients determined at the factory

9 WARRANTY

Warranty and limit of liability

AML warrants the instrument for a period of one year from the date of delivery. AML will repair or replace, at its option and at no charge, components that prove to be defective. The warranty applies only to the original purchaser of the instruments. The warranty does not apply if the instrument has been damaged, by accident or misuse, and is void if repairs or modifications are made by other than authorized personnel.

This warranty is the only warranty given by AML. No warranties implied by law, including but not limited to the implied warranties of merchantability and fitness for a particular purpose shall apply. In no event will AML be liable for any direct, indirect, consequential or incidental damages resulting from any defects or failure of performance of any instrument supplied by AML.

Disclaimer

AML reserves the right to make any changes in design or specifications at any time without incurring any obligation to modify previously delivered instruments. Manuals are produced for information and reference purposes and are subject to change without notice.

APPENDIX ‘A’: “ Instrument Configuration ”

1.1 LIST OF STANDARD PARTS

This instrument has been shipped with the following standard equipment:

_____ - Micro SVTP Sensor
_____ - User’s manual

1.2 SHIPPED CONFIGURATION

The Micro SVTP Sensor S/N ______________ was shipped from the factory with the following configuration:

Sensors

Sensor	Type	Range	Firmware
Sound velocity	Time of flight		
Temperature	Thermistor		
Pressure	Strain gauge		
Voltage	A/D converter		na
Real time clock	Quartz crystal	na	na

Data Logger Board
_______- flash memory
_______- firmware version

Communications
_______- RS-232 ASCII communications
_______- TTL ASCII communications
_______- RS-485 binary communications
_______-___________________________

Power
_______- external 8 to 16 VDC power
_______- internal C lithium batteries
_______- ___________________________
_______- ___________________________

Options
_______- Spares kit
_______- Blanking plug
_______- Data/Power cable with 2 meter pigtail
_______- Data/Power cable with right angle connector and 2 meter pigtail
_______- T-316 stainless steel housing (4500 meters)
_______- Mounting bracket
_______- Sensor protection cage
_______- Suspension bar
_______- Custom connector configuration ______________________________
_______- ____
_______- ____
_______- ____
_______- ____
_______- ____
_______- ____
_______- ____
_______- ____
_______- ____
_______- ____

1.3 TESTS AND QUALITY CONTROL

The following tests have been performed on the Micro SVTP Sensor S/N ___________ before leaving the factory.

_______ - Burn In.
_______ - Cold Chamber.
_______ - Electronic Drift.
_______ - Sensor Drift.
_______ - Water Tight Integrity "Pressure Test"
_______ - Calibration.
_______ - Post Calibration Verification.

THIS APPARATUS WAS PRESSURE TESTED

TO: __________________________ Metres

BEFORE LEAVING THE FACTORY.

OPERATOR: _________________________

1.4 CUSTOM OUTPUTS

APPENDIX ‘B’: “ Calibration Coefficients ”

APPENDIX 'C': " Drawings "

APPENDIX 'D': " Using Hyperterminal "

To communicate with the Micro SVTP Sensor the terminal emulation program Hyperterminal may be used. Hyperterminal is supplied with the MS Windows 95 and later operating systems. This program provides the mechanism of communication between the instrument and an IBM compatible computer.

This section describes the configuration of the Hyperterminal program for the Micro SVTP Sensor.

D.1 USING HYPERTERMINAL

Connect the Micro SVTP Sensor to the data cable. Connect the data cable to the serial port of the computer. If the Micro SVTP Sensor is externally powered connect the data cable power leads to a 12 volt DC supply.

Launch Hyperterminal by selecting the program from the start menu under programs. Under the File menu select properties, the Properties window will then open. Under 'Connect Using' select direct to com 2 (or the port the sensor is connected to). Click on the Configure button to open the COM2 Properties window and enter the following:

Bits per second:	38400 (or the desired baud rate)
Data Bits:	8
Parity:	none
Stop Bits:	1
Flow Control:	none

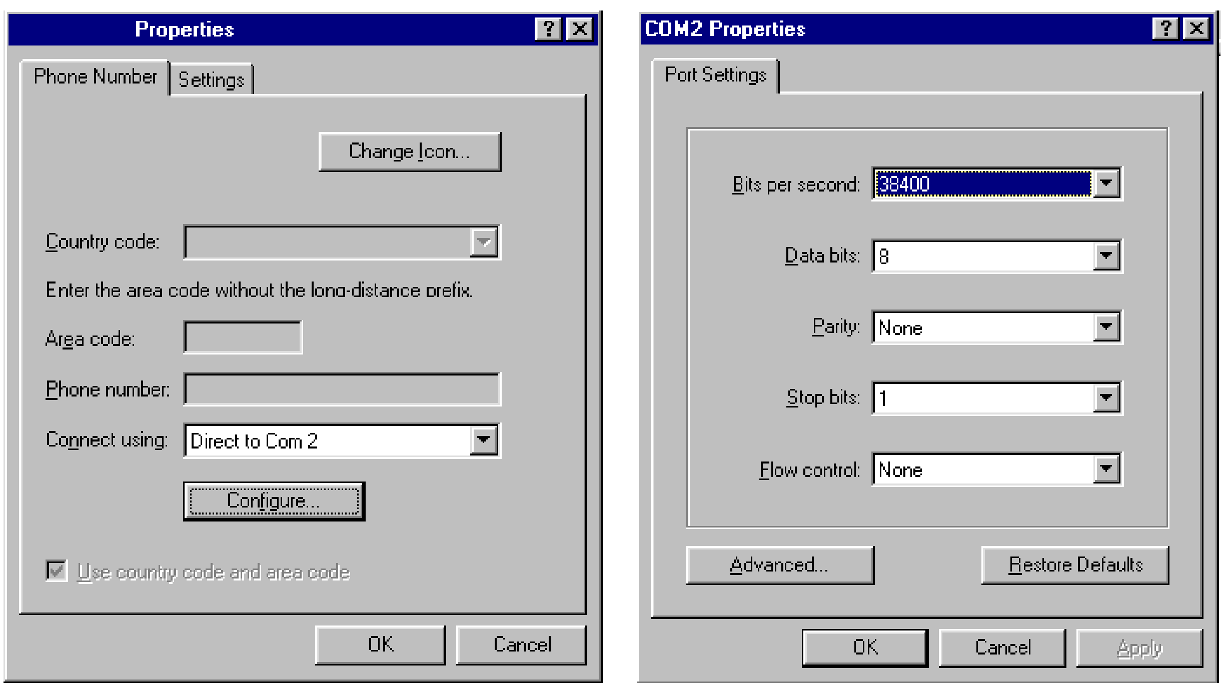


Figure D-1 Properties Windows in Hyperterminal.

Select OK in the COM2 Properties window. Select OK in the Properties window.

Hit the **<Enter>** key. If all cables have been connected properly and the appropriate baud rate/serial port combination chosen, the instrument will respond with a header and then the prompt (>), eg:

Micro SVTP Sensor V1.42 SN:7122-SVTP
Copywrite 2003, Applied Microsystems Ltd.

>

Once the prompt appears, the Micro SVTP Sensor is ready to accept instructions. Refer to the RS-232 Command Summary, section 5.1.2.

Caution: Some versions of Hyperterminal have a bug which does not allow the properties to be changed unless the disconnect command is selected under the Call menu before changing the properties. The affected programs will always show the property changes in the status bar but the changes are not actually implemented unless the program is disconnected prior to the property changes being made. Select the Connect command after the changes are made.

APPENDIX 'E': " Using PROCOMM "

To communicate with the Micro SVTP Sensor a terminal emulation program such as PROCOMM can be supplied. This DOS based program provides the mechanism of communication between the instrument and an IBM compatible computer.

This section describes the installation and use of the shareware program "PROCOMM" as a method of communicating with the Micro SVTP Sensor.

Note:

PROCOMM is a shareware program. It has been supplied free of charge and if it is found to be useful the user should register this software. Registration information can be found in the file LICENSE.DOC.

E.1 INSTALLING PROCOMM

PROCOMM should be installed on the computer's hard disk. The installation program will create a sub-directory named PROCOMM on the selected drive. To install PROCOMM on Drive C, place the disk labelled PROCOMM in the appropriate floppy drive. Log to that drive, then type:

```
INSTALL C:
```

E.2 USING PROCOMM

To use PROCOMM enter the following commands:

```
C:
CD \PROCOMM
PROCOMM
```

PROCOMM comes configured with the following parameters.

Communications port:	COM1
Baud rate:	9600
Parity:	None
Bits:	8
Protocol:	None

If the instrument has been connected to COM1 then no changes are necessary. To display the communication line setting menu type <ALT>P . This will display the screen as shown in figure 3-1. Enter the number that corresponds to the parameter to be changed (eg. entering 21 <RET> would select COM2). The baud rate can also be changed in the same manner. Any changes made should be saved to disk by entering 24<RET>. The parity, data bits, and stop bits must not be changed. Press the ESC key to exit this menu and return to the communications screen.

LINE SETTINGS			
CURRENT SETTINGS:	**2400,N,8,1,COM1**		
1)	300,E,7,1	7)	300,N,8,1
2)	1200,E,7,1	8)	1200,N,8,1
3)	2400,E,7,1	9)	2400,N,8,1
4)	4800,E,7,1	10)	4800,N,8,1
5)	9600,E,7,1	11)	9600,N,8,1
6)	19200,E,7,1	12)	19200,N,8,1

Parity	Data Bits	Stop Bits
13) ODD	16) 7 bits	18) 1 bit
14) MARK	17) 8 bits	19) 2 bits
15) SPACE		

20) COM1 21) COM2 22) COM3 23) COM4

24) Save Changes **YOUR CHOICE:**

Press ESC to return

Figure E-1 Communication parameters window in PROCOMM.

If all cables have been connected properly and the appropriate baud rate/serial port combination chosen, the instrument will respond with a header and then the prompt (>), eg:

Micro SVTP Sensor V1.42 SN:7122-SVTP
Copywrite 2003, Applied Microsystems Ltd.

>

Once the prompt appears, the Micro SVTP Sensor is ready to accept instructions. Refer to the RS-232 Command Summary in section 5.1.2.

To leave PROCOMM, the **<ALT>X** key combination is used.

APPENDIX ‘F’: “ Technical Papers ”

APPENDIX 'G': " Quick Guide "

For Micro SVTP Sensor S/N ____________

Caution: Do not exceed a pressure of ________________________ with this instrument.

Connections: Externally powered instrument

- Connect the Micro SVTP Sensor to the computer by plugging the communications cable between the Micro SVTP and the RS-232 port of the computer.
- If the Micro SVTP Sensor does not have a battery pack, connect the data cable wires to a DC power source (8 to 16 volts, 12 volts nominal). The red wire should be connected to the positive side of the supply and the black wire to the negative side of the supply.

If using ISS:

- Launch ISS. Configure the program for the correct port and apply the following settings: 8 bits, no parity, 1 stop bit. Select the desired baud rate.
- Select the desired sampling rate and logging rate.
- Select the monitor button in the toolbar. ISS will then start displaying and storing data.

If using SmartTalk:

- Launch SmartTalk. Configure the program for the correct port and apply the following settings: 8 bits, no parity, 1 stop bit. Select the desired baud rate.
- Select the desired sampling rate and logging rate.
- Select the connect command. Smart talk will then start displaying data.
- To log data select the capture command. SmartTalk will display a capture window. Provide a file name for the data and select OK. Logging will then commence. To stop logging deselect the capture command.

If using a terminal emulation program:

Examples include Hyperterminal, ProComm and Commo.

- Launch a communications program. Configure the program for the correct port and apply the following settings: 8 bits, no parity, 1 stop bit. Select the desired baud rate.
- Press <**enter**>. The instrument will respond with an identification header.
- To see one scan of data type <**s**> followed by <**enter**>. The instrument will respond with one scan of data in engineering units. Pressure is given in dbar, sound velocity is given in m/s and temperature is given in ºC.
- To monitor the data continuously type <**m**> followed by <**enter**>. The instrument will respond with a continuous stream of data with each scan on a new line. Pressure is given in dbar, sound velocity is given in m/s and temperature is given in ºC.