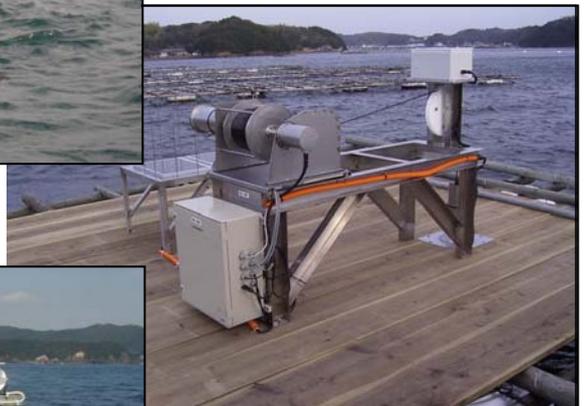


Introduction of a standardized telemetric automatic observation system!

AQUA-Mail

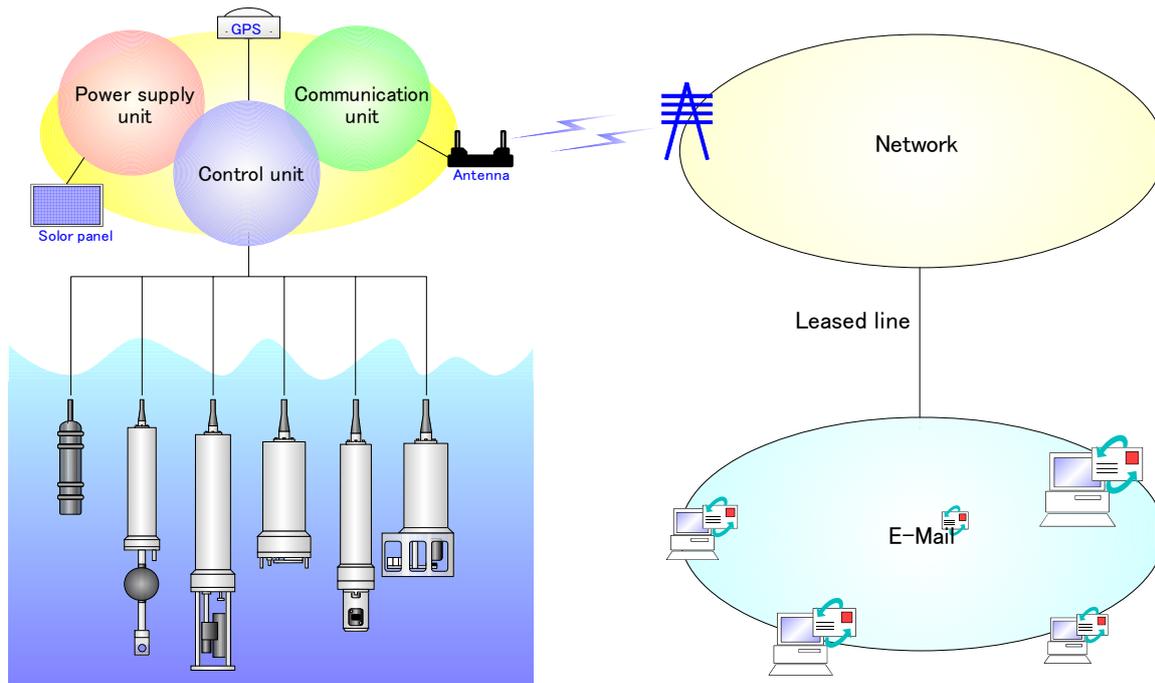
Over the last 20 years, ALEC ELECTRONICS has invested considerable resources into the development of telemetric observation systems that are used for the collection and transmission of marine environmental information. More than 100 such systems are now in operation in Japan, from the northern island of Hokkaido down to the southern island of Okinawa. These units have an excellent track record of reliability and have earned an exceptional reputation among their users. The measurement systems are based on ALEC ELECTRONICS' tried-and-proven instrumentation for measuring a host of marine parameters. These instruments feature low power electronics, long-term stability and some include technologies that minimize the detrimental effects of bio-fouling. As a result, the measurement systems are able to deliver reliable readings over extended deployment periods. ALEC ELECTRONICS has recently developed a standardized and compact marine telemetric system called the AQUA-Mail and a long-term field test was just successfully completed.



Overview of the AQUA-Mail System

The AQUA-Mail consists of various sensors, a control unit, a communication unit and a power supply unit. All sensors were developed by ALEC ELECTRONICS and use the RS-485 digital output format to communicate with the AQUA-Mail system. Sensors with RS232-C output can also be used.

The control unit for the AQUA-Mail system connects to a PC, which enables the user to set up observation intervals and transmission times before the system's deployment. While deployed, the signals from the various sensors are converted to physical units and stored in the system. Later, those data are transferred to the communication unit. In addition, the control unit includes a GPS receiver for position information and automatic compensation of system clock drift. Solar panels recharge the system's sealed lead-acid battery.



Control and Communication Unit

The AQUA-Mail's control/communication unit consists of an observation control section, communication control section, and GPS receiver/antenna section. These sections are housed in a waterproof, rugged epoxy resin box (equivalent to grade IP65).

The observation control section connects with the external sensors via RS485 or RS232-C interfaces. In principle, up to 128 channels can be connected; in practice 12 inputs channels are used in the standard configuration. The observation interval can be set to 10, 30, 60, and 120 minutes. While deployed, it is possible to change the observation interval by sending commands from the shore station. Up to 1,000 data sets can be stored in the flash memory. The communication system uses the DoPa packet communication protocol of NTT DoCoMo (Japan) and a GSM compatible system is now under development.

Every 12 hours, recorded observation data are transmitted as email messages to a shore station. The data can be transmitted anywhere in the NTT cellular coverage area and can be transmitted simultaneously to up to 9 stations. Because of the email formatting of the data, it is not necessary to implement a specific receiver system. In addition, the two-way DoPa communication protocol makes it possible to remotely adjust the observation setup of the observation station.

The AQUA-Mail observation station is equipped with a GPS unit. GPS positioning data are transmitted with the collected environmental data, which makes it possible to track the observation buoy's position and react if the buoy drifts out of the observation area. The GPS unit is also used to synchronize the system's calendar and time to GPS Time at regular intervals, which ensures that the system's time accuracy is maintained within 1 second per year.

Cabled Sesonrs

Over the years, ALEC ELECTRONICS has perfected a line of autonomous instruments suitable for long-term developments. ALEC ELECTRONICS has taken these autonomous units and made them available in cabled versions. These small, low-power, stable, cabled instruments with RS485 output are perfectly suited to the AQUA-Mail system or any other marine observation system. Many have integrated wiper mechanisms that keep the sensing surfaces free of biological buildup. The wiper-equipped instruments have been proven in log-term field tests to maintain their calibration 10 times longer than comparable sensors without wipers. (For more information, refer to Wolk and Li, 2005: *self-cleaning sensors for long-term mooring*, Sea Technology Magazine, Vol 46, No.2). In addition, all sensors have built-in micro-controllers and the digital output is automatically compensated.



(Remark) All sensors are available in the "-RS" (RS232-C output) or "-Di" (RS485 output) configuration. The "-Di" sensors (RS485 output) are standard for the AQUA-Mail system.

Field Test

The AQUA-Mail has been optimized for any in-situ coastal conditions, but can be customized for installations on marine structures, as well as large and small buoys. A long-term field test was conducted on a raft equipped with automatic yo-yo observation station in Ago Bay, where the system performed flawlessly without maintenance for a period of two months.

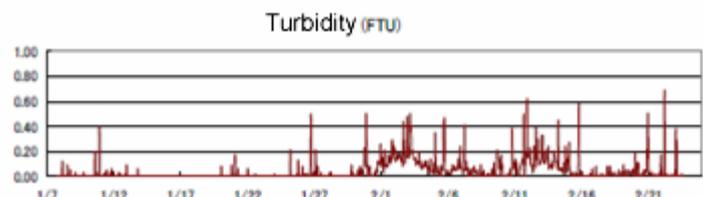
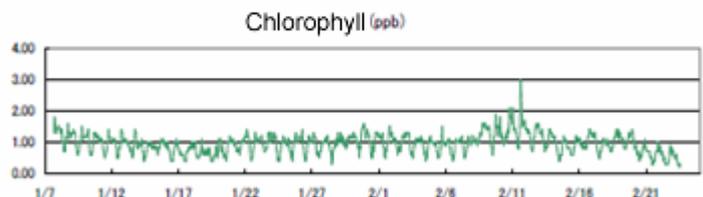
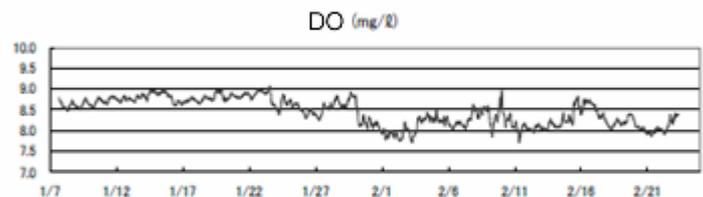
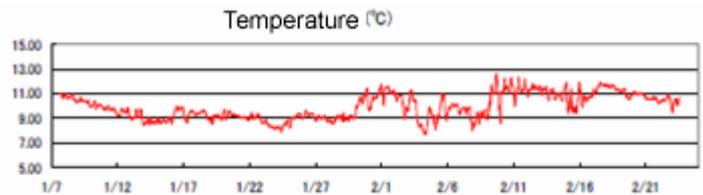
The Ago Bay setup includes the AT-Di sensors for measuring temperature; the ACTW-Di sensor for measuring salinity; the ACLW-Di sensor for measuring chlorophyll/turbidity backscatter; and the ADOW-Di sensor for measuring dissolved oxygen. Except for the AT-Di, all instruments were equipped with ant-fouling wipers. During the observation period, the sensors performed exceptionally well and no signal degradation was observed.



System installed on a raft



Sensor conditions after a two-month deployment



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