HOVERCRAFT

THEIR RETURN?

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ABSTRACT

Hovercraft were first considered by the MoD in the late 1960's until 1983. Since then, small and medium hovercraft technology has advanced and this article describes MoD (PE)'s involvement with two specific projects.

Introduction

Early hovercraft were all designed with aerospace concepts and techniques, using gas turbine engines. These craft were designed by aircraft designers, built by aircraft engineers, and maintained by aircraft fitters. They therefore attracted aircraft prices and operating costs, yet operated in marine markets. In the early 1980's new developments in diesel engines produced higher power outputs with reduced weights. At about the same time technology for small to medium sized hovercraft improved considerably, including aspects such as:

- Ducted low noise propellers.
- Skirt shift systems.
- The adoption of marine design and building techniques.

This article attempts to describe MoD(PE)'s recent involvement with two specific hovercraft projects.

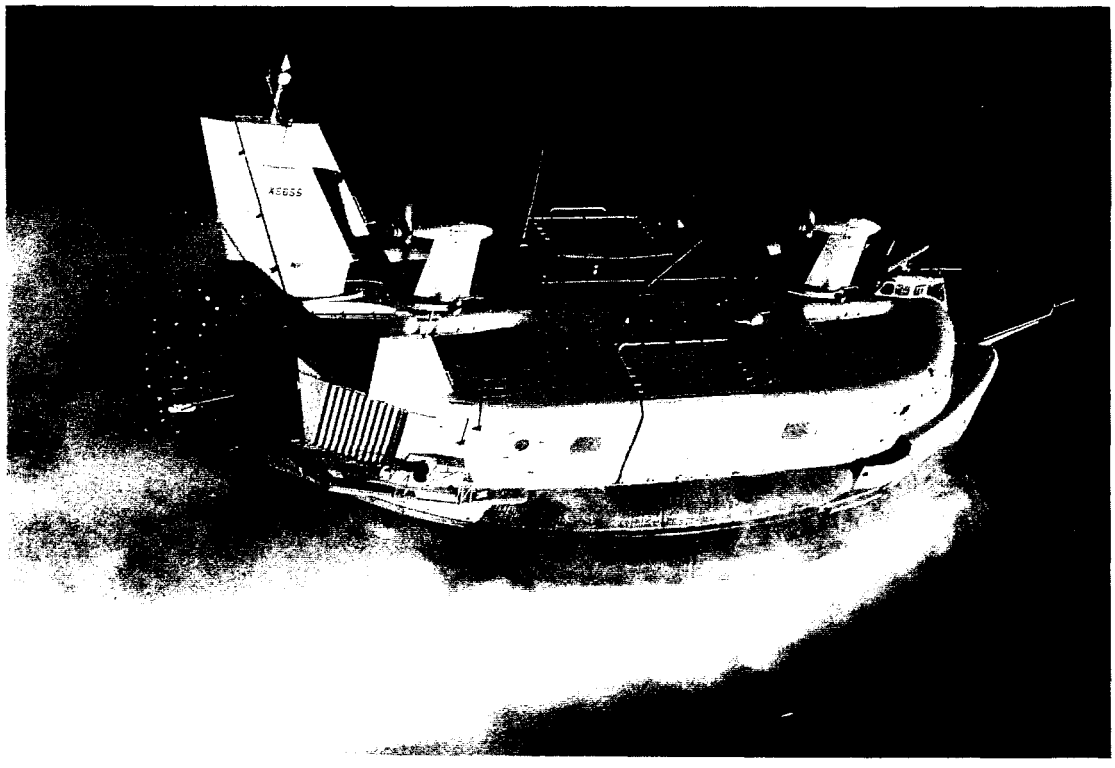

FIG. 1—EARLY MILITARY HOVERCRAFT (SRN 3)

Background

In the late 1960's hovercraft were seriously considered by the Ministry of Defence as an alternative means of transport, to such an extent that a Joint Services Hovercraft Trials Unit was established at Lee-on-the-Solent. At that time these craft were expensive, very noisy, and consumed vast amounts of fuel (FIG. 1). Consequently hovercraft were never adopted for formal Service use.

However, times change! In 1982 the Proof and Experimental Establishment (P&EE) at Shoeburyness took delivery of two 1970's state-of-the-art Tiger 12 hovercraft, manufactured by Air Vehicles Ltd of the Isle of Wight. These were 8m aluminium hulled, petrol engined craft, which whilst providing an ideal mode of transport for the specialised P&EE tasks, suffered from poor reliability. Eventually two accidents, resulting in severe hull damage, combined with the poor reliability and high maintenance costs, created a requirement for a replacement craft.

During the same time period the Royal Marines and MoD(PE) were also closely monitoring medium sized hovercraft developments, culminating with one of the latest (at that time) variants being hired for evaluation purposes. This was a 11m Slingsby Aviation Ltd SAH2200, which, after initial familiarization, was deployed with the Royal Marines on exercise Clockwork North during their 1989 winter training. This trial proved completely successful, and demonstrated that hovercraft would provide 3 Commando Brigade with a very useful additional asset. Consequently the procurement cycle was then started for four craft, eventually leading to an order being placed with Griffon Hovercraft Ltd, in late April 1993.

Outside of UK waters, the Americans are procuring (since 1981, and still ongoing) a vast fleet of Landing Craft Air Cushion (LCAC), from Textron Marine Systems. These are 27m long, powered by four gas turbines, and capable of carrying a 60 Tonne payload (i.e. Main Battle Tank) at 40 Knots in Sea State 2. Conversely, the USSR have developed many different types, all very large, for a similar role to the LCAC.

Design

The P&EE Shoeburyness craft fulfils a very specialized safety role. Its duties include:

- Buoy clearance.
- Policing of some 35,000 acres of the Maplin Sands.
- Trials observation.
- Recovery of spent munitions.
- Movement of rescue personnel.

Varying surface conditions, which range from hard sand through soft mud, to shallow and deep water, with a large tidal range, made a hovercraft the natural choice.

Following a competitive tendering exercise Slingsby Hovercraft Ltd won, with a slightly modified variant of the SAH2200 design, which entered service at the end of 1992 (FIG. 2). This craft is 11m in length, 4.8m beam, and of a completely composite construction. It comprises a central hull with hinged, load carrying sidebodies, to which the open loop and segment type skirt is attached. Propulsion and lift are provided by a single Deutz BF 8L 513 air cooled turbo charged V8 diesel engine, driving a variable pitch propeller and centrifugal lift fan, at speeds in excess of 30 Knots. The craft is controlled from the commanders cabin where rudder, throttle, propeller pitch and other controls are situated, along with instrumentation and warning systems.

The craft is supported during operation by a cushion of low pressure air, contained under the craft by a segmented flexible skirt. The skirt allows the craft

to lift approximately 0.5m above the operating surface, and obstacles not exceeding this height will pass under and through the flexible skirt with the minimum of drag. A comprehensive communications, navigation and radar fit, commensurate with the craft role, has also been installed.

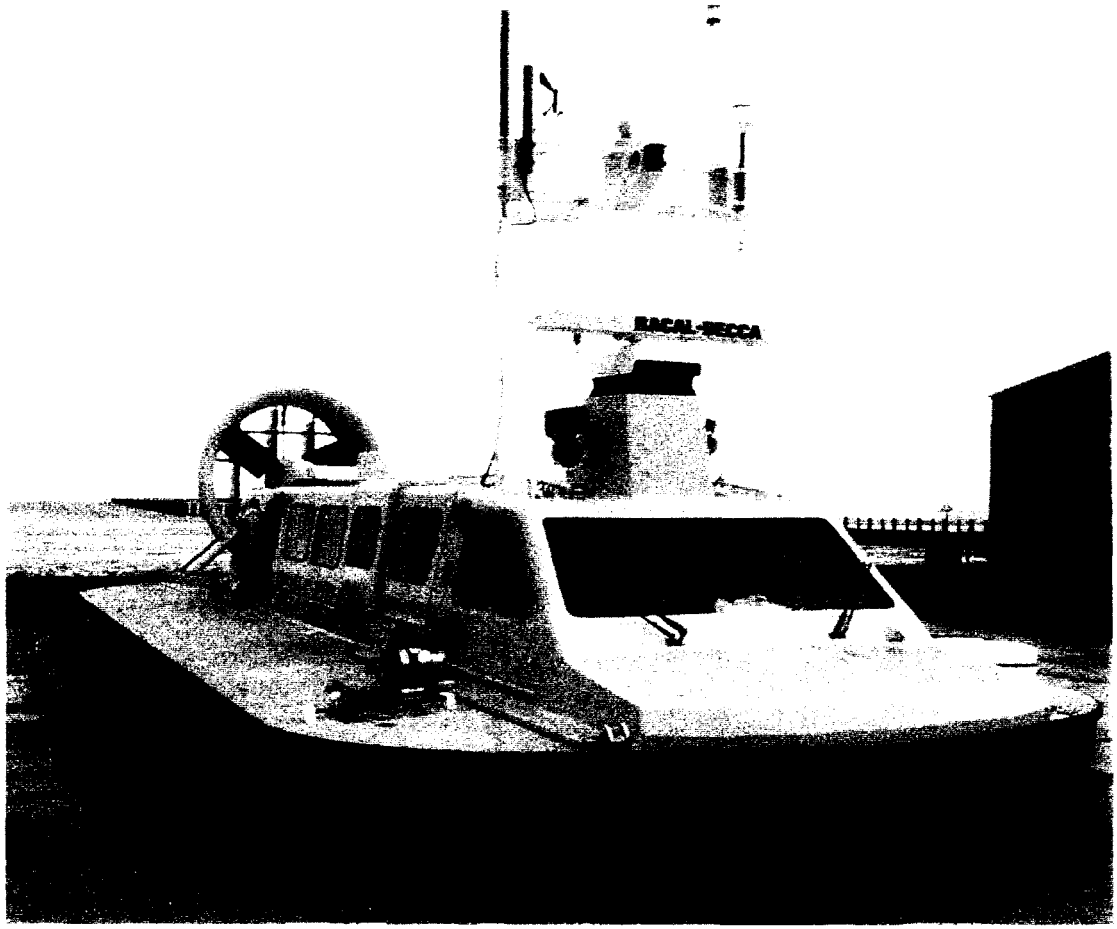

FIG. 2—RANGE SAFETY HOVERCRAFT (SLINGSBY SAH2200)

The concept of the four Royal Marines hovercraft follow similar principles to the Shoeburyness craft. Basically, they are Griffon 2000TDX commercial craft, modified to suit the specialist RM requirement, subsequently designated by the manufacturer 2000TDX(M), and by the user Landing Craft Air Cushion Light (LCACL). Each craft is operated by a crew of two from 539 Assault Squadron, and can carry 16 fully equipped marines. They are expected to operate in conditions varying from the Arctic to the Tropics, and have true strategic mobility. They can be road transported by 40 foot flatbed trucks, deployed by C130 HERCULES, loaded into the well deck of an LCU and carried by an LPD, or carried as deck cargo on an LSL. Obviously these varying means of transport have placed size constraints on the craft, resulting in a length of 11.9m and beam of 5m (FIG. 3).

In order to satisfy the speed/payload/size equation, the latest, most powerful engine variant, a single Deutz BF 8L 513 L was installed, enabling speeds in excess of 30 Knots to be regularly achieved. This powers both a 2m variable pitch propeller, and centrifugal lift fan. The hull is made from welded marine grade aluminium, and consists of three separate compartments:

1. Passenger/crew accommodation.
2. Lift fan bay.
3. Engine compartment.

FIG. 3—ROYAL MARINES HOVERCRAFT (GRIFFON 2000 TDX(M))

The craft is steered by a steering wheel which operates triple air rudders mounted behind the propulsion duct. Quick changes in longitudinal trim are achieved by using the three elevators mounted in the propulsion duct, with longer term changes being effected by fuel ballast transfer. Changes in lateral trim are achieved by operation of the skirt shift system, which causes the skirt to tuck in and alter the crafts centre of gravity, making the craft lean into a curve, like a bicycle.

Rigid sidebodies, which may be hinged upwards for transport, are fitted to the sides of the aluminium hull. Outside of these sidebodies are two inflatable fenders, one either side, with each having four separate buoyancy compartments. The skirt is of the loop and segment type, and is made of Hypalon coated nylon. When not hovering, the craft rests on two full length skids, each having replaceable surfaces.

Cabin arrangements are such that conversion from a personnel carrying role to a cargo role can be attained by simply removing sections of the cabin roof. Alternatively, a canvas roof can be easily fitted, for tropical operations. A full military communications fit is installed, along with suitable radar and navigation systems.

Operation

As explained earlier, the Shoeburyness craft has a very clearly defined role and area of operation, but the Royal Marine craft is totally flexible. It can now move two rifle troops (64 men) rapidly to secure a landing position, over a variety of beaches, many of which would have been unusable by conventional landing craft. Troops can also be delivered well up a beach, in a warm, dry, and therefore very strong fighting condition. With relatively low noise and radar signatures, they are particularly suited for raiding duties. Casevac, beach surveys, providing a logistic lift capability, and use as a Command post are further tasks easily undertaken.

The Future

Further procurement is not, at the time of writing, planned. However, hovercraft are being actively looked at for surveying duties. For specialist duties, they undoubtedly have a useful role to play, particularly alongside conventional craft.