PosNet

Vessel and In-Water Positioning System

PosNet provides accurate and stable GPS positioning for today's demanding seismic surveys. Whether shooting a complex 3D or a critical 2D project PosNet provides a dependable, sub-meter positioning solution to enhance the quality of your survey.

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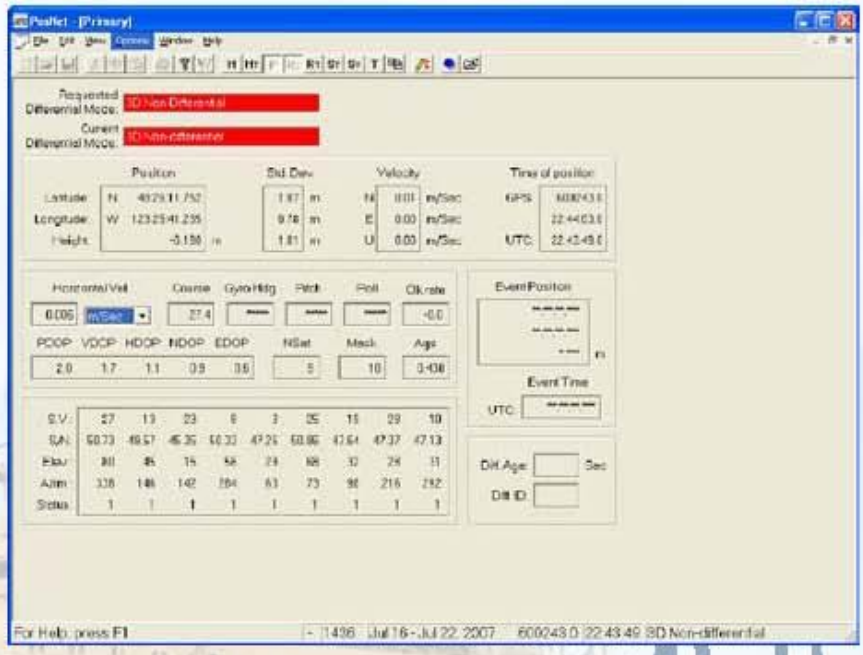
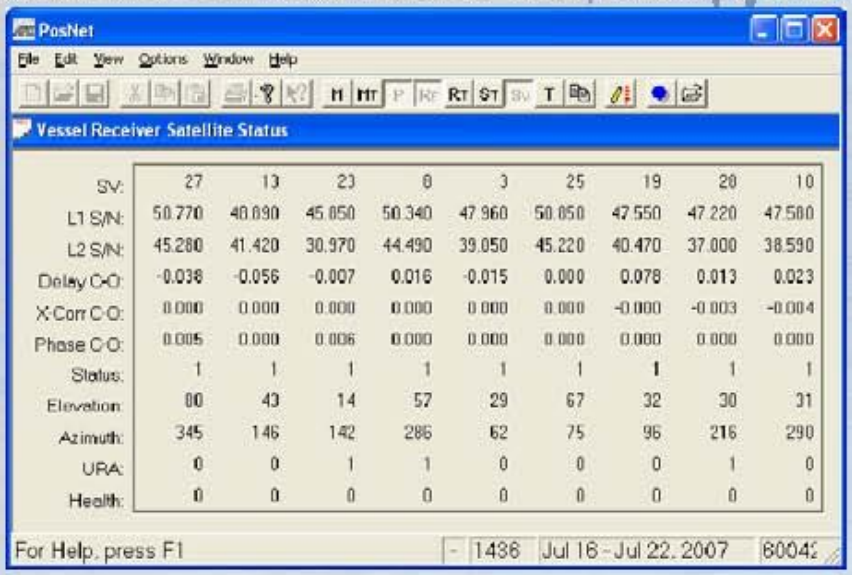
PosNet Positioning System

PosNet is a stable and mature Windows PC based vessel and in-water GPS positioning system. It can be used to track multiple in-water targets such as gun and tailbuoy pods. PosNet has been used to position seismic vessels and in-water targets for 15 years. It was the first product to ever offer dual band GPS positioning to the offshore seismic industry and is still considered by many to be one of the best positioning tools available. Today, PosNet is operating on major 3D projects world wide, preventing downtime when other systems fail.



PosNet Features

- Position the vessel to sub-metre accuracy using either proprietary dual frequency GPS corrections or client provided RTCM.
- Navigate without expensive 3rd party signals using a dual frequency vessel GPS receiver to typically 2.5m accuracy. It is used by clients to check other GPS positions on a vessel, especially when working in areas of marginal RTCM coverage; e.g., Africa, parts of Far East and recently, the Arctic.
- Operate in full 3D or 3D height constrained mode using an in-built OSU table for geoidal separation.
- Derive the position for over 20 in-water targets, to sub-metre accuracy, relative to the vessel position Accepts data from 3rd party in-water hardware.
- Stabilize the vessel position output by reducing the GPS antenna movement with the use of a system pitch and roll sensor.
- Derive vessel heading with the addition of a gun or tailbuoy pod on the vessel, on a known baseline length.
- Interface to a local navigation system via ethernet socket and provide vessel and target positions as well as all raw data to populate a P2 file as required.



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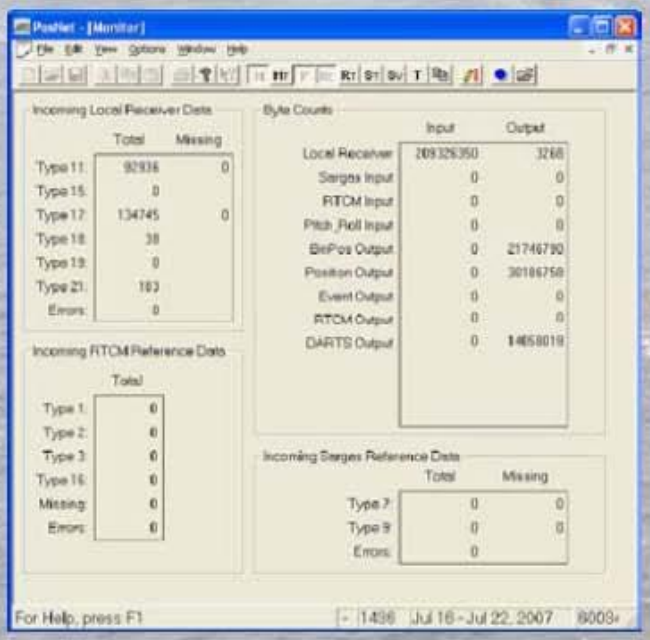
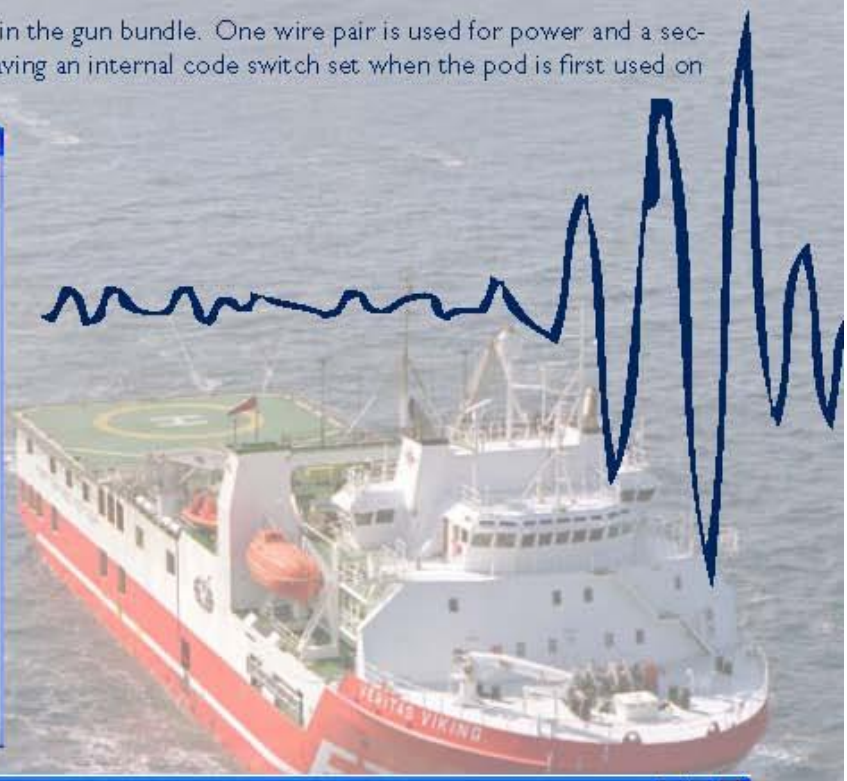
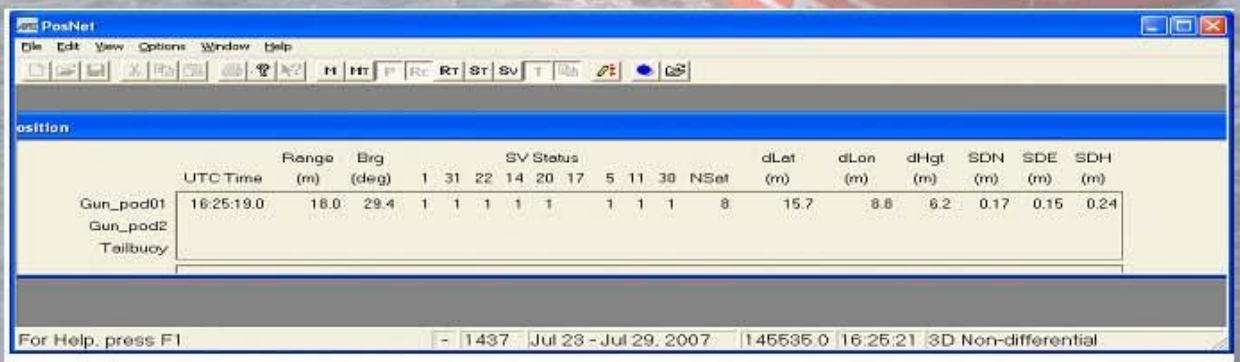
- Generate a NMEA GGA position string for any or all derived positions as well as a NMEA heading output for the vessel.
- Provide tailbuoy tracking out to 10-15 kilometers using a UHF data link.
- Communicate with Gun pods using two wire pairs in the gun bundle. One wire pair is used for power and a second pair for data. All pods self-configure beyond having an internal code switch set when the pod is first used on the vessel.







A recent stand-alone calibration of a system showed the following results:

	Diff North	Diff East	SD Rng	SD Brg
PosNet GPS	-1.104m	1.411m		
Pod 1	-0.135m	0.113m	0.372m	0.302Deg
Pod 2	-0.581m	-0.073m	0.122m	0.341Deg
Pod 3	-0.314m	0.189m	0.179m	0.448Deg
Pod 4	-0.371m	0.048m	0.183m	0.470Deg
Pod 5	-0.177m	-0.027m	0.213m	0.645Deg
Pod 6	-0.305m	0.090m	0.028m	0.092Deg
Pod 7	-0.373m	0.170m	0.103m	0.214Deg

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Where did PosNet come from?

PosNet traces its roots back to the early 1970's when Space Astronomy researchers had developed a technique to map the cosmos, using naturally generated radio frequencies, with Very Long Baseline Interferometry. This technique recorded incoming wave fronts from distant galactic sources together with accurate clock information derived from an Atomic clock at the receiving sites. Correlation of these wave fronts together with accurate baseline information between the receiving sites allowed mapping of the source of the radio signal [VLBI Astronomy]. Conversely, the baseline could also be computed by measuring time offset of the incoming wave fronts between sites [VLBI Geodesy].

At the time of the launch of the 1st GPS Satellite in 1979, researchers at MIT lead by Dr. Charles C Counselman conceived a method to use earth orbiting satellite transmissions to perform a similar function to VLBI Geodesy in measuring the incoming wave front from the carrier phase of the satellite signals. This technique did not require knowledge of the ranging code modulating these signals. This system, known as Miniature Interferometric Terminal for Earth Surveying [MITES] was first demonstrated in 1978. Dr Irwin Shapiro, an Astro Physicist, then at MIT was a collaborator in this endeavor.

Dr. Counselman worked with Dr. Donald Steinbrecher to create a system called the Macrometer V-1000 Interferometric Surveyor. This system recorded carrier phase measurements of the L1 frequency of the GPS satellite system. A pair of these instruments could determine the baseline between the antenna phase centers of each of the instruments to significant accuracy. A company was formed, Macrometrics Inc., which manufactured the Macrometer Interferometric Surveyor.

Aero Service, a Division of Western Geophysical Co. of America, bought Macrometrics in 1984, and continued producing Macrometers for a few more years. A later model the V2000 recorded both the L1 and L2 carrier phase to allow for correction of ionospheric refraction in post processing of the data.Today, an example of the V2000 can be found at the Smithsonian.

The next generation of receiver was the MiniMac 2816 dual frequency land surveying system.A tectonic monitoring version [2816AT] was also developed and installed in various locations, particularly in Japan were it was used for earthquake precursor monitoring. Other systems were sold to Crustal Monitoring groups in the US, Australia, Norway and Germany.

MiniMac 2816AT

Aero Service, with Dr Counselman and Dr Sergei Gourevitch as consultants, continued development of the 'codeless' technique to create a dual band [L1/L2] marine differential navigation system for Aero Service's parent Western Geophysical. This proof of concept system, internally known as the 'Marine Machine' showed that such a system could readily navigate a moving vessel with a recorded position accuracy of one (1) meter or better over a baseline of 1000 km. A subsequent system running on a P.C and known as SARGAS, was deployed and used extensively by Western Geophysical during the 1990's.

POSNET evolved from SARGAS in the mid-1990's as a system that tracks both the vessel and in-water targets such as gun and tail buoy pods used with 3D seismic acquisition vessels. The in-water targets are tracked differentially from the vessel in the same manner as the vessel is tracked differentially from a shore reference station.