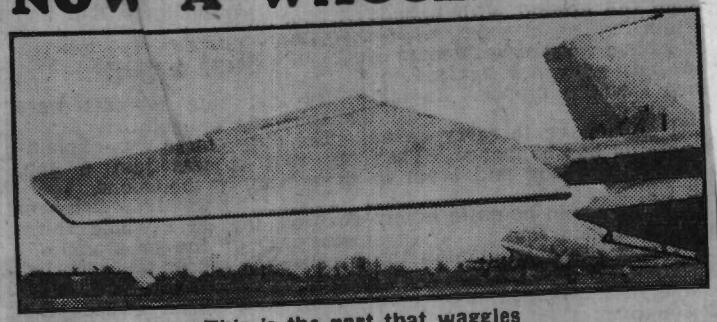
Dope for
Mr. Stagg

"News Chron"
5/1/53

NOW A WAGGLE-WING



This is the part that waggles

THE "elevon-control" aeroplane made its first public flight at Aldergrove R.A.F. airfield, near Belfast, yesterday (writes **Ronald Walker**).

It is another British contribution to high-speed flight.

Built by Short and Harland, it is called the Sherpa.

Rotating and swivelling wing tips do double duty as elevators and ailerons and these new controls are called "elevons."

The Sherpa is a small, swept-wing machine with rudder but no tail plane. Two small French jet engines, each developing only 350 lbs. thrust, are buried in the fuselage.

With test pilot Tom Brooke-Smith at the controls the Sherpa flew at low heights and it was possible to see the wing tips waggle or swivel as he turned, climbed and dived.

Chief designer Mr. David Keith Lucas said: "The wing has military applications rather than civil. It is intended to enable the pilot to chuck the plane about without it turning round and biting him."

176 20000 11
240
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5/9/53.

Check Colton

ES SATURDAY SEPTEMBER

SPEED ATTEMPTS AT 60,000FT.

MOVING WING-TIP ON NEW AIRCRAFT

Short Brothers and Harland Limited, the Belfast aircraft manufacturers, announced details yesterday of the Sherpa, a new experimental aircraft intended as the forerunner of aircraft for high speed flying at altitudes of more than 60,000ft. The new aircraft embodies a revolutionary wing structure, described as the "isoclinic" wing, which, the manufacturers claim, will give rigidity and manoeuvrability in stratospheric conditions.

REAR-ADMIRAL M. S. SLATTERY, chairman and managing director of Short Brothers and Harland, said in London yesterday that the Sherpa would make its first flight in Northern Ireland, probably within the next two or three weeks, from the R.A.F. Station at Aldergrove.

It would not be seen at the Farnborough air show, because the experimental aircraft was only designed for low altitude flying. For this purpose it was fitted with two small French jet engines, and the inclusion of foreign engines was not permitted at Farnborough.

SWEPT-BACK WING

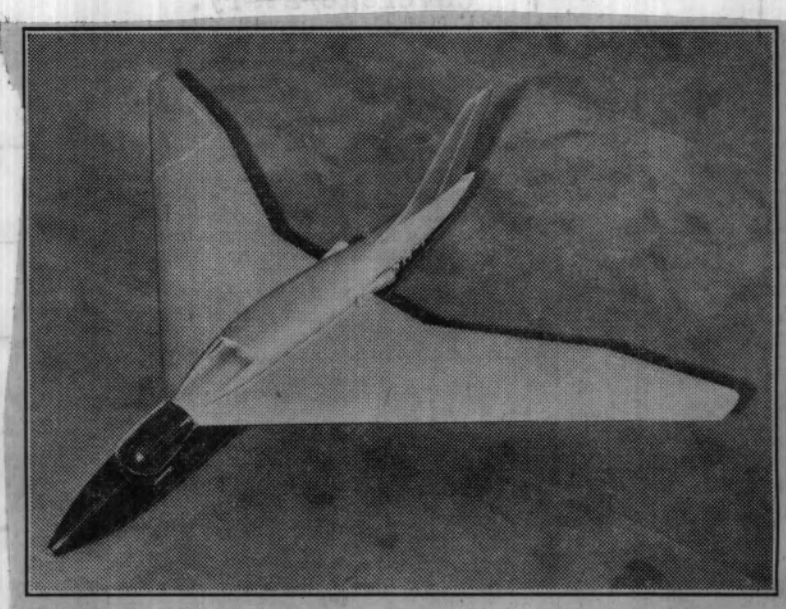
The wing shape, swept back and with an average sweep of 43 degrees, involved a new structure which had been patented by the company. The whole of the wing-tip moved, and this included about one-fifth of the whole wing area.

The experimental aircraft, which had a wing span of 38 feet and was 31 feet five inches long, was intended only for tests, and larger engines would have to be fitted into a machine for high altitude flying. The height the designers had in mind was more than 60,000ft.

Admiral Slattery explained that the name Sherpa was chosen after a competition in the Belfast factory of the firm. The "isoclinic" wing machine was envisaged as either a fighter machine or for civil aircraft, "wherever high altitudes are wanted."

A design expert of the firm said that the "isoclinic" wing was specially suited to flying in the thin air conditions at high altitudes. It was a development of the idea of Professor Hill's Pterodactyl aircraft of 1925, which was now in the Science Museum. "But the designers," he said, "have overcome important structural difficulties in the design."

** Picture on page 12.

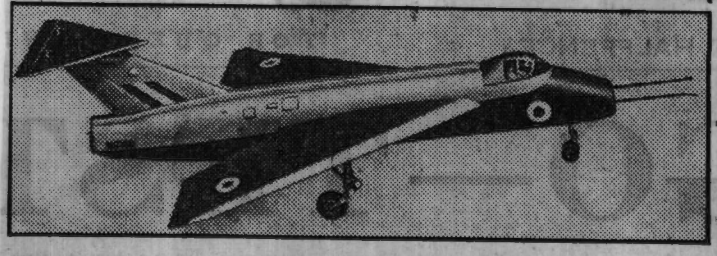


A MODEL of the new Sherpa aircraft which has been designed by Short Brothers and Harland Ltd. The design incorporates some new structural principles for high-altitude flying. A description appears on another page.

Note:-
Spoke to Mr. Colton, 3/9/53.
Will advise — may arrange
to fly us over to
Aldergrove.

In the air—1

The flying scissors



This is the S.B.5 research plane, built by Short Bros. and Harland, of Belfast, which is now carrying out a flight test programme with its wings swept back at a sharper angle than any previous British aircraft. The sweep-back can be adjusted on the ground.

D Mail

19/8/53

VISIT TO BELFAST

FOR

FIRST PUBLIC FLIGHT

OF

SHORT SHERPA

SHORT BROS. & HARLAND LTD.

SEAPLANE WORKS,

QUEENS ISLAND

BELFAST.

PROGRAMME

	08.00 a.m.	Assemble Waterloo Air Terminal to join coach.
	09.00 a.m.	Arrive Northolt and embark on B.E. Flight 516 (chartered Viking aircraft)
Approx	11.15 a.m.	Arrive Aldergrove R.A.F. Station, N. Ireland. Party will be met by Mr David Keith-Lucas, B.A., M.I.Mech.E., F.R.Ae.S., Chief Designer, Short Bros.
	11.30 a.m. to 12.20 p.m.	Sherpa demonstration by Tom Brooke-Smith.
	12.20 p.m.	Leave by bus for Queens Island.
	1.00 p.m.	Arrive Queens Island, Belfast. Cocktails.
	1.30 p.m. to 2.30 p.m.	Lunch
	2.30 p.m. to 3.00 p.m.	Talk by Rear Admiral M.S. Slattery, C.B., F.R.Ae.S., Chairman and Managing Director of Short Brothers, followed by David Keith-Lucas, Chief Designer, on future application of isoclinic wing.
*	3.00 p.m. to 4.00 p.m.	Tour of factory.
	4.15 p.m.	Leave by coach for Aldergrove.
Approx	5.00 p.m.	Take off from Aldergrove.
	7.00 p.m.	Arrive Northolt Aerodrome. Leave by coach for Waterloo.
	8.00 p.m.	Arrive Waterloo.

* It is regretted that security regulations preclude the taking of photographs inside certain sections of the factory.

LIST OF GUESTS

C. Birtwhistle - Westminster Press
D. Bristow - Exchange Telegraph
B.R. Bromwich - Financial Times
J. Chappell - Daily Telegraph
S. Crockett - G.B. Newsreel
C.B.S. Dawson - Aircraft Engineering
C.J. Dawson - Planet News
D. Desoutter - Aeronautics
H. Drake - Kemsley Newspapers
W.E. Goff - Aircraft Production
R.K.L. Gordon - Pathe Newsreel
P. Gregory - Press Association
W.L. Greig - Daily Mirror
F.N. Hillier - Air Pictorial
Ivor Jones - B.B.C. and Radio Newsreel
A.E. Long - The Aeroplane
J. McLaren - Flight
A.J. McWhinnie - Daily Herald
D. Miller - Keystone Press Agency
N. Monks - Daily Mail
A.H. Narracott - Times
Mrs Molly Neal - Engineering
R. Pearl - American Aviation
M. Smith - Flight
L. Smith - Daily Sketch
J.H. Stevens - American Aviation, L'Air and Alata.
J. Swanborough - The Aeroplane
J.A. Tunstall - Engineer
R. Walker - News Chronicle
D. Wood - Interavia
T. Wuriu - Airforce Daily
R.B. Williams-Thompson - Sidney-Barton.
F. O'Shanohun - Sidney-Barton. (Conducting Party)

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THE SHORT SHERPA

The Short Sherpa, which made its first flight on October 4th, 1953, is designed primarily to assist in the development of wings for faster, very high altitude aircraft. The Sherpa is the first plane to fly with an aero-isoclinic wing. The term "aero-isoclinic" signifies a swept-back wing in which the angle of incidence remains constant under flexion. A wing of this sort makes it possible to avoid the increase in torsional stiffness and structure weight that is usually demanded by sweep-back and permits the building of a swept wing aircraft capable of satisfactory performance at very great heights.

In a lecture given before the British Association in September, 1952, Short's Chief Designer, Mr David Keith-Lucas, pointed out the numerous advantages which could, theoretically, be obtained from a wing possessing this constant incidence characteristic.

The outcome of this theory is that Keith-Lucas designed the Short Sherpa. The Sherpa's wing is designed in such a way as to maintain a constant angle of incidence regardless of flexure, and this is achieved by placing the torsion-box well back in the wing so that the air loads, acting in the region of the quarter-chord line, have a considerable moment arm about it. Sweep-back on the leading edge is just over 42 deg. to facilitate low speed research. Construction is largely of spruce with plywood covering and light alloy components are employed at strategic points.

The torsional instability and tip stalling characteristics of

conventional swept-wings are today widely admitted, together with their tendency to aileron reversal and flutter at high speed. The aero-isoclinic wing is designed to prevent these effects.

In the Sherpa the wing, which is used without a tailplane, is fitted with rotating tips comprising approximately one-fifth of the total wing area. These can be rotated either together or in opposition to act as elevators or ailerons respectively. They are hinged at about 30 per cent chord and each carries, on its trailing edge, a small anti-balance tab, the fulcrum of which can be moved by means of an electric actuator. These rotary wing tip controls are expected to prove superior to the flap type at transonic speeds and will provide greater manoeuvrability at high altitudes.

The aircraft is powered by two Blackburn Turbomeca Palas turbo-jets of 350 lbs. thrust each.

The control system and rudder are both quite conventional and the fuselage is an ordinary stressed-skin structure. A fixed nosewheel is fitted and a small nose airscrew drives an electric generator. The undercarriage is fixed and an anti-spin parachute is housed in the extreme tail.

Dimensions of the Sherpa are:

Overall length:- 31 ft. $10\frac{1}{2}$" ins.

Span:- 38 ft.

Height to top of tail fin:- 9 ft. 1 ins.

The Sherpa is part of Short Bros. & Harland's own research programme

and has not been constructed to a Ministry of Supply contract. It is not itself a high speed aircraft but the lessons learned from it will provide information for future high-speed, high-altitude aeroplanes.

TECHNICAL NOTES

The Sherpa is a swept-back shoulder-wing monoplane aircraft.

The normal tail plane is dispensed with but a stabilising dorsal fin and rudder are retained.

The two Palas engines are mounted side by side in the upper part of the fuselage amidships and arranged at 10 deg. to the centre line of the aircraft; the jet pipes emerge at each side of the fuselage aft of the wing trailing edge.

Fireproof bulkheads and a sheet-steel floor spanning the fuselage, isolate the engine bay from the rest of the structure.

Fuel is carried in two tanks in the fuselage, below the engines; an additional tank is provided for petrol for starting purposes.

The main undercarriage has oleo shock absorber legs. The two radius rods are pivoted at the aircraft centre line and the oleo legs extend up into the fuselage to a central fitting.

The flaps are hinged from outrigger brackets on the under-surface of the wing and operated pneumatically.

The equipment includes an automatic observer positioned in the rear part of the fuselage.

A wind-driven generator in the nose of the aircraft charges storage batteries and provides power for radio and other instruments and services.

An anti-spin parachute is stowed in a metal container in the tail end of the fuselage. The stream release mechanism is fitted on top of the container and the control cable is led over pulleys in the fuselage to connect to tie-rods carried along the starboard side to the control unit in the cockpit.

The wing is built as a unit attached to the fuselage at three points.

The main spar is situated on the 25% chord line and is formed with upper and lower booms of laminated wooden construction. Shear webs are positioned at 35% and 60% chord and are of plywood construction; the 60% web is of ply with a thick centre lamination. Metal angle pieces are reduxed and glued to the webs for the attachment of the skin sheeting.

The elevons are of spruce and plywood, constructed around a built-up metal spar of octagonal section. The spar is positioned at 23% of the elevon chord; the main ribs which extend from nose to trailing edge are secured to the spar. Shorter intermediate ribs are fitted between the main ribs; all ribs have spruce booms and plywood webs are tied at the trailing edge by a spruce and metal member similar to that on the wing.

The elevons are operated from a normal spade-grip type control column which is pivoted, a short distance from its lower extremity, to a fore-and-aft torque tube below the pilot's seat. Below and parallel to the torque tube is a tubular drag link attached at its forward end to the

lower extremity of the column; the aft end of the drag link is connected to a yoke fitting which hinges to the aft end of the torque tube above.

With fore-and-aft movement of the column the drag link gives direct up and down movement to the elevons while the torque tube provides the necessary differential movement. Each arm of the yoke fitting is coupled by push rod to a bell crank lever in the wingroot.

SHORT BROS. & HARLAND LTD. IN 1953

The Short Sherpa is the third new aircraft to be designed and flown by Short Bros. & Harland within twelve months.

The first was the S.B.5 swept-back wing research aircraft and the second was the Seamew submarine hunter, which has been ordered by the Royal Navy.

The activities of Short Bros. have been steadily expanding since the end of the war cut-back in production. The extent of this expansion is shown by the fact that since the acceleration of the rearmament programme in 1950, the labour force has doubled and now stands at nearly 9,000.

In addition to the design and manufacture of its own aircraft, the company is making Comets and Canberras and is also producing certain Swift parts. Work on Sunderlands is still being carried out despite the fact that this veteran aircraft has been in active operation for over seventeen years. Sunderlands are being prepared at Belfast for the R.N.Z.A.F. and for R.A.F. Coastal Command.

Short's are also engaged in other work, including Admiralty contracts, in their four dispersal factories. An example is an electronic analogue computor which was designed by the Precision Engineering Division of Short's and shown for the first time at Farnborough in September. This computor quickly solves various aerodynamic problems arising in the design of aircraft and saves months of manual calculation. It is also suitable for other tasks in the engineering industry.

Short's production unit is one of the largest aircraft factories in Europe comprising nearly two million square feet of floor area.

In addition to the main factory at Queen's Island, Belfast, there are factories at Newtownards, Castlereagh and Lisburn.

Queens Island also embraces Sydenham Airport where the main runway is now being extended to 2,000 yds. to handle Comets and other large jet aircraft.

This great aircraft factory is uniquely situated next to a modern airfield which has adjacent to it a deep water berth capable of taking the largest aircraft carriers. A natural flying boat base completes the facilities which combine to make Queens Island one of the most unusual aircraft production centres in the world.

REMINDERS

SHORT S.B.5.

The Short S.B.5 first flew on 2nd December, 1952. It is designed

to undertake a programme of research into swept-back wings and for this reason, varying degrees of sweep-back can be applied to the wings.

The tailplane is also variable and can be positioned either at the top of the tailfin or underneath the fuselage.

The aircraft has already undertaken a programme of test flying in the 50 deg. and 60 deg. swept-back position. Soon it is to fly with the tailplane in the low position and after that, the wing sweep-back will be increased to 69 deg.

THE SEAMEW

This anti-submarine aircraft first flew on 13th August, 1953. Its design and production took only 17 months.

It can operate from esoort and merchant aircraft carriers and problems of N.A.T.O. countries were specifically considered by Short's design team when the Seamew was conceived.

Object of the Seamew is to provide a cheap, simple and rugged aircraft which can be produced easily and, at the same time, meet satisfactorily all the operational requirements of the Navy.

The Seamew is going into production for the Royal Navy.

PEOPLE YOU WILL MEET

Rear Admiral M.S. Slattery, C.B., F.R.Ae.S., Chairman of Short Bros. & Harland Ltd., entered the Royal Navy in 1916, and qualified

as a pilot in the Fleet Air Arm during the early years of service. In addition to commands at sea, he has held several appointments with the Admiralty, the Ministry of Aircraft Production and the Ministry of Supply - as Director of Air Material, Admiralty; Director General of Naval Aircraft Development and Production and Chief Naval Representative at the Ministry of Aircraft Production; Vice-Controller (Air) and Chief of Naval Air Equipment, Admiralty; and Chief Naval Representative, Ministry of Supply.

Rear Admiral Slattery retired from the Service in 1948 and joined Short Bros. & Harland soon afterwards.

David Keith-Lucas, B.A., M.I.Mech.E., F.R.Ae.S., served an apprenticeship with C.A. Parsons & Co. Ltd., Newcastle, and joined Short Bros. in Rochester. He was appointed Chief Designer in 1949.

At the British Association Conference in Belfast last year, Keith-Lucas delivered a paper entitled "The Shape of Wings to Come" which created great interest throughout the world, particularly passages dealing with the possibility of atomic powered aircraft.

T.W. Brooke-Smith, Chief Test Pilot, learned to fly at the age of sixteen and flew with various companies. At the outbreak of war, he assisted the Army and Air Force Staff Communications in France. In 1941, he joined the Air Transport Auxiliary and later went to Belfast to open up the pool of pilots then being formed to deliver Stirling four-engined bombers to operational units. In 1942, he joined Short Bros. as a test pilot.

He has flown over one hundred and twenty types of aircraft.