

The **S.16 Scion** was a **4, 5 or 6-seat** feeder aircraft designed and built by Short Brothers at Rochester in the mid 1930's. It was powered by two Pobjoy Niagara **III** engines of **90 HP**. Two of the aircraft were originally built as floatplanes and the other twenty aircraft were landplanes. The aircraft was remarkably light, with an unladen weight of less than **2000 lb** in both versions and a maximum take-off weight of around **3150 lb**. The typical range was **350 miles** at a speed of about **120 mph**.

The prototype, **G-ACJI**, was built in the Esplanade Works and first flown from Gravesend Airport. It had detail differences in its construction, particularly in the design of the wing and its attachment. A further five Scion I aircraft were built, one as a floatplane. The remaining aircraft were Scion **II**, featuring raised engines, revised cabin sides and a cockpit with improved visibility. The last six of the batch were built under licence by Pobjoy Airmotors and Aircraft Ltd at Rochester; the final aircraft was built a floatplane. See last page for further details of the aircraft built.

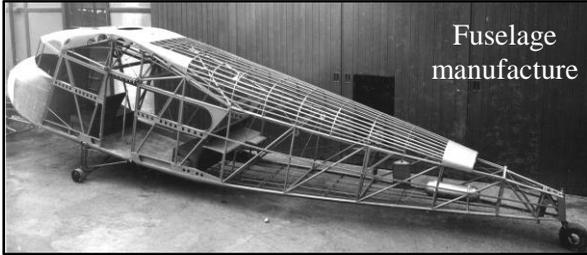
The aircraft mainly saw service in Britain, Palestine and Australia. Although intended for private ownership, the majority of the aircraft in Britain were seconded by the RAF as courier aircraft and personnel transports during World War II.



Reg Macey's painting of the 1st flight of Short **S.16 Scion II** Floatplane **G-AEZF** from the River Medway at Rochester, 22nd September 1937.

Construction

The aircraft fuselage consists of side frames of brazed thin steel tubes connected by duralumin tubes and girders, the whole being made rigid by steel bracing wires throughout the rear section and diagonal duralumin tubes at the front.



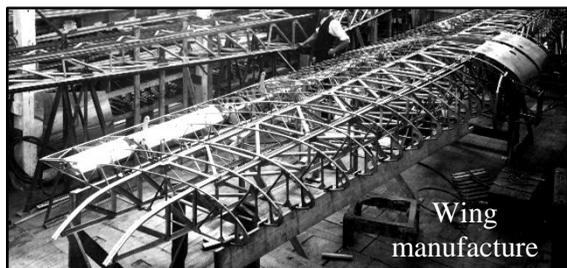
The fairings are constructed from wooden strips with limited amounts of duralumin and plywood sheeting protecting the most vulnerable areas. The

whole is covered in Irish linen, except for the Perspex windows in the cabin sides and door which have wooden surrounds. Internally, the cabin floor is of plywood, carried on wooden frames and covered with carpet; the cabin roof is also of plywood and the side panels are fabric (not shown in the above image).

The cockpit is a wooden-framed fairing skinned in plywood with Perspex windows. It features a sliding hatch in the roof and hinged nose cone for maintenance purposes. The pilot's seat is mounted on a sub-frame of brazed steel tubes cantilevered from the front of the fuselage; the controls are also mounted on this frame.

The high cantilever wings have a wide-chord profile tapering throughout their length. The front of the spar is square to the fuselage and the wings have a small dihedral. The spar consists of an open box formed from four aluminium extrusions of cruciform cross-section braced by duralumin tubes

with further steel bracing wires to add rigidity. Ribs made from thin-walled duralumin tubes are added to support the Irish linen covering and thin duralumin plates are used to strengthen the leading edges.



Each wing is attached by four bolts to the wing-box formed in the top of the fuselage frame. The wing of the prototype aircraft had a different construction.

The control surfaces consist of two ailerons, a tailplane, an elevator, a fin and a rudder. These are all constructed from thin duralumin plate and tube and are fabric-covered; thin duralumin plates are added to strengthen the leading edges, except on the fin. The incidence of the tailplane can be adjusted by a wheel in the cockpit driving a small screw jack. The other control surfaces are driven directly by cables, cranks and push rods from the control column and rudder pedals.

The flight instruments consist of altimeter, airspeed indicator, turn-and-bank indicator, fore-aft level indicator and a compass, plus a clock. A radio could be fitted if desired, but this was quite heavy. Navigation lights and a headlamp were also fitted as standard.



Typical cockpit layout

One Pobjoy Niagara III engine is mounted in front of each wing, on a steel sub-frame bolted to the front of the spar box. On the Scion I, the propeller hub is in line with the lower edge of the wing whereas on the Scion II it is raised to the chord line. Small fuel tanks are fitted into the leading edge of the wing on either side of the engine and an oil tank is fitted immediately behind the engine. The engine cowl is extended rearwards as a nacelle to blend into the wing. The engines have built-in electric starters.

The throttle box is in the cockpit and connects to the fuel system by rods,



Short S.16 Scion II

G-AEZF in its prime

as a landplane

cranks and cables. The magneto and starter switches are also in the cockpit but the engine instruments are mounted in each nacelle, visible from the cockpit.

The landplanes have the main wheels mounted on V-frames which are hinged to the lower sides of the fuselage with spring dampers running up to the wing, just inboard of the engines. Differential pneumatic brakes operate on the main wheels powered by an air cylinder. A small castoring tail wheel is mounted right at the rear of the fuselage.

The floatplanes have two floats mounted on struts below the fuselage. These were made by Shorts at a factory in Strood and were built them for a number of aircraft companies. Each float contains six water-tight compartments for buoyancy.

Variants

The prototype aircraft had a single-piece wing formed around a box-section of duralumin plates which fitted directly into the top of the fuselage and was not demountable. It was originally built without an upper fairing, this was later added. This aircraft also had the earlier Pobjoy **R**-series engines, rated at **85 HP**.

The main differences between the Scion **I** and the Scion **II** aircraft occurred in the cockpit and cabin area and in the location of the engines on the wing. The nose of the Scion **II** was smoother, with improved forward visibility from the windscreen and a composite nose cone. The line of the cabin windows was smoothed with the rear window finishing in a semi-circular section. The engines of the Scion **II** were raised so that the propeller hubs were on the chord line of the wing, with the exhausts running over the wing rather than from the bottom of the engine.

Scion **II** aircraft **G-ADDR** was later fitted with an experimental wing. This had an increased taper and a prototype Gouge flap at the inboard end. This type of flap was subsequently used on the larger seaplanes.

Many detail variations exist between the aircraft as these were largely hand-built. Many were also repaired at some stages in their life in a non-standard manner.

The History of Pobjoy-Short S.16 Scion II Aircraft G-AEZF

These details are taken from the log-book of the aircraft. The aircraft was originally built under licence by Pobjoy Airmotors and Engines as a floatplane for Elders Colonial Airways of Freetown, Sierra Leone, but is believed never to have entered service with that company.

It was first flown by Capt Lankester Parker (Shorts chief test pilot) from the River Medway at Rochester Esplanade on 22 September 1937. It did a further two flights by December of that year for modification, the last with

increased dihedral on the wing and a larger fin and rudder, probably to counteract the effect of the floats, before being stored.

It was dismantled and taken to Rochester Airport in February of the following year, where it remained until after it had been damaged during the bombing of the Airport on 21 September 1940. Later that year, it was taken to the Pobjoy factory at Northfleet, where it was repaired. At that time, it had only flown for a total of 30 minutes on the three test flights.

In November 1941, it was impressed by the RAF. It was towed to No.24 EFTS at Barton in the Clay, Bedfordshire and restored to flying condition as a landplane. Between 10 September 1942 and 4 December 1942, it flew several missions totalling 18 hours 10 minutes, before it was damaged in a gale at Cark and required major repairs.

The aircraft was transferred to Short Brothers at Windermere for repair, before re-entering RAF service in April 1943. It flew several times until August 1944, completing a 50 hours overhaul in September 1943. It was maintained in flying condition until February 1945, when the aircraft was returned to Short Brothers at Rochester.

The aircraft was overhauled at Rochester and Belfast and entered service with Air Carriers, Heston Airport in March 1947. It flew intermittently, some of the time with a camera fitted for photo-mapping, until August 1948 and again between February and May 1953, being maintained throughout the period. The log-book records a total flying time of only 178 hours and 43 minutes; the aircraft had spent most of its life in an unserviceable or stored condition.

After that time, the aircraft is believed to have lain derelict at Southend Airport. The aircraft suffered very serious deterioration due to the vicissitudes of the British weather, the removal of items by 'collectors' and being run over by a tractor. In 1996, a local preservation team made the first efforts to restore the fuselage but some of the work done has since had to be renewed.

The Restoration Programme

The aim of the restoration programme is to provide an aircraft for display purposes which is as close as achievable to the original standard with the limited funding and workforce available. **The Rochester Bridge Trust** has provided a very generous grant to allow this work to be undertaken. The aircraft fulfils the Trust's remit as being an important historic artefact associated with both Rochester (where it was designed and built) and the River Medway (from where it first flew). The aircraft will be finished as a floatplane but, due to its condition and the lack of authentic critical parts, it

will be a static display.

The aircraft was acquired by the Medway Aircraft Preservation Society Ltd. (MAPSL) in June 2013 in a very poor condition and transported from Redhill Aerodrome (to where it had been moved from Southend) to Rochester Airport by road. All that remained of the aircraft was the fuselage frame, the port wing and part of the starboard wing. Most of the steel tubes forming the lower part of the fuselage sides had been replaced during the earlier restoration attempt without being jugged, resulting in severe misalignment. The aluminium extrusions in the wings had corroded through and most of the small duralumin tubes in the wing were crystalline, broken, bent or missing, but the remainder could be salvaged. The tailplane and elevator, fin and rudder and ailerons were missing, as were the engines, airscrews and the entire fuel and electrical systems.

Wherever possible, the restoration work uses materials and techniques that are compatible with the original build, subject to availability and cost limitations. This will allow the original skills to be redeveloped and passed on to future generations. The programme will salvage and refurbish original components wherever possible but will require the manufacture of many replacement parts; little information exists so many of these will have to be designed and made in accordance with the general approach taken at the time.

The restoration work began with preserving all parts against further deterioration – cleaning by sand-blasting before being coated with an etchant primer. The fuselage frame has been strengthened in places, new bracing rods have been made and fitted and the alignment has been improved to the maximum practical extent.



Fuselage during restoration

All fairings and the cabin sides, floor and roof are being remade before covering the fuselage in fabric; it is expected that Ceconite will have to be used in place of the original Irish Linen. The cockpit frame and roof (including the hatch) and the nose cone are also being made to replicate the original design.

The starboard wing, of which only the inboard end of the spar-box remained, is being remade using new cruciform members and tubes; undamaged parts of the original are being used where possible. New ribs, wing tips, fuel tank brackets and the leading-edge have been made using the port wing as a guide; the remainder including the trailing edge and engine cowls remains to be done. Only when the starboard wing has been completed will the operation be repeated on the port wing, where there should be a little more of the original structure included. Again, Ceconite will probably be used for covering, although some areas may be left free to allow the construction to be viewed.



The fin, rubber, tailplane, elevator and ailerons are being fully remade using the limited information available. A few photographs from Short Brothers exist, showing limited details of the construction.

A Pobjoy Niagara II engine has been acquired and restored. It was originally at the University of Delft, being sectioned in 1940 as an exhibit which saved it from being destroyed, before being rescued and kept by private owner. Other engines are known to exist but may not be available; if necessary, replicas will be made. A similar approach will be used for the airscrews and the entire fuel system.



A float has been borrowed from the Ulster Folk & Transport Museum; profile drawings are being generated. Two replicas are being made; these will be accurate externally although the internal structure will be simplified.

Much work remains to be undertaken before the aircraft is available for display. A full record is being made, generally in the form of digital images and documentation. Come regularly to MAPS and you will see the gradual progress. For further information, please visit www.mapsl.co.uk

Overview of Short Brothers S.16 Scion / Scion II Production

(data from Wikipedia)

Aircraft	Type	First flight	Type	Builder	Built	RAF
G-ACJI	Land	18 Aug 1933	Scion	Shorts	Seaplane Works	1940
G-ACUV	Land	18 Aug 1933	Scion I	Shorts	Seaplane Works	-
G-ACUW	Land	18 Aug 1933	Scion I	Shorts	Seaplane Works	1940
G-ACUX	Float	18 Aug 1933	Scion I	Shorts	Seaplane Works	-
G-ACUY	Land	10 Dec 1934	Scion I	Shorts	Seaplane Works	1940
G-ACUZ	Land	13 Feb 1935	Scion II	Shorts	Rochester Airport	-
G-ADDN	Land	9 Jun 1935	Scion II	Shorts	Rochester Airport	1940
G-ADDO	Land	10 Jul 1935	Scion II	Shorts	Rochester Airport	1940
G-ADDP	Land	10 Jul 1935	Scion II	Shorts	Rochester Airport	1940
G-ADDR	Land	6 Aug 1935	Scion II	Shorts	Rochester Airport	1940
VH-UUT	Land	23 Aug 1935	Scion II	Shorts	Rochester Airport	-
G-ADDT	Land	-	Scion II	Shorts	Rochester Airport	-
VH-UVQ	Land	-	Scion II	Shorts	Rochester Airport	-
G-ADDV	Land	-	Scion II	Shorts	Rochester Airport	1940
VH-UTV	Land	-	Scion II	Shorts	Rochester Airport	-
G-ADDX	Land	-	Scion II	Shorts	Rochester Airport	1940
VQ-PAA	Land	-	Scion II	Pobjoy	Rochester Airport	1941
VQ-PAB	Land	-	Scion II	Pobjoy	Rochester Airport	1941
G-AEIL	Land	1936	Scion II	Pobjoy	Rochester Airport	1940
G-AEJN	Land	Sept 1936	Scion II	Pobjoy	Rochester Airport	1940
G-AETT	Land	Apr 1937	Scion II	Pobjoy	Rochester Airport	1940
G-AEZF	Float	22 Sep 1937	Scion II	Pobjoy	Rochester Airport	1941

G-ACJI was the prototype aircraft with detail differences

G-ADDR was an experimental aircraft, see above, and bore the number **M 3**.



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