



Ocean CLASS AGOR

Integrated Survey System

15 April 2009

Integrated Survey System (ISS)

An integrated survey system is not stated in the SMR's.

In researching the scientific mission equipment we would like to consider including ISS-2000 for providing a uniform data collection and data format system on the new Ocean CLASS AGOR.

ISS Background

- Hydrographic survey software produced by SAIC Marine Science & Technology Division (MSTD) Newport, RI
 - **ISS-60** – NAVOCEANO's tactical shipboard acquisition software
 - **ISS-2000** – Commercial data acquisition package, similar to ISS-60
 - **SABER** – Data Processing software
- SAIC/ MSTD has performed over 45 high-resolution shallow water surveys for safety of navigation under contract to NOAA since 1995.
- SAIC/MSTD have consistently received and “Excellent” rating from NOAA for their services.
- All SAIC NOAA surveys use ISS-2000 for Survey Planning, Data Acquisition and Data Archiving.



ISS & SABER on UNOLS Ships

- *R/V KILO MOANA*
 - ISS-2000 was temporarily installed for a 2005 University of New Hampshire (UNH), Center for Coastal & Ocean Mapping , Exclusive Economic Zone (EEZ) survey in Alaska.
 - ISS-2000 was integrated with the sonar suite for hydrographic operations.

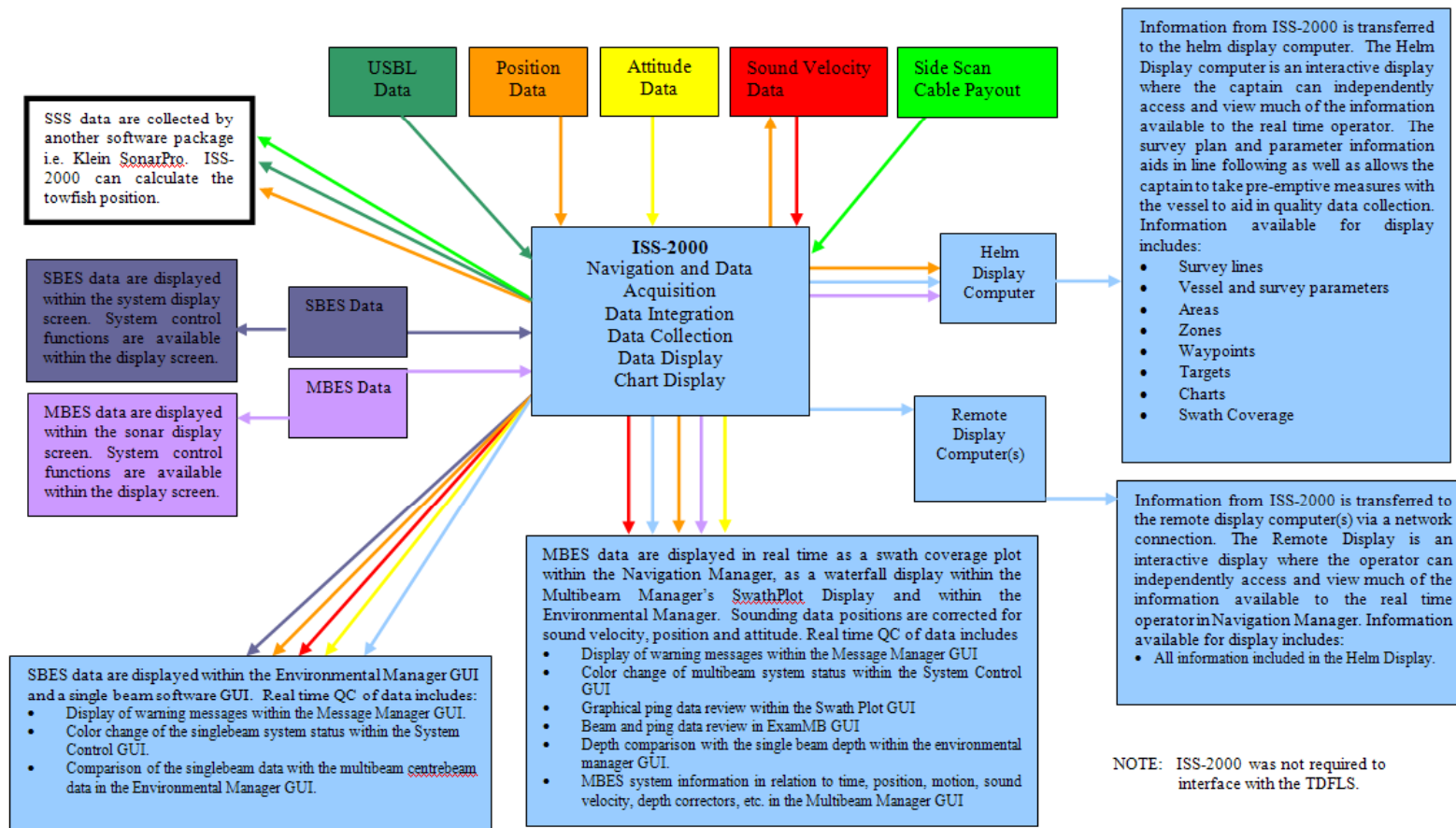
- *R/V ROGER REVELLE*
 - SABER was used during the 2008 SAIC survey for UNH EEZ survey.
 - SABER was brought aboard for post-processing of the hydrographic data.



Integrated Survey System

Why use ISS-2000?

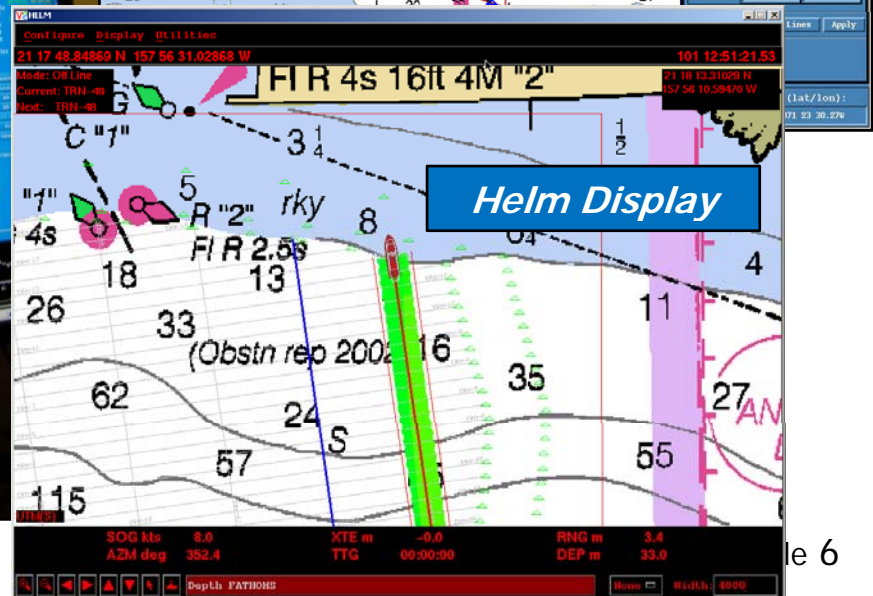
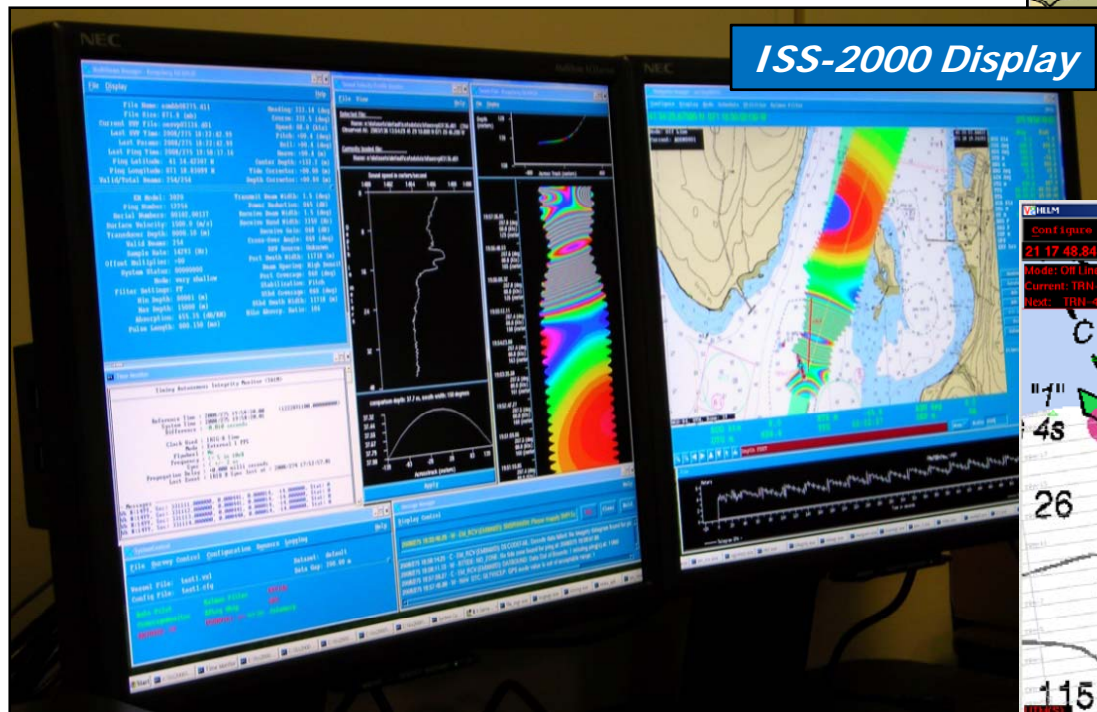
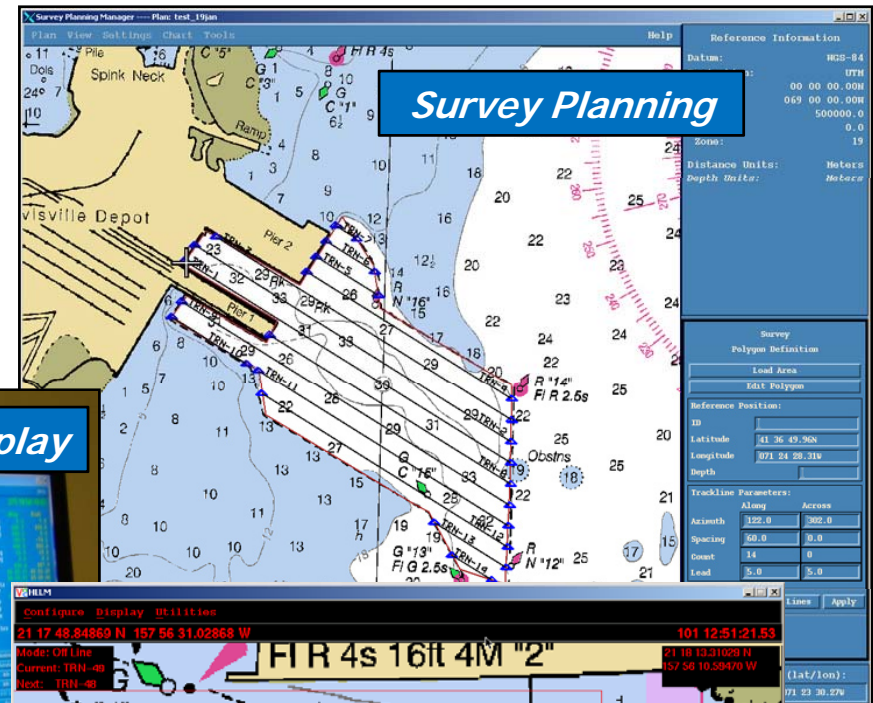
- Single monitoring workstation for multiple oceanographic equipment
- Real time navigation monitoring and editing
- Real time data analysis
- Data archiving to processing computers and Network Attached Storage (NAS)



ISS-2000 Components

ISS-2000 Real Time Data Acquisition

- ISS-2000 dual monitor display
- Survey Planning
- Helm Display located on the bridge
- All use Graphical User Interfaces (GUI)



ISS Timing Analysis

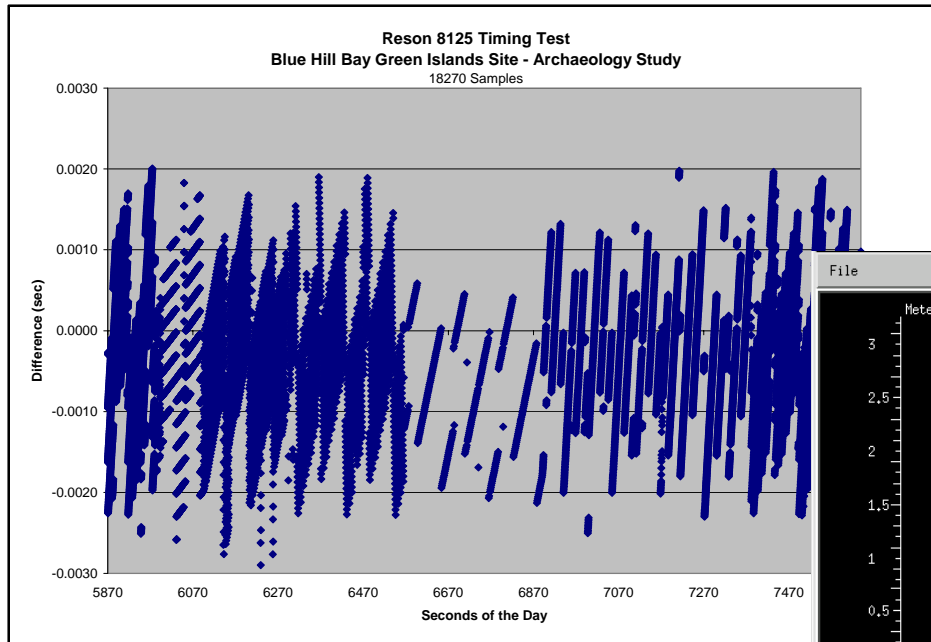
- The internal timing card receives the analog 1 PPS signal and serial time message to synchronize to the GPS receiver.
- The serial message options are NMEA ZDA, UTC and Novatel TMIB.

```
Time Monitor
Timing Autonomous Integrity Monitor (TAIM)

Reference Time : 2005/354 17:07:35.11
System Time : 2005/354 17:07:35.16
Difference : -0.051 seconds

Clock Used : IRIG-B Time
Mode : External 1 PPS
Flywheel : No
Frequency : <= 5 in 10e8
Sync : < +/- 2 us
Propogation Delay : +0.000 milli seconds
Last Event : IRIB B set at : 2005/353 20:46:06.11

- Messages -
$GPZDA,170732.11,20.12.2005,00.00*60
$GPZDA,170733.11,20.12.2005,00.00*61
$GPZDA,170734.11,20.12.2005,00.00*66
$GPZDA,170735.11,20.12.2005,00.00*67
```



```
c:\iss2000\bin\syncstime.exe

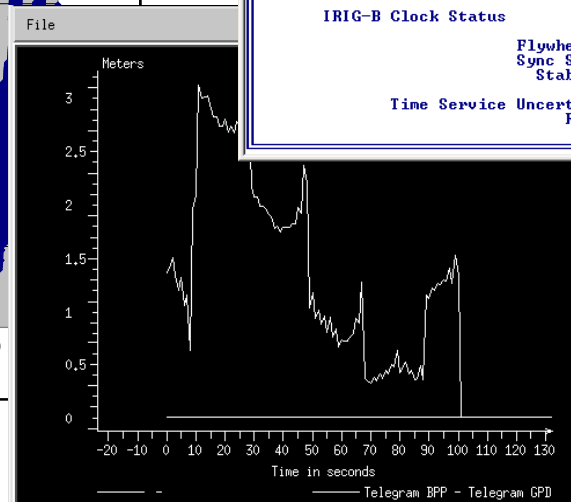
Precise Time Service
based on
Datum BC 635
IRIG-B Time Code Generator

Log File: clk_sync.log

CPU Clock Status
CPU Time: 2005/334 16:11:10.616
IRIG-B Time: 2005/334 16:11:10.619
Current CPU Difference: -0.003495, -0.003477
Last CPU Update was from: 2005/334 16:07:59.002
to: 2005/334 16:07:59.023

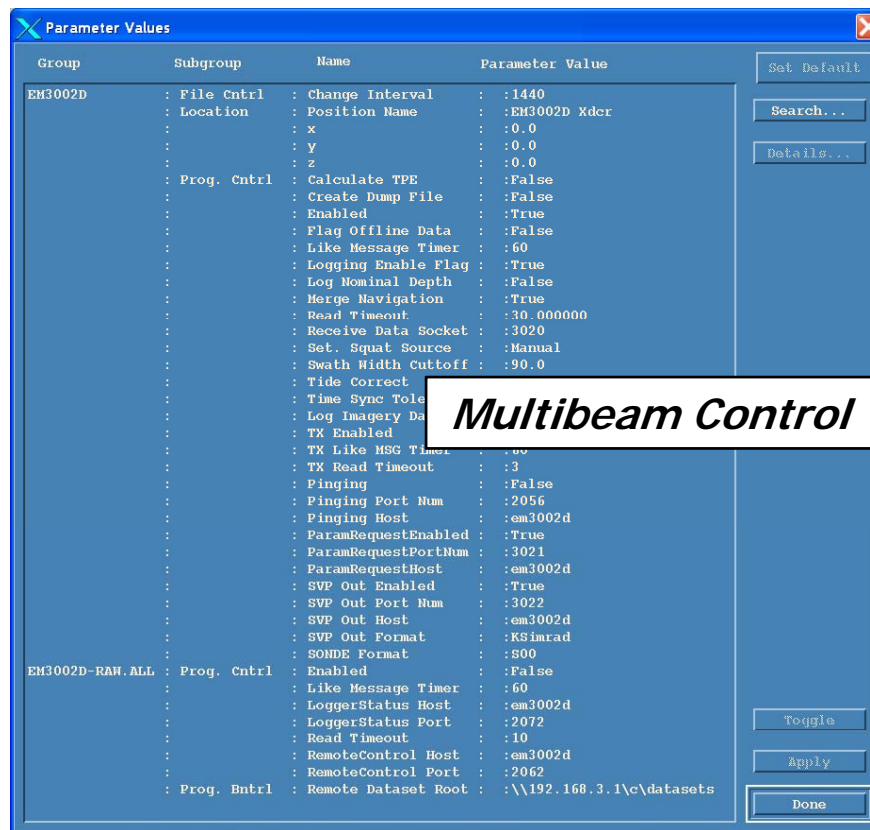
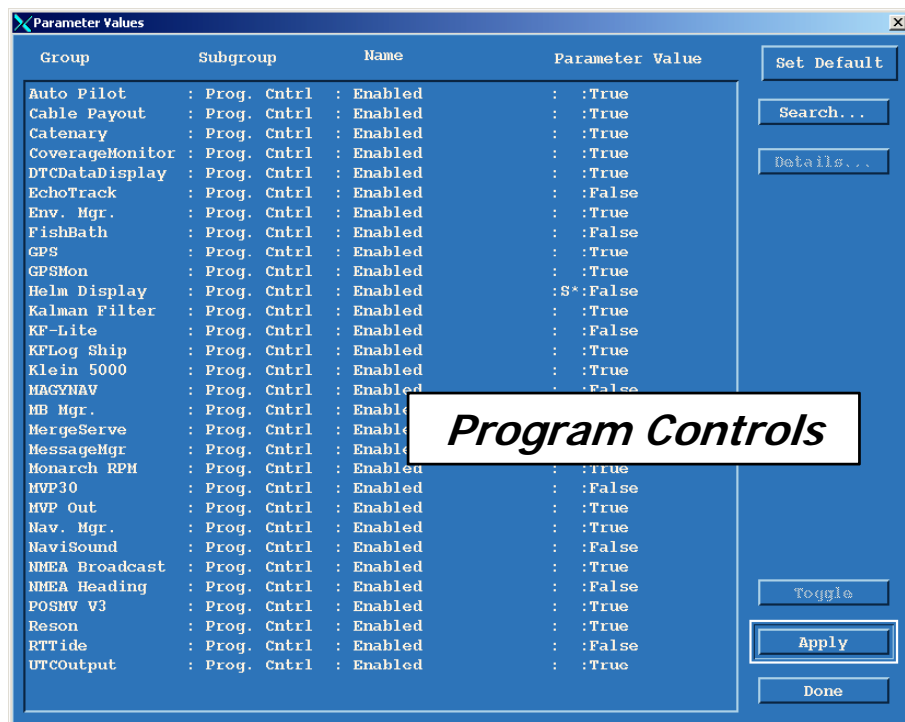
IRIG-B Clock Status
Mode: External 1PPS
Flywheeling: No
Sync Status: Yes
Stability: <=5 in 10e8

Time Service Uncertainty: -0.0000030, 0
Resets: 361
```



ISS Parameter Controls

- 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.



ISS Message Manager

Parameter Values

Group	Subgroup	Name	Parameter Value	Set Default
Cable Payout	Prog. Cntrl	Logging Interval	: 1	Search...
Catenary	Prog. Cntrl	Logging Interval	: 1	
EchoTrack	Log Interval	Off Line	: :01	
		On Line	: :01	Details...
		On Station	: :01	
		Underway	: :01	
	Prog. Cntrl	Logging Interval	: :2.0	Toggle
GPS	Prog. Cntrl	Logging Interval	: 1	
KFLog Ship090	Prog. Cntrl	Logging Interval	: 1.0	
Klein 5000	Prog. Cntrl	Logging Interval	: 1	Apply
MAGYNAV	Prog. Cntrl	Logging Interval	: 1	
Monarch RPM	Prog. Cntrl	Logging Interval	: 1	
MVP30	Prog. Cntrl	Logging Interval	: 1	Done
NaviSound GSF1	Log Interval	Off Line	: :01	
		On Line	: :01	
		On Station	: :01	Toggle
		Underway	: :01	
NaviSound GSF2	Log Interval	Off Line	: :01	
		On Line	: :01	Apply
		On Station	: :01	
		Underway	: :01	
NMEA Broadcast	Prog. Cntrl	Logging Interval	: 1	Done
NMEA Heading	Prog. Cntrl	Logging Interval	: 1	
POSMV V3	Prog. Cntrl	Logging Interval	: :0.5	
UTCoutput	Prog. Cntrl	Logging Interval	: :0.5	

Logging Interval Controls

- Logging intervals can be set for each sensor.
- During ISS-2000 operations messages are generated and written to the Survey Report File.
- The **Message Manager** window is automatically started when **System Control** is initiated.

SystemControl

File Survey Control Configuration Sensors Logging

Vessel File: davidson.vsl Dataset: testbed
 Config File: davidson.cfg Data Gap: 200.00 m

GPS CoverageMonitor POSMV V3 Monarch RPM
 Kalman Filter KFLog Ship RTTide
 Auto Pilot NaviSound Reson

System Control

Message Manager

Display Control

2004/001 00:08:34.77 - W - RTTIDE: NO_ZONE: No tidal zor Ack Clear Hold

2004/001 00:08:39.50 - W - TAIM: IRIGBFLYING: IRIG B Flywheeling at : 2004/001 00:08:39.5
 2004/001 00:08:39.50 - C - TAIM: TIMEOUT: Timeout reading input data
 2004/001 00:08:34.77 - W - RTTIDE: NO_ZONE: No tidal zone(s) could be found in the surv
 2004/001 00:08:26.14 - I - POS/MV v3: NEWFILE: New File Created: m:\datasets\testbed\po
 2004/001 00:08:18.61 - I - KFLOG_SHIP: NEWFILE: New File Created: m:\datasets\testbed\k
 2004/001 00:08:18.02 - W - NavMar: DEPTHTIMEOFF: Depth time differs from system time l

ISS Multibeam Controls

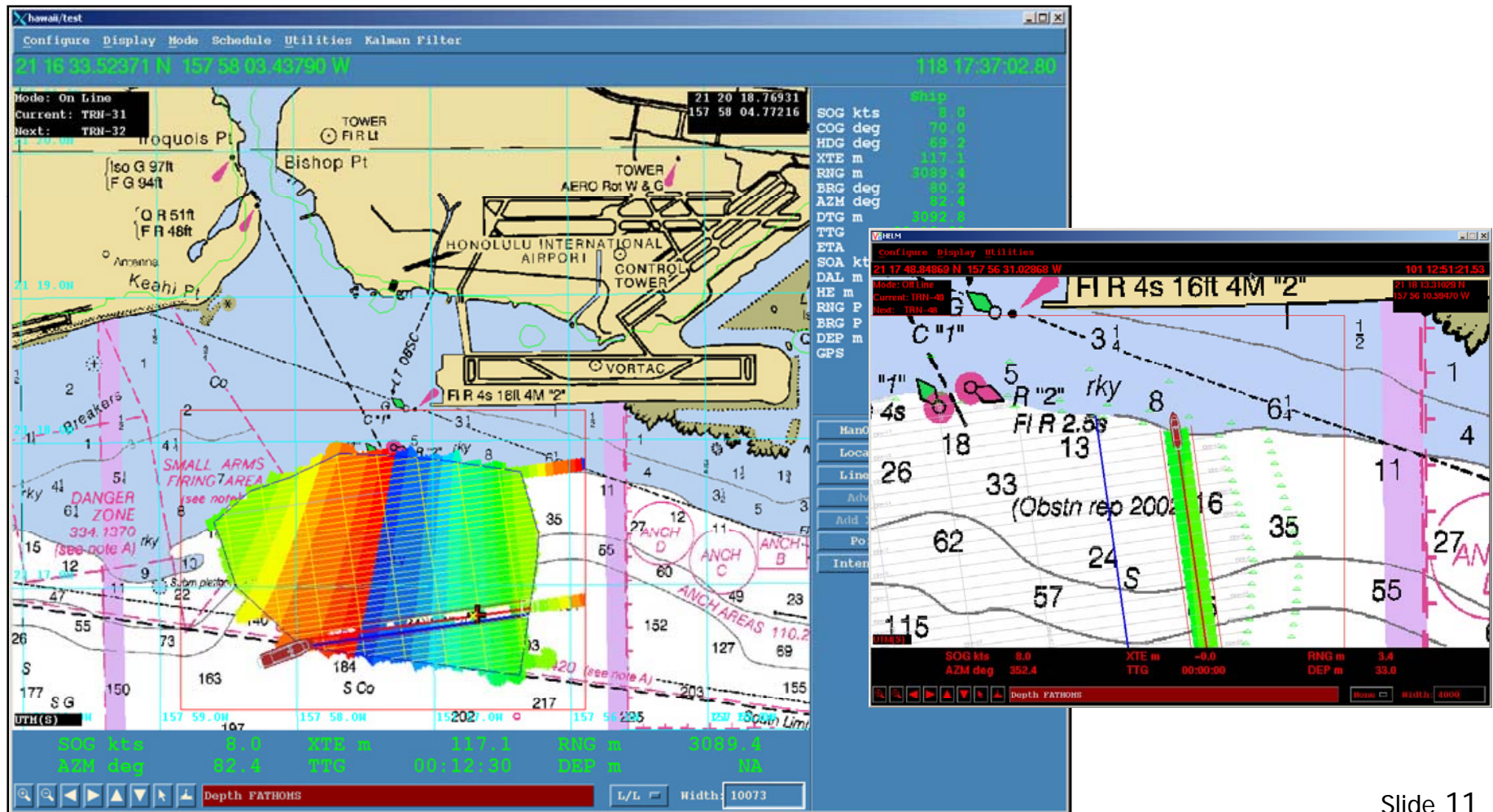
- Multibeam data can be viewed in real time to verify data quality.
- Sound Velocity Profile (SVP) cast can be applied and verified in real time.

The screenshot displays the Multibeam Manager software interface with several active windows:

- Multibeam Manager - Reson SeaBat 8101:**
 - File Display:**
 - Examine Data: 02029.d01 Course: 309.5 (deg)
 - Amplitude Display (mb) Speed: 06.8 (kts)
 - Bathymetry Display: 01094.d06 Pitch: -00.6 (deg)
 - Waterfall Display: available Roll: +00.9 (deg)
 - Noise Estimator: available Heave: -00.1 (m)
 - Sound Velocity Profiles: .62394 N Number Beams: 101
 - Heading: 312.80 (deg) Center Depth: +25.6 (m)
 - Tide Corrector: +00.00 (m)
 - Depth Corrector: +00.00 (m)
 - System Parameters:**
 - Ping Number: 01113 Pulse Width (us): 021
 - Sonar Mode: 0000 TVG Spread (db): 34.00
 - Surface Velocity: 1500.0 (m/s): TVG Absorption: 048
 - Sonar Range (m): 125 (m) Fore Aft BW (d): 01.5
 - Power (manual): 05 Athwart
 - City Profile Monitor:**
 - Filename: n:\iss2000_demo\support\svps\ctd09001.cnv (SeaBird)
 - Observed At: 1998/09/1 08:38:32.00 00 00.000 N 000 00 00.000 E
 - Sound speed in meters/second:** A plot showing depth (0 to 80 meters) vs. sound speed (1480 to 1530 m/s).
- Swath Plot:**
 - Depth (meters): 30 to 80
 - Across Track (meters): -100 to 100
 - Time/Position data:
 - 06:50:07.63: 314.1 (deg), 07.7 (kts), 44.49 (meters)
 - 06:50:00.74: 314.6 (deg), 07.7 (kts), 44.60 (meters)
 - 06:49:53.67: 313.9 (deg), 07.0 (kts), 44.20 (meters)
 - 06:49:46.60: 314.5 (deg), 08.1 (kts), 43.29 (meters)
 - 06:49:39.53: 314.4 (deg), 07.9 (kts), 41.34 (meters)
 - 06:49:32.46: 314.1 (deg), 07.7 (kts), 38.85 (meters)
- Examine Multibeam Data:**
 - Record Ping Record Table:

ISS Navigation Controls

- The Navigation Display allows the operator to view the data in real time while monitoring the survey progress and navigation information.



ISS-2000 GSF Format

- ISS-60 and ISS-2000 collect swath bathymetry and beam amplitude imagery data in GSF Format.
- GSF is designed to efficiently store and exchange information produced by geophysical measurement systems before it has been processed into either vector or raster form.
- Generic Sensor Format (GSF) is a standard file format for bathymetry data and widely used in the maritime community (US and the UK).
- Single-file format (one file saves all information)
 - Objective is to store all swath oriented information
 - Currently limited to one source of position
 - Currently limited to one source of motion
 - Not currently supporting the water column data

Examine Multibeam Data - Simrad EM3002

File Display Help

Filename: 46nb108092_p_100.d03
 GSF Version ID: GSF-v02.07 File Size: 123.6 Mbytes Sonar: Simrad EM3002

Record Type	Ping Number	Record Time/Position	Valid/Total Beams	Ctr. Beam	Heading (degs)	Pitch (degs)	Roll (degs)	Heave (meters)	Course (degs)	Speed (knots)	Tide Cor. (meters)	Depth Cor. (meters)	Flags
SUMMARY		Start: 1970/001 00:00:00.000 End: 1970/001 00:00:00.000 Lat: 00 00.00000 N - 00 00.00000 N Lon: 000 00.00000 E - 000 00.00000 E Depth: 0.00 - 0.00											
COMMENT		2008/092 15:25:38.081 CLASSIFICATION: *** UNCLASSIFIED PUBLIC DOMAIN *** : 100 PUBLIC RELEASE											
SNR PARAM		2008/092 15:11:00.403 Number of params: 76											
PRC PARAM		2008/092 15:11:00.403 Number of params: 31											
SVP		Position: 30 13.00000 N 088 59.70000 W Observation Time: 2008/092 15:13:00.000 Application Time: 2008/092 15:17:34.658 Number of points: 11											
COMMENT		2008/092 15:17:34.658 SVP_FILE_NAME: /data2/datasets/gpz_day3_p_100/cotsdata/svp/SV092002.CTD											
ATTITUDE		2008/092 15:25:36.052 51 measurements											
NB PING	000001	2008/092 15:25:36.054 30 12.87208 N 089 00.36417 W	254/254	129	097.10	+01.00	+00.88	+00.06	087.53	07.98	+00.00	+0000.00	0000 (G)
HV NAV ER		2008/092 15:25:36.054 Describes Record Type: Swath Bathymetry Ping Horizontal Error: 00000.107 Vertical Error: 00000.153 Type: SPSG											
NB PING	000002	2008/092 15:25:36.085 30 12.87208 N 089 00.36409 W	254/254	129	097.14	+01.12	+01.01	+00.05	087.54	07.98	+00.00	+0000.00	0000 (G)
NB PING	000003	2008/092 15:25:36.116 30 12.87208 N 089 00.36401 W	254/254	129	097.20	+01.23	+01.14	+00.04	087.55	07.98	+00.00	+0000.00	0000 (G)
NB PING	000004	2008/092 15:25:36.152 30 12.87209 N 089 00.36392 W	247/254	129	097.25	+01.35	+01.27	+00.02	087.57	07.97	+00.00	+0000.00	0000 (G)

View Record

ISS-2000 GSF Supported Equipment

- **Multibeam echo sounders**
 - Kongsberg EM100
 - Kongsberg EM120
 - Kongsberg EM121
 - Kongsberg EM121A
 - Kongsberg EM122
 - Kongsberg EM300
 - Kongsberg EM302
 - Kongsberg EM710
 - Kongsberg EM950
 - Kongsberg EM1000
 - Kongsberg EM1002
 - Kongsberg EM3000 and EM3000D
 - Kongsberg EM3002 and EM3002D
- **Interferrometric Side-Scan Systems**
 - GeoAcoustics GS+
- **Single-beam echo sounders**
 - Odom Echotrac
 - ODEC Bathy2000
 - Reson Navisound
- **Multibeam echo sounders**
 - RESON 8101
 - RESON 8111
 - RESON 8125
 - RESON 8150
 - RESON 8160
 - RESON 7125
 - RESON SEABAT 9001
 - RESON SEABAT 9002
 - RESON SEABAT 9003
 - Elac Bottomchart Mk II
 - SeaBeam 2100 series
- **Position & Orientation System**
 - Applanix POSMV
 - Kongsberg Seapath 200

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Thank You