

The New Israeli Research Vessel for the Exclusive Economic Zone

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1. Abstract

The extensive exploration and production activities in the Israeli Exclusive Economic Zone (EEZ) in recent years, the need to monitor it and to collect systematic environmental and marine data have lead the Israeli Government to purchase a new research vessel for the deep water. In June 2014 the *Bat Galim*, a Klein Klasse German support vessel, was purchased from the Israeli Navy who owned it since 2006. The refitting of the *Bat Galim* into a modern research vessel with capabilities to map, sample and analyze the seafloor, sub-bottom and water column from WD of 10-3,000 m was based on the guidelines set in the Science Mission Requirements (SMR) for Regional Class oceanographic vessels. The R/V *Bat Galim* will serve the needs of the different governmental agencies and academia for marine data and will be fitted to combat oil spills and assist in search and rescue missions.

2. Background

In 1932 David Ben-Gurion, the primary founder and first Prime Minister of Israel, said that *“Both seas of Israel – The Mediterranean Sea and the Red Sea are the prolongation of Israel’s economy and contain enormous hidden possibilities”*. Sixty eight years later this vision came true as large-scale natural gas deposits have been discovered within the EEZ of Israel (Fig. 1). The 1st offshore discovery was Noa gas field in 1999 than exploration activity increased drastically after the discovery of the giant Tamar and Leviathan fields in 2009-2010. The Leviathan gas field (~18 Tcf) is one of the world’s larger offshore gas finds of the past decade.

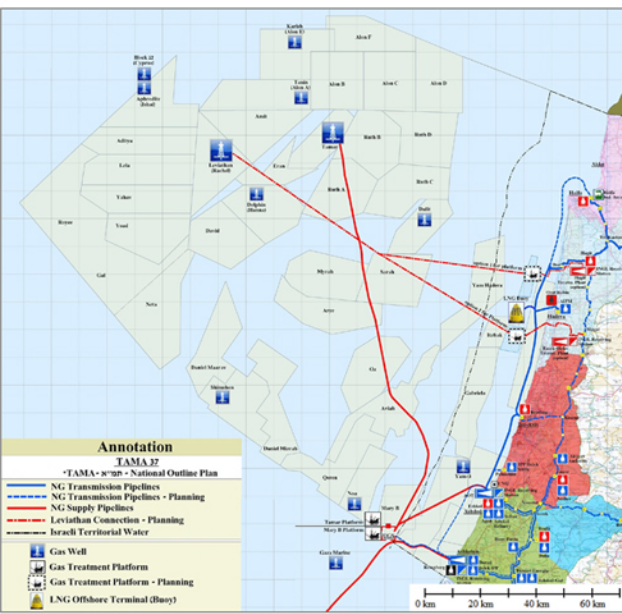


Figure 1: Israel EEZ

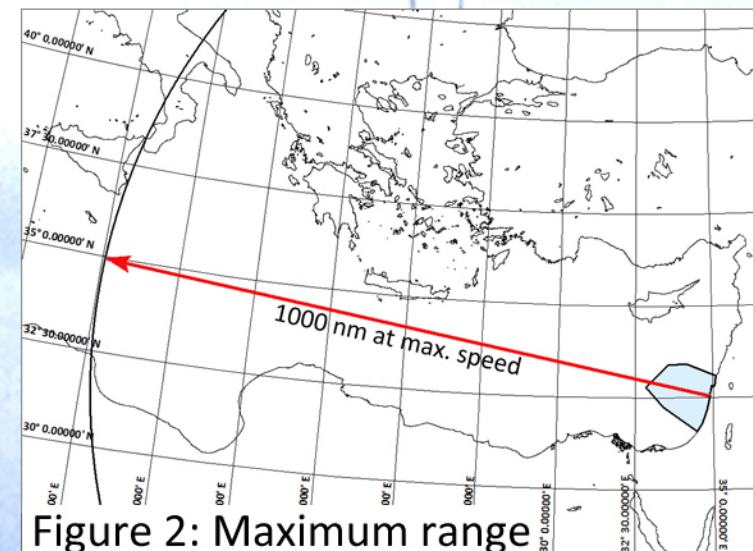


Figure 2: Maximum range

3. R/V Bat Galim missions & capabilities

The R/V *Bat Galim* will be a general-purpose research vessel serving the needs of the different governmental agencies and academia. It will have the capabilities to map, sample and analyze the seafloor, sub-bottom and water column from WD of 10-3,000 m. The R/V *Bat Galim* will also be fitted to combat oil spills, operate ROV and other autonomous vessels that will also assist in search and rescue missions.

4. The Klein Klasse Vessel

The *Bat Galim*, a Klein Klasse support vessel, was built in 1990 by Lurssen Shipyards in Germany. General features:

Hull material	Steel	Max. draft	3.45 m	Endurance at sea	14 days
LBP	34.6m	FB	3.1m	Operational range	~1,000 nm (Fig. 2)
LOA	38.55m	Max speed	12.7 knots	Propulsion	2X208 HP jets & single propeller
Max. displacement	528 ton	Crew	14 (24)	Propulsion system	890 kW Deutz engine
Two Deutz Generators	124kW each				

5. Acoustic testing

The acoustic testing was conducted by **Gates Acoustic Services**. The *Bat Galim* appears to be a relatively quiet platform for a future multibeam sonar installation. Propeller cavitation characteristics are good and no machinery noise was noted that will impact future sonar data. It is predicted that in the absence of bubbles, the acoustic levels expected during normal ship operations will be similar to other vessels equipped with mid-depth multi beam sonar systems (Fig. 3). These expected levels should not cause acoustic degradations to sonar operations.

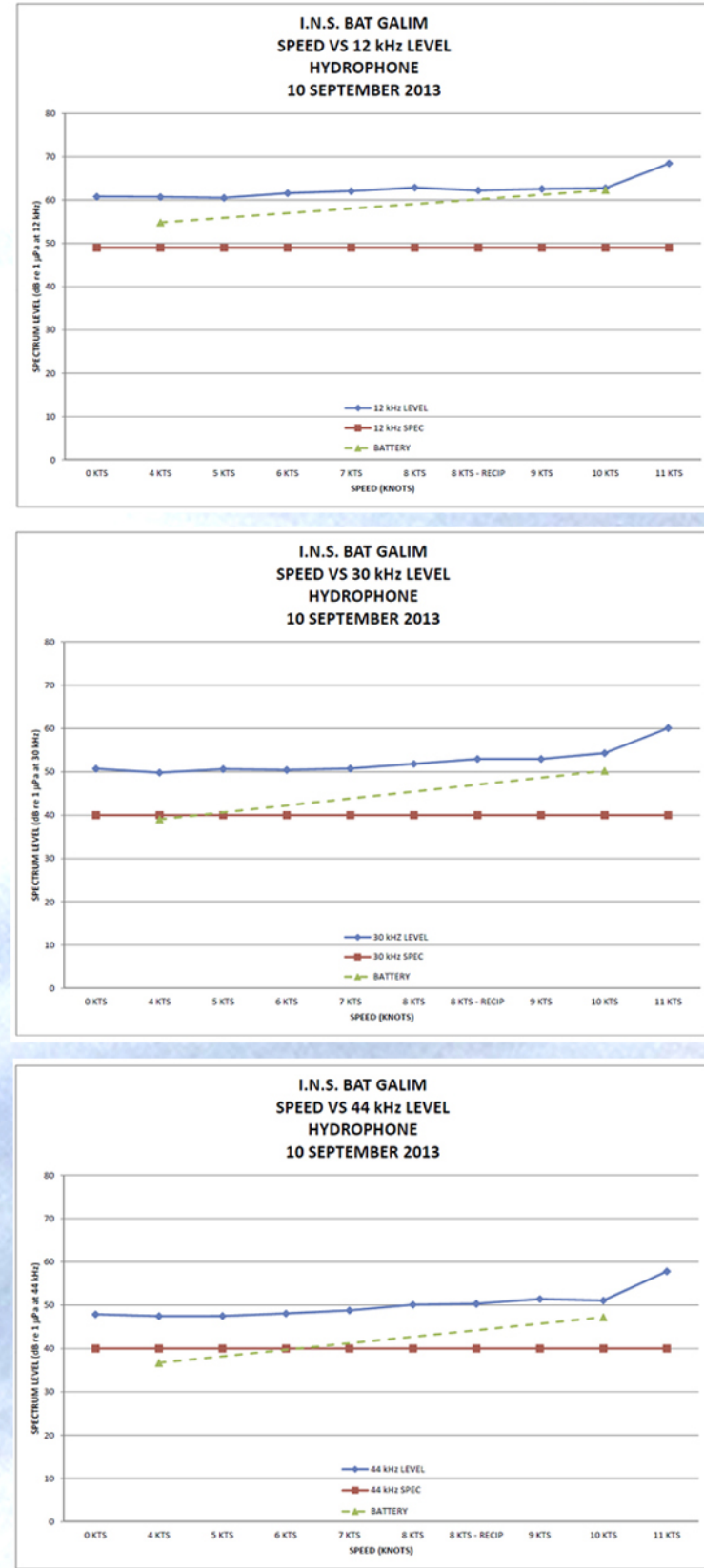


Figure 3: Acoustic level at future gondola location. The red line is the US Navy research vessel acoustic specification at each of these frequencies. Note that typically sonar levels are 15 to 20 dB quieter than omnidirectional hydrophone data.

Figure 4: Wet/Dry Labs

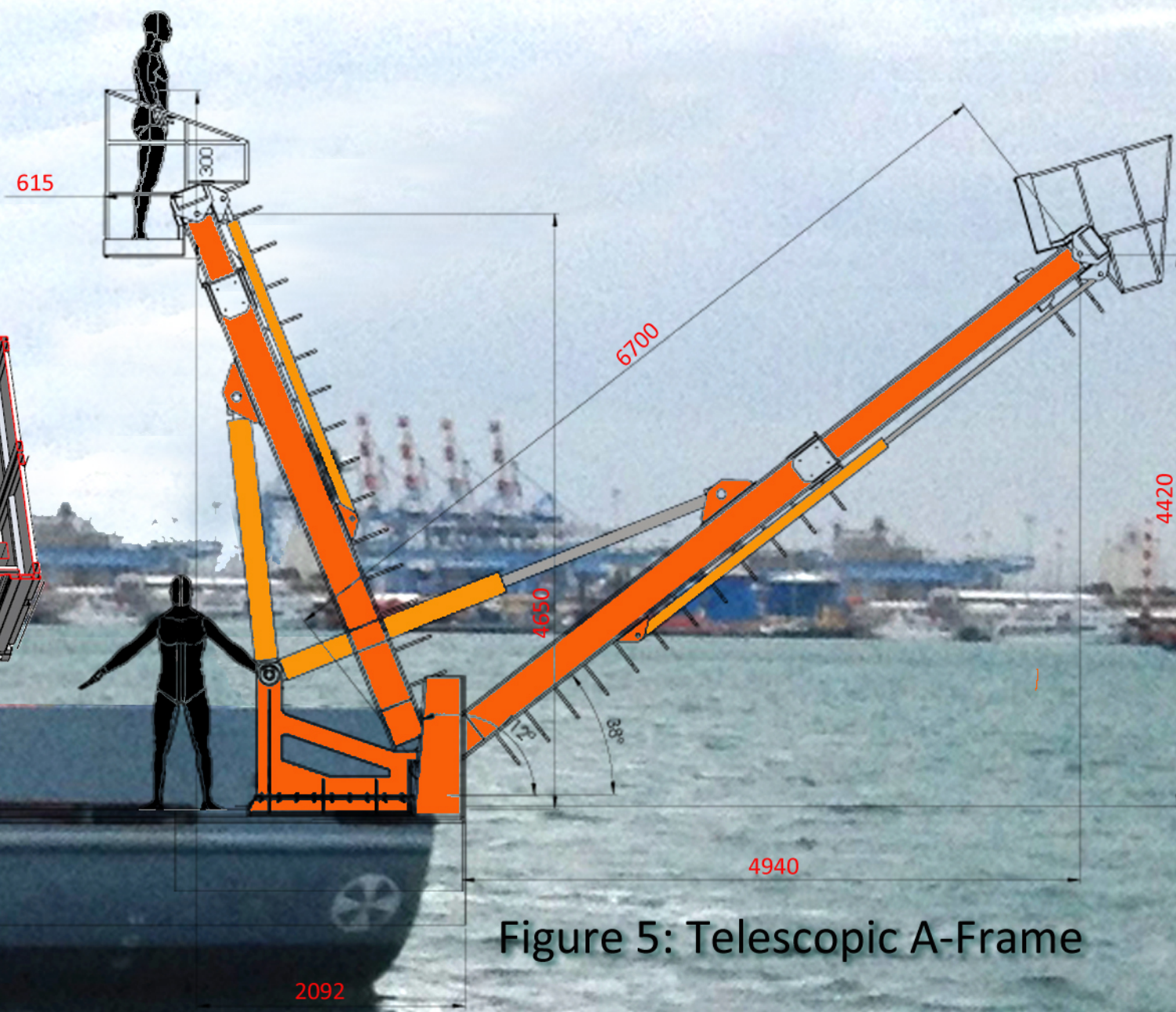
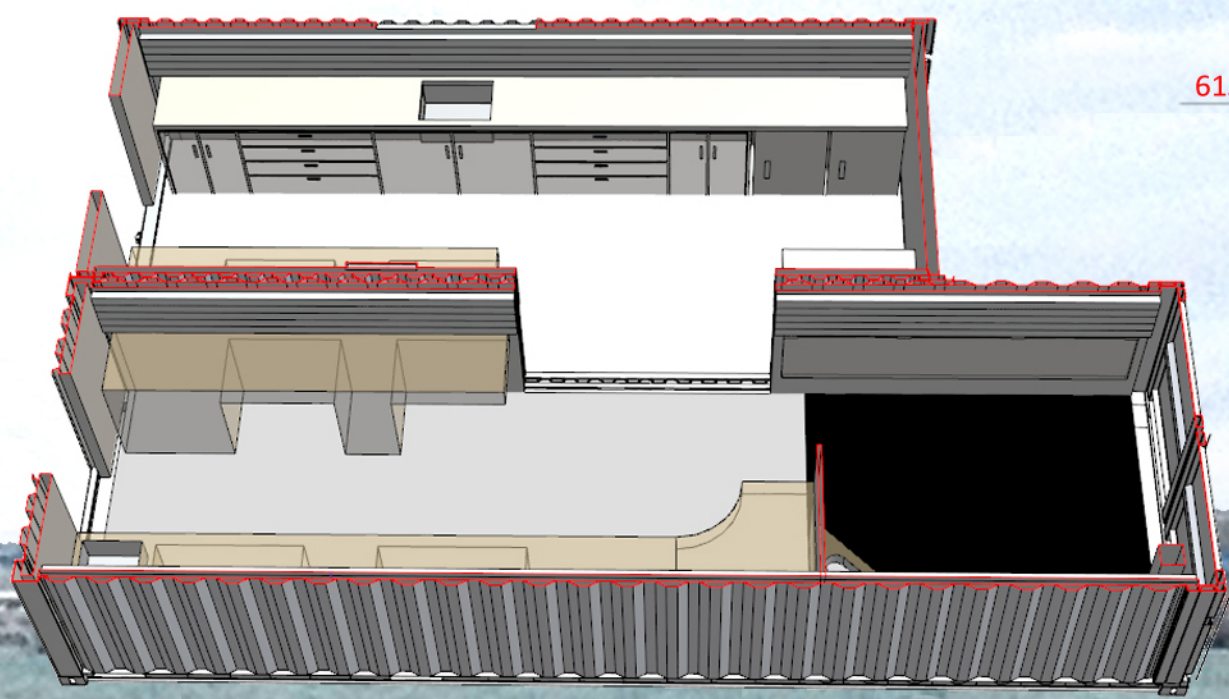


Figure 5: Telescopic A-Frame

6. Refitting to modern R/V

The refitting of the *Bat Galim* into a modern research vessel follows most of the guidelines set in the Science Mission Requirements (SMR) for Regional Class oceanographic vessels that were developed as part of the Academic renewal efforts by the University-National Oceanographic Laboratory System (UNOLS). The *Bat Galim* will be equipped with a L3 DP level 0 system; 36 m2 of Dry & Wet labs built in 20-25' removable containers (Fig. 4); 4 ton, 4 m width and 5-7m high telescopic A-Frame (Fig. 5).

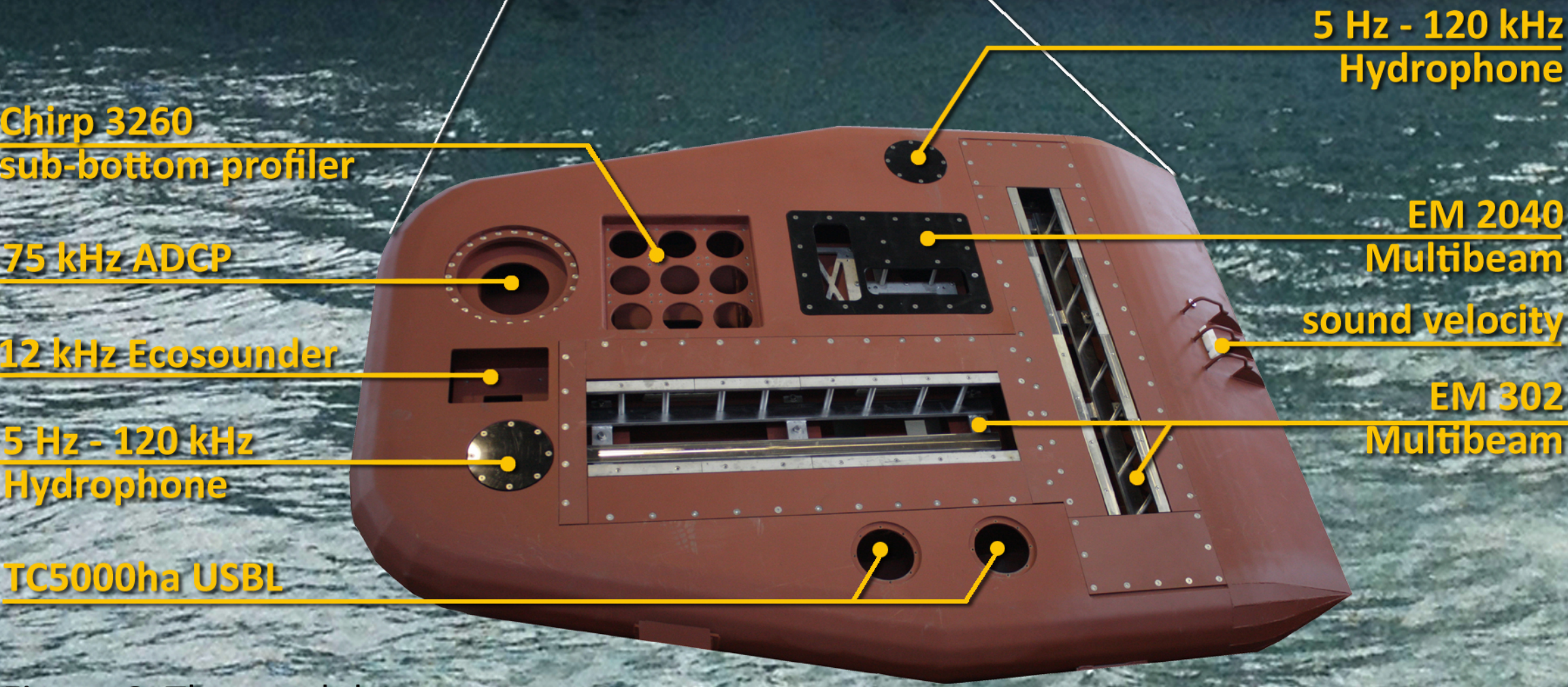


Figure 6: The gondola

The acoustic equipment will be installed in a 3.5 m x 2.6 m gondola (Fig. 6). It will include: **Kongsberg** EM-302 (1X2 deg.) and EM-2040 multibeam systems; **Knudsen** Chirp 3260 sub-bottom profiler and 12 kHz single beam echo sounder; **Teledyne RDI** Ocean Surveyor 75 kHz ADCP; **LinkQuest** TC5000ha USBL; **Teledyne Reson** 5Hz-120kHz hydrophones and **Valeport** mini sound velocity sensor. Other sampling and mapping equipment will include: **GEO Marine Survey Systems** high resolution seismic imaging with Geo-Spark 2000X and multichannel streamer; **SBE** 12 Carousel water sampler with CTD; box and 9 m piston cores (built similar to USGS design).