

## Sampling Modes

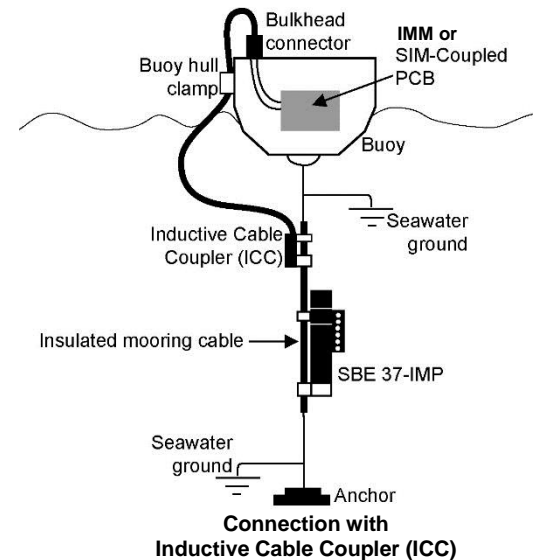
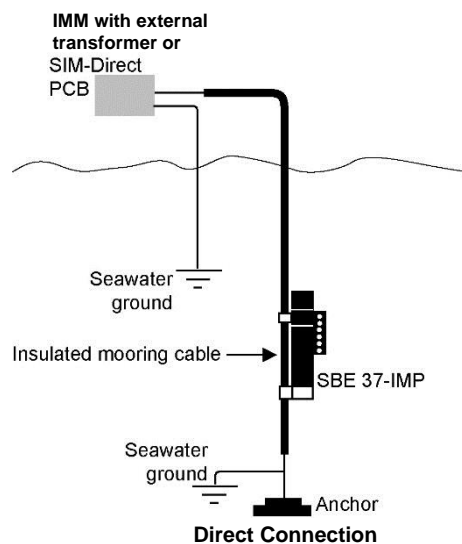
- **Polled** – On command, wake up, take one sample, transmit data, and go to sleep.
- **Autonomous** – At pre-programmed intervals, wake up, run pump for 1 second, sample, store data in FLASH memory, and go to sleep.
- **Combo** – On command, transmit last Autonomous sampling data.
- **Averaging** – On command, calculate and transmit average of Autonomous sampling data since last request.

## Setup

1. Install AA lithium cells (Note: **Current version of IMP MicroCATs use a battery pack with a yellow cover plate**):
  - A. *Remove modem end cap*: Wipe dry housing/end cap seam. Remove 2 cap screws from end cap, and twist end cap counterclockwise. Pull end cap out. Disconnect Molex connecting to battery pack. Wipe O-ring mating surfaces in housing with lint-free cloth.
  - B. *Remove battery pack and install cells*: Loosen captured screw in battery pack cover. Use handle to lift battery pack out of housing. Keep handle upright. Unscrew yellow cover plate from top of battery pack assembly. Roll 2 O-rings on side of battery pack out of grooves. Insert cells into battery pack, and roll 2 O-rings into grooves on side of battery pack. Align pin on battery cover plate PCB with post hole, keep handle upright, and screw yellow cover plate onto battery pack assembly.
  - C. *Reinstall battery pack and modem end cap*: Align D-shaped opening and pins on shaft. Lower battery pack into housing; push gently to mate. Tighten captured screw to secure battery pack in housing. Remove water from O-rings and mating surfaces with lint-free cloth. Inspect O-rings and mating surfaces for dirt, nicks, and cuts. Clean as necessary. Apply light coat of O-ring lubricant to O-ring and mating surfaces. Plug Molex connector together. Fit end cap into housing. Reinstall 2 cap screws.
2. Double click on SeatermV2.exe. In Instruments menu, select *SBE 37 IM*. SeatermIM opens.
3. In Communications menu, select *Configure*. In dialog box, input Comm port and baud rate. Set ID to *Automatically get ID* for 1 MicroCAT on line; set ID to *Use fixed ID* for multiple MicroCATs on line. Click OK.
4. SeatermIM automatically connects to MicroCAT. As it connects, it sends **#iiGetHD** and displays response, and then fills Send Commands window with list of commands for your MicroCAT.
5. Ensure all data has been uploaded from memory, and then send **#iiInitLogging** to make entire memory available for recording. If **#iiInitLogging** is not sent, data will be stored after last recorded sample.
6. Set Date and Time (**#iiDateTime=**).
7. Set up other parameters as desired — see Command Instructions and Command List.

## Deployment

1. Attach MicroCAT to insulated mooring cable with Sea-Bird mounting brackets. **MicroCAT is intended for deployment with the sensors at the top for proper operation – see manual for details.** Install (optional) ICC on mooring cable.
2. See MicroCAT manual for SIM wiring and configuration; see IMM manual for IMM wiring and configuration.



## Data Upload

1. Double click on SeatermV2.exe. SeatermV2 opens; in Instruments menu, select *SBE 37 IM*. SeatermIM opens.
2. In Communications menu, select *Configure*. In dialog box, select Comm port and baud rate (factory set to 9600). Set ID to *Automatically get ID* for 1 MicroCAT on line; set ID to *Use fixed ID* for multiple MicroCATs on line. Click OK.
3. SeatermIM automatically connects to MicroCAT. As it connects, it sends **#iiGetHD** and displays response, and then fills Send Commands window with list of commands for your MicroCAT.
4. If sampling autonomously (logging), command MicroCAT to stop logging by sending **#iiStop**.
5. Click Upload menu to upload stored data.
6. SeatermIM prompts you to run SBE Data Processing to convert uploaded .hex file to .cnv file for use by other modules in data processing software. Process file and review data to ensure all data has been uploaded.

## Command Instructions and List

- Input commands in upper or lower case letters and register commands by pressing Enter key.
  - MicroCAT sends an error message if invalid command is entered.
  - If new command is not received within 2 minutes after completion of a command, MicroCAT returns to quiescent (sleep) state.
  - If in quiescent (sleep) state, re-establish communications by selecting Connect in SeatermIM's Communications menu.
- Shown below are the commands used most commonly in the field. See the Manual for complete listing and detailed descriptions.

| FUNCTION   | CATEGORY  | COMMAND  | DESCRIPTION  |  |
|--|---|--|--|--|
| SIM Commands   | Power-On  | <b>PwrOn</b>                                   | Send wakeup tone to <b>all</b> IMs.  |  |
|  |   | <b>PwrOff</b>                                  | Send power off command to <b>all</b> IMs. Logging and memory retention unaffected.   |  |
|  |   | <b>AutoPwrOn=x</b>                             | <b>x=Y</b> : Send <b>PwrOn</b> to IMs when power applied to SIM. <b>x=N</b> : do not.  |  |
|  | Status  | <b>DS</b>                                      | Display SIM firmware version and status.   |  |
|  | Communications  | <b>Baud=x</b>                                  | <b>x</b> = baud from SIM to computer (1200, 2400, 4800, or 9600). Default 9600.  |  |
|  |   | <b>DataNNMax=x</b>                             | <b>x</b> = timeout that applies to <b>Dataii</b> ; default 1000 milliseconds.  |  |
|  |   | <b>RelayMax=x</b>                              | <b>x</b> = timeout that applies to all other commands; default 20 seconds.   |  |
| <b>EchoOn</b>  |   | Echo characters received from computer.        |  |  |
|  | <b>EchoOff</b>  | Do not echo characters received from computer. |  |  |
| MicroCAT Integrated IMM Commands<br>( <b>ii</b> = MicroCAT ID)<br><i>See IMM manual for complete details</i> | ID and Group Number   | <b>ID?</b>                                     | Get MicroCAT ID (0-99).  |  |
|  |   | <b>*ID=ii</b>                                  | Set ID to <b>ii</b> ( <b>ii</b> =0-99). Only 1 MicroCAT can be on line. Must be sent twice.  |  |
|  |   | <b>!iiSetGroupNumber=x</b>                     | Set MicroCAT group number to <b>x</b> (0-9). Group 0 is pre-defined as group of all instruments with integrated IMM.   |  |
|  | Status  | <b>!iiGetCD</b>                                | Get integrated IMM configuration data.   |  |
|  |   | <b>!iiGetHD</b>                                | Get integrated IMM hardware data.  |  |
|  |   | <b>!iiGetSD</b>                                | Get integrated IMM status data.  |  |
|  | Testing   | <b>!iiTestCableCoupler</b>                     | Test integrity of integrated IMM. Line must be captured before command sent  |  |
|  | Get Data  | <b>!iiSetGDataStr=x</b>                        | <b>x</b> = character string to send to MicroCAT acquisition microcontroller from integrated IMM when <b>GData</b> is sent from surface IMM/SIM.  |  |
|  |   | <b>GData</b>                                   | Command <b>all</b> integrated IMM to send command defined by <b>!iiSetGDataStr=</b> , and hold response in buffer until user sends <b>!iiData</b> or <b>Dataii</b> or <b>!iiGetReply</b> . |  |
|  |   | <b>!iiData, Dataii, or !iiGetReply</b>         | Get data obtained with <b>GData</b> from MicroCAT with ID= <b>ii</b> .   |  |
| MicroCAT Acquisition Microcontroller Commands<br>( <b>ii</b> = MicroCAT ID)                                  | Status  | <b>#iiGetCD</b>                                | Get and display configuration data.  |  |
|  |   | <b>#iiGetSD</b>                                | Get and display status data.   |  |
|  |   | <b>#iiGetCC</b>                                | Get and display calibration coefficients.  |  |
|  |   | <b>#iiGetEC</b>                                | Get and display event counter data.  |  |
|  |   | <b>#iiResetEC</b>                              | Reset event counter.   |  |
|  |   | <b>#iiGetHD</b>                                | Get and display hardware data.   |  |
|  |   | <b>#iiDS</b>                                   | Display status.  |  |
|  | General Setup   | <b>#iiDC</b>                                   | Display calibration coefficients.  |  |
|  |   | <b>#iiDateTime=mmddyyhhmmss</b>                | Set real-time clock month day year hour minute second.   |  |
|  |   | <b>#iiBaudRate=x</b>                           | <b>x</b> = baud rate (600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 94 115200) for communicating in Serial Mode (through internal RS-232 connector).                                   |  |
|  |   | <b>#iiOutputExecutedTag=x</b>                  | <b>x=Y</b> : output XML Executed and Executing tags. <b>x=N</b> : do not.  |  |
|  | Pump Setup  | <b>#iiReferencePressure=x</b>                  | <b>x</b> = reference pressure (decibars) (for MicroCAT without pressure sensor).   |  |
|  |   | <b>QS</b>                                      | Place MicroCAT in quiescent (sleep) state; for use in Serial mode only.  |  |
|  |   | <b>#iiMinCondFreq=</b>                         | <b>x</b> = minimum conductivity frequency (Hz) for pump turn-on.   |  |
|  | Memory Setup  | <b>#iiPumpOn</b>                               | Turn pump on for testing or to remove sediment.  |  |
|  |   | <b>#iiPumpOff</b>                              | Turn pump off, if turned on with <b>#iiPumpOn</b> .  |  |
|  | Polled Sampling<br>(data not stored in FLASH memory unless noted; format specified by <b>#iiOutputFormat=</b> unless noted) | <b>#iiInitLogging</b>                          | Initialize logging, setting memory pointer to 0.   |  |
|  |   | <b>#iiSampleNumber=x</b>                       | <b>x</b> = sample number for first sample when logging begins.   |  |
|  |   | <b>#iiTS</b>                                   | Take sample, output data.  |  |
|  |   | <b>#iiTSR</b>                                  | Take sample, output <b>raw</b> data.   |  |
|  |   | <b>#iiTSH</b>                                  | Take sample, do not output data.   |  |
|  |   | <b>#iiTSS</b>                                  | Take sample, <b>store in FLASH memory</b> , output data.   |  |
|  |   | <b>#iiTPS</b>                                  | Run pump, take sample, output data.  |  |
|  |   | <b>#iiTPSH</b>                                 | Run pump, take sample (do not output data).  |  |
|  |   | <b>#iiTPSS</b>                                 | Run pump, take sample, <b>store data in FLASH memory</b> , output data.  |  |
|  |   | <b>#iiTPSN:x</b>                               | Run pump continuously while taking <b>x</b> samples and outputting data.   |  |
|  |   | <b>#iiTSN:x</b>                                | Take <b>x</b> samples and output data.   |  |
|  |   | <b>#iiSL</b>                                   | Output last sample.  |  |
|  |   | <b>#iiSLT</b>                                  | Output data from last sample, then take new sample.  |  |
|  |   | <b>#iiSLTR</b>                                 | Output <b>raw</b> data from last sample, then take new sample.   |  |
|  |   | <b>#iiSLTP</b>                                 | Output data from last sample, and then run pump and take new sample (do not output data from new sample).  |  |
|  |   | <b>#iiSLTPR</b>                                | Output data from last sample in raw decimal format, then run pump and take new sample (do not output data from new sample).  |  |
|  |   | Data Upload                                    | <b>#iiIDNx</b>   | Upload last <b>x</b> scans from memory; can send while logging                   |
|  |   |  | <b>#iiGetSamples:b,e</b>   | Upload data from scan <b>b</b> to <b>e</b> . Send <b>#iiStop</b> before sending. |
|  |   | <b>#iiDDb,e</b>                                | Upload data from scan <b>b</b> to <b>e</b> . Send <b>#iiStop</b> before sending.   |  |

| FUNCTION   | CATEGORY  | COMMAND                       | DESCRIPTION   |
|--|---|-------------------------------|---|
| MicroCAT Acquisition Microcontroller Commands (ii = MicroCAT ID) | Autonomous Sampling (logging)   | #iiSampleInterval=x           | x = interval between samples (6 – 21,600 seconds).  |
|  |   | #iiStartNow                   | Start logging now. Data stored in FLASH memory.   |
|  |   | #iiStartDateTime=mmddyyhhmmss | Delayed logging start: month day year hour minute second.   |
|  |   | #iiStartLater                 | Start logging at delayed start time. Data stored in FLASH memory.   |
|  |   | #iiStop                       | Stop logging or waiting to log.   |
|  |   | #iiGA                         | Start logging now.  |
|  |   | #iiSACG                       | Output averaged data, in format specified by #iiOutputFormat=. Start new average.   |
|  |   | #iiSARG                       | Output averaged raw data. Start new average.  |
|  |   | #iiSAC                        | Output averaged data, in format specified by #iiOutputFormat=. Continue averaging.  |
|  |   | #iiSAR                        | Output averaged raw data. Continue averaging.   |
|  |   | #iiSS                         | Output statistics. Continue averaging.  |
|  | Output Format Setup   | #iiOutputFormat=x             | x=0: output raw decimal data<br>x=1: output converted decimal data<br>x=2: output converted decimal data, XML format<br>x=4: output converted decimal data, alternate format<br>x=5: output converted decimal data, compatible format   |
|  |   | #iiTxSampleNum=x              | x=Y: Output sample number with data. x=N: do not.   |
|  |   | #iiLegacy=x                   | x=0: Allow all commands.<br>x=1: Reset units to °C, S/m, dbar, ml/L, and enable output of temperature, conductivity, pressure, oxygen (disable sound velocity, specific conductivity, sample number). Do not allow user to disable temperature, conductivity, pressure, or oxygen, or change output units. Modify #iiDS response to match output from digital firmware < 2.0. |
|  |   | #iiOutputTemp=x               | x=Y: Output temperature.<br>x=N: Do not.  |
|  |   | #iiSetTempUnits=x             | x=0: Temperature °C, ITS-90.<br>x=1: Temperature °F, ITS-90.  |
|  |   | #iiOutputCond=x               | x=Y: Output conductivity.<br>x=N: Do not.   |
|  |   | #iiSetCondUnits=x             | x=0: Conductivity, specific conductivity S/m.<br>x=1: Conductivity, specific conductivity mS/cm.<br>x=2: Conductivity, specific conductivity µS/cm.   |
|  |   | #iiOutputPress=x              | x=Y: Output pressure.<br>x=N: Do not.   |
|  |   | #iiSetPressUnits=x            | x=0: Pressure decibars.<br>x=1: Pressure psi (gauge).   |
|  |   | #iiOutputSal=x                | x=Y: Calculate and output salinity (psu).<br>x=N: Do not.   |
|  |   | #iiOutputSV=x                 | x=Y: Calculate and output sound velocity (m/sec).<br>x=N: Do not.   |
|  |   | #iiOutputSC=x                 | x=Y: Calculate and output specific conductivity.<br>x=N: Do not.  |
| #iiUseSCDefault=x  | Only applicable if #iiOutputSC=y.<br>x=0: Do not use default; use #iiSetSCA=.<br>x=1: Use default value (0.020) for thermal coefficient of conductivity for natural salt ion solutions (specific conductivity calculation). |                               |   |
| #iiSetSCA=x  | Only applicable if #iiOutputSC=y and #iiUseSCDefault=0.<br>x= thermal coefficient of conductivity for natural salt ion solutions (specific conductivity calculation).   |                               |   |