Hovering into action

Military and other applications of the hovercraft

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Only a little more than a decade has passed since the hovercraft became a viable military vehicle. A vehicle which is now in service with the armed forces of countries in different parts of the world. When the first experimental hovercraft took to the air the invention was hailed by the over optimistic as a machine which would revolutionize warfare both on land and sea. It was, they thought, going to render obsolete many vehicles and weapons including naval patrol vessels, amphibious landing craft and maybe even helicopters for certain operations.

Such predictions were, of course, over enthusiastic. Although air propulsion gives these craft a special freedom of manoeuvre and allows them to move efficiently from land to water and to operate over swamp and marshy ground inaccessible to boats and land vehicles they are unfortunately expensive to build. For this reason they must be used for operations in situations in which they can perform tasks normally requiring combinations of other types of vehicles. In addition they must, where possible, have role versatility and be able to be converted rapidly from a load or troop carrier to a fighting machine.

The principle on which the hovercraft operates is simplicity itself. Air is drawn through a "funnel" built into the top of a rectangular buoyancy tank which is fitted with a "skirt" round the bottom of the sides. It is then blown out through ducts or holes around the periphery of the buoyancy tank. As the air stream hits the surface, be it land or water, it forces the whole contraption upwards before the air escapes between the skirt and the surface. Forward motion can then be obtained by the use of an aircraft type propeller. The snag was to build flexible skirts sufficiently strong and durable to permit fast travel over waves and rough ground and so give the craft an amphibious and practical operational future.

This the British Hovercraft Corporation Ltd, the first manufacturer of a manned hovercraft and the largest hovercraft builder in the world, did by building the upper half of the skirt as a double walled structure made in segments which run around the periphery of the craft. This is known as the "bag" and attached to it are a number of flexible extensions which have contact with the surface over which the craft is travelling to form an air seal for the cushion of air. These are called the "fingers". The whole skirt also acts as a shock absorber accepting any impact from obstacles or waves before it is transmitted to the hard structure. Once these skirts had been successfully developed it was a question of obtaining the correct power units, fans and propellers to produce maximum performance for weight required. This work was started in 1959 when the first manned hovercraft, the SRN1, took to the air.

British Army hovercraft CC7 (British Hovercraft Corporation Ltd)

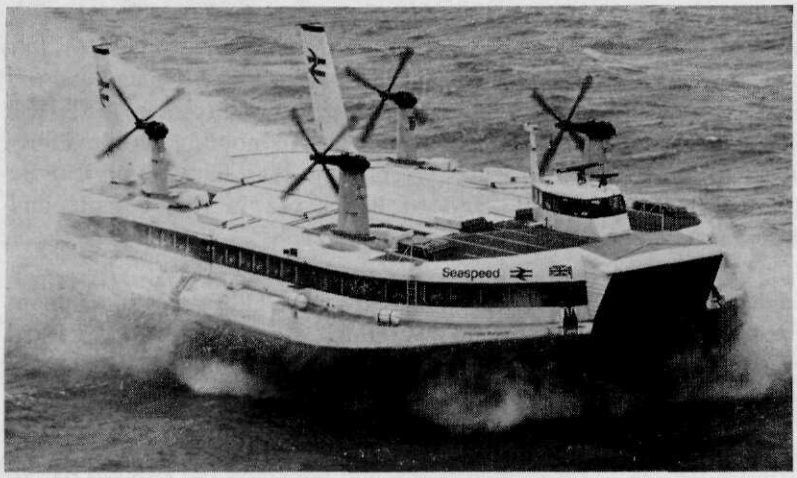
The British Services, with their tradition of amphibious operations, immediately showed interest and in 1962 formed the Inter Service Hovercraft Trial Unit. The unit first took delivery of a 37,5 ton BHC SRN3. Exhaustive evaluation trials were carried out in many parts of the world to test its troop and vehicle carrying capabilities, its possibilities as an anti submarine and fishery protection vessel and as a weapon platform. This particular hovercraft is still in operation and its excellent military service has led to the present orders for the larger and much more effective 45 ton Wellington BH7 for the Royal Navy and the Imperial Iranian Navy.
The smaller SRN5 type of craft also operated by the IHTU took part in the Borneo operations of 1965. There it was used for logistic support, troop carrying, coastal and river patrols. Later the Inter Service Unit tested it overland and in the swamps of Thailand; operational trials which were partly instrumental in causing the United States to decide to evaluate these craft for use in Vietnam.

After the British trials and operations the Inter Service Unit reverted to its normal task of training military hovercraft pilots and evaluating new developments. Their latest trial was carried out in the Baltic Sea where they showed the paces of the new 50 ton BH7-Mk2 to the Swedish, Finnish and Danish forces. This craft returned the 1,100 miles to its home base at HMS Daedalus at Lee on Solent under its own power, no mean achievement and proof of its reliability.

In June 1967 the Royal Navy decided that the hovercraft had an operational role and therefore formed a unit to convert and operate a civilian 10 ton SRN6 Winchester Class in the Falkland Isles. Its task is to provide mobility and logistic support for the Royal Marine garrison and the local Defence Force of these bleak isles in the South Atlantic. There are about 200 islands stretching 150 miles from East to West and 80 miles from North to South; most of the population of 2000 lives in the town of Stanley, the remainder are scattered around in isolated settlements. There are no roads outside Stanley and all communications to the outer isles are by sea, the weather is often wild and there are few sheltered landings. The ground is boggy with many streams and stone outcrops and few trees. A perfect area for the use of amphibious hovercraft both over land and sea. The BHC SRN6 employed there has been fitted with Decca 202 radar, HF and VHF radios, an overload fuel system and an auxiliary power unit driving an additional generator. With this extra equipment it provides a mobile headquarters when required. The garrison forces are delighted with the marked increase in mobility and flexibility which it has given them; they have found it more reliable and of better use in this climate and terrain than a helicopter.

The hovercraft used by the US Forces in Vietnam are British Hovercraft Corporation's SRN5s, fitted by the Bell Aerosystems Company with more powerful American engines and plastic armour. The first unit, the Patrol Air Cushion Vehicle (PACV) Division 107 of the US Navy, commenced training in 1965. After duty at the fleet amphibious base at Coronado Beach near San Diego they were shipped to Vietnam in the Dock Land Craft (LSD) USS Tortuga. On arrival they were used in comparatively peaceful areas to intercept and examine local junks and sampans. Later they were fitted with half inch and 7.62 mm machineguns and were assigned to operation "Game Warden", patrolling the rivers of the Mekong Delta to prevent contraband and gun running. However it was soon realized that such operations were not making the full use of the capabilities of the hovercraft for they were doing duties which could just as well be carried out by normal patrol vessels. They were therefore reassigned to the Plain of Reeds, a vast area of swamps where full use could be made of their special capabilities. The area was full of Viet Cong villages and hideouts. From their temporary base at Hoc Hoa the unit soon made its presence felt in areas unreachable by boat or land and where there are limited landing places for helicopters. In two short periods of operations totalling 14 days twenty three VC were killed, eleven captured, seventy one enemy sampans were sunk and quantities of ammunition and weapons seized.
After this successful operational evaluation the hovercraft returned to the United States for refurbishment at Bell Aerosystems before returning for a further tour in Vietnam as Coastal Division 17 in 1968.
The success of the unit in 1966 had caused the US Army to order a further three craft with strengthened side decks, heavier armament and a more powerful gas turbine engine. By 1968 they were in action in the Plain of Reeds from a base at Darg Tom.

The Shah of Iran was quick to realize the value



One of the SRN4s operated by Seaspeed *on the Dover Boulogne route* in the Channel. With a top speed of 78 knots (148 km/h) these craft would have a high reinforcement capability in time of crisis; they can carry 254 passengers and 30 vehicles

of the hovercraft for naval and coast guard work in the Persian Gulf. The Imperial Iranian Navy presently operates eight SRN6 Winchesters, two BH7-Mk2 Wellingtons and a further four BH7-Mk2 Wellingtons and a further four BH7-Mk5s are on order. Other hovercraft are presently in service with the Italian Interforce Unit, the Brunei Defence Force and the Saudi Arabian Coastguard.

Because the 50 ton BH7-Mk5 Wellington is the world's newest hovercraft it is worthwhile to take a closer look at its design and capabilities. There are two models, the logistic and the combat, but both are only variants of the one design.
The length is 78 ft (23,9 m), beam 45 ft 6 inches (13,9 m), the bow opening is 15 ft 9 inches by 7 ft 3 inches and the deck headroom is 7 ft 10 inches (2,4 m). It is powered by a Rolls Royce Marine Proteus gas turbine of 4250 shp (4309 cv). The propeller is a Hawker Siddeley Dynamics 4 blade convertible pitch. The maximum disposable load of the logistic model is 16 tons and 14 for the combat design. The cruise speed over calm water is 60 kts with a maximum of 65 kts and over waves of up to 5 ft height it can still reach 45 kts. Its endurance is about twelve hours with a range of 700 miles over calm sea or over marshland carrying a fuel load of 12.5 tons. The logistic load can either be in pallets (20 standard NATO), or six 105 mm pack howitzers or 3 Daimler Ferret Scout Cars or 92 fully equipped troops or a combination of vehicles, loads and men to the weight capacity of 14 tons.

The combination of payload and high speed plus its amphibious capabilities gives it the ability to transport a large tonnage in a given operating time and so enables a rapid build up of personnel and equipment at the vital point.
The combat model can mount a variety of weapons of which the most appropriate would be various forms of guided missiles including the Nord Exocet, Nord SS12 surface to surface missiles and the Short Seacat surface to air. A wide range of installations of the machinegun types up to 20 and 30 mm can also be fitted but the type fitted is left to the operator to decide.
The structure is built from corrosion resistant materials and considerable use is made of reinforced plastics. The skirts, which have already been described, are now made from a specially developed composite synthetic rubber coated fabric. Internally the centre section is divided from the side cabin by longitudinal walls. The centre part provides the main hold in the logistic model and the operations room in the combat design. The control cabin is located centrally on the roof, giving all round visibility.
The normal crew for the logistic model is four: a pilot, a navigator/radar operator, an engineer/gunner and a further gunner. The combat craft, in its fast attack role, can carry two watches each of five men; these would be the commanding officer, mechanical engineer, two lookout/gunners and the cook who acts as a further lookout or gunner.
Maintenance is comparatively easy; most first line repairs can be done in situ but for protected operations a minimum of six engineers are required. These include two for the structure, skirt and systems, two for the engine, one electrical, one radio and radar. The hovercraft can operate from a simple base; a rock or debris approach with a slope of less than 1 in 12 is needed plus fuel store, ammunition, water and, if possible, power, a store

and covered repair shop are the minimum requirements.

The Wellington hovercraft uses many of the same components as the four engined Mountbatten SRN4 passenger and car ferries which have been running with great regularity and efficiency across the Channel between Dover and Boulogne, Dover and Calais (British Rail Seaspeed) and Ramsgate and Calais (Hoverlloyd). The latter route passes over the dangerous Goodwin Sands which are exposed at low tide. The standard SRN4s carry 254 passengers and 30 vehicles although this can be increased to 262 passengers and 37 vehicles. These 130 ft (39,68 m) craft, which in war would have a considerable military capability for fast cross channel resupply and reinforcement, can operate in 8 to 10 feet seas and have service speeds of up to 50 knots.

Besides ferry operations the hovercrafts have many other civilian applications. One Winchester is presently in use at Mangere Airport, New Zealand, as a crash and firefighting vehicle. This airport is situated in a harbour of about 150 sq mls much of which becomes mudflats or is less than 3 feet deep at low tide. A Warden has proved its worth in over 250 rescue operations in the Vancouver area where it is manned by the Canadian Coastguard Service. Another two Wardens are operated successfully by the US Coast Guard in San Francisco. Hovercraft are, in fact, the only vehicles which meet the International Civil Aviation Organisation's criteria for rescue vehicles on airfields adjacent to difficult or muddy terrain, water or swampy areas. In Iran a hovercraft carried out invaluable rescue and medical operations during a disastrous flood saving several hundred lives. The members of the National Geographical Expeditions used hovercraft to travel 2000 miles up the Amazon, Negro and Orinoco rivers in South America and for 5000 miles on the Niger and Congo in West Africa. A good example of their reliability away from permanent bases. Winchesters have proved themselves in the exploitation of natural resources in marginal terrain. The oil industry quickly realized the potential of hovercraft for geophysical survey operations. Hoverwork Company and the Pacific Hoverwork Company have operated them for various firms in Holland on the inter tidal Waddensea, in the Persian Gulf around Abu Dhabi and Bahrain, in Alaska over the tundra near Prudhoe Bay, in the ice congested waters of Beaufort Sea, in the shallow waters off Tunisia and for supporting offshore oil rigs in Brunei.

In November 1972 the world's first hover-dredger built by Dredge and Marine in Cornwall showed its efficiency on the Penryn river. It weighs 114 tons and has the delightful name of "Mudstomper".

Already there are about sixty hovercraft of various types and sizes earning their living in civilian operations from Britain to New Zealand and so their future as a normal part of the world transport system seems secure. Militarily, although the early dreams of the future have been superceded by a more thoughtful and considered assessment of their their capabilities, they passed the trials stage and proved themselves in operations worldwide. The British Services, who have eleven in operation, have ordered the conversion of two 7 ton SRN5 hovercraft by "stretching" them from 38 to 53 feet in length. They will have an open well deck and flat sided decks, and will be able to carry land-rover type vehicles and 14,000 lbs of cargo. Orders from the armed services of other countries including Iran are presently being processed.

How far they will eventually dominate the military scene in future years depends principally upon how much use can be made of their unique operating techniques and tactics they allow and cost effectiveness of their multi role and multi purpose capability. In the last decade they have come a long way.