

BRISTOL SCOUT C/D & ROYAL AIRCRAFT FACTORY SE-5a

A COMPLEMENTARY FIRST WORLD WAR DUO

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INTRODUCTION

In April 2015 the centenary of the Anzac landing on Gallipoli will be widely commemorated. Queensland Air Museum (QAM) could be in an excellent position to participate in these ceremonies and pay tribute to those early Australian airmen who served over 1914-18. Some of these had served on Gallipoli before transferring to the Australian Flying Corps (AFC) or in several cases to the Royal Flying Corps (RFC). Replicas of the Bristol Scout and the Royal Aircraft Factories S.E.5a could display arguably the two best British aircrafts in their respective category, one from 1914/16 and the other from 1917/18 and could form as an excellent memorial to these airmen. Both aircraft had strong connections with early Australian service aviation and the Scout directly with the Dardanelles campaign.

A replica of the Bristol Scout is already in the Museum's collection. It was a high speed (for the time) single seat scout and was one of the outstanding British aircraft of 1914/15. With the earlier development of suitable offensive weaponry (the synchronised forward firing machine gun) it could have been the outstanding fighting scout (fighter aircraft) of that time. It was flown by the RFC and by the Royal Naval Air Service (RNAS), including, by the latter's Aegean Wing during the Dardanelles campaign in 1915. It was also used by the AFC in Sinai/Palestine in late 1916. Only ever issued to squadrons in small numbers 10 are known to have served with 1 Sqn AFC in Sinai/Palestine and four with 6 Training Sqn in Britain. As well one Bristol Scout came to Australia, for use at Point Cook, in 1916.

The other possible half of this memorial duo is the Royal Aircraft Factory's outstanding SE-5a. In December 1917, at the other end of the war, No 2 Sqn AFC began receiving the S.E.5a and took them into action in France very early in 1918. However, a number of Australians serving with RFC squadrons had already had successful encounters with the enemy while flying the SE-5a and in the case of Queensland born Major R.S Dallas later with 40 Sqn RAF. In all 133 SE-5a are recorded as having been flown by 2 Sqn AFC pilots while a further 25 are listed as used by two AFC training squadrons, 5 & 6, in Britain.

As well, the fledgling Royal Australian Air Force, formed in 1921, received some 35 SE-5a, as part of the "Imperial Gift" of aircraft to the Dominions. A number of these served as the new services first fighter aircraft and remained in use until 1927/28.

QAM is presently attempting to establish this dual memorial display with plans to build a full size S.E.5a replica to complement the Bristol Scout. All that is required to build it are finances for purchase of the materials and fittings. Detailed plans are on hand and labour for its construction is also available.

The aircraft, if successfully financed, will be finished as one of those flown by Major R.S Dallas, D.S.O., D.S.C. and Bar and *Croix de Guerre* (at least 39 victories), born 29th July 1892 at Mount Stanley, Qld. Initially a very successful Sopwith Triplane pilot with the RNAS he was killed in June 1918 flying an SE-5a while in command of 40 Sqn RAF. Two S.E.5a, B4879 and D3511, appear against his name as aircraft he flew.

BRISTOL SCOUTS

The single seat Bristol Baby Biplane (First flying (ff) February 1914) was initially built for racing but was retrospectively classified as the Bristol Scout A when the two slightly modified, but yet to fly, successors were taken over by the British Royal Flying Corp as Scout Bs at the outbreak of World War I. The A was a contemporary of the Sopwith SS-1 Tabloid (ff November 1913). Although the initial Tabloid, also a racer, had two side by side seats and a balanced rudder the one built for entry into the April 1914 Schneider Trophy Seaplane Race was given a fin and plain rudder and reduced to a single seat. In this form, without floats, it was selected for service use as the SS-1 Tabloid. Both designs were further developed and produced in quantity. In total 374 Scouts were produced, 161Cs (ff February 1915) and 210 of the developed D Scouts (ff January 1916). This compares with c40 SS-1 Tabloids plus 137 of the seaplane version, the Schneider (ff November 1914). The latter was developed further into the Baby (ff 1916 286 built) making a total of 474 of the Tabloids family.

Other late 1913/1914 British single seat biplane contemporaries of the Bristol included the Avro 511 Arrowhead (ff early 1914, 1 built), the latter a scaled down single seat, single bay Avro 504, Armstrong Whitworth FK-1 (ff September 1914, 1 built), Martinsyde S1 (ff October 1914, c65 built) and the Royal Aircraft Factory BS-1/SE-2 (ff October 1913, 1 built). The SE-2 was developed into the SE-4 (ff June 1914, 1 SE4 & four quite different SE4a, ff June 1915, built). The SEs were the precursors of "the Factories" highly successful SE5/5a of 1917-18 (ff December 1916, over 5 200 built).

TABLE 1

SPECIFICATIONS & PERFORMANCE – BRISTOL SCOUT, SOPWITH TABLOID & NIEUPORT "BEBE"

	Bristol Scout C	Sopwith SS.1 Tabloid	Nieuport 11C.1 "Bebe"
Engine	59.6kW (80hp) Gnome 7cyl rotary	59.6kW (80hp) Gnome 7cyl rotary	59.6kw (80hp) Le Rhone 9cyl rotary
Wing Span	7.5m 24ft 7in	7.77m 25ft 6in	7.55m 24ft 9.25in
Length	6.3m 20ft 8in	6.20m 20ft 4in	5.80m 19ft 0.5in
Height	2.59m 8ft 6in	2.57m 8ft 5in.	2.45m 8ft 0.5in
Wing Area	18.4sq m 198sq ft	22.42sq m 241.3sq ft	13.00sq m 139.9sq ft
Weight Take off	542kg 1 195lb	508kg 1 120lb	480kg 1 058lb
Weight Empty	343kg 757lb	329kg 730lb	kg lb
Maximum Speed	149.2km/h 92.7mph at sea level	148km/h 92mph at sea level	156km/h 96.8mph at sea level
Climb to 3 048m (10 000ft)	21min 20sec		15min c20sec
Service Ceiling	4 724m 15 500ft	4 572m 15 000ft	4 600 m 15 092ft
Endurance	2.5hr	3.5hr	2.5hr

Other outstanding single seat scouts of that period were the monoplane Fokker M5 (E1, ff May 1914, 68 built) in Germany, the monoplane Morane Saulnier N "Bullet" (ff c May 1914, 49 N built) and the sesquiplane Nieuport Ni 11 "Bebe" (ff cMay 1914, many built) in France. The Fokker was developed into the highly successful EII, EIII and EIV of 1915 with 359 built. The Morane N was derived from the widely built 1912 Type H several of which were converted to racers. The N was developed into the very similar but more powerful or slightly enlarged I, V and AC (the latter 31 built) of 1916. Again these were monoplanes. The

Morane N was one of the first aircraft to have a successful device for firing through the propeller, all be it metal plates to protect the blades. The Ni 11 was a sesquiplane, initially designed for the 1914 racing season (as the Nieuport XB, a scaled down version of the two seat Ni 10). As the Ni 11 the XB was widely used as a fighting scout. It was probably the most successful of all the early single seat scouts. It was also produced in quantity in both Russia and Italy (646 in Italy) and was copied by the Dutch Trompenberg firm (10 built out of 20 ordered) and in Germany by both Euler (70+ D1 built) and Siemens-Schuckert (94 D-1, 1a, 1b built). From the Ni 11 came the successful Ni 17, 21, 23, 24, 25 and 27 series.

When it first emerged the Baby Biplane (Scout A) had small wings, a small rudder, an engine cowling without a frontal opening and a narrow track undercarriage but these defects were soon corrected. The wing span was increased from the initial 22ft (6.7m) to 24.7ft (7.5m) with the wing area of 161.5sq ft (15sq m) increased to 198sq ft (18.4sq m) and these dimensions essentially remained standard for the B, C and D models. Length also increased slightly, by 11in (18cm). The engine cowling was quickly given a central cut out to improve engine cooling and the rudder was progressively increased in surface area throughout the development of the design, even the late production Ds had an increase in rudder area over the earlier ones. The same balanced rudder style and shape were retained throughout.

The two Scout B that had been requisitioned at the start of the war were tested in both Britain and France. This led to major orders for the practically identical Scout C powered by either 80hp (60kW) Gnome or 80hp (60kW) Le Rhone rotary engines. Both British air services ordered them, the Royal Flying Corp (RFC) receiving 87 and Royal Naval Air Service (RNAS) 74. Their major use was for reconnaissance or scouting. A new version, the Scout D, was developed with progressive changes to the basic C from November 1915. It did not reach its final form until January 1916. The development included structural changes, a larger rudder, provision for fitting a Challenger synchronised Vickers gun, and, after the first 50 for the RFC, new wings. The Vickers gun was often not fitted, especially by the RNAS, who preferred an over wing Lewis gun. A variety of engines, from 80hp (60kW) Gnome to 110hp (82kW) Clerget, were fitted, those for training uses having the lower powered engines. The RFC received 130 and the RNAS 80 Scout Ds, sixty of the latter with the 100hp (75kW) Gnome Monosoupape engine.

The Bristol Scouts were the most outstanding of the above British list and because of their speed were, like the Moranes, colloquially known as "Bullets". Only ever issued to RFC squadrons in small number for fast scouting purposes they were initially unarmed except for personal weapons carried by the pilot and sometimes containers of small steel (Rankin) darts for dropping on Zeppelins. They were however at the forefront of the development of means of attack with Lewis guns initially set at cockpit level to fire diagonally outside the propeller arc or sometimes even through it without arrester gear. Various later field improvisations allowed the Lewis gun to be fired over the top of the propeller. In March 1916 the Scout Ds were the first British scouts to take a synchronised machine gun into action. A Scout C was the first wheeled aircraft to be flown from an aircraft carrier and another Scout C was taken aloft in April 1916 sitting on the top wing of a Porte Baby flying boat from where it was successfully launched. Single Scout Ds were passed to France, Greece, Australia (see below) and the USA. America was apparently still planning to build it as late as 1918.

Australian Connections

From mid-1915 No 2, Aegean Wing, RNAS had four Scout Cs on strength based on the island of Imbros. These took part in the Dardanelles campaign. The Australian Flying Corps (AFC) also operated Scouts in Sinai/Palestine in late 1916 and at training schools in Britain. Isaacs (1971) lists serial numbers for three Scout C and seven Ds operated by 1 Sqn in

Palestine and one C and three Ds used by 6 (Trg) Sqn in England. Those issued to 1 Sqn, AFC in Egypt/Palestine helped protect the Australian Light Horsemen as they advanced across Sinai in late 1916. These advances were the concluding stages of their first campaign, after evacuation from Gallipoli the previous December. The campaign had started with their advance to the Romani oasis system on Easter Sunday 1916.

As well one Scout D was purchased in mid 1916 for use at Point Cook. Fitted with a 100hp (75kW) Gnome Monosoupape, 8976 arrived in late September 1916. It was taken on charge as C.F.S.10, later changed to C.F.S.4 and only flown by Instructors and advanced students being regarded as too hard to handle for elementary students. It was transferred to the RAAF when that was formed in 1921 and remained at Point Cook as the "CO's ship" under the serial 8976. Struck off charge in August 1926 the airframe was given to Footscray Technical College later that year.

The replica Bristol Scout C/D in the QAM collection was built as a D by the cartoonist Will Mitchell with the intention of flying it with a Volkswagon engine. However as there was insufficient official supervision during its construction it was refused a permit to fly and was purchased by Ken Woodrow and Mike Adams and presented to the Museum in 1980. Initially marked as the Australian D, 8976 / C.F.S.4 it went on loan to the Museum of Australian Army Flying at Oakey, Qld in December 1989. There the VW engine was removed and the forward fuselage re-worked in the correct style to cover a replica Gnome Monosoupape engine. It was repainted in "olive drab" finish and marked as 5321. Isaac (p170) lists this serial as a D but Bruce (1991) shows 5321 as the sixth last serial in the final batch of Cs (Serials 5291-5327) with the first D contract beginning with 5554. 5321 was one of the aircraft that served in Sinai/ Palestine with 1 Sqn AFC. In contradiction to his listing (p170) Isaacs (p67) says that in September 1916 a full page photo appeared in the Sydney Mail of "*Scout C 5321 in low-level flight over an Anzac camp near Suez*". This replica returned to QAM in May 1994 where it has remained on permanent display inside the front door.

ROYAL AIRCRAFT FACTORY S.E.5/5a

The B.S.1 (ff January 1913, 1 built) was the start of a search for a high speed, high performance scouting aircraft. It was a single seat, equal span biplane with a circular fuselage of semi-monocoque construction. It and all its successors, until the S.E.5, were powered by rotary engines, usually 80hp (60kW) Gnomes. The B.S.1 crashed in March 1913 and was rebuilt, initially to be the B.S.2 but the designation was quickly changed to S.E.2 (ff October 1913, 1 built). After testing by service pilots in early 1914 it was fairly drastically rebuilt (unofficially as the S.E.2a) (ff October 1914). This included fitting a new tail and replacing the rear monocoque fuselage with a more conventional tail section. In official records it remained the "reconstructed S.E.2" and in late October it went to France and did not return until March 1915. Meanwhile the S.E.3 had been designed but not built. Instead the S.E.4 (ff June 1914, 1 built) was produced. This was extremely fast with a maximum speed of 135mph (211km/hr) and a climb of better than 1 600ft/min (880m/min) but only an endurance of one hour. It crashed in August 1914 and was not rebuilt. Instead effort went into the totally different design, for some unknown reason designated the S.E.4a (ff June 1915, 4 built) the last flying August 1915. An over wing Lewis gun had been planned for them. Several were tested with Le Rhone and Clerget engines. The 4a was particularly designed to examine the relationships between stability and manoeuvrability.

The S.E.5

The result of these studies was the outstanding S.E.5 (ff November, 1916, 58 built). The S.E.5 flew within five weeks of the Sopwith Camel, its only competitor for the title of best British fighter aircraft of 1917/18. They were designed to totally different concepts. The Camel with an air cooled rotary engine, light weight, no dihedral on the top wing and considerable agility. The S.E.5 with an inline water cooled engine, was heavier with considerable dihedral on both wings which made it a very stable gun platform but it was still adequately manoeuvrable and could dive and climb faster and was more forgiving of ham-fisted, newly trained, pilots. It was regarded as just as easy for them to handle as the Camel was difficult.

One of the keys to S.E.5 success was the Hispano-Suiza engine, a water cooled, eight cylinder, V-type, initially a direct drive, of 150hp (112kW) power. It was the design of a Spanish motor vehicle company based on Barcelona. This first ran in February 1915. The French quickly took an interest in it and arranged licence production and continued development. Britain ordered 50 of the 150hp version from France in August 1915. These were slow to arrive the first not being received until August 1916. In the meantime, in Britain, a licence produced version was ordered as the Wolseley Python. Britain also took an interest in the developing 200hp (149kW) gear driven version. This interest was such that the S.E.5 was initially designed around the 200hp version but this was slow completing its development testing so the initial batches of S.E.5s (58 in total) were fitted with the direct drive 150hp (112kW) engine.

The original armament intended for the S.E.5 was a Lewis gun firing through the hollow propeller drive shaft of the geared engine. This avoided the weight and extra complication of the gun synchronising gear. However with the initial use of the direct drive engine and the increasing need for more firepower the armament was changed to a synchronised Vickers in the top of the forward fuselage with the second gun, a Lewis, on a sliding Foster mount above the wing. There was insufficient room to mount a second Vickers without unduly reducing the fuel tank capacity. As it turned out some pilots, in some situations, found the moveable Lewis gun very useful and effective.

The development of the S.E.5 took a serious turn when, in January 1917, the port wing on the prototype collapsed and it crashed killing the pilot. Appropriate modifications, including fitting stronger lift-bracing wires, were quickly introduced and testing proceeded. At the same time the wing span was reduced by 15.5 inches (39.4cm), giving a blunter tip. However occasional wing failures in combat were reported even in the 5a.

Early machines had two gravity tanks sitting on the top wing centre section. These were soon moved to a tank moulded into the leading edge of this wing centre section. These early aircraft also had a variety of exhaust manifolds, some with the exhaust pipe a short L shape exiting from the front, others with the outlet mid-section and others with a short rear mounted pipe. The final and standard arrangement were long pipes beside the fuselage reaching to beside the cockpit. There was also a large transparent wind screen semi-enclosing the cockpit. This was quickly removed in service. Production machines were issued to 56 Sqn in mid-March 1917 for action from mid-April in France. They quickly began to make a name for themselves and the aircraft but by June the first of the S.E.5a were being received and the 5s withdrawn for training. The S.E.5 was also issued to four other squadrons as full or part of their equipment.

The S.E.5a

The third prototype S.E.5 was fitted with a French built 200hp (149kW) geared Hispano-Suiza engine making it effectively the first S.E.5a (ff January 1917, c5 125 built). This model soon ran into trouble with a faulty batch of engines from one of the French suppliers, Brasier, These had inadequately hardened gear wheels and other defects. As well various British firms, which had earlier been contracted to licence produce both the 150 and 200hp engines, were having troubles. These problems severely restricted the completion and issue of the S.E.5a. In January 1918 400 new airframes were available awaiting engines. Meanwhile SE.5as were fitted with the geared French engines, from other sources, including a reliable Mayen- built batch, but they were slow coming to hand. Others engines eventually fitted included the Wolseley W.4A Viper, an ungeared high compression version of the 150hp engine This was produced through a miss understanding of an initial order for 400 of the lower powered type. The Viper, first installed in August 1917, was to become the standard engine for later production batches of the S.E.5a as it gave the best performance. Several other engines including the Wolseley W.4B Adder, a geared 200hp version of the Hispano-Suiza, and the Sunbeam Arab were tested and rejected.

The early 5a fitted with French Hispano-Suiza engine generally had a four blade propeller, most others only two blade ones. Nose shapes varied with engine fitted, the Hispano ones having a smoother rounded profile and only one single round topped radiator. The Viper eventually had a very distinct, angular, square cut front caused by two separate long radiator banks and short horizontal shutters, the latter made necessary, on all engines, by the ability to operate at high, cold altitudes. The geared engines had a higher thrust line than that of the Viper and other ungeared engines. On these it was quite low.

Other important modifications necessary to the basic design were to strengthen the undercarriage, replacing the original steel tube V type with a more robust virtually three strut (two faired together) wooden type. The improved version was fitted to many aircraft coming into depots for repair. As well a small fabric covered head rest was fitted behind the cockpit. These were sometimes removed by individual pilots to improve their rear vision.

TABLE 2

SPECIFICATIONS & PERFORMANCE – S.E.5/5a & SOPWITH CAMEL

	Royal Aircraft Factory S.E.5 (Prod,n)	Royal Aircraft Factory S.E.5a	Sopwith F.1. Camel
Engine	112kW (150hp) Hispano-Suiza 8A 8cyl direct-drive, in-line V. liquid cooled	149kW (200hp) Wolseley W.4a Viper 8cyl direct-drive, in-line V. liquid cooled	97kW (130hp) Clerget 9B 9cyl rotary air cooled
Wing Span	8.11m 26ft 7.5in	8.11m 26ft 7.5in	8.53m 28ft
Length	6.5m 21ft 4in	6.37m 20ft 11in	5.72m 18ft 9in
Height	2.87m 9ft 5in	2.9m 9ft 6in.	2.59m 8ft 6in
Wing Area	22.83sq m 246sq ft	22.83sq m 246sq ft	21.46sq m 231sq ft
Weight Take off	875.5kg 1 930lb	880kg 1 940lb	659kg 1 453lb
Weight Empty	635kg 1 399lb	694.5kg 1 531lb	421kg 929lb
Maximum Speed	213km/h 132.5mph at 3 048m 10 000ft	222km/h 138mph at sea level	185km/h 115mph at 1980m 6 500ft
Climb to 3 048m (10 000ft)	13min 40sec	11min	10.35min
Service Ceiling	6 706m 22 000ft	5 944m 19 500ft	5 774m 19 000ft
Endurance	2.5hr	2.5hr	2.5hr

On joint patrols the S.E.5a provided high altitude cover with the Sopwith Camel covering the middle flight levels. By the end of the war there were 16 squadrons, including 2 Sqn AFC and the two Americans, in France equipped with the S.E.5a and a further six in the various Middle East theatres and one Canadian working up. While it was not officially declared obsolete until September 1923 it ceased to be used by front line squadrons soon after the armistice. The Sopwith Snipe taking over this use. A number were converted to two seats for training purposes in 1918.

Post war at least 50 reached the civil register in Britain where 33 were used in the 1920-28 period to pioneer the art of aerial sign writing. Of these three still exist in museums. Coming from other sources a number of S.E.s were re-engined with a range from 80hp (60kW) Renault to 300hp (224kW) Hispano-Suiza engines.

While constructed using the fuselage and tail unit of a crashed S.E.5a, the S.E.5b (ff April 1918, 1 built) was virtually a new design. It was a sesquiplane with unequal chord wings, raked inter-plane struts, a smooth, streamlined cowling around a de-g geared 200hp Hispano-Suiza engine and a retractable under slung radiator. Its performance was no improvement and a return to the standard S.E.5a wings had no effect either so it was not progressed further. Strangely, while the change from 150 (112kW) to 200hp (149kW) engines warranted the change of designation to 5a, all standard airframes with the various 200hp (149kW) engines kept the primary designation of S.E.5a. It is strange that at least the Hispano-Suiza and Wolseley Viper powered aircraft were not distinguished at this level.

Serial numbers were issued for some 5 790 S.E.5/5a in Britain with 400 cancelled with the armistice and 5 205 taken on charge. British contractors actually produced 5 269. As well a considerable number were rebuilt, from damaged airframe, in the field repair depots and usually allotted new serials.

S.E.5a Australian Connections

In 1918 No 2 Sqn AFC flew the Royal Aircraft Factory's outstanding SE-5a which it began receiving in December 1917 and took into action in France very early the next year. Their first success being recorded in mid-February. However a number of Australians serving with Royal Flying Corps squadrons had had successful encounters with the enemy while flying the SE-5A. In all 133 SE-5A are recorded as having been flown by 2 Sqn AFC pilots while a further 25 are listed as being used by two AFC training squadrons 5 & 6 in Britain.

As well the fledgling Royal Australian Air Force, formed in 1921, received, as part of the "Imperial Gift" of aircraft to the Dominions, 35 SE-5a. A number of these served as the new services first fighter aircraft and remained in use until 1927/28. Some were erected and used immediately at Point Cook but most did not go to squadrons until 1925 when Nos 1 & 3 Sqn receive one flight each of SEs. Many were in such poor condition when finally un-crated that they were written off without reassembly.

Only one is believed to have survived intact, A2-4 is in the Australian War Memorial, Canberra. This was one of those never assembled for service use. A non-flying replica of A2-31, built in the UK, is on display in the RAAF Museum, Point Cook. As well the metal wreckage of A2-11, which crashed in 1927 in rugged country near Cootamundra, NSW and was not discovered until April 1963, was retrieved by RAAF personnel for the museum in 1992. These were to be displayed as recovered. As well, a recent report, Australian Aviation - August 2010, indicated one, reputed to be A2-25, was under restoration in the UK. Parts of the original A2-25 were sent to the MSB laboratory for testing after it crashed. It was written off February 1929 but in May 1930 an unidentified airframe was approved for issue to

Sydney Technical College. Is this the residue of A2-25 now in the UK where its restoration is under way?

One, possibly A2-2 or a specially purchased aircraft, was converted to two seat standard, as A2-36, for the conversion of service pilots onto the S.E.5a.

S.E.5a in Other Countries.

The US Air Service purchased 38 S.E.5a from Britain in October 1918 for use in France by its two newly forming squadrons. Those remaining were taken to the US after the armistice. As well, in America, the Curtiss company was contracted to produce 1 000 S.E.5a to be powered by 180hp (134kW) Wright-Martin Hispano-Suiza engines. Only one was completed but Curtiss did assemble 56 from British made components. As well, in 1922/3, the Eberhardt Company built a batch of 50 S.E.5E using existing spare parts with the fuselage covered with plywood They had a 180hp (134kW) Wright built Hispano E V-8 engine. At least two still exist.

As well as Australia's 35, Canada (12) and South Africa (22) received the S.E.5a as part of the Imperial Gift, one still exists in a South African museum. Some (20?) went to Poland in 1920. These were used against the Bolsheviks in the Ukraine. At least one perhaps more were captured as several wore the red star. At least one served with the Argentine Navy from 1926 until a heavy landing in 1929. It had been imported by an Anglo-Argentine resident and then passed on until donated to the navy. At least 11 of the 33 aerial sign writing aircraft went to the USA for the same purpose in 1927 and five were sold to Germany in 1929.

The S.E.5a has also proved an enticing subject for replica producers and plans are readily available in the USA. A number of accurate replicas have been built and several, produced locally in New Zealand, by The Vintage Aviation, are presently flying. A number of other look-a-like machines have been produced, by modifying the appearance of other designs, for various war based films.

AN ANNOTATED BIBLIOGRAPHY – SCOUT & S.E.5/5a

Angelucci, Enzo & Matricardi, Paulo (1977) :- *Bristol Scout D & R.A.F. S.E.5 & 5a – World Aircraft –Origins to World War 1 : 172-173 & 192-193– Sampson Low, Maidenhead, Berkshire. England.*

A brief description of origins and uses of the Scouts & S.E.s. and outline of some firsts. Plus a small scale three dimension plan and colour drawing of each.

Anonymous, (1986) :- *SE5 “The Farnborough Fighter – “70th Anniversary – Wingspan : 20-27.*

A general description of the evolution and use with 11 photos several of early S.E.5s, one of the cockpit and a double page one of the Shuttleworth F907.

Anonymous, (1985) :- *Royal Aircraft Factory S.E.5a – Royal Air Force Yearbook : 64-65.*

A one and a half page cutaway drawing.

Anonymous (2009) :- *In Focus Royal Aircraft Factory SE.5 - Far and away Superior – Flypast, April : 48-54 & 63-67.*

Has a two page close up photo of armament, Civilised Savages, “Ack”, the story of G-EBIA/D7000/now F904 with the Shuttleworth collection in the UK. “Beer” G-EBIB in the Science

Museum, London, "Charlie" G-EBIC in the Royal Air Force Museum and a list of nine survivors. Four in UK, one in South Africa, Two in Australia, and two ex USA Eberhardt S.E.5E. Ford (2009) below is part of this series.

Bruce, J.M. (1953) :- *Historic Military Aircraft : No 5 - The S.E.5 – Flight 17 July* : 85-90.

A detailed description of the S.E.5 and its development and use. 15 photos starting from S.E.1 through to the S.E.5E. Tables of dimensions of the ancestors from S.E.1 to S.E.4A and a table of dimensions and some performance figures for seven S.E.5 variants to the S.E.5B, (two of S.E.5 and four of S.E.5As) with various engines.

Bruce, J. M. (1976) :- *Ancestors of the S.E.5 – Aeroplane Monthly July* : 346-352 & August : 430-443 & 441.

The S.E.5 was the result of a series of studies, using rotary powered designs, to look at the combinations of stability, for which early "Factory" aircraft were renowned, and manoeuvrability. This was to develop a high speed scouting aircraft. This study developed from the B.S.1 through the S.E.2, S.E.2a, S.E.4 and the unrelated S.E.4a. Considerable detail of their development testing and use is given along with a table of specifications and performances.

Bruce, J. M. (1977) :- *S.E.5 Fighter Supreme – Aeroplane Monthly May* : 264-269, June : 327-338, July : 355-360, August : 437-442, September : 493-498, October : 552-558, November : 608-613.

A very detailed seven part account of the development and usage of the S.E.5 and S.E.5a citing numerous official records and diary entries from the "factory" archives in the Official Records Office. These give direct access to the thoughts and actions that were involved in the development and testing. A copy of an original drawing of the S.E.5, with a single Lewis gun firing through the hollow propeller shaft of a geared Hispano-Suiza engine and a small fin and rudder is shown. The fin and rudder were replaced by that from the contemporary F.E.10, also drawn. The F.E.10 had the propeller behind the cockpit as in the F.E.2b etc. but was not progressed further. The engine problems are covered as are the delays these caused in getting the fully developed S.E.5a into service. These delays include the break-up of the wings of the prototype S.E.5 in the air and the steps taken to correct the problem. Full production details are given including a full list of serial numbers against contract numbers and the individual contractors. Performance details of a number of examples are shown.

Bruce, J. M. (1991?) :- *Bristol's Fighter Manque – Air Enthusiast - Thirty-Two February/March*: 1-21 & 73-76.

Provides an extremely detailed account of the development and use of the four marks of the Scout. There are 55 photos plus a two page Cutaway Drawing (labelled C & D) and an unlabelled small scale three dimension drawing. A Data Box gives extensive details of variations in Power Plant, Dimensions and Armaments. A table of Weights & Performances gives details for the A, two different Cs and two different Ds, (with differing engines fitted). Four engines being represented in the five performance details presented. There is also a table of Production Contract Nos and related service Serial Numbers for four C and five D contracts. Service units and other groups using the Scout are indicated in a Data Box.

Bruce, J. M. (1993) :- *S.E.5a Fighter Supreme – Air International April* : 180-185.

A general description with 12 photo and a two page cutaway drawing of an S.E.5a with Wolseley Viper engine. Table of power plants used, performance and weights with the Viper, dimensions, armaments, production and operational use. Final British production was 5 269 aircraft plus one by Curtis in the USA out of an order for 1 000 and 50 modified ones by Eberhardt as the S.E.5E

Cameron, D.G. (2005) :- *Bristol D Scout – Thirty Years on* ,, Queensland Air Museum – Major Collections : 13,14,19 – Qld Complete Printing Services, Nambour, Qld.

Summary of the developments and use plus specifications & performance table and two photos with details of the Museum's replica.

Cooksley, Peter (1985) :- *In Flanders Skies- The Bristol Scout* – Airfix Magazine December : 147-150.

A general description of the development, use and colours and markings. Six photographs and a box with four side-on black and white drawing showing various colour and marking patterns.

Ellis, Ken & Green, Peter (1996) :- *Civilised Savages – The Surviving Skywriter SE.5s* – Air Enthusiast No 61, January/February : 36-39.

Gives details of the establishment of Savage Skywriting Co Ltd and its use of S.E.5 aircraft for that purpose. Lists 33 SE.5s used with civil registrations and fate plus, where known, c/no and service serial and manufacturer. Details history of three survivors, G-EBIA, G-EBIB & G=EBIC. Twelve photos inc. cockpit.

Ellis, Ken & Green, Peter (2009) :- *Civilised Savages – Flypast* : 50-53. Part of a collection of articles. - "In Focus Royal Aircraft Factory SE.5".

Briefly covers Savages UK aircraft plus briefly work in Europe, USA and Australia.

Ellwood, J. K. (1995) :- *Personal Album- Photographs from the album of James E. Keane* – Aeroplane Monthly, September, 1995 : 44 – 45.

Two Photographs of Scout C 1255 being hoisted aboard the carrier HMS Vindex and its subsequent take-off on 3rd September 1915, the first for an aircraft with wheeled undercarriage to take off from the deck of its carrier. Also photos of D Scouts 8980 in flight and 8973 after a landing mishap with an Avro 504. The later shows the Lewis gun mounted on the top wing to fire over the propeller arc.

Ford, Daniel (2009) :- *Transatlantic SE.5s* – Flypast April :63-65.

Half page of text plus two photos of the SE.5E and the American search for aircraft to produce in the USA in 1917. This resulted in the selection of the SE.5 among others.

Hardesty, Bergen (1966?) :- *SE-5a War Bird* – Air Classics 3 (1) : 38-41.

"The SE5A Was All Heart – But She Had A Lot Of Trouble With That Ticker" –Four photos, a side view cutaway drawing and ¾ page of text dealing very well with the engine problems.

Hickson, Cdr. K. R. (1959) :- *Airborne in the S.E.5a* – The Aeroplane and Aeronautics, December : 657-659.

Discusses a test flight in the Shuttleworth aircraft shortly after its restoration with several photographs including one of cockpit and one of Lewis gun mounting

Isaacs, Keith (1971) :- *Military Aircraft In Australia 1909 -1918* : 31, 67, 123, 170 & 87,129,171 Australian War Memorial Canberra.

Has three separate references to the Scouts C & D one giving Australian experiences, one the general story of the type and finally a listing of serial numbers known to have served with the AFC in Europe and Sinai. Similarly the S.E.5a and its use by 2 Sqn AFC in France is detailed together with a list of serial numbers.

Lamberton, W.M. & Cheesman, E. F. (1960) :- *Bristol Scouts B, C and D & S.E.5 and S.E.5a- Fighter Aircraft of the 1914-1918 War* - : 36 - 37 & 56 - 57. Harleyford Publications Ltd. Letchworth, Herts, England.

Half page description, development, features and general usage. With five photographs and full page 1/72nd scale plan. Dimensions and performance for each model of both designs (212-5)

Lewis, Peter (1974) :- *The British Fighter Since 1912 – Sixty years of Design and Development* : 36,37, 47 & 101& 117 – Putnam & Co., London, England.

Detail description of the origins and usage of the Scouts A, B & C. No mention of D (p36-37). Plus

data on A in an end table. Photo of Scout A in original form (p32). The same materiel provided for the S.E.5 (101) & S.E.5a (p117).

Lezon, Richardo Martin & Stitt, Robert M. (2007) :- *Gifted Fighter. The Argentine Navy's Singular SE.5.* – Aviation Enthusiast No 100 July August : 25.

A brief history plus one photo of AC-21 the sole SE.5a used by Argentine services. Further details of origin and fate are given in an earlier extract from a column by Philip Jarrett in *Aeroplane*, October 2006.

Owers, Colin (1988 b) :- *The RAAF's first Fighter* – Flightpath 1 (3) : 60-64.

A brief history starting with loss of A2-11 in May 1927 and a number of reminiscences of several associated with the use of the S.E.5a. A2-4 to Aust. War Memorial mentioned.

Owers, Colin A. (1984) :- *The SE5a and the Royal Australian Air Force* – Aircraft Modelworld, November :294-297.

Details the history of the 35 S.E.5a fighters that Australia received as part of the Imperial Gifts from Britain to the Dominions in 1920. In total Australia received 128 aircraft of four makes. Nine photos and a 1/48th scale drawing plus a full list of the SE5as received, A2-1 to A2-36 listed, the latter's origin debatable, special purchase or conversion of A2-2 to a two seat trainer?. Where known, the fate of each is shown. Most withdrawn from service and written off by late 1928.

Revell, Alex (1976) :- *Fighting Fifty-Six* – Aeroplane Monthly, November :591-596.

Being equipped with the S.E.5 in March 1917 56 Sqn was the first unit to take it into action in France. This is essentially their history until re-equipped with the S.E.5a.

Robertson, Bruce (1956) :- *Aircraft Camouflage and Marking 1907 -1954* : 13 & 17-18, Harleyford Publications Ltd , Marlow, Bucks, England.

Details the development of service marking for the early scout with differences between the RFC and RNAS with C & D Scouts at the heart of these early developments (p13). Details of the S.E.5 & S.E.5a and their markings are also provided (P117-18)

Schaedel, Charles (1972) :- *Men and Machines of the Australian Flying Corps 1914-19 —The Desert War - Chapter 2 : 12 -22 & The First Fighter Unit – Chapter 4 : 37-46* - Kookaburra Tech. Publications P/L, Dandenong ,Victoria.

The early section Ch 2 contains details of Scout activities in Sinai and one photo. Last half of Ch 4 covers actions with S.E.5a after they replaced the original DH-5s. Eighteen photos plus full page, three view colour drawing of S.E.5a (p29).

Sturtivant, Ray (1994) :- *Royal Aircraft Factory SE5A Two Seater* – Wingspan, March : 49

Identifies a photograph of a two seater and discusses the possible location where it was taken and the general use of the two seat S.E.5a.

Various Letters (1996) :- *Savages SE5s* – Air Enthusiast No 64 July/August : 78-77.

Letters from three correspondents relating to the earlier AE61 article on "Civilised Savages".

Wixey, Ken (1998) :- *Aircraft in detail – Royal Aircraft Factory S.E.5a* –Scale Aircraft Modelling June, 20 (4) : 160-175.

A detailed general coverage under the headings, Conventional Design, Initial Modifications, Introducing the SE.5a, First Squadrons, Large contracts, Engine and Airframe Problems, Experimental, S.E.5 Trainers, Exports, Civil Owner, Museum Pieces and Replicas. Twenty eight photos plus six pages of side view colour schemes with mostly 6 aircraft per page.

Woodman, Harry (2002) :- *Aspects of the Bristol Scout* – Model Aircraft, July : 42 – 45

Some overview text but mainly seven photographs showing (a) a line-up of Scout C in June 1915, (b)

Scout B in August 1914. (c) C 1262, of RNAS, on its nose after a crashed landing, January 1916 on the island of Imbros. (d) 1611 the Scout C in which Capt. Lanroe Hawker won his VC. (e) close up of 1611 showing the Lewis gun mounted at cockpit level to fire outside the propeller arc. (f) over wing mounted Lewis gun and the cut out in the top wing necessary to service this gun. (g, h & i) various armament fittings including one firing through the propeller without interrupter gear and the first synchronising gear (Vickers-Challenger) mechanical actuating rod externally along the side (j) a 1919/20 photo of 8976 in Australia. (k) RNAS D Scout 7053 in 1917 with possibly the Sopwith-Kauper synchronising gear There is also a small scale drawing prepared in the USA dated September 1918 preparatory to manufacture of the D there. This came to nothing.

APPENDICES

The Bristol Design Numbers

The numbering system for Bristol aircraft designs began from the Scout C but was not devised until post war and numbers were retrospectively allocated. Those for the Scouts were :-

Bristol Type 1 – all Scout Cs

Bristol Type 2 – Scout D with 80hp Gnome. It included 19 a/c N5400-N5419

Bristol Type 3 – Scout D with 80hp le Rhone engine included at least A1778 from the batch A1742 - A1791 (59a/c)

Bristol Type 4 – Had a 100hp Gnome Monosoupape engine and included 10 a/c N5390 – 5399 and 50a/c 8951 – 9000

Bristol Type 5 – Had a 110hp Clerget engine (Text as copied says only 3 a/c – 5555 & 5556 and possibly 5558 experimentally fitted.

Royal Aircraft Factory Designations

Initially the “Factory” aircraft were designated either as Bleriot Experimental (B.E.) - tractor types or Santos Experimental (S.E.) – canard (rear engine, pusher) types. However by the B.S.1 the designation for tractor scouting aircraft had changed to indicate Bleriot Scout. While being rebuilt or soon after the B.S.2 designation was changed to S.E.2 for Scouting Experimental. A, B, C etc suffixes were used to denote variations within a major design but this does not appear to have been consistently used. The S.E.4a was a completely new design whereas variations in the S.E.5a, to accommodate different engines for example, were not identified, at least at the major model number level.