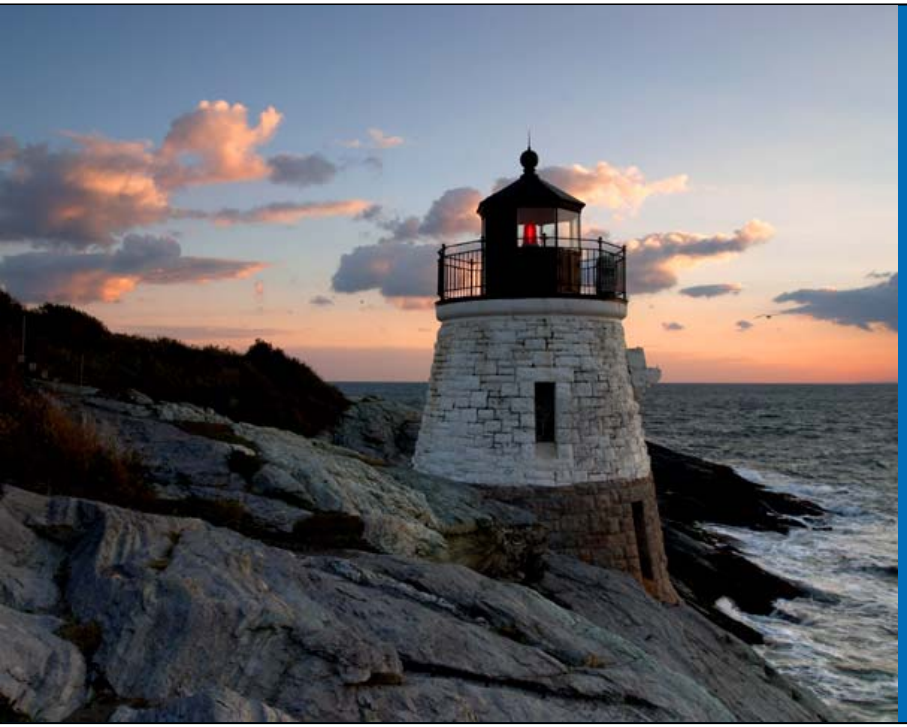

Research Vessel Technical Enhancement Committee (RVTEC)
November 2009 Meeting
ISS - Integrated Survey Systems

John Kiernan, P.E.
SAIC - Marine Science and Technology Division

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ISS-2000 Integrated Survey System

- ISS Overview
- Functional Components
  - Timing and Clock Synchronization
  - System Setup and Parameter Control
  - Message Manager (Informational and Event Messages, and Caution, Warning, and Severe Alarms)
  - Navigation Display and Control
  - Multibeam Manager
  - Tow Body Positioning
- Strengths and Benefits of Using an ISS
  - Marine Geology, Geophysics and Archeology
  - Biological, Physical and Chemical Oceanography

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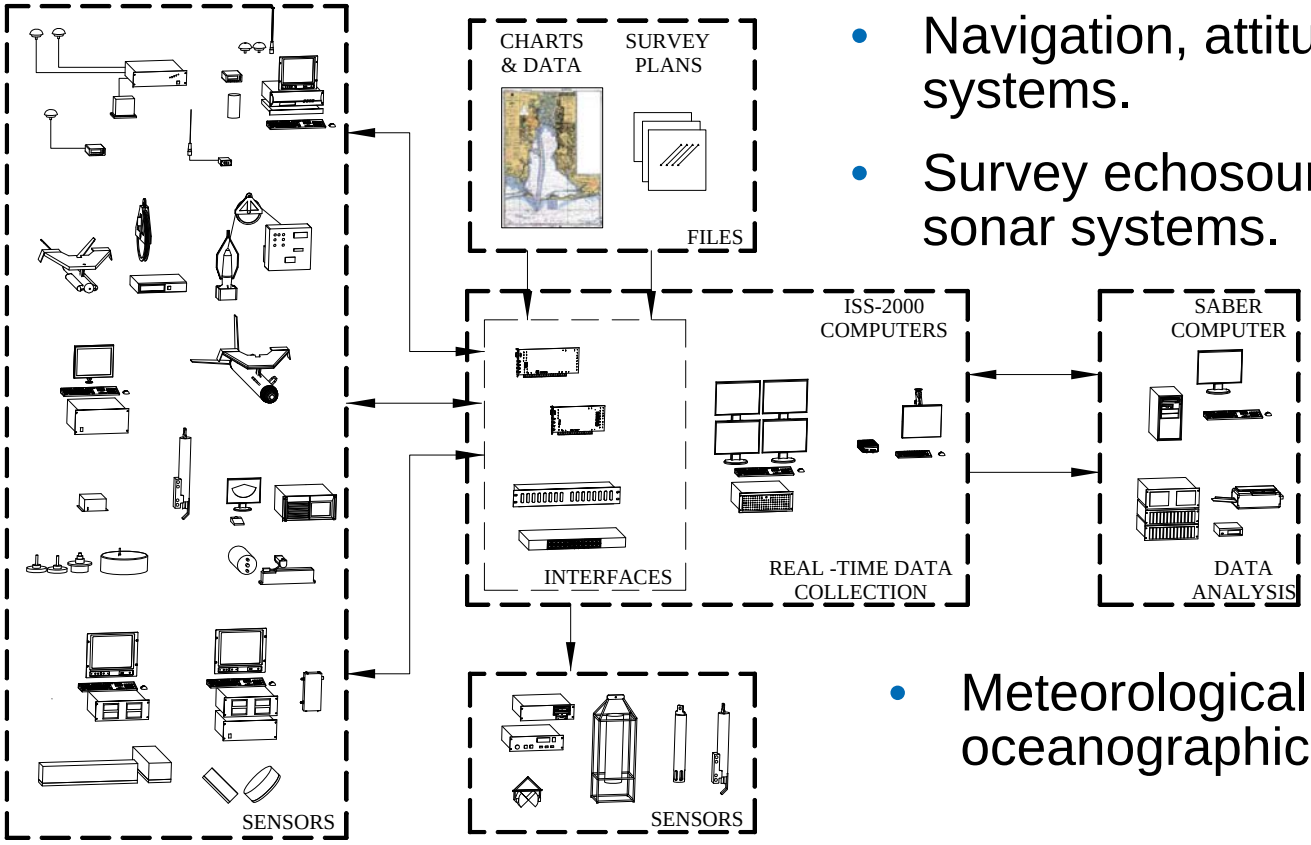
Overview

- System for acquisition and management of oceanographic survey data.
- Single data quality monitoring station, reduces training and operators.



- Navigation, attitude and orientation systems.
- Survey echosounders and towed sonar systems.
- Meteorological and physical oceanographic systems.

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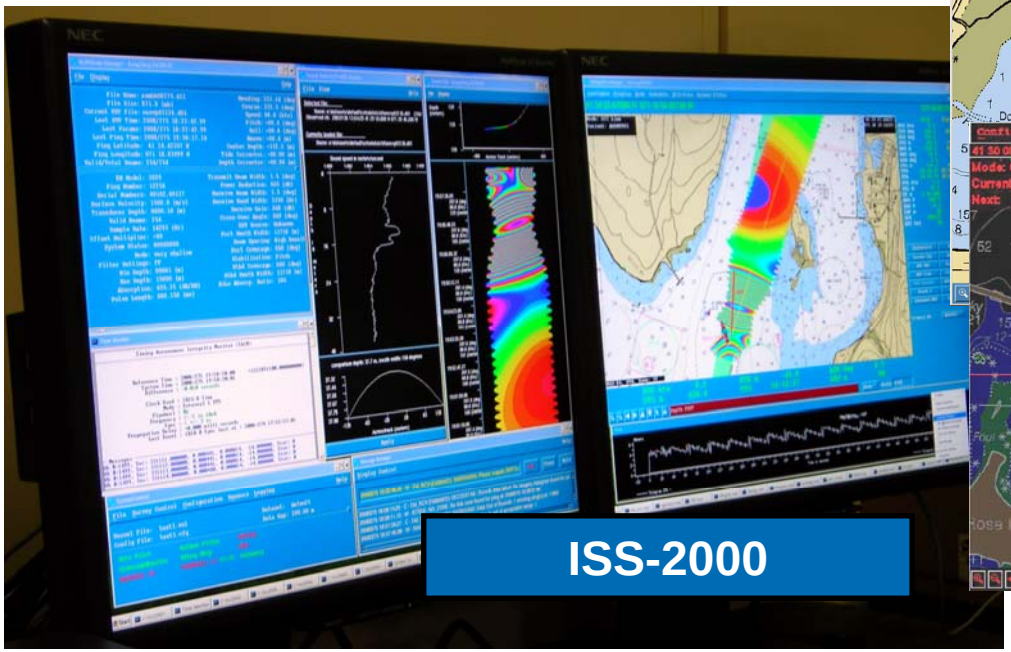
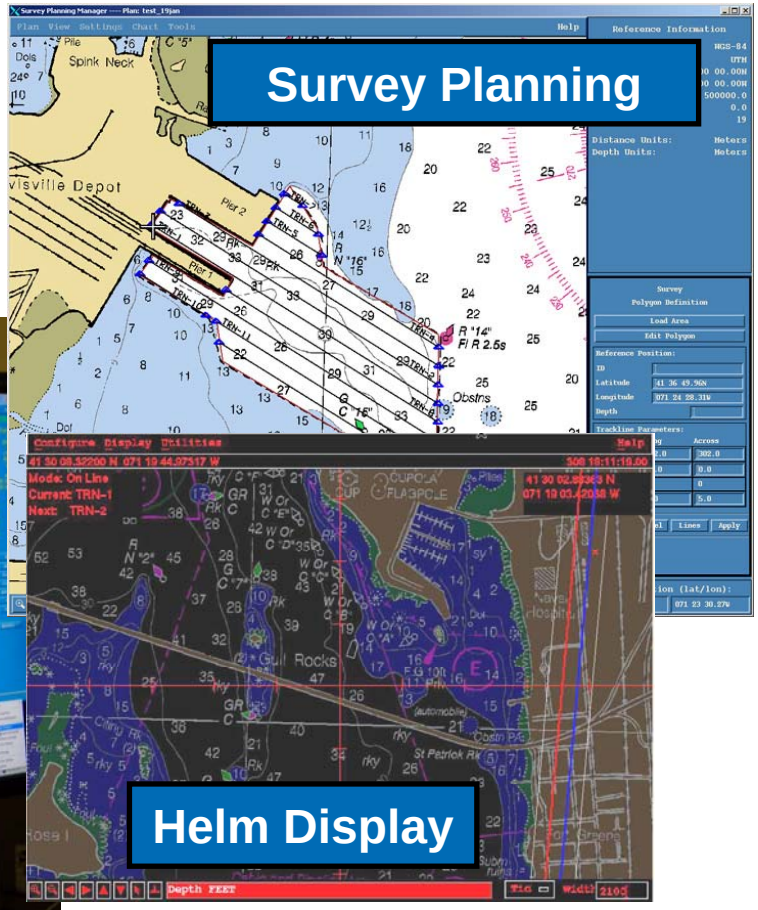
Functional Components

- ISS-2000 Real-Time Data Acquisition.
  - Workstation with timing module
  - Survey Planning
  - Helm Display





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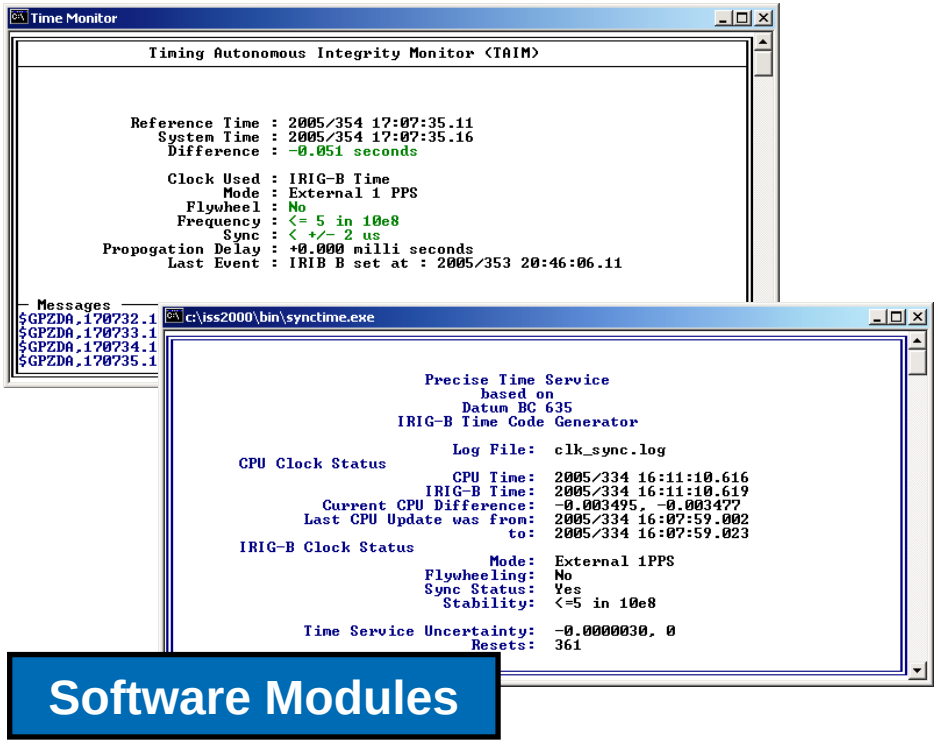
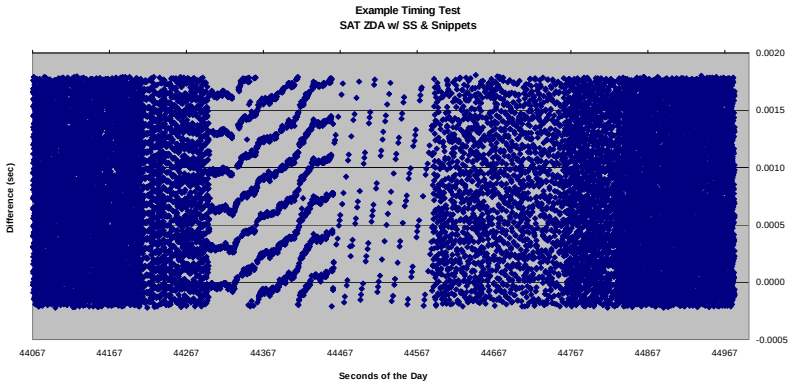
Timing and Clock Synchronization

- The internal timing card receives an analog 1 PPS signal and serial time message to synchronize to the GPS receiver.
- The serial message options are NMEA ZDA, UTC, and Time Mark 1B.



Software Modules



Results of Timing Test

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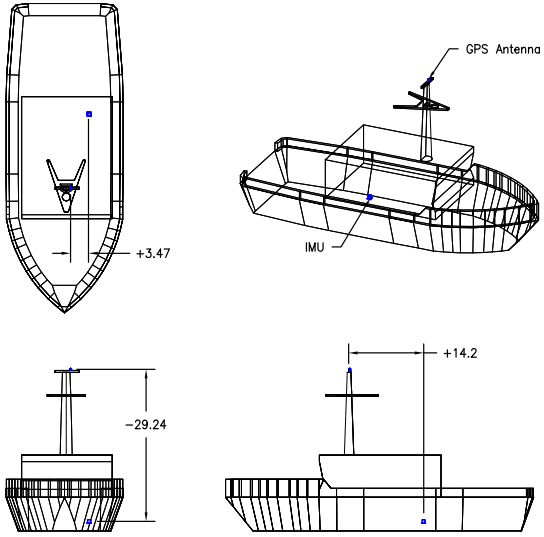
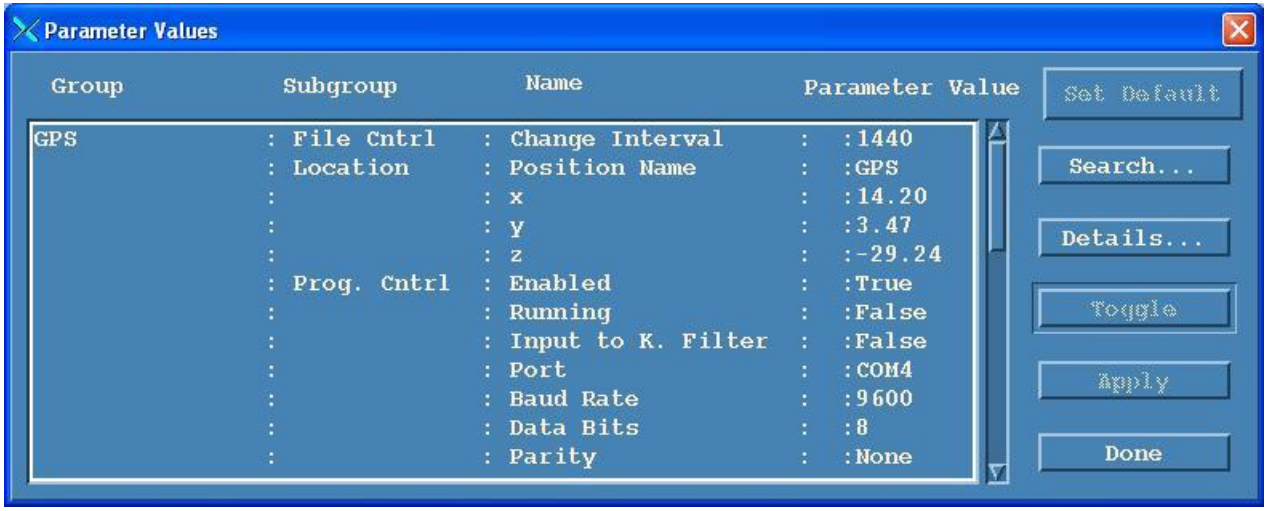
System Setup

- The antenna and transducer lever offsets are entered and applied.
- Vessel parameters for settlement and squat, towfish block offsets.
- Program selection, error limits, timeout values and data logging intervals.





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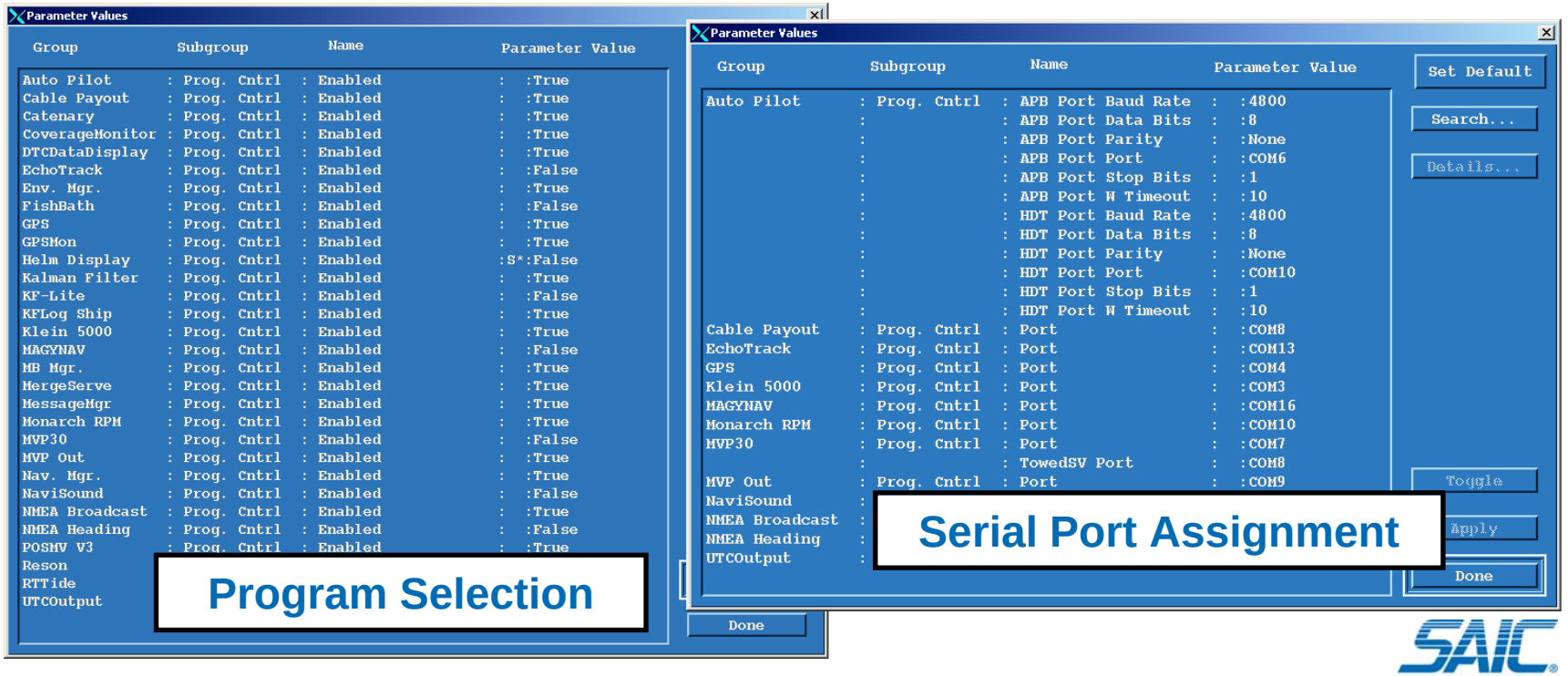
Setup & Control

- The operator can control many of the equipment settings from ISS-2000 software through Parameter Control interfaces.
- Does not increase the number of operators required and provides a single control interface for different equipment.



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Parameter Control

- Sensor parameters are monitored to user-defined parameters.

Parameter Values

Group	Subgroup	Name	Parameter Value
SeaPath	File Cntrl	Change Interval	:1440
	Prog. Cntrl	Enabled	:True
		Create Dump File	:True
		Like Message Timer	:60
		Logging Enable Flag	:True
		Logging Interval	:1.0
		Read Timeout	:10.0
		Receive Data Socket	:3050
		GGA Data Socket	:3051
		Running	:S :True
		Pos&Vel to K Filter	:True
		Heading to K Filter	:True
		Attitude to K Filter	:True
		Truth to KFP	:True
		Filter Velocity Data	:False
	Quality	Max GPS/System Diff.	:1.0
		DGPS Corr Latency	:20
		HDOP Limit	:2.5
		SV Tracked Limit	:4
		RMS Pos Error	:10
		GPS Service Level	:RTK

Set Default | Search... | Details... | Toggle | Apply | Done

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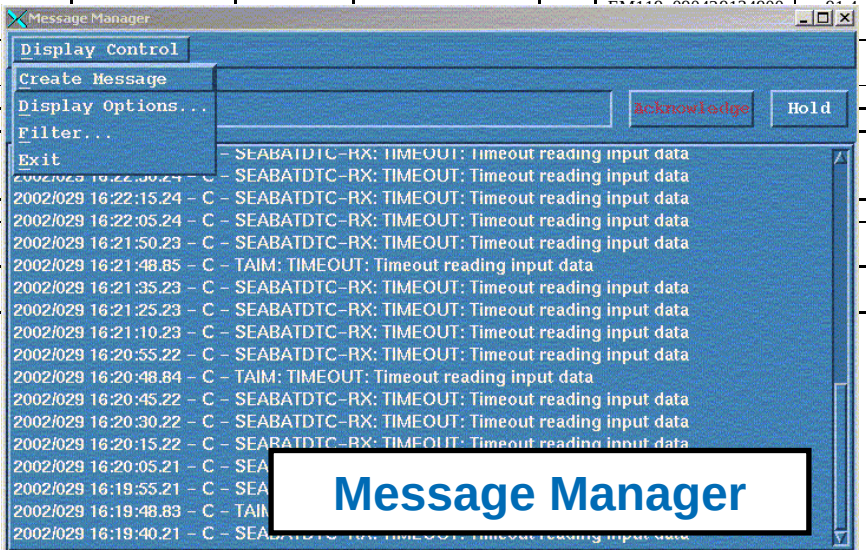
Message Manager

- Messages generated by sensor errors, survey operations, performance information and operator entered text messages.

UTC TIME	LB/LE	SURVEY LINE	100/200 COVERAGE	MB FILE	RPM	SS FILE	SURVEY LINE AZ.	RT NOTES
13:47:32	LB	A_SSHOL_225-186				EM119_090429134600	271.1	HOL: EMSBH09119.D03 RPM: 2400
13:47:32						EM119_090429134600	271.1	SS FILE CHANGE: EMSBH09119.D03 RPM: 2400
13:49:18	LE	A_SSHOL_225-186						
13:51:13	LB	A_SSHOL_125-80				EM119_090429134900	91.4	
13:51:13								SS FILE CHANGE: EMSBH09119.D03 RPM: 2400
13:51:29								
13:53:32								WILL ATTEMPT TO CHANGE FILES EVERY OTHER LINE.
14:01:15								SONARPRO NOT RECEIVING LAT LONG OR SPEED.
14:47:10								FIGURED OUT THE TOWFISH POSITION ISSUE. COM PORTS ARE REVERSED ON THE TPU AND NMEA BROADCAST IS USING PORT 10.
14:48:22								SB FILES D04 - D06 ARE NOT USED.
14:49:43								XTF FILES 1346 AND 1349 ARE NOT USED. THEY HAVE NO POSITIONING.
14:54:34								WIND 10-15 KNOTS, DIRECTION SE, WAVE HEIGHT 2-4 FEET, VISIBILITY 8 NMI

Report Generation



Message Manager

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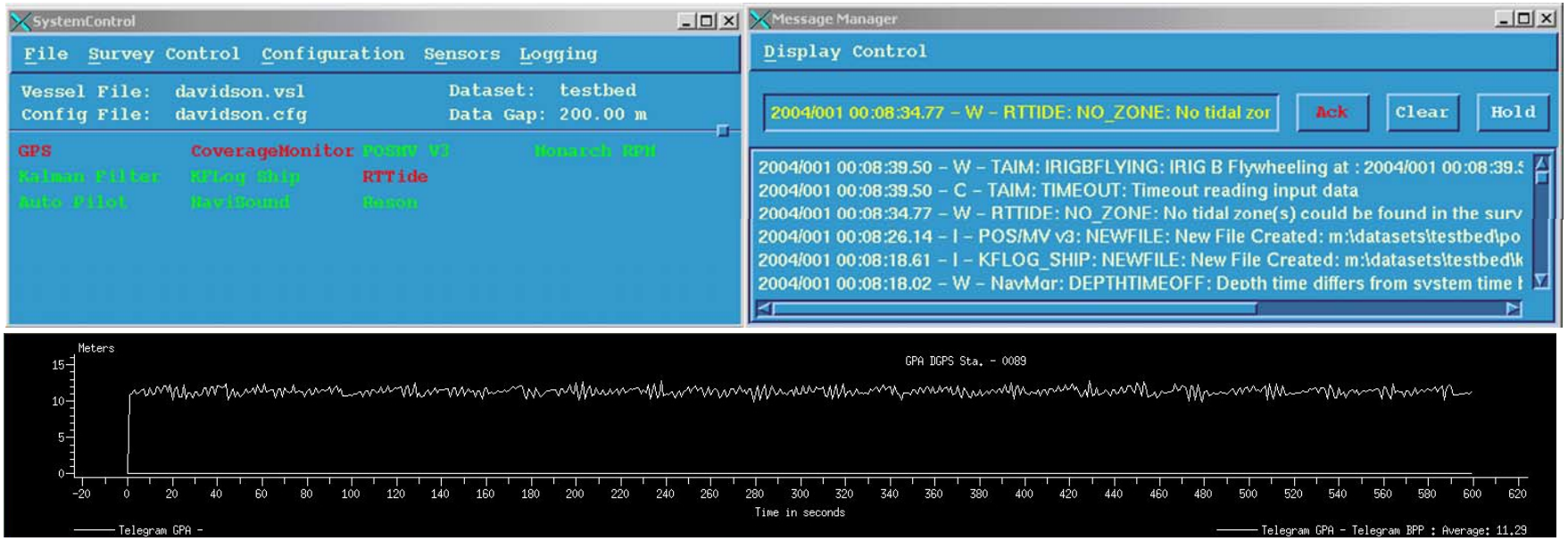
Messages & Alarms

- ISS-2000 is designed to automatically alarm the operator when the system is exceeding the operator set parameters.
- Allowing the operator to monitor the integrated system in real-time.
- Types include informational and event messages, and caution, warning, and severe alarms.



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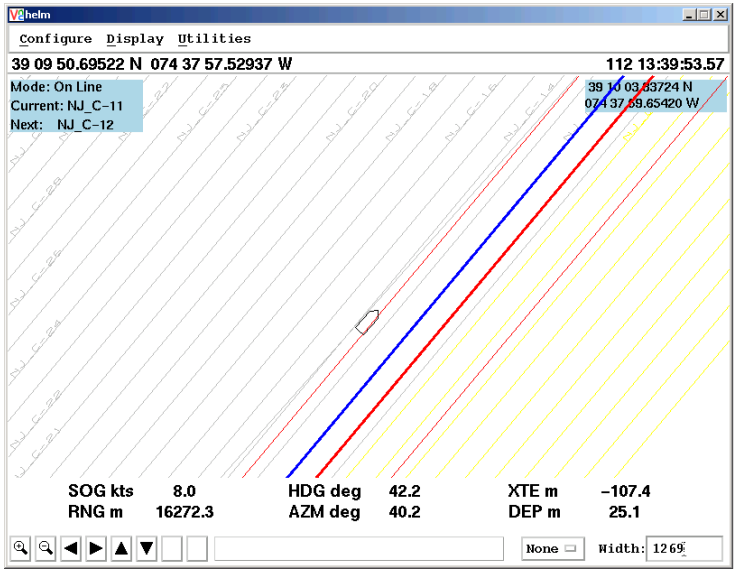
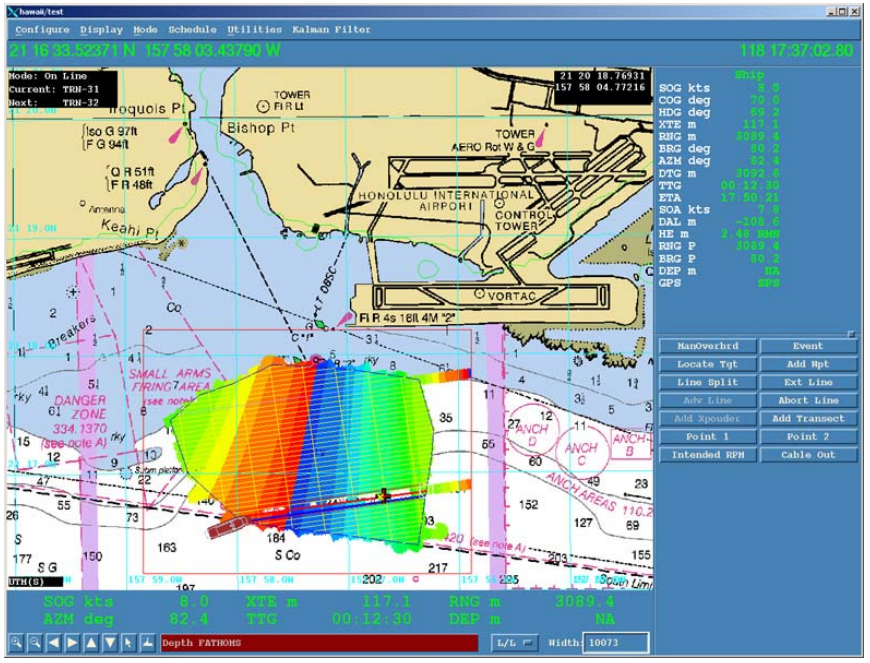
Navigation Display & Control

- The Navigation Display allows the operator to view the data in real-time while monitoring the survey progress and navigation information, including survey lines and swath coverage.
- System provides steering commands to the DP and/or autopilot systems.





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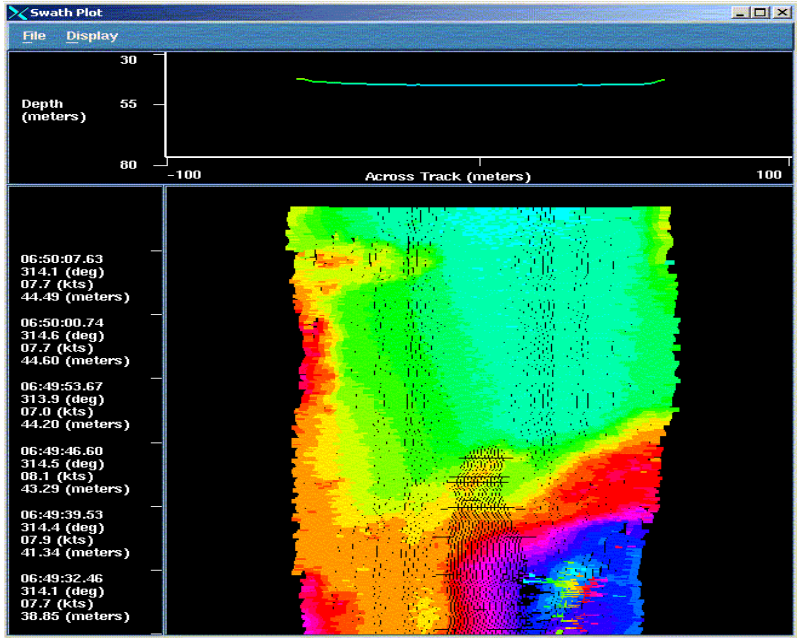
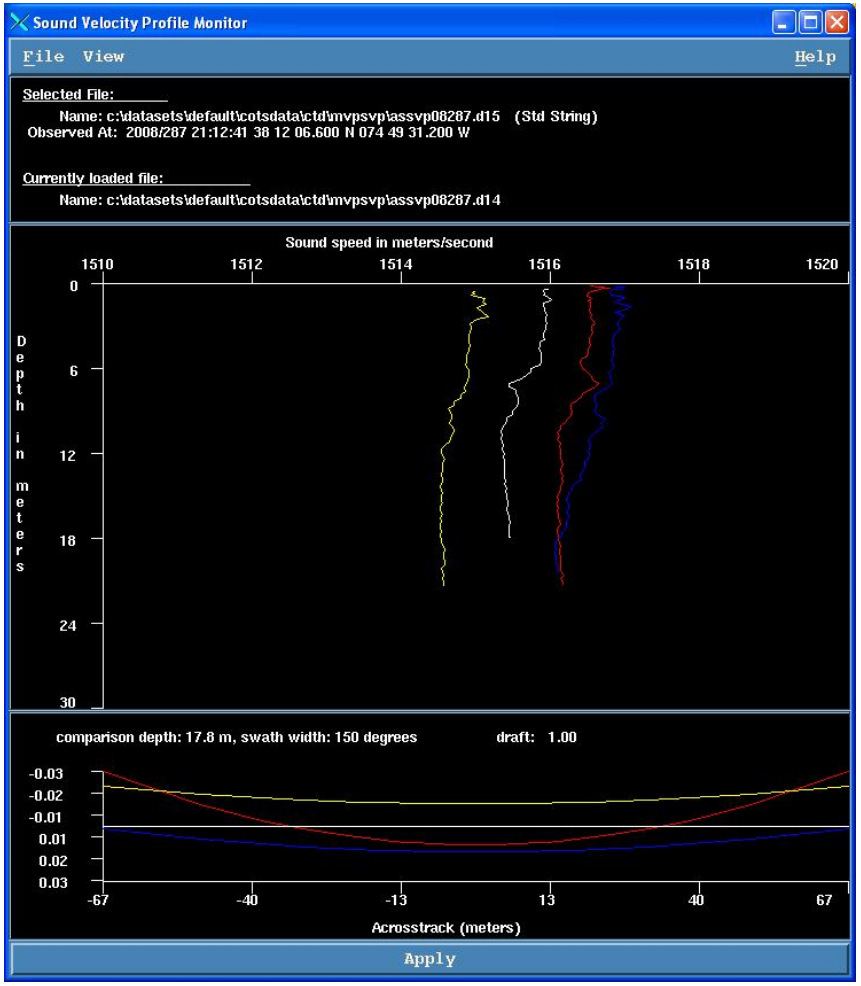
Multibeam Manager

- Multibeam data can be viewed in real-time to verify data quality.
- SVP cast can be applied and verified in real-time.





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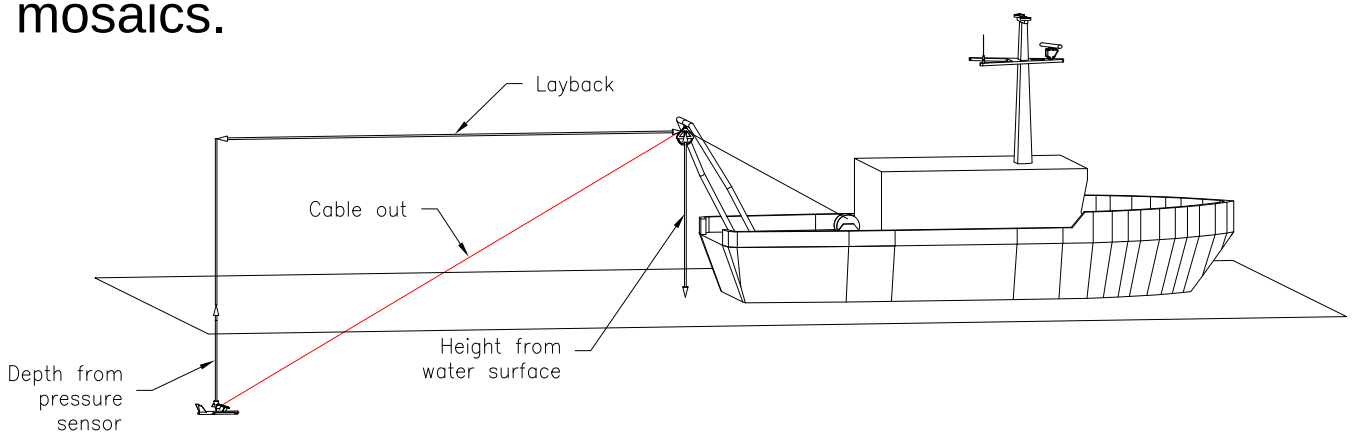
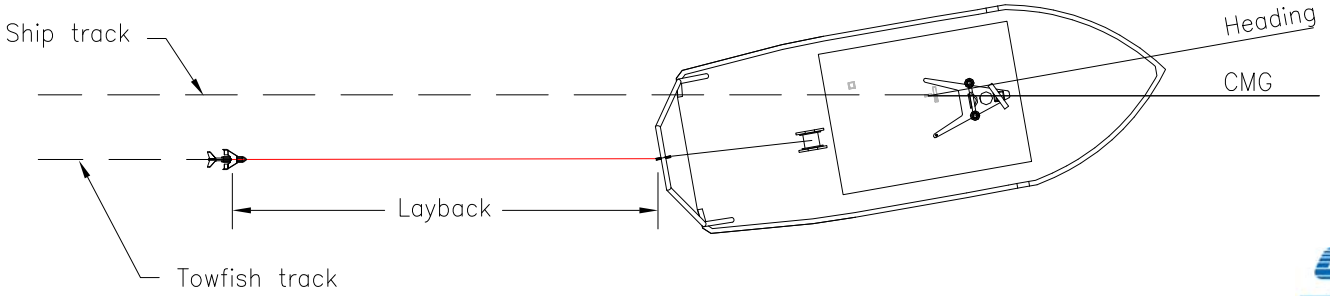
Tow Body Positioning

- Towfish and ROV positioning is enhanced using proven algorithms.
- Coring and bottom investigations used to ground truth sidescan mosaics.



$$\text{Layback} = \sqrt{(\text{Cable out})^2 - [(\text{Depth} + \text{Height})]^2}$$



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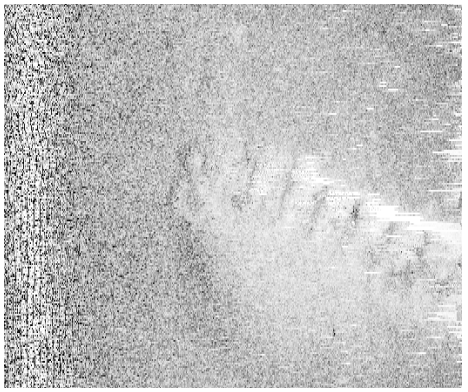
Marine Geology, Geophysics and Archeology

- Marine Geology, Geophysics and Archeology.
  - Multibeam Bathymetry
  - Hydrography
  - CTD and Sound Velocity Profiles



- ISS provides the strongest support for these operations. Data from multibeam swath mapping sonar system recorded to OEM and open format GSF. Generic Sensor Format (GSF) is a standard file format for bathymetry data and widely used in the maritime community.
- Many multibeam sonars provide one or more outputs of acoustic backscatter.

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Biological, Physical and Chemical Oceanography

- Biological, Physical and Chemical Oceanography.
  - Hull-Mounted Sampling Systems/Sensors (ADCPs, seawater sampling)
  - Mooring Deployment & Recovery
  - Free-Fall Instrument Deployment & Recovery
  - Coring - Piston, Box
  - Seasoar Towing MOCNESS & other nets
  - Deep Towing
- These systems are not tightly integrated and are run independent of main ship systems. Ship and/or tow body position and time synchronization can be transmitted to workstations collecting and recording data. Survey planning includes waypoint surveys. Data archive can be managed using ISS at the end of survey.

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Thank you

Questions?

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