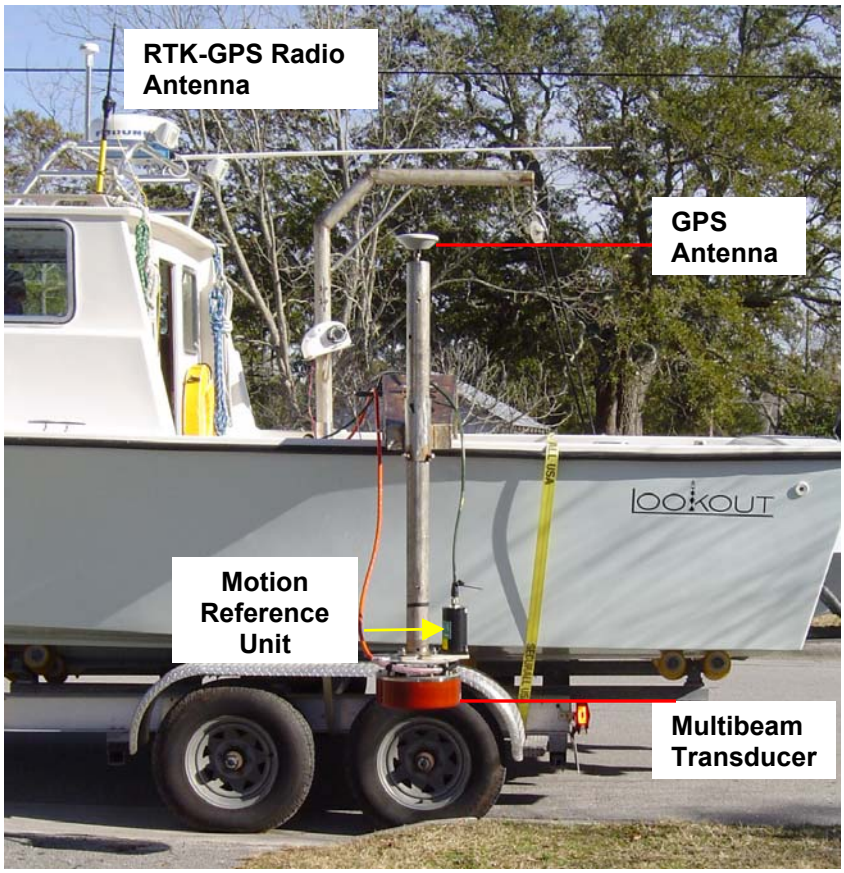
geodynamics
GEOLOGIC & OCEANOGRAPHIC SERVICES

Multibeam Survey Equipment

Survey Vessel

The research vessel *4-Points* is a custom fiberglass survey boat designed specifically for shallow water sonar and acoustical operations. The vessel is 25' long with a 10' beam; the bottom tapers from a deep "Carolina" style Vee to a relatively flat-bottomed stern that provides a shallow draft of approximately 1.2'. Twin 140 four-stroke engines, hung on a stainless steel bracket, power the vessel. All electronics and generators are grounded to the sea via a bottom mounted bonding plate to eliminate all potential electrical noise in the sonar data. The transducer mount was engineered and designed by Dr. Jim Hench at the University of North Carolina at Chapel Hill's Institute of Marine Science specifically for multibeam and ADCP surveys (Hench, et. al, 2000 "A portable retractable ADCP boom-mount for small boats". *Estuaries*, 23 (3): 392-399). The mount was designed to keep the transducer below any potential bow wave and to also house the motion sensor directly over the transducer.



Multibeam Sonar Equipment

- **Simrad EM 3000 multibeam sonar transducer**
  - Frequency: 300 kHz
  - Max ping rate: 40 Hz
  - No. of beams/ping: 127
  - Beam width: 1.5^{o} x 1.5^{o}
  - Beam spacing: 0.9^{o}
  - Depth range from sonar head: 1 to 150 m
  - Depth resolution: 1 cm
  - Depth accuracy: 5 cm RMS
  - Range sampling rate: 15 kHz
  - Bottom detection by phase or amplitude. Seabed imaging & classification with backscatter (sidescan-like) output.
  - Full swath width accuracy to the latest IHO standard

- **VT TSS Meridian Surveyor gyrocompass**
  - Settle point: 0.1^{o} secant latitude
  - Static accuracy: 0.05^{o} RMS secant latitude
  - Dynamic accuracy: 0.2^{o} secant latitude
  - Follow up speed: 200^{o} /sec
  - Settling time: <40 minutes to within 0.7^{o}

- **VT TSS DMS-10 motion sensor**
  - Dynamic heave accuracy: 5 cm
  - Dynamic pitch & roll accuracy: 0.07^{o}
  - Output rate: 200 Hz
- **Trimble 5700 dual frequency GPS system & RTK-Basestation**
  - Instrument used for positioning and tidal corrections
  - High precision L1 and L2 measurements
  - 24 channels L1 C/A code, L1/L2 full cycle carrier
  - Extremely low latency (20 milliseconds)
  - RTK-GPS accuracy depends on conditions such as multipath, obstructions, satellite geometry, atmospheric parameters and basestation control quality.
    - Published horizontal accuracy: 10 mm + 1ppm RMS
    - Published vertical accuracy: 20 mm + 1ppm RMS

- **Odom Hydrographics Digibar Pro sound velocity probe**
  - Sampling rate: 10 Hz
  - Depth accuracy: > 31 cm
  - Velocity accuracy: +/- 0.3 m/sec

Computers & Software

- Rack mounted multibeam acquisition PC
  - 3.0 GHz Intel Pentium 4 processors with 800 MHz system bus
  - 1 GB of RAM
  - Triton Elics International (TEI) Isis version 6.2 acquisition software

- Rack mounted Simrad multibeam power unit
    - EM3000 controller and power modulator

- Fujitsu pentop navigation PC
    - Hypack Max version 2.12 a.

- (2) Dell high-end GIS processing workstations
    - Arcview 3.3, ArcGIS 8.3, Surfer 8.0, Trimble Geomatics Office, Matlab 12, TEI Bathypro and DelphMap

Backup field & processing computers and instrumentation

- (2) Dell laptops
- (1) Sony Viao laptop
- (1) Fujitsu pentop
- (1) Maxtor 120 gigabyte external backup drive
- (1) Maxtor 200 gigabyte external backup drive
- (1) Trimble 5700 receiver and Zephyr antenna