

WINDACS

Windows Real Time Data Acquisition System

Introduction

WinDACS is a real-time data acquisition program developed to sample continuous and discrete data from a variety of environmental sensors during transits of a research vessel. It was specifically designed for the Pacific research cruises: MOPS (Monitoring Of Porpoise Stocks), PODS (Population Of Delphinus Stocks), and CAMMS (California Marine Mammal Survey), to use an inexpensive personal computer (PC), but it also has potential in any R/V oceanographic program due to its inherent expandability and adaptability.

WinDACS is a Visual Basic program designed to sample, average and store multiple streams of data from a variety of sources. It is presently configured to directly use an analog-to-digital (A/D) board and convert analog data from a Turner Designs fluorometer to a 12-bit digital form, collect temperature, conductivity, and salinity data from a Sea-Bird thermosalinograph through a communication port, and to collect satellite navigation (GPS, LORAN, SATNAV) latitude and longitude locations through a second communication port, or GPS can be read in through the Sea-Bird data stream. It is also possible to reconfigure the system to sample from other types of sensors.

The input data are averaged and stored in an ASCII data format. Data are collected at one-second intervals and averaged over two minutes (default). The data file is opened only when data are to be written, thereby safeguarding data integrity from power loss or equipment failure.

The main display contains the cruise track map display and incoming data display ports. A small window with the real-time line chart display of temperature and salinity is also available. The main form contains the date, time, latitude, longitude, speed, heading, temperature, salinity, conductivity, depth, fluorometer voltage, fluorometer scale, and comment bar which are constantly shown and updated as new data arrive.

Keys available and Mouse function

CTRL-X – Exits the program.

F5 – Suspend data acquisition. Used to begin the blanking process for the fluorometer.

Moving the mouse over the map display window and right-clicking will pop up a small text block of the latitude and longitude to where the mouse is pointing.

Pull-down Menus

File

New Map – Reloads Original.BMP. Working file is Map.BMP. If you'd like a clean map without cruise tracks, then just click on New Map. If you like a clean map, but of

a different area, then rename the new map to Original.BMP (save the first one) and click on New Map.

Exit – Saves and closes any open files and shuts down program.

Operation

Suspend – Suspends data acquisition and brings up the blanking form. Allows the blanking of the fluorometer. Click on Blank to start the blanking process (default is 30 seconds). Also clicking on Calibrate will start a special data acquisition period (same as sample interval, 120 seconds default) and mark the end of the output file with a “3”. After the Calibrate period, WinDACS automatically resume normal operation. Clicking on Resume will also resume normal operation.

Reconstruct Map – This routine call redraw the cruise track on a map from the previous data files. The default is “beginning” and “present” for the starting and ending dates (default). If you would like a different period, enter the starting and ending dates in YYMMDD format. All six digits must be present.

Fluorometer Profile – Brings up the line chart showing the last 24 hours of fluorometer voltage data.

Configure

Initialization Variables – Contains the values for the sample interval, blanking interval, starting data character for output file names, GPS string information, and map boundaries.

COM Ports – Allows changing the port speed (baud rate) and port number. A port number of zero (0) will disregard data for that item (not present).

Digital I/O – Sets the values for the A/D board, such as base address, gain, and fluorometer input channels. To turn on these variables, click on the Enable Fluorometer check box. If not checked, then the A/D board will not be polled.

Line Chart – Allows the setting of the starting high and low vertical axis for temperature and salinity. If the Enable check box is not checked, the line chart will not be displayed.

Raw I/O – Shows the raw data coming into the TempSal port. This raw display can help decipher the offsets for configuring the TempSal configuration strings.

TempSal – Allows changing the variables for the Seacat Thermosalinograph. Here you can enter the calibration coefficients for temperature and conductivity. Also, if the device allows, you can also read in from the Seacat box A/D channels (default is

0). Location string is default to ^10 (line feed). You can also get GPS feed from the Seacat. Changing the last three options will automatically change the TempSal string, which can also be changed manually by the user. Also you can filter temperature and salinity data with high and low cutoff points.

*Note – All previous Configure forms have a Save button. If this button is pressed, then the program will use the new settings for the current session and each time the program is executed. If not, then the program will use the new settings for the current session, but will reload the previous settings the next time the program is execute.

Startup Variables

Under the Configure pull-down menu is the Initialization Variables screen. This screen contains the following variables and defaults:

Screen	Default
WinDACS Directory:	C:\Program Files\Windacs
Sample Interval:	120 seconds
Blank Interval:	30 seconds
Data Character	F
TempSal Baud	9600,E,7,1
GPS Baud	4800,N,8,1
Depth Baud	4800,N,8,1
TempSal Port	1
GPS Port	0
Depth Port	0
TempSal Parse String	^10,1,4,5,4,20
GPS Parse String	\$GPGLL,7,2,9,6,16,1,18,3,21,6,28,1,75
Ship Speed Parse String	\$GPVTG,19,4,13,3
GPS Time Parse String	\$GPZLZ,7,6,22,2
Depth Parse String	f,2,50
SeacatGPS	False
Temperature Scale Low	22.0
Temperature Scale High	27.0
Salinity Scale Low	28.0
Salinity Scale High	33.0
A/D Board Base Address	768
A/D Input Gain	1
Fluorometer Enabled	False
Fluorometer Input Channel	1
Fluorometer Scale Channel	0
Fluorometer x100 Channel	2

Filter Data	0
Temperature Filter Low	0.0
Temperature Filter High	40.0
Salinity Filter Low	0.0
Salinity Filter High	40.0
Temperature Calibration a	0.00367593631
Temperature Calibration b	0.000582842387
Temperature Calibration c	0.00000814940647
Temperature Calibration d	-0.00000253084951
Temperature Calibration fo	2477.13
Conductivity Calibration a	0.000529581308
Conductivity Calibration b	0.468794979
Conductivity Calibration c	-3.91453844
Conductivity Calibration d	0.000667288291
Conductivity Calibration m	3.0
Map North Boundary	50.0
Map South Boundary	-20.0
Map West Boundary	-160.0
Map East Boundary	-70.0
Map Scale	10.0
Seacat A/D Channels	0

WinDACS Directory - Drive and directory where WinDACS.exe is located.

Sample Interval - Number of seconds before data are written to the output file.

Blank Interval – Number of seconds to do a blanking procedure on the fluorometer.

Data Character – The first letter used on the output data file names.

TempSal, GPS, Depth Baud - Input COMM port settings

4800,N,8,1

- 4800 - Baud rate. Most GPS use 4800
- N - No parity bit (E is even parity, O is odd parity)
- 8 - 8 data bits (7 is even or odd parity is used)
- 1 - 1 stop bit (can be 1, 1.5, or 2)

TempSal, GPS, Depth Port – Port number for the incoming data streams.

- 1 Comm 1 (2 = Comm 2, ...)
- 0 Input stream not present or not used

TempSal Parse String - Format information for incoming TempSal data

^10,1,4,5,4,20
a b c d e

Example: 5C8DA1231A40765B50AE41

- ^10 – The start string to search for. The ^ symbol means the start character is a control code, in this case, line feed. Each incoming string ends with a carriage return (^13) and line feed (^10). Since line feed is unique and is the last character before the beginning of a new line of data, it is used as the start string.
- a - Number of characters after start string to 1st character of temperature frequencies. In the above example, the number 5 after the ^10 would be the 1st character.
 - b - Number of characters representing temperature frequencies.
 - c - Number of characters after start string to 1st character of conductivity frequencies. In the above example, the character A (as in 5C8DA) would be the 5th character after the start string (following the ^10).
 - d - Number of characters representing conductivity frequencies.
 - e - Minimum number of characters that must be received before program will process data.

GPS Parse String - Format information for incoming GPS data.

\$GPGLL,7,2,9,6,16,1,18,3,21,6,28,1,75
a b c d e f g h I j k l m

Example: \$GPGLL,3215.45,N,11002.23,W

- \$GPGLL - Start string to search for. Must be distinct and repeating.
- a - Number of characters after start string to 1st character of latitude degrees. In the above example, the letter G after the \$ would be the 1st character. Therefore, the following 3 would be the 7th character after the start string.
 - b - Number of characters representing latitude degrees.
 - c - Number of characters after start string to 1st character of latitude minutes. In the above example, the character 1 (as in 15.45) would be the 9th character after the start string (in this case, following the \$ character).
 - d - Number of characters representing latitude minutes.
 - e - Number of characters after start string to 1st character of latitude north/south indicator.
 - f - Number of characters representing latitude N/S indicator.

- g - Number of characters after start string to 1st character of longitude degrees.
- h - Number of characters representing longitude degrees.
- I - Number of characters after start string to 1st character of longitude minutes.
- j - Number of characters representing longitude minutes.
- k - Number of characters after start string to 1st character of longitude east/west indicator.
- l - Number of characters representing longitude E/W indicator.
- m - Minimum number of characters that must be received before program will process data.

GPS Speed/SPEED - Format information for incoming ship data.

\$GPVTG,19,4,13,3
a b c d

- \$GPVTG - Start string to look for. Must be distinct and repeating.
- a - Number of characters after start string to 1st character of ship speed.
- b - Number of characters representing ship speed.
- c - Number of characters after start string to 1st character of ship heading.
- d - Number of characters representing ship heading.

SeacatGPS – Tells the program if the incoming TempSal string also contains Seabird GPS feed. If so, then the program will ignore the GPS Parse String and the GPS Port can be set to 0.

Temperature Scale Low – The starting low value on the Temperature/Salinity Chart.

Temperature Scale High – The starting high value.

Salinity Scale Low – The starting low value on the Temperature/Salinity Chart.

Salinity Scale High – The starting high value.

A/D Board Base Address – Base address the A/D board talks to the program.

A/D Input Gain – Gain value gain be used on A/D board or attached multiplexer.

Fluorometer Enabled – If a fluorometer is attached, then this should be enabled.

Fluorometer Input Channel – Input A/D channel the fluorometer voltage comes in.

Fluorometer Scale Channel – Input A/D channel the ABCD scale voltage comes in.

Fluorometer x100 Channel – Input A/D channel the x1/x100 knob voltage comes in.

Filter Data – Turns on/off data filtering on temperature and salinity values.

Temperature/Salinity Filter Low – Low value for filter. Any value below will be discarded.

Temperature/Salinity Filter High – High value for filter. Any value above will be discarded.