LIST OF TABLES

APPENDICES

APPENDICES (Cont.)

APPENDICES

APPENDIX 3

(The attached SOP includes Attachment A: *Ocean Surveys, Inc. Manual of Standard Operating Procedures.* This attachment contains SOPs for the operation and calibration of navigational and geophysical survey instrumentation. Not all of the SOPs included in this attachment apply to the Sub-Bottom Profiling Test SOP.)

STANDARD OPERATING PROCEDURE FOR SUB-BOTTOM PROFILING SURVEYS

1. Tests of acoustic- and GPR-based sub-bottom profiling equipment will occur over two to three week period on the Upper Hudson River just north of the Northumberland Dam near Hudson River Mile (HRM) 184 and in the Thompson Island Pool, near HRM 190 at Griffin Island, and near HRM 189.4 at Moses Kill. Since this is a well-traveled navigational channel, the work will be coordinated with the Canal Corporation, as required by the Health and Safety Plan and the Community Health and Safety Plan. In addition, the sampling vessels will maintain contact with the Canal Corporation using marine band channel 13.

2. The sub-bottom profiling tests will utilize GPS receivers (Trimble 7400 MSi) to acquire navigation data using shore-based reference stations with known coordinates and elevations. Differential correctors determined at these stations will be transmitted to the survey vessel where they will be used by the onboard receiver using Real Time Kinematic OTF software to determine the accurate position of the GPS antenna in the vertical and horizontal planes. These data will be logged on board at one-second intervals for the duration of the survey. Data quality parameters will also be logged and monitored by the onboard navigator with flags put on all data points which do not meet the quality limits set. The specified accuracy for this system is +/- 2 cm when satellite configuration is sufficient.

3. The sub-bottom profiling tests will focus on one technique at a time – either acoustic or GPR. Tests of the acoustic sub-bottom profiling equipment will be tested along 4-5 transects at each survey location using an EdgeTech Geostar Chirp sub-bottom profiler with both 4-24 kHz and 2-16 kHz transducers. Once the acoustic survey is completed, tests of GPR sub-bottom profiling techniques will be conducted along the same transects using a

GSSI SIR 2000 Ground Penetrating Radar system with 100, 200, 300 and 500 MHz antenna.

4. Before leaving dock, the sub-bottom survey crew will check to make sure all navigation and instrument systems are working properly. Calibrate and set navigation instruments based on the instrument-specific standard operating procedures (Attachment A). Prepare survey equipment for start of daily survey operations including: deployment of sonar tow fish into water (or deployment of GPR antenna), measurement of survey equipment offsets, daily speed of sound test, and other required pre-survey activities.

5. Navigate to coordinates of first transect. Transect coordinates and headings are based on tracklines that intersect Sediment Sampling and Analysis Program (SSAP) coring locations in the vicinity of historical coring locations that show stratification of a variety of sediment types. Transect coordinates and headings will be provided to the sub-bottom survey crew for import into the navigation computer. A Coastal Oceanographics "Hypack Max" will be used for trackline design, navigation, trackline control, and digital depth and RTK DGPS data logging.

6. Align survey vessel along longitudinal transect and confirm autopilot heading and operation. Start data acquisition and commence sub-bottom survey tests along transect. Conduct acoustic (or GPR) sub-bottom profiling tests. Test multiple frequencies along transect and note frequencies of highest resolution. Export and log the sub-bottom imagery to the ISIS data acquisition platform. Enter all system annotations in the ISIS XTF notes field.

7. Use a digital depth sounder to collect water depth information along each transect. Log depth data to the Hypack Max system.

8. During the survey, perform periodic manual probing and visual characterization of sediments. Note coordinates and results of probing or characterization in the field log. Note coordinates of areas that may need additional confirmatory sampling and sediment grain size analysis to ground-truth the sub-bottom data in the field log.

9. Note relevant observations and changes in operational procedures to the field log. These may include: coordinates of observed obstructions or artifacts; areas where interferences or other conditions limit survey resolution, and coordinates where adjustments to the tow fish or GPR antenna are made. Repeat survey of the entire transect using acoustic (or GPR) frequencies that showed highest resolution during preliminary survey tests.

10. At the end of each transect, confirm successful data acquisition and storage, navigation and equipment calibrations and settings. Log time and coordinates at end of each transect line surveyed.

11. Prepare equipment for navigation to next transect; navigate to next transect.

12. Repeat steps 4-12 and collect sub-bottom data along each transect until representative sub-bottom data for each has been acquired in each survey section for each survey technique - both acoustic and GPR.

13. All raw survey data and information (e.g., field notes, instrumentation frequencies) must be documented electronically or in a field note book. At the end of each day, check daily computer data from the Hypack Max and ISIS systems for error flags. Output all notes to an ASCII file and store with the raw records. Back-up copies of the raw electronic data and make copies of all field log entries.

ATTACHMENT A

OCEAN SURVEYS, INC.
MANUAL OF
STANDARD OPERATING PROCEDURES

(Geophysical Survey Instruments)

1.1.1.1.1 TABLE OF CONTENTS

Page

1.0 INITIAL EQUIPMENT SETUP

This is a draft document. The most recent modification was on 07/31/02 by MLK. New versions will be distributed as they are created.

There are presently several documents that are associated with this that are not included at this time.

1 Caris offset drawing
2 Hypack offset drawing
3 System wiring document
4 System comm. Port settings and data formats

1.1 General Tasks Before Start of Survey

- Obtain reviewed Survey Plan
- Notify GE of vessel movement
- Obtain permits for movement through and between locks
- Obtain proper charts and update with all Notice to Mariners
- Verify availability of CG DGPS correctors and RTK stations
- Document equipment installation
    - Establish Boat 0,0,0
        - Vessel fore/aft centerline, aft edge of athwart ship I-Beam on A-Frame, point on aft deck slightly above waterline
    - Measure and record all offsets
        - Trimble 7400 MSi DGPS's
            - Navigation antenna X, Y, Z
            - Reference antenna X, Y, Z
        - Trimble 7400 RTK GPS
            - Antenna to waterline
            - X & Y to boat 0,0
        - Innerspace 448 X, Y, Z

- TSS DMS 2i-05
  - X, Y, Z
  - Zero out mounting angles with appropriate vessel loading – see procedure in TSS section

- Robertson Compass
  - X, Y
  - Align to true heading of vessel centerline – see procedure in Compass section

- Sidescan Tow Point X, Y, - Z left at 0.0 m for proper Caris import of layback

- Subbottom Profiler Tow Point X, Y, - Z left at 0.0 m for proper Hypack import of layback

1.2 Equipment Setup

1.1.1.1.2 ***1.2.1 Trimble 7400 Receiver***

- Initial Settings
  - RTCM Output = off
  - RTCM Input
    - Inputs ON
    - Port = 2
    - Format = USCG
    - ASCII Printout off
    - Beeper Off
    - Station = any
    - Age Limit 20 sec.
    - Integrity Monitor Off
  - Power Up Control
    - Do not default controls at power up
  - SV Enable/Disable
    - Disabled mode = none
  - Adjust local time

        - Time offset EDT-UTC = -4 hrs
        - Time Zone Identifier = EDT
    - Baud Rate Format
        - Port 1 = 9600-N-8-1
        - Port 2 = 9600-N-8-1
    - Remote Protocol
        - Data Collector Compatible
    - Reference Position
        - Lat = 35 50 40.91718
        - Lon = 075 39 19.57021
        - Height = -37.529
        - (Note, may be changed during survey by selecting **HERE** to get local position and current ellipsoid height for Lat/Lon – Fixed height)
    - Masks/Sync Time
        - Elevation Mask = 8
        - PDOP Mask = 5
        - SV Sync Time = 1.0
    - Positioning Modes
        - Weighted solution enabled
    - Lat/Lon Height Always
- Power Controls
    - Charger and Power output disabled
- NMEA 183 Output
    - Port 1 Enabled
        - GGA, VTG, ZDA
- Cycle Printouts = Off
- 1 pps output = disabled
- Default controls – **DO NOT USE!!! RESETS TO FACTORY**
- Modify
    - Units of Measure
        - Lat/Lon Degrees = Deg.Min.Sec.
        - Time = 24 Hr UTC
        - Position = WGS-84 LLH
    - Altitude Reference
        - Height above ellipsoid

1.2.2 MX-51 Beacon Receivers

- Initial Settings - DGPS1

- **HUDSON FALLS, NY**
  Status: Operational
  RBn Antenna Location: 43° 16.21' N73° 32.31' W
  REFSTA Ant Location (A): 43° 16.2491' N73° 32.34705' W
  REFSTA Ant Location (B): 43° 16.2637' N73° 32.34534' W
  REFSTA RTCM SC-104 ID (A): 94
  REFSTA RTCM SC-104 ID (B): 95
  REFSTA FIRMWARE VERSION: RD00-1C19
  Broadcast Site ID: 844
  Transmission Frequency: 324 KHZ
  Transmission Rate: 200 BPS
  Signal Strength: 100uV/m at 135NM

- CTToolbox should be used to reload H11032R.CNF (config file) if necessary. The following settings are in H11032R.CNF
  - CONTROL/BASE STATION
    - Input using **HERE** at Hudson Falls
    - LAT 35 50 40.77420
    - LON 075 39 19.81768
    - HGT – 0035.870
    - ANT Height 000.000
  - CONTROL/SV ENABLE/DISABLE
    - ALL – ENABLE
  - CONTROL/GENERAL CONTROLS
    - ELEV. MASK: 08
    - PDOP MASK : 05
    - MEAS RATE 1 HZ
    - MOTION: KINEMATIC
  - CONTROL/POWER CHARGER
    - POWER OUTPUT MODE DISABLED
  - CONTROL 1PPS OUTPUT
    - 1 PPS OFF
    - ASCII TIME TAG PORT OFF
  - CONTROL SERIAL PORT OUTPUT
    - NMEA/ASCII OUTPUT
    - GGK
      - PORT 2
      - 1 HZ
    - ZDA
      - PORT 2
      - 1 HZ

    - All others off
- STREAMED OUTPUT
    - ALL OFF
- RT17/BINARY OUTPUT
    - ALL OFF
- CMR/RTCM
    - BASE – MOVING
    - CMR PORT – OFF
    - NAME - cref
    - RTCM PORT – OFF
    - TYPE - 1
- CONTROL/SERIAL PORT SETUP
    - PORT1 9600 8-NONE-1
    - PORT 2 9600 8-NONE-1 NONE
    - PORT 3 9600 8-NONE-1
    - PORT 4 9600 8-NONE-1 NONE
- CONTROL/INPUT SETUP
    - USE RTCM STATION – ANY
    - RTK/DGPS AUTO SWITCH RANGE – 20.0 KM

1.2.3 Compass (Side scan sonar operations)

- Initial Calibration Procedure
  - Load vessel, as it will be for survey ops. Remove any large ferrous objects from the vicinity of the compass.
  - Position the vessel in open water
  - Apply power to the Robertson autopilot
  - Begin by turning the vessel to starboard.
  - Select **INSTALLATION/RFC COMP calibration**.
  - Calibration should complete after ~ 1 ¼ turns and should be verified by a display of **Calibration confirmed**.
- Determine and apply Compass Offset
  - Con the vessel on a straight line while observing the heading computed by the GPS system.
  - Adjust the offset by turning the autopilot knob to match the pilot compass heading to the gps heading. Note the applied offset. (This puts the pilot compass into "TRUE" heading.)

1.2.4 TSS DMS 2i-05 (Hydrographic survey operations)

- Initial Settings
  - Set baud rate/format to 19200,N, 8,1
  - Heave bandwidth = SHORT
  - Output Rate = 50 hz.
  - GPS data input settings = NMEA Local 9600, 8, N, 1
    - Check GPS RAW and CALCULATED input
  - GYRO data input settings = NMEA Local 4800, 8, N, 1
    - Check Compass RAW & CALCULATED INPUTS
  - Data output format = TSS1 19200, 8, N, 1
  - Zero out mounting angles. Document mounting angles with screen grab.
    - Stabilize vessel with static loads approximating those that will be experienced during the survey.
    - Access TSS through communication program and set mount angles automatically by averaging data for 5 minutes
    - Accept values and screen grab settings

Restart TSS operation and exit from program

Mount Angle Setting Recorded

06/04/02

```
---------------------------------
DMS 2-05 Version 2.03 Terminal Mode
---------------------------------
Sensor Mounting

Orientation : Vertical
Roll  Mount Angle [  1.741  deg] :
Pitch Mount Angle [  1.711  deg] :
Yaw Mount Angle [  0.000  deg] :
```

- **Do Not Change These Settings!**

1.1.1.1.3

1.2.5 Innerspace 448 (Hydrographic survey operations)

- Initial Settings
  - Verify the following initial settings
    - Gain = Approx. 10 o'clock setting
    - Range = 0-15 M
    - Mode = Meters
    - Chart Speed = 4
    - Range Multiplier = X1
    - Input default speed of sound of 1500 m/s
    - Set draft = 0.0
    - Tide = 0
    - Initial = 5
    - Gate = 2
    - Mode = Gated
    - Reply = 16
    - Alarm on during survey
    - Set variable power TX board to Low, to limit interference with SS and MB
    - Set internal TVG curve switch to open/open or +60 db. This was needed to receive quality data at the above mentioned low power setting with our combination of components
    - Set date & time – See back of paper carrier
    - Load paper per picture on back of paper door

1.1.1.2

1.2.6 Klein 595 (Side scan sonar operations)

- Initial Recorder Setup
  - Set system to factory defaults by pushing left button on the CPU board
    - This resets all values to factory default
    - It also resets all gain curves and other "adaptive controls prior to calibration
      - A calibration should be preformed, per the manuals description any time a component is changed, like a cable or fish
  - Set time/date in submenu
    - Add "*" to time and date to print it when an event is pressed. This can be used to log tuning changes and rub tests
  - Set system to the following values:
    - Auto CPU
      - Altitude = 0,0
      - Return = 0
      - Offset = 2
    - Auto TVG Port
      - Normal
      - Atten. = 9
      - Salt Water
    - Auto TVG Starboard
      - Normal
      - Atten = 9
      - Salt water
    - Printer = Off
    - Range = 25 Add "*" to field
    - Scale lines = 10 Add "*" to field
    - Source = Fish
    - Channel = 1 | 2
    - Speed = Manual –1.0 Set to avoid alarms
    - Altitude = Auto
    - Mapping Mode = Off
    - Altitude Alarm = Off
    - Auto Mark = Off
    - Event Count = Off
    - Event Mark = Off

        - Side Scan Expand = Off
        - Profiler Expand = Off
        - Nav Source = Nav3* - used for external Eventing option
    - Follow the calibration found in the operations manual on 3-34 to tune for site conditions
    - Document tune-up settings in SSS annotations
    - Document tow configuration and Cable out in SSS annotations
        - Tow Point
            - See attached drawing for exact location
            - The tow point is a sheave mounted to a bowsprit. In operation the fish is lowered to1meter in the water as the vessel is moving at survey speed.
            - The cable is fair leaded back to the stern on the outside of the bowsprit mount. Cable out measurement is taken from the point of the sheave closest to the mount point
            - The layback was measured by observing the fish under survey conditions and measuring from the center of the xducers to the tow point.
            - Document any changes made to the recorder online in the Isis notes section
    - Initial Fish Setup
        - Depression angle = 20 degree's
        - 500 KHz only
        - 100 KHz disabled in fish – SCR trigger is disconnected.
        - Attach depressor to fish

    - Internal Jumpers
        - A/D board jumpers should be set to reflect proper software version (checked 050202)
        - Fish Tape I/O jumper should be set to either 15v for short cable or 24v for long cable (winch) (checked 05/2/02 set to 15v)
        - Verify which channel is tracking altitude on the Connector interface board

1.2.7 EdgeTech Geostar (Sub-bottom profiling operations)

The power amplifier power input is manually set to 110 or 220VAC. To access the switch on the amplifier, it must be removed from the 19" rack, the switch is located on the right side of the unit. The monitor and the computer are auto sensing.

1.2 Operator Controls (refer to GeoStar manual before modifying any of the default control parameters)

Review the following parameters and select to optimize data quality:

a) Normalize gain control
b) Select display gain for either or both channels (From 1 to 97, in increments of 3 dB)
c) Set Time Varying Gain (TVG) for either or both channels (From 0 to 30, in single increments)
d) Select one or two channel display based on transducer number
e) Bandwith selection (Full, High or Low)
f) Set vertical zoom (1/2, 1, 2 or 4 times) based on range and water depth
g) Set Mode selection (Acquire or Playback), acquire for data collection
h) Select Time and Data source (CPU or GPS)
i) Select Start depth (A/D delay) of display and acquisition 0 to 200m below the fish
j) Review Pulse selection (3 pulses for each towfish)
k) Set data storage selection (Iomega Jaz or hard-drive)
l) Data file management (deleting unnecessary files)
m) Set decimation factor
n) Select printer (EPC 1086) if using printer
o) Quit to shut down the system

1.2.8 GSSI SIR 2000 (Subbottom profile operations)

2.

3. Startup System

- Connect antenna.

- Connect power source.

- Press Power button. The green light above the power button should be steady. If the green light is not steady, your power source is faulty, change power source.

4. Data Collection Setup

- The blue SIR-2000 Startup Screen will appear.

- Press Enter for Standard operation.

- Press the Left arrow for Previous Setup or the Right arrow for Stored Setups.

    - Previous Setup will recall the last used operating parameter.

    - Stored Setups provide a list of factory- and user-defined settings.

- Select a factory setup based on antenna frequency or user defined setup from window using arrow keys.

    - Press the Enter to recall the setup file and then press Enter to confirm.

    - System will initialize (you will see "servo in process") according to selected setup.

5. Data Collect Setup

- The Screen will open with a Linescan display on the left and the O-Scope window on the right. The User menu is navigated with arrow keys.

- The auto setting recalled will set data collection parameters according to "rule of thumb" guidelines. All settings can be changed by the user, if desired. Refer to SIR 2000 manual for additional information

1.2.9 Bar Check

- Initial Setup and Calibration
  - Determine maximum depth of survey and depth units
    - Sheet A maximum depth is in the 10 meter range
    - Survey depth units are meters
  - Construct Bar Check per OSI standards
  - Type 1
    - .2 meter diameter lead disk with eye bolt
    - Imprint a "serial number" onto bar
      - "A"
      - "B"
    - Coated aircraft cable
    - Brass marker beads at appropriate intervals
      - Minimum of every 1 meter throughout the survey depths
      - This is to allow use of a "pocket rod" to read inter bead values
    - Also mark cable on both sides of bead with a "sharpie" to help identify bead slips
    - Measure bead locations with steel tape to the nearest 0.01 meter increment
    - Record bar s/n and all other information required on OSI Lead Line Calibration form
  - Recalibration
    - Recalibrate Bar Check every 6 months, or after any action that could possibly affect the condition of the Bar Check, such as snagging line on bottom.
    - Recalibrate at the completion of the survey
  - Maintenance
    - Periodically examine the eye bolts and cables

  - Type II
    - Aluminum square-beam > width of boat with target at position of in hull xducer
    - Imprint a "serial number" onto bar
    - Coated aircraft cable
    - Brass marker beads at appropriate intervals
    - Minimum of every 1 meter throughout the survey depths
      - This is to allow use of a "pocket rod" to read inter bead values

        - Also mark cable on both sides of bead with a "sharpie" to help identify bead slips
        - Measure bead locations with steel tape to the nearest 0.01 meter increment
        - Record bar s/n and all other information required on OSI Lead Line Calibration form
    - Recalibration
        - Recalibrate Bar Check every 6 months, or after any action that could possibly affect the condition of the Bar Check, such as snagging line on bottom.
        - Recalibrate at the completion of the survey
    - Maintenance
    - Periodically examine the eye bolts and cables

1.2.10 GE 1 Computer System

- Start Up
    - Verify DC Mains and Autopilot are off before powering up, or logging onto, system
    - Log on using default Logon
        - User Name osiuser
        - Password (blank)
- Verify time zone is set to (GMT) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London.
- DO NOT CHECK "Automatically adjust clock for daylight savings time.

- Start HyPack MAX with appropriate shortcut
    - Open new project named GE-1
        - Create folders in the project folder named DATA1
        - Set geodesy to UTM Zone 18 WGS 84
        - HYPACK HARDWARE SETUP
            - New File
            - NAV - NMEA183.DLL
                - Name = DGPS1
                - Update Frequency = 50ms
                - Type
                    - Position
                - Options
                    - Record raw data
                    - Record quality data

    - Record
        - Always
    - Connect
        - Serial Port
            - COM3, 9600,8,none, 1,Flow Control = none
    - Offsets
        - Starboard = -.35
        - Forward = + .23
        - Height = +1.97
        - Latency = 0.860
    - Setup
        - Standard NMEA 0183 sentences to be used
            - GGA
        - HDOP Limit = 2.5
        - Minimum Satellites = 4
        - Use ZDA message for time tag = Disabled
        - Send alarm when non differential
- Depth – Innerspace 448 {Serial} - IN448.DLL
    - Name = 448
    - Update Frequency = 50
    - Type
        - Echo sounder
    - Options
        - Record raw data
        - Record quality data
        - Paper Annotation
    - Record
        - Always
    - Connect
        - Serial Port
            - COM6, 9600,8,none, 1
    - Offsets
        - Starboard = 0.0
        - Forward = 0.0
        - Height = +.8 NOTE!!! .8 meters used as “display offset”. See Draft explanation
        - Latency = 0.000
    - Setup

        - Send annotation string with event mark
        - Multiply not needed
- Auto Pilot Compass – NMEA.DLL
    - Name = AP Compass
    - Update Frequency = 50
    - Type
        - Heading
    - Options
        - Record raw data
        - Record quality data
    - Record
        - Always
    - Connect
        - Serial Port
            - COM5, 4800,8,none, 1
    - Offsets
        - All zero
    - Setup
        - Sentence to be used
- HDG
- Auto Pilot – NMEA.DLL
    - Name = AP XTE
    - Update Frequency = 500
    - Type
        - Output
    - Options
        - Record raw data
        - Record quality data
    - Record
        - Always
    - Connect
        - Serial Port
            - COM8, 4800,8,none, 1
    - Offsets
        - All zero
    - Setup
        - Sentence to be used
- GGA
    - Sentence to generate
    - APB
    - GLL output places = 4
    - XTE (Nautical Miles) checked

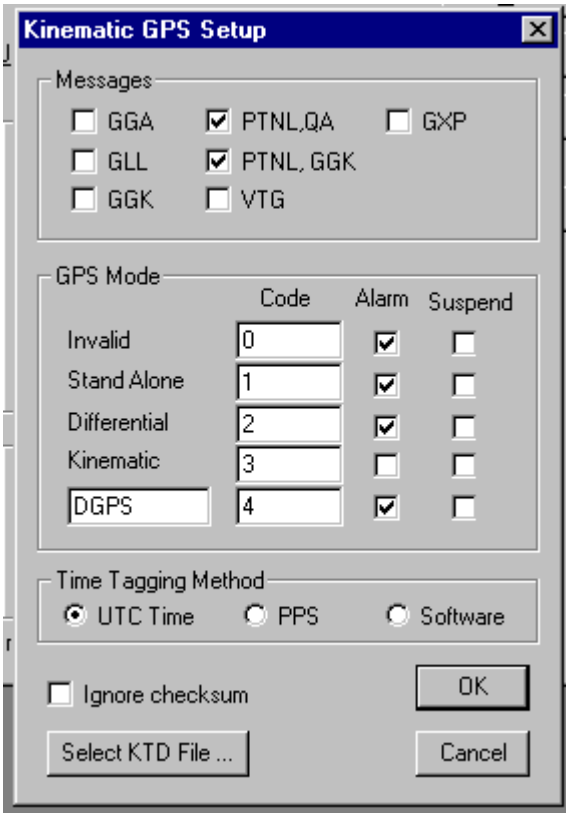
  - Output to hundredth decimal place = Enabled
  - XTE Factor = 0.0

- File Server – Delph Output – DELPH.DLL
  - Name = Isis Out
  - Update Frequency = 20000
  - Type
    - (nothing checked)
  - Options
    - Record raw data
    - Record quality data
    - Paper Annotation
  - Record
    - Always
  - Connect
    - Serial Port
      - COM7, 9600,8,none, 1
  - Offsets
    - All Zero

- TSS DMS2i-05 – TSS320.DLL
  - Name = DMS2i-05
  - Update Frequency = 50
  - Type
    - Heave Compensator
    - Other
  - Options
    - Record raw data
    - Record quality data
    - Paper Annotation
  - Setup
    - Motion reference Unit Only
  - Connect
    - COM 1 19200,8,N, 1
  - Record
    - Always
  - Offsets
    - Position
    - Starboard = -.44
    - Forward = +.47
    - Vertical = -.18

- Yaw = 0
- Pitch = 0
- Roll =0
- Latency =0

- Trimble 7400 RTK OTF - KINEMATIC1.DLL
  - Name – RTK
  - Type
    - Position
    - Echosounder
    - Sync. Clock
    - Tide Gauge
  - Record RAW
  - Record Quality
  - Setup



  - SELECT KTD FILE

        - File 02ES007.KTD used for survey ops

    - Connect
        - COM2 9600,8,N, 1, Flow Control = none
    - Offsets
        - Position
        - Starboard = -1.50
        - Forward = +.25
        - Vertical = + 2.05
        - Yaw = 0
        - Pitch = 0
        - Roll =0
        - Latency =0
    - Record
        - Always

    - Create a second mobile named RTK. Transfer the RTK device to the second mobile

- URS-1 – VHW.DLL
    - Name = Speedlog
    - Update Frequency = 200
    - Type
        - Speed
        - Other
    - Options
        - Record raw data
        - Record quality data
    - Setup
        - none
    - Connect
        - COM 9 4800,8,N, 1, Flow Control = none
    - Record
        - Always
    - Offsets
        - None
- Settlement – DraftTable.dll
    - Name = Settlement
    - Update frequency = 100
    - Type

- Draft
- Setup
  - Create Draft table from Settlement and Squat test
  - Insert Draft table picture – set to 0.0 for squat test
- Offsets
  - None
- Connect
  - Ignored
- Record
  - Always

1.2.9 GE-1 CARRIS OFFSETS to BOAT

DGPS1 (NMEA183.DLL)

STBD	+1.18
FWD	+0.02
Height	+1.97
Latency	+0.00

448 (INN448.DLL)

STBD	+1.53
FWD	-0.21
Height	+0.80
Latency	+0.00

Auto Pilot Compass (NEMA.DLL)

STBD	+0.00
FWD	+0.00
Height	+0.00
Latency	+0.00

Isis Output (DELPH.DLL)

STBD	+0.00
FWD	+0.00
Height	+0.00
Latency	+0.00

Auto Pilot (NEMA.DLL)

STBD	+0.00
FWD	+0.00
Height	+0.00
Latency	+0.00

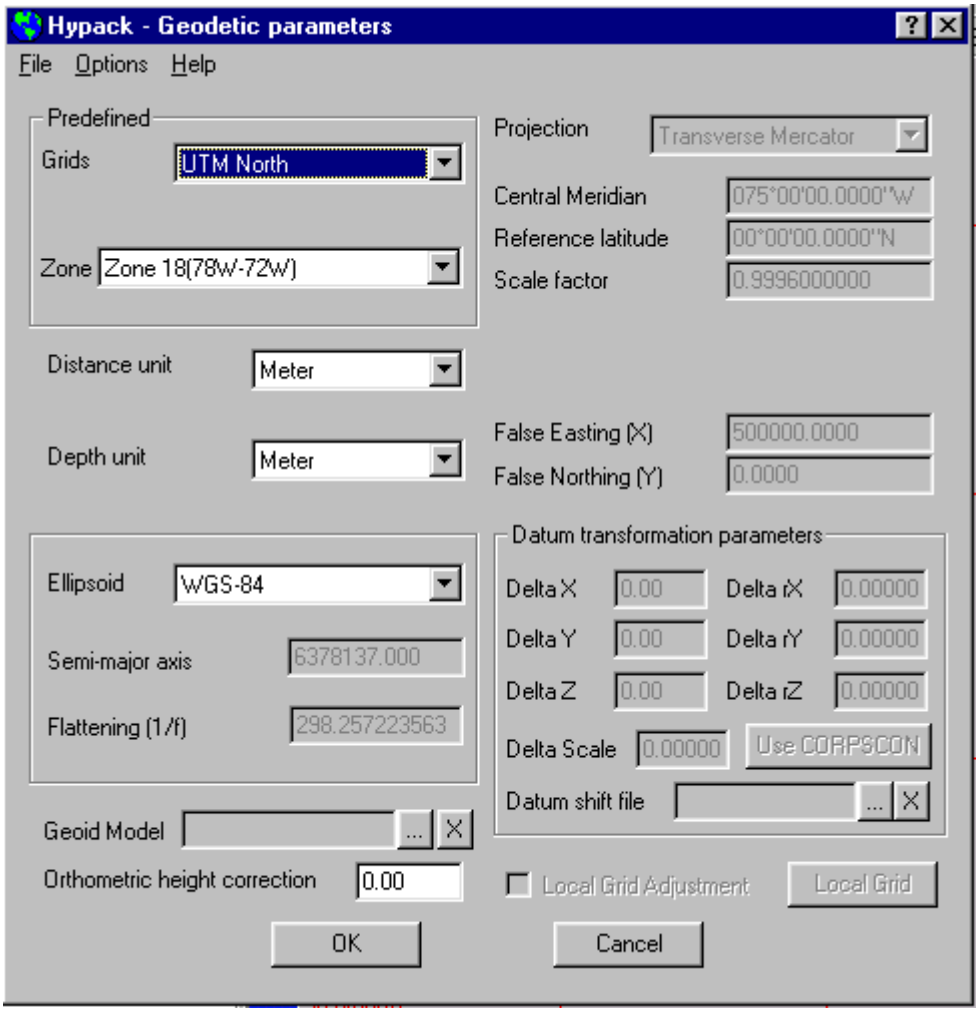
DMS 2i-05 (TSS 320.DLL)

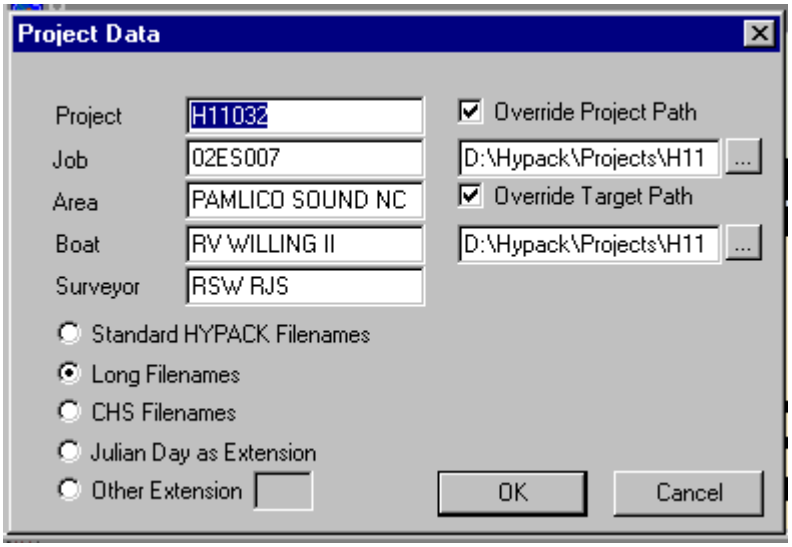
STBD	+1.09
FWD	+0.26
Height	-0.18
Latency	+0.00

RTK GPS KINEMATIC.DLL

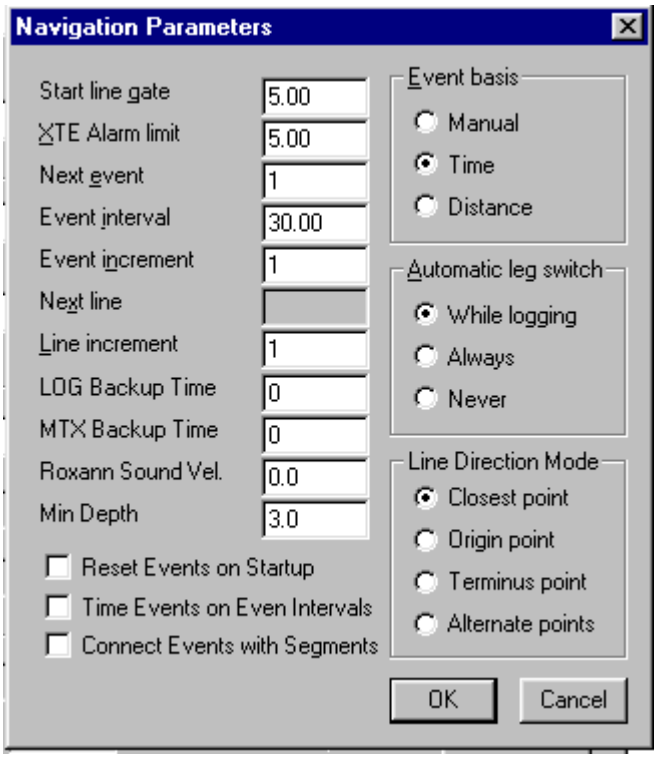
STBD	+0.03
FWD	+0.02
Height	+2.05
Latency	+0.00

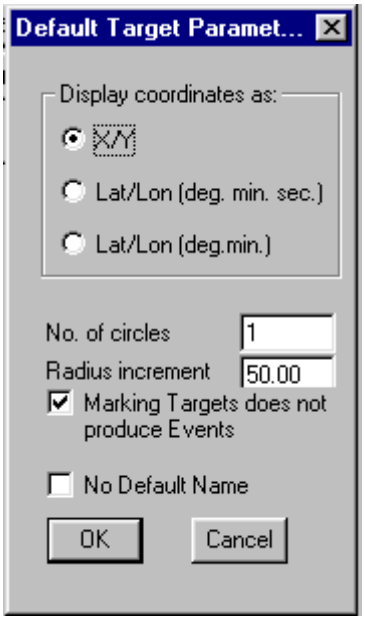
1.2.10 Other Hypack Max Settings


Hypack - Geodetic parameters
File
Options
Help
Predefined
Grids
UTM North
Zone
Zone 18(78W-72W)
Projection
Transverse Mercator
Central Meridian
075°00'00.0000"W
Reference latitude
00°00'00.0000"N
Scale factor
0.9996000000
Distance unit
Meter
Depth unit
Meter
False Easting (X)
500000.0000
False Northing (Y)
0.0000
Ellipsoid
WGS-84
Semi-major axis
6378137.000
Flattening (1/f)
298.257223563
Datum transformation parameters
Delta X
0.00
Delta rX
0.00000
Delta Y
0.00
Delta rY
0.00000
Delta Z
0.00
Delta rZ
0.00000
Delta Scale
0.00000
Use CORPSCON
Datum shift file
Geoid Model
Orthometric height correction
0.00
Local Grid Adjustment
Local Grid
OK
Cancel



NOTE: XTE ALARM set to 100000 for Sea Trials





5.1.1.1 **1.2.11 ISIS**

- Start Up
  - Verify DC Mains and Autopilot are off before powering up, or logging onto, system. Note: if monitor does not come on (yellow power/signal indicator steady yellow on lower right corner of monitor) remove power from monitor for a few seconds, then restore and turn on monitor.

  - Start Isis with Isis H11032 shortcut – **Only**
    - This calls up a specific configuration file

- File types and locations
  - H11032 ISIS Short Cut to Start Isis Desktop
  - H11032.LAY Window Layout E:\H11032 ISIS\H11032 Config\
  - H11032_140.CFG Isis configuration file D:\TEI\IsisSona\v5.91\
  - Survey. log Isis session log D:\root
    - Note: unable to redirect this file

- Initial Processor Settings
  - File Menu

- Playback N/A
- Record Setup
    - Sonar Setup
        - Pick standard analog
        - Select CHICO/CHICO PLUS Board
            - Channel 1 edit
                - Status = On
                - Name = Port
                - Type = Port SSS
                - Trigger = 1
            - Channel 2 edit
                - Status = On
                - Name = Stbd
                - Type = Starboard SSS
                - Trigger = 1
            - All other channels disabled
            - Sonar name to H11032 Klein 595 2 CH 500Khz
            - Frequency = 384.0,384.0
            - Horizontal Beam Angle = 0.2,0.2
            - Beam Width = 50.0, 50.0
            - Tilt angle = 20.0, 20.0
            - Name of server = ISISCHICO.EXE
            - Automatic control disabled
    - Serial Port 1 Heave, Pitch, Roll
        - Status = On
        - Settings = 19200, 8, N, 1
        - Template = TSS
        - Convert Lat - Long = Disabled
        - Filter Speed = Disabled
        - Navigation Latency = 0.0
    - Serial Port 2 Not used
    - Serial Port 3 GPS for SSS
        - Status = On
        - Settings = 9600, 8, N, 1
        - Template = NMEA0183 NOCLOCK
        - Convert Lat - Long = Disabled
        - Filter Speed = Disabled
        - Navigation Latency = 0.0
    - Serial Port 4 GPS for Single Beam
        - Status = On
        - Settings = 9600, 8, N, 1

- Template = NMEA0183
  - NMEA0183 SHIPPOS NOVTG
- Convert Lat - Long = Disabled
- Filter Speed = Disabled
- Navigation Latency = 0.0

- Serial Port 5 Compass
  - Status = On
  - Settings = 4800, 8, N, 1
  - Template = NMEA0183 NOCLOCK NORMC NOGLL NOVTG
  - Convert Lat - Long = Disabled
  - Filter Speed = Disabled
  - Navigation Latency = 0.0
- Serial Port 6 May be used for Fish Altitude input
  - Better Tuning Has Made This Option Unused
    - Manual SSS Bottom Tracking Option
    - Status = Off
    - Settings = 9600 8, N, 1
    - Template = Manual
      - Modify Default = {/100}{-1.3}7
        - Change 1.3 to value needed to get correct altitude
    - Convert Lat - Long = Disabled
    - Filter Speed = Disabled
    - Navigation Latency = 0.0
- Serial Port 7 Hypack feed for Line Control
  - Status = On
  - Settings = 9600, 8, N, 1
  - Template = (Leave Blank)
    - Allows events and start/stop info in from Hypack
  - Convert Lat - Long = Disabled
  - Filter Speed = Disabled
  - Navigation Latency = 0.0
- Serial Port 8 448 feed to Aux Sensor 1
  - Status = On
  - Settings = 9600, 8, N, 1
  - Template = Manual
    - Modify Default = {/100}1
  - Convert Lat - Long = Disabled
  - Filter Speed = Disabled

- Navigation Latency = 0.0
- Serial Port 9 RTK INPUT

- Serial Port 10 Speed Log
  - Status = On
  - Settings = 4800, 8, N, 1
  - Template = {pattern=m}s
  - Convert Lat - Long = Disabled
  - Filter Speed = Disabled
  - Navigation Latency = 0.0

- File Format
  - Format = XTF
  - Media = Disable
  - Sample Size to Record = 16 bit
  - Samples per Channel = 1024
  - Processing Method = MAX
  - XTF File Header Notes
    - Vessel Name
    - Survey Area
    - Operator

- Configure
  - Playback Speed – as desired
    - Real Time Scrolling
      - Scroll without restoring covered data
        - This keeps system from locking up
    - Transducer Depth = 0.0
    - Ocean Tide
      - Apply Corrector = Disabled
      - Verify = 0.0
    - Sound Velocity = Average from first cast of the day
    - Multiple Pings = 1
    - Hypack DDE
      - Accept from Hypack = Disable All
      - Automatically Start Saving At Start of Line
        - Use File Name from Hypack = Enable
        - Generate File Names = Disable
        - Start Each File with = Enter Daily Directory Info
    - Cue Boxed = Disabled
    - Set Date and Time = Ignore – Will be automatically set during operation
    - Save Setup = Prompt User at Exit

- Color
  - Palette
    - SSS Colors = Grey Scale
    - Squelch = 0.0
    - Reverse Palette = Enabled
    - Strong Returns Red = Disabled
  - Grid Color
    - Voltage Grid
      - Line = Blue
      - Data = White
      - Dim = Both Enabled
    - Scale Lines Red

- View
  - Scale Lines
    - Apply Settings to = All the same
    - Scale line Unit = Distance
      - Spacing = 10
  - Depth Delay and Duration
    - Apply Settings to = All the same
    - Units = Off
  - Overlay
    - Show on Waterfall
      - Event Marks = Disabled
      - Event Text = Disabled
      - Bottom Track = Enable
    - Bookmarks
      - Save Bookmarks = Enabled
      - Display Bookmarks = Enabled
  - Down Sample = Max
  - Speed
    - Automatic = Enabled
    - Filter = Disabled
  - Heading = Automatic
  - Layback Correction
    - Apply Delta XY = Disabled
    - Apply Layback = Enable
      - Use Logged Layback = Disabled
      - Enter layback manually = Enabled

- Compute layback from Cable Out = Disabled
- Enter layback value in box provided (Currently 1.0M)
    - This field with be empty, enter value
        - Obtain value from chart
    - Click ACCEPT, current value changes to entry
    - NOTE: **DO NOT CLOSE WINDOW**
    - NOTE: CHECK AT START OF EACH LINE
    - NOTE: HAVE OPEN DURING CONTACT PICKING

- Tools
    - Target Setup
        - TargetPro.exe only
        - Target Setup
            - Height = 512
            - Width = 2048
            -
        - Target
            - File
                - **Set working Directory = Enter Daily Data Directory**
            - Tools
                - Configuration
                - Speed auto
                - Speed Corrected display = yes
                - Layback = manual
                - Horizontal beamwidth
                    - Manual, 0.0
                - Local variation = 0.00
                - Latitude/longtitude
                    - Deg Min Sec
                - Northing/Easting Display
                    - Meters
                - Range Display Units
                    - Meters
                - Speed display Units
                    - Knots
                - Misc.
                    - Automatic Audit Trail = yes
                    - Object Detection on image load
                        - None
            - Units = Meters

- Constants = Use defaults
- Set Contact Number = Start with 1 – Ensure number is consistent with contacts logged to date.
- Speed Correct = Enabled

- Parameter Window – Current File Section
  - Switch Button
    - Record Data to File Name = Blank
    - Remaining storage = Enable D: and E:
    - File Grows larger than = Disable

Altitude - Absolute

Based on 595 Range Scale

Range	8% Minimum Altitude	20% Maximum
25	2.00	5.00

Maximum System Speed

Based on 595 Ping Rate

Range	Ping Rate / Second	Maximum Speed
25	27.00	17.50

Maximum Survey Speed

Based on 10% Buffer

Range	Maximum Speed (Knots)	90 %Maximum Speed (Knots)
25	17.50	15.75

5.1.1.2 1.2.12 Robertson Autopilot

Introduction:

The factory technical representative for the parent company Simrad, is Rich Barnes (425-778-8821) who is located at Simrad, Inc., 19210 33rd Avenue West, Suite A, Lynwood, WA. 98036. The pilot was interfaced to NOAA1 to receive NMEA (modified) standard messages from Coastal Oceanographics HYPACK MAX Survey program. The vessel captain performs all operations related to the pilot.

Interface:

The pilot receives the following NMEA-0183 messages;

APB (modified by Coastal to send .#### nm of cross track error vs. .## nm, the NMEA standard)

VTG (standard)

GGA (standard)

Baud rate is 4800/N/8/1

NMEA input to the pilot is through TB 10 on the Junction Unit, Pins RX 1(+) and RX1 (-). There is no handshaking or error correction used. The Robertson RFC35R rate compass is used to provide vessel heading to all systems and outputs a NMEA message through TB10on the Junction Unit, Pins TX2(+) and TX2(-).

Operation:

The pilot starts in the **Helmsman** mode. The captain steers the vessel on to the trackline well ahead of the actual BOL and attempts to track down the line. When the vessel has stabilized online the pilot is put into the **Auto** mode. The pilot is "course steering" at this point. The captain observes the vessel motion and line tracking while adjusting the "course" using the left/right buttons on the control unit or remote control. When the vessel is steering the line and cross-track error has been reduced to a minimum (typically less than 1 meter), the captain changes to the **NAV** mode. The pilot will continue to steer in "course steering" mode for a period of time determined by an internal setting (currently at minimum – 100 sec). Then it will use the XTE value received from HYPACK MAX and attempt to adjust it's course to achieve zero XTE.

Some conditions prohibit the use of the **NAV** mode. One example is the use of a drogue chute to slow the vessel. Sea conditions that cause sudden large heading changes are another example. In these cases the pilot is left in the **Auto** mode and the left/right buttons on the control unit or remote control unit are used to con the vessel down the line.

Initial Setup:

Mechanical setup and alignment are performed at the time of installation and should require no further adjustment. There are many electronic settings that affect pilot operation. They fall in to several categories:

- Front Panel
  - Rudder – used to set the amount of rudder used by steering commands
  - Counter Rudder – used to set the opposing rudder used when crossing a course line
  - Weather – used to reduce pilot sensitivity in heavy seas
- Info Loop
- Weather Loop
- Debug Loop

Normally, only the Rudder setting is changed throughout the day. More rudder (higher #) causes closer tracking and quicker steering response. Too much rudder causes large heading swings. Too little rudder and the vessel will fail to closely follow the line.

2.0 PRE SURVEY OPERATIONS

2.1 Navigation System Check

Upon arrival in Hudson Falls a third order control disk will be located to facilitate the performance of a navigation confidence test. Two separate procedures will be performed. The first procedure is to determine the horizontal and vertical position of the project RTK GPS base station and certify it. The second procedure involves using the Trimble 7400Msi L!/L2 Kinematic OTF system to locate a check point in proximity of the survey vessel for future confidence checks.

The first procedure involves the following.

A RTK base will be set up with it's antenna positioned at a known height over a GE/QEA supplied point. The Trimble 7400Msi reference receiver is then configured to provide CMR correctors based on the following parameters.

Configuration Toolbox file D24_Base.cfg

1. Generate CMR correctors on Port 1
2. Kinematic base unit
3. A elevation mask of 13 degree's
4. A PDOP mask of 5
5. Reference position of 35 50 40.87561 Lat, 075 39 15.38597 Long, -37.75 Elev. (WGS-84 Ellipsoid height)
6. Antenna height set to 2.000 meters, Antenna mounted on a 2.00 meter rod
7. Antenna type set to L1/L2 compact resulting in a True Vertical Height of 2.062 meters

The project RTK base will be set up as a rover station, receiving corrections from the station set at various stations using the following parameters:

Configuration Toolbox file RTK_ROV.cfg

1. Receive CMR corrections on Port 1
2. Kinematic rover
3. A elevation mask of 13 degree's
4. A PDOP mask of 5
5. Output GGK on Port 2.

For reference, the RTCM-104 correctors will be relayed from the reference station to the project base station location with Pacific Crest Radio Modems Model RFM96W.

Finally, a Hypack Project will be setup to monitor the position in both WGS-84 Lat, Long and UTM Zone 18 NAD-83. The following parameters will be used.

1. Project = Base_Average
2. Kinematic DLL for GPS input configuration
3. System offsets were set to 0,0,0 for this test
4. Geodesy was set for the above listed UTM Grid.

Position observations will be recorded for a sixty minute period. These observations will then be averaged and assigned as the project RTK base stations horizontal (WGS-84 Lat Lon) and vertical elevation (WGS-84 Ellipsoid).

The project RTK base will then be set up as a reference station, sending corrections based upon the assigned position. The following parameters will be used:

Configuration Toolbox file BASE.cfg

1. Generate CMR correctors on Port 1
2. Kinematic base unit
3. A elevation mask of 8 degree's
4. A PDOP mask of 5
5. Reference position of Lat 35 50 37.98404 N , Long, 075 39 15.87987 , -23.826 Elev. (NAVD88)
6. Antenna height set to 000.00 and antenna type set to **UNKNOWN (0.0 offset)**

The data from each file will be processed through SB-MAX where it will be filtered to only GPS Mode 3 points with an HDOP of <=2.0. These values will then be averaged and also the min & max values will be observed.

2.2 Static Draft Measurement

6. Establishment of Vessel Reference Position

Prior to survey operations, a Vessel Reference Position was set for use in post processing. Survey data will be collected by an Isis v5.91 system for processing under the Caris HIPS/SIPS software package. Single beam only data will be collected by a Coastal Oceanographics HyPack MAX v0.5b system for processing under the Caris HIPS/SIPS software package. During survey operations, no physical offsets will be entered into the Isis system. Therefore, all offsets and corrections should be handled by the Caris package. It should be noted that an average sound speed for the water column and Side Scan "Horizontal Layback" will be input into the Isis raw data package. This information will be discussed in the appropriate system sections.

With this in mind the following Reference Position was established based on the definition of a Vessel Coordinate System provided in the HIPS User's Guide.

Vessel Coordinate System

Vessel configuration is based upon an instantaneous, three-dimensional, vessel coordinate system. The

Origin of the coordinate system is the reference position (RP). The axis is defined as follows:

The Y-axis is oriented along the vessel's fore/aft axis, positive forward.

The X-axis is oriented along the vessel's port/starboard axis, perpendicular to the Y-axis, positive

to starboard.

The Z-axis is perpendicular to the X-Y plane, and positive down (into the water).

The Y-axis is located approximately mid ship at the fore/aft centerline created perpendicular to the location of the A-Frame.

The X-axis is located at the approximate port/starboard center of the vessel.

The Z-axis was located at the rear deck level, slightly above the water line of the vessel during setup and sea trials

Once this point was established, measurements were made to determine the physical offsets of all survey equipment based on this coordinate system. These measurements were compiled and displayed in the AutoCAD 2000 file called R/V Willing.dwg. This drawing contains all sensor offsets.

During the establishment of system offsets a "Reference Mark" was set to aid in monitoring vessel Static Draft. The Reference Marks are located on the starboard single beam transducer mount vertical member, The distance from the Reference Mark to the Z-axis is 1.20 meters.

2.3 Monitoring Vessel Static Draft

To correctly process soundings, Caris needs to know the position of the Reference Point during survey operations. This point will move as equipment load, personnel, and fuel levels change. To compensate for these changes the Static Draft is monitored daily. At the start of every survey day the motion sensor is monitored to determine vessel attitude and a measurement is made from the Reference Mark to the present waterline. If the vessel is experiencing a roll bias, due to fuel load, personnel are moved to steady the vessel at its standard attitude. This attitude was established during sea trials, by approximating vessel loads and "zeroing" the motion sensor.

7.

8. Appling Static Draft

The measurement is logged in the daily spreadsheet and is reduced to a static draft value that is subtracted from the distance to the zero vertical reference and the difference entered in Caris.

9.

10. Static Draft Variation

The Static Draft is monitored daily as mentioned above. The Static Draft of the vessel appears to have a maximum deviation of 0.01 meters. The data to date is summarized below:

Fuel Load	Static Draft (meters)
Full	0.080
.9	0.080
.8	0.080
7	0.079
.6	0.079
.5	0.079
4	0.079
.3	0.079
.25	0.079

2.4 KTD File Development for RTK GPS Water Level Data Collection and Raw Data Collection

We will be collecting RTK GPS water level elevations throughout the survey area and will be saving them as water elevations referenced to the NAVD 88 datum. This requires the preparation and use of a .KTD file. The KTD file models the difference between the ellipsoid height and the collection datum (NAVD 88) throughout the site.

3.0 HYDROGRAPHER OPERATIONS

11.

3.1 Start of Day - System Start-up and Dock Side Checks

Upon arrival to the vessel on a planned survey day, perform the following functions or verify their occurrence. These items should be done every day before departure.

- Start generator and switch system power from shore to generator.
- If system was shut down the night before, turn on both UPS main power switches and wait for the units to power up. Trip the TEST switch once on both units to apply power to the outlets.

3.2 Start of Day – Electronics Systems Start-Up

11.1

- Verify DC Mains, 448, 595, and Autopilot are off before powering up, or logging onto, the computer systems.
- Verify that the monitors are all off via the switch on the monitor outlet strip.
- Power up the Triton Elics, NOAA 1 & NOAA 2 computers.
- Turn on the monitors via the switch on the outlet strip.
- Computer 1 & 2
  - Log on using default Logon
    - User Name osiuser
    - Password (blank)
- The Triton Elics machine is Windows 2000 and has no log on screen
- Wait for all three computer systems to fully boot
- Turn on DC Mains switch. This powers the DMS2i-05, 7400, T4000s, MX51s, CTD and radio modem
- Put the Autopilot in standby
  - Observe compass = 244 - 250 degrees

- Verify computer date/time on each system
  - Open the H11032 vessel log.xls and enter the crew arrival time, vessel departure time, and crew initials.

3.3 Start of Day - GPS Systems Check

- Activate REMCON
  - Select CLEAR to acknowledge power-up
  - Select POSITION
    - Verify Mode is RTK FIX
    - Verify position
      - Lat ~ 35 50 40.8
      - Lon ~ 75 39 19.6
- Minimize REMCON

11.1.1.1

3.4 Start of Day – Klein 595

- Check mount
- Check connector
- Check cable and lock ring
- Check Fish body screws
- Apply power to unit
- Press “any” button to start system
- Press enter once, and left arrow once to stop printer

3.5 Start of Day – Innerspace 448

- Verify paper supply in unit
- Set power to on to verify date and time – correct if necessary
- Set power back to standby
- Add Start of Day Annotation
  - Registry #
  - Julian Date
  - Calendar Date
  - Vessel
  - Transducer in use
  - Operators

- Roll #

3.6 Start of Day – EdgeTech GeoStar

- Check mount
- Check connector
- Check cable and tow line
- Check Transducer housing
- Apply power to unit

3.7 Start of Day – GSSI SIR 2000

- Check mount
- Check connector
- Check cable and tow line
- Check Transducer housing
- Apply power to unit

3.8 Start of Day – Logging

- Open Survey Log
- Log date and personnel on board
- Log WX observations at start of day
- Log activities at dock

11.2 **3.9 Start of Day – HYPACK MAX**

- Open Explorer
- Create a folders in the HYPACK/PROJECTS//DATA1/ folder with a naming scheme of ###MAX1 where ### is the Julian date of the survey day. (Daily survey directory) Create a separate folder for each survey day.
- Start Hypack MAX
    - Verify that correct Line File is Enabled

  - Verify that correct background chart is enabled
  - Verify Geodesy
- Start Survey
  - Open Dialog box under Options/Project Options
    - Set Project directory to the daily survey directory.
    - Set the Target directory to the daily survey directory.
    - Verify that the other information is correct and that Long Filenames are enabled.
  - Verify all alarms are off (except 448)
  - Verify that all equipment is in normal locations (generator, etc.)
  - Ensure vessel is in Reference position. Have vessel captain move the vessel as needed. In Survey, click on Targets, Select, and then Change File. Select the file NAVCHK.TGT from the project directory. Select the dockside nav-check point and right click on it to "select" target. Observe distance to target. If distance is excessive. (Value +/- 1.5 meters) determine what the problem is and correct it. Take a target (F5).
  - Modify the target properties (F6) to name it *XXX AM NAV CHK* where XXX is the Julian Date. Add entries in Comments section: *Pitch X.X Roll X.X Hdg XXX.X* in which you record the observed pitch, roll, and heading as observed at the dock.
  - Dockside Limits:
    - Pitch 0.0 +/- .2
    - Roll 0.0 +/- .5
    - Heading 246 +/-5 deg.
  - Evaluate if values exceed the limits.
  - Log the time in the "activity sheet" of the H11032 survey. Also, place an "x" in the roll, pitch, and heading columns on the same sheet to indicate they have been checked.

- **Dockside static draft:**
  - Observe the ROLL value from the MRU and move people to normal positions within the vessel, or as necessary to compensate for fuel load, to achieve a "zero" roll while measuring the static draft from "Reference Mark" to the water's surface. Record the measured value in survey log. Correct the measurement to true static draft value with formula provided. Also note the RTK tide displayed on the NOAA1 Hypack Max data display and enter it in the daily log sheet.
- **Dockside RTK water level check**
  - Observe the local water level reading and enter it in the RTK vs. Observed section of the daily log sheet. Compare the NAVD-88 value calculated by the log sheet with the value recorded from Hypack Max.

11.3

11.3.1.1 **3.10 Start of Day – ISIS**

- Open Windows Explorer
- Verify space unavailable on data drive E: > 10 GB. If less than 10 GB you need to clear out older (already archived) files to make space.
- Create a new directory on that drive in the H11032 ISIS folder based on the following format:
    - XXXISIS - With X = to Julian day
- Minimize Windows Explorer
- Start ISIS system from the H11032 ISIS shortcut. (This starts ISIS with the correct config file)
    - Set working directory for Isis under Configure>Hypack DDE> *Start each filename with* to daily directory
    - Set Target working directory under Tools>Target>File>Set Working Directory
- Verify next contact number is set in Tools>Target> Edit>Set Contact Number
- Set unit to Start Record to screen only- File>Start Recording>Display Only
- Set Layback—View>Layback>Enter value>Accept
- Set threshold in waterfall by right click—Threshold =1
- Set waterfall window values as shown below
- Open Sensor window- Windows>Status & Control>Sensors
- If you want to view 448 depth - Aux 1 displays depth
- Open Altitude window
- Click on symbol of Alt: in Telemetry window of Parameter Display

- **Annotations**
    - Annotations are kept in a WordPad document name JD###.TXT where ### is the Julian Date. This file is kept open on the Isis machine and annotations are copied and "pasted" into the **NOTE:** section of the .XTF.
    - SSS annotations must be recorded in the notes section of the Isis box at:
        - At start of line
        - When surface objects are noted
        - When SS tuning, range, cable out, or any other parameters are changed

4.0 CONFIDENCE CHECKS

Confidence Checks H11032-JD160-06092002-RV WILLING II/PORT

Confidence Checks H11032-JD160-06092002-RV WILLING II/STBD

Confidence Checks H11032-JD160-06092002-RV WILLING II/BOTH

Registry#/Julian Date/Calendar day/Towing Vessel/Channel

5.0 INTERFERENCE

H11032-JD160-06092002-RV WILLING II/Wake

H11032-JD160-06092002-RV WILLING II/Biologic

Registry#/Julian Date/Calendar day/Towing Vessel/Type of Interference

11.4 **6.0 DURING TRANSIT TO SITE**

- Ensure the shore power cable is stowed.
- Remove all dock lines and depart.

7.0 ON-SITE – PRIOR TO SURVEYING

- Determine sound velocity and enter into machines
- Isis – **Configure/Sound Velocity**
- Hypack Max – **Options/Navigation/Roxann Sound Velocity**
- Innerspace 448 – Dial in as **Speed of Sound**
- Bar Check
- Depth confidence check
- Deploy SSS for appropriate tow
- Check SSS Range

11.4.1

7.1 Daily Average Speed of Sound

- Obtain speed of sound readings. Enter in 448, Isis, and in HYPACK MAX - Survey, under OPTIONS, Navigation Parameters as "Roxann Sound Vel. Verify value is representative of prior values.

11.4.2 7.2 BAR Check (Depth)

- Verify that the average speed of sound from the days first cast is entered into the 448
- Lower the barcheck to the lowest 1.0 meter increment available referencing the 1 meter marks to the 448 draft mark on the transducer vertical pole.
- Start the 448 paper and record the bar at one meter intervals to 1.0 meters.

11.4.3 7.3 Confidence Check (Depth)

- Check 448 to insure correct sound velocity entered, draft=0.0, tide=0. Mode Auto, gate 4, replies 8. Turn 448 from STBY to ON just prior to check to record date, time, speed of sound, and draft on paper record.
- Record depth on paper record as Hydrographer lowers bar to seafloor. On the "MARK" given by the hydrographer as the bar is touching the seafloor, toggle the FIX MARK switch on the 448. The hydrographer will measure the distance from the seafloor to the water surface using the barcheck marks and by measuring between marks. Take target.(F5) Name target XXX Depth Confidence Check. Return 448 to STBY mode.
- Annotate paper record with:
  - Depth Confidence Check
  - H11032
  - Julian Date XXX
  - Operator Initials
  - Bar Check = X.X m (meters)
  - Calculated 448 depth by adding displayed depth to daily static draft.

7.4 Confidence Check (Sidescan)

- While collecting data:

- ISIS operator will enter the appropriate annotation into the **NOTE:** section of the .XTF while online. The time is entered into the daily log and noted as a confidence check .
- At times other than during regular data collection
- A line can be run outside of regular data collection to demonstrate that the sidescan sonar system is able to detect targets out to the full extent of the selected range. The Hypack operator selects line 900 to record the data. The XTE value in *Survey/Options/Navigation Parameters* should be changed to 200000 to avoid unnecessary TEXT log entries. Start the line when ISIS is ready.

11.4.4

11.4.5 **8.0 BEFORE ON LINE DATA COLLECTION**

8.1 Computer 1 - Hypack Max

Start Survey

Verify correct line entered, and line azimuth is correct. Change if necessary.

8.2 Computer 2 - Hypack Max

Start Survey – start logging prior to BOL.

8.3 Innerspace 448

Turn 448 alarms on (if off) – verify digital depth is ok Start Paper

8.4 ISIS

Verify ISIS is ready.

8.5 Heave

Verify Heave is ready.

Create a target (F5) and change it's properties (F6) to DECK CTD = XXXX.X. (The value observed at the beginning of line)

9.0 START OF LINE

- Save / Clear any contacts in the Target window
- Verify SSS data quality and bottom track prior to start
- Verify coastal line start of Isis
    - Watch file size increment
    - Check destination directory for file

11.5 10.0 ONLINE

Observe digital depths, heave, and profile window to verify proper operation. In shallow areas assist the vessel helmsman by closely monitoring the depth of water. Immediately notify helmsman of hazardous condition. Watch water depth to QA/QC alt. of SSS. Watch vessel speed.

Observe Sidescan record in Isis. Mark targets & put target in Hypack so as to allow checking the target on the next pass.

Periodically observe Deck CTD value, DIM value, heave, vessel speed, and CTD time interval. Observe Navigation map for holes in Isis.

11.5.1 10.1 Gap Tracking - Sidescan

If a condition is observed that may create a gap in the Sidescan data the operator hits F5 on Computer 1 to create target. The operator then evaluates further. If a gap is declared the target will be called up for modification (F6). The default name in the target name field will be changed to

XXX SS GAP; where XXX is the julian date. Further info will be entered into the notes field as follows:

Start & end time of gap, channel (port/stbd) Line designation

Example:

034 SS GAP

Notes: 16:37:00 to 16:37:45, Port Channel, Line 201_1549.034, type of interference

Ensure that Gap is entered in H11032 daily log.

10.2 Gap Tracking - Singlebeam

Hypack operator hits F5 and creates a target as SB gap is seen. Operator modifies target (F6) to change name to XXX SB GAP. (XXX is the Julian date) Ensure that Gap is entered in survey daily log file.

12. 11.0 END OF LINE

- Save all contacts as follows, and report final contact number in log
  - Target>File>Save All>Yes if not saved already

12.0 END OF DAY

Review ASCII text file for alarms

12.1 End Of Day - ISIS

- Exit from Isis
- Close Target window if still active
- Log off machine or shut down based on required backup situation

12.2 Archiving Procedure

- Data from all sources is colleted in Computer 1archive for archiving and data transmittal preparation
- A separate directory is established for each survey day with a subdirectory structure where each type of data is stored
- The structure and file types are outlines below

DIRECTORY NAME		FILE NAMES	
XXX Data\Docs	All documents created	H11032 Survey Log.XLS	Summary of all activities
		Willing II_offsets_1_19.DWG	Vessel layout and system offsets
XXX Data\XXXisis	All Isis data files	*.XTF XXX.LOG *.CON, XXX-00-contact.TXT	All .XTF files from the day Daily Isis survey log Original Isis contact files
XXX Data\Max_Support	Hypack MAX support files	Varied file types	Setup and support files for Hypack MAX operation Hypack MAX operations and alarms summary

			.INI files used for MAX
XXX Data\XXXmax1	Hypack MAX data files and .log file	*.RAW *.TGT	All Hypack data lines .TGT is MAX target file

- A directory template is available with all subdirectories established with an XXX, copy this template to Computer 1 and replace XXX with Julian day.
- Removable Hard Drive
  - A copy of each days data are copied from Computer 1 to a removable hard drive at the end of each survey day.
  - The Drive is then taken to the project office where the data is archived.
- XTF Data
  - Move the survey log from D:\root to daily directory at the end of the survey day
- Hypack Data
  - Copy both the TGT and the TXT file for the day to the data archive.
- Document Files
  - Copy the Daily Survey Log to the Daily Directory Doc section
  - Copy the Master Log.XLS to the Daily Directory Doc section
  - Copy any other relevant documents or drawings to this section
- Misc Section
  - Place any other non-standard files into this directory.

13. 12.3 End of Day: System Shut Down and Dock Side Checks

Upon arrival at the dock, perform the following functions or verify their occurrence. These items should be done every day before departure from the vessel.

- Secure all dock lines and hook up the shore power cable upon arrival at the dock, log arrival time in vessel log.
- Read the vessel fuel gauge and enter the value in “Activities Section” of Daily Log
- Capacity is approximately 120 gallons

- Ensure vessel has all appropriate supplies for the next day. Fuel, disks, FEDEX supplies, food, paper supplies, and water.
- Switch the system over to shore power after verify unneeded systems are off.
- Turn off the DC Mains and Autopilot.
- Verify you have the Data package and any files that will be e-mailed with you.
- Ensure all lights and boat electronics are off. Check all windows. Ensure bilge pumps are on. Lock back door upon departure.

12.4 Misc. System Operations

13.1.1.1

13.1.1.2 **12.4.1 Klein 595**

- Lower fish into the water to test operation

- Deploy fish and note cable out for layback calculations.
- Verify SSS image quality on Isis

- End of Day
  - Power Off
  - Recover Fish
  - Inspect entire wet end of system for wear – damage

13.1.1.2.1.1 **12.4.2 Innerspace 448**

- On-site
  - Input average speed of sound from first SVP and verify entry into all other systems
    - 448 – Hypack – Isis
- Start of Line
  - Alarm on
    - Good bottom lock
  - Verify range, gain, mode, and gate settings for upcoming line conditions.
  - Verify proper sound velocity based on first cast

- Unit in standby power unless performing confidence check or time check

- End of day
  - Turn unit off
  - Remove and archive sounding roll
  - Verify Sounding pole is raised
  - Verify paper supply on board

- Periodic Maintenance
  - Clean print head

12.4.3 EdgeTech GeoStar subbottom profiling system

- End of Day
  - Power Off
  - Recover Transducer

  Inspect entire wet end of system for wear – damage

12.4.4 GSSI SIR 2000 ground penetrating radar system

- End of Day
  - Power Off
  - Recover Antenna

  Inspect entire wet end of system for wear – damage