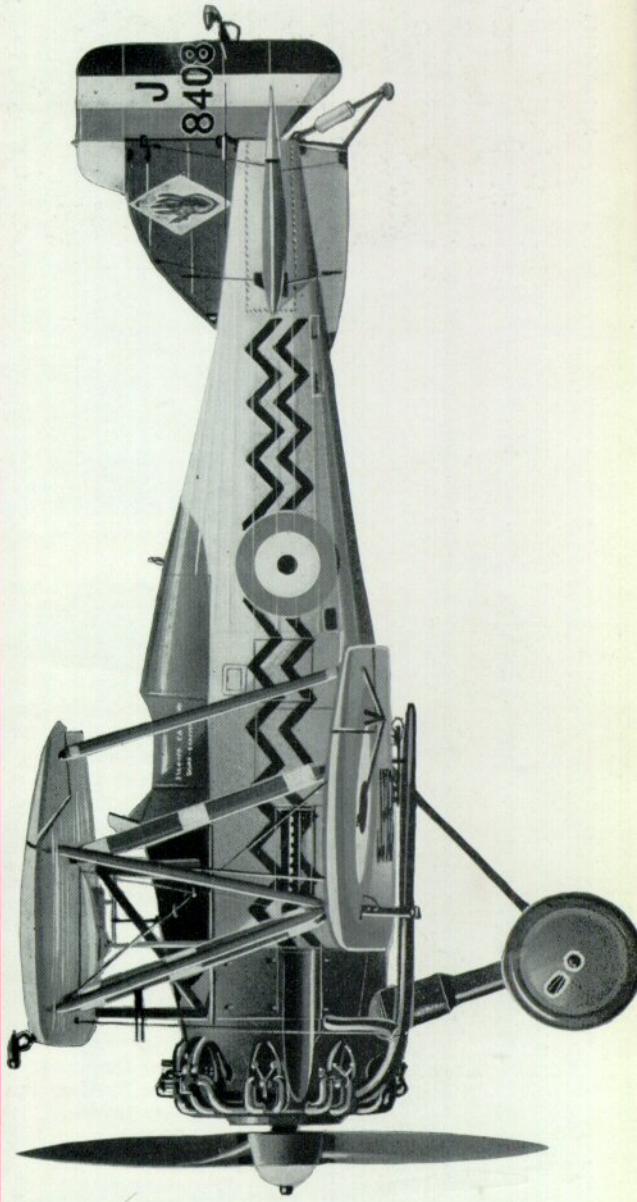
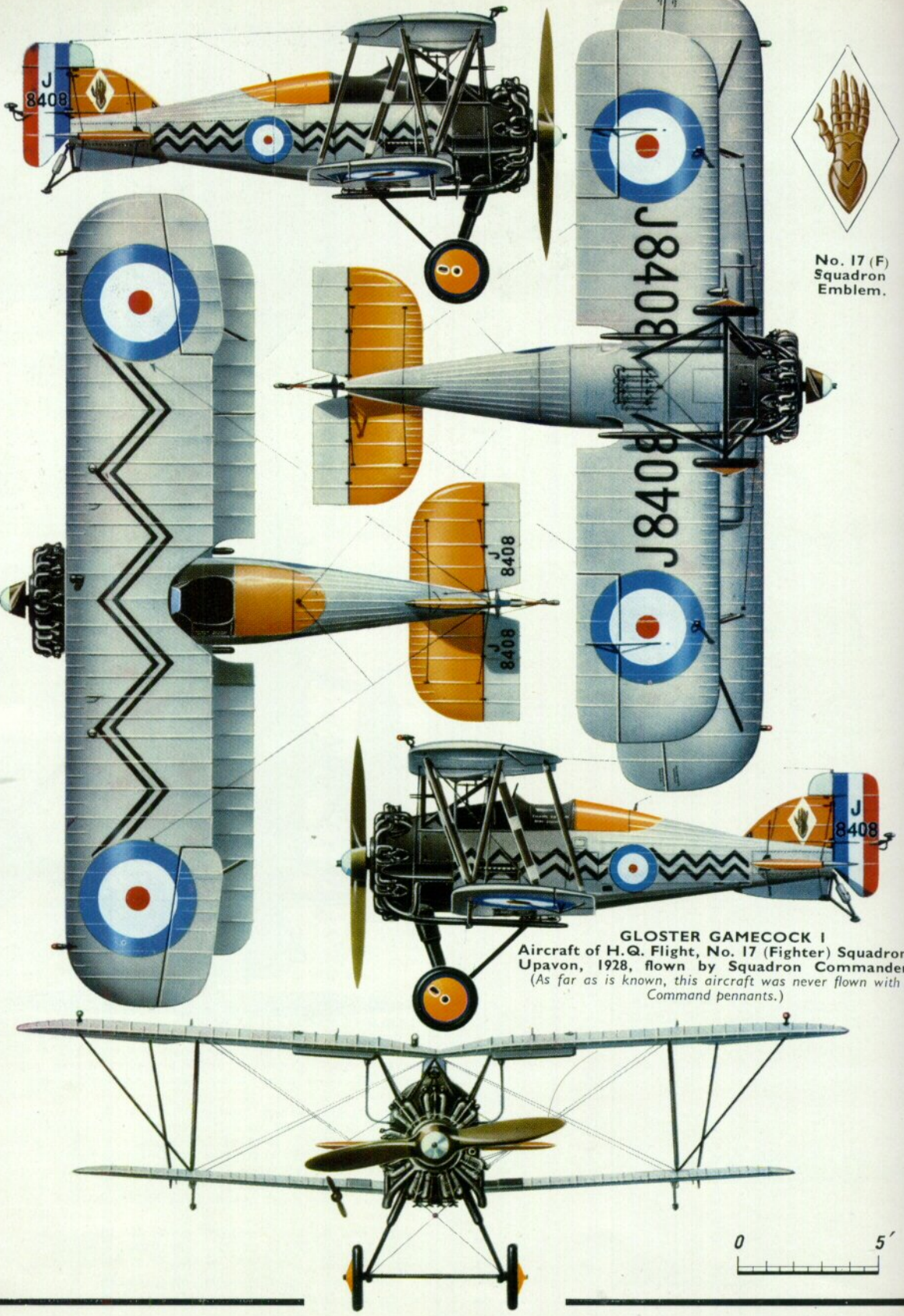
PROFILE
PUBLICATIONS

The Gloster Gamecock



NUMBER 33



No. 17 (F) Squadron Emblem.

GLOSTER GAMECOCK I

Aircraft of H.Q. Flight, No. 17 (Fighter) Squadron, Upavon, 1928, flown by Squadron Commander.

(As far as is known, this aircraft was never flown with Command pennants.)

The Gloster Gamecock

by Francis K. Mason

Gamecock of No. 23 (Fighter) Squadron taking off at Northolt during the Sassoon Cup competition in May 1929. Most squadron Gamecocks had by this time acquired the extra Vee-interplane struts. (Photo: "Flight")

The aftermath of the two world wars displayed a number of strikingly similar facets with regard to the apathetic attitudes towards Britain's armed forces. In the years following W.W.II, while America sought to exploit the tremendous momentum achieved by her gargantuan aircraft industry and maintained a smooth flow of advanced aircraft year by year (a policy which enabled the North American F-86A to uphold American ascendancy over Korea), Britian virtually accepted the wartime-designed Gloster Meteor and de Havilland Vampire as being adequate for metropolitan defence for almost ten years after VJ-Day. The result of this was a singularly pathetic technical contribution to the United Nations' responsibility in Korea. A similar technical apathy had been evident after the Armistice in 1918, and counterparts for the Gloster Meteor 4 and 8 may be recognised in the Gloster Grebe and Gamecock of twenty years earlier for, although the latter were designed some years after the war, they still employed outdated design features with little regard for advances in technology. Such aircraft as the Boeing P-12 (see *Profile* No. 2) were contemporaries of the Gamecock and, exploiting the painful disabilities of wood structures, adopted metal construction—while the British aircraft did not.

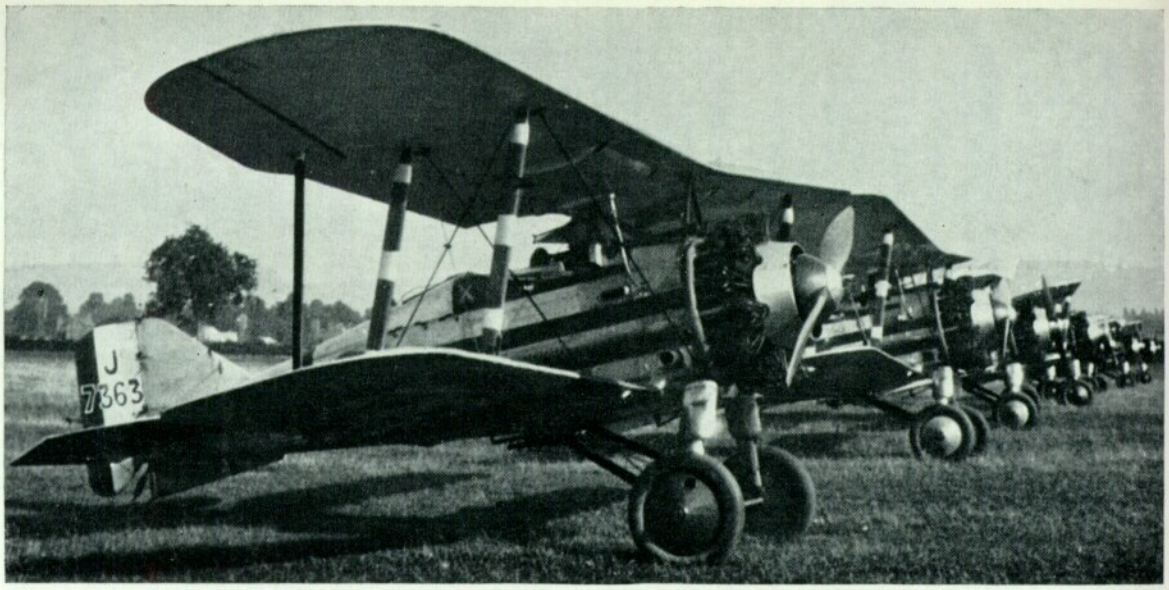
The truth lay in Britain's attitudes of mind, both political and economic. Eagerly sought and administered, the Ten-Year Rule dictated an attitude that Britain could "co-exist" with the world without fear of domestic interference, and so she set about pruning her non-essential forces to the point of near-disarmament. For several years no new fighters were produced for the R.A.F., with the result that the defence of metropolitan Britain rested upon a single squadron of Sopwith Snipes. At the same time the jealous and partisan attitudes of the Admiralty and War Office contributed nothing at all to the suvival of Britain as an air power. Indeed, only such difficult commitments as the Turkish and Iraqi operations, successfully concluded by the R.A.F., lent support to Trenchard's demands in Whitehall for survival of the flying service.

The apathy towards the Air Force and the continuing lack of support for the aircraft industry brought ruin to many British companies with the result that little or no justification for the expenditure on research was forthcoming. Any technical improvement to be seen in successive aircraft design thus lay in the individual abilities and instincts of the aircraft designers. Allied to this were the benefits from air-racing—fast gaining its old popularity of pre-war years.

As already remarked, the successful Snipe survived long after the war, but its parent company was less fortunate, Sopwiths going into liquidation in 1920. The Air Ministry issued a number of fighter specifications in 1921 and 1922, and from these stemmed designs for a Snipe replacement. The Siddeley Siskin, with the temperamental Dragonfly radial engine, suffered political birthpangs and eventually materialised as the Armstrong Siddeley Siskin III in limited R.A.F. service during 1924. The Siskin III shared the replacement honours with the Gloster Grebe which first entered service with No. 111 (Fighter) Squadron at Northolt in the autumn of 1923. Whereas the Siskin made token gesture to technical advance in adoption of mixed metal and wood construction, the Grebe still used an all-wood structure.

The Grebe, designed by H. P. Folland of the Gloucestershire Aircraft Company, owed its origins to the S.E.5 and was evolved through the multitude of fighters built for export and in prototype form (such as the Mars and Grouse) of the early 'twenties. Hallmark of the design evolved was Folland's development of a high-lift upper wing and a lower wing of "high-speed" section and moderate lift—these features contributing a characteristic manœuvrability combined with a marked increase in top speed. (Compared with the Snipe's top speed of about 120 m.p.h., the Grebe achieved 152 m.p.h.)

It was, however, in the powerplant where deficiencies lay. The 14-cylinder Jaguar engine in the Siskin and



Gloster Grebes of No. 25 (Fighter) Squadron lined up at the manufacturer's Brockworth airfield. Powered by a Jaguar engine, the Grebe represented the design transition from the wartime fighting scout concept to the pure interceptor.
(Photo: Francis Mason collection)

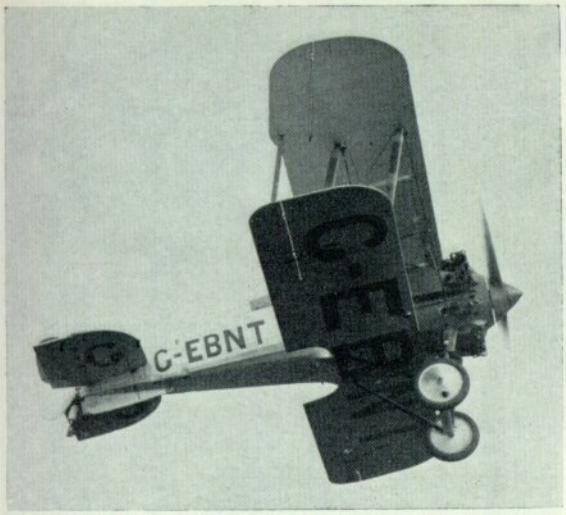
Grebe was a heavy and complex engine for its output; lubrication problems often led to fire in the air, and short engine life served to reduce the "on line" strength of a squadron to but one-fifth of its Unit Establishment. Thus the promising development of the Bristol Jupiter IV encouraged the Air Ministry to issue Specification 37/23 for a development of the Grebe to be powered by the lighter and simpler engine.

Ordered in August 1924 as a Grebe II, the prototype of the new design, *J7497*, was tested at Martlesham Heath in February 1925 with a Jupiter IV engine and unbalanced S.E.5A/Grebe-type rudder, but the latter was changed to horn-balancing in the following months. Two further Jupiter-powered Grebes were ordered in late 1924, *J7756* with Mk.IV engine, and *J7757* with Jupiter VI.

GAMECOCK PRODUCTION AND SERVICE

Following the initial trials on *J7497*, accomplished pilots at Martlesham Heath waxed enthusiastic with the new design. It is interesting, however, to note that with all their experience of shortcomings in the Grebe —notably lack of remedial stability in the spin and with wing and tail flutter—they made no mention of such failings in the new prototype; and there is no

The Gamecock prototype and company demonstrator. Differences lay in the exhaust manifold and spinner. The close-up view (above) *shows the demonstrator G-EBNT. Photos taken in March 1926.*
(Photos: "Flight")



The demonstrator G-EBNT in flight. (Photo: "Flight")

doubt that these failings existed. Such may be an early reflection on the disadvantage of placing sole reliance for assessment of new aircraft in the hands of highly experienced service evaluation pilots. (It certainly brought about the introduction of service-trained pilots to the aircraft industry.)

Prompted by this optimistic appraisal, the Air Ministry placed an order with the Gloster Aircraft Company in September 1925 for thirty Gamecock Is (*J7891–J7920*) to be powered by Bristol Jupiter VIs as fitted in the third prototype. Most of these aircraft were delivered to No. 23 (Fighter) Squadron at Henlow in May 1926, this squadron retaining Gamecocks until July 1931 when it received Bulldogs—long after other Gamecock squadrons had been re-equipped. It was at the Hendon Air Pageant of 1931 that two No. 23 Squadron Gamecocks gave a memorable display of integrated solo aerobatics—flown by Flight Lieutenant M. M. Day and a certain Pilot Officer Douglas R. S. Bader.

In July 1926, forty-two further Gamecock Is were ordered (*J8033–J8047* and *J8069–J8095*) and were followed in November that year by eighteen more (*J8405–J8422*). The sixty aircraft were issued to No. 32 Squadron at Kenley (to which airfield No. 23 Squadron also moved) and No. 43 Squadron at Tangmere. Unit Establishment of these squadrons during the nineteen-twenties was twenty-one aircraft—six aircraft in A, B and C Flights and up to three in H.Q. Flight. Replacement level in 1927 was just adequate to maintain the three squadrons at U.E.*

Nevertheless the accident rate on Gamecock Is was extremely high having regard to the numbers in service, four crashing in 1926 and eighteen in 1927. Contemporary records show that seven pilots lost their lives as the result of spinning and landing accidents, and another appears to have died after his Gamecock broke up in the air. Certainly wing flutter gave cause for Air Ministry consternation and in late 1927 additional struts were mounted outboard of the interplane struts, an innovation which, added to the aileron tie rods, gave rise to the soubriquet, Folland's "Cock's Cradle".

Notwithstanding these criticisms, for pilots long exasperated with war-weary Snipes the Gamecock was immensely popular. With careful and sensible handling it was a delightful aerobatic mount, essentially simple to maintain and a moderately steady gun platform. That great Gloster pilot, Captain Howard Saint, performed a 275-m.p.h. terminal velocity dive and retained possession of his mainplanes throughout the recovery, and several pilots survived 22-turn left-handed spins. For reasons of engine torque and slipstream blanking, however, intentional right-hand spins were dangerous owing to immediate flattening, and were forbidden. One Gamecock I, *J7910*, was experimentally fitted with narrow-chord ailerons for anti-flutter trials.

In 1928 two further R.A.F. squadrons were equipped with Gamecocks, this time with limited modification as specialist night fighters. These were the two night interceptor Squadrons, Nos. 3 and 17, at Upavon, which gave up their Hawker Woodcock IIs. Service with these units was shortlived and in May the following year No. 3 was re-equipped with Bulldogs.

G-EBNT with minor modifications to exhaust manifolds. (Photo: Imperial War Museum)

**Repaired aircraft amounted to one in 1926 and ten in 1927.*

FURTHER DEVELOPMENT

Perhaps the most characteristic of Glosters' development procedures between the wars was their ability to apply successive improvements to single prototypes over relatively long periods. The Gloster S.S. 18/19 was a first-class example of this (see the Gloster Gauntlet, *Profile* No. 10) and the Gamecock I, *J8047*, was another.

J8047 had been delivered, new and to R.A.F. standard, to the Central Flying School at Wittering in October 1926. Thence it went to the Royal Aircraft Establishment at Farnborough in April 1927 for spinning trials; recommendations following these led to the wings being repositioned a few inches aft, and further trials commenced.

Later in 1927, *J8047* returned to Glosters who virtually rebuilt the airframe with extended fuselage, revised rudder, narrow-chord ailerons and wide-track undercarriage. Unofficially termed by Glosters the Gamecock III, *J8047* was not flown by Saint until August 1928, and in November it was re-delivered to Farnborough. Here it was found to be considerably nose-heavy and was flown with ballast in the W/T tray in the aft fuselage.

By March 1929 it was back at Brockworth having the Jupiter VI replaced by a Jupiter VII (in sympathy with recent R.A.F. acceptance of this engine in the Bulldog). Thereafter and until late 1930, *J8047* was used for trials with the Hele-Shaw-Beecham variable-pitch propeller, a heavy but ingenious excrescence that demanded considerable additions to the tail ballasting, which created almost insuperable difficulties in measuring any real improvements in performance anyway!

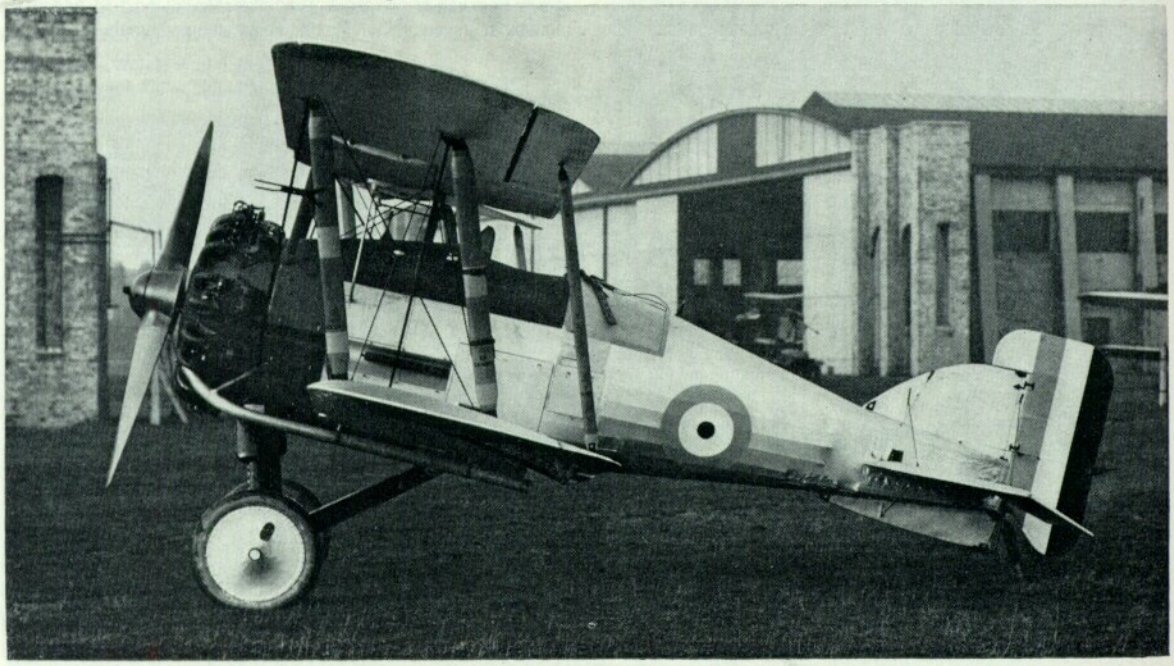
In 1932 a Jupiter VI re-appeared in *J8047* and further spinning was undertaken for academic purposes. When the Gamecock was declared obsolete in 1933, *J8047* had completed 202 flying hours and was offered for sale; its fuselage became part of *G-ADIN*, a Gamecock rebuilt by J. W. Tomkins in 1934 with a Jupiter VIIFP.

Captain Howard Saint, Chief Test Pilot of the Gloster Aircraft Company and responsible for Gamecock development flying. Photo taken in late 1926. (Photo: Hawker Siddeley Aviation)

THE GAMECOCK II

Intended as a replacement for the Gamecock I (but overtaken by the Bulldog), the Gamecock II was a company-sponsored project but one which gained official sanction in the purchase of a prototype, *J8804*, in January 1928. This was the outcome of the various 1927 trials, and included slightly larger rudder

Below and on facing page: *Fitted with narrow-chord ailerons, Gamecock J7910 was used in some of the many "anti-flutter" trials of 1927 both at Brockworth and Farnborough.* (Photo: "Flight")

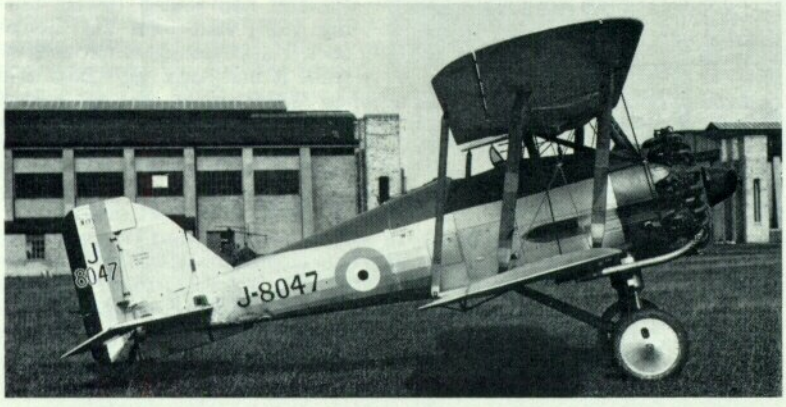


Gamecock J7905 *of No. 43 Squadron with night flying equipment and Aldis gunsight.* J7904 *in background displays chequered top fuselage decking and flight leader's chequered pennants.*
(Photo: Ministry of Defence)

and narrow-chord ailerons. One other aircraft, previously *J8075* from the Gamecock I production, was used in the flight trials of the Bristol Mercury IIA engine and was eventually brought up to Gamecock II standard.

Judging by A. & A.E.E. reports on *J8804*, the Gamecock II displayed a great improvement over the Mark I—especially in handling—few of the earlier vices remaining. However, R.A.F. service was not for the Gamecock II, and Glosters faced something of a crisis with the end of Mark I production. A delegation from Finland had visited Britain during 1927, had seen the Gamecock I and seemed impressed by what it had seen. No order had been placed, but when *J8804* performed a number of demonstration flights in 1928 fresh interest was generated. Two pattern aircraft were ordered from Brockworth and these were delivered by sea to Helsinki in November that year; within six months,

Gamecocks of No. 43 (Fighter) Squadron at the Birmingham Air Pageant of June 1928. Note additional interplane struts and also Flight Commander's pennants, coloured wheel discs and fins. (Photo: "Flight")



Two views of the experimental Gamecock III J8047 *at an early stage in its career (August 1928) showing parallel-chord ailerons, lengthened fuselage and enlarged fin.* (Photos: "Flight")

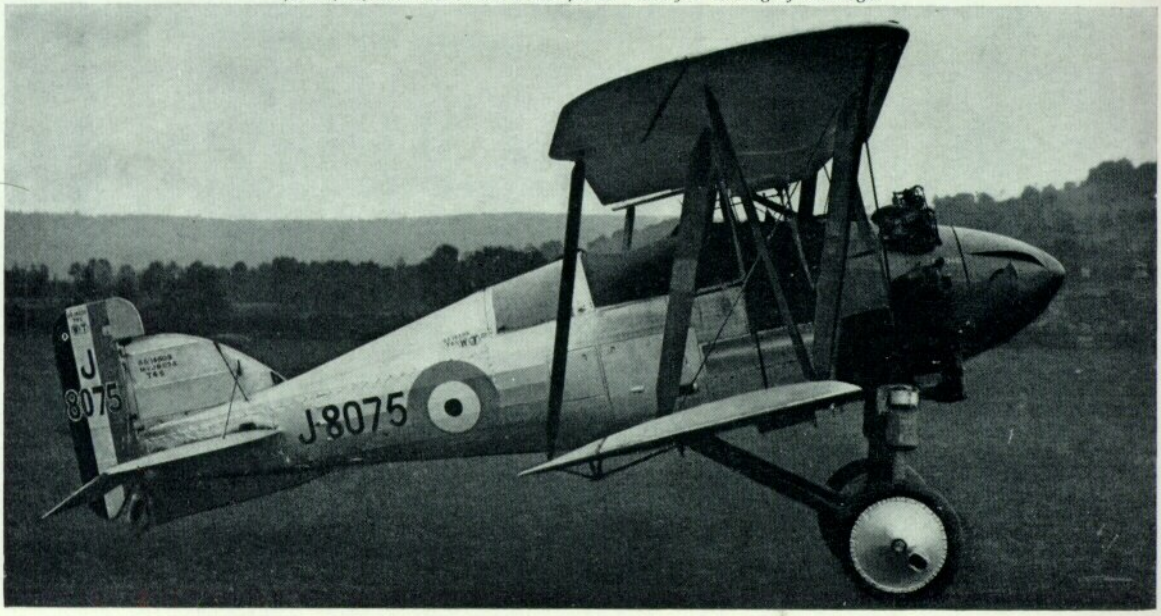
licence-built Gamecock IIs (with interchangeable wheel and ski landing gear) were being produced in Finland. At home, the entry into R.A.F. service of the 174-m.p.h. metal Bulldog spelt the end of the 152-m.p.h. all-wooden Gamecock—and also the end of an era. Not even the technically-starved Royal Air Force of 1930 could long endure the ridiculous anomaly of supporting the maintenance spectrum whose responsibility ranged from the Gamecock to the Fury, *via* the Bulldog. And so in July 1931, No. 23 Squadron gave up the last operational Gamecocks to receive Bulldogs, and in March 1933 the Gamecock was declared obsolete for all R.A.F. purposes, at the same time as that other great aeroplane of the nineteen-twenties, the Fairey Fox light bomber.

FLYING THE GAMECOCK

Immensely popular in the air, the Gamecock presented fewer pitfalls than the Grebe, but the wary pilot was nevertheless mindful of legion warnings and in-flight limitations. Due to the high cockpit position, pilot vision on the ground was good but when lined up for take-off, as in the air, the upper wing constituted a severe handicap; for downward view, the lower wing could scarcely have been located worse! Take-off was sprightly, the elevators becoming effective at about 20 m.p.h. despite the short fuselage, As speed increased to 90–100 m.p.h. lateral control improved, but care was needed when raising the nose as speed decreased very quickly, and if a wing dropped lateral control was quite inadequate to avert a spin.

Owing to the large mass of the propeller, right-hand spins were more easily entered than left and were tricky to handle. The conventional "stick-forward-full-opposite-rudder" remedy was seldom entirely

Below and on facing page: *Another experimental Gamecock was* J8075, *used in 1929 for flight trials of the Hele-Shaw variable-pitch propeller. Louvres on the spinner were for cooling of bearings.*



Finnish Gamecock II in "pre-delivery" colour scheme. Anti-glare panel extended aft to the fin. Aircraft were dismantled after flight test for delivery by sea.
(Photos: "Flight")

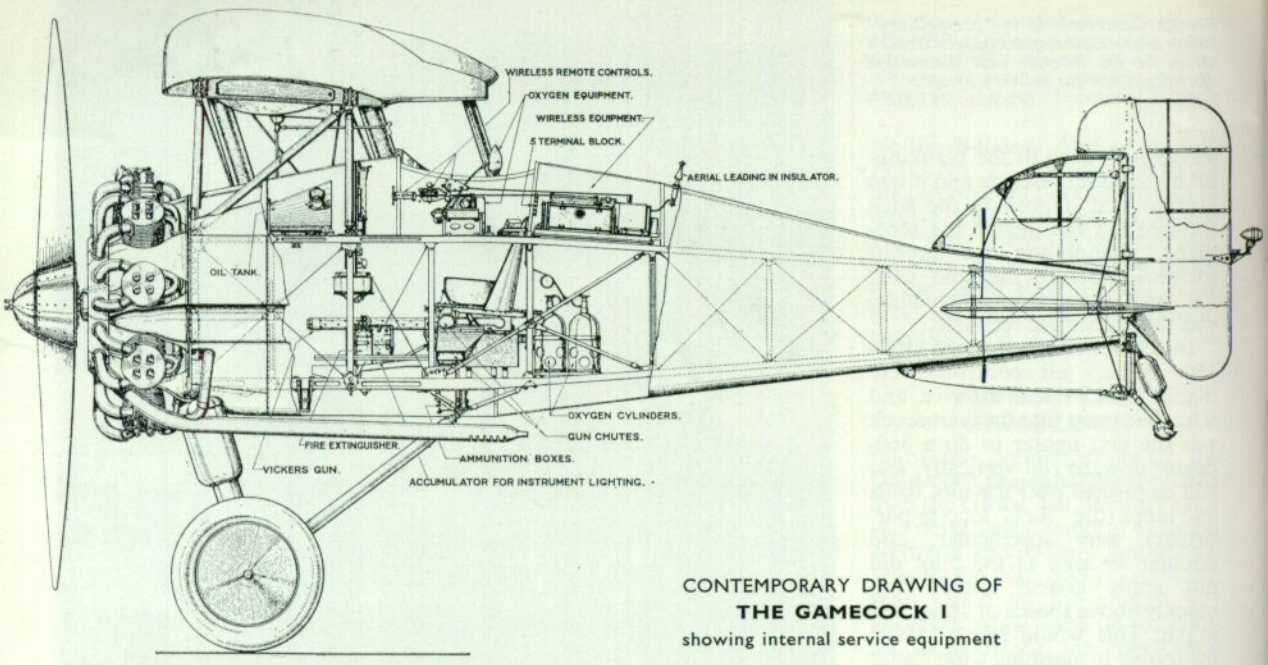
successful owing to the blanking-off by the deep fuselage and it was averred that if pushing the stick forward did not unstall the aeroplane, abandoning the aircraft forthwith (before the spin went flat and utterly uncontrollable) was the immediate recourse.

In the upper speed range (100–150 m.p.h.) all controls were highly sensitive and effective, and it has been said that the Gamecock was the first fighter to do a 360-degree upward roll vertically, and still be pushed over the top. Rolls and loops (the "flick" loop in particular) were spectacular, and popular so long as the pilot did not apply coarse aileron too quickly above speeds of about 130 m.p.h. This would result almost invariably in alarming wing flutter for which the only remedy was to cut the throttle, centralise the controls and then slowly raise the nose. Too often, however, the onset of flutter was manifest during a roll or in the course of a diving turn and the effects were so destructive that the tip flutter would be accompanied by the loss of one or two ailerons and the possibly disastrous fracture of an interplane strut.

As with so many aircraft of those years, prolonged inverted flying was impossible and even in rolls and loops ignition usually failed momentarily until gravity restored the fuel supply. Low level rolls were therefore discouraged as insufficient height existed to air-start the engine-

In the landing phase a tail-down attitude was important due to the lack of propeller clearance, and this entailed some degree of yawing to maintain forward visibility. Touchdown at 42 m.p.h. could be effected by use of plenty of throttle, but coarse throttle movement in the approach was accompanied by sympathetic rolling. The inexperienced pilot was advised to touchdown at rather higher speeds as instinctive corrections to rolling on the approach often led to wing-dropping (one-wing stall) and disastrous results.

No wheelbrakes were fitted, but on grass landing surfaces the tailskid contributed—by ploughing a furrow—to pull the aeroplane up in well under 100 yards.

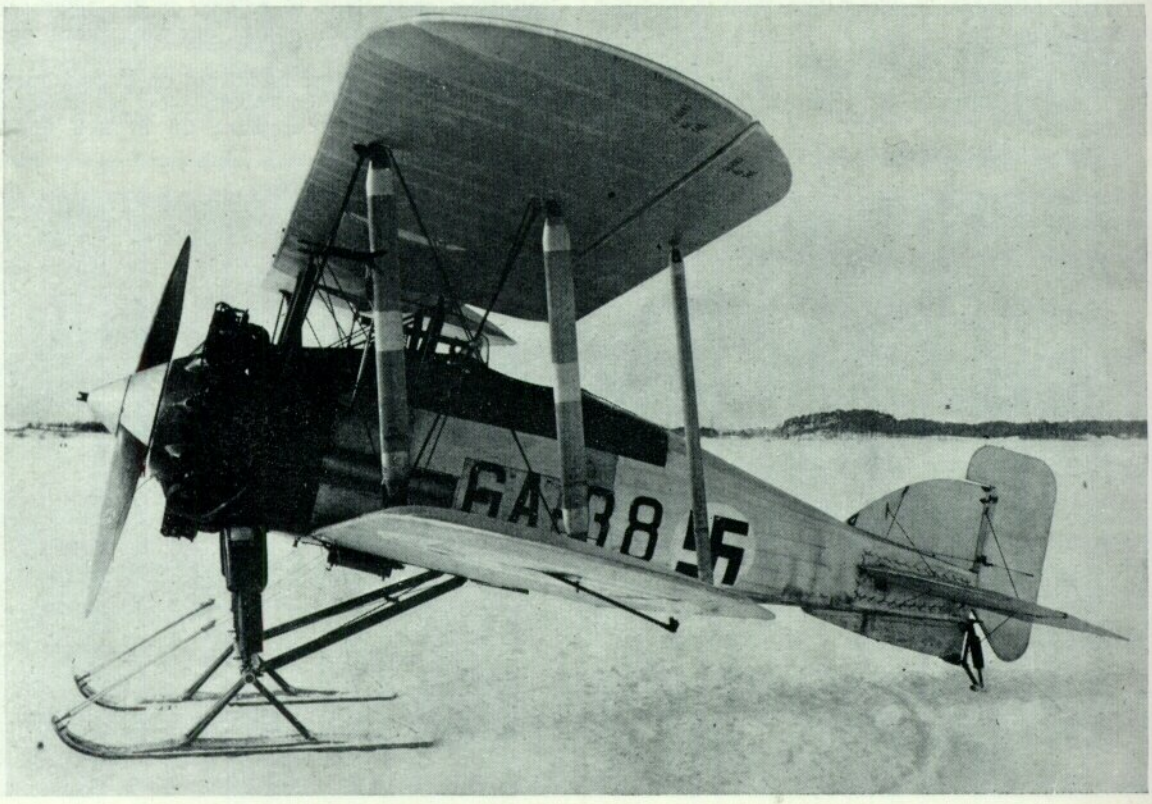


CONTEMPORARY DRAWING OF
THE GAMECOCK I
showing internal service equipment

THE GAMECOCK DESCRIBED

Structure of the Gamecock was almost entirely of wood. The fuselage was a built-up structure using ash longerons with ash, spruce or laminated ply supports and distancing struts, the whole box structure being tensioned by rigging wires with turnbuckles attached to bolts passed through fishplates on the longerons. There were four single-piece bulkheads: the front bulkhead, of mild steel plate, carried the engine attached by nine radial bolts. No. 2 bulkhead was a fireproof screen consisting of an $\frac{1}{8}$-in. sheet of asbestos sandwiched between sheets of aluminium. No. 3 bulkhead carried the instrument panel and fire extinguisher, and the rear bulkhead accommodated

Ski-equipped Gamecock (GA-38) of the Finnish Air Force. Note swastika on the airscrew blade. (Photo: Finnish Air Force)



Gamecock I,
No. 19 Fighter Squadron, Duxford.

Gamecock prototype
with Grebe fin and rudder.

Squadron Leader's
pennant.

Gamecock I, No. 23 Fighter
Squadron, Henlow. The
Squadron Commander's a/c.

Silhouette of No. 23 Sqdn.
badge—Eagle with prey in its claws.
Motto—*Semper Agressus.*

Upperwing squadron marking.

Gamecock I, No. 32
Fighter Squadron, Kenley.

Gamecock I,
No. 43 Fighter
Squadron, Tangmere.
'A' Flight
Commander's a/c.

Upperwing squadron marking.
Upperwing squadron markings
varied in position and proportions
from time to time.

Gamecock I,
Finnish Air Force.

Gamecock I,
No. 43 Fighter Squadron,
Tangmere.

Upperwing Hinomaru position.

Nakajima Type 3; AINI, early model. Japanese
Naval Air Force. Used in some numbers during
the Shanghai Incident and Sino-Japanese war,
subsequently used as fighter trainer.

Nakajima Type 3; AINI-2,
Licence-built version of the
Gambet, 1929–35.

No. 23 (Fighter) Squadron Gamecocks J7914 *and* J8409 *at Northolt for the 1929 Sassoon Cup. Fuselage and wing dicing were alternate red and blue squares; fuselage roundel size differed between aircraft.* (Photo: "Flight")

mountings for the pilot's seat and brackets for the machine guns on each side of the fuselage. Three more strut-fabricated bulkheads provided rear fuselage strength aft of the cockpit, and aft of these structure bays were three sets of side struts culminating in a sternpost to which were attached rudder hinges and tailskid. The underfin was a relic of the S.E.5 design. All joints in this wooden structure were faced with plywood, wrapped with tape and reinforced with fishplates.

The upper wing was built up in two halves, meeting at a butt joint on the aircraft centreline. The two main spars were made of spruce and there were two alternative designs; one in which the spars were produced from one piece of timber, and the other in which laminated strips of timber were used. The laminated spar was more commonly used owing to the difficulty of obtaining sound timber of the length required for the whole spar. Ailerons were fitted in both upper and lower wings, control runs passing through the lower wing and movement being transmitted to the upper ailerons through tie-rods. Wings, tail surfaces and rear fuselage were fabric covered.

The uncowled nine-cylinder Bristol Jupiter VI engine drove a wooden fixed-pitch two-blade propeller. Sixty gallons of fuel were carried in two top wing gravity tanks, gravity feed being employed and controlled by a manual stopcock on the port side of the cockpit, and by cocks on the feed pipes under the top wing. A six-gallon oil tank was situated immediately forward of the instrument panel.

Armament consisted of two 0·303-in. Vickers Mk.I machine guns mounted on trays on the sides of the fuselage and synchronised to fire through the airscrew. Six hundred rounds of Mark VII ammunition were fed to each gun from magazine boxes mounted between Nos. 4 and 5 bulkheads. Both Aldis and ring-and-bead gunsights were included, the former on the aircraft centreline and the latter offset to starboard. Four 20-lb. bomb racks were attachable to the underfuselage; bomb release was by toggle and Bowden cable.

SPECIFICATION OF GAMECOCK I

Powerplant: 425-h.p. Bristol Jupiter VI nine-cylinder air-cooled radial engine driving 2-blade fixed-pitch wooden propeller.

Dimensions: Wing span, upper wing 29 ft. 9½ in.; lower wing 25 ft. 11 in. Chord, upper wing 5 ft. 3 in.; lower wing 5 ft. 2½ in. Incidence, upper wing 3 degrees; lower wing 2 degrees. Dihedral 4 degrees. Stagger 20 in. Total area 264 sq. ft. Wing loading 10·85 lb./sq. ft. Tailplane span 9 ft. Overall length 19 ft. 8 in. Overall height (aircraft centreline horizontal) 9 ft. 8 in. Undercarriage 750×125 mm. Palmer No. 77 wheels, 5 ft. track.

Fuel and Oil: Total fuel capacity 60 Imp. gal. Oil capacity 6 Imp. gal.

Radio and Equipment: R.31 receiver, T.25 transmitter; two 500 litre oxygen cylinders; fire extinguisher.

Weights: Empty 1,930 lb. Loaded 2,863 lb. Overload 2,980 lb.

Performance: Maximum speeds, 155 m.p.h. at 5,000 ft.; 145 m.p.h. at 10,000 ft. Time to height 7 min. 40 sec. to 10,000 ft.; 20 min. to 20,000 ft. Service ceiling 22,100 ft. Absolute ceiling 22,900 ft. Range at best range speed 365 statute miles.

Armament: Two 0·303-in. Vickers Mk.I machine guns with 600 rounds per gun allowing approximately 25 seconds duration of fire.

PRODUCTION

Three prototypes (ordered as Grebe IIs) *J7497, J7756, J7757.*

First production batch, 30 aircraft, ordered in 9/25, *J7891–J7920.*

Second production batch, 42 aircraft, ordered in 7/26, *J8033–J8047, J8069–8095.*

Third production batch, 18 aircraft, ordered in 11/26, *J8405–J8422.*

Gamecock II: One aircraft, *J8804*, newly built; one other, *J8075*, previously a Mark I modified to Mark II state. Two pattern aircraft built for Finland; further licence production of Mark II in Finland.

SERVICE ALLOCATION

Representative aircraft in R.A.F. service

No. 3 (Fighter) Squadron, Upavon: *J8407, J8410, J8411,*

No. 17 (Fighter) Squadron, Upavon: *J8405, J8408, J8414.*

No. 23 (Fighter) Squadron, Henlow and Kenley: *J7894, J7895, J7898, J7903, J7907, J7914. J7915, J8040, J8041, J8082, J8406, J8420, J8421.*

No. 32 (Fighter) Squadron, Kenley: *J7907, J7909, J8420.*

No. 43 (Fighter) Squadron, Tangmere: *J7905, J7906, J7908, J8037, J8090, J8415, J8418, J8421.*

Central Flying School, Wittering: *J8046, J8047, J8089.*

Armament & Gunnery School, Eastchurch: *J8033, J8034.*

PRINTED IN ENGLAND. © Profile Publications Ltd., P.O. Box 26, Leatherhead, Surrey, England,
by George Falkner & Sons Ltd., for McCorquodale City Printing Division, London.