Imagine being tasked to bring a modern cruise ship into a port. You arrive on the ship and do not know any of the crew you will be working with. They may not speak your language well. The ship’s equipment may be inaccurate or not functioning. Around the world, harbor pilots are asked to do this daily.

“A ship’s equipment is the one variable a pilot can never depend on,” says Captain Wayne Bailey of the Pilots’ Association for the Bay and River Delaware.

Nautical charts and basic marine electronics are standardized, but pilots today can no longer realistically be expected to have intimate knowledge of how to fully operate one of several dozen ECDIS units installed on today’s cruise vessels. Additionally, many can attest to the fact that, when a vessel nears shore, maintaining situational awareness with the amount of information presented on an EDCIS display can be challenging.

What if you could bring your own set of tools to that ship, tools that you were intimately familiar with and that provided you with known accuracy and reliability? That is a primary benefit of the Portable Pilot Unit (PPU). Over the past three decades, harbor pilots have not only been leveraging modern technology to improve safety and accuracy but applying customization to PPUs in order to maximize situational awareness.

EVOLUTION OF AN IDEA
According to Bailey, the PPU was sired in a traditional maritime environment – a bar. And like many of the world’s most profound inventions, it was first put to paper on a cocktail napkin. In 1980 Captain Donald Feldman, USCG and Delaware River Pilot Captain Joseph Bradley came up
It’s not easy docking today’s mega-cruise ships. Portable Pilot Units can help.

with the idea of a portable system that would give the harbor pilot access to accurate navigational data integrated into a database of waypoints and routes.

The first PPU, known as the Portable Loran-C Assist Device (PLAD), was developed through a joint effort of the USCG R&D lab and Johns Hopkins Applied Physics Laboratory. Two devices were put into service with the Delaware pilots in 1981. The 35-pound system, which gave pilots 10-meter position accuracy, was cumbersome. “I used to see Joe [Captain Bradley] on the schedule and hide so that I wouldn’t have to hump that thing around and set it up,” recalls Bailey, who was an apprentice at the time.

The introduction of GPS and development of portable computers led to the creation of the next generation of PPUs. It was actually the hyper-accuracy of Differential Global Positioning Systems (DGPS) that made the PPU a more viable tool for pilots. DGPS PPUs were developed by the Delaware pilots in conjunction with the marine electronics industry. With the integration of Automatic Identification System (AIS) data and electronic charting, the technology has been refined over the years.

The modern PPU consists of a computer that connects to one or more external accessories. External connections may include a GPS receiver, a rate-of-turn (ROT) system, or a transmitter that plugs into the ship’s AIS system via the “Pilot Plug.” Some PPUs have their own AIS receiver. The accessories communicate with the PPU via a WiFi or Bluetooth signal.

The ship’s AIS Pilot Plug is designed to provide the PPU with AIS information, position data and the ship’s gyro heading. But pilots and PPU manufacturers are the first to question the accuracy and timeliness of the data provided by the ship’s AIS, which may or may not have DGPS capability and calibrated gyro information.

Mike Harrison of Inshore Systems, a UK company that distributes New Zealand-based Navicom-Dynamics PPU systems in Europe, says, “Try watching the same ship displayed from the Pilot Plug AIS data and from independent PPU data. The differences are immediately apparent with the AIS ship image often lagging far behind the PPU ship image, this effect being caused by latency in the AIS feed to the Pilot Plug. The pilot can’t do anything about bad Pilot Plug data or may be unaware of the deficiencies that will differ from one ship to the next.”

**PINPOINT ACCURACY**

PPU digital ROT indicators are providing pilots with turning accuracy of up to 0.1 degree per minute. Analog gyrocompass systems often featured a distinctive clicking noise as the ship’s heading changed. Watch-standers had an aural indication of the speed with which the vessel was turning. Many of today’s digital compasses have done away with the audible clicking. For smaller vessels that do not carry ROT indica-
tors and larger ships with silent indicators, the ROT-equipped PPU system gives the pilot needed accuracy.

Capt. Jorge Viso of the Tampa Bay Pilots Association and Chair of the American Pilots Association Navigation and Technology Committee says that one of the benefits of the hyper-accurate ROT PPU is that it “drives predictor software that gives you a good indication of where you are headed and what your turn is going to look like.”

Viso adds that PPU configuration and use are heavily driven by the individual pilot group. No two ports are identical. Tampa pilots rely on the DGPS accuracy of their units to help in channel-keeping as they transit ships over a vast bay with a narrow channel with “no good hard targets for the radar.” Many European pilots also use PPUs that are designed to support precision docking. Traffic management is a chief concern of pilots working the Mississippi and Columbia Rivers. In Canada, pilots in British Columbia have tailored their PPU systems to provide the most timely and accurate sounding data while Halifax pilots rely on data to ensure air draft clearance for bridges.

The diversity of needs makes it difficult for industry to produce a cost-effective, one-size-fits-all PPU system since the “sub-centimeter accuracy” provided by AD Navigation’s ADX XR PPU for pilots in Rotterdam may be wasted on pilots in an American port.

The PPU’s benefits can be critical in many situations. It can be used independently from the ship’s power – a power loss on board will not affect the PPU if the unit has battery power. Mobile Bay pilot Dave Berault says that his PPU can easily run for four hours, well past the three hours needed to transit from the sea buoy to a Mobile terminal.

The intangible benefit of the PPU is “familiarity and confidence,” adds Delaware Pilots’ Bailey. A pilot on the bridge of a foreign vessel with an ENC-equipped PPU no longer has to face a language barrier to get a crew member to declutter an ECDIS display or zoom in on a turn upriver to check AIS traffic when the data is already available on the PPU.

PILOT-DRIVEN INNOVATION

Throughout its history the PPU has been a tool designed, developed and enhanced by its users. Berault and another Mobile Bay pilot began using PPUs in 2006 after purchasing them with their own funds. In 2013 the pilot group issued all pilots working in the

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Alabama port laptop or tablet-based PPUs running on Rose Point ECS™ (electronic charting software).

The PPU market is a small part of the ECS business, says Rose Point’s John Cuttiette, head of commercial sales. Rose Point provides ECS systems to 14 pilot organizations, and the Rose Point software was not designed “to be pilot-specific, but it is pilot-friendly.” Internet connection to the Rose Point system allows users to upload the latest NOAA weather and hydrographic information.

Portability is chief on the wish list of many pilots for future PPUs. Maryland pilot Capt. Beth Christman says, “Everyone wants an iPad, smaller and lighter.” Tablet PCs are now traveling with pilots, but others prefer ruggedized laptops for the job.

Inshore System’s Harrison says, “Almost everyone loves the iPad and, allied to good software, an iPad becomes a powerful piloting tool. But there are two dangers: First, some iPad navigation software is best described as ‘eye candy,’ a pretty interface for recreational boaters but lacking the functionality required by a professional mariner; and second, the iPad performance can be poor – just a couple of hours – when conditions demand an always-on, no sleep mode.”

A prime example of pilot-driven innovation is the Mississippi River Traffic Information System (mrtis.com), called “Mister TIS.” Developed by two local pilots, the system’s main purpose is to provide operators on the lower Mississippi with a Web-based traffic management tool.

Pilot Keith Siverd wanted to create the technology needed to answer a simple question: “What time will the ship be at the pilot boarding area?” To do this, he placed a single AIS receiver on the roof of his house and asked fellow pilot Ryan Scully to design a simple website that would calculate the arrival times of ships. After implementing the homemade system, it became apparent that there were many other uses for the Web-based program. Siverd and Scully went to work and have developed MRTIS into a comprehensive situational awareness tool for those doing business on and along the river.

MRTIS is a situational awareness tool, and Siverd says the best navigational tool for pilots transiting the river is still radar. Scully adds that, “MRTIS gives pilots the ability to find information more quickly. Therefore you can spend more time focusing on navigation.”

Todd Vorenkamp is a frequent contributor to the magazine.

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