

- Message From Jim Mimlitz
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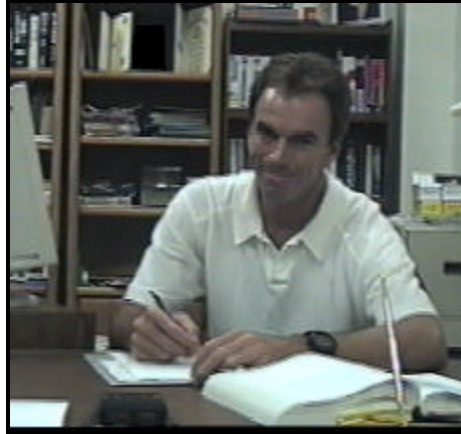
NAVIONICS UPDATE

Serving The Rural Water And Wastewater Industries With Customer-Oriented Wireless Control and Telemetry Systems

In 1995, Navionics Research introduced the **WiSTAR** (**W**ireless **S**ystem **T**elemetry **A**nd **R**emote-Control) Network. This product was designed to solve the complex distributed control and monitoring requirements of the rural water and wastewater industries.

In contrast with other national control system manufacturers who design and fabricate their electronic circuit boards in-house, Navionics adheres to the principle of using standard, general-purpose, off-the-shelf industrial computer boards and components.

This use of standard electronic hardware allows the embedding of Navionics' powerful suite of IBM PC-compatible control, telemetry, and graphical user interface software - software with a design focus on satisfying the needs of the rural water and wastewater communities.



...And rock-solid, in-house-developed software, in conjunction with off-the-shelf hardware, produces a potent combination: The standard hardware arms us with the economies-of-scale of a national manufacturer, while the in-house software gives us the flexibility to provide responsive, customer-oriented control and telemetry solutions.

By listening to and working closely with you, our customers, and by working to satisfy your requirements, we will furnish 100% of the desired functionality. And, whenever we have the opportunity to add a customer-requested enhancement, the WiSTAR System gains an improved ability to serve both future and existing customers - We both win.

At Navionics, we will continue with our philosophy and pledge of striving always to realize **your** vision of what a Wireless Control and Telemetry System can and should be.

Jim Mimlitz
President, Navionics Research Inc.

Portable Telemetry Unit Delivered To Raccoon Water Co.



The Navionics **WiSTAR** PC³ Unit

In March 1997, Navionics unveiled and delivered a portable wireless laptop control and telemetry interface to the Raccoon Water Co. of Marion and Jefferson Counties, Illinois. The portable control unit, code-named the **PC³ Unit** (**P**ortable **C**ommunication, **C**ommand, and **C**ontrol), advances the state-of-the-art of rural water system vigilance and control. The unit features a notebook Pentium computer, radio modem, and magnetic roof-mount antenna, all integrated within a rugged briefcase-sized carrying case. The PC³ unit, which features the same user-friendly Windows95 graphical operator interface



The Rugged PC³ Unit, Outfitted With Automatic Radio Tracking, Delivers Telemetry And Control To The Field

for monitoring and remote-control that is contained in the fixed *WiSTAR* C³ Station, is especially designed for use while on the road or at home for off-hours system observation. A sophisticated tracking algorithm automatically selects wireless data communication routes based upon vehicle location, enabling reliable hands-free operation.

Additionally, System Management Personnel may use the notebook computer to dial in to the Master C³



PC³ Unit Draws Power From Vehicle Cigarette Lighter Or 120V_{AC} Wall Outlet

Station via ordinary or cellular phone from almost anywhere in the country for telemetry and control purposes.

Many thanks are owed to Mr. Jim Green (Consolidated Water Service - Centralia, IL), Mr. Walter Cox, (Heneghan & Associates, P.C. - Centralia, IL), and Mr. Steve Fletcher (Washington County Water Company - Nashville, IL). The final design of the PC³ was inspired by their insight and suggestions.

"luka" NCL Enables Precise In-Line Pump Station Timings

On July 4 1997, the new release of the *WiSTAR* System Software was introduced, and, in Navionics' tradition of naming each major upgrade after a rural Midwestern community, the new version (4.0) was code-named "**luka**" (pronounced "i-yuka") for luka, IL.

Leveraging the enhanced **NCL** (Network Control Language) capabilities provided within this release, Navionics was able to successfully implement a reliable wireless control strategy for multiple in-line pump stations.



Within the Raccoon Water Company (Marion & Jefferson Counties, Illinois), there are two pump stations, spaced four miles apart along the same pipeline, which feed a standpipe located several miles away. It was deemed critical that both pump stations turn ON and OFF at identical times (with adjustable delays). If the first station were to turn ON without the second station, it would push an unacceptably high discharge pressure into the line. Conversely, if the second station were to turn ON without the first station, it would pull an unacceptably low suction pressure.

The previous control system, which was being replaced due to age and reliability factors, utilized leased telephone lines for control linkage. When the leased line system was operating correctly, both stations would receive the ON and OFF signals simultaneously, so that precise timing control could be achieved. However, in a much more economical and effective manner, Navionics was able to terminate the phone line lease and realize precise timing control using the robust wireless network control techniques of its *WiSTAR* system.

With the *WiSTAR* control unit at the water tower transmitting the ON and OFF requests, the two pump stations should successfully receive the command signal at the same time. However, taking into account the fact that FCC-assigned radio channels are often shared by others within proximity, Navionics added an extra measure of protection against both outside and inside interference.

When the standpipe requires water at, for example, 9:00am, it will immediately signal the first pump station with a command to: **"Turn ON At 9:05:00 am"**. If there is any interference, this message may take a couple of re-try attempts. In an identical manner, the standpipe signals the second pump station to: **"Turn ON At 9:05:00 am"**. Because the transmissions and retries (if any are needed) normally do not take more than a minute, this 5 minute lag is

more than sufficient to ensure a successful transmission. Turning the pumps OFF works in the same manner.

Clearly, in order to achieve the above control strategy, the clocks within each control unit's computer must contain the exact same time. This is ensured by the Master C³ Unit, which sets the clock of each control unit once per day over the wireless data link.

In the previous "wired" control system, a failed leased line between the two pump stations would render the system inoperable. However, in the rare instance of a radio failure within the *WiSTAR* system, the operator can switch both pump stations from Radio-Mode to Timer-Mode (with identical ON and OFF periods). The stations would then continue to be operational until their computer clocks drifted too far apart. This would certainly take over a week, thereby allowing ample time to replace the failed radio.

Need More Information?

Give us a call. Working together, we can configure a Navionics *WiSTAR* System to solve your Water or Wastewater System's control and telemetry needs.

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