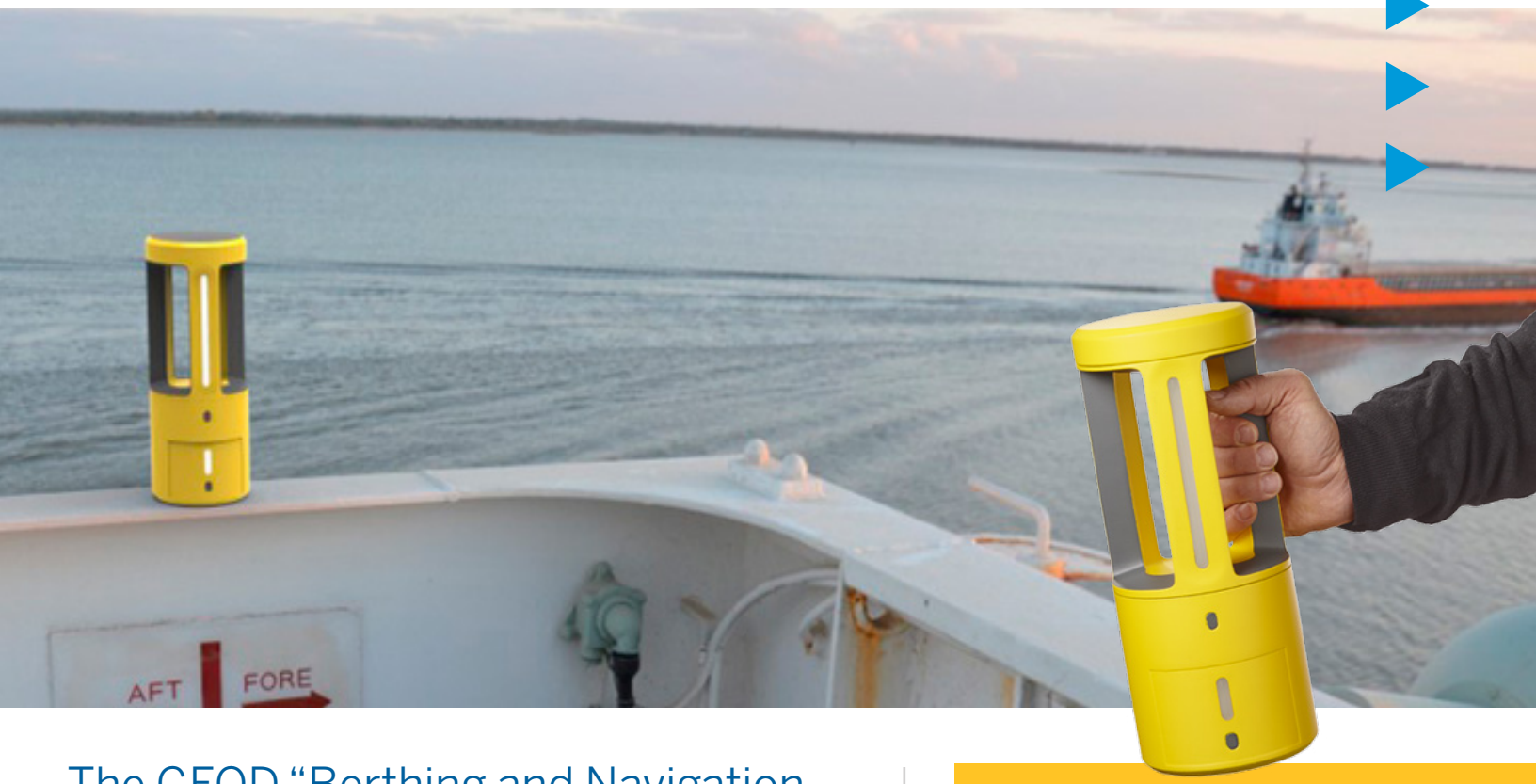
Marine Pilots go BANANAS for Faster Heading Acquisition



The GEOD "Berthing and Navigation Aid System" (BANANAS) by CADDEN relies on Trimble's MB-Two receiver to guide vessels through tight waters, in all sorts of conditions.

This unique Portable Pilot Unit (PPU) uses the Trimble MB-Two's Z-Blade technology to increase solution availability and system uptime, while its dynamic RTK/PPP engine quickly calculates exact location data from a moving base, in real-time. The simple, yet deceptively powerful navigation aid is sure to help mariners out "a bunch."

Solution

Trimble MB-Two Receiver

Overview of the general capabilities, features, and benefits:

- Precise Heading + Pitch/Roll
- Dual Core Engine with Z-Blade technology
- Configurable from L1 RTK to L1/L2 RTK
- User-friendly web interface
- Precise Point Positioning using optional Trimble RTX Corrections Services
- No Base Station or VRS Network Required
- Superior Connectivity
- Ethernet, USB 2.0, Serial Ports
- Small, lightweight form factor with low power consumption

overview

The Trimble MB-Two receivers integrated within CADDEN's *Berthing and Navigation Aid System* beacons make piloting a marine vessel far more reliable: the powerful RTK/PPP engine delivers positioning corrections immediately, in real-time, for outstanding geo-location precision during difficult maneuvers, while its Z-Blade technology increases solution availability so that mariners can operate in situations with traditionally poor GPS signal availability.

Location
NANTES, FRANCE

Single GEOD Berthing and Navigation Aid System (BANANAS) Beacon by CADDEN.

THE SITUATION

Maritime pilots responsible for navigating marine vessels can quickly find themselves in "troubled waters" without proper assistance from a Portable Pilot Unit (or PPU). Circumstances that increase risk and cause pilots considerable stress are on the rise—as today's ships are fashioned larger than ever before, and waterways are becoming more and more congested at a rate far greater than they can be modernized.

Extreme care must be taken to slowly maneuver heavy vessels through tight harbors, canals, or rivers, while actively weighing factors that can—quite literally—turn with the tide in a matter of moments (such as dynamic under-keel-clearance [UKC], or extreme weather). It is crucial that marine pilots have easy access to dependable navigational aids that are safe, consistent, reliable, extremely accurate, and responsive to changing conditions.

THE SOLUTION

The GEOD "Berthing and Navigation Aid System," affectionately referred to by its acronym BANANAS, is a PPU designed by CADDEN that uses one or two bright yellow beacons to provide the exact position and orientation of a ship in real-time, with centimeter-level precision. The system's compact, portable design is entirely wireless, and its hot-swappable batteries can be changed even while its beacons are functioning—ensuring uninterrupted, long-lasting usage.

A line-up of CADDEN's GEOD BANANAS kits, with hot-swappable batteries removed for demonstrative purposes.

The system boasts exceptional Real-Time Kinematic (RTK) technology due to its integrated **Trimble MB-Two receiver.** Versatile, powerful, compact and smart, the Trimble MB-Two receiver provides faster dual-frequency-based heading acquisition and an improved Real-Time Kinematic (RTK)/ Precise Point Positioning (PPP) engine with multiple GNSS signals. It can also operate in non-RTK configurations when decimeter- or meter-level positioning is sufficient.

Every individual yellow BANANAS beacon is fitted with one antenna and Trimble MB-Two receiver. A single BANANAS beacon configuration can be used for lower precision and heading applications by relying on augmented-GNSS navigation technology, and AIS for vessel identification. However, upgrading to a two-beacon system yields higher precision, where both are used in tandem to produce position and heading computations. In this configuration, the beacons are placed on opposite sides of the ship (one port, one starboard). The first beacon, which calculates RTK position using correctional services (PPP, base station, VRS network), acts as a moving base station to generate correctional data. In turn, this data is received by the second beacon, the acting "rover," which uses the incoming corrections to calculate and output external heading.

BANANAS' **hyper connective** capabilities means that it also has access to a full spectrum of radio networks (including UHF, GSM, VTS, AIS, and L-Band). Each beacon contains an antenna and a receiver to track GNSS signals, as well as transceivers for communicating with VTS and attaining real-time feeds from hydrological monitoring systems; A UHF radio receives RTK corrections while the GSM modem maintains constant connections to the Internet. One of the Trimble MB-Two's many virtues is its flexibility to combine a wide range of communication technologies into a single, unified solution, for detailed navigation and guidance up to 100 meters from the pilot's tablets.

THE REASON IT WORKS

The GEOD BANANAS delivers **outstanding positioning accuracy and speed** thanks to the **Trimble MB-Two**'s powerful RTK/PPP engine. Trimble MB-Two is a powerful dual-frequency, lightweight GNSS receiver capable of providing centimeter-level accuracy position and heading. Obtaining centimetre-level RTK precision with moving base functionality—where both rover and base station do not have fixed positions—is paramount for marine pilots, who guide vessels that are constantly in motion on the water. And because PPP technology corrects GNSS system errors using Trimble's network, exact location data is delivered quickly in real-time. As a result, onboard pilots can make time-sensitive navigation decisions safely and confidently, such as when guiding a huge ship through a canal that has only a few meters' margin of space.

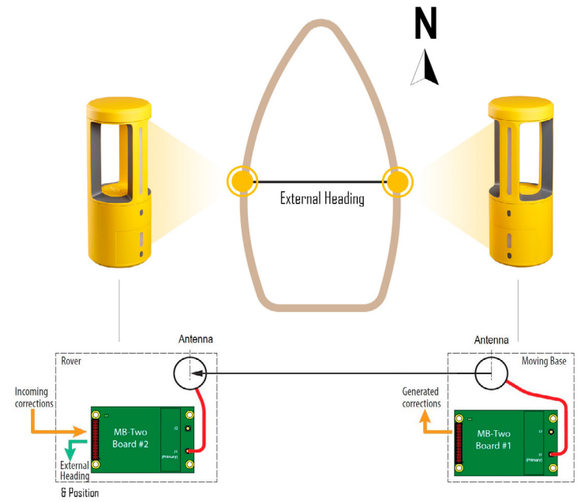


Diagram of BANANAS configuration that features one beacon on either side of a boat, and the function of the MB-Two boards contained within each beacon.

The MB-Two's **Z-Blade capabilities** also impressively increase **system uptime** for the BANANAS. As opposed to an over-reliance on GPS satellites, Z-Blade technology makes use of any combination of GNSS signals (i.e. GLONASS, Galileo, BeiDou, etc.), thereby increasing the number of satellites used for position computation at a given time. The BANANAS makes piloting a vessel through areas with poor GPS signal availability or acquisition—due to building obstructions or bad weather, global position, etc.—a far more reliable endeavour.

"With a working relationship of approximately twenty years and counting, we knew that we could count on Trimble to deliver reliable performance, at a very good price."

— Marc Le Floch, Business Support Manager, CADDEN

And because the hot-swappable batteries keep the system functioning without an external power source, there is no change to signal acquisition and retention. The BANANAS can deliver uninterrupted positioning and heading information from the Trimble MB-Two boards in an instant, from anywhere. Power and data disruptions which plague traditional PPUs, inadvertently placing the pilot at risk, are no longer a concern.

The BANANAS system therefore strikes a unique and innovative balance between simplicity, autonomy and complex precision, which makes the marine pilot's work that much safer, easier and consistent, even during the most complicated berthing and docking maneuvers.

THE COMMUNITY IT SERVES

A relatively new solution, BANANAS has already been employed for important projects by the French Defense Ministry and the French Harbor, and will soon be available to customers worldwide, including Panama and South Korea.

A single yellow BANANAS beacon ready for berthing.

ABOUT CADDEN

Established in July 1999 in Nantes, France, CADDEN specializes in the supply of electronic precision measurement sensors and systems for any Geoscience application related to positioning, orientation and navigation. CADDEN's team is deeply involved in the technologies provided and keeping up-to-date in order to offer the latest solutions. Their proprietary product line, GEOD, represents a significant portion of their business, and is sold worldwide.

For more information, visit: www. geodproducts.com/bananas/

ABOUT TRIMBLE

Trimble is a recognized manufacturer of high-precision positioning solutions that maximize productivity and enhance profitability through the latest technologies. For over 40 years, Trimble has worked on developing technology that delivers multi-constellation support for worldwide scalability and highly accurate position and orientation data. With years of engineering, testing and customer experience, Trimble's technology helps to make our customer's products reach their market potential.

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