

ACOUSTIC DATA COLLECTION SYSTEM FOR SHALLOW WATERS

Development of new data collection equipments and analysis systems for acoustic survey in coastal areas.

Development of acoustic data collection system and modification of equipment were carried out for the coastal area survey in Rayong Province, Thailand. The hardware and software system for data collection were developed at Tokyo University of Marine Science and Technology, Tokyo Japan. The first testing session of the hydro-acoustic equipments and systems for shallow areas were conducted at Tateyama Bay, Chiba Prefectures, Japan in October 2012.

Modification of GPS and echo sounder system for hydro-acoustic data collection

The hydro-acoustic system for data collection was modified by using any kind of echo sounder and GPS receiver. Some devices have echo sounder and GPS plotter (e.g. FURUNO GP-1670F), but some devices are independent of an echo sounder and the GPS receiver.

Required specifications of echo sounder

The echo sounder should operate on 50 kHz. The data collection system was designed to record the echo sounder signal of 50 kHz only.

Required specifications of GPS receiver

The GPS receiver provides highly accurate position, courses and speed information. The GPS receiver should have these data output. Normally, these data are in NMEA0183 format and output in RS-232C or USB terminal are used for other instruments.

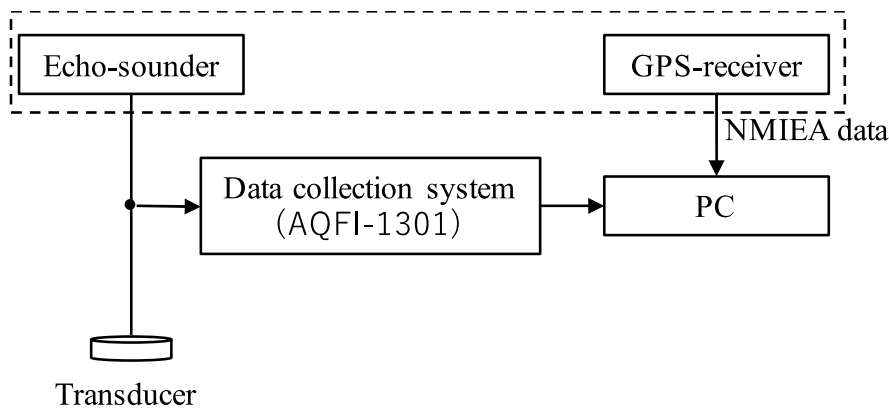


Figure 1. Echo sounder data collection system block diagram.

In this study, the hydro-acoustic system for data collection was modified by using FURUNO GPS Plotter model GP-1670F. The GP-1670F is equipped with GPS receiver and chart plotter system. The machine is also equipped with echo sounder operating simultaneously on 50 kHz and 200 kHz. The GP-1670F provides a total integrated GPS receiver, color video plotter and color fish finder. The built-in GPS receiver provides highly accurate position, courses and speed information. The fish finder presents vivid underwater images on a high quality LCD.

The compact display unit and antenna unit permit could be installed even where space is limited. Specifications of the equipment are shown as follows,

Main features of GP-1670F;

- Bright 5.7 inch (GP-1670F) color LCD with brilliance control.
- Excellent viewing angles, even when wearing sunglasses.
- Internal GPS receiver provides high accurate position information (GPS, within 2.5 m, SBAS, within 2 m).
- Customizable analog and digital displays show wind angle and speed, engine condition (speed, temperature, oil pressure, etc.), etc.
- Large internal memory stores 30,000 track points, 30,000 points, 1,000 routes (500 waypoints/route).
- SD card slot accepts SD and SDHC cards for external storage of data and settings.
- Full range of alarms; Arrival, Anchor Watch, Cross-track Error, Speed, Depth, Temperature, Fish Alarm, Bottom Alarm, etc.
- Man overboard (MOB) feature records latitude and longitude coordinates at the time of MOB.
- CAN bus interface for the connection of GPS Receiver, Weather Station, FI-50 (instrument series), Satellite Compass, etc.
- Accepts NMEA0183 input with optional NMEA data converter.
- Internal GPS antenna available.
- C-Map 4Dcharts available.

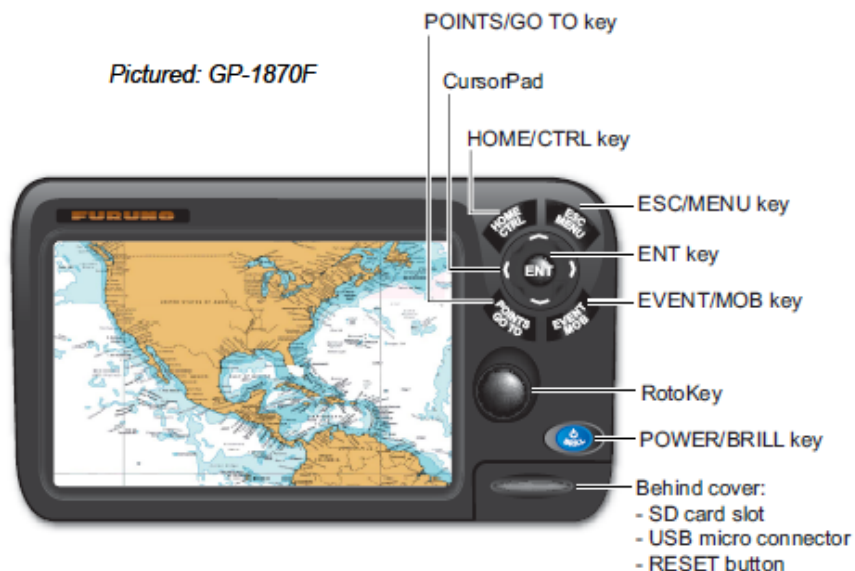


Figure 2. FURUNO GP-1670F display and control panel.

※ This figure is quoted from “FURUNO GPS PLOTTER/SOUNDER GP1670F, GP1870F OPERATOR’S MANUAL” of product GP-1670F of Furuno Electric Co., Ltd.

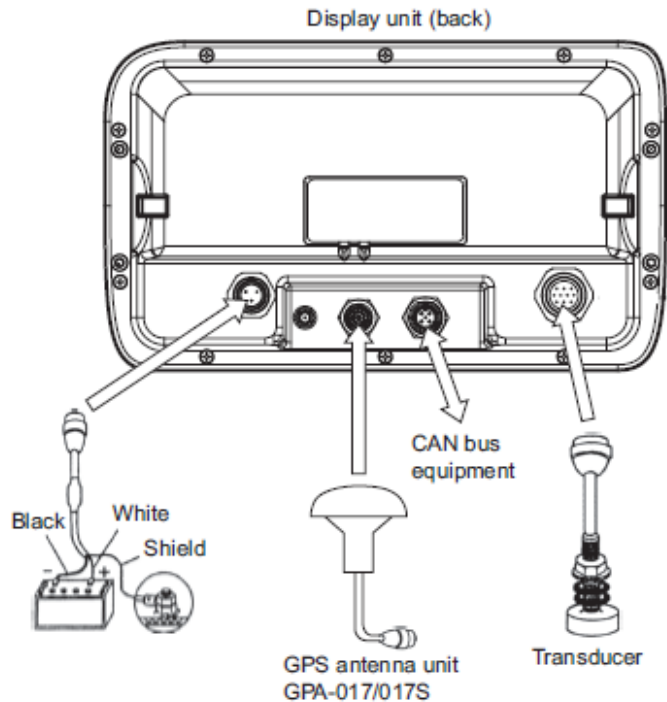


Figure 3. Connection socket of GP 1670F.

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HOW TO CONNECT ECHO SOUNDER TO DATA COLLECTION SYSTEM

There are multiple signal lines on the cable connecting the main unit and the transducer. Among them, it is necessary to find the signal line used for transmission/reception. The number of pins and assignments varies from manufacturer to manufacturer. In many cases, it is described in the manual of each device. After checking the signal line, cut the cable halfway and connect it to terminal 8 (Transducer side) shown in Figure 4. Other signal lines are connected to the same pin number as Transducer side and GP1670F side. If necessary, replace the connector both of Transducer side and GP1670F XDR PORT.

Equipment modification was performed by importing the echo sounder transmitting and receiving signal from transducer cable to the newly designed Echo Sounder Data Collection System (AQFI-1301). The Echo Sounder Data Collection System (AQFI-1301) is composed of Pre-Amplifier and Band Pass Filter, Interface unit, Analog to Digital Converter, and PC computer system. The GPS position data is transferred from GP 1670F to PC Computer passing through NMEA to USB port. The GPS position data are recorded to the PC using Windows Hyper-terminal program. The data collection system is designed to record the echo sounder signal of 50 kHz. only.