

NEW JAPANESE SURVEY VESSEL "TAKUYO"

by Akira NAKANISHI (*)

ABSTRACT

The Hydrographic Department, Maritime Safety Agency, Japan, has commissioned a new survey vessel named *Takuyo*. She was commissioned on 31 August 1983 and has been designed to carry out hydrographic and geological surveys and oceanographic observations by using her modern survey/observation equipment such as an integrated navigation system, a Seabeam precision bathymetric system, and a digital marine seismic profiling system, as well as to perform long-range cruises covering the waters in the north-western Pacific Ocean.

INTRODUCTION

With the advent of the era of a new legislative order of the sea, the needs for oceanic surveys and observations from scientific, economic and social circles in Japan have increased and diversified. To cope with such demands, a large survey vessel equipped with modern survey/observation equipment and capable of performing long-term ocean cruises was required for carrying out accurate hydrographic surveys and oceanographic observations in and around Japanese waters. With these needs in view, the new survey vessel of the Hydrographic Department of Japan was designed by the Maritime Safety Agency and built by Nippon Kokan K.K. Tsurumi Works in Yokohama. Now that the *Takuyo* is fully operational, it is expected that scientific surveys and investigations in and around Japanese waters will be further progressed and hydrographic/oceanographic data and information will be greatly enriched.

(*) Senior Officer, Ocean Surveys Division, Hydrographic Department, Maritime Safety Agency, 3-1 Tsukiji, 5-chome, Chuo-ku, Tokyo, 104 Japan.



FIG. 1. — Survey vessel HL 02 *Takuyo*.

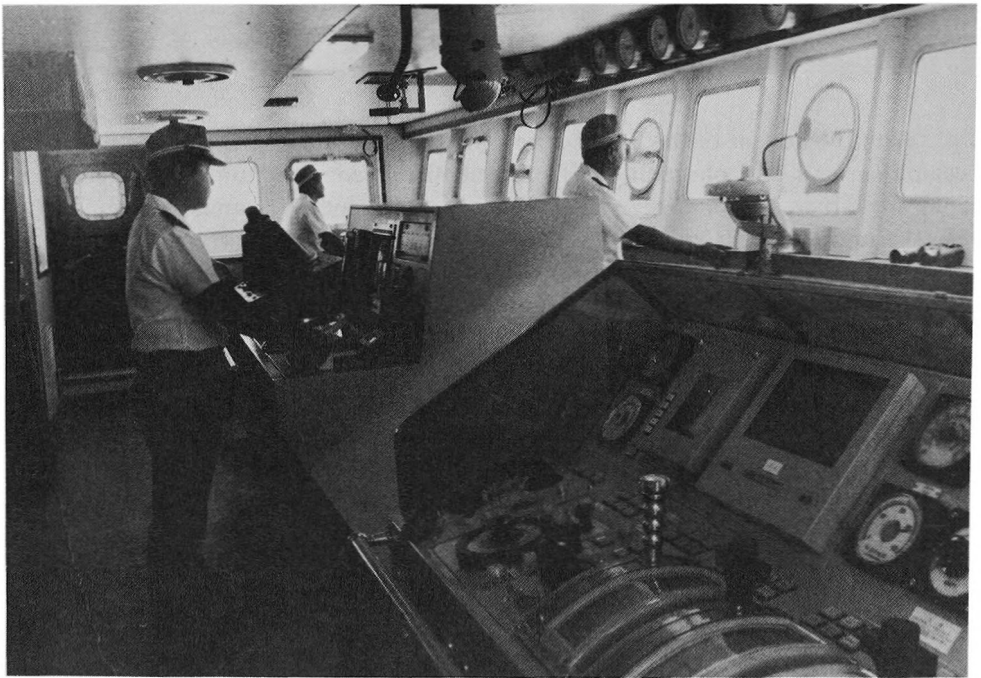


FIG. 2. — Steering wheel and remote engine control in the wheelhouse.

PRINCIPAL PARTICULARS OF THE "TAKUYO"

The principal particulars of the *Takuyo* are as follows :

Type of ship	Flush decker with forecastle
Length overall	96.00 metres
Breadth moulded	14.20 metres
Depth moulded	7.30 metres
Gross tonnage	2 600 tons
Cruising speed	16 knots
Cruising range	12 000 miles
Complement	38 officers and crew members (an additional 23 scientists and/or technicians can be accommodated if necessary).

Engines and Propulsion

Propulsion is provided by the twin 4-stroke trunk piston type supercharged diesel engines (2600 hp; 340 rpm) manufactured by Fuji-Diesel Co. Ltd, with controllable pitch propellers CPC/30BF manufactured by Kamone Propeller Co. Ltd. The propeller pitches and their corresponding power can be automatically adjusted at the remote engine control consoles provided at the wheelhouse and the engine control room. Electric power is obtained from two 400 kVA main generators driven by a 430 hp diesel engine 6D17/BHCSM manufactured by Kubota Ltd.

In order to obtain high maneuverability of the vessel, she is equipped with a bow-thruster generating a thrust of 7 tons, which can be controlled at the remote engine control consoles, as well as a new type of anti-rolling system (roll damping tanks) with which the rolling of the vessel can be minimised. In this system the flux of water is controlled by micro computer. Thus, the vessel can be maneuvered precisely and held at a specific point at sea as necessary during a survey or observation.

She also has a bulbous bow in which the bow-thruster hole can be covered with a hood to eliminate the induction of air bubbles under the hull, which may adversely affect the Seabeam precision bathymetric system and other survey instruments with acoustic noises.

Craft and deck equipment

The following craft are carried aboard :

- 2 survey launches, 12.00 × 3.20 × 1.55 metres, with 150 hp diesel engines, specially designed for inshore hydrographic survey work.
- 2 lifeboats, 7.32 × 2.32 × 1.00 metres, equipped with outboard engines.

The survey launches are slung on Miranda-type boat davits. The winches of these davits are driven by electro-hydraulic motors so that lowering and hoisting of launches can take place even in rough seas.

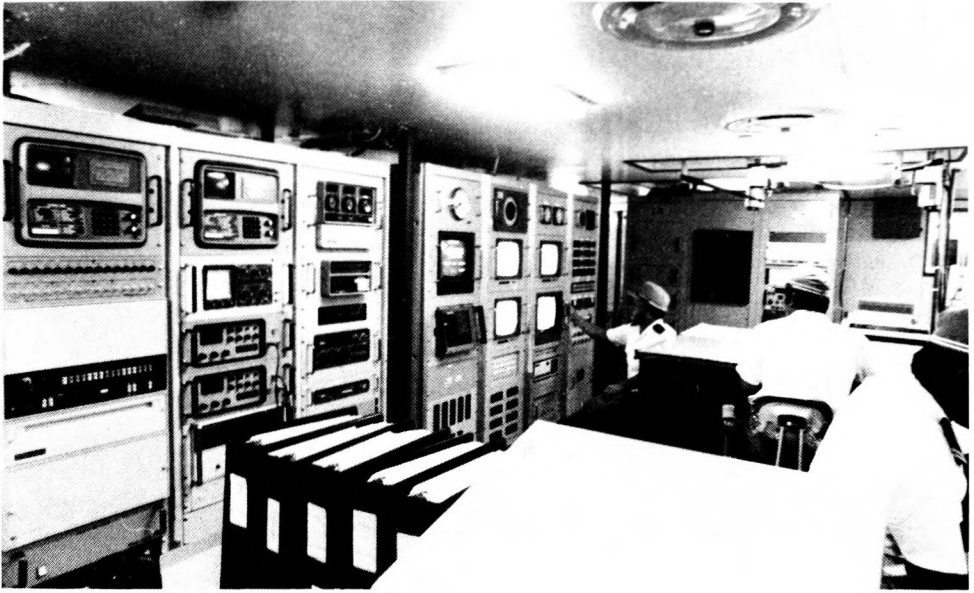


FIG. 3. — Integrated navigation system and Seabeam precision bathymetric system in the observation room.



FIG. 4. — Marine seismic system in the observation room.

For hydrographic survey and oceanographic observation work, the following deck equipment has been fitted :

- 1 winch with 12,000 m of stepped wire of 7.3 - 10.0 mm diameter used for core sampling;

- 2 oceanographic winches with 12,000 m of stepped wire of 3.3 - 5.7 mm diameter;
- 1 oceanographic winch with 6,000 m armored cable, used for the CTD/O system;
- 2 gallows used with oceanographic winches for coring;
- 2 jib cranes, one for towing the sensor of the magnetometer, and the other for the hydrophone streamer.

In addition, an electro-hydraulic 3-ton deck crane has been installed for handling heavy equipment such as a core sampler, a dredge, etc.

Navigation and survey equipment

Major navigational equipment includes :

- 1 gyrocompass TG/5000 with an automatic pilot, manufactured by Tokyo Keiki Co. Ltd;
- 1 doppler sonar log CIH/20 with a track plotter, manufactured by Furuno Electric Co. Ltd;
- 2 sets of radars, MS/DSX/1240B3, using 10 cm wave and MS/DSS/1260B 3 cm wave, with anti-collision processor JAS/800 manufactured by Japan Radio Co. Ltd;
- 1 digital echo-sounder set MG/70R/D1 manufactured by Kaijo Denki Co. Ltd.



FIG. 5. — C.P.U., disc unit, MT unit and plotter in the computer room.

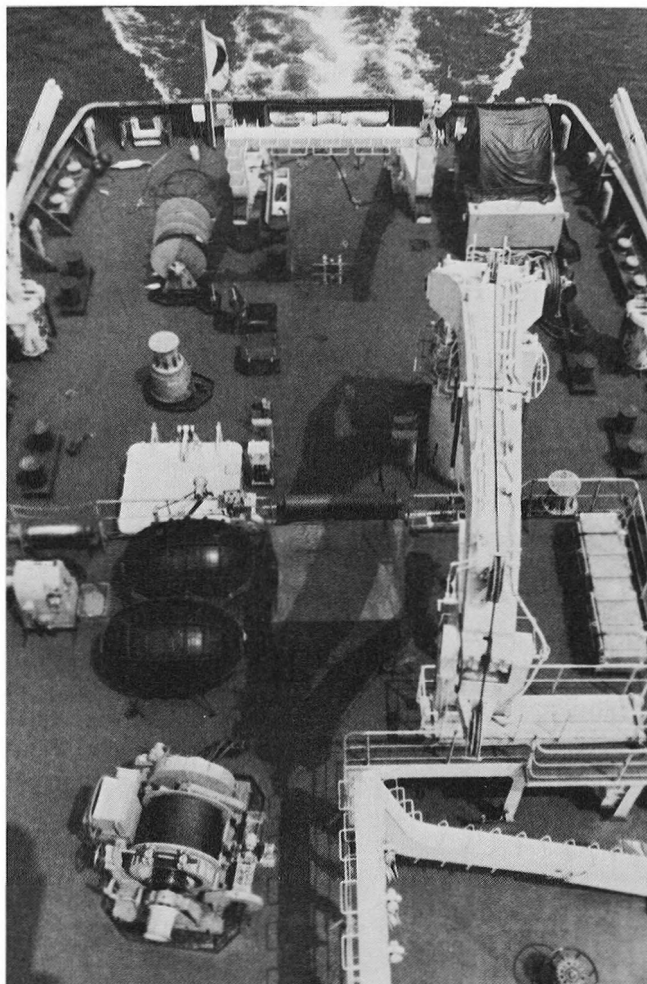


FIG. 6. — Galleys, jib cranes, 3-ton deck crane and oceanographic winches on the quarter deck.

A significant feature of this vessel is her highly automated equipment. A hydrographic and geological data acquisition and processing system is controlled by two electronic computers, Hewlett-Packard series 1000F, backed up by a magnetic disc operating system (OS) in real time operation; a seismic profiling system, using an air-gun generating acoustic pulses in the water, which are reflected at layers of the bottom and picked up by the 12-channel streamer hydrophones, collects and records data regarding geological structures beneath the seabed.

The major items of equipment for hydrographic and geological surveys are :

- 1 Magnavox integrated navigation system, model 200, composed of 2 satellite receivers, 2 Loran-C receivers, 1 cesium oscillator and 1 computer;
- 1 data acquisition and processing system Hewlett-Packard 2179A (1 MB) with a plotter TDM/912LHB manufactured by Tokyo Denki Co. Ltd;

- 1 Seabeam precision bathymetric system manufactured by General Instrument Corporation;
- 1 precision echo sounder, 12/34 kHz, manufactured by Raytheon Ocean Systems Company;
- 1 digital marine seismic profiling system (12 channels) manufactured by Texas Instruments Incorporated, with an air gun Bolt PAR 1500C of 466 cubic inches;
- 1 3.5 kHz sub-bottom profiler with correlation echo sounder processor (CESP);
- 1 proton magnetometer manufactured by Barringer Research GM/123;
- 1 onboard gravimeter system GBBH KSS/30 manufactured by Bodenseewerk Geosystem;
- 1 CTD/O system mark/3B manufactured by Neil Brown Instrument Systems;
- 1 Batfish model 8801 with CTD system manufactured by Guildline Instrument, Ltd.

The survey launch equipment is as follows :

- 2 echo sounders type PDR/101 manufactured by Senbon Denki Co. Ltd.
- 1 Trisponder electronic position fixing system Del Norte 520.

CONCLUSION

The Hydrographic Department of Japan will continue to undertake such projects as the Basic Map of the Sea in Continental Shelf Areas in Japanese waters, the WESTPAC programme of the IOC, etc., by fully utilizing the operational capabilities of the new survey vessel *Takuyo*. It is expected that the survey and observation activities of the *Takuyo* will greatly contribute to revealing the ocean and the sea and to enabling their exploration and exploitation.