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REMOTE ALARMS AND CONTROLS

Verbatim
Gateway

BULLETIN-103
SCADA-Controlled Wastewater Treatment Plant Uses Verbatim Gateway for Alarm Reporting

The historic Iron House Sanitation District, of Oakley, California, uses a RACO Verbatim Gateway Autodialer to add alarm reporting capability to their wastewater treatment plant SCADA system.

Rycon Systems, of San Ramon, California, served as system integrator for the SCADA system which monitors and controls the wastewater treatment plant and 30 lift stations.

At each of the lift stations, an Opto 22 controller is used to monitor high sump level, pump status, power consumption, and power failure. Each lift station controller is connected to a SCADA system central computer via radio modems.

Remote radio modems at each lift station and a master radio modem at the control center form a Radio Area Network (RAN) — or a "wireless" Local Area Network (LAN) — for SCADA system communications. The 450 MHz Radio Modems allow the asynchronous controllers to communicate over the RAN without any additional special communications programming.

The entire system is directed by a PC-compatible computer running Paragon software. Offered by Intec Control, of Walpole, Massachusetts, the software program provides the high level supervisory control and information management functions required for system operation. The SCADA system central computer also communicates with another Opto 22 controller which interfaces the wastewater treatment plant control equipment.

The SCADA control computer continuously interrogates all of the remote sites and the plant control equipment. Performance and alarm data are received, logged, and reported at the control computer. The entire network can be scanned in 3 seconds.

In addition to gathering data from the remote sites, the Paragon software provides a graphical display of current process data, as well as hardcopy reports containing historical information. Paragon is also used to program each of the remote Opto 22 controllers. Using Paragon's graphical programming language, the control programs are defined and then downloaded to individual controllers for execution.

In order to provide daily, 24-hour supervision of the facilities, the Verbatim Gateway Autodialer is used to report alarms when the plant offices are unattended during nights and weekends. The Verbatim Gateway combines a digital autodialer with an alarm and control system having full microprocessor-based operation and convenient user programmability.

The Verbatim Gateway provides interactive monitoring and control of the controllers via the dial-up telephone network, allowing read and write access to controller data registers via any standard tone phone. The Verbatim Gateway turns a conventional tone phone into an interactive, multi-functional operator interface.

The Verbatim Gateway can monitor up to 96 points, reflecting any combination of discrete, analog, timer, counter, or other controller data object. It delivers these important functions via serial cable connection and without requiring the use of controller outputs or modification of control programs.
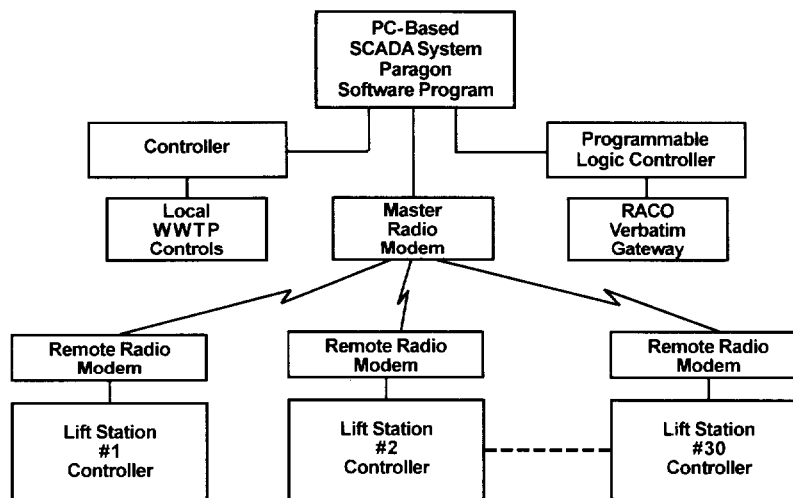
Wastewater Treatment Plant SCADA System Diagram

In this installation, the Verbatim Gateway is linked to the SCADA computer via a Modicon Micro PLC, whose primary function is to convert the Modbus RTU master protocol to Modbus RTU slave protocol. In a Modbus-based link, the Verbatim Gateway must act as the master.

A Modbus slave protocol driver for the Paragon software is being developed which will let the control computer mimic a Modbus PLC. With the slave protocol driver installed, the Verbatim Gateway can be directly connected to the computer without need for the Micro PLC. When using more advanced protocols such as Allen-Bradley Data Highway or Modicon Modbus Plus, neither a slave protocol driver nor a PLC are required. The Verbatim Gateway and the central computer are peers on the network.

The SCADA computer is programmed to collect and reformat data from the remote sites and discern alarm information. As alarms occur, site numbers and alarm information are relayed by Paragon to the Verbatim Gateway using Modbus slave protocol.

Upon detection of an alarm condition, the Verbatim Gateway automatically starts calling a list of pre-programmed phone numbers, calling until it gets an answer. When a connection is made, the system reports the station identity and the specific alarm condition by way of the user's own voice-recorded message. Acknowledgement of the alarm is accomplished simply by pressing a button on the called phone.

Calling is continued even if an alarm condition returns to normal — intermittant or short duration alarm conditions do not go unnoticed. Once tripped, calling is continued until acknowledged by the called party. Line seizure is also built into the system, which cuts off any conversation on a called line when in the alarm calling mode.

The Verbatim Gateway stores messages that are digitally-recorded in the user's own voice and plays them back exactly as recorded when an alarm occurs or a status condition is requested. All voice messages are pre-programmed by the user and stored in the system's non-volatile memory. The Verbatim Gateway may be programmed at the front panel or from any standard telephone.

The Verbatim Gateway system, itself, has its own alarm system and failure protection. Standard features include battery backup and an internal power failure alarm. System operation can be verified simply by calling the unit.

In addition to alarm reporting, the Verbatim Gateway has a status-checking capability. The user can call in at any time from a conventional tone phone to hear a voice message giving the present status of all monitored functions. At any time, the user can also alter any monitored data table location or I/O points. For alarm activity reports, the unit can be configured for data logging to a serial or parallel printer.

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