

5 Software

The SeaKeepers computer uses the Windows XP Service Pack 2 operating system. All of the software for the SeaKeepers operation is installed on the computer when it is shipped from Miami. The major components are: the data acquisition software, the water pump control program, the communications program which initiates the transfer of the data via INMARSAT std C, and the remote control program pcAnywhere. The programs will start automatically when the computer is powered up and logged on, and may also be re-started from icons on the computer desktop if they have been shut down while the computer is running.

5.1 SCS software

SCS (Scientific Computer Systems) Version menu 3 was developed by the National Oceanographic and Atmospheric Agency (NOAA) for use on its research vessels. It is a data acquisition and processing system designed for oceanographic and fisheries applications. It is a flexible program which allows the user to select the suite of sensors to be monitored, apply calibration factors, and display the signals in real time via text and/or graphic displays, while simultaneously logging the data for later analysis.

A program called SCSTMenu3, which was written specifically for the SeaKeepers application of SCS, will invoke a standard configuration. SCSTMenu3 will start automatically when the SeaKeepers computer is turned on.

When the program is started, several windows open on the computer screen: LoggerControl, SCSTDataServer, Acq and a toolbar labeled “Scientific Computer Systems” (SCS). The programs are controlled from the toolbar and cannot be individually closed. It is convenient, however, to minimize the program windows to open up space on the screen and to locate the toolbar if a real-time display is desired.



5.1.1 Getting a text data display

With the SCS program running, find the toolbar and click the “r.t.d”. button on the tool bar once. From the Select Display File menu on the left, select 7plusmetcalcnew.sel, if available, by double-clicking on it or by clicking once and then clicking the RUN button. This will specify a display, which shows the oceanographic sensor signals and the meteorological sensor signals with their applied calibrations. A Real Time Display window will open which lists each of the sensors, its current value and calculated properties like Salinity.

To control the size of the data file that is generated, the oceanographic sensor unit log is programmed to update and write to file only at 1 minute intervals. The real-time text display will show intermittent warnings that data is not available or not updating (red or yellow flags) because the logger programs cycles more rapidly. This is not a sign of trouble, unless the values do not in fact update every minute (approximately). Click the box on the lower left of this window marked <turn off error checking>. The weather data updates rapidly and continuously and should not display error warnings.

Other choices for data display are 7param.sel which will call up only the 7 oceanographic sensors, and 7plusmet.sel which will display the oceanographic monitors and the raw signals (uncalibrated) from the meteorological sensors. Installations which have only a weather station will have met.sel and metcalc.sel.

5.1.2 Getting a RT time series plot

It is possible to display the data from any of the sensors in the form of a time series graph. This will give a visual history of how the selected parameter(s) are changing with time. The user can select the type of display, the sensors to be charted, and the time interval. The instructions for building a particular type of plot can be saved and called up to build the same type of graph in another session. More than one plot can be active at the same time, in separate windows, as well as the text real time display.

An example:

Click on the word Display on the SCS toolbar.

From the drop down menu, select RT Plot, and then RT 2Y-Axis Time series plot. A window opens called RT Time Series Plot –Inactive.

Click on Select Sensors.

Click on Select Y1 sensor.

A drop down menu will list all the available sensors.

Select 010-Temperature 2 (the signal from the external thermometer).

Click on Sensors.

Click on Select Y2 sensor.

Select 005- Salinity.

Two differently colored lines will start being plotted, which will show Temperature and Salinity values as a function of time of day. To change the default time period, click on the word Graph at the top of the window.

From the drop-down menu select Time Frame.

Change the time interval to 4 hours by clicking the up and down arrow boxes beside each time unit: days 0, hours 4, minutes 0, seconds 0 (or any other time interval, as desired).

Click OK.

Note that the instantaneous value for each sensor is shown in a box on the right.

Another sensor could be added to each axis by making additional selections. If the values of the sensors to be displayed on the same y-axis are not similar (for example water temperature (0-30) and barometric pressure (980-1020)) then the axis range will be large and variations in the parameters hard to discern. Air temperature and Sea Surface Temperature could be plotted on the same axis. Line color, line type and other changes can be made from the submenus in the Graph menu.

If this display is one that will be used on multiple occasions go to File.

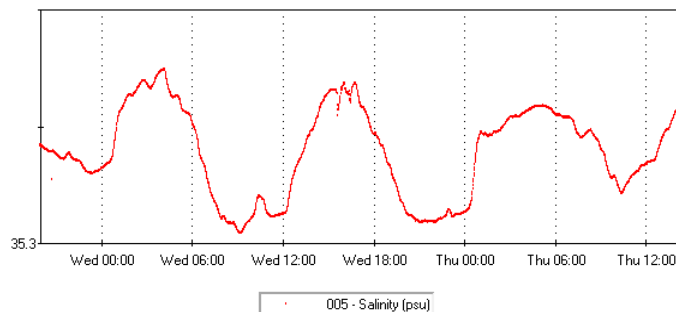
Save Current Settings.

To see a saved graph like the example above (with SCS running)

go to File.

Open Saved Settings.

Select Geoff1.tpl.



5.1.3 Real-time data gauge displays

An alternate way to display the data from any of the sensors is in the form of a gauge. This will give a visual display which is easy to read at a glance, and can include a “history” indication of how the selected parameter has changed over a selected time period. The user can select the sensor to be displayed, the format (dial or bar type gauge), the update rate and the time interval for the history. The instructions for a particular gauge can be saved and restarted in another session. More than one gauge can be active at the same time, as well as the text real time display and time series plots in separate windows.

An example of designing your own gauge style display:

With SCS running, click on the word Display on the SCS toolbar.

From the drop down menus, select RT Gauge, Gauge Builder.

A window opens called SCS Gauge Selection template Files.

Click on New File.

On the upper part of the window, select Dial, one pointer style.

A drop down menu will list all the available sensors.

Move the cursor down to highlight the sensor you want to display. For example, App-Wind-Speed (Met).

Click on Select.

Click on OK.

A Parameter Selection window will open, with many options:

Shape of dial: $\frac{3}{4}$ circle.

Range: 50 (knots) maximum, 0 minimum.

Number of labeled sectors: 5.

Number of divisions in a sector: 5.

Gauge screen location: the circles mark relative position on the screen; click on one.

History defaults are 1 hour, and sample every 15 seconds.

File name: Wind Speed.gag. Be sure to delete the * and the words “or *.tpl”, when naming the file.

Click on Save.

Exit the Gauge Builder window.

Color, line type, history display and other changes can be made from the submenus in the Gauge Builder window. The file can be opened for editing later to explore the various options.

Other gauges could be added by repeating the process.

To call up a gauge (with SCS running)

go to Display.

RT Gauge.

Gauge display.

Or, click on the Gauge icon button in the SCS toolbar.

Highlight the name of the gauge you just designed; click OK.

Note that the current value for the sensor is shown digitally in a box on the gauge.



In some installations there may be filenames for gauges that will not work correctly with the SeaKeepers system, because they are residual files from other versions of the program. They can be deleted using Windows NT Explorer; C:\Ship\SeaKpr\Display\gauges*.gag. Do not delete gag.cmd in this directory.

5.1.4 Saved Data formats and location

The data is logged in real time, into raw format files (*.RAW) in the directory DataLog on the C drive of the SeaKeepers computer. The RAW files contain the entire message received from the sensor in its original form. They are ASCII, and can be read in a word processor or a spreadsheet program. A file is opened each time the SCS program is started, and given a name, which encodes the sensor type, date and time. The format is Device_yymmdd-hhmmss.RAW. The meteorological data is saved as device Met and device Wind-Speed[Met]. Wind-Speed[Met].raw files are the same as the Met.raw, except that the sensor outputs have been translated into knots, degrees, etc. from pulse or voltage

reading by applying the instrument calibration factors. All the oceanographic data is in Idronaut-Polled; the sensor performs the calibration internally before the signal is sent to the SCS software.

There is also a Sensor file, which contains configuration information about the sensors.

5.1.5 Displaying saved data

SCS also saves archive files of the data, in the Datalog subdirectory Compress, with the extensions .ACO and .LAB. Each time SCS is run, the new data is appended to the archive files. To plot saved data, you must access the SCS toolbar. {If the program is not collecting real time data, you may start an off-line session by clicking on SCSMenu, instead of SCSMenu2, in C:\AllSCS\Exe from NT explorer}

Click on QA Processing.

Plot individual sensors.

A Time Series Post Plot window will open.

Click on File.

Open Data Files.

Open File #1.

A list of available sensors will open. Select one to plot. Click OK.

A window will open for selecting the time frame for the plot to be displayed, with the limits of the available data displayed as defaults. Accept the values given or change them to a time period of interest, and click Plot. Additional sensors can be plotted on the same graph by opening additional files, but they will all be plotted on the same Y axis. Other sensors can also be plotted in separate windows by repeating the steps of making a plot from the QA processing menu.

5.2 Satcomm

The Satcomm program is a program that controls the transmission of data via INMARSAT from the SeaKeepers computer to the shore-based data center. This program also writes the gps position log, which is essential for utilizing the stored oceanographic and meteorological data. It runs out of a DOS window (black background with title bar that identifies it as the Satcomm program), which **may be minimized but should not be closed**. Closing the window will stop the program.

At 0000, 0300, 0600, 0900, 1200, 1500, 1800, 2100 UT (GMT) the program selects the most recent 10 data from the SCS data files, calculates the average value for each parameter and assembles an email message with the data, time and the GPS position of the ship. It sends the message via satellite to the International SeaKeepers Society's mailbox at the University of Miami.

Versions 1.2 and higher are installed in a SatComm subdirectory under C:\SeaKeeper. A SatComm.ini file is used to configure the program (versions 1.3 and higher) which includes a mode with the ability to send test transmissions to alternate email addresses. A log file <C:\SatcommLog~1.log> is generated which is useful for troubleshooting. Details are in Section 6.3.2.

5.2.1 Understanding messages

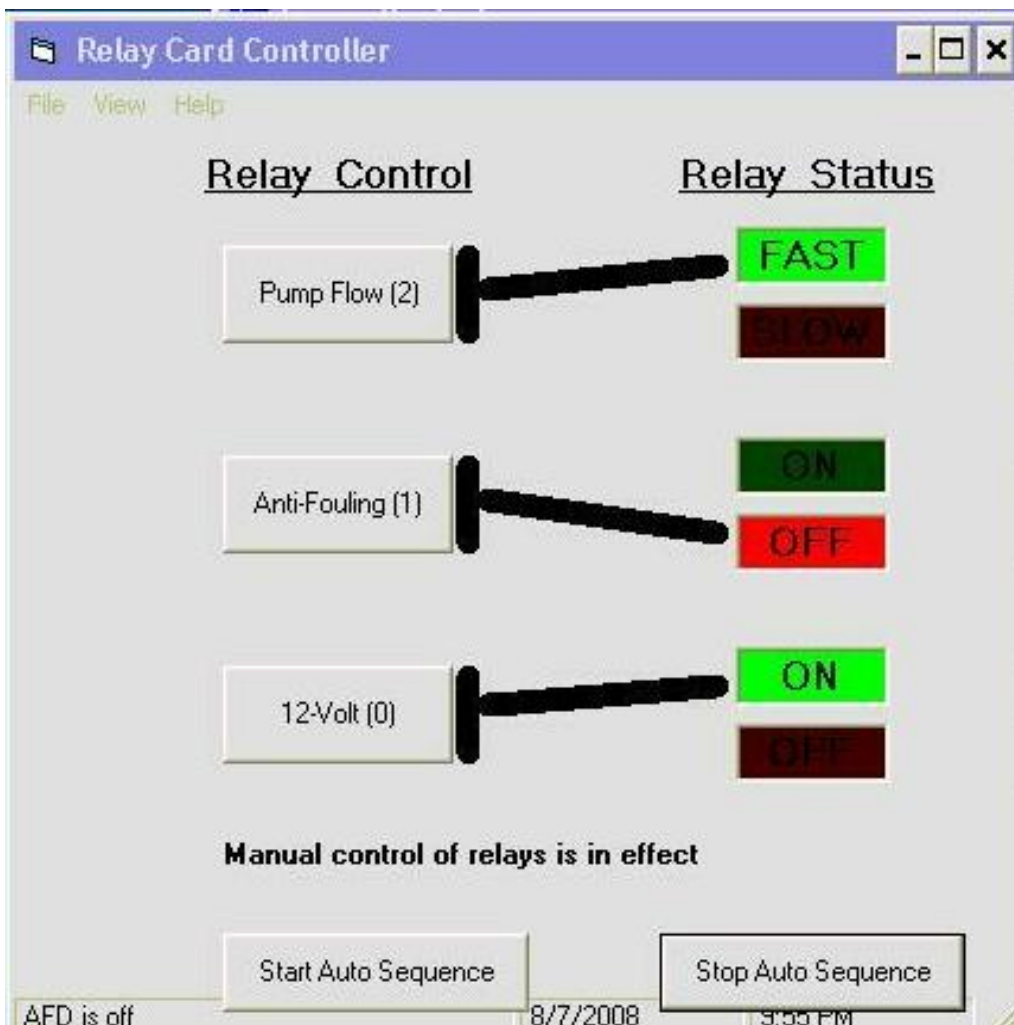
1. **Did not receive response from UTC query.** When the program starts it establishes communications between the INMARSAT transceiver and the computer. If there is a problem, the program generates this error message. The most likely causes are:
 - transceiver not installed;
 - power cable or antenna cable not connected;
 - transceiver not turned on;
 - 9-pin cable between COM1 and the transceiver not present.

2. **Unable to retrieve met data - not enough data in file.** Check the cabling between the met station and the computer module. Is SCS program running? Is the hard drive full? Is the 24 volt power supply working?

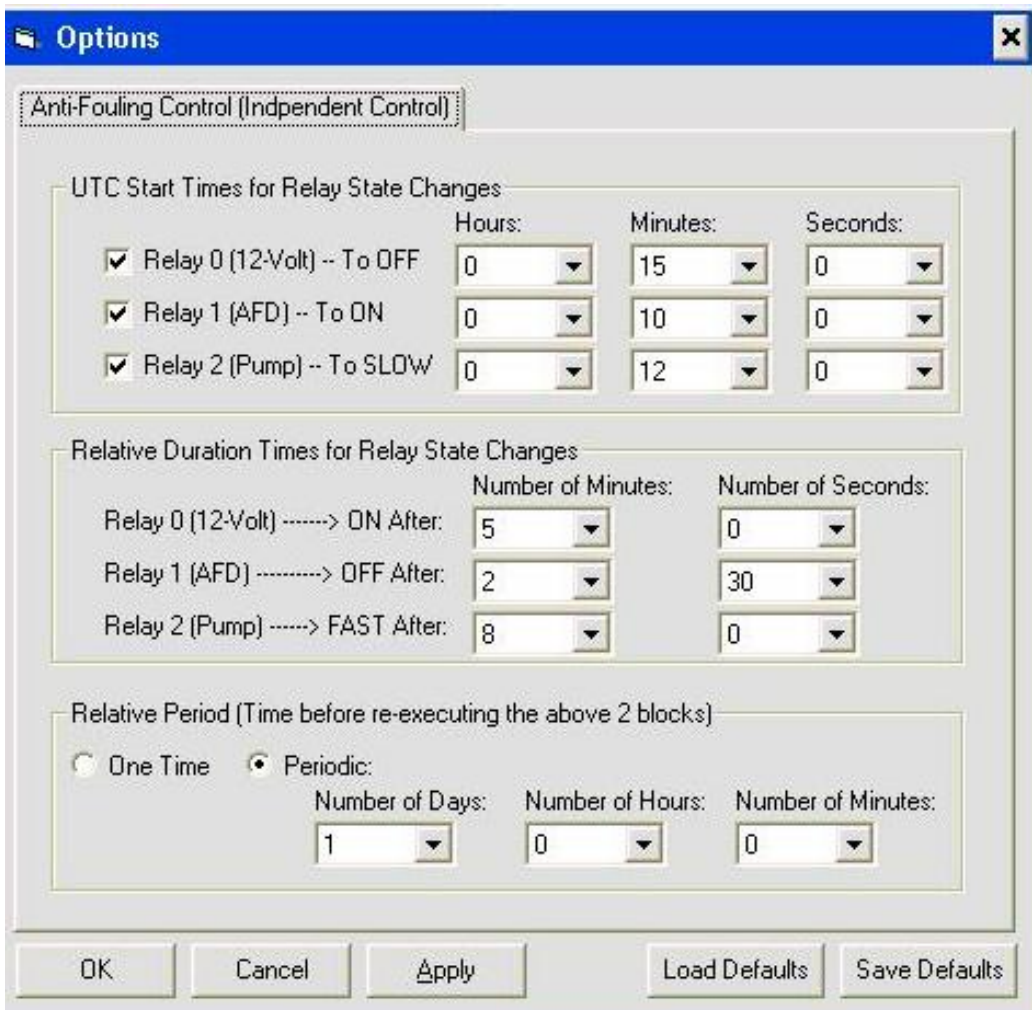
3. **Unable to retrieve Ocean data - not enough data in file.** Check cabling between the CTD sensor and the computer module. Is SCS program running? Is the hard drive full?

5.3 Relay control program

The **relay board** has an associated software program called **RelayCardController**. This program turns the pump on and off, using a labeled toggle switch, which responds directly to the mouse click. There is no hardware switch on the relay board; controlling the pump is done through the software. When the RelayCardController program starts it initializes the relays and sets them to the normal position. (NO is set open and NC is set closed relative to the COM terminal on each relay) The pump will start after a delay of about 2 minutes. When the program is turned off, the pump will also shut down. In addition to switching the pump (relay 0) this program also controls relays 1 and 2 which control the active anti fouling device and the pump speed. The program is controlled by a configuration file in which all events are determined by time of day this file may be viewed by clicking the “stop auto sequence” button.



The clicking view and options buttons you will arrive at the configuration window seen below.



Remember to restart the auto sequence after adjusting or viewing and closing this window.

5.4 pcAnywhere®

In normal operation the SeaKeepers computer does not have a monitor, keyboard or mouse. Symantec pcAnywhere® is a program that allows a networked computer to operate the computer remotely as if the operator were actually using the keyboard and mouse of the SeaKeepers computer. The SeaKeepers computer has pcAnywhere installed, and will start in “host” mode

as the computer boots up. If it is required to access the system from the ship's computer, then the program must also be installed on the shipboard computer.

Installing pcAnywhere[®] on the ship's computer

The program installs from CD; select install current version and accept the default settings. This program works with XP but as of today August 7, 2008. Is unproven with Vista

After installation has been completed:

Start Symantec pcAnywhere[®] from the Start Menu or the desktop icon.

Select Remote Control from the toolbar buttons.

Double click on **Add remote control item**.

At the prompt for a name, type SeaKeepers.

Click Next.

What connection device?

From the drop down box, select **TCP/IP**.

Click Next.

Host PC's name?

Type the name of the SeaKeepers computer, which will be SK1000.

PcAnywhere can search for computers by name or by IP address. As it is delivered, the computer address will either be 129.168.2.199,

Our example will be 129.168.2.199 and it will be a member of the MSHOME workgroup. An icon named SeaKeepers will appear in the pcAnywhere remote control screen on your computer.

The IP address and workgroup name of the SeaKeepers computer should be changed so that the SeaKeepers computer becomes part of the ship's local area network and workgroup. In some configurations, it may be suggested to set the SeaKeepers computer for auto-assignment of an IP address by the system server in earlier versions with an NT operating system this DHCP assigned IP address caused problems with software execution so we prefer to use a fixed IP address. Settings for DNS, gateway and WINS may also need to be entered, depending on the complexity of the vessel's network.