STRIKE CRAFT

EXCERPTS ONLY

ANTONY PRESTON

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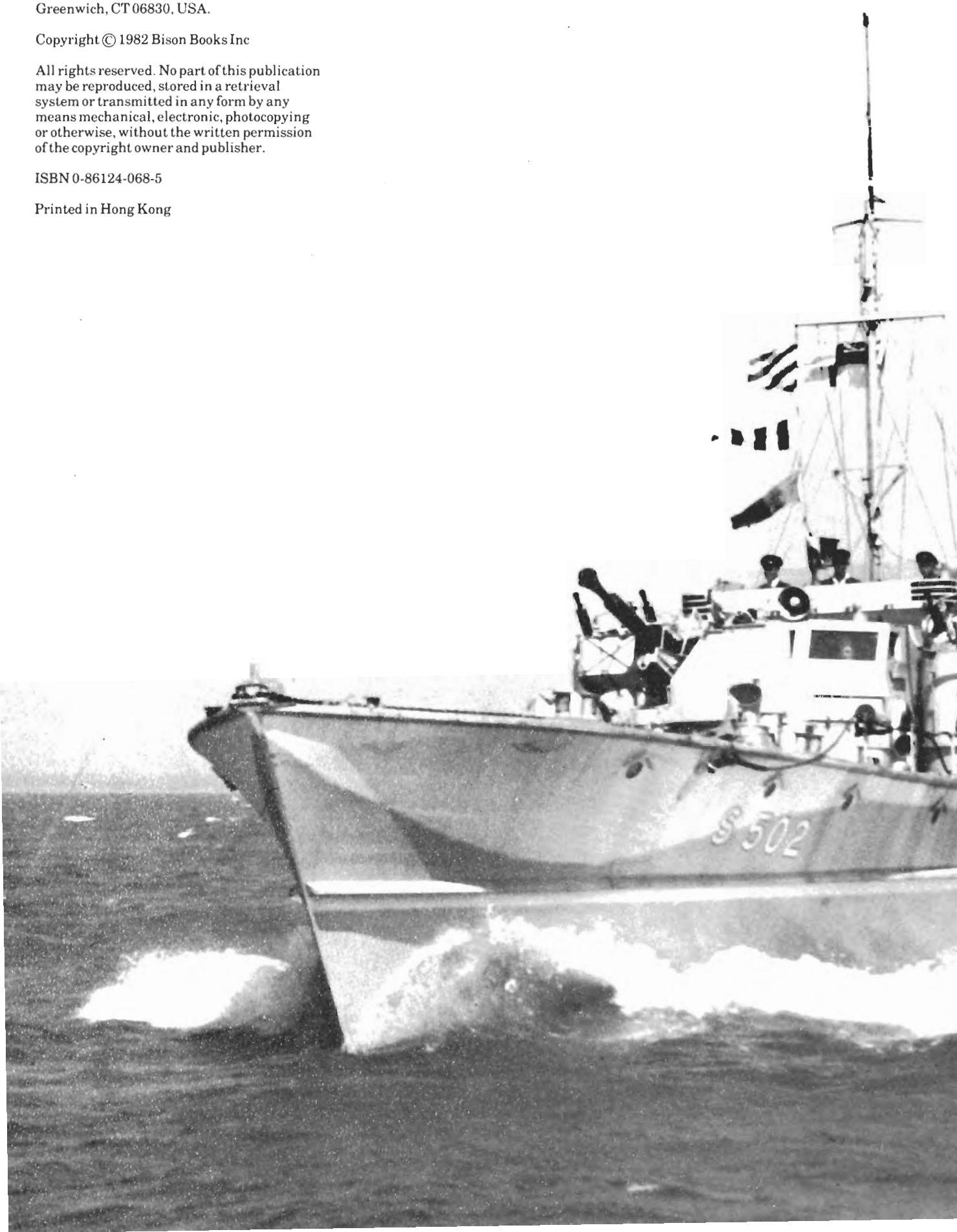


HOVERCRAFT & HYDROFOILS

By the 1960s designers were generally agreed that, however much hull-designs and power units might be improved, there was going to be no significant increase in speeds. If anything, the opposite was true, with a greater emphasis on seakeeping, reliability and robustness, all qualities which are incompatible with ultra-light structures and maximum engine power. Clearly some alternative to the classic 'displacement hull' would have to be developed if the quest for higher speeds was to be pursued.

The answer had already been looked at many years before. In Britain, for example, trials had been carried out on a Canadian design for a ladder hydrofoil as far back as 1921. It was not successful but in 1936 Commander Hampden and the naval shipbuilders J Samuel White produced an 18ft hydrofoil 'runabout.' Although hardly a basis for development, it showed that a hydrofoil, by raising the hull clear of the water, reduced drag to a great extent. The Hampden hydrofoil, on a displacement of 1.34 tons, reached 33 knots, whereas a fast dinghy (1.12 tons) and a fast motor boat (1.78 tons) only reached 24 knots.

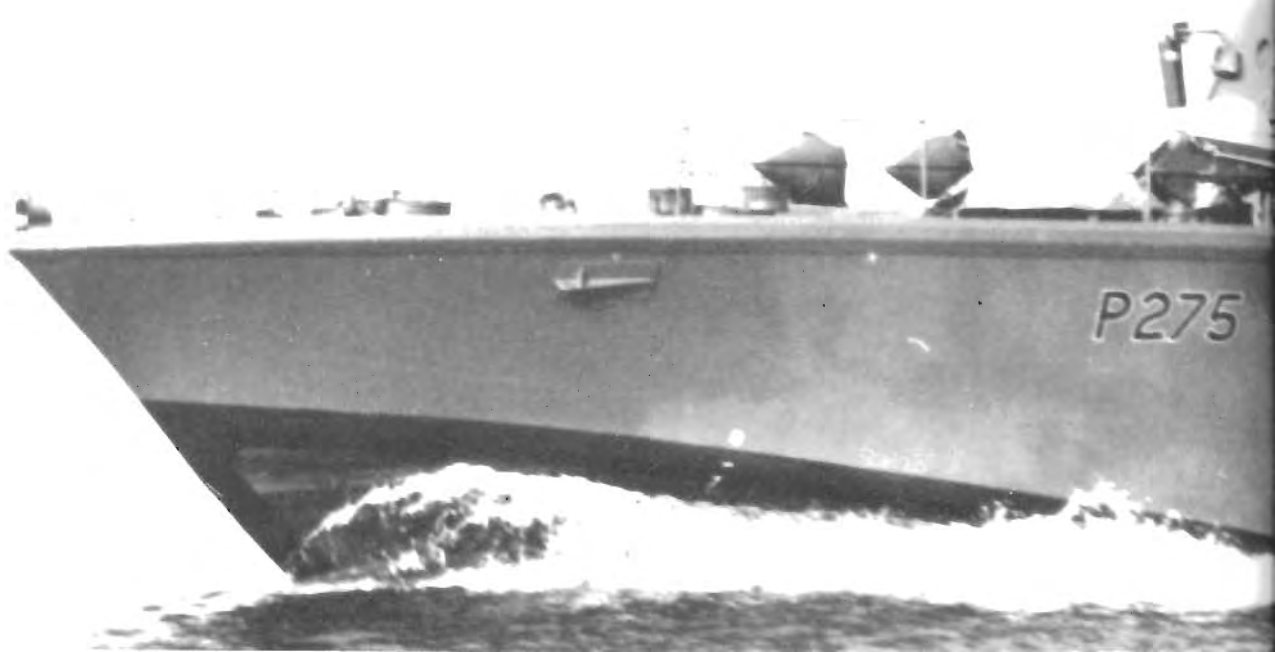
The Admiralty was sufficiently impressed by White's proposals for a 67ft hydrofoil MTB to go ahead with an order for *MTB.101* in 1936. She ran her trials in 1940, but the foils and struts produced so much cavitation that she could not get beyond 41.3 knots, no matter how much power was generated. In 1939, the Denny shipyard at Dumbarton put forward a 'semi-hydrofoil' design, using a stepped hull like the old CMBs, but with a single fixed submerged foil at the after end. *MTB.109* was built and on trials in 1944 reached nearly 46 knots. There were however serious practical problems. For one thing it was not possible to fire torpedoes at more than 25 knots and for another, the boat could not turn safely at high speed. The Admiralty reluctantly decided that these faults prevented *MTB.109* from being accepted and so this interesting craft was broken up.

Although much interest had been generated in German research into military hydrofoils, little was done by the British in the postwar years. They had a new toy to play with, the air-cushion craft or hovercraft, which offered a different solution to the problem of drag by floating the hull on a cushion of air inside a rubber skirt. As soon as the hovercraft demonstrated its unique ability to run ashore over a shelving beach, ideas began to churn forth for strike versions armed with guns and missiles and in 1964 came the first mention of a 'hovership' for the Royal Navy.

Sadly none of these dreams came to anything, for although the hovercraft can do what it claims, it does so at much greater cost than any conventional displacement hull. More important it makes much heavier demands on maintenance, a problem already acute for strike craft. In the early 1970s the Shah of Iran ordered six BH.7 hovercraft, four of which were to be armed with surface-to-surface missiles of an unspecified type. This interesting innovation did not materialize however and nobody else has followed this line of development. Not even the Russians, who made a massive investment in military hovercraft in the 1970s, have tried to use them in the strike role, so for the foreseeable future the strike hovercraft can be discounted. One of their biggest drawbacks is noise, which robs them of any element of surprise.

In contrast the hydrofoil has shown remarkable promise. In the 1950s Russian civilian hydrofoil ferries were developed and they were followed by a large number of 50-ton hydrofoil MTBs.

Below: Although not FPBs as such, the fast target boat *Sabre* and her two sisters were the last British fast strike craft. They had two Proteus gas turbines and were similar to the 'Brave' Class.



Above left: The new Thai FPB *Witthayarom*, one of three missile boats built in Italy.
Above: Soviet Osa Type missile boats in line ahead, showing the massive SS-N-2 missiles.
Left: The Turkish FPB *Dogan* was built by Lürssen and armed with eight Harpoon missiles.

Known as the *PA-4* class, they had a bow foil to assist in reducing drag at top speed. They were not particularly successful and were replaced by the *P-8* class in the early 1960s. In the mid-1960s the *Pchela* class appeared, roughly the same size but armed with only twin 25mm guns. They were clearly too small for the strike role and most of them were subsequently turned over to the KGB for use in patrolling the rivers and maritime frontiers of the Soviet Union.

In 1973 the first proper strike hydrofoils entered service, the 165-ton *Turya* class. Thirty were built, 123-footers armed with four 21-inch torpedo-tubes, a twin 57mm gun turret aft and a twin 25mm light automatic mounting forward. An unusual feature was a light dipping sonar on the transom stern; as there are no obvious anti-submarine weapons carried this equipment was presumably put in to allow the *Turya* class to cooperate with shore-based helicopters in hunting submarines in coastal waters.

In 1976 a new hydrofoil appeared from the Petrovsky shipyard in Leningrad and it was promptly christened the 'Sarancha' type by NATO. Only one of this class has been sighted, which suggests that she was a test-bed for the new SS-N-9 surface-to-surface missile. Four of those bulky missiles are carried in launching-tubes, two on either side of the bridge, and in addition she is protected against air attack by short-range SA-N-4 missiles and a 30mm 'Gatling' gun. Here was a formidable strike craft, with missiles capable of hitting at a range of 60 miles. The 'Sarancha' was also the first Russian craft with foils forward and aft and her combined gas turbine and diesel propulsion is credited with giving her a top speed of 45 knots.

The next class of hydrofoils, the 129ft *Matka*, started to appear two years later but reverted to the SS-N-2C, an updated variant of the 'Styx' missile. Only two missiles were carried, a reflection of the considerable weight of such weapons, and a 76mm gun forward. The single-foil system of the *Turya* design was retained, suggesting that the design actually predated that of the 'Sarancha.' Western naval opinion sees the ten *Matkas* so far

Above: The Argentinian *Intrepida* is armed with wire-guided torpedoes aft, a 40mm gun amidships and a 76mm gun forward.

completed as replacements for the older 'Osa' boats, which must be approaching the end of their useful lives.

In the last 15 years the People's Republic of China has also built military hydrofoils. The Hutong shipyard at Shanghai turned out the staggering total of 120 *Huchuan* class for the Navy, in addition to another 44 for friendly countries. It has also proved a commercial success, for 16 have been built in Rumania. The 71ft *Huchuan* is armed with twin machine guns and is driven by Russian-designed diesels at a maximum speed of 50 knots and is armed with two 21-inch torpedo-tubes.

The United States took some time to match these impressive achievements by the Communist Bloc. The experimental anti-submarine hydrofoil *High Point* (PCH-1) was completed in 1963 and reached 48 knots on two British Marine Proteus gas turbines. Her antisubmarine qualities were never fully investigated, as she spent most of her time firing Harpoon surface-to-surface missiles and other weapons. In the year that *High Point* came into service, the 328-ton *Plainview* (PCEH-1) was ordered, but she encountered mechanical setbacks and was not commissioned until 1968. She was intended to evaluate the concept of a 'hydrofoil frigate' and carried a variety of weapons during her exhaustive trials.

Both the *Plainview* and the *High Point* were experimental craft and the first intended for operational duties were a pair of prototypes, the Grumman-built *Flagstaff* (PGH-1) and Boeing's *Tucumcari* (PGH-2), which were completed in 1968. Both craft undertook a number of demonstrations around the world, *Tucumcari* going to Europe after a brief trip to Vietnam, while

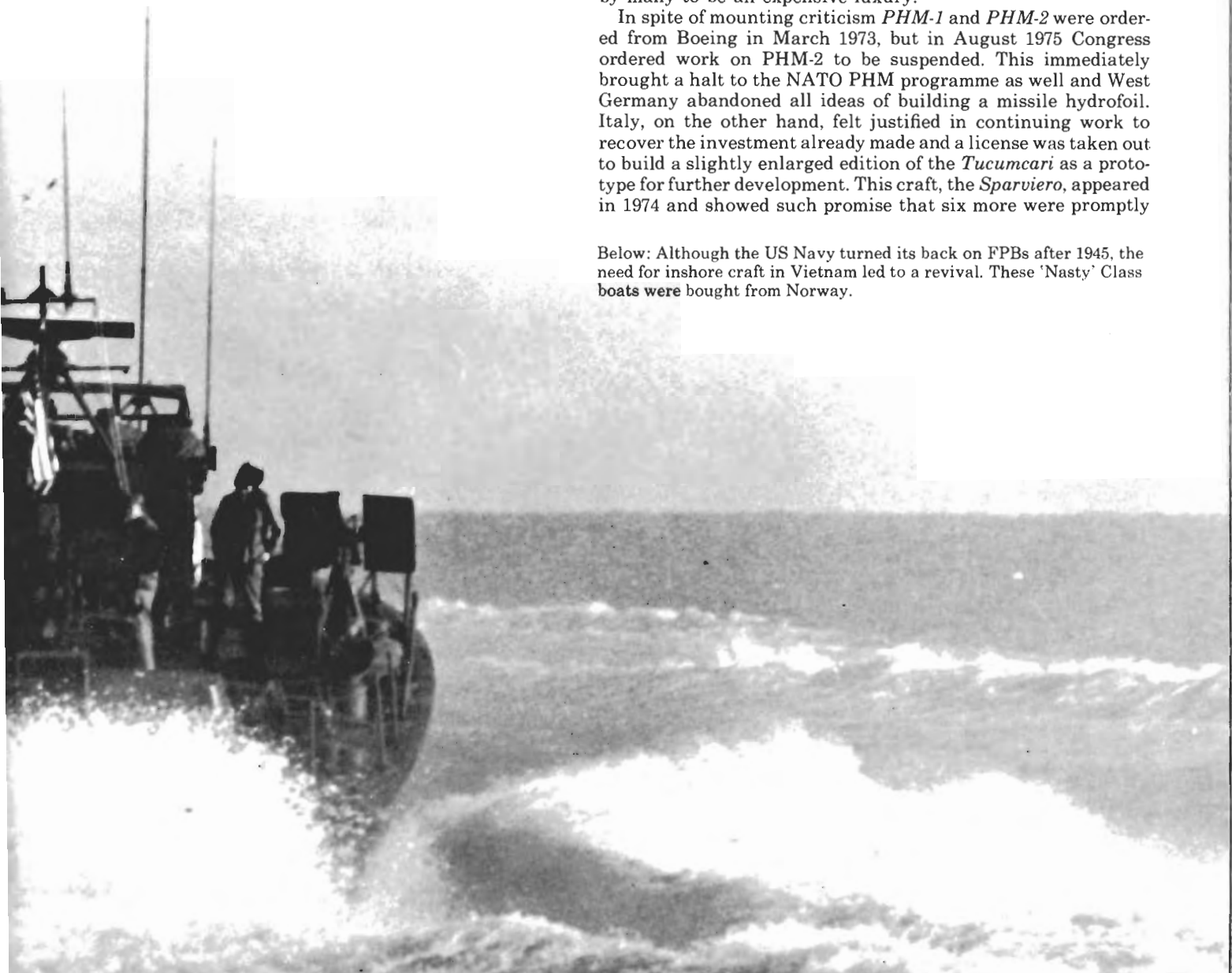
Flagstaff made such an impression on the Israelis that they ordered the *Flagstaff II* design for their Coastguard.

The *Tucumcari* made an outstanding impression on her European tour and out of this stemmed the 'NATO Patrol Hydrofoil' (PHM) project. This called for 30 advanced naval strike craft to be built jointly by the United States, West Germany and Italy, and it was hoped to use an international weapons-fit. It was an ambitious plan, possibly too ambitious, for in an era of rapid inflation of costs, rising fuel bills and a general shortage of defence funds, a missile-armed hydrofoil was felt by many to be an expensive luxury.

Above: The Saudi Navy's *As Siddiq* en route through the Great Lakes from Sturgeon Bay, Wisconsin.

In spite of mounting criticism *PHM-1* and *PHM-2* were ordered from Boeing in March 1973, but in August 1975 Congress ordered work on PHM-2 to be suspended. This immediately brought a halt to the NATO PHM programme as well and West Germany abandoned all ideas of building a missile hydrofoil. Italy, on the other hand, felt justified in continuing work to recover the investment already made and a license was taken out to build a slightly enlarged edition of the *Tucumcari* as a prototype for further development. This craft, the *Sparviero*, appeared in 1974 and showed such promise that six more were promptly

Below: Although the US Navy turned its back on FPBs after 1945, the need for inshore craft in Vietnam led to a revival. These 'Nasty' Class boats were bought from Norway.



Above: The Ecuadorean FPB *Quito*, built by Lürssen, is armed with French Exocet missiles.
Right: The Turkish 'Kartal' Class FPBs are armed with Norwegian Penguin missiles aft and two 40mm guns.

ordered. She carries an exceptionally heavy armament for an 80ft craft: two Otomat missiles aft and a 76mm gun forward.

Meanwhile Boeing were permitted to complete *PHM-1*, named *Pegasus*, and she made her first foil-borne trip in February 1975. Since then she has come through every type of trial and test imaginable and has even survived running aground in 1979. She is an impressive craft, 145ft long (with the forward foil retracted) and capable of 48 knots. She is armed with the Italian OTO-Melara 76mm Compact gun and Dutch WM-28 fire-control radar intended for the NATO PHM, and carries eight Harpoon anti-ship missiles aft (only four were mounted during early trials).

The continuing success of the trials with *Pegasus* convinced the doubters and in August 1977 Congress 'unfroze' the funds to complete the PHM program. The change of heart was too late to save *PHM-2*, named *Hercules*; her hull was scrapped and a new one started with the same name and hull-number. The first of the new PHMs to be commissioned is the *Taurus* (PHM-3) and all five are expected to be in service by 1982. Although externally similar to the *Pegasus*, the later PHMs have been completely redesigned internally to take advantage of the lessons learned since 1977.

The results of experience in *Pegasus* make interesting reading. She began her 'shakedown' in April 1977 and two months later she completed her acceptance trials, before commissioning

formally on 9 July. During the next seven months she accumulated nearly 700 hours of running under way, with 262 of those foilborne, a distance of nearly 16,000 miles. This distance compares favorably with US Navy destroyers, which log an average of about 14,000 miles each year. She is fitted with an automatic control system, which provides dynamic control during takeoff, running on the foils and 'landing' or returning to the hullborne state. In addition to stabilizing against the roll, the system controls the height of the hull above the surface of the water and all but eliminates the effect of waves. Foilborne turns are 'banked,' reducing violent motion and further improving the conditions on board. The big submerged foils also act like fixed-fin stabilizers and, if the weather becomes too severe, the commanding officer can always 'land' and turn his vessel back into a conventional 235-ton patrol craft.

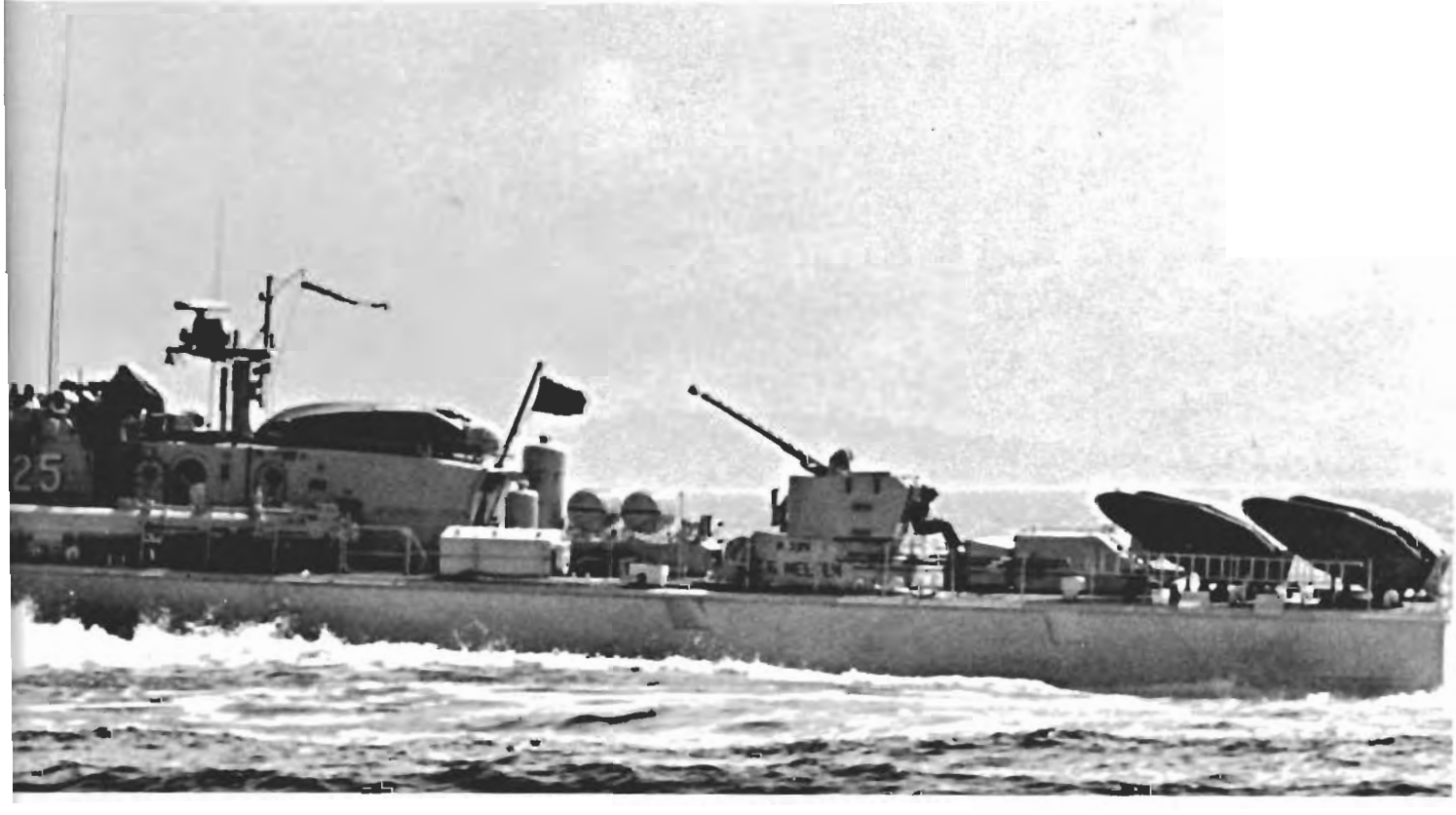
As each PHM is completed she is sent to Key West, Florida, where a new PHM Squadron Two was formed in October 1981. There they will be supported by a fleet of mobile logistic support vehicles, allowing them to be independent of major base facilities. It is hoped that they will require no more than a ten-week docking and overhaul every two years, a great improvement over what was previously possible. It is intended to try PHM-RON TWO out in the Caribbean and possibly in the Mediterranean, two operating areas which favor the hit-and-run tactics of a missile-armed PHM. Although there is no reason why the PHMs should not sail across the Atlantic in company, with stops for refuelling in mid-ocean, they are more likely to be towed or carried on board a large merchant ship.

The tactics are still in their infancy, but there are many options open when five or six PHMs are in commission. One way is to use them as part of a larger battle group, with the primary intention of multiplying the number of missile-launching platforms. In this role the PHM's small radar-profile and high speed makes her a difficult target and yet she has the same missile-capability as a much larger ship. The secondary role being looked at is that of controlling 'choke points,' or in other words, ambushing hostile forces trying to push their way through relatively narrow bodies of water such as a strait between two land masses. The PHMs could work with aircraft or by themselves, providing surveillance and a measure of deterrence as well. The high speed of the PHM is particularly valuable when it becomes necessary to investigate suspicious echoes among a large number of friendly ships, as it will enable a large area of water to be patrolled.

Above: The Norwegian FPBs *Glimt* (P.962) and *Gribb* (P.997) tied up alongside.

While the hydrofoil continues to make such strides it is easy to forget that the conventional displacement-hull FPB is still developing. Modern experience shows that the speed of an FPB has relatively little impact on her efficiency in battle; the difference between 35 and 40 knots will not affect the outcome, especially when speed falls off drastically in rough weather.

What matters is the ability of an FPB to make use of tactical information and to use her weaponry to maximum effect on the basis of that information. This means that precious weight and between-decks space must be given over to equipment for handling communications and target-plotting. Last but not



least, space must be found for generators to power all this equipment. Microminiaturization of electronics has done much to shrink the volume of equipment and there are now 'mini-combat systems' designed specifically for FPBs, capable of presenting the bewildering amount of raw information electronically. Only electronics can provide a speed of response capable of matching a missile travelling at the speed of sound and only electronics can provide a coordinated response to an attack – alerting the commanding officer and at the same time initiating a response, such as the launch of chaff and infra-red decoys, all in one movement.

Another problem is the long range of the latest series of missiles. The Harpoon ranges out to 60km, the MM-40 to 70km, and the Otomat to 150km, and although their manufacturers claim that they can function over the horizon just as efficiently as they do out to horizon-range, there are practical difficulties. At extreme range the target can very easily move out of the 'range gate' after the missile has been launched.

If the missile uses active radar to 'home' onto the target, that radar must be given a wider area to scan in order to pick up the target. If it is a 'fire-and-forget' missile, the triangulation of the relative position of the firing ship and the target becomes even more tricky. At extreme range it is also easier for the target to make use of countermeasures such as chaff and jamming, for the firing ship is too far away to be able to 'see' on radar the correct state of affairs.

The simple solution to these problems is to provide extra data for the missile in flight; the problem is where to get this additional information. The easiest way is to put a radar into a helicopter, which can then relay information back to the FPB,

Left: Soviet 'Stenka' Class boats at sea.
Above right: Captain and lookout on the bridge of a Soviet FPB.
With a vast coastline to protect the Soviet Navy has large numbers of FPBs, hydrofoils and small patrol craft.
Below: Music-loving Soviet sailors on the quarterdeck of a Soviet FPB.
Below right: The first of a new class of 84-foot hydrofoils built for Israel, ready for launching at Lantana, Florida.


STORAGE
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or update the individual missiles in mid-flight. In 1979 Ecuador announced that she would buy the French MM-40 missile for installation in six 660-ton corvettes, and that these would each carry a light helicopter. These *Esmeraldas* class are basically enlarged patrol boats, 204ft long and driven by four-shaft diesels at a top speed of 34 knots. There is no hangar and the helicopter will be lashed down to the small flight deck right aft and this is where the problems begin. Landing a helicopter on a small platform is tricky even in a calm sea, but when the weather is rough the platform is heaving and pitching and the risks multiply. Another problem is that most small helicopters are not suited to the task of operating a sophisticated surveillance radar and passing that information back to a warship or a missile; the power required imposes a considerable load on the generators and every extra pound of gear eats into the helicopter's flying time. Helicopters are notoriously difficult to keep flying – 14 hours of maintenance to one hour of flying time is not uncommon. Their light alloy fuselages are very susceptible to corrosion from salt water and ideally they should be kept under cover for as long as possible.

Whatever the drawbacks of operating helicopters from small craft, the benefits they offer in combat make them indispensable. The new improved version of the Israeli *Saar* class, the 202ft *Alia*, has a hangar amidships, accomodating a Kiowa helicopter. A much larger class of corvettes, 253ft long and displacing 850 tons, will also have a hangar and flight deck, and it has been suggested that their role will be to provide targeting information for the Harpoon missiles which have been retrofitted to the *Reshef* class.

The fast patrol boat, having made its reputation by being small and hard to detect, is now succumbing to that fatal tendency of warships to grow in size. We have seen hulls grow steadily from 220 tons and 147ft in length only ten years ago to nearly 500 tons and over 200ft long today. Such growth is inevitable, for the inherent drawback of the small craft is that its ability to accomodate weapons is much greater than its ability to control them. Modern technology has done a lot to narrow this gap, but at the same time the performance of weapons has been improving steadily and so the gap is virtually impossible to bridge. We can only guess at what the future holds, but many more FPBs of various types will continue to be built, having made themselves a major influence on tactics and strategy.

Sadly there is little permanent record of the thousands of fast strike craft which served in the two world wars. By their very nature they tend to be ephemeral, quickly built and quickly discarded. Wooden hulls tend to rot away the aluminum alloy corrodes very easily and yet there are a surprising number of craft around, for it is at least possible to lift small craft out of the water. One or two wartime MGBs and MTBs have been preserved as war memorials in the Soviet Union, for example, and two CMBs, the 40ft *CMB.4* and the 70ft *CMB.103* survive in Great Britain.

Canada has preserved the experimental hydrofoil *Bras d'Or*, for not for any sentimental reasons. She ran very successful trials in 1969–*70* but proved so costly that she was laid up in the dockyard at Halifax, Nova Scotia. There she remains, a forlorn reminder that too giant a stride can be made; it is little use achieving a technical breakthrough which does not make economic sense.

Hundreds of wartime MTBs, MGBs and motor launches survive on both sides of the Atlantic as houseboats. A walk around most backwaters will reveal the unmistakeable lines of a Vosper 70-footer or an Elco PT-Boat. It is a poor tribute to their achievements.

Right: The US Navy's patrol hydrofoil *Pegasus* (PHM.1) at high speed. Below: The camera's wide angle lens exaggerates the size of the forward foil on the new PHM *Aries*.

Above: A Norwegian 'Storm' Class FPB fires a Penguin missile.
Below: The US Navy's *Pegasus* on trials in Puget Sound in 1977. Only four Harpoon missiles are on board, the fifth cannister being a dummy weighted to compensate.