CSS “JOHN P. TULLY”
A HYDROGRAPHIC AND GEOPHYSICAL RESEARCH VESSEL

by W.S. HUGGETT (*)

THE SHIP

Principal Particulars

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length overall</td>
<td>68.9 m</td>
</tr>
<tr>
<td>Length waterline</td>
<td>62.0 m</td>
</tr>
<tr>
<td>Breadth moulded</td>
<td>14.0 m</td>
</tr>
<tr>
<td>Draft</td>
<td>4.5 m</td>
</tr>
<tr>
<td>Displacement — loaded</td>
<td>2 100 tonnes</td>
</tr>
<tr>
<td>Shaft power</td>
<td>3 000 HP</td>
</tr>
<tr>
<td>Shaft revs</td>
<td>230 rpm</td>
</tr>
<tr>
<td>Trial speed</td>
<td>13.6 knots</td>
</tr>
<tr>
<td>Endurance</td>
<td>120 days</td>
</tr>
<tr>
<td>Range</td>
<td>12,000 miles</td>
</tr>
</tbody>
</table>

Complement

- Officers: 9
- Crew: 16
- Hydrographers: 15

Classification

- Lloyd’s 100 A1
- Lloyd’s Ice Class 1* LMC-UMS
- Non-passenger, Home Trade I
- Arctic type “A”, Foreign-Going

Machinery

- Main propulsion: 2 Deutz model SBVM628 diesel engines
  1150 KW 91564 HP @ 900 rpm

(*) Canadian Hydrographic Service, Sidney, B.C., Canada.
The Tully is designed primarily for hydrographic surveying on the west coast of Canada and in the Western Arctic. The secondary purpose of the vessel is to carry out geophysical surveys in the NE Pacific Ocean.

The design consultants for the vessel were Cleaver and Walkinshaw Ltd. of Vancouver, B.C., and the builders were Bel Aire Shipyards Ltd. of North Vancouver, B.C. Design talks began in 1981 and the vessel specifications were completed in 1983. The contract was placed with the shipyard in November of that
year and she was launched in October, 1984, and handed over to the Department of Fisheries and Oceans in May, 1985, after the successful completion of her acceptance trials. In July, the vessel sailed for the Beaufort Sea in the Western Arctic.

One of the main design characteristics to be resolved before conceptual drawings could take place was whether a helicopter should be carried aboard or not. It was decided that on the West Coast of Canada and in the Western Arctic hydrography would only need for a helicopter landing-pad with no re-fuelling facilities. In other words, no helicopter would be permanently carried aboard the ship. This decision then made it possible to have a clear working deck aft by placing the helicopter-pad forward, and also dispensed with the complex fuelling system, fuel tanks and hangar that are all part of carrying a helicopter to sea. The next decision involved the amount of ice strengthening required. After much discussion it was decided that Lloyds ice strengthening Class 1* would be sufficient. The reasoning was that the vessel would always enter Arctic waters in the company of an ice-breaker, and would only work in ice-free waters.

The Tully has a normal bow and a transom stern. The hull is divided into five watertight compartments with ten fuel oil tanks, seven water ballast tanks and two fresh water tanks. There are five decks, of which the lower three are constructed of steel — to the helicopter landing deck — and the upper two are of aluminium construction. The after deck is the main working deck and has a 10-tonne crane and four ‘A’ frames, provision for carrying seven hydraulic winches, and a 6-metre (20-foot) standard container. There is a hydrographic chartroom just below the bridge, an electronic workshop, a dry lab, a wet lab and a gravimeter room. There are also separate lounges and messes for the officers and crew, a sauna and a gym. Four aluminium 9-metre survey launches are carried amidships and are also fitted out to serve as lifeboats. When not on hydrographic surveys, only two of the launches need be carried.

The wheelhouse is exceptionally large (110 sq. m.) with windows all round for good visibility. There are three steering and ship manoeuvring consoles. One, the master console, is on the centre line forward and the other two are on the starboard and port sides at the after end of the wheelhouse. All the ship’s radios are fitted into three racks across the after end of the wheelhouse with remotes going to all the steering consoles, chart table and forward starboard bulkhead. In addition to the standard navigation instruments (see list), an Integrated Navigational System (SN 81) is fitted that includes a digitizer to construct electronic charts for viewing on the video display which, at the same time, also shows the courses that have been fed into the SN 81. The SN 81 also gives a printout of the vessel’s position and, when coupled to the auto-steering, will keep the vessel on the given courses. The vessel is also outfitted with two automatic direction finders and a citizen’s band radio for search and rescue work.

Radios fitted on the ship are:

<table>
<thead>
<tr>
<th>Radios fitted</th>
<th>Model</th>
<th>Power</th>
</tr>
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<tbody>
<tr>
<td>I.T.T.</td>
<td>MSR8000</td>
<td>1 KW HF/SSB</td>
</tr>
<tr>
<td>Skanti</td>
<td>52835 (2)</td>
<td>250W HF/SSB</td>
</tr>
<tr>
<td>I.M.R.</td>
<td>Microtor</td>
<td>teletype system</td>
</tr>
<tr>
<td>Glenayre</td>
<td>GL1142</td>
<td>teletype system</td>
</tr>
<tr>
<td>Sailor</td>
<td>RT145 (3)</td>
<td>VHF/FM</td>
</tr>
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CSS "JOHN P. TULLY"
ICOM     Model M80     VHF/FM
Collins  Model 251 (2)  VHF/AM with AC beacon
Intech   Model 1511    2182 guard receiver.

Navigational aids fitted on the ship are:
JRC SN81  Integrated Navigation System
JNA-104  Omega
JNA-760  Loran C
JLE-3200 SatNav dual channel
Sperry   MK 227 gyros (2)  MK 340 radars (2) X and S band
Furuno   C1-30 Doppler log
Taiyo Musen TD-C338 MF/HF automatic direction finder
          TD-L1620 VHF automatic direction finder
Alden    Weatherfax
Raytheon DSF6000 dual frequency echo sounder.

The hydrographic chartroom is divided into two parts. The plotting tables and
“command position” when the Tully is running sounding lines are on the starboard
side, and the computer for data processing and the plotter are all on the port side.
The “command” post has two echo sounders, one for shelf work on 24 and 100 kHz
and one for deep work on 12 kHz. The racks for the positioning system are also
here.

Just aft of the chartroom is the electronic workshop which, besides having a
workbench and electronic rack for test equipment, also houses the electronics for
the two gyro compasses, ship’s telephone system and electric clock system. The
wiring from the transducers for the echo sounders on the bridge and hydrographic
chartroom all terminates here in a patch panel. The bridge and chartroom sounders
are the same models — different frequencies — so that these two sounders are now
interchangeable if one or the other should break down.

The wet lab is directly under the after end of the bridge house. The
hydrographic winch (bottle) and chains are just forward of the launches and are
situated under the deck to deckhead windows on the after starboard side of the
bridge which give a clear view to the bridge of this bottle station and wire angle.
The wet lab has non-skid tiling on the deck and stainless steel bulkheads, bench
and sink. This lab, when the vessel is on hydrographic surveys, doubles as a
storeroom for survey equipment with easy access to the launches.

On the same deck as the wet lab are the ship’s officers’ and the chief
hydrographer’s quarters. Between the launches are the emergency generator room,
battery charging room, paint locker and emergency survival suit storage.

On the main deck are the officers’ and hydrographers’ messes and lounges,
hydrographers’ cabins, gym, sauna, ship’s office and the main lab. The main lab
is a large room (77 sq. m.) with benches around all four bulkheads, with the centre
of the room fitted out to take electronic racks. There is a cable tray set into the deck
head that allows the easy distribution of cable leads from the racks to the benches
or through ports to the outside decks. These cable trays are part of the total cable
tray system that runs from the mast to the transducer space with offshoots on each
dock for the installation of temporary wiring or cable runs. The bench on the
starboard side of the lab is stainless steel with two sinks and a fume hood, and a
desk on the forward bulkhead is fitted out to take the recorders of the 12 kHz and
16 × 3.5 kHz array of transducers. There is also a VDU from the SN 81 and a
repeater from the doppler log. The main lab also has the master computer for the
SAIL (Serial Ascii Interface Loop) loop that is fitted to the vessel. There are twenty
outlets on the loop to which various sensors can be coupled and read sequentially
at specific time intervals. Permanently coupled to the loop are air temperature,
humidity, wind speed and direction, barometric pressure, sea temperature and
conductivity, ship’s course, speed and latitude and longitude. This information is
displayed on VDUs in the wheelhouse, hydrographic chartroom and the two labs.

On the lowest deck are the stewards’ storerooms, galley, crew’s mess and
lounge, and the crew’s cabins. These cabins are single occupant as are all the crew’s
cabins on the vessel. Only the hydrographers’ cabins have pullman berths to allow
for double occupancy.

Just forward of the Machinery Control Room (MCR) is the transducer space
where transducers for 24, 40, 100 and 200 kHz for the shallow sounders, the
doppler log which is flush mounted with the hull, and two 12 kHz and 16.35 kHz
transducers are wired. There are also two 18-inch rams that can protrude 1 m below
the hull and are wired for additional transducers, if required. These can be added
or changed while the vessel is at sea. Two Salt Water pumps for the scientific SW
loop in the labs are also in this space, and all piping connected with the SW loop
is insulated to allow temperature measurements to be taken in the labs.

Machinery Spaces

Below the main deck forward is the bow thruster compartment, and aft of this
is the forward machinery space which houses the domestic fresh water pumps,
refrigeration, vacusan system and two reverse osmosis fresh water makers capable
of making 14 tons of potable water a day.

Forward of the engine room is the Machinery Control Room which, besides
housing the pneumatic engine controls by PMC, also has the ship’s electrical switch
boards. The engine room, being an Unmanned Machinery Space (UMS), is
monitored by two TV cameras with the display on the control console. The
machinery monitoring system is by NORTEK and monitors all machinery, tanks
and alarm systems, displaying the information on a VDU. There is also a hard copy
printout. Alongside the MCR is a separate room housing the harbour generator, a
Caterpillar 3412 to a Stanford alternator. Two similar generating sets, also 450 kW,
are in the engine room and an additional 800 kW Stanford alternator is mounted
on the starboard engine to run, primarily, the bow and stern thrusters. Emergency
power is supplied by a 140 kW Caterpillar 3306 and Stanford alternator.

The main propulsion is two Deutz 628 8 cylinder in-line engines coupled to
a single shaft by a 3-1 reduction via a Reintjes gear box. The engines produce a
total of 3100 HP at 900 rpm. Either or both engines can be used by engaging or
disengaging Vulcan friction couplings. The propeller is a four-bladed skewed type
CP Kamewa operating in a Koit nozzle.
The steering is by Wagner, a hydraulic ram system coupled to a triple rudder. This system gives very positive steering with very little helm.

Other features on the vessel include an incinerator for waste disposal, a FAST sewage treatment system, PACE oily water separator and a fuel monitoring system by Econometer.