Ocean CLASS AGOR

Integrated Survey System

10 March 2009

ALION
SCIENCE AND TECHNOLOGY

Integrated Survey System

- Background
  - ISS60 is basis for ISS-2000
- ISS-2000
  - ISS-2000 Real Time Data Acquisition
  - Acquisition Data Flow
  - System Architecture
  - Equipment
- Generic Sensor Format (GSF)
  - Definition
  - Widely used hydrographic community

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

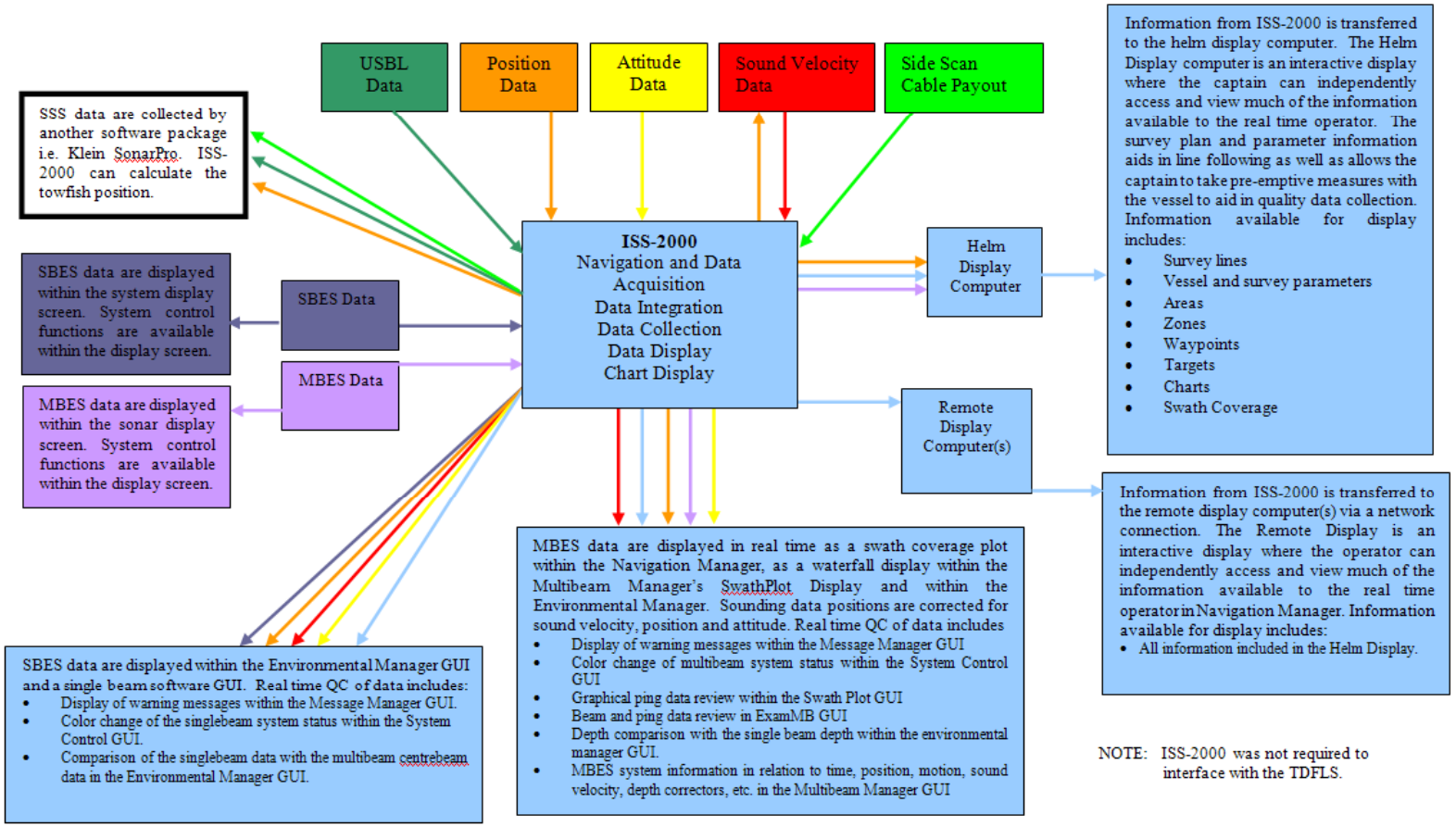
- *R/V KILO MOANA*
  - ISS-2000 was temporarily installed for a 2005 UNH mission in Alaska.
  - ISS-2000 was integrated with the sonar suite for hydrographic operations.

- *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

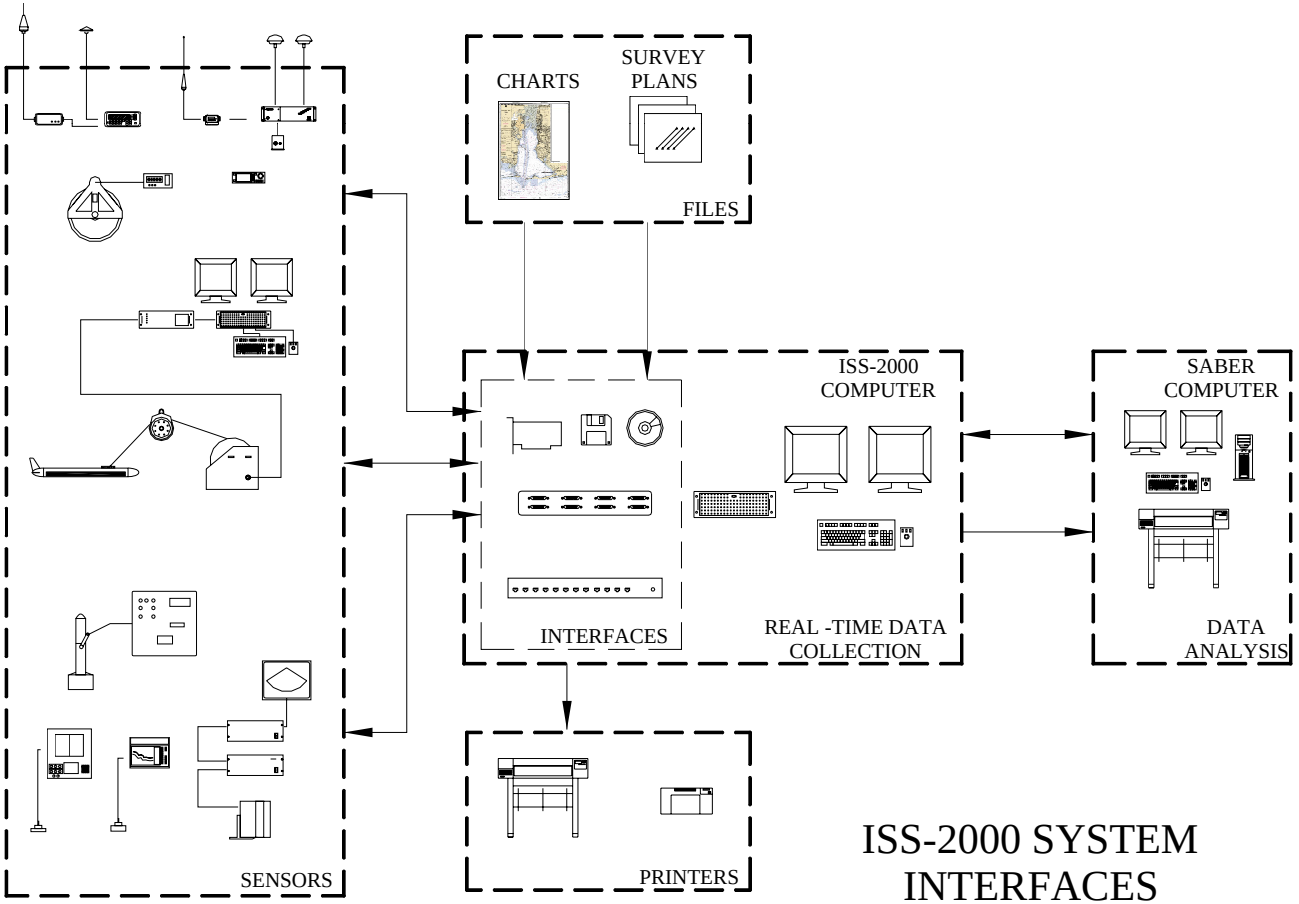
Why use ISS-2000?

- Single monitoring workstation for multiple oceanographic equipment
- Real time navigation monitoring and editing
- Real time data analysis
- Data archiving to processing computers and/or NAS



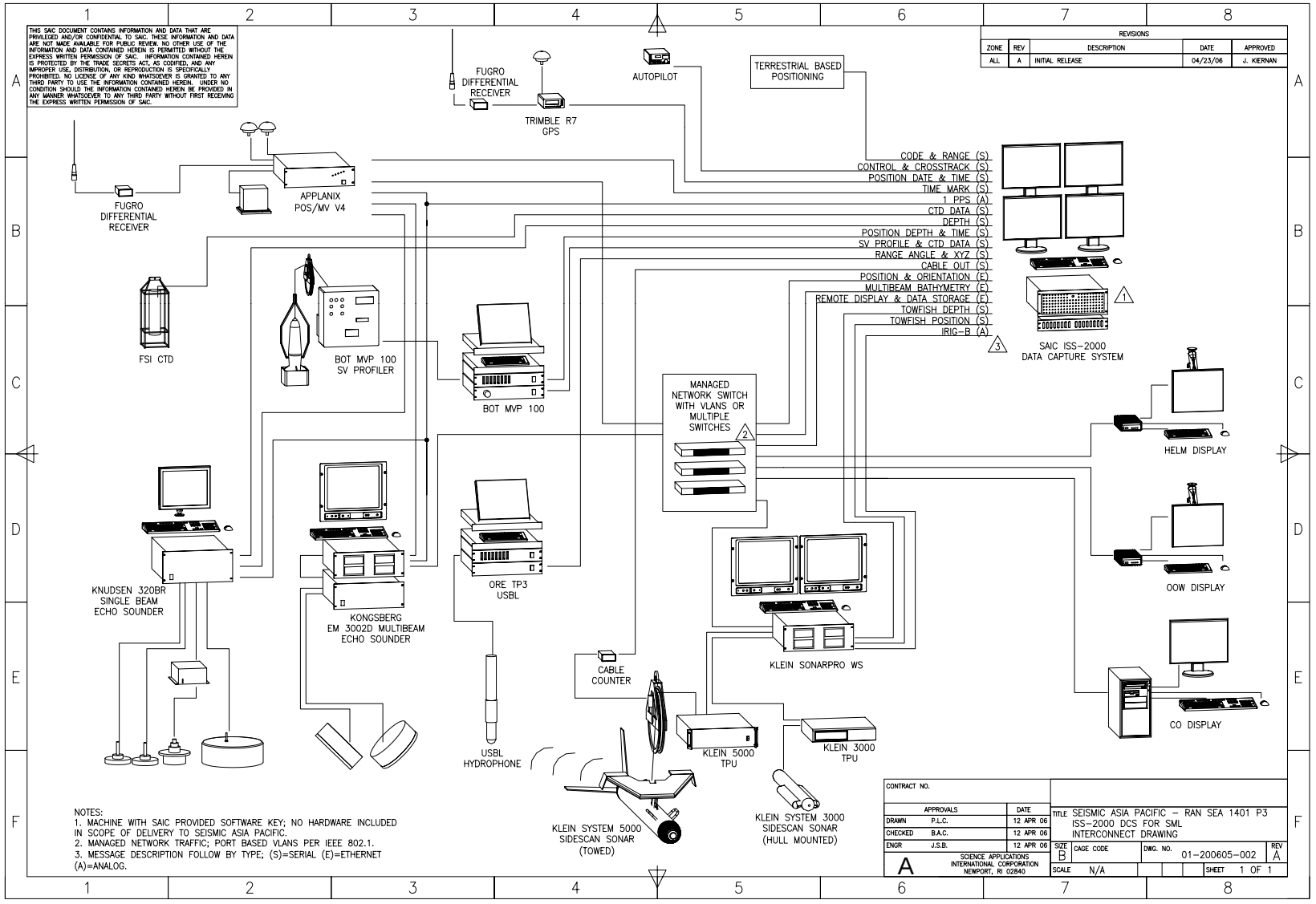
ISS Simplified Overview

- ISS-2000 consists of a 4U rack mounted computer and dual monitors
- The ISS-2000 computer is built with a timing card for timing synchronization
- The computer uses multiple port expansion digi-boards for serial interfaces
- ISS-2000 uses a VLAN for setting up isolated IP networks to minimize data traffic



ISS-2000 SYSTEM INTERFACES

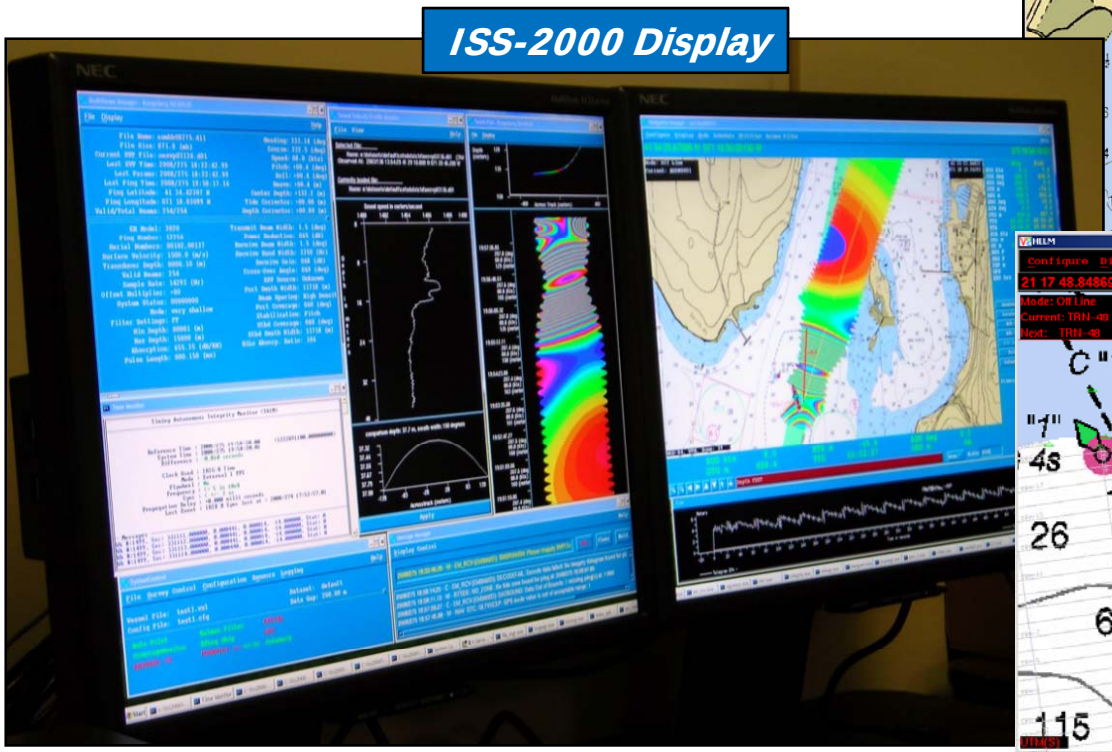
ISS System Schematic

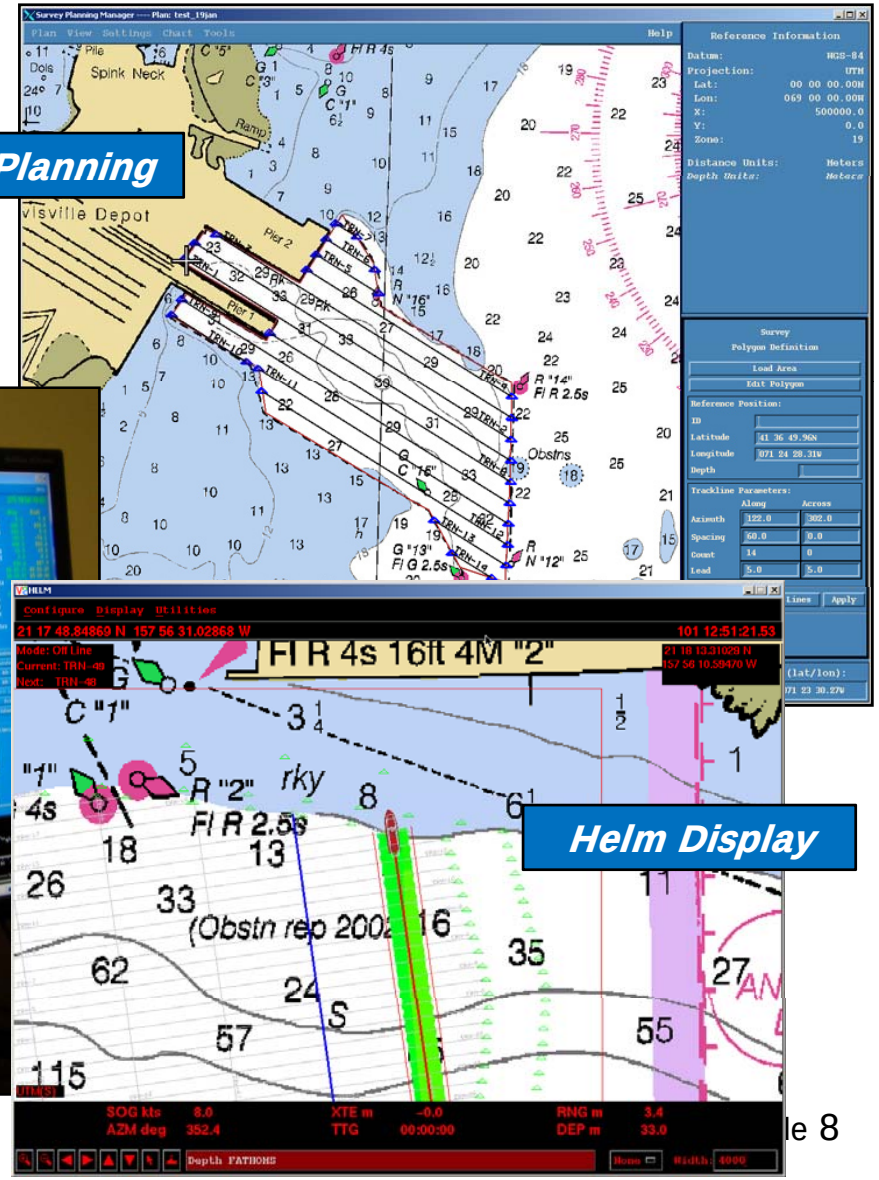


ISS-2000 Components

ISS-2000 Real Time Data Acquisition

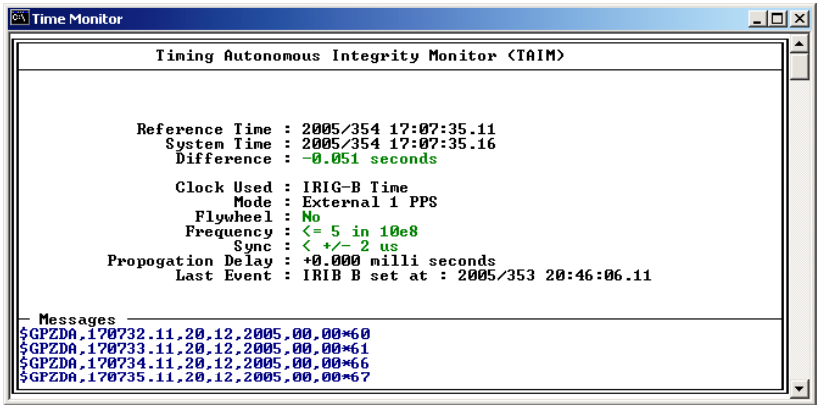
- Workstation w/ timing module
- ISS-2000 software
- Survey Planning software
- Helm Display software

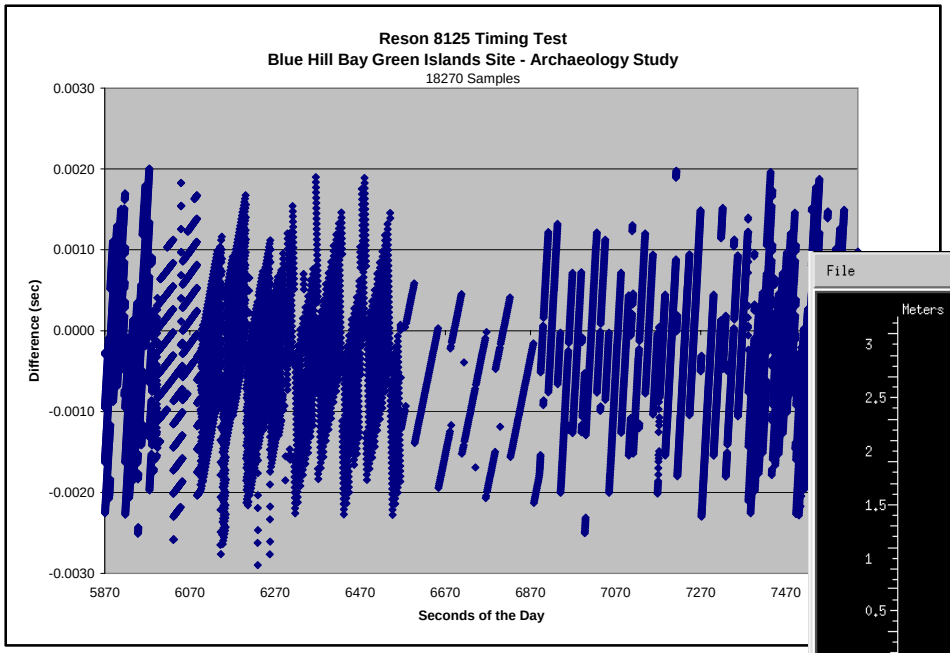


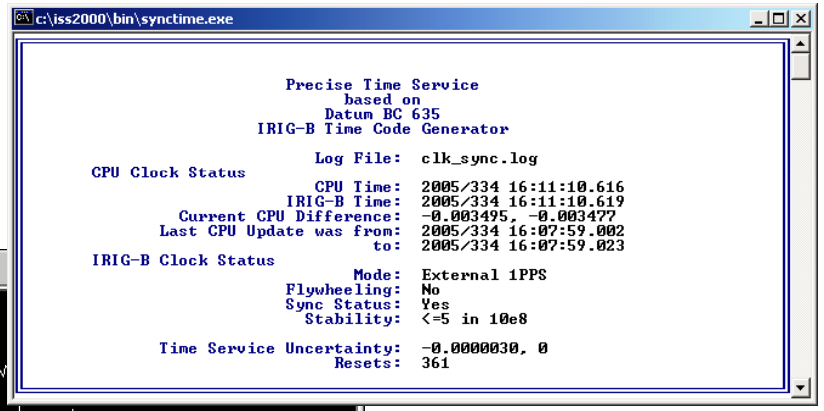


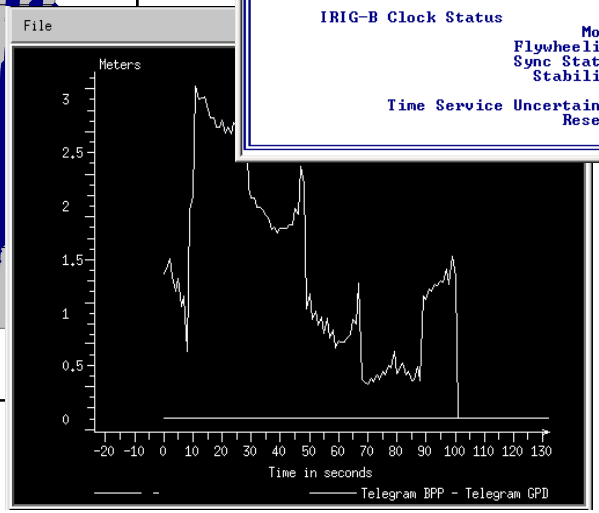
ISS Timing Analysis

- 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 Novatel TM1B.



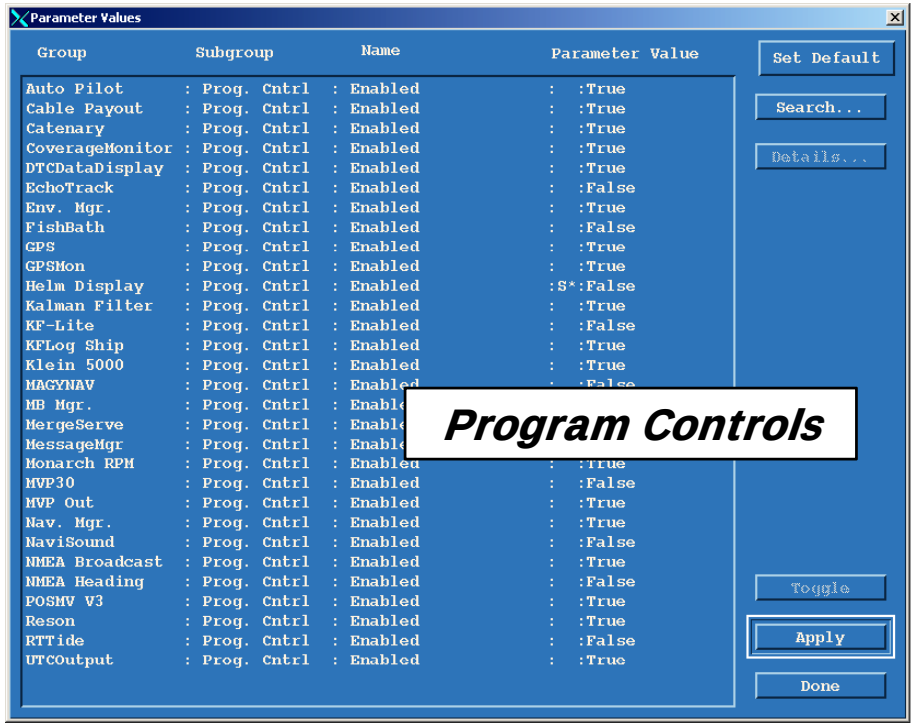


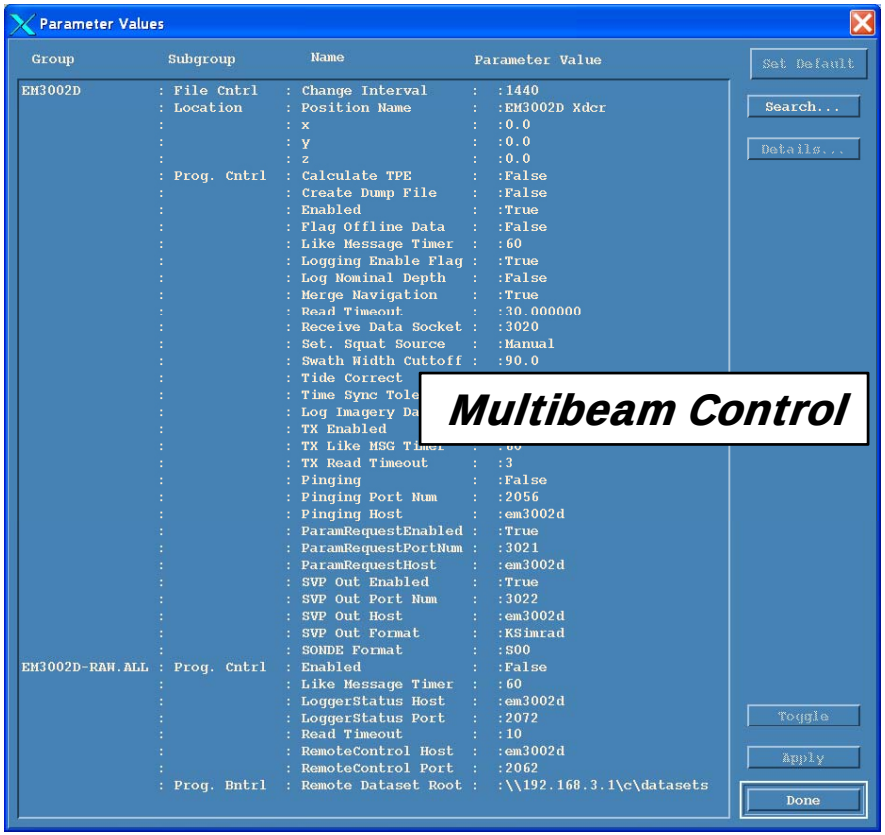




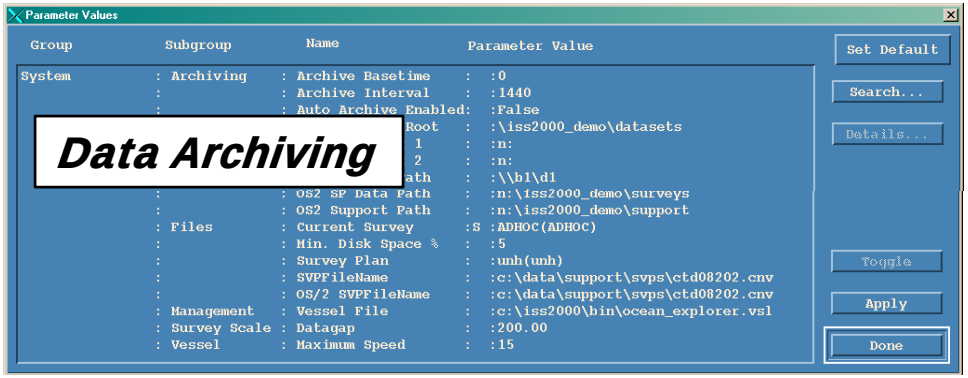
ISS Parameter Controls

- 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.





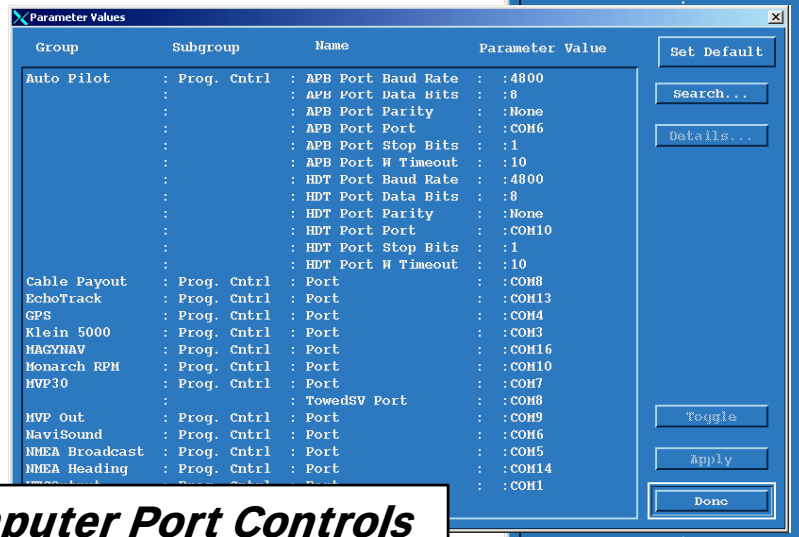
ISS Parameter Controls

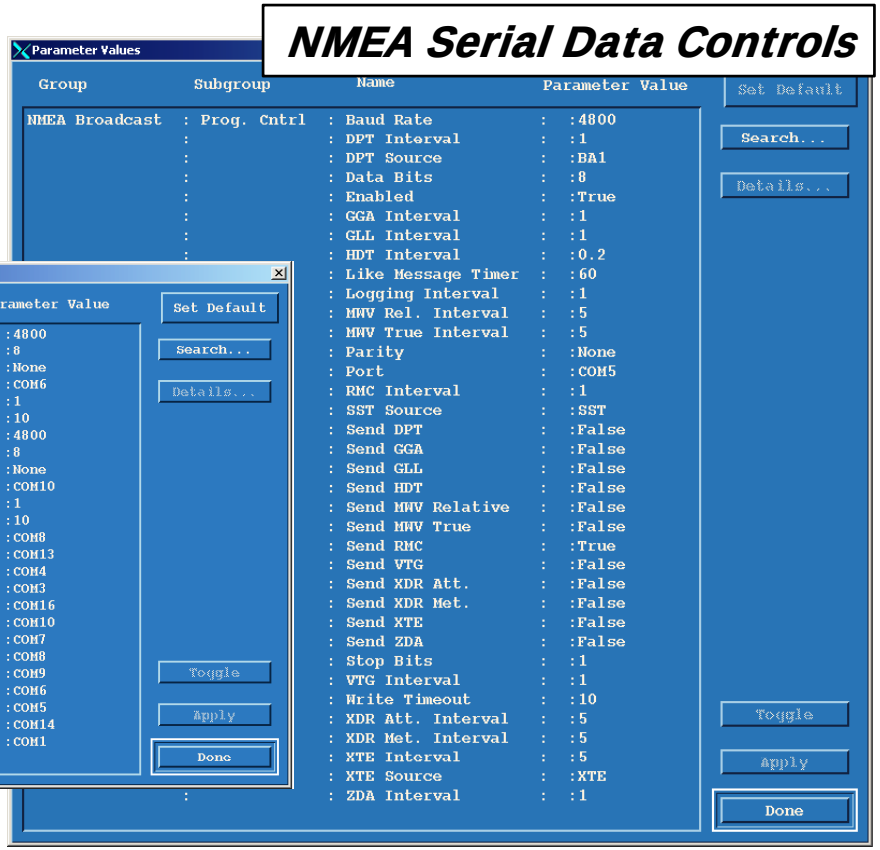


- Once the network is established data archiving can be set to auto-archive files during data acquisition.

- ISS-2000 multiple port configuration can be controlled in one GUI.

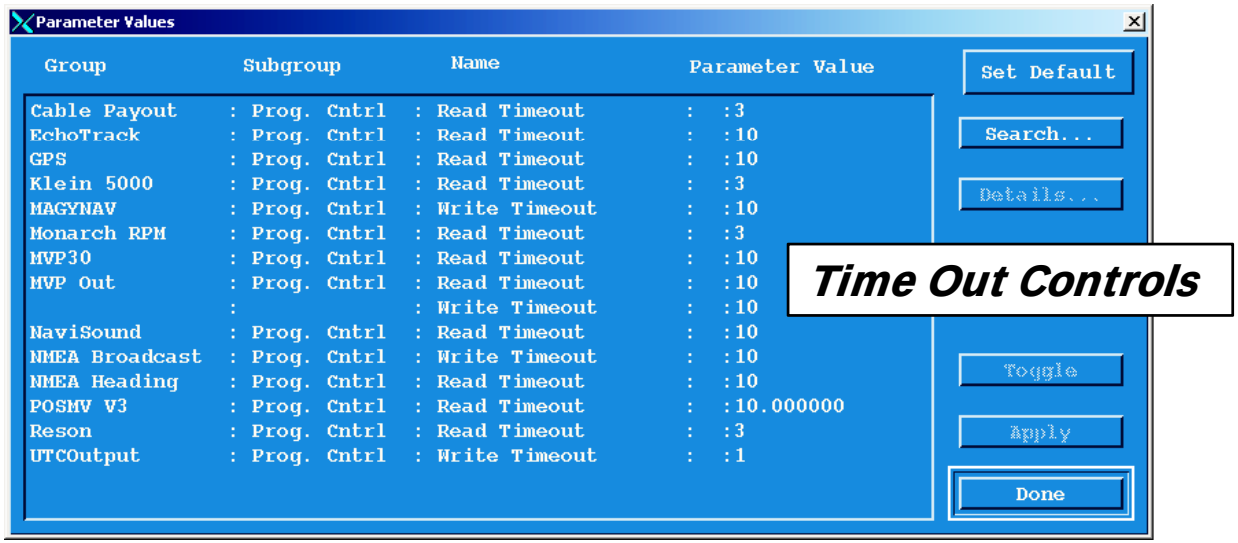
- The single interface allows for quicker troubleshooting of port configuration.





ISS Alarm Control Settings

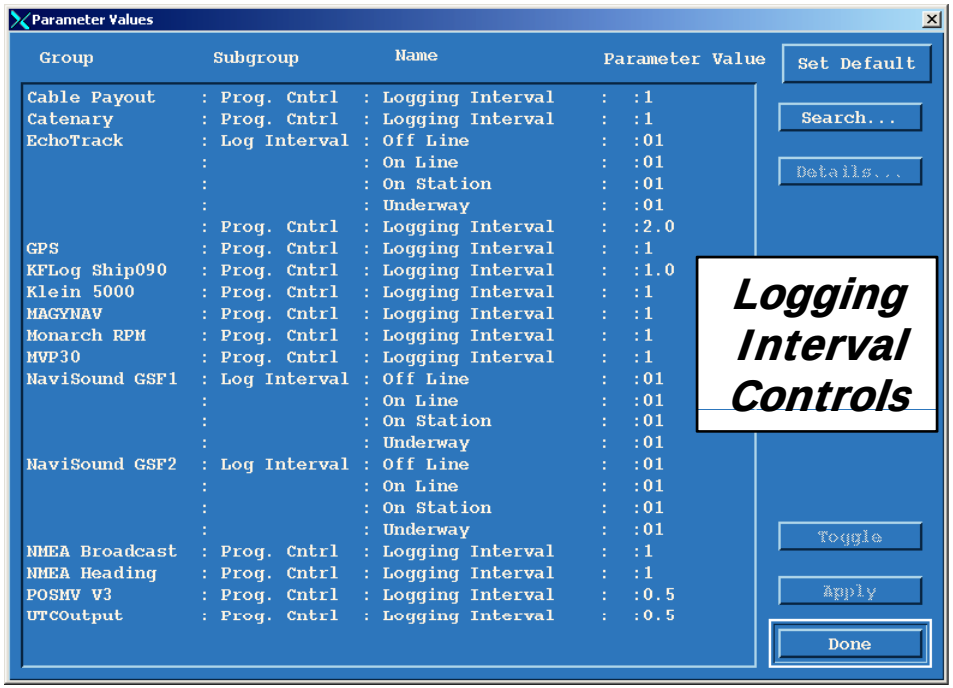
- ISS-2000 is designed to automatically alarm the operator when the system is exceeding the operator set parameters.
- Allowing the operator to monitor the integrated system in real time.



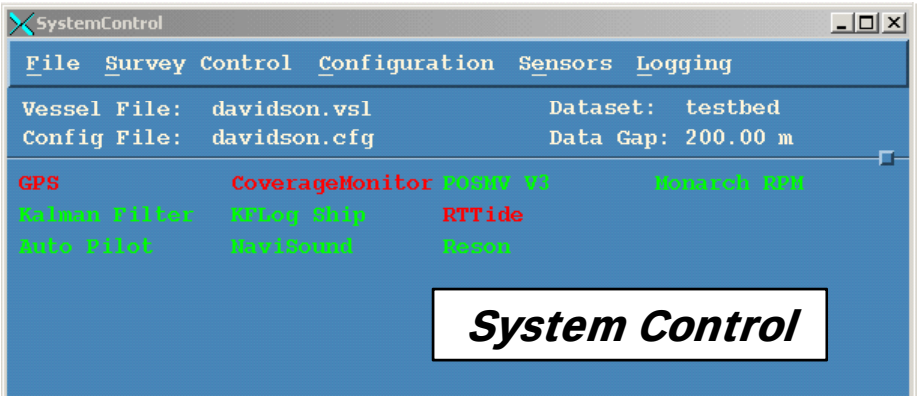
A read timeout is the amount of time (in seconds) that can pass without receiving raw sensor data before issuing and alarm via the Message Manager.

The write timeout is the amount of time (in seconds) that can pass between receipts of raw data from a DTC before issuing an alarm.

ISS Message Manager

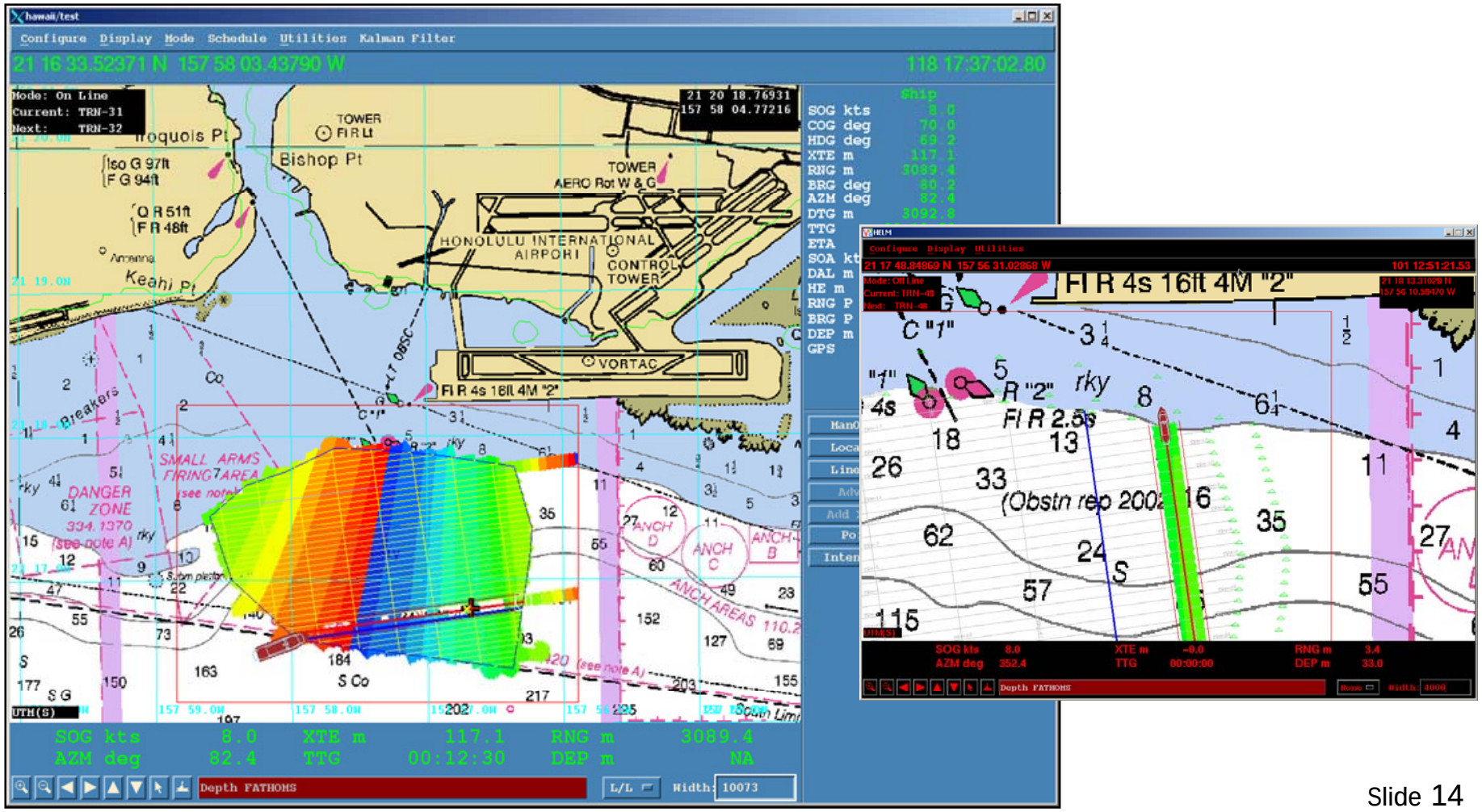


- Logging intervals can be set for each sensor.
- During ISS-2000 operations messages are generated and written to the Survey Report File.
- The ***Message Manager*** window is automatically started when ***System Control*** is initiated.



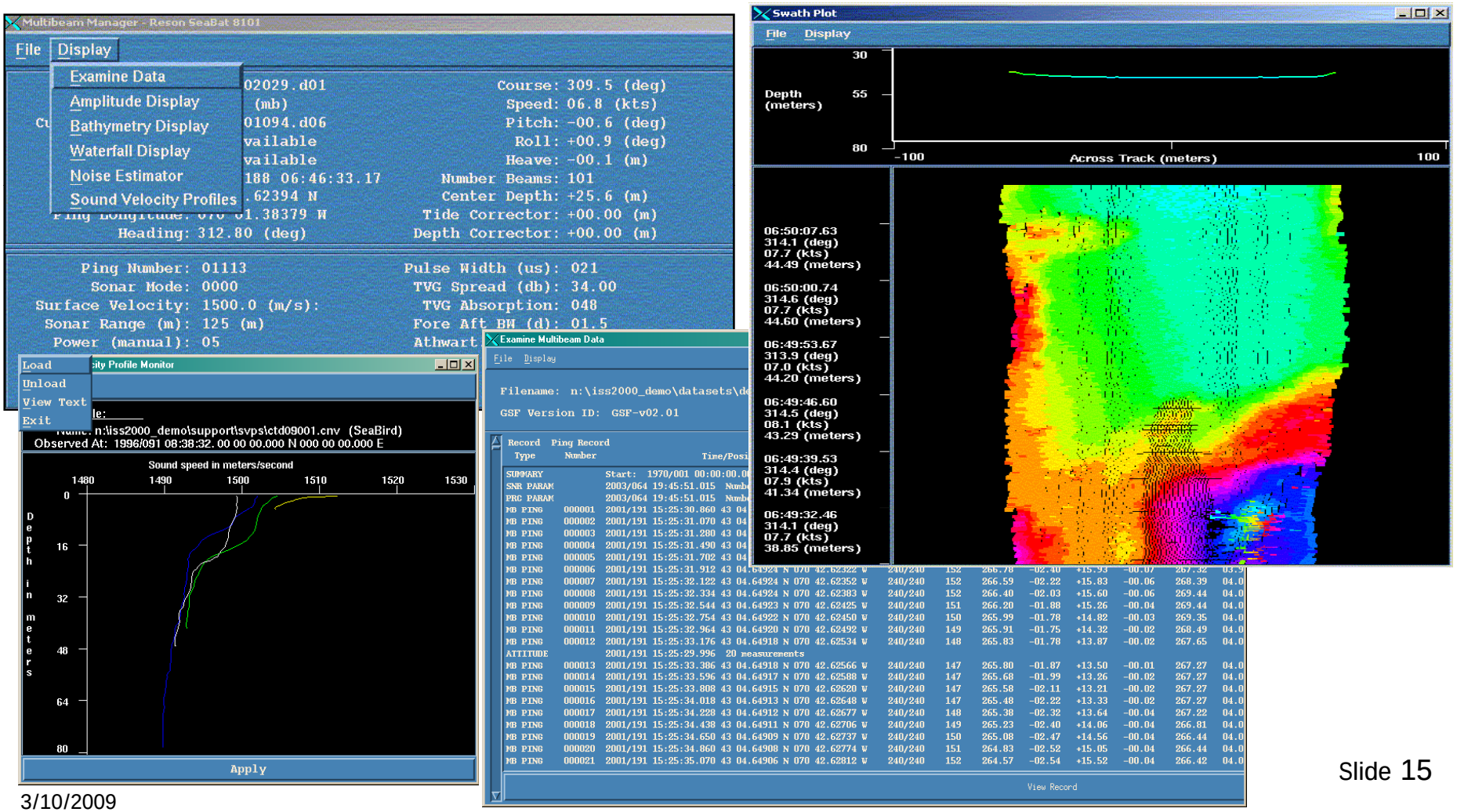
ISS Navigation Controls

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



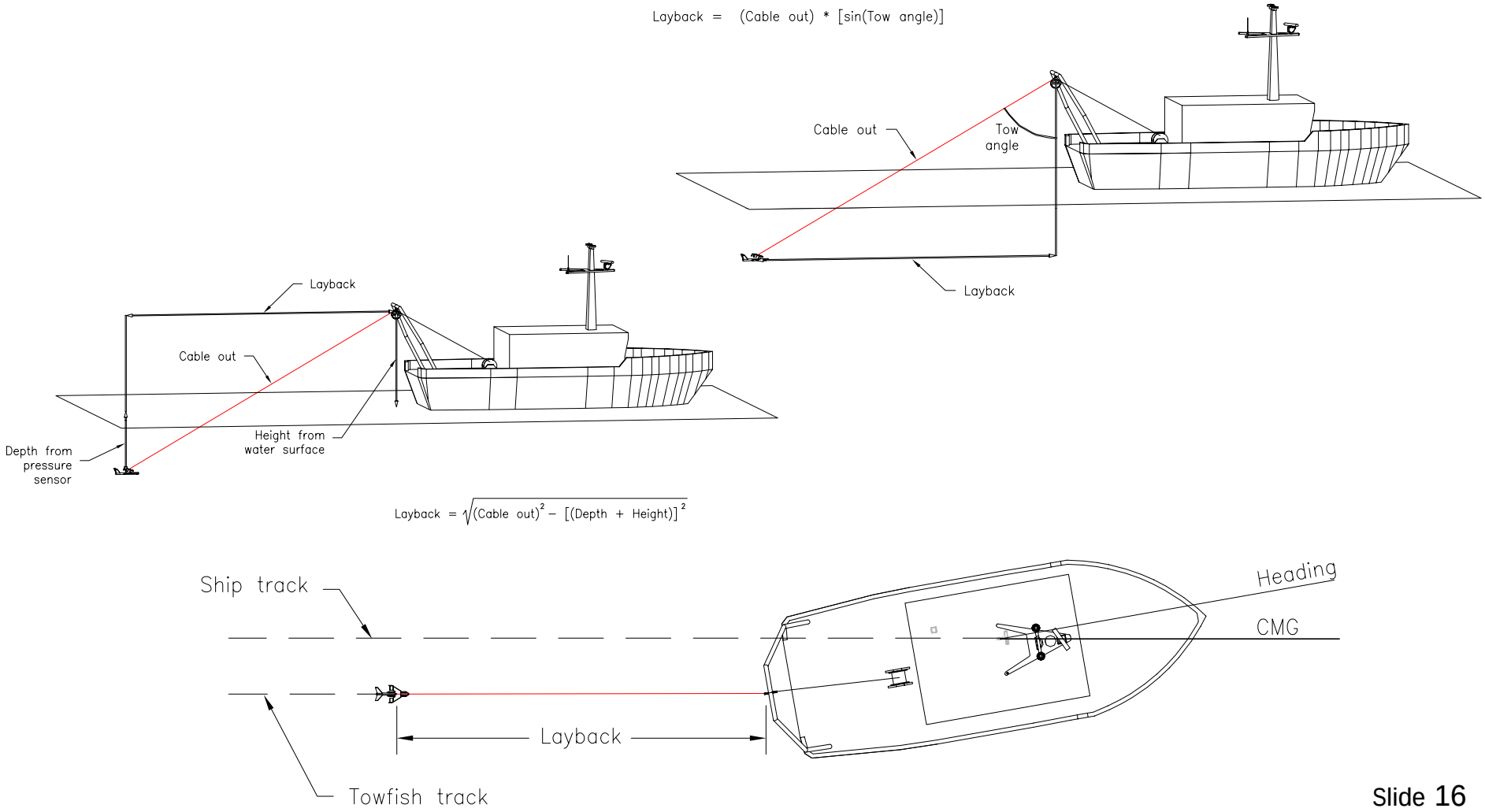
ISS Multibeam Controls

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



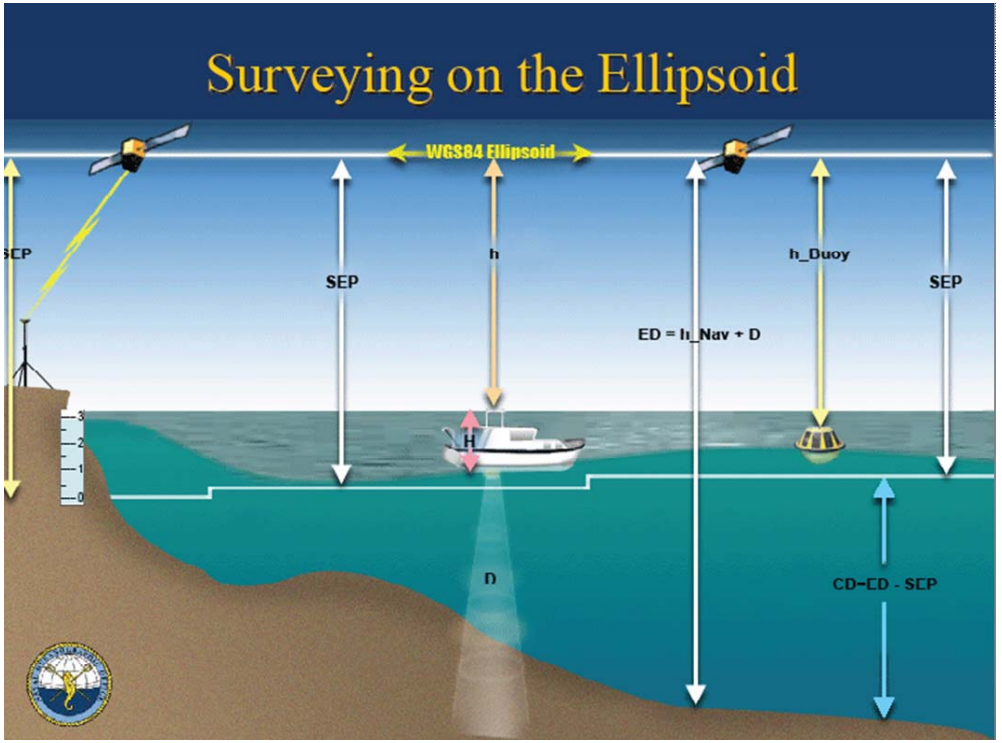
ISS Tow Body Positioning

- ISS-2000 can handle positioning of towed arrays using proven algorithms.



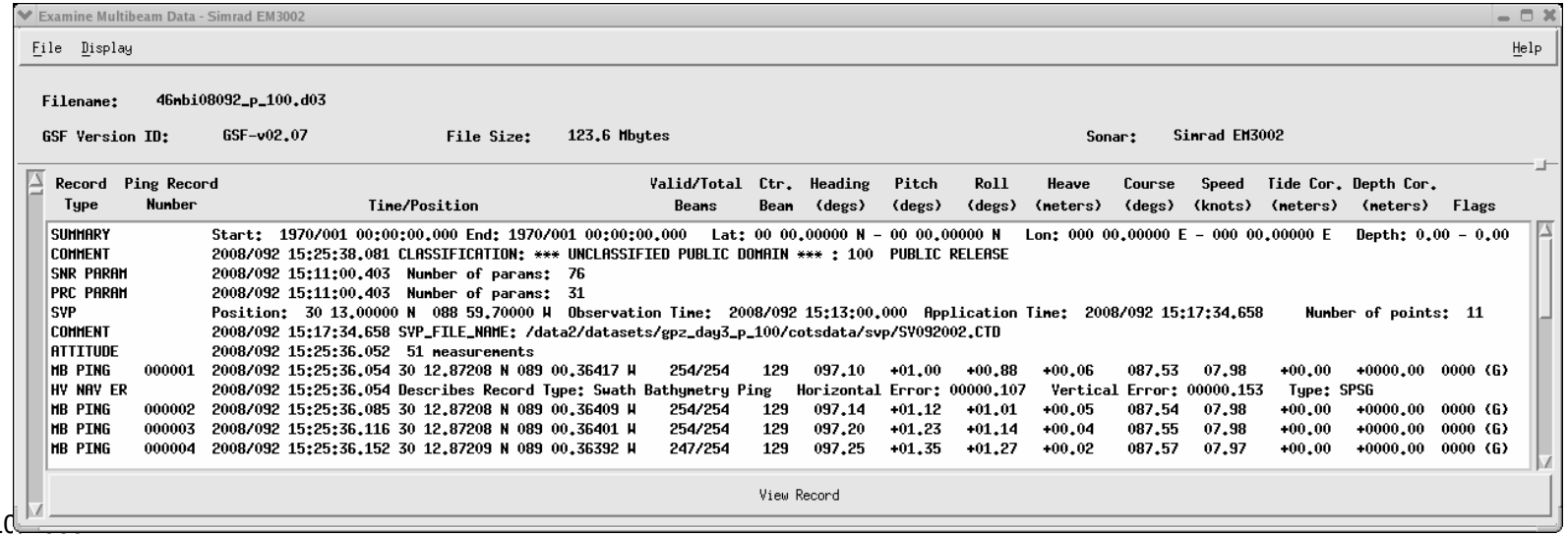
ISS Development *(Example)*

- Ellipsoidal Survey
  - Application first being implemented in post-processing (SABER)
  - Updates for GPS and POS/MV DTC's to record and apply data
  - Updates to GSF to support recording ellipsoidal height and SEP (Separation Between the Chart Datum and the WGS-84 Ellipsoid) for each ping
  - Implement into data acquisition and merge for near real-time display



ISS-2000 GSF Format

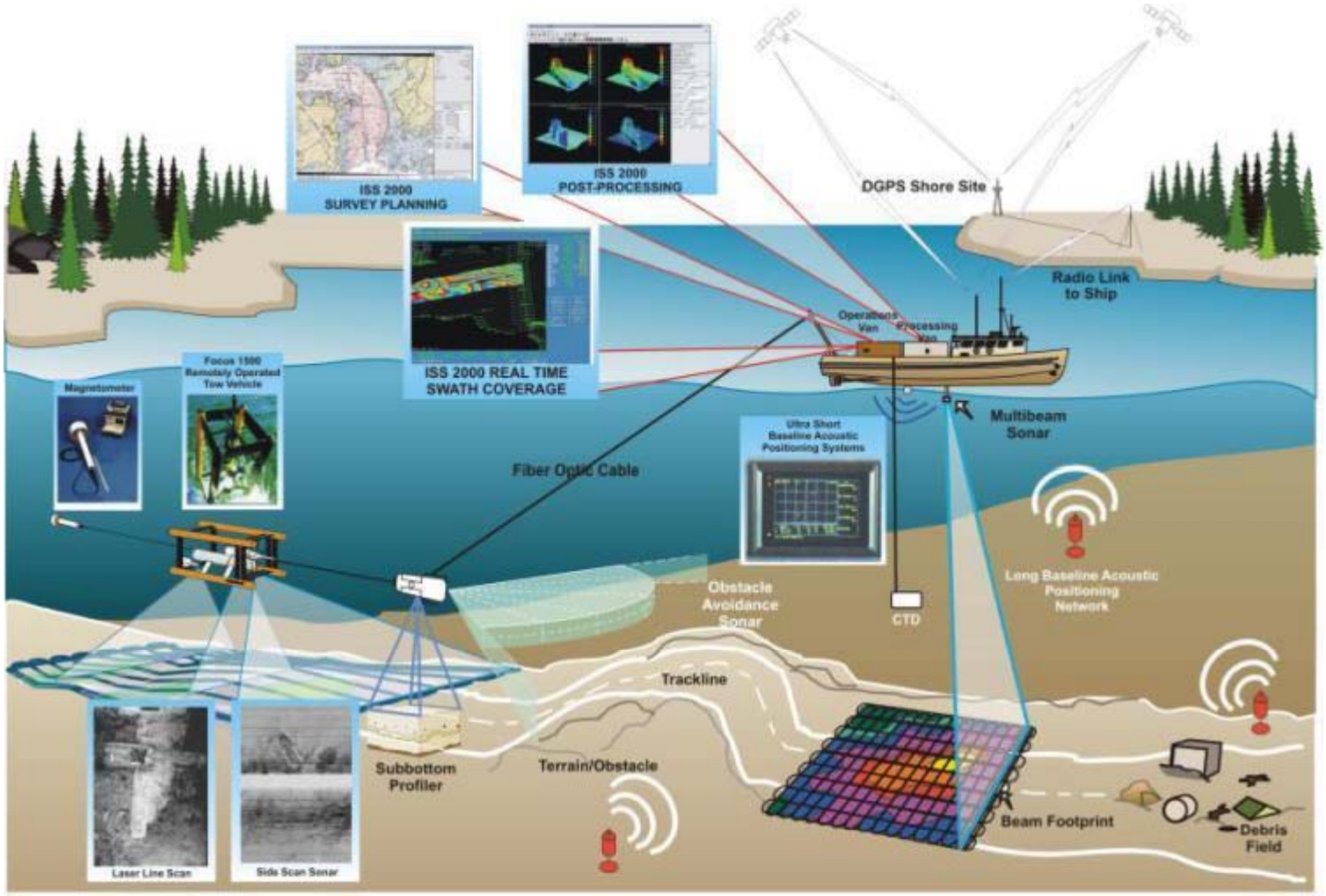
- ISS-60 and ISS-2000 collect swath bathymetry and beam amplitude imagery data in GSF Format.
- GSF is designed to efficiently store and exchange information produced by geophysical measurement systems before it has been processed into either vector or raster form.
- Generic Sensor Format (GSF) is a 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



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

Integrated Survey System



Ocean CLASS AGOR

Questions?