AEROPLANE

13 IN-DEPTH PAGES

DATABASE

BLACKBURN SHARK

WORDS: MATTHEW WILLIS

Shark IIs from HMS *Courageous* flying in formation prior to making a mass mock attack on the British fleet as it returned from the 1937 spring cruise. *AEROPLANE*

- An 'extraordinarily stable' torpedo bomber
- Embarked with the 'Whistling Shark'
- Superior to the Swordfish?

Shark I K5625
444 Catapult Flight,
Fleet Air Arm
CHRIS SANDHAM-BAILEY

Birth of Blackburn's new torpedo bomber

The Blackburn Shark is regarded today as a minor part of Fleet Air Arm history, thoroughly eclipsed by its near-contemporary the Fairey Swordfish. The Shark served for barely two years in operational squadrons — 1935-37 — and spent most of its career in unglamorous second-line roles, only briefly facing the enemy and without conspicuous success. Yet it actually had slightly better performance than the Swordfish, handled just as well and possessed more modern features, such as an enclosed cockpit and stressed-skin structure.

In 1918, the Royal Navy first introduced torpedo aircraft intended specifically for use from aircraft carriers. By the early 1920s, the Blackburn Aeroplane and Motor Car Company had become the leading supplier of torpedo aircraft to the Fleet Air Arm, a role it would retain until the Second World War. During 1920, Blackburn developed the Swift, a large Napier Lion-powered single-seater that, as the Dart, entered service with the Fleet Air Arm in 1923. The Dart was replaced by the two-seat Ripon, and in turn by the Baffin, an upgraded Ripon powered by a Bristol Pegasus radial.

Blackburn's approach of evolving tried-and-tested designs and carefully introducing new technologies enabled its products to improve steadily in performance and capability. One such development was in metal structures, particularly suitable for naval aircraft because of their additional strength and better tolerance to the marine environment. The Ripon IIc introduced duralumin ribs and steel spars, and the experimental Ripon III of 1928 brought in an all-metal structure with a streamlined fuselage, and square-cut wings to simplify fabrication.

The pattern for RN carrier aircraft had fallen into three main types by the mid-1920s: the torpedo aircraft, the spotter-reconnaissance aircraft and the fighter. All three types could also carry bombs, but otherwise the roles were relatively distinct. In 1930, Fleet Air Arm officers began to promote the idea of a smaller number of multi-purpose types replacing the three accepted single-role aeroplanes, permitting each design to perform several roles and maximising their usefulness. As a result, the Admiralty began to consider which roles could be combined. The obvious solution was to combine the torpedo and spotter-reconnaissance requirements, as both were fulfilled by multi-place aircraft needing good endurance and load-carrying capacity.

> "The trials programme showed the aircraft to be extraordinarily stable in all axes at all speeds and loadings, engine on or off"

The aircraft that would emerge as the Shark evolved

ABOVE: The B-6 Shark prototype conducting torpedo-dropping tests from Gosport in early 1934. As designed, the Shark's torpedo gear carried the projectile with a distinct nose-down trim, which the Fleet Air Arm requested be reduced. *AEROPLANE*

from an earlier type, the B-3. This was a prototype designed by Blackburn in response to specification M1/30, which called for a torpedo bomber capable of carrying a 1,866lb Type K torpedo or a 2,000lb bomb. The specification required a top speed of 130kt (150mph) with an endurance of seven hours at cruising speed. Leading-edge slots — either fixed or automatic slats, or an alternative mechanism — were demanded to ensure control and stability at or below the stalling speed. Any engine that had passed its 100-hour type test could be used, but the Air Ministry preferred the Armstrong Siddeley Leopard or the Rolls-Royce H10, later named the Buzzard.

Blackburn offered the B-3, which showed clear lineage with the Ripon III, but was somewhat larger and cleaner aerodynamically. The prototype was lost in a crash in January 1933, but a second, more advanced B-3 was built as a private venture. The new aircraft had an entirely new fuselage of stressed-skin construction, with a 'wet' stainless steel section containing the fuel, negating the need for separate tanks. The fuselage itself was completely watertight in order to help the aircraft remain afloat after ditching. The wing cellule was similar to that of the earlier B-3, but with full-span 'flaperons'. The aircraft made its first flight at Brough in February 1933, and went to Martlesham for testing that March. It received the serial K3591 in May.

Specification M1/30 had been dropped by this time, but the Air Ministry regarded the B-3 as having considerable technical merit, particularly its watertight fuselage. By now, however, the Admiralty was fully committed to the idea of combining aircraft roles and the Air Ministry therefore merged the requirements of M1/30 with a specification for a new spotter-reconnaissance aircraft, S9/30, into S15/33. This effectively created a new category of torpedo-spotter-reconnaissance ('TSR') aircraft.

The second, revised Blackburn B-3, the true forerunner to the Shark. The aircraft was powered by a Rolls-Royce Buzzard and incorporated innovations such as a monocoque fuselage with a 'wet' section containing the fuel. BAE SYSTEMS BROUGH HERITAGE

The firms still in the running included only one that had tendered for M1/30, Blackburn, but two — Fairey and Gloster — that had prepared aircraft for S9/30. Blackburn developed the B-3 into the B-6. The sealed fuel tank section was dispensed with, but the B-6's fuselage was otherwise similar to that of the second B-3. The design of the wings was largely carried over too, but in place of a conventional wire-braced cellule the B-6 introduced 'warren truss' strut-bracing, largely eliminating wires. The wings were folded manually, but locked hydraulically, and it had pneumatic wheel brakes.

The Blackburn was designed to be powered by either an Armstrong Siddeley Tiger or a Bristol Pegasus, the prototype using the former at the insistence of the Air Ministry. Both engines weighed the same, but the 700hp Tiger IV produced more power than the contemporary 635hp Pegasus IIM. However, there were numerous disadvantages to the Tiger, which would later blight the Shark's career.

Maj Bumpus would later write (as recounted in *Canadian Wings Volume I*) that the company had made "every effort with the Air Ministry to be allowed to produce a machine with the Pegasus III engine, with a view to switching over as soon as possible, chiefly because of the troubles that constantly recurred on the Tiger. We were always, however, met with the assurance that the Tiger was a perfectly good engine, and that, in any case, there were several hundred on order and they would have to go into the Sharks."

The first true Shark — at the time still known as the B-6 — was constructed at Brough and flew on 24 August 1933, piloted by chief test pilot A. M. Blake. Once manufacturer's trials were successfully completed in November 1933, the prototype went to the Aeroplane and Armament Experimental Establishment at Martlesham Heath, where it joined its forebear, the B-3, then still undergoing tests on its handling and performance.

The first flight of the B-6 on 24 August 1933, in the hands of Blackburn chief test pilot A. M. Blake. BAE SYSTEMS BROUGH HERITAGE

Early in 1934, the prototype left Martlesham for Gosport, from where it took part in deck landing trials on HMS *Courageous*. Torpedo carriage and dropping tests were conducted during the same period. These successfully completed, the machine was finally taken on charge by the Admiralty's Directorate of Technical Development, and the Air Ministry issued the serial K4295. The Admiralty placed a small order for 16 production-standard aircraft, which Blackburn dubbed the T9 under its internal designation system.

The B-6 returned to Martlesham and an air test was conducted on 1 May. In June 1934, all three prototype TSR designs were at Martlesham, including the redesigned Fairey machine, now known as the TSRII. The name Shark was allocated that October, in accordance with the new policy under which TSR aircraft were given the names of predatory fish.

A&AEE test pilot Flt Lt Duncan Menzies flew to Brough on 1 December 1934 to collect the prototype Shark, K4295, and deliver it to Martlesham for testing after its modification to production standard. Over Norfolk, the engine suddenly cut and Menzies had to make a forced landing in a field of winter wheat, the aircraft fortunately coming to rest just before colliding with a hedge. The prototype was undamaged, the engine failure having been caused by an air lock in the oil system. It seemed at the time to be a one-off difficulty, though the oil system would turn out to be one of several powerplant-related problem areas.

Testing at Martlesham was promising. The trials programme showed the aircraft to be extraordinarily stable in all axes at all speeds and loadings, engine on or off. During the stall, the aircraft behaved well, with no control snatching or any other vicious tendency. The flaps were effective and gave good lateral control at the stall. In fact, when loaded to the

K4295 in floatplane configuration, running up its engine on the Brough slipway with dummy torpedo fitted. BAE SYSTEMS BROUGH HERITAGE

same weight as when carrying a torpedo and with the centre of gravity at the forward limit, the Shark would not spin. The A&AEE test pilots noted that all the controls were reasonably light, well harmonised for a large biplane, and quick in response at all speeds. The variable-incidence tailplane could be adjusted to trim the aircraft for various conditions of flight, and this feature was used extensively. The wheel brakes, an innovation for naval aircraft of the time, were easy to operate and effective.

Extensive testing was carried out to assess the Shark's stability in a dive while heavily loaded, crucial when dive-bombing or carrying out a torpedo attack. A number of dives were carried out at torpedo load from 9,500ft, at various throttle settings. The Shark proved steady under all circumstances, with no vibration or instability. The controls answered normally at all speeds, and it was easy to recover from the dive. Landing and take-off were similarly straightforward, and no swing was experienced. The undercarriage was described as "very good", and the Dunlop wheel brakes as "efficient", aiding the Shark's already good ground handling characteristics.

In December 1934, while the trials continued at Martlesham, Shark Is from the first small batch were issued to 820 Squadron. A full production order was placed in June 1935 for three pre-production and 53 production examples of the improved MkII, followed six months later with orders for a further 70. The MkII incorporated a redesigned engine mount, strengthened structure and a more powerful Tiger, the MkVI, rated at 760hp — though one of the pre-production machines was fitted with an 840hp Pegasus IX. The existing MkIs had their Tiger IV engines replaced with Tiger VIs.

> "The A&AEE test pilots noted that all the controls were reasonably light, well harmonised for a large biplane, and quick in response"

The switch to the Tiger VI involved an unusual operation in the process to ensure the suitability of the engine type and its installation. This would normally be carried out by the service, but the ministry asked the manufacturer to assist, and Blackburn grasped the opportunity to demonstrate publicly how dependable the MkII with its Tiger VI could be.

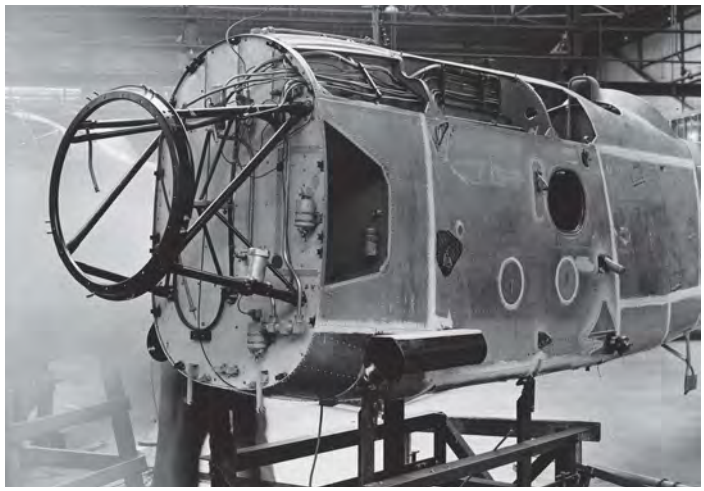
Blackburn aimed to carry out the required 100 hours of flying within a week, sharing the task between four pilots. At 03.45hrs on 8 July 1935, A. M. Blake took off for the first flight. The trial progressed in flights of three-and-a-half hours' duration, with an average of 35 minutes between each, although it proved possible to turn the aircraft around in 15 minutes. The exercise proceeded smoothly until the sixth day when bad weather halted proceedings, but 98.5 hours were completed within the week, and the 100-hour test was passed the next day. It was a significant achievement in any case, and augured well for the Shark II's Fleet Air Arm service.

Prototype K4295 was equipped in the summer of 1935 with a trial set of floats, as S15/33 required that the Shark be readily convertible from land to water undercarriage, and to allow operation from cruisers and battleships by catapult. The Shark's floats were described by the Marine Aircraft Experimental Establishment (MAEE) as having a "very efficient" design, being divided into five watertight compartments, one of which doubled up as a stowage space for an anchor, drogue and other equipment. Blackburn had designed the undercarriage so that each float was identical, without any 'handing', greatly aiding maintenance and replacement. The floats were fitted with hydraulic water rudders, which hinged downward for steering but would 'kick up' automatically if they struck an obstruction. They were fitted to the first full production MkII, K5607, for trials with the MAEE at Felixstowe.

At all weights up to the extreme maximum of 9,300lb, the controls were described as "reasonably light and positive" and response was good. As with the landplane, the Shark floatplane was stable in all axes and there were no apparent vices. The floatplane handled "extremely well" on the water. Its turning circle to port was 70 yards and to starboard 60 yards, well within requirements. Control during take-off and just after alighting was described as "distinctly good", regardless of centre of gravity position.

The B-6 taking off from HMS *Courageous* during the aircraft's carrier trials in 1934, still fitted with the short-chord cowling. BAE SYSTEMS BROUGH HERITAGE

Under the Shark's skin



ABOVE: Shark fuselages from the initial batch of MkI airframes nearing completion at Brough in 1935 — K4354 was the sixth production Shark and K4356 the eighth. Note the sealant applied to the panel joins to help render the monocoque fuselage watertight. The aircraft to the right rear are Baffins, the Shark's predecessors, which were still being delivered. *AEROPLANE*

ABOVE RIGHT: A Shark I forward fuselage showing the firewall and tubular engine mount. This proved to be susceptible to metal fatigue and several failures occurred. It was improved on the MkII. BAE SYSTEMS BROUGH HERITAGE

The Shark was a three-person, unequal-span biplane powered by a 14-cylinder Armstrong Siddeley Tiger or a nine-cylinder Bristol Pegasus air-cooled radial engine.

The fuselage was built in three sections. The forward section was a tubular steel frame attached to the firewall at the aft end, with a circular frame at the forward end on which the engine was mounted. The aft section bore the empennage and tailwheel. It was built up with sheet metal bulkheads reinforced with channel sections and ring frame, with U-section stringers, and skinned with Alclad. The main section was constructed of built-up frames connected with U-section stringers and skinned in Alclad. It extended from the firewall at the nose to the transport joint with the tail.

In the MkI and MkII the pilot had an individual open cockpit, with the observer and telegraphist air gunner (TAG) sharing a large single open cockpit just aft of the pilot's. In the MkIII and Canadian aircraft, all three crew members were covered by a single, long, glazed canopy left open at the aft end. A single machine gun on a flexible mount was installed in the rear cockpit, a Lewis in British and Canadian aircraft and a Vickers in Portuguese machines.

To allow the carriage of a torpedo the main undercarriage was of fixed, split configuration, able to fit floats or wheels. The floats were of duralumin construction and were interchangeable left and right. The landplane undercarriage was equipped with Dunlop pneumatic wheel brakes. Torpedo release gear was fitted between the undercarriage legs, and a single large bomb could be carried as an alternative to the torpedo.

The wings were unequal in span and chord, with the upper considerably larger than the lower, although of similar planform and section. The wings were slightly swept and of constant chord in the outer sections, with square tips parallel to the longitudinal datum. Both wings were fitted with full-span ailerons that also served as trailing-edge flaps. Wing and tail flying surfaces were all-metal frameworks with duralumin ribs and covered in fabric. Three bomb carriers could be fitted beneath each wing.

All but three UK-built aircraft were powered by an Armstrong Siddeley Tiger two-row moderately supercharged 14-cylinder radial engine: the MkI used the Tiger IV, the MkII and MkIII the Tiger VI, and the Portuguese MkIIa the Tiger VIC. The Canadian MkIIIs had a nine-cylinder single-row Bristol Pegasus IX engine of 840hp.

SPECIFICATIONS: SHARK II LANDPLANE

POWERPLANT:
One Armstrong Siddeley Tiger VI, 760hp
(MkI: one Armstrong Siddeley Tiger IV, 700hp; Portuguese MkIIa, one Armstrong Siddeley Tiger VIC, 700hp; Canadian MkIII, one Bristol Pegasus IX, 840hp)

DIMENSIONS:
Length: 35ft 3in
Wingspan: 46ft 0in (folded 15ft 0in)
Height: 12ft 1in

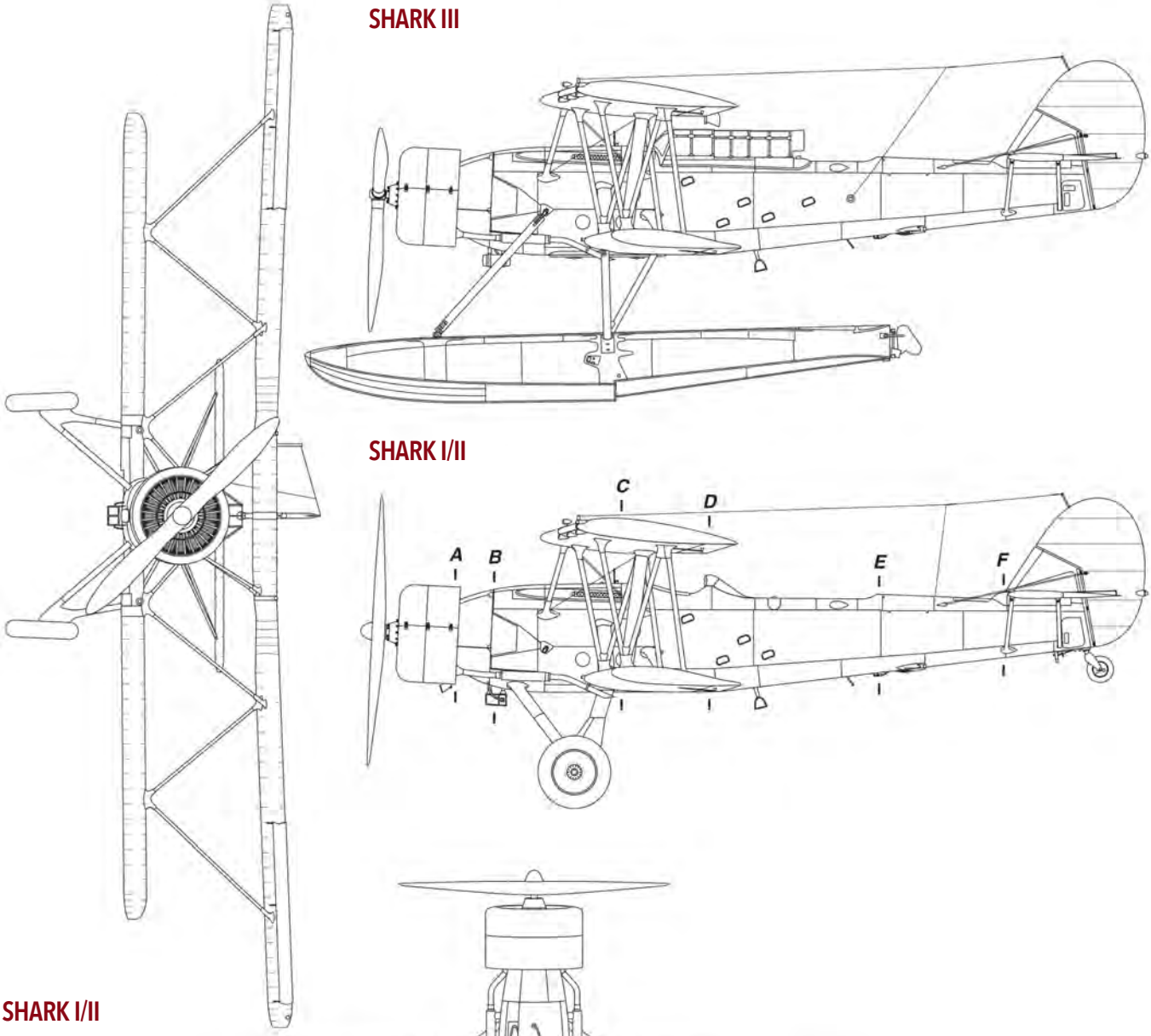
WEIGHTS:
Tare weight, torpedo or reconnaissance load: 4,596lb
Flying weight: torpedo load, 8,250lb; reconnaissance load, 7,249lb
Total military load: torpedo weight, 2,721lb; spotter/reconnaissance, 1,605.5lb

ARMAMENT:
Centreline: One 18in torpedo or 2,000lb bomb
Wings: Four 250lb or two 500lb bombs, or light-series stores carriers
Guns: One fixed, forward-facing 0.303in Vickers machine gun, one free 0.303in Lewis or Vickers machine gun

PERFORMANCE:
Top speed: torpedo load, 149mph at 5,000ft; reconnaissance load, 150mph at 5,000ft
Economical cruising speed: 130mph at 7,300ft
Service ceiling: torpedo load, 14,600ft; reconnaissance load, 17,500ft
Estimated absolute ceiling: torpedo load, 16,200ft; reconnaissance load, 18,800ft

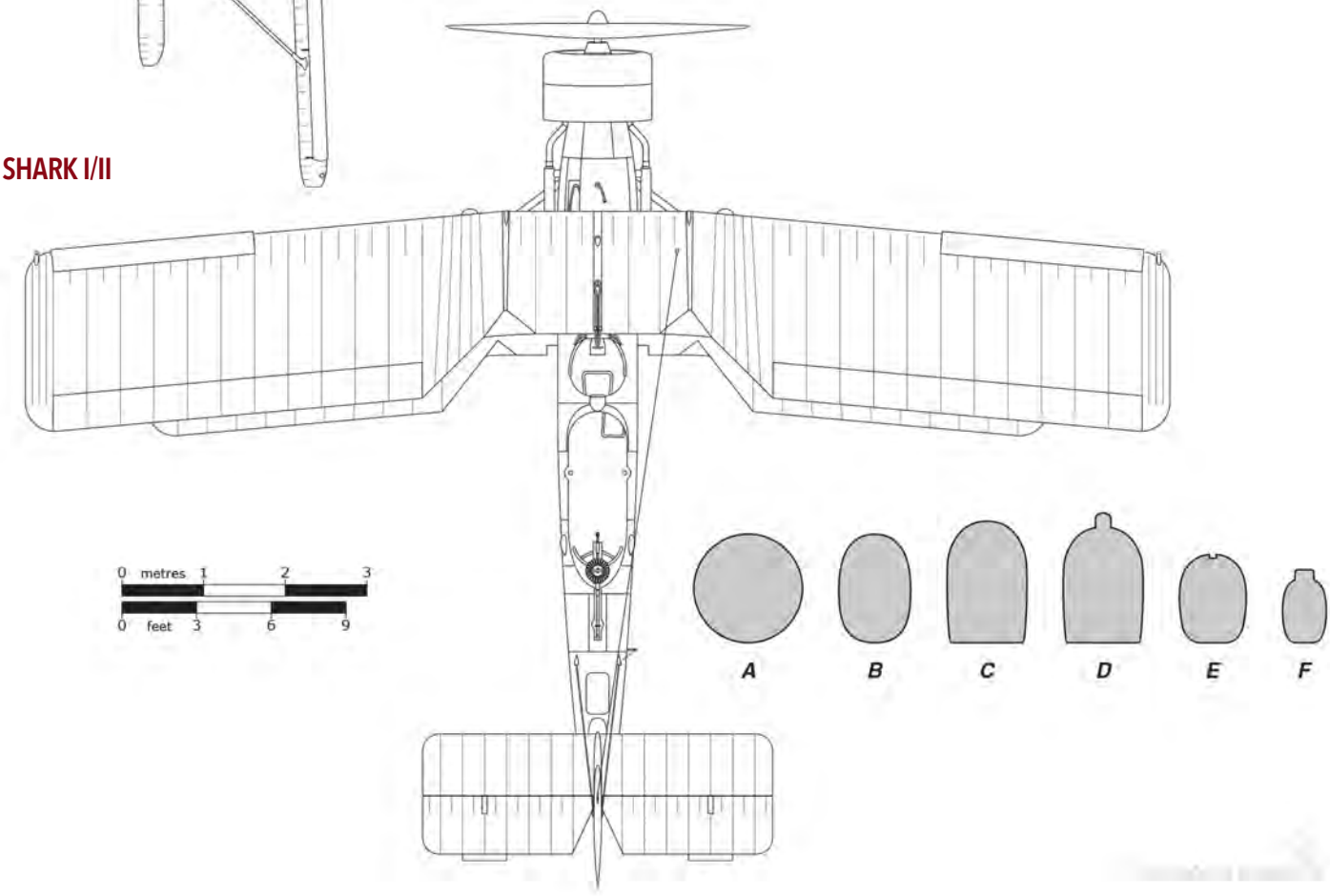
TECHNICAL DETAILS BLACKBURN SHARK

SHARK III



SHARK I/II

SHARK I/II



Shark IIs of 821 Squadron — and Baffins of 810 — about to conduct a mass take-off from HMS *Courageous* during the 1937 Coast Defence exercises. AEROPLANE

'Whistling Shark' embarked

Aside from a few slight, easily rectified problems, and the more serious matter of the engine's lack of reliability, the Shark had proved extremely satisfactory during testing. Unfortunately, the same was not true of the aircraft's early service.

Thanks to the Shark's good early performance in trials, it was able to enter service speedily. In December 1934, after only the prototype had been tested — and concurrent with trials of production aircraft — the type was allocated to 820 Naval Air Squadron, attached to HMS *Courageous*.

Despite the Shark's torpedo-bomber heritage, 820 had been a spotter-reconnaissance unit equipped with Fairey Seals. The unit was now expected to fulfil the range of strike and reconnaissance functions as well as getting used to its new aircraft. *Courageous* sailed for the Mediterranean on 5 January 1935, and remained with the Mediterranean Fleet for nearly three months, though it appears that 820 took little part in fleet exercises because of the unreliability of the Tiger IV engines.

After 820 disembarked following Exercise 'AB', it was based at Gosport, continuing to work up with its Sharks and trying to cure the various problems it suffered, apart from a two-week spell at the Second Armament Training Camp at North Coates in April. The engine maladies continued, however. When the threat of Italy invading Abyssinia became acute in August, 'A' Flight was equipped with Baffins and sailed for the Mediterranean, leaving 'B' Flight at Gosport.

In his memoir *Almost a Boffin*, Eugene E. Vielle, then an RAF officer posted to the FAA, described this period with 820 Squadron: "I joined the half of the squadron that had been left behind at Gosport and began flying the Shark — a very easy aircraft to handle… The design of the wires and struts that held the biplane together caused it to make a whistling noise and it became known as the 'Whistling Shark'. As soon as the full complement of Sharks arrived, we expected to be sent by ship (with the aircraft in packing cases) to join *Courageous* either in Malta or Egypt". Instead, though, the squadron continued training. "We made perhaps one flight a day, working slowly through a training programme involving practice bombing, dropping dummy torpedoes, night flying and — on one trip to Farnborough — learning to be shot off a catapult ('accelerator') of the types used in carriers."

A good view of a Shark with wings folded is provided by MkII K5620, here being lowered from the main deck of HMS *Courageous* into the ship's hangar. AEROPLANE

Vielle here identifies a seemingly innocuous characteristic of the Shark that later caused difficulties. The 'whistling' noise was only partly the result of the aircraft's unusual structure, which in any case had hardly any wires — most of the sound emanated from the oil cooler. This had not been picked up during testing of the B-6 because it used a different oil cooler to production aircraft. During long flights the noise could become irritating and distracting for the crew.

The Abyssinian crisis escalated in October with Italy's invasion. Neither France nor Britain wanted war with Italy, and nor were they ready for it. Their actions to resolve the crisis were only taken so far as to avoid provoking Mussolini to attack them. It cannot have helped that the Navy's most modern and

potentially capable torpedo bombers were stuck in England having their troublesome engines upgraded.

820's 'A' Flight gave up its Baffins in February 1936, and the remainder of the squadron prepared to travel to the Mediterranean, ferrying its Sharks to Sealand for dismantling and packing, while personnel sailed on the liner SS *Orsova*. All expected to join *Courageous*, and were surprised to pass the carrier returning to Gibraltar as they sailed to Alexandria. In fact, 820 was to operate from RAF Aboukir to protect the Suez Canal from possible Italian attack, or to enforce sanctions if the League of Nations decided to impose them.

On arriving at Aboukir, the Sharks were assembled and the squadron continued training, including deck-landing practice aboard HMS *Glorious*. That April 820 relocated to Heliopolis at the other end of the Suez Canal. Here, a further serious problem with the Shark I was to manifest itself, as described by Vielle: "I was cruising at about three thousand feet near the airfield, with an observer in the rear cockpit, when I suddenly felt an extremely strong vibration. The controls acted normally and the vibration did not feel aerodynamic in nature. But the moment I altered the engine setting, the vibration changed. I sensed danger — and reacted immediately. I not only closed the throttle — but also switched off the engine. That almost certainly saved our lives… I managed to land just inside the airfield boundary.

"My aircraft was towed to the parking area, where Sgt Pope listened carefully to my reasons for my actions resulting in the forced landing. He climbed up a stepladder and removed the cowling to examine the long metal struts that held the engine to the fuselage. Then one of the legs of the stepladder began sinking into the sand. He grabbed hold of one of the main struts securing the engine to the fuselage to steady himself, and it came clean off in his hand, causing him to fall and hurt his ankle. It was a scene I shall never forget — Sgt Pope lying on the ground, holding the broken metal beam, staring up at the engine incredulously, and swearing at the pain in his leg… I was thanking my sixth sense (which has saved me many times since) for causing me to switch off the engine when I did. Had I not done so, the engine would have almost certainly torn free and fallen off — making the aircraft so uncontrollable that we would not have even been able to get out and use our parachutes.

"The remaining struts holding the engine were all found to be cracked and on the point of failure too. An urgent examination of our other Sharks revealed that most had serious cracks too. Our aircraft were obviously too dangerous to fly without major modifications to the engine mountings. They were dismantled and put back into their packing cases to be returned to Blackburns."

Shark II floatplane K8502 overflies the battleship HMS *Nelson*. *AEROPLANE*

820 Squadron Shark IIs over Aboukir, Egypt in February 1937, during the course of aircraft carrier manoeuvres in the eastern Mediterranean ahead of the spring combined exercises of the Home and Mediterranean Fleets. *AEROPLANE*

The MkI was declared obsolete in early 1937 and 820 Squadron was re-equipped with Shark IIs back in England. The extent of the problems with its MkIs is reflected in the gap of more than a year before a second Shark squadron was formed. The next unit, 821, did not receive its Sharks until March 1936, and was equipped from the start with the MkII. Two more squadrons, 821 (HMS *Courageous*) and 822 (HMS *Furious*), received Sharks in 1936, as did 444 Flight, providing catapult floatplanes for HMS *Barham*, *Renown* and, from May 1936, *Repulse*. That July the 400-series series flights were replaced with 700-series units, and part of 444 Flight became 705 Flight, equipped with two Swordfish and the two Sharks previously attached to *Repulse*.

Further development of the design was in train. In January 1937 the Air Ministry placed orders for 95 further-improved Shark IIIs. Contrary to some sources, these were all powered by Tiger engines and not the Bristol Pegasus, although the type was still designed to accept either. Some, though by no means all, were fitted with three-blade propellers with a metal hub and compressed plywood blades. The biggest improvement was an enclosed cockpit to cover the crew. This had a fixed windscreen and central section, with a sliding element allowing access to the two cockpits.

During the same month, 810, 820 and 821 Squadrons embarked on HMS *Courageous*, and 822 on HMS *Furious*, for the Spring Cruise and combined exercises for the Home and Mediterranean Fleets. These exercises took on a more serious tone than many in the preceding years due to the tensions in several territories surrounding the Mediterranean — indeed, because of the Abyssinia crisis, there had been no exercises the previous year. The Spanish Civil War was in its second year, and the combined fleet was obliged to observe a strict 12-mile limit from the Spanish coast. The Arab revolt in Palestine caused further headaches for the Mediterranean Fleet, which had to detach ships to Haifa to

support local forces. So important was the air element that the three carriers proceeded to Malta weeks ahead of the rest of the Home Fleet to carry out their own exercises in the eastern Mediterranean.

The combined fleets' focus was on trade protection, and the Merchant Navy was invited to take part, as it had in 1935. The scenario played out in March 1937 was a convoy that one of the two fleets, Red and Blue, would have to attack, and the other defend until it reached its destination. The Sharks' torpedo attack and bombing capabilities made them vital to both sides. The squadrons concentrated on night flying and torpedo attacks, which turned out to be time well spent considering the successful night attacks carried out by the Fleet Air Arm during World War Two, not least at Taranto. More than 100 ships took part.

The decision to retire the Shark from front-line use was, however, imminent. Even with improved models equipping the four squadrons and two flights, accidents and failures persisted. Several fatalities occurred due to engines cutting out at dangerous times, such as on take-off. Efforts had been undertaken at the manufacturer, the A&AEE and the RAE to identify the source of the problem, eventually traced to the Robertson oil cooler. Its tubes had been fracturing from metal fatigue, leading to oil loss and engine seizures. At first it was considered that the failures might be aerodynamic in nature and related to the whistling sound that emanated from the unit, but these problems turned out to be separate.

Factory-fresh Shark III L2351, from the final production batch. The main external difference on the MkIII was the enclosed canopy. This aircraft served at the School of Navy Co-operation from delivery in 1937, then going to the Fleet Air Arm pool, before being converted to a target tug in 1938 for service at No 2 AACU. BAE SYSTEMS BROUGH HERITAGE

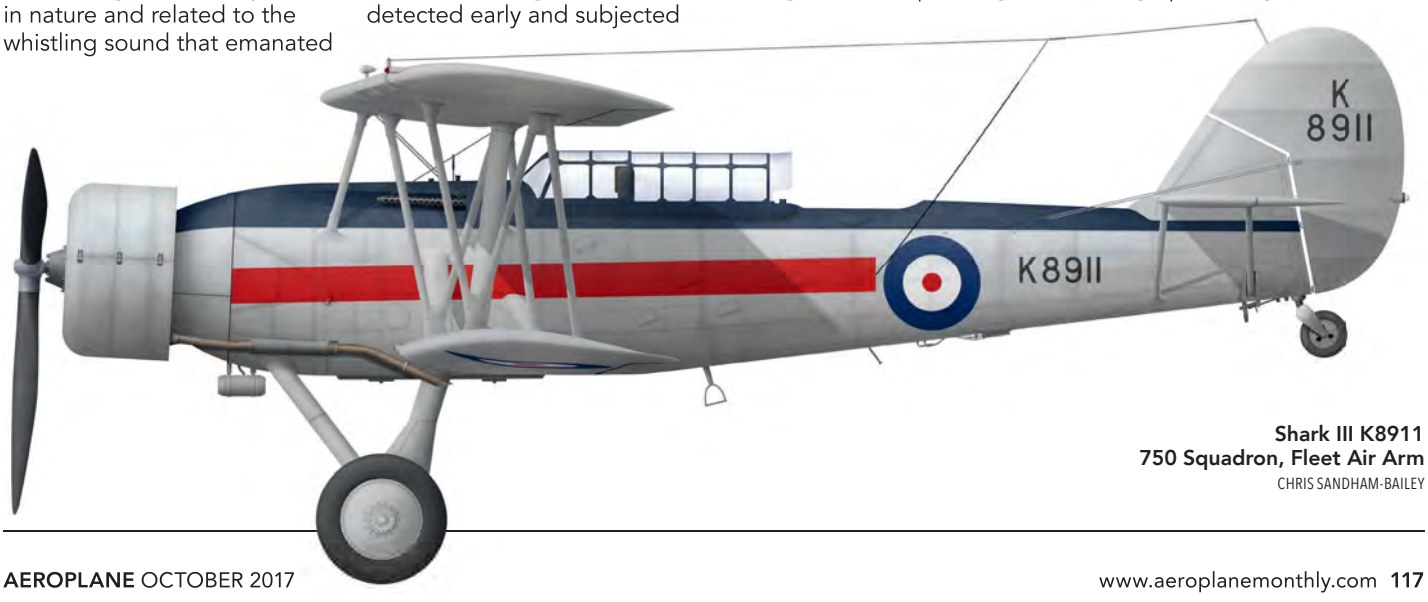
While the RAE suggested modifications to the oil coolers, the decision was taken to replace them with Marston coolers, which necessitated changing the entire oil system. Although this seemed to solve the problem, the Admiralty and Air Ministry had run out of patience. The work was to be carried out, but the Shark was relegated to second-line use, even though deliveries of the MkIII and a programme of improvement for all MkIIs — including structural and powerplant enhancements, and full upgrade to MkIII standard — were under way.

For the time being, though, all four Shark TSR squadrons were still operating their aircraft and starting to show their potential. *Furious* and *Courageous* took part in the Coast Defence exercises in July, both using their Sharks to good effect as part of Blue Force. On the Thursday of the exercise, *Courageous* was detected early and subjected to a bombing raid from shore-based aircraft and a torpedo attack, but dodged the attempts to sink it, launching a concerted air attack on Portsmouth and Portland as part of a combined assault made at dawn. The *Naval Review* of November 1937 referred to "a touch of perfection" in "Blue's close-up attacks", caused by their forces "getting inside the defences' guard and catching them unprepared". Even when the presence of a carrier force was known, the Shark squadrons proved the possibility of successfully attacking a heavily defended port. One of *Courageous*' Shark units, 810 Squadron, disembarked to Southampton to fly mock night bombing raids over Portsmouth, for the benefit of the Observer Corps and "to lend an air of reality to the proceedings" without having to undertake night deck landings.

The last two squadrons still providing Sharks for catapult use on capital ships, 701 and 705, gave them up in August 1937, and 822 exchanged its Sharks for Swordfish. The month after that, the other three TSR Shark squadrons followed suit.

There was still plenty of use for the Shark, especially with the programme of improvements, which ran to 1,000 hours per aircraft. Even then, the Tiger engines were far from reliable. Leaking oil or shedding spark plugs would be of critical importance in operational service, but on second-line duties the impact tended to be less serious, not least as the engine could generally keep running. Some Sharks were converted into dedicated target tugs, receiving the semi-official designation MkIII TT.

The Shark continued to be useful in training telegraphist air gunners in gunnery and wireless operation, observers in navigation, and pilots in deck landings and torpedo-dropping. Its robustness and docile handling helped, and many Sharks were delivered to the various flights of the School of Naval Co-operation, which later became the 700-series squadrons. Others were allocated to training schools and Anti-Aircraft Co-operation Units (AACU) for towing targets for gunnery training. Six second-line Fleet Air Arm squadrons operated the Shark when they were formed in 1939. Numerous training units continued to fly the type after war was declared: 750 and 753 Squadrons training observers, and 755, 757 and 758 Squadrons training telegraphist air gunners.



Shark III K8911
750 Squadron, Fleet Air Arm
CHRIS SANDHAM-BAILEY

Portuguese Shark IIa serial 74, code 2, taxiing on the Humber. The load here is asymmetric, with three 250lb bombs under the port wing, and a 500lb and a smaller bomb to starboard. MATTHEW WILLIS COLLECTION

OVERSEAS OPERATORS

When Portugal, Britain's oldest ally, issued a tender in 1935 for a coastal defence and patrol floatplane, it was natural that Blackburn would express interest. The Shark was a close fit for the requirement, and beat competition from European and US manufacturers in a deal for six aircraft. Three were to be fitted out as bombers, and the other three as long-range reconnaissance aircraft, though all were fitted with bomb carriers.

The Portuguese Sharks were in most respects similar to the Fleet Air Arm's MkII floatplanes, being classed as the MkIIa by the Air Ministry. Differences were minor, mainly being found in equipment such as metric instruments, and the Vickers machine gun in the rear cockpit in place of the standard Lewis. The engine was a Tiger VIc, a slightly detuned Tiger VI. For the three reconnaissance machines, Blackburn developed a 160-gallon auxiliary belly fuel tank resembling a bathtub that fitted between the main undercarriage struts. This extended the aircraft's range from 690 miles to around 1,140. The six Sharks, bearing Portuguese 'Cruz de Cristo' markings, carried out their acceptance tests for the Portuguese Naval Air Service — for which three Portuguese naval officers had been detached to Brough — in early 1936.

The aircraft were based at the Bom Sucesso Naval Aviation Centre, on the Tagus at Lisbon. They received the Portuguese serials 73 to 78, which were applied beneath the tailplanes, and wore the code numbers 1 to 6 on the forward fuselage. One well-publicised use of the aircraft came when Portugal was accused of breaching its neutrality in the Spanish Civil War by refuelling Nationalist aircraft. Shark 74/2 was dispatched with a diplomatic courier bearing a document appealing the accusation for the attention of the Commission of Non-Intervention in London. It made the flight from San Jacinto to Calshot on 22-23 October 1936 with only one stop, at Brest, making good use of the belly tank. The document was presented to the Portuguese embassy, and the Shark made the return flight from 28-30 October successfully, despite bad weather on much of the journey. However, one of the Sharks was lost in a crash into the Tejo River in 1938 due to a catastrophic failure of the upper wing, and the remaining five aircraft were withdrawn later that year.

At the same time as the Portuguese Naval Air Service was issuing its requirement for a coastal defence floatplane, the Royal Canadian Air Force was beginning its own search for such an aircraft. The RCAF discussed its needs with the British Air Ministry, which recommended the Shark, then just entering service with the Fleet Air Arm. Seven MkIIs were ordered to equip No 6 Squadron, RCAF, with float and wheel undercarriages provided. They were issued the serials 501 to 507 and shipped to Canada, arriving from October 1936. The first four were assembled at No 1 Aircraft Depot, Ottawa, from where three were flown to Trenton on Lake Ontario, one being retained to enable the depot to design and manufacture a ski undercarriage and an enclosed canopy. In the event, Blackburn's pattern for the MkIII canopy was used instead of the Canadian design. The remaining aircraft were shipped straight to Trenton.

Boeing Aircraft of Canada was awarded a contract in June 1937 to build 11 Shark IIs under licence, later changed to MkIII standard. The RCAF also agreed to buy two MkIIIs from Blackburn. Boeing hoped to be able to use one as a pattern aircraft, but in the event it was needed for squadron service. The chief difference in the Canadian MkIII was the use of the 840hp Bristol Pegasus IX, which both Blackburn and the RCAF preferred due to the ongoing problems with the Armstrong Siddeley Tiger.

It took some time to get the Blackburn-built Canadian Sharks properly into service, due to the now-familiar problems with the Tiger engine and oil system, exacerbated by the cold climate over-cooling the oil. When the improvement programme was developed by Blackburn, a set of kits was sent to Canada so they could be brought up to the appropriate standard. Only when these improvements had been made, and once the first Pegasus-engined examples arrived in April 1939, did flying begin in earnest. Six Sharks from the squadron escorted King George VI during a sea passage from Vancouver to Victoria in May that year, following which torpedo training began at Jericho Beach, Vancouver.

The first Canadian Shark, 501/FG-O, leaving the slipway at Prince Rupert, British Columbia, in 1942. The colour scheme has changed from the early one of grey, black and silver to an overall grey. RCAF 501 served with three operational squadrons, Nos 6, 4 and 7, this image showing the aircraft at the latter. MATTHEW WILLIS COLLECTION

A Shark II wearing standard temperate land scheme camouflage, some time between 1939-41.
MATTHEW WILLIS COLLECTION

THE SHARK AT WAR

At the outbreak of war, numerous second-line Fleet Air Arm units were using the Shark, while the RCAF continued with the type on its front-line strength as a coastal patrol aircraft.

One use that Sharks were put to early in the war was the training of civilian pilots to naval standards, which was the responsibility of 780 Squadron. Another was torpedo training, with 785 Squadron at Crail under the command of Lt Cdr P. G. O. Sydney Turner. There 13 Sharks fulfilled valuable service (and freed up operational types) until more service-representative aircraft were available in August 1941.

Sqn Ldr D. H. Clarke described the typical use of a No 2 Anti-Aircraft Co-operation Unit Shark in *RAF Flying Review* Volume XVII, No 7 in April 1962: "Our Sharks at Gosport were supposed to be non-operational and were used mostly for target towing — a D-type winch (with propeller-driven rewinding gear) being fitted on the port side of the rear cockpit. The drum of this would carry up to 7,000ft of wire and on the end of the wire we towed banners, sleeves, 17ft-wingspan gliders (which were launched off the centre-section like a miniature Mayo Composite) and sundry oddments."

From 11-13 June 1940, No 2 AACU provided aircraft to fly with lighted flares on target-towing cables over the Somme estuary, to help prevent E-boat attacks on the Dunkirk evacuations under cover of darkness. Clarke flew a Shark on one such mission but did not reach Abbeville before having to turn back.

The TAG training squadrons were also ordered to take steps to meet the enemy during this period, such was the pressure that UK air defences were under — and the need of the civilian population for reassurance. Ken Davies reported that, at No 1 Air Gunners' School (755 and 757 Squadrons) at Worthy Down, "about the time of Dunkirk all the aircraft were fitted with guns and took off and formated as a wing. We were impressed up there among it to see such a gaggle at one time but what we were supposed to be doing I never knew. I guess it was a show of strength to boost the morale of the population. Poor gullible souls. God help us if Jerry had appeared. Still, if our Swordfish were doing fighter patrols over the Dunkirk beaches, why shouldn't we protect England in a Shark?"

> "If our Swordfish were doing fighter patrols over the Dunkirk beaches, why shouldn't we protect England in a Shark?"

Blackburn was informed by the Air Ministry in early 1942 that the Shark was considered obsolete for all purposes, that all work on it should cease and remaining components be scrapped. The last home-based Sharks were phased out between 1941 and 1943. The largest second-line user of Sharks was 750 Squadron, which moved from Ford to Piarco Savannah on Trinidad in late 1940, to train observers in safety from German bombing. Around 40 Sharks were in use at one point, freeing valuable Swordfish for front-line roles. Fairey Albacores replaced the Sharks in 1942.

King George VI inspects the Sharks of 753 Squadron at Lee-on-Solent in 1940 before they moved to Arbroath that August. The squadron was responsible for training telegraphist air gunners, and used a mix of MkIIIs and upgraded MkIIs. *AEROPLANE*

In Canada, the last of the Boeing-built machines was delivered in early 1940. The RCAF planned two Shark squadrons, but in the event, only one — No 6 (Torpedo Bomber) Squadron — was formed, to protect the Pacific coast and the sea-lanes along it from hostile shipping.

At the outbreak of war with Germany in September 1939, the RCAF considered that the chief threat was likely to be submarines rather than the surface vessels the squadron had been formed to counter. As a result, the torpedo role was dropped and the squadron redesignated as No 6 (Bomber-Reconnaissance) Squadron. A two-aircraft detachment was established to the west of Vancouver Island while the remainder remained at Jericho Beach. The squadron was chiefly engaged early in the war in patrolling the coast and practising bombing and gunnery. A series of early take-off crashes represented an inauspicious start to operations, but these were judged to have been the result of pilot inexperience and rough water. Once the crews became more familiar with their aircraft, no mishaps were experienced for several years.

In April 1940, No 6 Squadron moved to Alliford Bay in the Queen Charlotte Islands, while five of the Sharks were transferred to No 4 Squadron at Ucluelet in the west of Vancouver Island. The initial equipment was three Shark IIs and two MkIIIs,

alongside Supermarine Stranraers, but soon the Shark flight standardised on MkIIIs.

One of No 6 Squadron's machines, 517, was lost with the death of its crew in July 1940, in a similar fashion to the Portuguese machine destroyed two years earlier: upper wing failure. The other Sharks were found to have buckling of some wing ribs and movement in the main spar, so the squadron's aircraft were shipped to Vancouver for strengthening, resuming coastal patrols in August. They were not used as dive-bombers again as a further precaution. Other squadrons' aircraft were not affected.

With the outbreak of war in the Pacific, No 6 Squadron was placed on readiness, and its Sharks were armed with bombs. Only a few days later, however, the Sharks were replaced by Supermarine Stranraer flying boats. It marked the end of the longest-serving front-line Shark squadron, which had operated the type for five years. With the Japanese entry into the war, No 4 Squadron commenced armed anti-submarine patrols, but as with No 6 Squadron the Sharks were supplanted within days. Remaining aircraft were issued to the quickly formed No 7 (BR) Squadron at Prince Rupert, British Columbia.

Meanwhile, on the other side of the Pacific, No 4 AACU had been operating at Seletar, Singapore since 1940 with a flight of six Sharks ('A' Flight) alongside de Havilland Queen Bee pilotless aircraft and Fairey Swordfish. The unit was formed to help the island's anti-aircraft gunners practise, but it was to be a Shark from this unit that was among the very few to meet the enemy in action (for more detail on this unit's involvement in the war in the east, see *Bloody Shambles: Volume 1* by Christopher Shores and Brian Hull). From May 1941, No 4 AACU's Sharks were principally used on air gunnery training. Its Shark Flight had moved to Tengah by October.

> "No 7 Squadron, RCAF carried out single-aircraft anti-submarine patrols — lasting three to four hours — several times a day in early 1942"

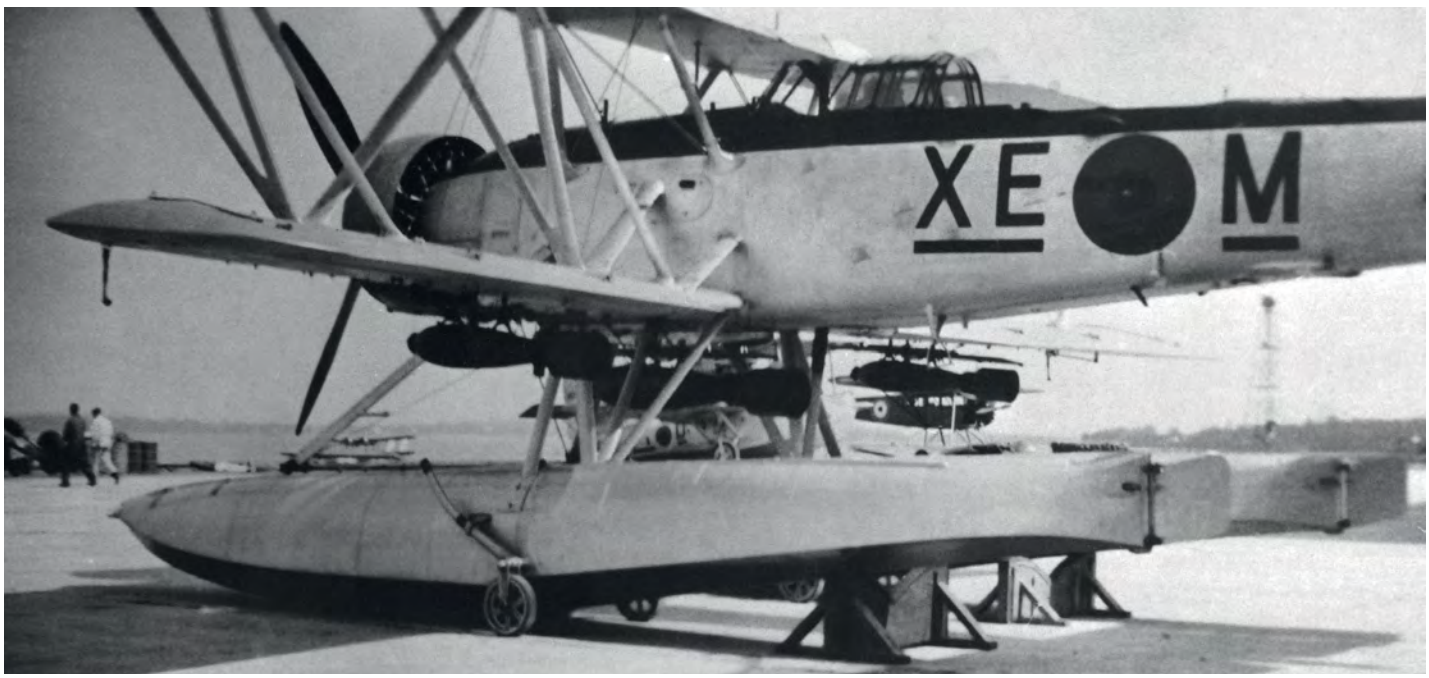
Japan launched its attack against British territories on 8 December 1941. Aircraft were in great shortage to British forces on Singapore, so many second-line machines were pressed into service. Two Sharks were among a number of aeroplanes sent on coastal anti-submarine patrols, one escorting a destroyer towing a broken-down submarine. Another Shark on dawn patrol escorted vessels returning with survivors of the devastating Japanese attack on HMS *Repulse* and HMS *Prince of Wales*. Japanese forces on the Malay mainland began to encircle the 45th Brigade, which called for assistance on 22 January.

Two Fairey Albacores from No 36 Squadron and a No 4 AACU Shark (K5621, flown by Sgt Peter Ballard and armed with four 250lb bombs) were dispatched to bomb advancing Japanese troops on the road between Muar and Batu Pahat. The three aircraft found a motor column, which they dive-bombed and strafed, doing "quite considerable damage."

The Sharks were among the last aircraft left on the island, retained to spot for the naval base's defensive guns. However, no operations of this nature were undertaken and the aircraft were probably destroyed on the ground.

The sole remaining operational Shark unit was now the Canadian No 7 Squadron, which carried out single-aircraft anti-submarine patrols — lasting three to four hours — several times a day throughout early 1942. Activity increased when Japanese forces landed on the Aleutian islands in the summer of that year, and in October WO2 Thomas sighted and attacked a submarine with depth charges. The submarine crash-dived, and it is not known if it sustained any damage. At this time, even Shark target tugs were armed and placed on readiness.

The accident rate among the No 7 Squadron Sharks increased through 1942, due to the heavy workload on the now ageing aircraft. The last Shark operation took place in September 1943, and all remaining Canadian Sharks were put in storage or converted to target tugs for service with No 122 (Composite) Squadron. The examples in this unit were themselves used heavily. The final Shark target-towing sortie was carried out in January 1944, and the only remaining function performed by the type was for deck-handling practice on Canadian-manned escort carriers.



Shark III 524/XE-M of No 6 (BR) Squadron, loaded with 250lb bombs beneath the wings and a 500lb bomb under the fuselage. The larger, squarer rudders of the Boeing-built MkIII's floats compared with their Blackburn equivalents can be seen to advantage. MATTHEW WILLIS COLLECTION

A Shark takes off for an evening flight from HMS *Courageous* during the February 1937 manoeuvres in the eastern Mediterranean.
MATTHEW WILLIS COLLECTION

Superior to the Swordfish?

The Aeroplane and Armament Experimental Establishment test pilots from Martlesham Heath remarked that the Shark was "stable in all directions for all speeds and all conditions of loading, engine on or off". In a dive, important for the aircraft's role as a dive-bomber and torpedo bomber, "the aircraft was steady throughout, there being no vibration or instability. The controls were moved through small angles at the highest speeds attained with proper response and without any control surface instability or vibration resulting". The cockpit was "roomy, easy to enter and leave, there is no undue noise", but "very cold and draughty."

Aircrew flying Sharks in service came to appreciate its steady behaviour and rugged construction. TAG Ken Davies wrote in *Telegraphist Air Gunner* (J&KH Publishing, 1999), "The old Shark was pretty docile and few people suffered qualms."

Sqn Ldr D. H. Clarke flew the type with No 2 AACU and later wrote in *RAF Flying Review* (Volume XVII, No 7, April 1962), "She was long, wide, high, heavy and solid, and yet somehow managed to look efficient, sleek (biplane standards — not jet!) and capable. Certainly she could be voted 'the aircraft I would most like to crash in'". He recounts the story of a Shark that crashed into the sea and sank to the bottom, but was later recovered and put back into service "within the month."

> "In my opinion the Shark was a superior aircraft to the Swordfish. They were both wretchedly slow, but the Shark was more comfortable"

Clarke added: "The Shark was designed as a torpedo bomber and in my opinion was a far superior aircraft to the Swordfish. She could lift almost any load without effort… they were both wretchedly slow! But the Shark was considerably more comfortable."