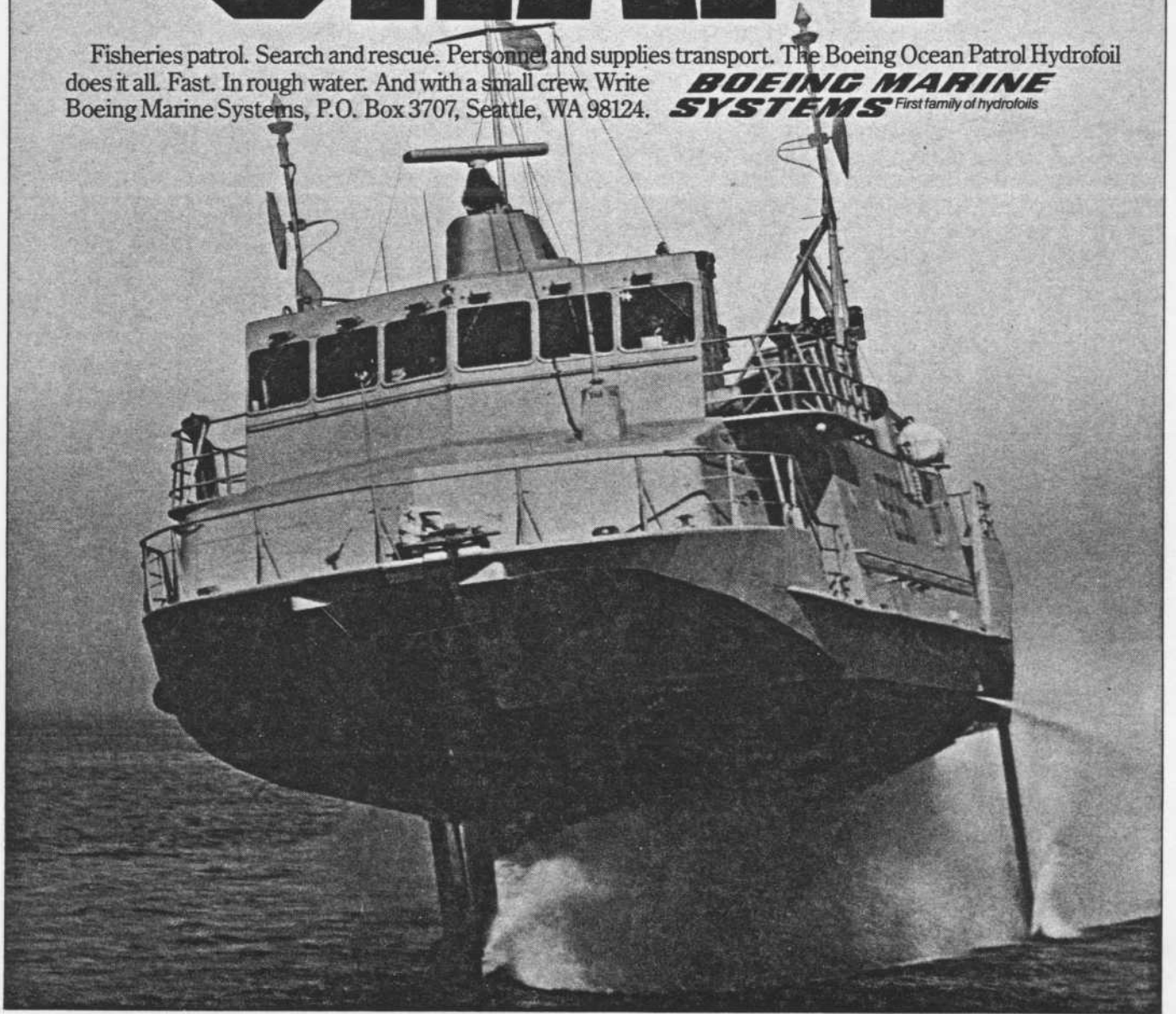
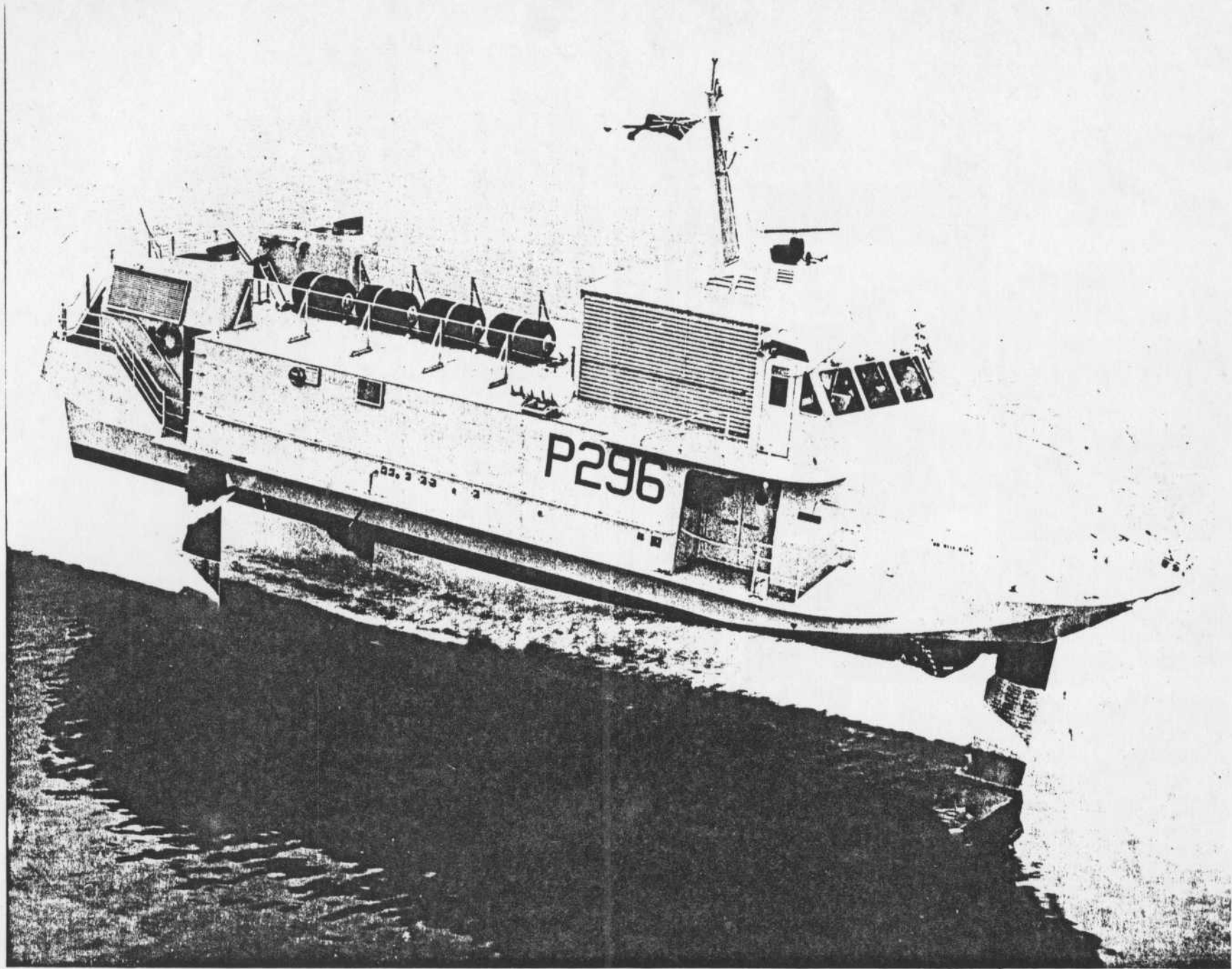


HANDY CRAFT

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**BOEING MARINE
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Boeing Patrol JETFOIL

The first derivative of the Boeing JETFOIL hydrofoil was ordered in June 1978 by the United Kingdom Royal Navy. Launched in July 1979, the craft was commissioned *HMS Speedy* on June 14, 1980.

Speedy is now being evaluated by the RN to establish roles which the hydrofoil may undertake more effectively than conventional naval ships. Trials are designed to establish possible future roles for vessels of this type.

Speedy has thus far met or exceeded all performance criteria. A composite of highlights thus far during *Speedy's* evaluation serves to show a wide variety of possible roles for Patrol JETFOILS.

Speedy catches Gonzales . . .

THE story of how HMS Speedy, the Navy's fastest ship, caught a Spanish trawler 70 miles ahead of her in 90 minutes was unfolded yesterday at Falmouth Magistrates' Court.

Mr. Brian Peters, prosecuting, said that the hydrofoil, ploughing at 45 knots, the equivalent to 50mph., through a force 6 gale and waves eight feet high, caught up with her quarry, the Pinar, and made her first arrest.

When the speedy sent across a boarding party to make the arrest, it included Mr. Peter Derham, Britain's chief inspector of fisheries. They found that the Pinar's trawls were still outside the vessel and that the net was on the deck.

Oscar Villar pleaded guilty to a charge that his gear and tackle was not stowed in accordance

with the Foreign Fishing Boats Stowage of Gear Order, 1970 and contrary to section two of the Fisheries Limits Act, 1976.

He was fined £7,000, plus £1,000 costs, and an order was made that his ship should be detained for one month so that arrangements could be made for payment. There was no order that he should forfeit his catch of 2½ tonnes of fish, valued at £2,000, or his gear, worth about £1,500.

The arrest was the first carried out by Britain's new deterrent to the illegal activities of foreign vessels—a liaison between the Speedy and a Nimrod from St. Mawgan.

At about 11.32 a.m. on Wednesday, Mr. Peters said, a Nimrod of No. 42 Squadron, on fishery surveillance, observed and photo-

graphed the Pinar in the Western Approaches to the west of the Isles of Scilly. Her net was in the sea.

"The Nimrod radioed HMS Speedy, the fastest ship in the Royal Navy, a hydrofoil capable of remarkable speed," Mr. Peters said. "As the result of information passed to it by the RAF aircraft. Speedy made towards the fishing vessel, which the Nimrod kept under observation."

Mr. David Bishop, defending, said: "Mr. Villar did not deliberately set out to fish on the English side of the median line in the South Western Approaches. He thought he was on the right side of it. He wishes to apologise to the court for his mistake. I ask you to be lenient, Mr. Villar has no previous convictions."

Times Dec. 28, 1980

NAVY ARRESTS THREE FOREIGN TRAWLERS

By Our Naval Correspondent

The Navy last night underlined the Government's determination to retain British fishermen's exclusive fishing rights in coastal waters. Three foreign vessels were arrested yesterday by ships of the Fishery Protection Squadron for breaking the rules.

The offshore patrol vessel Jersey, 1,260 tons, arrested the Dutch trawlers Avontuur and Anna Margarethe for allegedly using nets with too small a mesh. The three vessels were due at Grimsby late last night.

A Spanish trawler, the Pinar, was sighted by an RAF Nimrod when allegedly fishing illegally some 100 miles west of Land's End, and this vessel was arrested by the American-built hydrofoil Speedy, 110 tons, after a dash from some 50 to 60 miles away. Last night, the coastal mine-sweeper Cuxton, 440 tons, was escorting the Pinar into Falmouth.

New speedy guard for fishing ground

From Ronald Faux
Rosyth

HMS Speedy, the latest and fastest weapon in the fishery protection service, will shortly begin patrol in the controversial "pout box", the huge area in the northern North Sea where industrial fishing is banned. The 45-knot vessel, which is a Boeing hydrofoil in military guise, is under test by the Navy as a fast patrol boat. Armed with nothing more than the latest in EEC fisheries legislation, Speedy is able to jet to the fishing grounds in a fraction of the time taken by conventional patrol craft.

In the "pout box" she will ensure the law is observed chiefly by a large fleet of Danish industrial fishing boats lifting Norwegian pout from the edge of the area by the ton. Fishery officers will also check that the "by catch" of other types of white fish caught by the Danes does not exceed the legal limit.

For the past two seasons fishing was banned in the "pout box" after a unilateral declaration by Britain to protect immature fish. The Danes

objected and the matter went to the European Commission where a compromise was reached, allowing the Danish boats to fish in an 1,100 square mile area within the box. Scottish fishermen still object because of the harm they claim is being done to immature shoals. They have asked the Government to take extra measures to ensure the law is being obeyed.

Fleeing boat hydrofoiled!

THE Royal Navy's new hydrofoil made her first arrest yesterday. HMS Speedy—top speed 50 mph—caught a Spanish trawler 100 miles off Land's End.

The boat had fled when asked to sail to Falmouth by an RAF Nimrod watching for fishing offences.

Jan. 20, 1981

WHEN THE GET-UP-AND-GO CRAFT HIT FORCE 10

by Geoffrey Underwood

OPERATING the Royal Navy hydrofoil Speedy in foul weather "is rather like driving a car down a country lane with the accelerator stuck open and no brakes," says her captain.

Lieut-Com Peter Roach, 48, is putting Speedy through her paces in Westcountry waters during her evaluation for a possible future role with the Fishery Protection Squadron.

Speedy's ability to handle really heavy going has been questioned in some quarters recently, but Lieut-Com Roach maintains that her limitations are not very different from the Ton-class craft used in fishery protection.

The navy bought Speedy from Boeing's for £6 million and spent another £1½ million preparing her for her military role — she is based on Boeing's commercial passenger ferry jetfoil.

She is just over 27 metres long and has a maximum displacement of 117 tonnes. Her water jet propulsion system gives her a speed well over 40 knots when flying on her fully submerged hydrodynamic foil system.

The essence of Speedy's remarkable performance is that she must get up on her hydrofoils. Waves much above 15ft are close to her operating limits. In extreme weather, she would come down off her foils and battle on like a conventional craft.

Storm

Lieut-Com Roach told me that Speedy had operated successfully in a Force 10 gale recently on passage over from Guernsey and he made the point that fishing vessels had already sought shelter in Start Bay by the time Speedy reached this side of the Channel.

Speedy is an exceptional craft in many ways, not least because her captain or one of her other officers physically drives her from a seat rather like an aircraft pilot's. Her bridge is very much like an aircraft



cockpit and her captain and the watch-keeping engineer alongside are strapped in their seats.

In very rough weather Speedy's automatic height sensors have to be overridden by her "driver" and he then has to drive "by the seat of his pants," judging each wave as it comes. No mean feat of concentration at 40-plus knots.

It is this rough weather handling which prompted Lieut-Com Roach's analogy with driving down a country lane with jammed accelerator and no brakes. With classic understatement, he added: "It is a question of very fine judgment."

He told me: "We have a button on the steering wheel to warn everyone below that there is a big one coming. It gives them a chance to grab something to hang on to. We operate very close to the limits. We are pushing her very hard."

A brief spin in Speedy off

Plymouth was an eye-opener for a small-boat sailor more used to plodding along at four or five knots. After dealing with initial hiccup cause by an obstruction in a water intake — quickly blown clear with compressed air — Lieut-Com Roach went through the pre "take-off" checks.

Speedy had been switched from her diesels to her gas turbines and she accelerated impressively when the throttles went fully forward. In no time she was foil-borne at about 27 knots and surging forward to 46 knots.

She manoeuvred superbly and the motion, admittedly in very sheltered waters, was like that of a high-speed train. I am sure a cup of tea would not have spilled.

"I am very pleased with her," said Lieut-Com Roach. "Her speed, manoeuvrability and control are far greater than any other ship I have had anything to do with."

He added: "The surprising thing is that anyone is surprised there are limitations. It is a very small craft and like every small craft, we have our limitations."

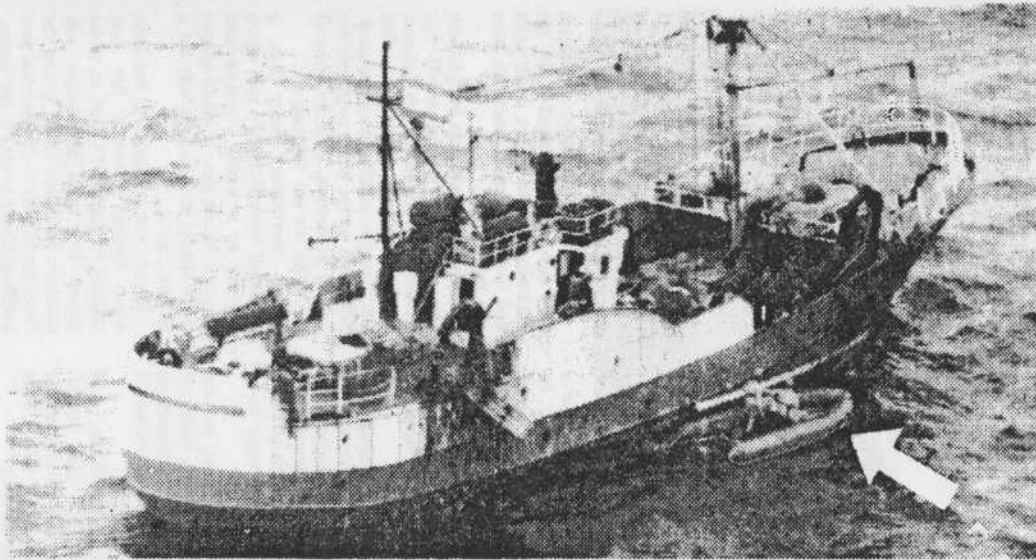
"Speedy has not been bought with any particular job in mind. She cannot fall down on any job, because she has not been given a job. She was bought purely for evaluation. Although we are being evaluated for fishery protection, it is only one of the roles we are looking at."

The American Navy has a hydrofoil twice Speedy's size which is used as a missile platform and carries a 76 mm gun. It would appear fairly simple to equip Speedy for a missile role.

Speedy was commissioned last June when Britain became the first country to deploy a jetfoil on naval duties. Her trials programme will continue for some time, giving the Navy the chance to decide what part hydrofoils have to play in the future.

Feb 12, 1981

Aug. 4, 1980



Speedy's boarding party in a rubber dinghy (arrowed) by the Spanish trawler.

Speedy makes first arrest

THE Navy's fastest ship, HMS Speedy, showed her paces as a hydrofoil yesterday 100 miles out in the Atlantic when she arrested a Spanish trawler alleged to have been fishing illegally.

It was Speedy's first arrest since she joined the Fishery Protection Squadron and it came about through good liaison work between the vessel and a patrolling RAF Nimrod from St. Mawgan.

It was at 1.15 p.m. yesterday when Speedy was making for the Irish Sea, after being immobilised temporarily at Falmouth with generator trouble, that the Nimrod spotted the Spanish trawler Pinar 100 miles west of Land's End.

The Nimrod suspected the vessel to be fishing illegally in British territorial waters and contacted its base.

Within minutes the Nimrod had

been switched to HMS Speedy, which has a top speed of 45 knots.

The trawler got under way, but the Speedy quickly caught up on them and put a boarding party aboard.

Last night HMS Speedy handed over the Pinar to another fishery protection vessel, HMS Cuxton, to escort the trawler into Falmouth, where they were expected early today.

THE Royal Navy's first hydrofoil, the aptly-named HMS Speedy, is pictured here during sea trials.

She is based on the same design as the Jetfoil, currently in use as cross-channel ferries.

After completing her trials, HMS Speedy will initially be allocated to the Fishery Protection Squadron.

The fastest of the fleet



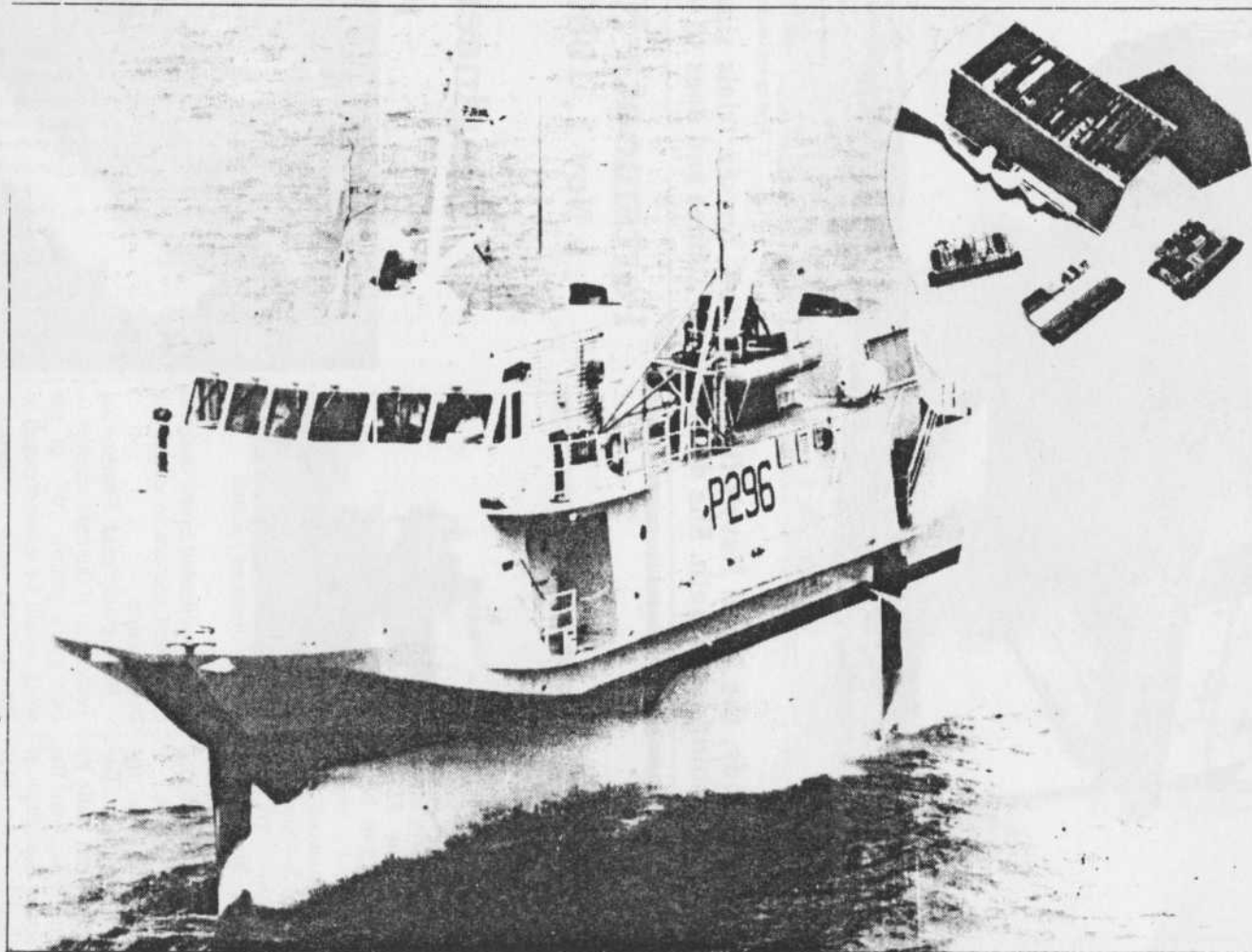
Micro Forecast

Planner No. 18-110-15

Bi-Weekly

18 NOV 1980

QUIZZING HMS 'SPEEDY'



A 32-channel shipborne data-acquisition and shore-based decoding equipment are being supplied by Base Ten Systems Ltd to aid operational tests being carried out by the Royal Navy on the Boeing Jetfoil high-speed craft HMS 'Speedy'.

The data-acquisition system will take data from 11 strain gauges and ten other analogue sensors and will convert it to a pulse-code-modulated (p.c.m.) data stream for recording onto instrumentation tape recorder.

Additionally equipment, enabling decoding of the p.c.m. data stream and time-code data stream, is being supplied, as are replay facilities for interconnection to a minicomputer.

CONTACT: Base Ten Systems (MF), 12 Elemoor Road, Farnborough, Hants. GU14 7QN. Tel: 0252-517665. * Ref 1739

Micro Forecast
Nov. 1, 1980



Photograph by Bill Warhurst

HMS Speedy, the Royal Navy's first hydrofoil, on sea trials since her commissioning last month. She displaces 117 tonnes and does 40 knots.

ROUND UP

Portsmouth News

Nov 1, 1980

Can HMS Speedy match the mighty Russian?

Below is the Russian navy's most recent acquisition, the 32,000 tonne *Kirov*. The 250m battle cruiser is the world's biggest warship, apart from aircraft carriers, to be built for 30 years. The *Kirov* boasts anti-aircraft missiles, batteries of 30mm guns, space satellite communications and electronic countermeasure systems to jam enemy radar.

Above is *HMS Speedy*, the Royal Navy's latest recruit. The 116 tonne 27m Jetfoil built by Boeing in Seattle has joined the Fishery Protection Squadron at Rosyth, Scotland for six months to evaluate its most suitable roles. On the way to Rosyth from Portsmouth, where it had been undergoing trials and crew train-



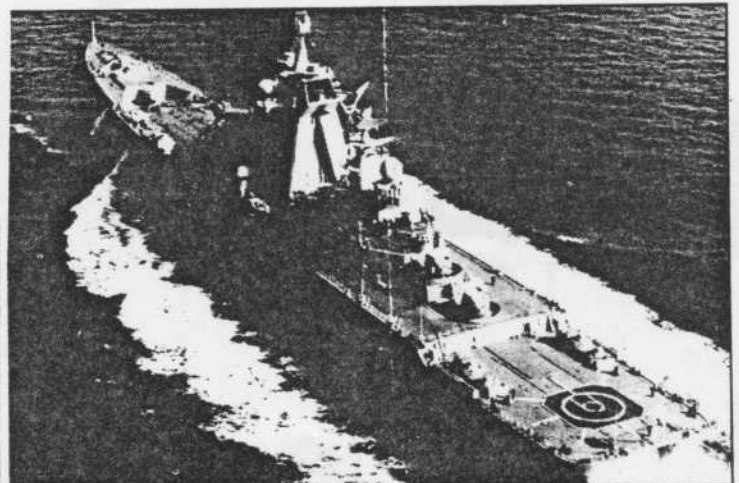
Speedy: breaking records

ing, the hydrofoil broke distance and speed records in extremely bad weather.

Boeing has told *Engineering Today* that if the navy decides to buy more jetfoils 70% of the work would be subcontracted to British firms, with a systematic transfer of much of the technology to a British prime contractor—probably Vosper Thornycroft. *HMS Speedy* cost £7.5 million.

Engineering Today

Feb. 1981



Kirov: the biggest battleship to be built for 30 years

Jetfoil variant 'Speedy'

enters RN Service

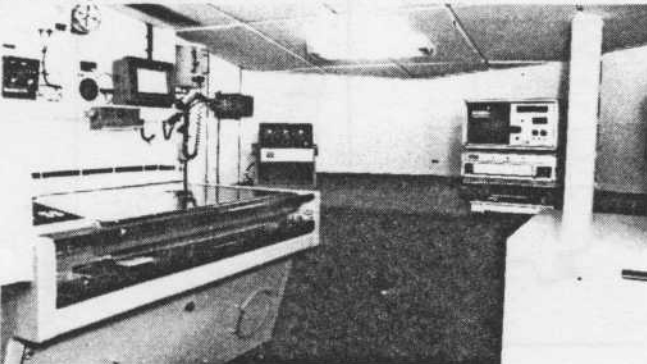


In June 1978 the Royal Navy ordered a Boeing modified jetfoil for evaluation in a number of roles and for assessment as to whether, in principle, the hydrofoil could sensibly and economically replace conventional craft for given operations.

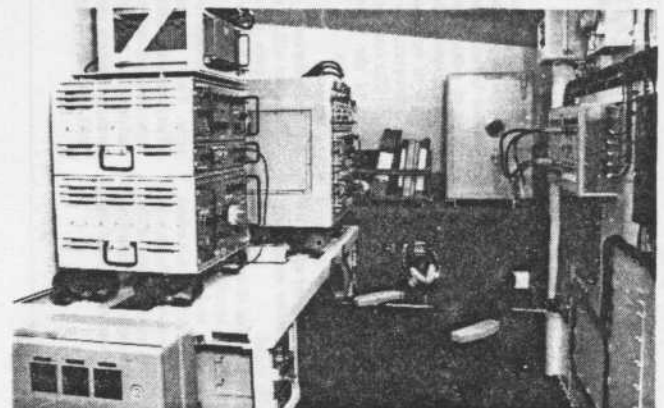
The bare *Speedy*, complete with foils, main and auxiliary machinery and all associated control systems, was delivered to the Porchester yard of Vosper Thornycroft for outfitting in November '79.



The wheelhouse, showing instruments and controls. The navigation room with Decca CANE system



Upper deck arrangement with rigid inflatable boats. The extensive communications installation



VT's work included the installation and furnishing, in ultra-lightweight fashion, of the whole accommodation together with required extensions to the ventilating and air-conditioning systems. Of more particular importance was the installation of navigation and communications systems, similar to those of the 'Isles'-class OPVs, to RN requirements.

The 117tonne, 43knot, *Speedy* has now been commissioned and commenced operations in RN hands.

Impressions of Speedy

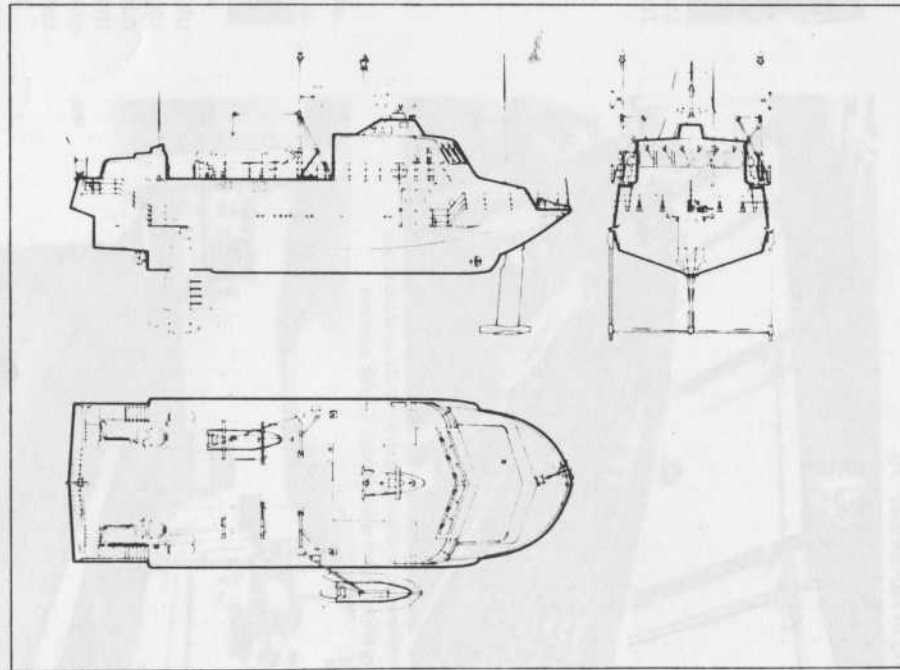
On 14 June 1980 the hydrofoil HMS *Speedy*, was commissioned into RN service. Developed from Boeing Marine Systems Commercial Jetfoil, *Speedy* was purchased at a cost of some £6 million, with additional fitting out costs approaching £1½ million.

Manoeuvrability

HMS *Speedy* herself, is a truly impressive craft. The hydrofoil is an extremely stable craft, and during a demonstration run earlier this year the editor of *NAVY international* experienced at first hand the exceptional manoeuvring capabilities of the vessel.

Most impressive was the heel of between 10 degrees and 15 degrees during a six degrees turn at a speed of 38.8kts. Admittedly the sea was fairly calm but no buffeting was experienced and there was hardly any indication felt when the vessel heeled and turned. A slight slowing down was noticed as the vessel turned but this, explained one of the officers, was due to slight drag on the after foil, resulting from the attitude of the foil as the vessel executed the manoeuvre.

General arrangement layout of HMS *Speedy*.



Although the vessel appears to be enormous when foilborne (as she approaches at high speed it is as though some science fiction creature from outer space was bearing down on one), there is very little room to spare aboard, and conditions are fairly cramped. *Speedy* is certainly not the type of vessel for carrying out an extended patrol. This, however, was not the intention when she was purchased. The concept being purely to investigate the application of the hydrofoil to meet possible future RN requirements.

Accommodation

The crew will, to some extent, suffer from the cramped quarters, even on the one-day type patrols currently envisaged. The crew totals 18 at present, five officers, four POs and nine junior rates, but this can be varied depending on operational roles. One small galley serves the whole crew. There is a small wardroom to starboard for the officers together with the CO's cabin and officers' cabins. Separate bunk and recreation space is provided as in normal practice. Apart from this there is the communications room, navigation room, senior and junior rates cabins (to port) and the ratings mess.



The Decca CANE console for HMS *Speedy*. The console features a Decca ED1200 viewing unit (top) and integral track management controls.

The structurally complete hydrofoil was shipped to Britain in November 1979 for fitting out by Vosper Thornycroft at Portsmouth. The accommodation areas were largely empty and little of the upper deck equipment fitted. Prior to fitting out the accommodation Vosper built a mock-up. The accommodation area is divided up by lightweight aluminium honeycomb core partitions which

were fitted to the main hull structure using resilient mountings to minimize noise transfer. The partitions and interiors were then finished with thermal insulation linings, trim panels etc. The basic heating and ventilation system was also extended to serve the various areas and extractor fans fitted to the galley and washrooms. Certainly the finish was tasteful and the insulation and ventilation appeared to be adequate - little noise or vibration from the propulsion system intruding into the general atmosphere and the environment being generally comfortable.

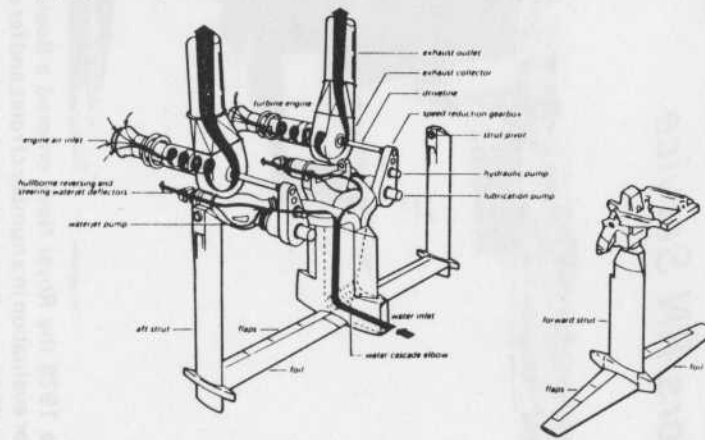
Extensive use has been made of the thin gauge aluminium alloy and honeycomb core sandwich construction in an effort to reduce weight. Even so weight is still a considerable problem, the maximum weight allowable being 117 tonnes. Should this figure be exceeded the vessel may not get foilborne!

Above decks ample space aft has resulted by dispensing with the extensive passenger accommodation on the commercial Jetfoil. The space available has been used to accommodate two Avon Searider semi-rigid inflatables and their small davits capable of handling up to 855kg. The davits have been so arranged that the inflatables can be lowered even when the hydrofoil has a list of up to 10 degrees.

Navigation and Communications

As the main operational task currently envisaged is in the offshore role, *Speedy* is being fitted out with extensive navigation and communication facilities. On the navigation side the major item of equipment is the Decca CANE system. The CANE system fitted is a slightly modified form of that on the 'Island'-class. This incorporates a new console with improved radar display and integral track management controls. The display is the ED1200 12-inch fixed viewing unit. A back-up unit (BU1600) is also included which provides interface circuitry and controls over the presentation of radar and computer generated data plus an independent electronic range/bearing strobe with readout. In addition the main console has a larger capacity data display giving 12 lines each of 40 characters.

A waterjet propulsion system...



Other aids include an automatic navigation plotter, Decca AC1226 radar, Decca Navigator, depth recorder, and Omega QM14 receiver. The plotting room is sited below the bridge and ample working space has been provided.

On the communications side there is a comprehensive internal communications suite, VHF/UHF transceiver, HF direction finder, radio teletype etc.

Much of the communications and navigation suites will in fact be common to those fitted on the 'Island'-class OPVs (see August issue of *NAVY international*).

Machinery

Perhaps the most interesting feature of HMS *Speedy* is her machinery and hydrofoil system. The vessel is supported by a totally submerged foil system whose control surfaces and attitudes are controlled by computer signals which effect a perfectly smooth ride, even in rough seas.

The propulsion system comprises two water jet systems driven in the foilborne mode by gas turbines. Water is drawn in through an intake on the after foil and ejected through jet nozzles at the stern.

When operating as a conventional displacement craft at lower speeds (with foils extended or retracted) diesels are used to drive the water jets. The use of the diesels enables the vessel to achieve economical cruising speeds and fuel consumption with increased endurance. This is further aided by wing tanks which were added during construction.

To achieve astern propulsion a bucket system is fitted to the water jet nozzles which reverses the thrust. A bow thruster in the forefoot of the hull facilitates manoeuvring in confined spaces.

At present HMS *Speedy* has no armament, but a 20mm could be fitted, at the expense of fuel because of the weight restriction problem.

Future Hydrofoil Operations

Purchase of HMS *Speedy* is a major step into another field of surface skimming vessels for the RN. For many years the RN has been experimenting with hovercraft (see previous issues of *NAVY international*) but has so far failed to reach any definite conclusions as to their viability in the context of RN operations. The acquisition of a hydrofoil now considerably widens the scope for the RN to investigate the possibility of using hull forms other than the conventional displacement craft for naval operations. However, it is to be hoped that £7½ million is not going to be passed around the various Admiralty departments in the same way that the Hovercraft has been shunted around!

A period of evaluation in a number of roles there must be, which include amongst others offshore protection and possibly some type of MCM role. However, decisions must eventually be made and an operational requirement thoroughly and exhaustively developed and tested before too long.

Initially HMS *Speedy* will be seconded to the Fishery Protection Squadron for an 8-9-month period (which commenced in September) before her first overhaul to evaluate both technically and operationally the possibilities of using hydrofoils to augment the protection for offshore fishery and oil/gas installations.

Operational evaluation programme will be directed by Captain Fishery Protection Squadron who will be responsible for drawing conclusions and making recommenda-

tions. He will be assisted by a civilian analysis team. During the first few months *Speedy* will operate in as many fisheries and with as many different types of fishing vessel and other patrol craft and aircraft as possible, patrolling to the fullest extent the 200-mile EEZ.

Following this period the hydrofoil will operate in those roles for which the initial period has shown her to be most suited.

This immediately opens up a number of possibilities for such operational use. Already the 'Island'-class OPVs and their closer inshore 'Ton'-class patrol vessels are overstretched (see August issue of *NAVY international*) and although aerial patrols are undoubtedly of great value and are an important integral part of the whole operation, *NAVY international* has already pointed out the folly of using the sophisticated ASW Nimrod jet aircraft on such fairly mundane tasks. The concept of aerial use in an offshore patrol scenario is to provide extensive all round coverage of the EEZ. The Nimrod is not the right aircraft and currently Britain has no other suitable aircraft available for such patrols, although there are plenty of such aircraft in existence around the world (Fokker F27 Maritime, Dassault Mystere Guardian, Hawker Siddeley Coastguarder, Israel Aircraft Industries Sea Scan etc).

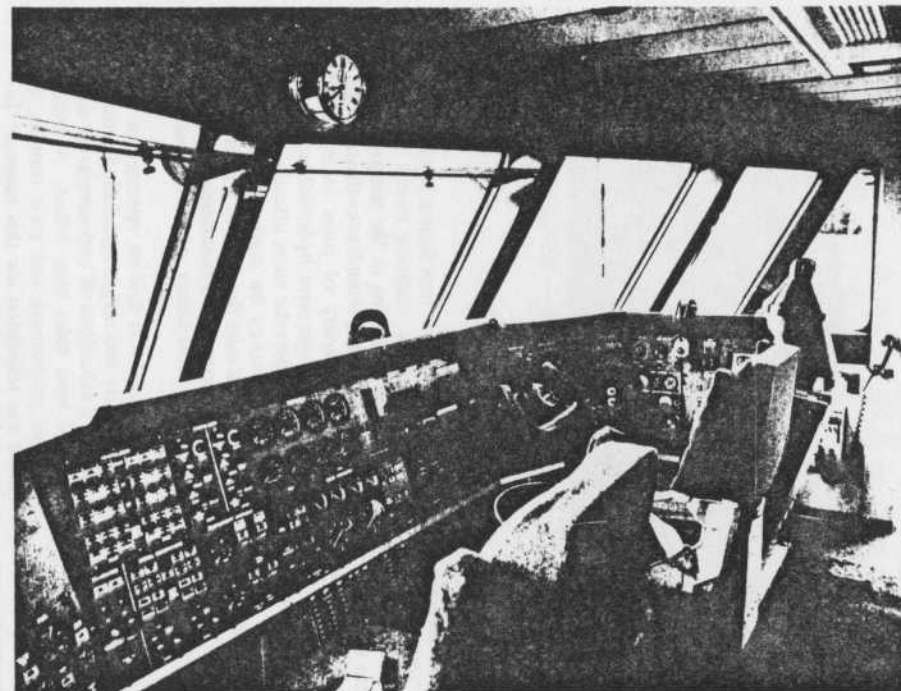
If the Nimrods are rightly returned to ASW patrol what is there available to provide extensive coverage in a short time of the EEZ? The high speed and relatively economic fuel consumption of the hydrofoil would enable extensive areas to be patrolled over a relatively short period. Alternatively the hydrofoil can be used to provide a rapid response, either to assist vessels already on patrol, or to reach an area requiring on-the-ground support following reports from aerial surveillance.

There are in fact many possibilities for hydrofoil operations in the off-shore patrol scenario. However, it has been reported that one of the first casualties in the forthcoming 30% fuel cut to the RN, may be the off-shore patrols. Any cut-back in this area could have considerable economic consequences in a direction opposite to that being planned as a result of the 30% cut! That, however, is another story.

Of more immediate concern is the fact that these cuts may severely interrupt the trials and evaluation programme of HMS *Speedy* with the Fishery Protection Squadron. Under no circumstances should this be allowed to happen as it may severely delay and perhaps jeopardize any future possibilities for hydrofoil operations in the RN.

Characteristics

Length (a) (foils extended)	27.4m
(foils raised)	30.78m
Beam	9.1m
Draft (Hullborne, foils extended)	5.2m
(Hullborne, foils raised)	1.8m
(Foilborne)	1.4-2m
Displacement	117 tonnes
Machinery - Foilborne	2 x Allison 501-KF gas turbines 3,780hp (each)
- Hullborne	2 x Allison 8V-92T1 diesels 550hp (each)
- Waterjet	2 x Rocketdyne PJ-20 pumps 24,000 gallons/min (each)
Cruise Speed - Foilborne	43kts (up to sea state 5)
- Hullborne	5-15kts
Range - Endurance	12-14 hours
- Foilborne	600 + nm
- Hullborne	1,500nm



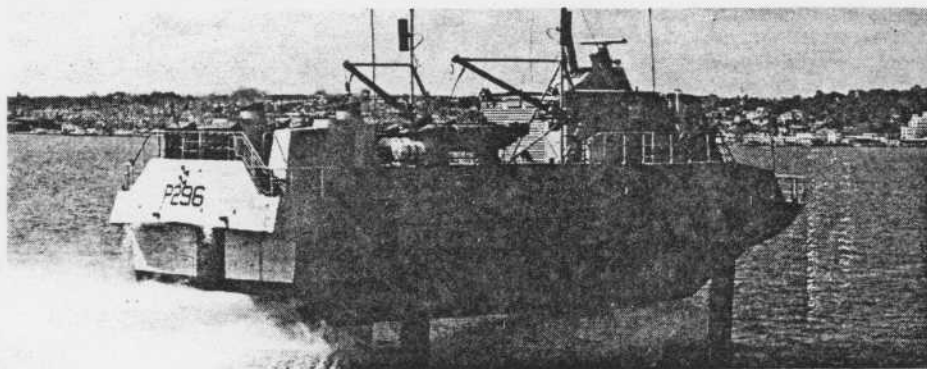
Bridge of HMS *Speedy* showing instruments and controls. On the left is the engineer's machinery controls, centre, the joystick steering control and far right, the radar.

Photograph by courtesy of Visper Thornycroft

HMS *Speedy* on a demonstration run showing foil attitude.

Photograph by courtesy of Michael Lennan





SPECIAL SHIPS — SEPTEMBER 1980

HMS Speedy commissioned

The Royal Navy's first hydrofoil was commissioned at Portsmouth on June 14th. 'HMS Speedy' is based on Boeing Marine Systems' Jetfoil passenger ferry but features a revised super-structure, purpose-built interior and auxiliary diesel engines. At an operating weight of 117 tonnes, the 27.4m craft has a maximum foilborne speed of 43 knots.

BMS launched 'HMS Speedy' last summer and, following trials in the United States, it arrived at Vosper Thornycroft's Portchester yard for fitting out in November. The Royal Navy has paid approximately £7½ million for the craft, some £1½ million of which has gone to Vosper Thornycroft. The purchase, it says, "represents a major step into what is a completely novel field in the overall concept of small, fast-moving vessels".

Most of the standard Jetfoil's upper passenger saloon, located aft of the bridge, has been deleted on 'HMS Speedy' and replaced by a deck and two davits holding Searider rigid-bottom inflatable boarding boats. The propulsion system based on two Allison 501-KF gas turbines, rated at 3,780 shp each, driving Rocketdyne waterjet pumps is augmented by two Allison 8V92TI 450 bhp diesels in order to increase maximum patrol time. These are used to power the waterjets during operations off-foil at speeds of up to 15 knots. The gas turbines are substituted when the high-speed capability is required. Range is 550 n. miles on foil or 1,500 n. miles off-foil.

Vosper Thornycroft, in addition to fitting out 'HMS Speedy', has designed the hydraulic davits and stowage system for the Seariders. The hydrofoil has a communications room, navigation room, Commanding Officers' cabin, Officers' cabins, wardroom, Senior and Junior Ratings' cabins, Ratings' mess and galley.

The two davits are designed to each be capable of lifting up to 855 kg, made up of the Searider, outboard engine, crew of two and equipment. Navigation and communications equipment includes a Decca computer aided navigation system with automatic navigation plotter, radar, internal communications system, depth recorder, Decca Navigator, Omega receiver, VHF/UHF transceiver, HF direction finder, radio teletype equipment and antennae. No major weapons will be fitted during the trials period. Vosper Thornycroft returned 'HMS Speedy' to BMS for sea trials in mid-May, a week ahead of the contract date.

Initial operating crew is the Commanding

Officer, four Officers, four Senior Ratings and nine Junior Ratings. Manning levels, though, may be varied according to the nature of the trials. The Royal Navy intends to evaluate 'HMS Speedy' in "a variety of roles to establish whether, in the longer term, hydrofoils are likely to be able to undertake more effectively roles currently undertaken by conventional naval ships. Trials will take the form of a number of technical and operational evaluations designed to establish possible future roles for a vessel of this type."

'HMS Speedy' will first be operated in the offshore fishery and oil/gas installation protection roles. Evaluations of anti-submarine and fast patrol boat roles may follow. A trials/acceptance programme and crew training at Portland are scheduled for this summer. Included will be speed and manoeuvrability measurements, on board noise measurements and a preliminary study of some other characteristics.

The craft will join the Fishery Protection Squadron in late September for six months of operations as a patrol vessel. Based in Rosyth, it will be used during the first three months in a variety of fisheries with as many different fishing vessels as possible. The entire area of the 200 mile extended fisheries limit will be patrolled, several ports will be visited and operations with other naval ships and craft will take place. The craft has a draught of 5.2m with the foils locked down or 1.8m with the foils raised. Between December and February, operations will centre on those roles in which the hydrofoil has proved most suitable.

A maintenance period will follow, after which more detailed technical trials will be conducted and other operational evaluations may take place. The Royal Navy says that the acquisition of 'HMS Speedy' puts it "well to the forefront of NATO's hydrofoil evaluations". The Italian Navy has been operating a 60-tonne vessel built in Italy but using BMS technology since 1973 and recently took delivery of the first of a class of six similar patrol hydrofoils. The French Navy is also reported to be considering the purchase of a military Jetfoil. Next year, five more 235-tonne Patrol Hydrofoil Missiles ships will be delivered to the United States Navy, which has been operating a sister ship for the past five years and evaluating large hydrofoils since the early 1960s. Should any derivatives of 'HMS Speedy' be ordered for the Royal Navy, construction would take place in the United Kingdom under licence from BMS.

Circle 34



BOEING HMS SPEEDY

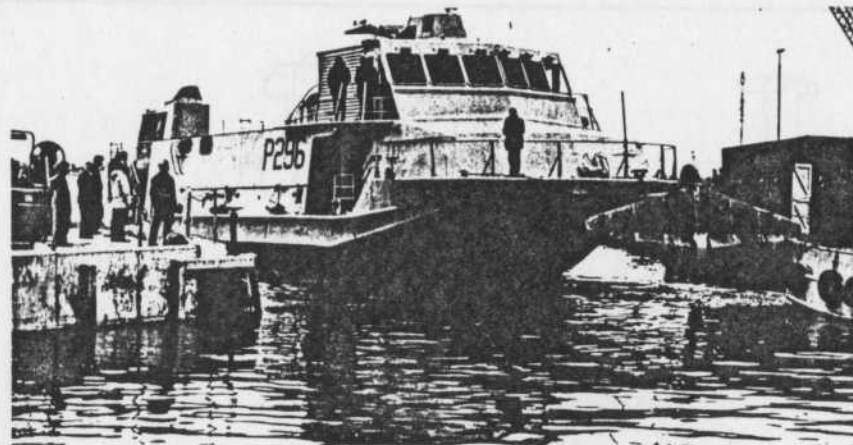
The British are well known for their awareness of progress, and equally well known for their ability to create a happy marriage of the past and the present, of progress and tradition. Reflections of that kind spring to the mind when the Royal Navy increases its strength with a hydrofoil of the fully hullborne type (pennant number P246) and then christens it SPEEDY its eight ship to bear that name, starting back in 1782 when the first SPEEDY, a brigantine of 208 tons, first made her acquaintance with the seas of England.

So, an ancient name for a technologically advanced craft whose role of offshore patrol combines the old with the new, for the direct and indirect pressures and contropressures of the past are now, in the exclusive economic zone, joined by others that are more indidious and more difficult to control than ever before.

HMS SPEEDY, officially classified as an Ocean Patrol Hydrofoil (OPH), is the fruit of American engineering and workmanship by Boeing Marine Systems, of Seattle, Washington, which as an offshoot of the Boeing Aircraft Company, has been designing and building hydrofoils for twenty years past and has reached a position of universally admitted leadership in the field. The company built the United States Navy's first operational hydrofoil, PCH-1 HIGH POINT, followed by PGH-2 TUCUMARI, which has been taken as the basis for the NATO programme for a Patrol Hydrofoil Missiles ship (PHM) and has as a direct offshoot the Italian Navy's P420 SPARVIERO. These have been followed by the US Navy's PHM-1 PEGASUS and her development programme. On the civil side there are the eleven JETFOIL 929-1155, which have been in commercial service for years in every continent.

Delivered to the Royal Navy on 10 October 1979, SPEEDY cost the British taxpayer fifteen million dollars. "Money well spent", grows the Admiralty, in response to criticism from some English popular dailies and part of the specialist press. The OPH card is being played strongly by the Royal Navy, which is in danger of losing some

The water jet propulsion of the SPEEDY limits the noise and the wake produced, while the retractable hydrofoils of the immersed type ensure excellent stability.



The arrival of the SPEEDY at the vospier yard in Portchester.

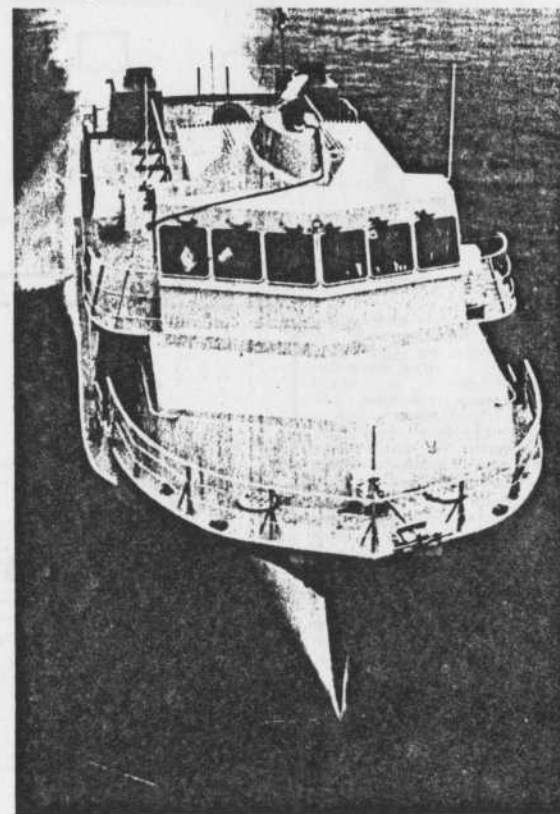
This shot of the SPEEDY's prow shows the front hydrofoil with two wings, and the spacious bridge area with its excellent visibility.

credibility in its efforts to cope with some of the chickens that are coming home to roost, including the urgent need to have ships capable of providing national security at sea and safeguarding the country's overriding economic interests.

That means watching over the North Sea's rich oilfields to prevent the platforms from being sabotaged by terrorists, countering infiltration by sea of undesirable groups or individuals, monitoring and disciplining merchant traffic, which also means anti-pollution, anti-smuggling and anti-drug patrol, and looking after the operations of a fleet of some 300 fishing vessels generally scattered in small groups over 86000 square miles of sea.

Years back, when attempting to create a balanced force for the protection of home waters, the Naval Staff found itself faced with a difficult dilemma: it could continue to put its money on conventional ships of fairly simple design, which could consequently be built quickly by British shipyards but would have a limited useful life because of the insidious and varied nature of the offensive that could today be launched by a potential enemy, or it could "invest" in units embodying new concepts so as to ensure a coverage of a satisfactory quality, particularly in the future. The final answer was a compromise: the current patrol strength would be increased with a conventional ship, but at the same time the question of a genuine jump in technical and operational capabilities would be pursued.

The approach to a new concept



involved the consideration of studies prepared by British and foreign shipbuilders in response to detailed requirements stated by the Royal Navy.

The choice finally fell on Boeing and its OPH project. Why Boeing? Because of that company's twenty years of fruitful experience in the field and the outstanding results it had achieved.

And why a hydrofoil, and a fully foil-borne one at that? Because thorough study by the Navy and research by Boeing had both led to the identical conclusion that a hydrofoil offered most useful operational capabilities and great potentialities, as yet largely unrevealed, particularly in offshore areas.

After signing a consultancy contract with the British Admiralty, Boeing studied all the data given to it, and from its computer obtained a set of answers that resulted in the design of the OPH.

In the mid to long term, therefore experience with HMS SPEEDY ought to make it possible to decide whether it is actually possible to replace conventional ships by hydrofoils for fishery patrol and supervision of the economic zone. Obviously the experiment does not only concern the Royal Navy but is of interest to more or less all the principal navies, which have been taken somewhat by surprise in the race to exploit their underwater resources - made more urgent by the oil crisis and the international depression and the consequent

The SPEEDY at full speed, flanked by a Boeing jetfoil for commercial use. Numerous of the latter are used for fast short/medium distance passenger transport in various parts of the world.

proliferation of offshore installations.

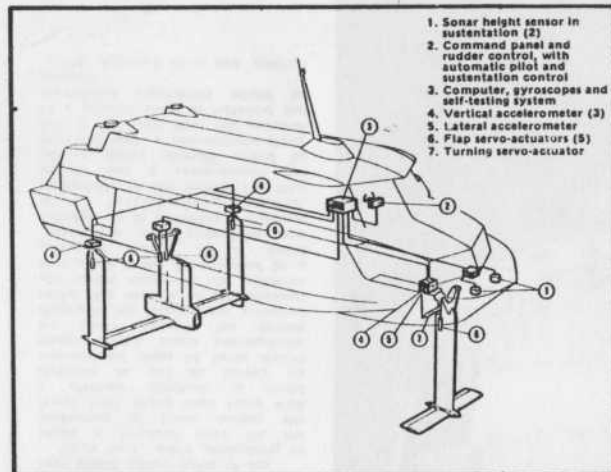
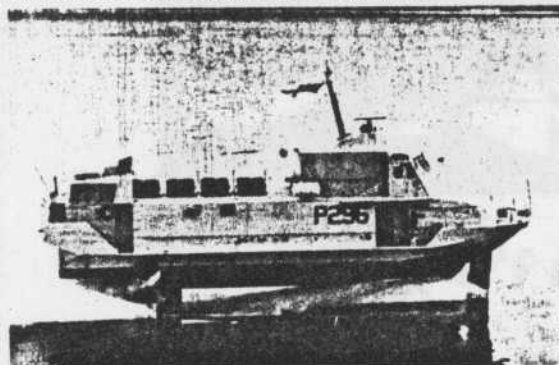
GENERAL CHARACTERISTICS

The world's first hydrofoil intended specifically for fishery patrol duties and surveillance of the so-called exclusive economic zone (EEZ), SPEEDY is particularly suitable for military and paramilitary tasks. Though her main features - hull, gas turbines and foils - are derived from the JETFOIL commercial hydrofoil, SPEEDY's longer range, CODOG machinery (COMbined Diesel Or

Gas) and simplified superstructure give her the speed, sturdiness, readiness and flexibility of employment required of patrol units. In brief, a thankless task, murderous on ships and crews, a tough test bench. SPEEDY is coping with it outstandingly in her trials, devouring thousands of miles in the waters of the North Sea and North Atlantic, a theatre where the waters are often prohibitive.

The hull has been designed with retractable loadbearing "wings" in a canard layout, with the bulk of the weight carried by a main wing mounted on three fins aft of the centre of gravity, and an

The P296 HMS SPEEDY is lowered into the water in Southampton.

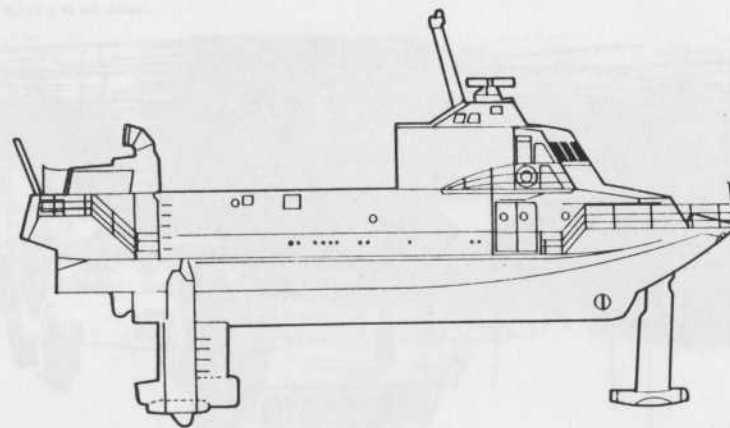
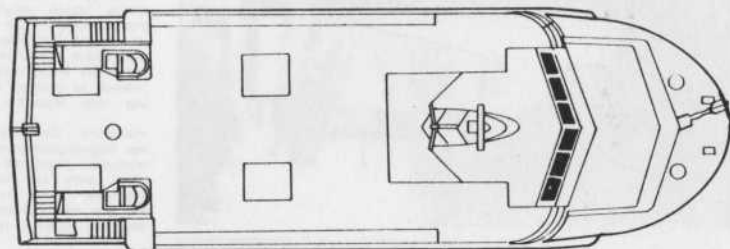


inverted-tee empennage forward to provide stabilization in pitch. This arrangement is now regarded as allowing the best performance in a rough sea.

The hull, superstructure and bridge which should perhaps be called the flight deck because of its aircraft-type control columns and instrumentation - are of aluminium alloy, resistant to marine corrosion and probably having a magnesium content of about 3% to give it good mechanical properties without making it too liable to the phenomenon of stress-corrosion, which is particularly prevalent in a marine environment. The hull and superstructure are welded, but a combination of welding and riveting is used for the bridge. The wings and associated components are made of corrosion-proofed high-tensile steel.

The OPH has a displacement of 117 tons, including 43½ tons of useful load. On deck amidships

HMS SPEEDY



there is an area of 109 square metres with a loadbearing capacity of 830 kg/sq. m, capable of taking loads of all kinds, including weapons. There is a further 129 sq. m available under cover for installing additional equipment of various kinds in addition to the generous instrumentation already carried.

With her great reliability and her high speed of 50.8 knots, or more than 90 km/h, SPEEDY is capable of patrolling much greater areas than a conventional patrol boat. At 46 knots she can cover 552 miles, compared with a conventional craft's 360 and 240 miles at 30 and 20 knots respectively. She also burns less fuel over a given distance than an ordinary patrol boat. Despite the use of GODOG and hydrojet propulsion, maintenance is kept within acceptable limits.

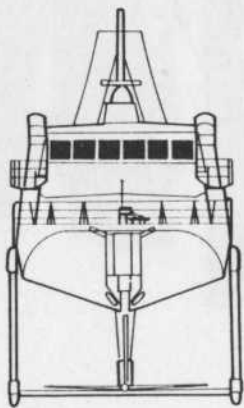
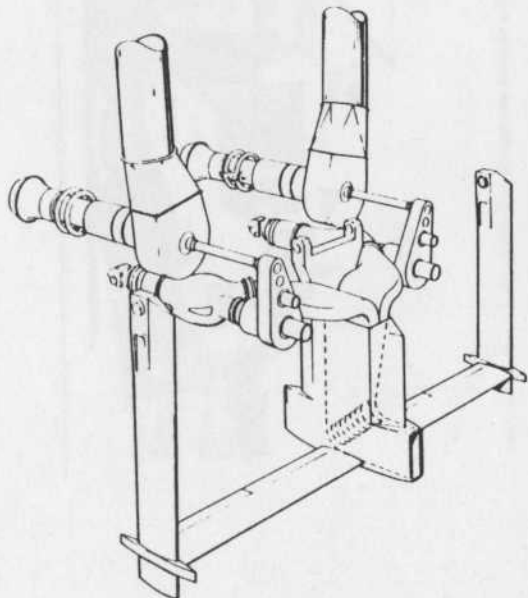
PROPULSION SYSTEM

When foible, SPEEDY is



The form of the hull and prow details seen during unloading in Southampton on arrival from the USA. It will be completed in Vosper's Portchester yard.

PROPULSION SYSTEM



propelled by hydrojets driven by gas turbines. The hydrojets are also used when hullborne, but they are then driven by diesel engines. The gas turbines are normally used for emergency departures or for taking timely action when speed is an essential factor, but they can also be used for limited hullborne operations. The diesels ensure a long operational life when the foils are retracted. They are mainly used when the requirement is for long patrols at low speed, but combined operation is possible and indeed necessary. For example, to patrol for 830 miles at an average of 20 knots, the two diesels are used to give a hullborne speed of 7 knots until they have burned enough fuel to reduce the displacement from 117 to 110 tons, after which the rest of the distance is covered at 33 knots in one diesel and one gas turbine. Similarly, to cover 790 miles foible at an average of about 30 knots in under 23 hours, the two turbines are used for the first 190 miles at 42 knots, and the remaining 600 miles are covered at 33 knots, using one turbine and one diesel.

Hydrojet propulsion offers the great advantages that its efficiency is comparable to that of a continuously-variable-pitch propeller, the jet of water is silent and does not create a wash, all the moving parts are housed within the hull, and its simplicity of installation and reliability of operation have a decisive influence on running and maintenance costs. Like all the ship's main systems, the propulsion is automated to the maximum and it can be controlled direct from the bridge by a single operator. All the main and subsidiary

components are nevertheless accessible and replaceable with surprising ease.

AUTOMATIC CONTROL SYSTEM

The automatic control system is what gives the ship's complement a comfortable ride even in very rough seas, because when foible there is no noticeable vibration. With waves a good six feet high, for example, roll is less than half a degree, and pitch is less than one degree.

The system uses sensors located at key points in the hull, which collect basic data relating to the ship's height above the water, longitudinal and transverse trim, and vertical accelerations, and transmit them to a computer that forms part of the ship's instrumentation. The computer processes the input data and transmits the appropriate orders and signals to the hydraulic components that control the movement of the ailerons. The computer also enables the ship to follow the slope of particularly high waves, thus preventing the water from pounding the hull.

Very tight turns can also be made without sharp sideways accelerations, by tilting the wings up to five degrees to either side, thus reducing the stresses on the mechanical components of the hydrofoil system. In all cases the computer which is the real virtuoso of the ship's operation keeps the positive and negative accelerations within limits that can be accepted by the ship and her crew.

At this point, unfortunately, the space available compels us to break off our necessarily incomplete discussion of a highly stimulating and technically

advanced piece of equipment that may well — after the improvements that are bound to be suggested by service with the Royal Navy — develop into something of great military and commercial interest.

HMS SPEEDY (P 296)

Type of unit: Fully foible hydrofoil with canard wing layout.
 Constructor: Boeing Marine Systems, Seattle, Washington.
 Customer: Royal Navy.

Delivery date: 10 October 1979.
 Full-load displacement: 117 tons, including 43½ tons useful load.

Dimensions: Length 27.4 m, beam 9.1 m, mean draught on going foible 2.3 m.

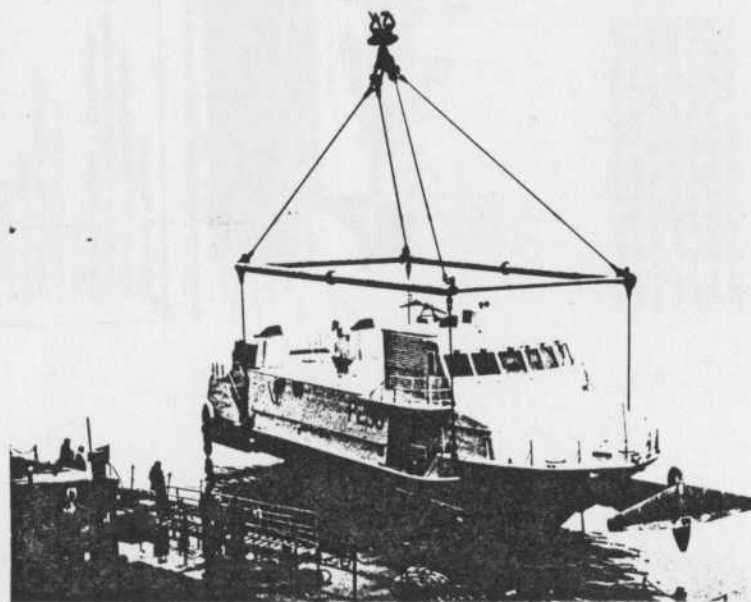
Foible propulsion: Twin North American Rocketdyne PJ-20 hydrojets, rated delivery 90840 l/min, driven by twin 3750 h.p. GM Detroit Diesel Allison 501-KF gas turbines; maximum speed 50.8 knots.

Hullborne propulsion: Same twin hydrojets, driven by twin 550 h.p. GM Detroit Diesel Allison 8V-92T1 diesels.

Electrical supply: Two 62.5 kVA diesel generators, 440 volts a.c., three-phase, 60 Hz.
 Cost: \$15 million.

Complement: Eighteen (the ship can be handled by just two men, one at the control column and the other at the engine console).

HMS SPEEDY being lowered into the water.



Tragflügelboot HMS »Speedy« in Dienst

HMS *Speedy* ist das erste nunmehr in Dienst gestellte Tragflügelboot der Royal Navy. Es ist ein Boeing Jetfoil, das von Vosper Thornycroft nach den einschlägigen Vorschriften der Royal Navy ausgestattet und ausgerüstet wurde. Das Tragflügelboot soll in verschiedenartigen Auf-

gaben erprobt werden, u. a. im Vorpostendienst, um festzustellen, ob »Hydrofoils« auf längere Sicht und zu geringeren Kosten konventionelle Einheiten ersetzen können.

Das Boeing Jetfoil-Tragflügelboot ist ein modernes Fahrzeug, das Geschwindigkei-

ten bis zu 43 kn erreichen kann (vergl. MR 9, 1978, S. 602). Bei Flugfahrt ruht das 117 t große Boot auf den voll eingetauchten Tragflügeln und -stützen. Durch Computerteuerung ist selbst bei rauher See eine glatte Fahrt gewährleistet.

Das Boot ist mit einem Gasturbinenwasserstrahl-Antrieb ausgerüstet. Für niedrige Fahrtgeschwindigkeiten bei Verdrängungsfahrt besitzt Hydrofoil zusätzlich einen Dieselantrieb. Durch ein Steuersystem an den Strahldüsen kann der Schub für Rückwärtsfahrt umgestellt werden; am Bug befindet sich eine Schubdüse zur Erhöhung der Manövrierfähigkeit. Vermittels einer leistungsstarken hydraulischen Anlage werden die Tragflügel aus- und eingefahren sowie andere Geräte bedient. Zwei Diesellaggregate für alternierenden Betrieb sorgen für eine großzügige Versorgung mit elektrischer Energie.

HMS *Speedy* lief im Juli 1979 im Boeing Werk Seattle vom Stapel. Nach Erprobungsfahrten wurde sie von der Royal Navy abgenommen und im November nach Southampton gebracht, von dort zur Vosper-Thornycroft Werft zur Fertigstellung geschleppt.

Vorhanden war der Bootskörper mit seinen Unterteilungen, ferner waren die Tragflügel installiert sowie die Antriebs- und Hilfsaggregate. Die Besatzungsräume waren fast leer, die Decksrüstungen noch sehr unvollständig. Demgemäß richtete Vosper-Thornycroft die Besatzungsräume ein und montierte selbstentworfenen hydraulischen Bootswinden für die beiden an Bord mitgeführten aufblasbaren Boote des Typs Avon Searider. Auf die Ausstattung der Räume (modernes Heiz- und Lüftungssystem, Heiß- und Kaltwasserversorgung) verwandte die Werft große Mühe. Sie veranlaßte auch den Einbau und elektrischen Anschluß einer Reihe von Einzelgeräten nach dem Royal Navy Standard.

Die hydraulischen Bootswinden (eine auf jeder Seite) können mit einer Bedienungsmannschaft von zwei Mann jeweils ein Avon Searider-Boot zu Wasser lassen oder aufnehmen. Mit dem Außenbordmotor und der Ausrüstung wiegt ein Searider 855 kg. Im Zuge der Komplettierung des Schiffes wurden außerdem von Vosper-Thornycroft eingebaut: Die Navigations- und Fernmeldeeinrichtungen (u. a. Decca Cane-Computer Aided Navigation Equipment, AC 1226 Radar, Echolot, Decca-Navigator Anzeigengerät, Omega-Empfänger, VHF/UHF-Sendeempfänger, HF-Peilfunkgerät).

Bei der Montage wurde streng darauf geachtet, die vorgeschriebenen Gewichtsgrenzen einzuhalten. Vosper-Thornycroft testete die meisten der installierten Systeme und Geräte.

HMS *Speedy* wurde eine Woche vor Ablauf der vertraglich vereinbarten Zeit fertig und ist inzwischen wieder nach Seattle überführt worden, seit Mai 1980 fanden dort Probefahrten statt. F. Forstmeier

HMS *Speedy* in Flugfahrt.
Foto: Vosper/Thornycroft

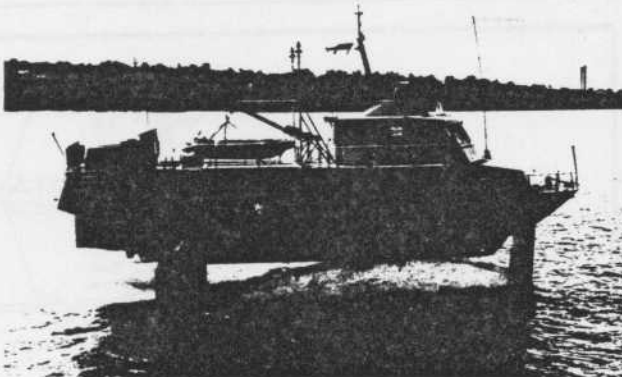
Die belgische Boelwerf, Temse, die sich u. a. mit dem Bau von zwei der vier Fregatten der *Wielingen*-Klasse für die belgische Marine einen Namen machte, legte jetzt den Entwurf einer neuen Korvette vor, über die die MR im Heft 1/1981 in einem Sonderbeitrag unseres Schiffbau-Experten Harald Fock berichten wird.



Das britische Tragflügelboot HMS *Speedy* in Verdrängungsfahrt. Foto: C. & S. Taylor

HMS <i>Speedy</i> , Hauptdaten:	
Länge über alles (Tragflügel in Betrieb)	27,43 m
Länge über alles (Tragflügel in Ruhestellung)	30,78 m
Länge des Bootskörpers in der Wasserlinie	23,77 m
Größte Breite	9,14 m
Tiefgang (Tragflügel in Betrieb)	5,18 m
Tiefgang (Tragflügel in Ruhestellung)	1,83 m
Tiefgang (bei Flugfahrt)	2,40 m
Wasserverdrängung	227 t
Besatzung: Kommandant, 4 Offiziere, 4 Portepee-Unteroffiziere, 9 Seeleute verschiedener Dienstgrade.	

Das Achterschiff von HMS *Speedy* mit beigeklappten achteren Tragflügeln. Foto: L. v. Ginderen



SUCCESSFUL SPEED TRIALS FOR BOEING OPH

The Boeing Ocean Patrol Hydrofoil (OPH) recently gave a convincing demonstration of its high speed capabilities, which give it a maximum speed of no less than 50 knots (92 km/h). The trials were run in Puget Sound. At the end of this special trial, the new hydrofoil continued its normal series of final trials, with a view to its delivery to the Royal Navy, which will then subject it to still further tests before

putting it into service. The Ocean Patrol Hydrofoil is derived from a Boeing model designed for the civilian market, and is particularly suited to the tasks demanded of a modern patrol craft designed for protection of the economic zone, fishing rights and offshore oil platforms. The craft, named the HMS SPEEDY, has a displacement of 117 tons and is 27 m in length.

Lieutenant-Commander Peter Rouch (left), the commanding officer of the HMS SPEEDY, affixes his signature to an affidavit affirming the achievement of a speed of 50 knots. On the right, Mr. Gene Myers, Director of Military Sales of Boeing Marine Systems, and Lieutenant Richard Morgan of the Royal Navy engineers.

Le Lieutenant-Commander Peter Rouch (à gauche), l'officier commandant le HMS SPEEDY, appose sa signature sur une déclaration affirmant que le HMS SPEEDY atteint la vitesse de 50 noeuds. Sur la droite, Mr Gene Myers, directeur des Military Sales de Boeing Marine Systems, et le lieutenant Richard Morgan du génie de la Royal Navy.

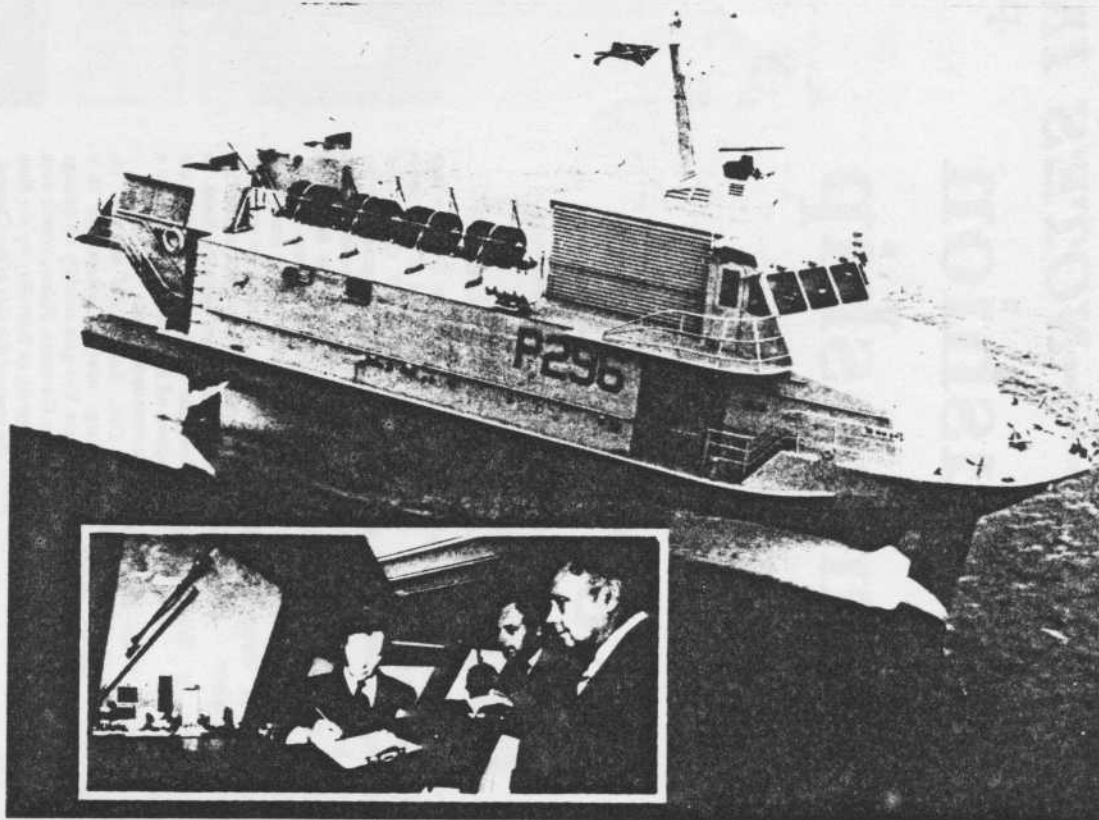
Aviation and Marine International

Jan. 1980

BOEING RELIES ON MARCONI PRODUCTS

Marconi Avionics' new Doppler Velocity Sensor (DVS) has been ordered by Boeing for its 737s. Marconi's AD660 DVS is a measurement apparatus linked to a digital minicomputer which supplies the pilot with flight parameters optimized for fuel economy.

It is extremely compact, needing a space of just 38x24 cm in the fuselage. Therefore the AD660 DVS can be installed even onboard the smallest aircraft. It functions by doppler measurements of relative ground speed, and through the processing of this data by the minicomputer it directly computes the parameters to correct the aircraft's trim. In these years of energy crisis, it is easy to predict significant sales for this new Marconi product, and the firm has in fact already received orders totalling £750,000.



Air cushion seamanship in a Force 10

Westcountryman

"LIKE driving a car down a country lane with the accelerator stuck open and no brakes," was the way the Captain of HMS Speedy, the Royal Navy's hydrofoil, described her performance in foul weather to Westcountryman.

Lieut.-Cdr. Peter Roach was putting Speedy through her paces in Westcountry waters during her evaluation for a possible role with the Fishery Protection Squadron.

Her ability to handle heavy weather has been questioned in some quarters, but 48-year-old Cdr. Roach maintains that her limitations are not that different from the Ton-class craft used currently for fishery protection. These are converted coastal minesweepers, relatively slow and introduced originally to cope with Korea War mines.

The Royal Navy bought Speedy from Boeing's for £6-million and spent another £1.5-million converting her to a Naval role. She is based on Boeing's commercial passenger ferry jetfoil.

A little more than 27 metres long HMS Speedy has a maximum displacement of 117 tonnes. Her water jet propulsion system gives her a speed well in excess of 40 knots when "flying" on fully submerged hydrodynamic foil system.

To fulfil this remarkable performance she must get up on her hydrofoils. Waves much above 15ft. are close to her operating limits. In extreme weather, she would come down off her foils and operate like a conventional craft.

Cdr. Roach told me that his charge operated successfully in a Force Ten gale recently on passage from Guernsey. Fishing vessels were sheltering in Start Bay by the time she reached this side of the Channel.

Speedy is an exceptional craft in many ways, not least because the captain or officer of the watch drives from a seat — rather like an aircraft pilot. Her bridge is very similar to an aircraft cockpit. Captain or OOW and watch-keeping engineer alongside are strapped in their seats.

In extremely rough weather Speedy's automatic height sensors have to be over-ridden. Then the officer of the watch has to drive "by the seat of his pants," judging each wave as it comes — no mean feat of concentration at more than 40 knots.

Rough weather handling at 46



HMS Speedy, the Royal Navy's jet-foil experimental patrol boat, showing her starboard quarter during speed trials off the Devon coast. Bought from Boeing, she was commissioned last year.

knots prompted the analogy with driving down a country lane with a jammed accelerator and no brakes. With classic understatement, Cdr. Roach added: "It is a question of very fine judgement."

"We have a button on the steering wheel to warn everyone below that there is a big one coming. It gives them a chance to grab something to hang on to. We operate very close to

the limits — pushing her very hard."

A brief voyage off Plymouth was an eye-opener. After an obstruction in a water intake — it was blown clear quickly with compressed air — Cdr. Roach went through the pre "take-off" checks.

HMS Speedy switched from diesel to gas turbine, accelerated impressively. Foil-borne at about 27 knots surging forward swiftly to 46

knots.

She manoeuvred superbly and the motion (admittedly in sheltered waters), was like that of the high-speed train. I am sure a cup of tea would not have spilled.

"I am very pleased with her," commented Cdr. Roach. "Her speed, manoeuvrability and control are far greater than any other ship I have had anything to do with."

FIRST AND EIGHTH

Fastest craft in the Navy

The new pride of the Royal Navy, officially welcomed into service at Portsmouth today, bears a name with almost 200 years of searing tradition.

H.M.S. Speedy became the latest addition to the fleet as she was brought into her new home base at H.M.S. Vernon by Lt-Commander Peter Roach.

The eighth vessel to bear the name, the Boeing-built 115 ton jetfoil is the first such craft — and fastest vessel — to be adopted by the Navy.

With a top speed of 40 knots, 90 foot long and 30 foot wide, H.M.S. Speedy will now start a series of sea trials which it is hoped will establish that jetfoil can be more effectively operated in offshore patrol than conventional craft.

The first ship to bear the name, launched in 1782, was a 208 ton 14-gun brig which saw action in George III's Mediterranean fleet during the French revolutionary war.

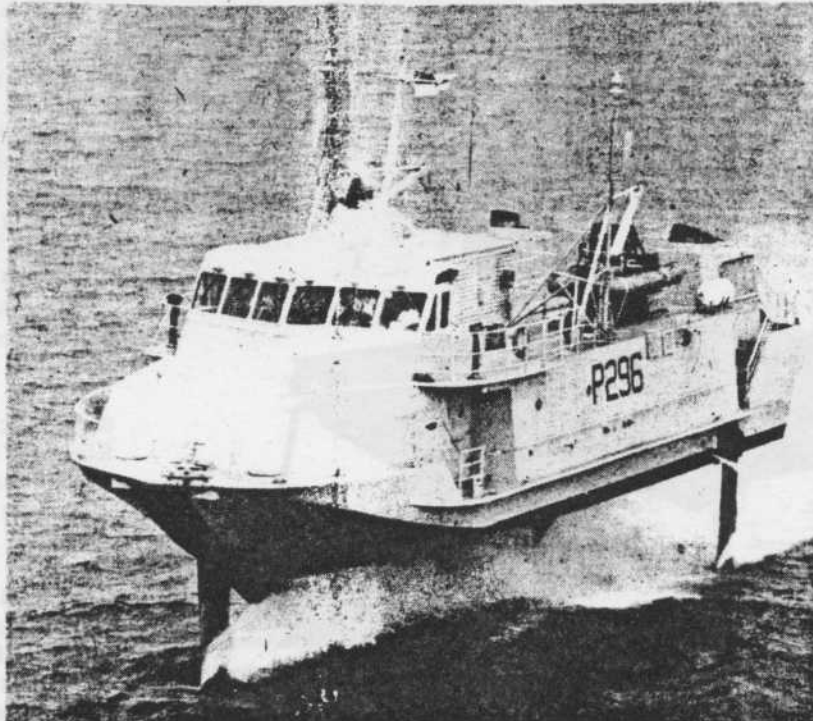
But the present H.M.S. Speedy is not built for war unlike her direct predecessor — a fleet minesweeper completed in 1939.

TRIALS

Powered by two 3800 horsepower gas turbines, the craft has just completed two weeks of preliminary sea trials.

Lt-Commander Roach has become commanding officer of the craft after nearly three years service in the naval hovercraft trials unit at Lee-on-Solent.

He feels he has now got "the best job in the Navy" and



likens the jetfoil to a train, car, and plane.

"It is like driving a car, but because of the dynamic struts, it acts very much like an aircraft," he said.

"Yet as soon as you move the helm the craft actually moves with you — and in many ways you could not do this in a conventional craft or hovercraft.

"Speedy is very manoeuvrable. You can stop her in about two boat lengths, and the comfort of the ride is very surprising and in that respect more like a high speed train.

"The craft has tremendous sprint and drift capability and we are probably the fastest thing in the Navy which is what really interests us."

H.M.S. Speedy is of similar design to the passenger jet foils which operate services in the English Channel.

One important exception is that it has two 55 horsepower diesel engines, which serves as an alternative power source when the craft is hullborne — greatly increasing its patrol capability.

Portsmouth News June 3, 1980

Western Evening Herald Feb. 12, 1981

Speedy's first arrest

Contacted

THE Navy's fastest ship the hydrofoil HMS Speedy, showed her paces 100 miles out in the Atlantic yesterday when she arrested a Spanish trawler alleged to have been fishing illegally.

The trawler was escorted into Falmouth today by the fishery protection vessel HMS Cuxton.

It was Speedy's first arrest since she joined the Fishery Protection Squadron and it came about through good liaison work between the vessel and a patrolling RAF Nimrod from St. Mawgan.

It was at 1.15 p.m. yesterday when Speedy was making for the Irish Sea, after being immobilised temporarily at Falmouth with generator trouble, that the Nimrod spotted the Spanish trawler Pinar 100 miles west of Land's End.

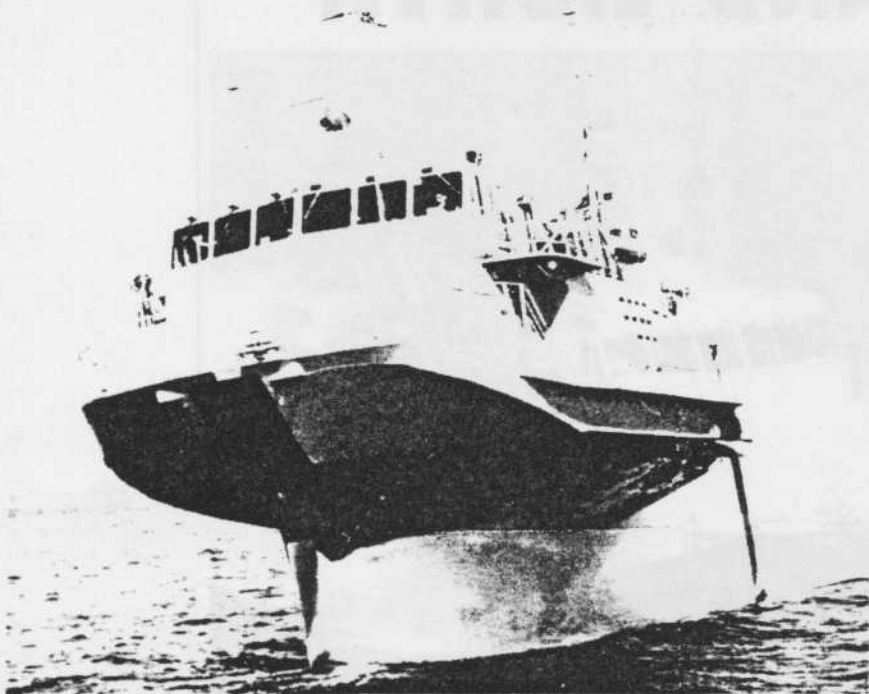
The Nimrod suspected the vessel to be fishing illegally in British territorial waters and contacted its base.

Within minutes the Nimrod had been switched to HMS Speedy, which has a top speed of 45 knots.

The trawler got under way, but Speedy quickly caught up on them and put a boarding party aboard.

BOEING HYDROFOIL SPEEDY BEGINS EVALUATION

3063



The HMS Speedy, pictured above, is operating in fishing areas throughout the United Kingdom's 200 mile extended fisheries limit as part of an operational evaluation.

Marine Digest Jan. 1981

Motor Ship Feb. 1981

Encouraging start to Boeing Jetfoil trials with U.K. patrol fleet

H.M.S. "Speedy", the first offshore patrol hydrofoil version of the Boeing Jetfoil, recently commenced a six-month operational evaluation with the U.K. Royal Navy's fishery protection squadron based at Rosyth in Scotland. During the first three months, "Speedy" will operate in many different fishing areas, and with as many fishing vessels as possible, patrolling throughout the U.K.'s 200-mile fishing limit. The remaining trial period will concentrate on those rôles in which the craft has proved most useful. The extending of the limit to 200 miles has imposed a large requirement on the Navy, which has responded by increasing its patrol fleet—most recently by the addition of the new Castle class of vessels (*The Motor Ship*, November and December 1980), the first

of which will enter service this year. The squadron also operates seven Island class patrol boats along with up to eight "Ton" class minesweepers of earlier vintage.

Speed has always been an essential requirement, due to the vast areas to be covered, and impressions gained so far suggest that "Speedy" will be ideal for the job. En route from Portsmouth to Rosyth, the hydrofoil broke the speed and distance records for a Boeing Jetfoil, covering the 320 nautical miles to Flamborough Head, off Yorkshire, at an average speed of 42 knots, against headwinds of up to 35 knots and in sea-states up to five. The Navy are reported to be impressed with the craft's performance, considering it capable of operation in worse weather than normal fast patrol craft.

SEATTLE — The HMS Speedy, the first offshore patrol hydrofoil version of the Boeing jetfoil, has begun a six-month operational evaluation with the British Royal Navy's Fishery Protection Squadron based in Scotland, according to a Boeing Marine Systems spokesman.

During the initial three months, Speedy will operate in as many fishing areas and with as many different fishing vessels as possible, patrolling throughout the United Kingdom's 200-mile extended fisheries limit.

Operations the final three months will center on rôles in which the hydrofoil has proved most suitable.

Fishery Protection Squadron activities include patrols of the United Kingdom's vital offshore gas and oil installations.

Evaluation in the anti-submarine and fast patrol boat rôles may follow.

Following HMS Speedy's commissioning with the Royal Navy in June 1980, the 50-knot hydrofoil has been undergoing trials and crew training at Portsmouth and Portland on Britain's south coast.

These included speed and maneuverability measurements, onboard noise trials and characteristic studies of this new type of naval vessel.

En route from Portsmouth, England, to Rosyth, Scotland, the hydrofoil broke the speed and distance record for a Boeing jetfoil, covering the 320 nautical miles to Flamborough Head off Yorkshire at an average speed of 42 knots (48 mph) before refueling in Newcastle.

The entire trip was against headwinds between 15 and 35 knots and in sea states of from two to five.

The United Kingdom is the first to deploy a Boeing jetfoil on naval duties. The aim of HMS Speedy's current evaluation program is to determine the best operating patterns for high-speed hydrofoils to supplement the Royal Navy's existing conventional craft. 3063

Britain's approach to countering terrorist threats to its oil and gas supplies is becoming the model for other countries

Operation Oil Rigs . . . to counter North Sea raiders

THE Royal Navy this week begins trials on one of its newest and most advanced craft — the high speed hydrofoil HMS Speedy. The job of the 90ft long, 43-knot Boeing Jetfoil, with her 18-man crew will be offshore protection.

Speedy also serves as a reminder that 16 years after the first exploration in the North Sea, Britain is still finalising an effective security plan to protect oil and gas supplies — arguably the country's biggest single asset. Earlier this summer in another significant move, an elite group of 300 Royal Marines — the Comacchio Company — moved into Arbroath on the Scottish coast, with the specific job of North Sea defence.

Millions of pounds have been spent in the past few years. And what has been put together is being watched closely by other countries who have developed, or are developing, offshore resources.

Under the British system, in peacetime at least, it should be local police forces ashore — with not a helicopter or boat capable of operating offshore — that have front line responsibility for security on the high seas.

This gives Grampian police, for example, a gigantic sea area to cover, with its furthest platforms as far from its base in Aberdeen as is Cork in southern Ireland.

Some countries, such as Norway, have already begun copying the British system quite closely. And a senior intelligence officer from the US Coastguard recently flew home to Washington to write a glowing recommendation of the system for protecting the hundreds of rigs in the Gulf of Mexico and California's Santa Barbara channel.

But other countries still want to know more about how the British would stand

up to a serious threat such as a terrorist attack on an oil platform in the North Sea.

They wonder whether the carefully-presented picture of smooth, friendly cooperation between the oil companies, the police and the Navy actually papers over some embarrassing cracks.

Even some of those most closely involved accept that the system could never prevent a determined terrorist attack. And they still do not know how well the police, the admirals and the Government would manage to work together in the crisis which would follow.

One of its ironies is that it may have been an elaborate hoax which galvanised Britain into putting together its present system at all.

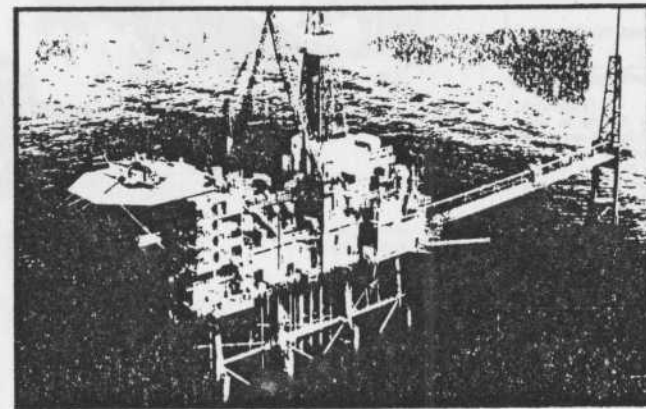
In March 1975 an unidentified caller telephoned the Great Yarmouth offices of Phillips Petroleum with the devastating message that bombs had been attached to the legs of two of its gas production platforms, timed to explode within two hours.

And the Royal Navy, police and the Department of Energy struggled to make sense of the call and get some kind of response organised, the deadline passed without an explosion. But it was serious enough a hoax to have frightened the life out of the authorities and the oil companies.

The incident began a furious row inside and outside Parliament about whether there was adequate protection for the country's growing North Sea assets. And it gave birth to most of the major efforts which have since been made to ensure those responsible were never caught napping again.

Each oil company now has its own, often-computerised, security system which tells it who is and who is not offshore.

Staff have their back-grounds probed. Their



men both ashore and on the platforms check crewmen for drink, drugs and offensive weapons. Platform bosses watch their men for signs of treachery or disaffection.

The companies swap information, liaising through a seven man committee of the United Kingdom Offshore Operators' Association, headed by its director general, George Williams, who for nine years ran the Shell-Esso operations in the North Sea. The companies use the association to talk to the police, the Navy and the Government.

Their security men have close contacts with the police, who by law can now handle any crime on installations registered in their areas, and in the sea for 500 metres around each rig.

With no boats or helicopters of their own the police rely heavily on the

companies to provide transport for the daily visits to the platforms.

The police are supposed to provide the first measures against terrorist attack. But the oil companies realise their responsibilities and often organise their own internal exercises. Occidental, with platforms in the Claymore and Piper fields, have an annual exercise, NOR-OK, simulating a so-called Category 3 emergency, which would result in the evacuation of an entire platform.

Five times a year the Department of Energy calls a snap "emergency" on one installation to test company response. In closely guarded conditions, the Navy and Marines are also brought in for one all-out exercise a year, code-named Operation Purple Oyster, which simulates an attack on a terrorist-held platform.

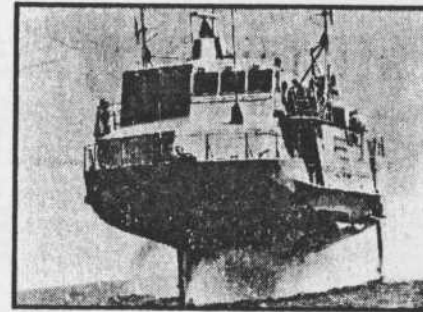
The Navy has been spending extensively to bring itself to readiness for a call to its HQ in Pitreavie from a chief constable such as Grampian's Alec Morrison.

Britain's offshore protection service now includes a squadron of seven new 925-ton Island class patrol boats, backed up by eight slow Ton-class minesweepers; aerial cover from Nimrod surveillance planes from RAF Kinloss; a 40-knot high speed patrol boat HMS Tenacity; the Marines; and now—HMS Speedy.

The key new weapon is the Comacchio Company — named after the Italian lake where a corporal won the Marines' only VC of the Second World War.

It is based on a squad from the Special Boat Service, the little-known Marine equivalent of the SAS, who

The emergence of HMS Speedy (pictured below)—the Navy's high-speed hydrofoil—marks the latest chapter in Britain's offshore protection system. Philip Jordan reports



have been shinning up and down the North Sea rigs for some time now, practising their armed raids.

In the 16 years of exploration and production there has never been a serious crime of violence, much less a murder, aboard an installation — and this in a period where violent crime in Britain in general escalated by 73 per cent.

Nor in the same period has there been an actual case of terrorism offshore, though the oil companies are plagued with obvious hoax calls: one had 100 in 18 months.

The emergence of the Comacchio Company might suggest that the Navy does not believe things will remain constant.

But not all experts believe things will remain as they are. They point to two inci-

dents in the background to British oil exploration.

At least one company has been the victim of a well thought out extortion plot, with money demanded in return for details of the location of a "device" planted on a platform. The sum demanded, £50,000 was realisable enough for the company to take the threat seriously and a search revealed a planted package.

It was not a real bomb and those behind the plot were later caught by police and oil company security men.

In 1975 the so-called "Tartan Army" group carried out two bombings ashore on the pipeline to the Forties Field. One member, an electrician, was later discovered to have worked offshore.

Certainly, American sources, who have been taking a more global look at terrorism, are pessimistic about offshore assets going unmolested in future.

Ambassador Anthony Quinlan, director of the US State Department's Office for Combating Terrorism, says: "We have made aircraft hijacking and building seizure much more difficult than they once were, but we can't just fight the last war while terrorists are thinking of new targets."

The most likely candidates for an attack are seen to be some of the South American terrorist groups, many of whose members studied engineering at university, and who have shown previously that they are capable of forming international alliances, notably with the Arabs, to identify and attack targets.

Only a few years ago, the French nationalised oil company Elf, developing a gas field off the Norwegian coast, advised one of its employees that he was considered a security risk because of his father's connection with South American refugees in Paris.

The best guess is that, rather than attempt the almost impossible task of destroying or disabling a platform, the likely terrorist aim would be to seize it from the air and hold its crew hostage for the publicity value.

The introduction of HMS Speedy is a tacit admission by the Navy that it knows its offshore fleet is thinly spread and likely to become more so as exploration reaches out into the Atlantic and other coastal waters.

Oil company chiefs believe they have one massive ally in any attack: the platform itself, built to withstand seas of 100ft and winds of 150 knots.

Police chiefs tend to be sanguine about whether a terrorist threat will materialise. "Pray God we never have one," says Alec Morrison.



Antony Preston reports from Seattle

When the British Ministry of Defence Procurement Executive placed a contract with Boeing Marine Systems of Seattle last June, to build a hydrofoil for the Royal Navy it marked an important step forward. Although the RN is not a stranger to the hydrofoil concept, having built an experimental craft during the Second World War, it has shown no interest subsequently. However, the present Director-General, Ships has long supported the idea of a hydrofoil, and a fortunate series of chances combined to make his wishes come true.

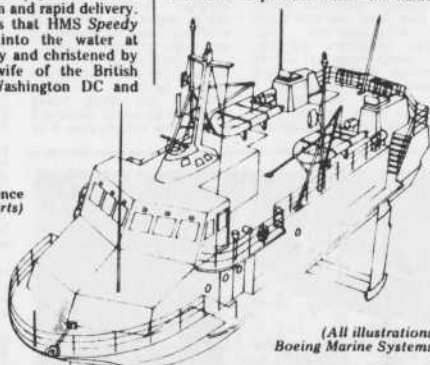
The first chance came in 1977, when the commercial hydrofoil, the Boeing Jetfoil *Flying Princess* was delivered to P&O to inaugurate a ferry service between Zeebrugge and London. The Royal Navy was able to charter the Jetfoil for a short period to evaluate its seakeeping, and all observers were greatly impressed by its manoeuvrability and stability. A year later, when the British defence services encountered the phenomenon of 'underspend' the RN was faced with the undesirable situation of having to return some £200 million to the Treasury, and used part of the unallo-

cated funds to order a military variant of the Jetfoil. The third factor influencing the decision was that Boeing had already spent a year designing an offshore patrol version of the Jetfoil for the Japanese Maritime Self-Defence Force (it was later dropped), and was therefore in a position to guarantee minimal development cost, a proven basic design and rapid delivery.

The result is that HMS *Speedy* will be lowered into the water at Seattle on 9th July and christened by Mrs Peter Jay, wife of the British Ambassador in Washington DC and

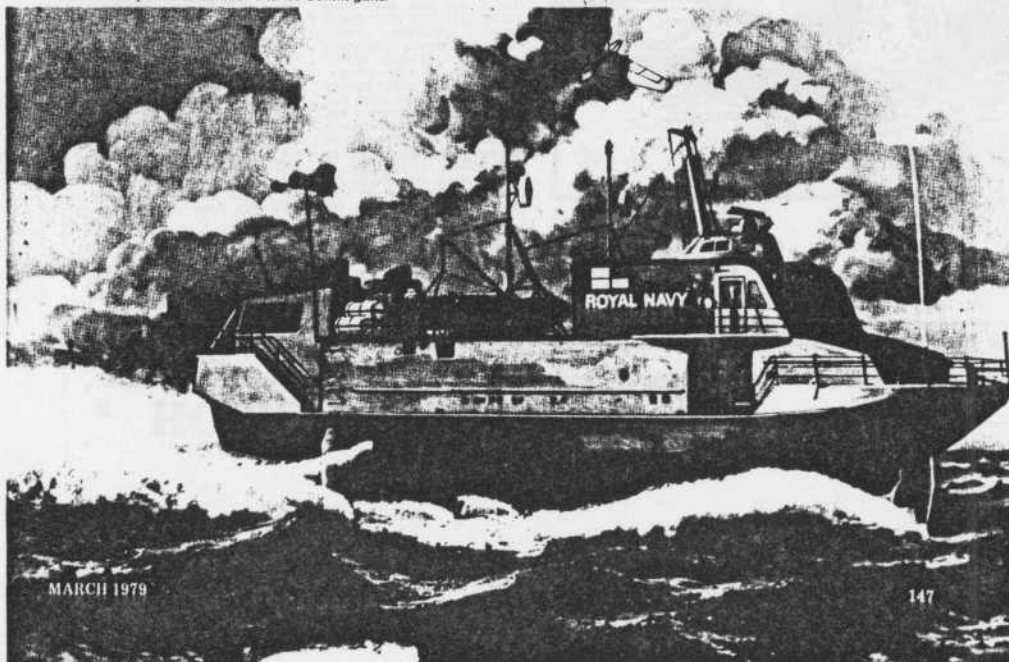
daughter of Mr James Callaghan, the British Prime Minister. The name *Lightning* was a strong contender, but eventually *Speedy* was chosen, a name dating back to 1782 and made famous by Lord Cochrane, believed to be one of two figures who served as the original of Captain Hornblower. Six more ships have borne the name,

(Drawn for Defence by John Roberts)



(All illustrations: Boeing Marine Systems)

Figure 1: The latest impression of HMS *Speedy*, without the PH01 pendant number and no 20mm guns.



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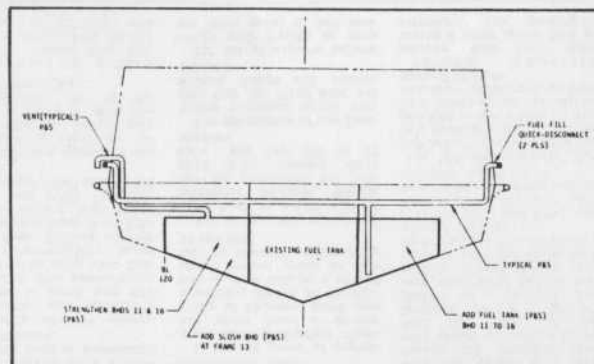


Figure 2: The fuel supply has been increased by adding wing tanks.

the last being a minesweeper which won three battle honours in 1939-1945.

The Hull

HMS *Speedy* is identical to the commercial Jetfoil in dimensions and configuration, but with significant differences. The capacious passenger accommodation has been dispensed with, leaving ample deck space for handling two Avon inflatable boats. The twin funnels aft are also lower as they do not have to clear the deckhouse. Accommodation is provided for the crew of 18, five officers, four POs and nine junior rates. A comprehensive outfit of communications and navigation equipment is also provided to enable the *Speedy* to carry out her role of fishery and offshore protection (fig.1).

The CO's cabin is on the starboard side, immediately abaft the bridge but a deck lower. One galley serves officers and ratings, and the current practice of providing separate bunk space and recreation space has been followed. The two inflatables are handled by small derricks stepped on the upper deck amidships but access is provided by double doors to port and starboard at lower deck level.

The fuel capacity has been doubled by adding wing tanks (see fig.2) thus remedying one of the few drawbacks of the Jetfoil. This gives her 72 hours' endurance.

Propulsion

The heart of the *Speedy's* success is her propulsion system, a marriage between marine and aerospace technology (fig.3). As she runs on her foils

water is scooped up by an inlet on each horizontal strut below the water. This flows into two water-jet pumps driven by two Allison 501-K20A gas turbines, each rated at 3,300 hp at 80° F at sea level. These light, compact turbines use a gearbox drive-train to power the pumps, which eject the water at high speed. The pumps are made by the Rocketdyne Division of Rockwell International, and have a capacity of 24,000 gallons per minute.

There is an important difference, in that HMS *Speedy* is provided with a separate hullborne propulsion system (fig.4). This comprises 1 Detroit Diesel Allison 8V-92TI diesel engines driving shafts through flexible couplings, with over-running clutches in the gearbox. This change made it necessary to move the hydraulic pumps and to shorten the high speed shafts.

When the ship becomes hullborne the foils and struts can be re-

Figure 3: the waterjet propulsion intake is between the foil struts.

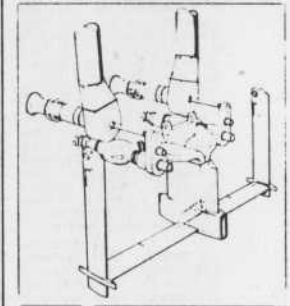
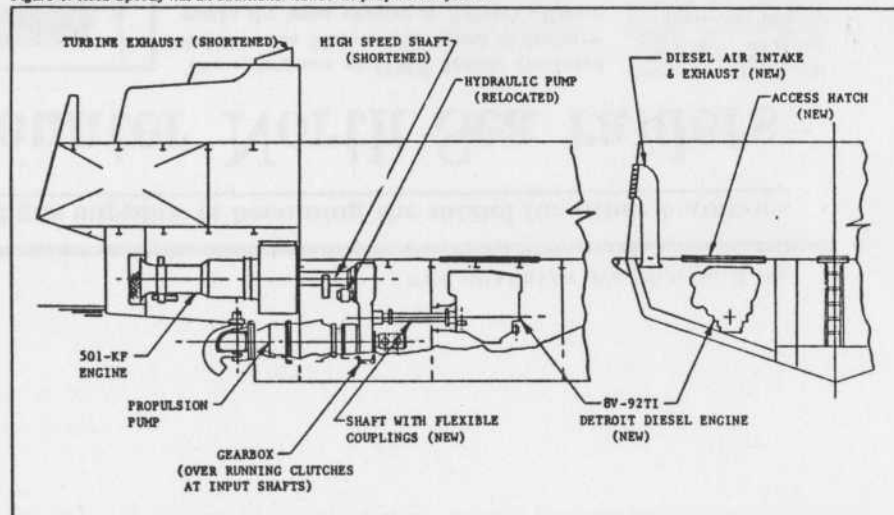


Figure 4: HMS *Speedy* has an additional hullborne propulsion system.



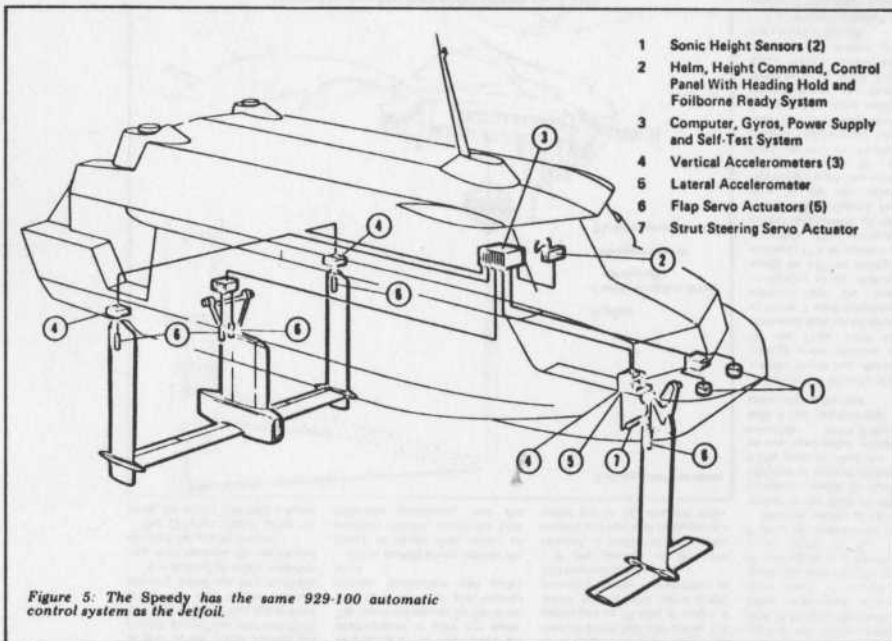


Figure 5: The Speedy has the same 929-100 automatic control system as the Jetfoil.

tracted, allowing her to move in shallow water. To aid manoeuvring at very low speeds a bow thruster is provided.

The Automatic Control System

The large submerged foils have an inherent stabilising effect, but this is greatly enhanced by Boeing's Automatic Control System (ACS). This translates the Commanding Officer's decisions into the best combination for stability and control. Before take-off he estimated the height at which the hull must ride above the water to clear the wave-tops. Once the height-control is set the throttle can be advanced until the ship picks up speed and becomes foilborne, usually a process of half a minute, and as she accelerates she is automatically stabilised at the correct height by the ACS.

The ACS uses a computer to coordinate commands from height sensors, gyroscopes and accelerometers (fig.5), ensuring straight and stable running. The commands for speed and direction are blended with the readings from these instruments, and are then processed by the computer. Hydraulic servo-actuators adjust the full-span flaps at the trailing edge of both foils, modifying the deflection of water around the foils. The forward and after flaps each vary the pitch and control the height, and the after flaps control the roll and change of direction.

The Speedy will be able to make a banked turn, just like an aircraft. A

smooth turn-rate of up to 6° per second can be attained within five seconds of a helm command being given and the vessel has a turning circle of 1,290 ft (393.2 metres). The risk of malfunctions during critical manoeuvres is reduced by back-ups incorporated into the ACS, for separate sections of the roll-control system.

Navigation and Communications

The Speedy is to be fitted with the same equipment as the Royal Navy's successful 'Island' class offshore patrol vessels (OPVs), Decca radar and the Decca Computer-Aided Navigation Equipment (CANE). As with the 'Islands' communications are provided to allow rapid exchange of informa-

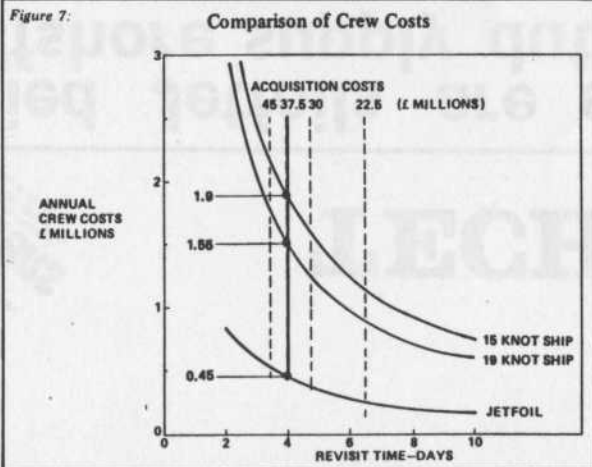


Figure 7:

tion from ship-to-shore and from aircraft-to-ship.

Armament

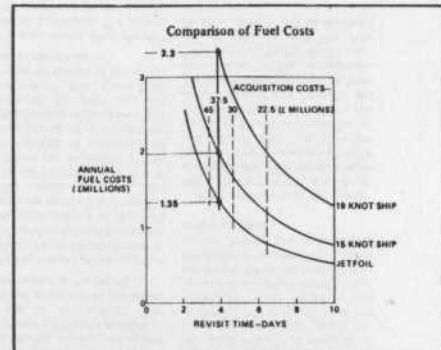
Although the original artist's impression showed single 20-mm Oerlikon guns abreast of the wheelhouse these are not to be mounted. Precisely what is to be mounted is uncertain, and it may be only a pair of 7.62-mm (.30-inch) light machine guns.

The Role and Cost-Effectiveness

The purchase price of HMS Speedy is \$12.4 million (roughly £6.2 million) and there is no doubt that her cost of about \$106,000 per ton makes her more costly than a conventional displacement hull vessel. However the ease of maintenance over a 25 to 30-year hull-life and the much higher degree of effectiveness show that a hydrofoil can be considerably cheaper. Her interception speed of 50 knots means that she can cover the distance out to the 200-mile EEZ limit quickly, and this improves her chances of intercepting ships. Fig. 6 shows a comparison of the number of ships needed to achieve 'revisit' time measured in days. To achieve four days of active surveillance would require five Speedy type, costing £37½ million, or 12.5 patrol ships capable of 15 knots such as the 'Island' class or 10 of a faster 19-knot type. Fig. 7 shows that five Speedys would use only £1.35 million in fuel cost, as against £2 million and £3.3 million for the 15- and 19-knot OPVs. Fig. 8 is even more favourable, with five Speedys costing only £0.45 million to man each year, as against £1.55 million and £1.9 million respectively.

The high degree of readiness and the ability to cruise at high speed will make the Speedy very different

Figure 8:



Below: Figure 9.

from the traditional warship 'on station'. To take full advantage of her unique capabilities it may be necessary to adopt a dual-crew system, similar to the Port and Starboard or Blue and Gold crewing systems used in Polaris

Particulars of HMS Speedy.	
Displacement	117 tonnes
Length	30.78m (oa, foils up), 27.43m (oa, foils down)
Beam	9.14m
Hullborne draught	5.18m (foils down) 1.83m (foils up)
Foilborne draught	2.40m
Cruising speed	42-45 knots (48.5-51.8mph)
Complement	18

submarines. Before any sailors throw up their hands in disgust it should be remembered that the crew of a bomber does not 'live' in the aircraft, and the idea that each sailor has to 'own a plank' may have to go.

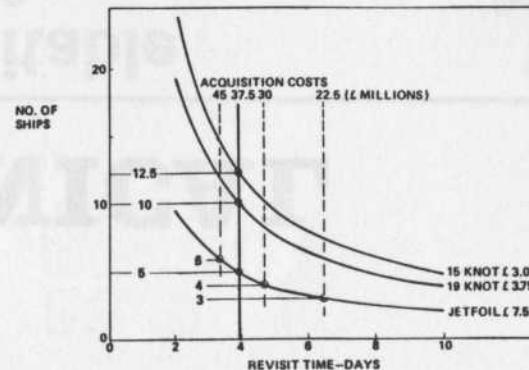
The Royal Navy has a unique opportunity to develop a potent off-shore patrol force. Studies made by Boeing in conjunction with the RN show that five Speedys would suffice to patrol the North Sea in support of existing conventional forces. What is more, the designers have sufficient faith in the Speedy to claim that there is no need to build a larger hydrofoil. She is a fishery protection vessel pure and simple, and the only reason for expanding the design would be to add weaponry for a totally different role. The light armament is only a token of force, for the risk of interception remains the best deterrent to any peace-time poacher. As for the often-repeated fear that a hydrofoil could not keep at sea in extreme sea states, the Boeing-built Tucumcari (PGH-2) coped with Sea State Lower 6 between 1969 and 1971. In the words of Boeing's UK FPV project manager, 'if anyone wants to continue fishing in that sort of weather the best thing is to leave him to it'.

When I visited the Speedy at Seattle last month she was already well advanced. The hull is complete, but fitting of major systems has not yet started. A nice sentimental touch was a Union Jack draped over the bow, with a notice warning Boeing employees that this was customary with Royal Navy warships under construction, and asking them not to remove or mishandle the flag.

The contract between MoD(N) and Boeing provides for construction of the hull and propulsion only, but I understand that Boeing has tendered for completion of the detailed fitting-out as well. The ship will start a series of acceptance trials after her 'launch' in July. An interesting point is the absence of a Royal Navy or MoD(N) team on site, as quality control and supervision of the building has been entrusted to Boeing Marine Systems.

The RN is a notoriously demanding customer and there can be no doubt that the landing of the contract for Speedy is a feather in Boeing's cap. I was told that if more of the class are ordered a second-of-class might be built at Seattle but follow-on ships would be built under licence in a British shipyard.

Comparison of Number of Ships



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Modified Jetfoils are suitable for offshore supply duties

By Alan Blunden

FIFTEEN months ago, Boeing Marine Systems announced that Braathens SAFE of Oslo had taken options on two Jetfoil hydrofoils which it intended to operate on offshore supply duties in the Norwegian sector of the North Sea.

Discussions with Woodside Petroleum about the possible use of Jetfoils off the coast of Australia, as part of the North Rankin gas project, started last year and BMS has since forecast that the number of Jetfoils sold to the offshore industry could run into hundreds — if a method of safely transferring men between the vessel and the platform can be devised.

The Offshore Jetfoil being offered, the Model 929-202, is based

on the Model 929-115 passenger craft already operating in Europe, Argentina and Japan. The most obvious difference is the deletion of most of the upper saloon to provide a working deck of approximately 950 sq ft for a personnel transfer system and stowage of light, high priority cargo.

The remaining section of the upper saloon, aft of the bridge, can be used as a VIP area, passenger compartment or crew rest room. The lower saloon can be fitted out with up to 165 seats plus luggage storage, washrooms and galley units.

Other modifications include the fitting of larger fuel tanks, an auxiliary control station for both hullborne positioning and the

transfer system, a bow thruster which is effective in a seaway, improved main thrust control and a paravane roll attenuation system to reduce hullborne roll motions by about 30%. Normal crewing would be two operators, two deckhands and two cabin attendants.

At a maximum displacement of 115 tons, the Offshore Jetfoil could carry a useful load, including fuel, of 40 tons. With a full load of 25 tons of diesel fuel and either 100 passengers or 10 tons of cargo, it would have a calm water range, assuming normal fuel reserves, of 550 nautical miles.

If the amount of fuel was reduced, it could carry 20 tons of cargo and four tons of cargo on a round trip of 325 nautical miles.

For operations in the North Sea, and other rough water areas, the larger fuel reserves needed would result in a slight reduction in the loads carried.

The two General Motors Detroit Diesel Allison 501K/F gas turbines, each with a continuous rating of 3,800 shp, powering Rockeidyne R10 waterjet units give the Jetfoil a cruising speed of 43-45 knots. BMS points out that this brings most of the offshore fields in the Gulf of Mexico, the North Sea and other exploration areas within three hours of current staging bases and opens up the possibility of operations in relatively remote areas, such as the Exmouth Plateau off northwestern Australia.

The ride quality of an Offshore Jetfoil in the Gulf of Mexico, it estimates, would be comfortable (defined as vertical accelerations of 0.05g rms or less) for 95% of service runs either acceptable or tolerable (0.05-0.08g and 0.08-0.10g respectively) for the remainder of the time.

The Gulf of Mexico, of course, is not the North Sea. Based on the average wave statistics available for the Frigg field area and continued high-speed operation up to Force 7 wind conditions, BMS believes that the long term availability of an offshore Jetfoil would be 83% in spring, 96% in summer, 77% in autumn and 64% in winter. This averages out to annual availability of 80%. The corresponding figures for operations to the two other major Norwegian fields are estimated to be approximately 76% for Statfjord and 85% for Ekofisk. More detailed information about the behaviour of a Jetfoil in the North Sea will have been collected this winter during the three-month deployment of HMS *Speedy*, the Royal Navy's variant, which was operated on fishery protection patrols out of Rosyth.

A provisional schedule for Norwegian Continental Shelf Jetfoil operations in 1983 projects five weekly trips between Stavanger and Ekofisk, five between Bergen and Statfjord two between Stavanger and Statfjord and three between either Bergen and Stavanger and Frigg.

It is anticipated that full passenger loads of up to 165 men will be carried on journeys from Bergen to Statfjord (130 nautical miles), from Bergen to Frigg (110 nautical miles) and Stavanger to Frigg (130 nautical miles). The 175 nautical miles between Stavanger and Ekofisk, though, may require a reduction in numbers.

BSM has calculated that the total traffic of the three fields in 1983 will be 29,884,400 passenger miles. This would require 6,864 Jetfoil trips, 9,133 Chinook trips or 29,543 S-61 trips and fleets, when reserve craft are included, of four Jetfoils, five Chinooks or 17 S-61s. The company claims that the cost per passenger mile of Jetfoil is just over half that of the Chinook and approximately one-third that of the S-61. It also recognises that, "Any surface vessel, unless of relatively large size and low speed, will face operational limits in the adverse conditions of the Norwegian North Sea and Jetfoil is no exception."

What is proposed, therefore, is an overall transportation system in which the Jetfoil is used whenever possible, including periods when helicopters are grounded by fog, and the Chinook, a product of another subsidiary of Boeing, is substituted when weather conditions stop the Jetfoils running. "If the two modes of transportation were combined into a single system," BMS believes, "that system could build on the best of each and be more reliable than either mode alone."

Assuming that some of the costs of the additional equipment would be offset by a reduction in the total number of reserve craft required to cover mechanical unserviceability, it is estimated that the annual



Impression of the Offshore Jetfoil operating without a transfer capsule on the upper deck

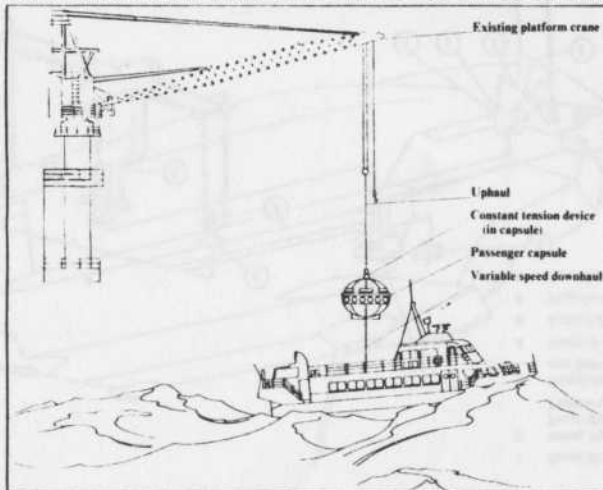


Diagram to show how the transfer capsule would work.

average costs of such a hydrofoil/helicopter package, in which Jetfoils were responsible for 79% of total worker movements, would be just over \$1 per passenger mile, even after allowing for the purchase of the additional equipment and stand-by crew costs. Including workers travel time compensation, estimated savings would be \$150-\$200 per man per trip or up to \$18-20 million per year for the project traffic to the Norwegian offshore facilities.

But all this is academic if a crew transfer system cannot be developed. The Offshore Jetfoil could be adapted to fit existing arrangements but for areas where "surface transportation is not used because of platform heights, heavy seas or distance from base," the Boeing Relative Motion Transfer System (see diagram) has been introduced. Based on existing components, this consists of a transfer capsule, a variable speed downhaul, a constant tension lift device in the capsule maintained at a level greater than the gross weight of the loaded capsule and an uphaul hoist provided by the existing platform crane.

The transfer capsule, which is adapted from a Whitaker escape

capsule, is expected to weigh 6,000 lb empty and up to 12,000 lb with 30 men on board. It will be both buoyant and self-righting. The constant tension device is likely to be similar to a Rucker guideline tensioner, consisting of an air/oil powered cylinder and multiple sheave pull-out cable, with a capacity of approximately 16,000 lb and 40 feet of cable. This will be fitted into the capsule, the uphaul attachment ending in a pendant on the top of the capsule. The downhaul winch will be located on the upper deck of the Jetfoil.

The key feature of the system is the ability of the winch operator to match the movement of the capsule to the heave motion of the craft through the tension forces applied to the connection cables. All capsule movements within 20 ft of the Jetfoil are controlled by the winch operator. A pneumatic air cushion pad on dock accepts the spherical bottom of the capsule and compensates for pitch and roll during contact. The capsule itself can either be carried on the Jetfoil or kept at the platform.

If it is on board when the craft arrives at a platform, the uphaul will be connected to the tension

pendant on the capsule and the operator of the platform crane, under the command of the Jetfoil crew, will lift the tension device to midlength (20 ft) at the mid heave of the hydrofoil. The crew will then unlock the capsule from the deck and release the downhaul at a fixed speed. The capsule will climb the uphaul tension line, while matching the heave motion of the Jetfoil, to a point about 20 ft above deck. As it is now safely above the maximum heave elevation of the vessel, the winch operator will release the downhaul and the crane operator will hoist the capsule onto the platform. To return the capsule to the Jetfoil, the procedure is simply reversed.

Some indication of the importance attached to this new system can be gauged from the statement, made by a representative of BMS last August, that "the principal obstacle for surface transportation in the North Sea has been the development of a method for the transfer of passengers to and from the platform." If trials are successful, Braathens SAFE should exercise its options and the first Offshore Jetfoils will be delivered to Norway.

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United States Naval Institute
Proceedings
April 1981

Boeing's Jet Foil Undergoes Royal Naval Evaluation

James D. Ferguson

Although extensively and successfully operated by several Warsaw Pact navies, and also by that of the People's Republic of China, hydrofoils have attracted remarkably little interest in the West. A long U. S. naval evaluation program is only now resulting in definitive system selection, and limited Italian operations have taken place, but otherwise the very real attractions of foil-borne vessels seem to have been ignored by Free World navies. This is despite various hydrofoil projects having been studied by several European navies during the 20th century. A change in tactical thinking may, however, be just around the corner, as the Royal Navy, which carried out relatively low-key hydrofoil trials during the 1940s, has

recently spent some \$12 million on the purchase and modification of a Boeing Marine Systems Jetfoil. Its operational evaluation is now well under way, with its potential suitability for a wide variety of tasks being assessed.

HMS *Speedy* (hull number 14 in the successful Boeing Jetfoil series), was ordered in mid-1978, and launched at Seattle, Washington, in July 1979. The ship was delivered to the U. K. some four months later. Royal Navy modifications were made at Vosper-Thornycroft's Porchester yard, and included such items as the provision of crew accommodations, boats, radio and navigation equipment, etc. Following the successful completion of extensive builder's trials, she was accepted by the Royal Navy on 3 June

1980, and formally commissioned 11 days later. On-board post-commissioning and shiphandling training took place over the next few weeks, being combined with a further period of technical trials. Speed and maneuverability parameters were recorded under a wide variety of weather and sea conditions; noise levels were monitored at numerous stations; and a beginning was made in studying some of the vessel's unique characteristics.

With the Royal Navy's Fishery Protection Squadron being tasked to oversee fishing activity around U. K. coasts, plus the surveillance of much of Britain's extensive offshore oil installations, it was logical that the *Speedy* be assigned to this unit for her operational evaluation.

On patrol with the Royal Navy's Fishery Protection Squadron, HMS Speedy is currently unarmed.

This was scheduled to take six months, and she accordingly arrived at Rosyth Dockyard, on the Firth of Forth, last November to begin her program. The service is stressing that the *Speedy* is no more than a trials vehicle, having been minimally modified from the basic Jetfoil design. Her suitability for all aspects of the offshore patrol task will be critically assessed, with special attention being paid to her behavior in the exacting weather conditions commonly encountered in typical operating areas. On completion of this program, the ship will undergo further evaluation in a number of alternative roles—mine countermeasures, strike, etc.—and the outcome will be the compilation of a complete hydrofoil operational package. Future British hydrofoils could be built under license in U. K. yards, but the Ministry of Defence is pointing out that the *Speedy* represents only one aspect of Royal Navy interest in unconventional ship systems. A hovercraft unit has been operational for some years, and its activities have taken it to a wide variety of climatic regimes, and other surface-effect-ship projects are under consideration. An additional benefit from the *Speedy*'s operation evaluation is the likelihood that material would be made available



to other NATO navies, and there can be little doubt that Boeing will use British operational experience in refining its future development programs.

Unlike most comparable systems, the Jetfoil design uses submerged foils, these giving a far smoother ride, and allowing her to operate at higher speeds in much worse weather conditions than conventionally designed craft. Computer-controlled flaps on foil trailing edges use sensor inputs to retain a constant immersion level and also maintain the vessel's one-degree, bow-up pitch angle. This effectively prevents the vibrating motion associated with surface-effect foil types, and its passenger appeal is a major part of Jetfoil's considerable commercial success. All hydrofoils are subject to varying degrees of weather limitation and a significant part of the ship's evaluation will study this vital opera-

tional parameter. Current Fishery Protection Squadron thinking sees a wave height of between 12 and 15 feet as a notional limit, with swell length having to be taken into consideration. The operational evaluation will also study the military application of the commercial Jetfoil procedure of putting the sea on one or other bow, and then beating up in short legs to make good a given base course. This allows for foil-borne operation in sea and swell states which would otherwise be over limits.

Civil Jetfoils have no means of propulsion apart from their twin gas turbines, but HMS *Speedy* has been fitted with two Allison G.M. diesels to provide an alternative hull-borne capability, as well as a means of extending her range. The two 3,780 s.h.p. Allison 501-KF gas turbines each drive a 24,000 gallon-per-minute

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TELEPHONE - ABERDEEN/1161 EXT 342 OR 321 TELER - 72322HMS SPEEDY

HMS Speedy is a hydrofoil manufactured by Boeing Marine Systems of Seattle, USA. She is based on Boeing's commercial passenger ferry 'Jetfoil' and was commissioned into service with the Royal Navy at Portsmouth on 14 June 1980.

The purchase of HMS Speedy represents a major step for the Royal Navy into what is a completely novel field in the overall concept of small, fast-moving vessels, and brings us well to the forefront of NATO's hydrofoil evaluations. The basic craft was purchased from Boeing at a cost of some £m and fitting costs have amounted to an additional £1m. Ordered in the summer of 1976, she was launched at Seattle in July, 1979, by Mrs Peter Jay, wife of the then British Ambassador in Washington. Following arrival in the UK in November, she was fitted out (crew accommodation, boat, radio, navigation equipment, etc) at the Yeoper Thorowpexte yard at Portsmouth, near Portsmouth, and underwent a series of initial harbour and sea trials, prior to her commissioning.

The Royal Navy will evaluate HMS Speedy in a variety of roles to establish whether, in the longer term, hydrofoils are likely to be able to undertake more effectively roles currently undertaken by conventional naval ships. Trials will take the form of a number of technical and operational evaluations designed to establish possible future roles for a vessel of this type. The initial evaluations will be in the role of offshore fishery and oil/gas installation protection. This may be followed by evaluations in the anti-submarine and fast patrol boat roles.

General details

HMS Speedy is just over 27 metres long and has a maximum displacement of 117 tonnes. She is a craft of modern design and construction, drawing on technological advances in the aerospace field. Her water jet propulsion system gives her a speed when 'flying' on her fully submerged hydrodynamic foil system in excess of 40 knots, with a range of about 550 miles. Propelled by two gas turbine engines, the vessel rides clear of the sea surface on two fully submerged foils which are controlled automatically to provide greater stability in rough seas than is possible with conventional high speed craft. In addition, her overall performance and seakeeping is expected to be superior to that of conventional craft of similar size.

HMS Speedy is based on the same design as the Jetfoils currently in use as cross-channel ferries, but she is fitted with a quite different super-structure appropriate to her military role and diesel engines for hull-borne propulsion, which will give her greatly increased endurance (perhaps of the order of 1500 miles) in this mode of operation. The accommodation fit, weatherdeck equipment and communications systems are also additional.

HMS Speedy has a crew of four officers and 13 ratings initially, but actual manning levels could vary depending on the particular roles in which she is deployed and on experience gained in the course of evaluation.

Dimensions

Overall length	-	27.43m
Beam	-	9.1m
Depth	-	5.18m (foils extended) 1.83m (foils raised)
Speeds (Max/foil borne)	-	43 knots (in up to Sea State 5)
(Cruising/hull borne)	-	up to 15 knots

Key development

Following commissioning on 14 June, HMS Speedy completed her trials and acceptance programme and underwent a period of crew training at Portland with the Flag Officer Sea Training's staff. Prior to beginning her evaluations in the role of fishery/offshore installation protection a number of technical trials were completed. These included speed and manoeuvrability measurements, on board noise trials and an initial study of some of the other characteristics of this new type of naval vessel.

Following the Fishery Protection Squadron evaluation, HMS Speedy will undergo a looking and maintenance period. The longer term programme will include further, more detailed, technical trials and consideration is also being given to including the additional operational evaluations mentioned earlier.

Foreign interest in deployment of hydrofoil

The United Kingdom will be the first to deploy a jetfoil on naval duties. Other kinds of hydrofoil are currently in service with the Naval Forces of the United States, Italy, China, Pakistan and the Soviet Union. There is also a growing interest on the part of other nations in the naval deployment of the hydrofoil.

HMS Speedy is just one example of the MOD's interest in unconventional ship designs. A programme of hovercraft evaluation has existed for some time. Investigation will also continue into different kinds of "surface effect ships". Should there be any further R&D orders for the hydrofoil, Boeing would expect to transfer construction to a UK contractor so that by far the major proportion of the work would be carried out in the UK.

Previous vessels with the name HMS Speedy

HMS Speedy will be the eighth vessel of the name to serve in the Royal Navy. The first was a 158 ton brig (1782-1801) and the second a 300 ton sloop taken up from the merchant service (1803-1813). The third was a 130 ton revenue cutter with six guns (1828-1853), which had duties similar to those projected for the new Speedy. The fourth was also a patrol ship; a 330 ton wooden gunboat which was launched in 1860 and sold in 1889. The fifth was launched in 1893 as a torpedo gunboat, but converted to a minesweeper in the early 1900s. The vessel had a short World War I career as she was mined and sunk in September, 1914, while sweeping between Lowestoft and the Bamber. The sixth was a 1075 ton Admiral's 'S' Class destroyer launched in 1918 but sadly lost after a collision with a Dutch merchant ship in 1922. The last Speedy was a 815 ton minesweeper, launched in 1936, which had an active World War II career. She gained battle honours for the North Sea, Arctic and Malta convoys, and was finally sold in 1946.

Armaments

The main machinery system consists of two identical but independent (port/starboard) O2000 plants - 16 gas turbines or diesel drive-ester jet propulsion units. The Allison CT engines used are related to those fitted in the RAF Hercules aircraft.

Other equipmentCommunications

MR/SP
V/UHF
VHF/DF
Associated portable and mirror RT equipments.

Navigation

Computer assisted navigation equipment (CANE)
Dopco Radar type AC 1226
 gyro/Magnetic compass and ship's compass transmission system
 Omega/GP14
 Echo sounder

Weapons

The vessel will have no major weapon system(s) fitted during its trials role.

water pump, with inlets being located in the foils, and which have movable "buckets" to provide an astern capability. A bow thruster provides control in the athwartships plane during berthing and slow-speed turning. The docking switch, or splay facility, which sets the deflectors at varying angles from 12° to 24°, in conjunction with the engines providing a turning moment, produces the athwartships

Table 1 HMS Speedy Basic Specifications

Length	30.78m. (Foils up)
	27.43m. (Foils down)
Beam	9.14m.
Draft	5.18m. (Hull-borne, foils down)
	1.83m. (Hull-borne, foils up)
Weight	2.40m. (Foil-borne)
	117 ton (Full load)
Speeds	47 kt. (Max.)
	42/45 kt. (Cruise)
	10 kt. (Diesels)
Range	550nm. approx.
Complement	18 (5 Officers, 4 CPOs,
	9 Junior Ratings)

control and resultant sideways movement during berthing.

Time from hull- to foil-borne operation is a variable dependent on ship weight and sea state (the computation is very similar to that required prior to the takeoff or landing of any large aircraft), and is between one and two minutes. Acceleration is smooth, and in many cases can be achieved without personnel on board being aware of the transition. For this reason, and to advise of significant deceleration forces which can be experienced during some types of reversion to hull-borne operation, all transitions are advised in advance on the ship's internal broadcast system. Special crew-safety procedures have also had to be devised for "crash" reversions. While hull-borne operation generates a moderate wash, foil-borne operation does not, and port authorities have permitted Jetfoils to proceed at full speed on waters as confined as London's River Thames. This permits high-speed operation in close proximity to other vessels.

On her near-400-nautical mile passage from Portsmouth to Newcastle-on-Tyne, the *Speedy* established a host of records by taking approximately ten hours port to port. As this included a brief hull-borne spell for personnel transfer, her average speed was more than 40 knots. Evidence of her value for fishery patrol operations came from her first Rosyth-based patrol, during which she made 44 fishing vessel sightings, 30 of which took place in an hour, and her semi-rigid inflatable dinghies were used to carry out two boardings. This performance was about twice the going rate for conventional fishery protection offshore patrol vessels in the same period, and was achieved with a relatively inexperienced crew.

With weight being critical for optimum foil-borne performance, the *Speedy* is unarmed, and Royal Navy sources advise that no weapons fit is now contemplated. Fishery Protection Squadron experience is that mere Royal Navy presence is enough to result in compliance with instructions, and "night-stick-happy" policing plays no part in their thinking. Future Royal Navy hydrofoil developments could well include a limited weapons package, but probably not more than a light automatic gun or missile mounting. A small number of crew personal weapons would also be carried, but Royal Navy boarding parties are uniquely and traditionally unarmed, save in the most exceptional circumstances.

The *Speedy* has an endurance of about 14 hours, which translates into a range of 500 to 600 nautical miles. This does away with the need for extensive crew accommodations, and in fact, her facilities for both officers and ratings are Spartan. Most nights, she would be berthed alongside, with her crew living ashore, and if need be this could be done on a detached duty basis from civil ports. The need for full-standard accommodations is one which will have to be carefully assessed for any future Royal Navy hydrofoils, especially if they are larger and more sophisticated, with bigger

complements.

Her high speed makes the provision of adequate navigation equipment of paramount importance, and some of her bridge gear seems more suitable for airliner use than on board a small warship. She is controlled from the wheelhouse by an aircraft-type control column, and in aircraft fashion, takes up steep bank angles in turns. Unlike conventional vessels turning tightly at high speed, the *Speedy* only loses 1 or 2 knots, with a 180° radius of less than 400 meters. Again, unlike her conventional counterparts, she is physically steered by an officer, who has direct access to engine and foil controls for one-station handling of all maneuvers. Her operations room is located immediately below the wheelhouse, and houses the very successful Computer-Assisted Navigation Equipment system as fitted to all other offshore patrol vessels. Her radar is a Decca 1226 set, with a specially built display, and her prime navigational system is the Decca Mk-14. A proposal that some form of satellite navigation system be fitted as a replacement to the Decca is under consideration, with the eventual outcome probably being the selection of one of several recently developed systems.

Progress through the initial stages of the operational evaluation has generated a considerable amount of enthusiasm and determination among her ship's company and fishery protection staff to make the project work and establish the offshore hydrofoil concept as a viable defense system. According to First Sea Lord and Chief of Naval Staff, Admiral Sir Henry Leach, "HMS *Speedy* represents a major step for the Royal Navy in the field of small, fast-moving vessels. . . . It is obviously too soon to draw any firm conclusions, but the Service would not have procured the ship for trials and evaluation unless it was felt she had good potential."

Mr. Ferguson, the Northeast Scottish Correspondent for *Flight International* and *Aviation News*, is a frequent contributor to the *Proceedings*.

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HMS SPEEDY - THE OCEANIC CONVOY

The Scottish link with HMS Speedy is particularly strong, for it was in a ship of the same name that Lord Thomas Cochrane, 10th Earl of Dundonald, whose family lived in Oulross near Duffemuline, began his naval career; a career that was to rival even that of Horatio Nelson for heroism, military flare and seamanship.

HMS Cochrane, the fleet accommodation base at Rosyth, is named after him. The original Speedy was a coastal brig of 158 tons manned by six officers and 84 men, and her armament consisted of a mere 14 four pounder guns. Such was the smallness of the vessel that Cochrane, who was over six feet tall, had the greatest difficulty in moving between decks whose maximum head room was five feet. However, between May, 1800, and July, 1801, this diminutive ship succeeded in capturing a number of French men of war in the English Channel plus the vast (by comparison) 32 gun Spanish frigate Gamo complete with her complement of 340 officers and men. A few months later HMS Speedy drove several Spanish merchant ships ashore in the Mediterranean setting fire to them with gunfire.

The Cochrane and Speedy partnership came to a spectacular end when, in July 1801, three of the largest Spanish battleships surrounded Speedy and in spite of Lord Cochrane's brilliant seamanship in trying to avoid the devastating broadsides of the enemy she eventually had to strike her colours when all sails and masts had been shot away.

After a short period of imprisonment Cochrane escaped and after many adventures, went on to be one of the most famous and colourful seamen in British history, culminating in his commanding both the Greek and Argentinian Navies.

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HMS SPEEDY - FISHERY PROTECTION SQUADRON EVALUATOR

HMS Speedy is allocated to the Fishery Protection Squadron at Rosyth for a six month period of operational evaluation as a patrol vessel.

The operational evaluation programme will be directed by the Captain Fishery Protection (Captain John Trinder RJ) who will be responsible for drawing conclusions and making recommendations.

During the first three months, HMS Speedy will operate in as many fisheries and with as many different types of fishing vessels as possible. She will patrol to the full extent of the 200 mile fisheries limit, using many different ports of call and operating with other service vessels and aircraft.

For the next three months HMS Speedy will operate in those roles for which the initial period has shown her to be most suited, the aim being to determine the best operating patterns for such a craft to supplement our existing conventional vessels.

The objective is to give the craft a thorough trial in all Fishery Protection Squadron activities - and that includes patrols of our vital offshore gas and oil installations.

Worried at Rosyth security

Navy minister Kelth Speed said at Rosyth Naval Base yesterday he had seen the interim report of the board of inquiry into the radio-active equipment found to be missing two weeks ago from the top-security section at the Fife base.

On his return to London from Turnhouse last night, he said he would study the report in detail prior to answering Parliamentary questions put by local M.P. Mr Dick Douglas.

Mr Speed said, "The source has not yet been found but I am satisfied with the thorough search that is being made involving hundreds of people."

He admitted, however, he could not be perfectly happy with general security.

"To satisfy myself and the public the board of inquiry should address itself to security," he said.

"Obviously security was not what it should have been."

Dredging was started four days ago but had yielded nothing to the searchers.

"We will go on searching all the time," Mr Speed said. "We don't know where it is but we believe it is still within the base area."

He added that when the board of inquiry report was completed in three to four weeks' time, he hoped "as much as possible will be made public."

"There is nothing to be gained by putting it under the carpet," he said.

"I hope it has been mislaid and not deliberately taken, although there is no evidence to show a conclusion either way."

The missing spherical lead-shield container is about six inches in diameter.

Mr Speed spent most of his day with the navy on board H.M.S. Speedy on a Fisheries Protection Squadron patrol.

Speedy is the Boeing Jetfoil modified for the Royal Navy and is now half-way through a six-month evaluation period with the squadron.

In that time she has been round the United Kingdom one-and-a-half times and covered almost 7000 miles.

During her patrols she has put boarding parties on ten fishing vessels.

The most notable was the Spanish trawler Pimar caught fishing illegally by an R.A.F. Nimrod aircraft.

In the subsequent court case the prosecutor paid tribute, saying the successful prosecution was only possible because of the incredible speed of Speedy and the unique co-operation of the two services in fishery patrol.

Speedy appears over the horizon so quickly crews fishing illegally have no time to haul their gear and have had to cut it off rather than risk being caught.

● Aberdeen police are investigating the disappearance of a radio-active isotope from Aberdeen Royal Infirmary, Foresterhill. It was discovered in a city rubbish dump 24 hours after its disappearance.

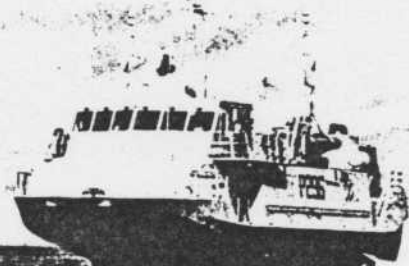


Mr Speed (right) with Vice-Admiral Sir Thomas Baird about to board H.M.S. Speedy at Rosyth.

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