



# Saunders-Roe and the Princess Flying Boat

Talk presented by Bob Wealthy for the Hamburg  
Branch of the Royal Aeronautical Society  
on the 3<sup>rd</sup> of June 2010  
at Hamburg University of Applied Sciences

# Scope & Introduction

This presentation is an introduction to the origins and history of the Saunders Roe Company and the exceptional engineering achievements of the team of employees and contractors/suppliers in designing, building and flying the world's largest all metal flying boat, the Saunders-Roe SR45 Princess.

The first flight of the Princess took place from the Solent off Cowes on the 22<sup>nd</sup> of August 1952. The event was marked in August 2002 with the unveiling of an information board on the waterfront at East Cowes and a "get together" of ex Saunders Roe employees and friends at the East Cowes Town Hall organised as a joint effort by the East Cowes Heritage Centre, The IoW Branch of the Royal Aeronautical Society and GKN Aerospace.

# Princess First Flight 50<sup>th</sup> Anniversary Event 22<sup>nd</sup> August 2002



*The late Dick Stratton, Princess Chief Flight Test Engineer, unveils the Saunders Roe information board situated on the waterfront at East Cowes. Also in attendance were Maurice Mabey and Tony Walker, two other Princess flight test crew members, and Ray Wheeler, who joined Saunders Roe as a student apprentice and later became Technical Director.*

# Princess First Flight 50<sup>th</sup> Anniversary Event 22<sup>nd</sup> August 2002



View of the Princess model and exhibition boards set up for the Princess first flight 50<sup>th</sup> anniversary "get together" in East Cowes Town Hall

# Topics

- ❑ *Scope & Introduction*
- ❑ *Origin & History of the Saunders-Roe Company*
- ❑ *Saunders Roe and the Princess Flying Boat*
  - ❑ *Origins of the Large Flying Boat Concept*
  - ❑ *Vision of the Future Drives the Project On*
  - ❑ *Saunders-Roe SR45 Large Flying Boat Project Gets Underway*
  - ❑ *Saunders-Roe Works at East Cowes*
  - ❑ *Princess Design is Completed & Ready for Production*
  - ❑ *Verifying the Princess's Design*
  - ❑ *Prototype Princess G-ALUN Nears Completion*
  - ❑ *Princess G-ALUN is Launched & Readied for a First Flight*
  - ❑ *Princess Dream Fades as the Project is Put on Hold*
  - ❑ *Princess Hulls Preserved in Cocoons Pending Disposal Decision*
- ❑ *Saunders-Roe Re-deploys Skills & Capabilities*
- ❑ *Reminders of the Past*
- ❑ *The Princess Legacy*

# Saunders-Roe and the Princess Flying Boat

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## Origin and History of the Saunders-Roe Company

# 1901: Sam Saunders sets up a business at Cowes

pic448



Sam  
Saunders,  
1857-1931

pic449



Columbine Yard c 1910

pic459



Sopwith Bat Boat c 1913

# 1901: Sam Saunders sets up a business at Cowes

Sam Saunders, as part of the "Saunders Patent Launch Building Syndicate" originally based on the River Thames, had opened a branch of the works at Cowes in 1901 to take advantage of the location at the centre of British yachting. The syndicate had developed a new method of construction for plywood hulls where the material was sewn together with copper wire - this method was given the name "Consuta".

When Sam Saunders' agreement with the syndicate expired in 1906, he started his own business in a derelict works by the River Medina which he named Columbine Yard. In 1908 Sam Saunders converted his business into a private limited company named S.E. Saunders Ltd.

The "Consuta" hulls built by Sam Saunders soon gained international fame and as a sideline to his main business he took an interest in aviation. Two gondolas were built for the first naval airship and some early experimental work was undertaken for Sir Hiram Maxim, a noted pioneer of aviation. The first real success came with construction of T.O.M. Sopwith's Bat Boat in 1912 - one of the earliest flying boats made.



pic448

Sam  
Saunders,  
1857-1933

Columbine  
Yard c 1910



pic449

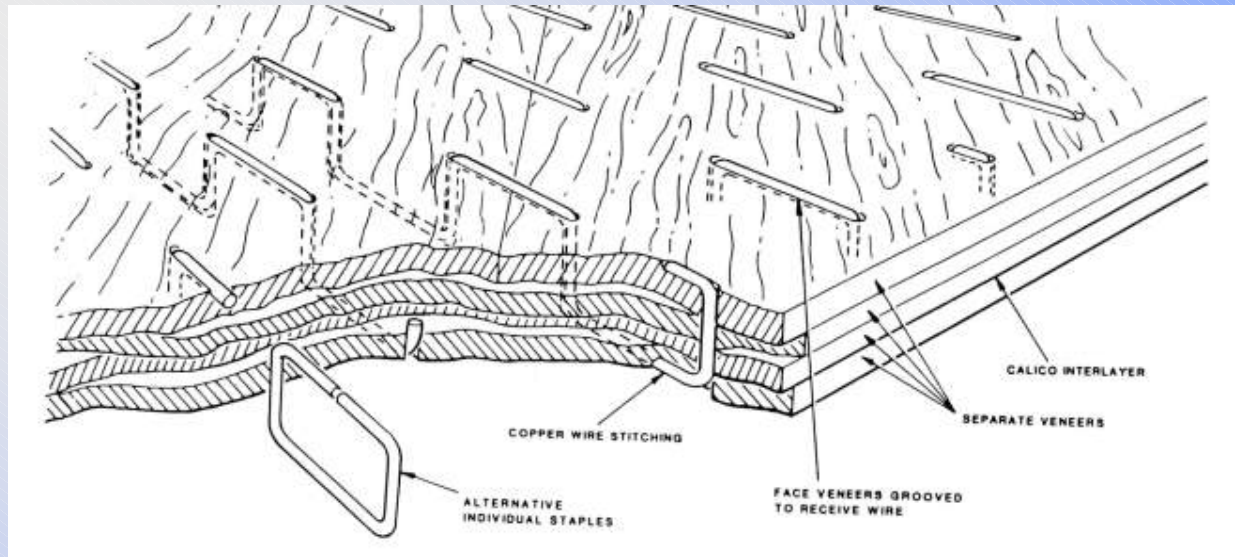


pic459

Sopwith Bat Boat c 1913



# 1901: Sam Saunders devises patented "Consuta" Construction Method



The syndicate had developed a new method of construction for plywood hulls where the material was sewn together with copper wire - this method was given the name "Consuta".

The "Consuta" hulls built by Sam Saunders soon gained international fame and as a sideline to his main business he took an interest in aviation. Two gondolas were built for the first naval airship and some early experimental work was undertaken for Sir Hiram Maxim, a noted pioneer of aviation. The first real success came with construction of T.O.M. Sopwith's Bat Boat in 1912 - one of the earliest flying boats made.

# 1908: Sam Saunders sets up a new business as S.E. Saunders Ltd

	<p>LAUNCH BUILDER AND ENGINEER</p> <p>ESTABLISHED 1870</p> <p><b>S.E. SAUNDERS,</b>  <b>BOAT, PUNT AND CANOE BUILDER,</b>  <b>GORING-on-THAMES,</b></p> <p>At the new Springfield Works on the Moulisford Reach is the largest Slipway, Launch Building and Repairing Works on the Upper Thames.</p> <p><i>First-class Moorings for Houseboats, Safe from Floods.</i></p> <p>Telegraphic Address: "SAUNDERS, GORING, OXON," Station, Goring, G.W.R.</p>	
<p>ELECTRIC CHARGING STATION.</p> <p>IMPORTER OF CANADIAN CANOES.</p> <p>BOAT BUILDING OF THE HIGHEST CLASS IN ALL ITS BRANCHES.</p> <p>SAUNDERS' BOAT FITTINGS ARE UNEQUALLED.</p>		<p>STEAM, ELECTRIC, AND OIL LAUNCHES BUILT TO ORDER.</p> <p>LAUNCH AND BOAT FITTINGS OF ALL DESCRIPTIONS KEPT IN STOCK.</p> <p>HOUSING, REPAIRING, AND VARNISHING EXECUTED IN BEST POSSIBLE MANNER.</p>

**SAUNDERS'**  
**Patent Launch Building Syndicate,**  
(LIMITED)  
 SOLENT WORKS, COWES, I.W., AND GORING-ON-THAMES.



MARINA MOTOR, Patent Motor Launch

The Cruising Launch that vanquished France of greater length and water her  
**NAVAL ARCHITECTS, YACHT & LAUNCH B.**  
**MARINE AND ELECTRICAL ENGINEERS.**

SPECIALTIES — HIGH SPEED STEAM AND PETROL LAUNCHES  
 OF LIGHT DRAFT DESIGNED WITH GREAT STABILITY

S. E. SAUNDERS, Ltd.

ESTABLISHED 1830.

Designers and Constructors of Air and Marine Craft

Contractors  
to  
The Admiralty  
and  
War Office.



Telegrams:  
Consuta  
East Cowes.

Phone:  
493 Cowes.

HEAD OFFICE & PRODUCTIVE WORKS:  
**EAST COWES, I.W.**

ERECTING & TESTING:  
SEAPLANES | LAND MACHINES  
OSBORNE WORKS | WEST MEDINA AERODROME

# 1914: Sam Saunders takes up aircraft manufacture

pic451



Solent Works at West Cowes,  
built in 1916

Felixstowe F2A flying boat  
production at Solent Works, 1917

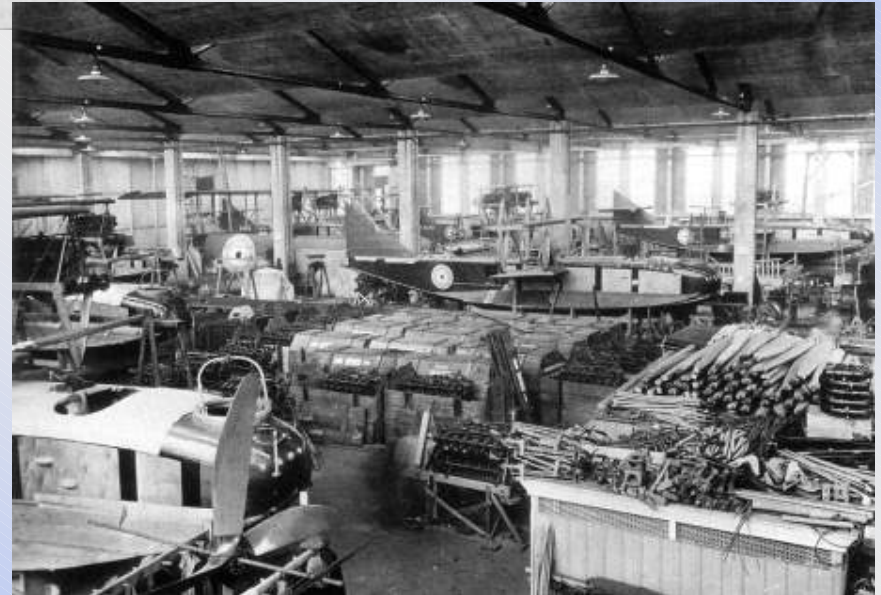
S.E. Saunders Ltd was contracted to produce a number of different aircraft during WW1 including:

Avro 504 training aircraft at the Folly Works

Short 184 seaplanes at the Folly Works;

Felixstowe F2A flying boats in the Solent Works at West Cowes;

Norman Thompson NT2B flying boats in the Columbine Yard



pic452

# 1914: Sam Saunders takes up aircraft manufacture

The main business was construction of a number of aircraft hulls & fuselages at Cowes using the "Consuta" method, however, by the time that the First World War had started in August 1914, Sam Saunders company undertook the manufacture of complete aircraft. This work began when A.V. Roe awarded S.E. Saunders Ltd a contract for 50 Avro 504A trainers, followed shortly afterwards by an order from the Admiralty for 30 Short 184 seaplanes. A small airfield was established on the east bank of the River Medina and known as the "Folly Sheds".

As a result of the large influx of work a large erecting shop was built at West Cowes. In 1917 the Air Board proposed that S.E. Saunders Ltd should build complete F2A flying boats resulting in a further expansion of the works on both sides of the River Medina with smaller workshops scattered throughout the district.

Although the company was hard hit by the cancellation of military contracts after the Armistice in 1919, reconditioning of F2As and F5s and the manufacture of spares for these aircraft and for DH9A day-bombers tided the company over a difficult period. The demand for "Consuta" had justified the cost of a equipping an 85,000 ft<sup>2</sup> purpose built factory known at the Osborne Plywood Works.



pic451

Solent Works at West Cowes,  
built in 1916



pic452

F2A production at Solent  
Works, 1917

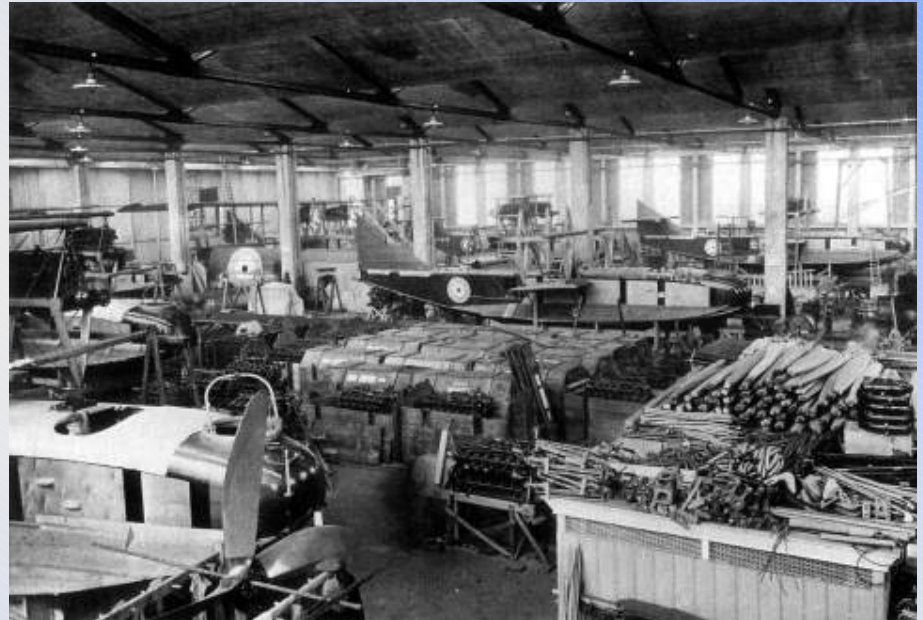
# 1915:S.E. Saunders Ltd Aircraft Production during WW1

S.E. Saunders Ltd was contracted to produce a number of different aircraft during WW1 including:

Short 184 seaplanes at the Folly Works;

Felixstowe F2A flying boats in the Solent Works at West Cowes;

Norman Thompson NT2B flying boats in the Columbine Works



Production of Felixstowe flying boats in the Solent Works at West Cowes c1917

# 1917:S.E. Saunders Ltd moves into aircraft design

pic458



Saunders TI biplane  
c 1917

pic462



Saunders Kittiwake  
amphibian c 1921

# 1917:S.E. Saunders Ltd moves into aircraft design

In 1917 S.E. Saunders Ltd produced its first aircraft design. This was a conventional two-seat biplane designated T1 powered by a 150 hp Sunbeam Nubian engine. The T1 was designed by a small team under the leadership of H.H. Thomas. H.H. Thomas died during the 1918-1919 influenza epidemic and the T1 was not developed any further.

S.E. Saunders Ltd next venture in aircraft design was in 1920 when the Kittiwake was proposed as an entrant for the Air Ministry competition held at Felixstowe and Martlesham Heath. Designed mainly by F.P. Hyde-Beadle, who had been recruited from the Gosport Aircraft Company, the Kittiwake was a twin-engined, four bay biplane amphibian. The design drawings were completed during the Summer of 1920.

The Kittiwake emerged as an unusual design with a several innovative features. The first flight took place at Cowes on 19th of September 1920 and after encountering a number of problems with the novel wing camber mechanism and engines it was decided that the aircraft was too experimental.

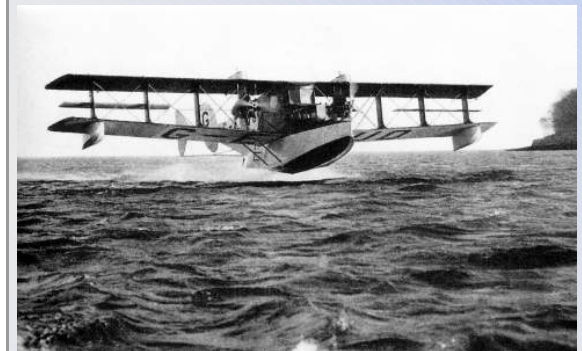
During the Summer of 1921 the Kittiwake crashed while being flown by an Air Ministry pilot who was unused to the elevator control anomalies affecting the design. The crash seriously damaged the Kittiwake and confidence in the type was lost. Soon afterwards the Kittiwake was scrapped, thus bringing the project to a close.

pic458



Saunders T1 biplane  
c 1917

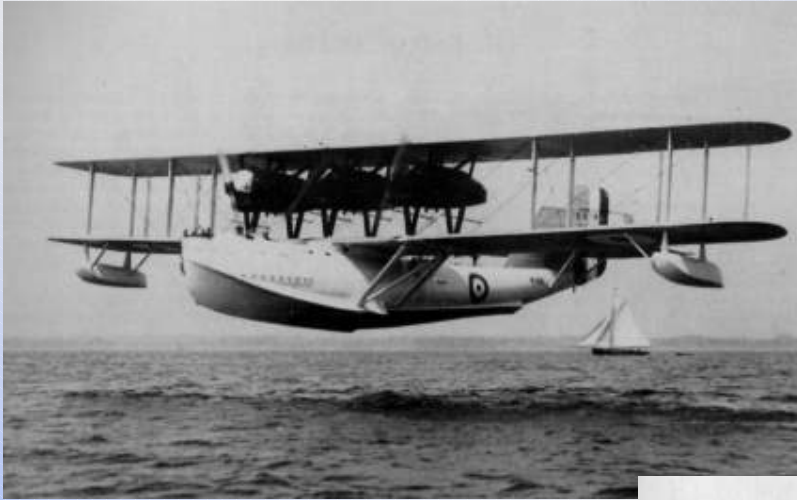
pic462



Saunders Kittiwake  
amphibian c 1921

# 1923:Aircraft design department reinstated

pic463



Saunders A3 Valkyrie  
c 1926

pic467



Saunders A4 Medina  
c 1926



# 1923:Aircraft design department reinstated

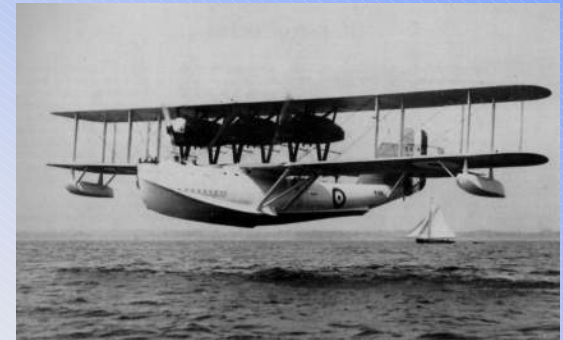
Following the demise of the Kittiwake amphibian, its designer, F.P. Hyde-Beadle, left S.E. Saunders Ltd and it was not until 1923 that a new aircraft design team was established at Cowes. The new team was led by Bertie Thompson who had formed a design partnership with Henry Knowler.

The first design to be built was an all wooden reconnaissance flying boat the A3 Valkyrie, powered by three Rolls-Royce Condor engines. This was followed by the A4 Medina as a potential commercial flying boat for Imperial Airways. The first flight of the A3 is believed to have taken place in early June 1926 and that of the A4 in the Spring of 1926.

On August the 12th 1927 the Valkyrie set out on a 9,440 mile Baltic cruise as part of an RAF mixed flight of prototype flying boats. However neither the A3 or A4 types were successful in gaining orders. It also became apparent that the day of the wooden hulled flying boat was over and with it the major application of "Consuta" to aircraft production.

Due to the disappointing performance of the A4 Bertie Thompson left the design team in 1929 and Henry Knowler was made Chief Designer.

pic463



Saunders A3 Valkyrie  
c 1926

pic467



Saunders A4 Medina  
c 1926

# 1928: S. E. Saunders Ltd. taken over and Saunders-Roe Ltd is formed

pic015



SARO company emblem



Sir Alliot Verdon Roe

In 1909 A V Roe was the first British citizen to fly a British built aircraft, taking to the air in an aircraft that he had designed and built

# 1928: S. E. Saunders Ltd. taken over and Saunders-Roe Ltd is formed

pic015

Sam Saunders realised that a switch to metal construction was essential if his business was to prosper and this would require considerable capital to invest in new equipment.

The possibility of re-establishing links with Vickers Ltd. did not materialise and, in June 1928, S.E. Saunders Ltd. was taken over by Sir Alliott Verdon (A V) Roe, John Lord and H.E. Broadsmith and other investors.

The new company was named in 1929 as Saunders-Roe Ltd. and the last traces of the old family business disappeared. In its place a stronger company had emerged that was better placed to weather the financial ups and downs of the late 1920s and foreseen for the early 1930s.

A V Roe became a director, managing director and chairman to 1937. In 1933 he became President of the company in succession to Sam Saunders, an honorary position he held until 1958 when the Saunders Roe Company was taken over by Westland Aircraft.



SARO company emblem



Sir Alliot Verdon Roe

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# 1929: Saunders Roe Leads Development of Metal Hulled Flying Boats.

pic457



Saunders-Roe A7 Severn metal hulled flying boat  
moored off the  
Solent Works slipway at West Cowes c1930

# 1929: Saunders Roe Leads Development of Metal Hulled Flying Boats.

The new company, generally known by the "SARO" trademark, set out to show that it could build aircraft in metal as well as S.E. Saunders Ltd. had built in wood.

As evidence of the new era a metal hull, designated as the A14, was produced in 1928 and attached to the superstructure of a Supermarine Southampton flying boat.

Henry Knowler's A14 hull design proved to be highly efficient and durable and became the prototype for most of the Saro water based craft for the next decade.

The A7 Severn was the first Saunders Roe metal hulled flying boat and appeared in 1930, although it had been initiated by S.E. Saunders Ltd

pic457



Saunders-Roe A7 Severn metal hulled flying boat moored off the Solent Works slipway at West Cowes c1930

# 1930s:Saunders-Roe business expansion

pic461



Miss England II  
c1930



SARO Cloud c1930



Spartan Cruiser c1933

pic426

pic455



New Columbine Works  
1936



Saro London Production  
1936

# 1930s:Saunders-Roe business expansion

Whilst aircraft work was predominant after the takeover, SARO was still involved with marine craft. Water speed record boats produced included the Rolls-Royce engined *Miss England II* in which Sir Henry Seagrave captured the world water speed record in 1930 and the *Bluebird* in which Sir Malcolm Campbell raised the record to 130.9 mph in 1938.

A number of aircraft designs were produced by Henry Knowler's design team during the 1930s. These included a range of small flying boats and amphibians such as the A17 Cutty Sark, the A19 Cloud and the A21 Windhover. Later in 1934 the A27 design emerged which was ordered into production for the RAF as the SARO London reconnaissance flying boat type. Simultaneously SARO was also building under sub-contract aircraft designed by other companies, the most numerous type produced being the Blackburn Bluebird IV, an all metal two seat biplane.

In 1931 SARO acquired Spartan Aircraft Ltd. and became involved in the airline business through Spartan Airlines and its operation of the three engined Spartan Cruiser airliner.

Once again work space was at a premium and a new programme of expansion and re-organisation was begun in 1935. This led to construction of a large erecting shop at East Cowes with a clear floor area of 150 x 200 ft which came to be known as the Columbine hangar.

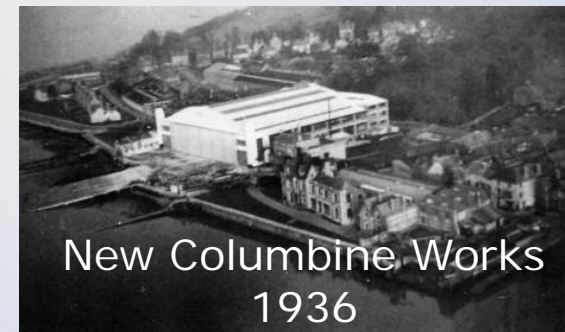
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pic426



pic455



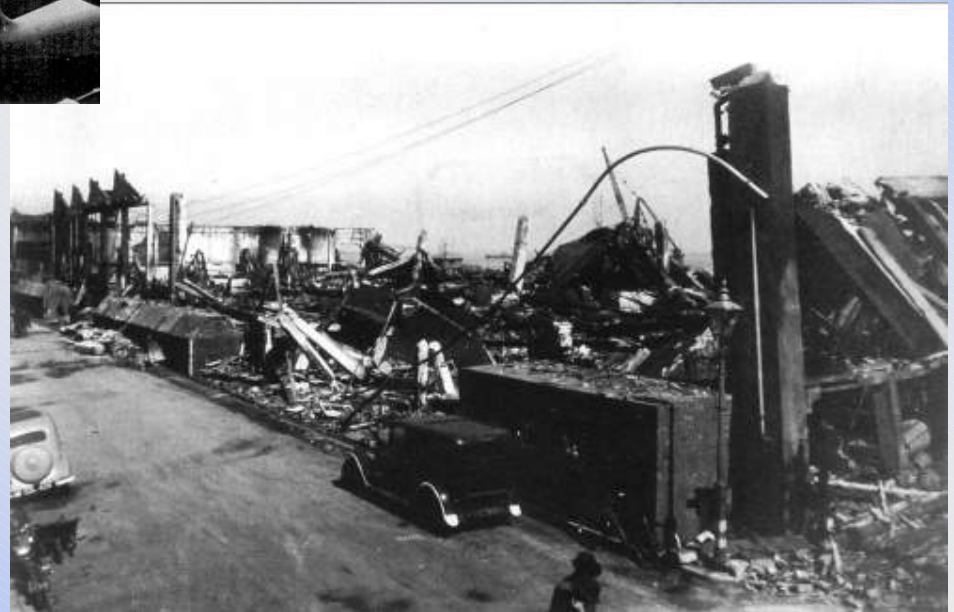
# 1940s: Contribution to the war effort

pic456



Sea Otter production in Columbine Works 1944

pic454



Solent Works after they were destroyed in an air raid in May 1942



# 1940s:Contribution to the war effort

The re-organisation of late 1937 and early 1938 meant that all shipbuilding activities were undertaken by Saunders Shipyard Ltd. SARO Laminated Wood Products Ltd. was formed to develop the rapidly growing plywood business and by 1939 nearly 40% of all aircraft plywood made in Britain was produced by this company.

Apart from a limited contract for the SARO Lerwick twin engined reconnaissance flying boat type, the majority of the work undertaken during World War 2 involved production of aircraft for other companies. This included manufacture of the Supermarine Walrus Mk II and Sea Otter amphibians for the RAF and RN use, production totalling 453 Walruses and 290 Sea Otters. Large numbers of damaged aircraft were repaired and 336 Catalina amphibians were equipped with ASV radar and other equipment to suit RAF operational requirements.

Much of the design and conversion work was done at a new factory at Beaumaris on the shore of the Menai Straits, Anglesey, North Wales. The Saro team at Beaumaris were responsible for design work and wind tunnel testing as part of the Short Shetland project.

pic456



Sea Otter production in Columbine Works 1944

pic454



Solent Works after they were destroyed in an air raid in May 1942

# Late 1940s and 1950s : Other Business Activities

- Beaumaris, Anglesey
  - Boatbuilding
  - Bus body design and manufacture
- East Cowes, Folly Works
  - Plywood
  - Plastics and fibreglass materials (SaRez)
  - Interior partitioning and wall cladding for aircraft, ships and buildings
- East Cowes, Osborne
  - Electronics
  - Strain gauges & strain measurement systems
  - Marine equipment, outboard motors
- East Cowes, North Site
  - Aircraft structure sub-contracts
    - Supermarine Swift jet fighter wings
    - De Havilland Vampire jet fighter wings
    - Vickers Viscount air liner wings
    - Vickers Valiant bomber pressure cabin design and build
    - Shorts Belfast military transport loading ramp

# Late 1940s and 1950s on: Post war re-organisation and new directions

With the end of World War 2 it was necessary to re-organise the company to operate on a peacetime basis. A widely dispersed collection of factories engaged on a variety of work evolved to support the war effort. Aircraft work was re-grouped into two main centres in the Isle of Wight and at Eastleigh. The Beaumaris work was taken over by Saunders Shipyard Ltd. and in 1951 became Saunders-Roe (Anglesey) Ltd. Although the SARO name was still used the company became more generally known as Saunders-Roe.

Aircraft developed in this period were the SRA/1 jet fighter flying boat and the Princess long range transport flying boat. However with the changing needs in the post war era it became evident that the flying boat age was over and the company undertook new work such as the SR53 rocket propelled interceptor, the Black Knight atmospheric re-entry test vehicle, the Black Arrow satellite launch vehicle. Development of the hovercraft principle into a full sized craft led to the large SRN4 Mountbatten Class cross-channel hovercraft.

Following acquisition of the Cierva helicopter company development and production of the Skeeter light helicopter formed an important part of the business. The P531 helicopter was designed as a successor to the Skeeter: the P531 formed the basis of the highly successful Wasp and Scout types produced by the Westland Helicopter Company.

SRA/1

pic425



pic099



Princess

SR53



pic466



Black Knight  
rocket at  
Woomera

pic460

# Late 1940s and 1950s on: Post war re-organisation and new directions

pic099



SR A/1- 1947

pic425



Princess-1952

pic460



Black Knight  
rocket at  
Woomera-1958

pic466

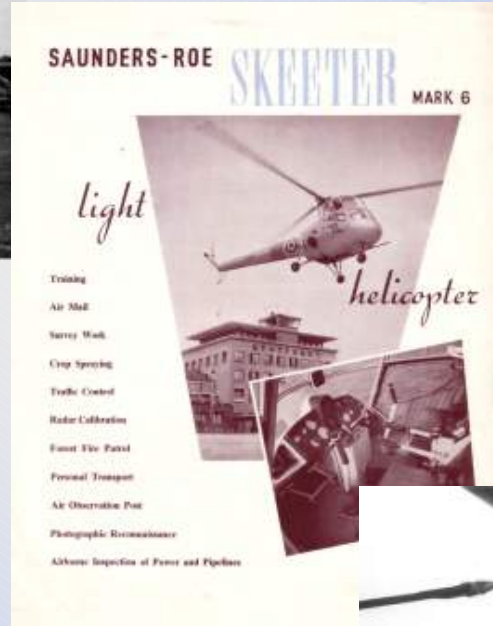


SR53 - 1957

# Early 1950s on: Acquisition of Cierva Helicopter Company -



Skeeter  
prototype c1952



Skeeter Sales  
Brochure—c1954



P531 prototype - 1957 29

# Late 1950s on: More organisation changes and the Saunders-Roe name disappears

pic465



Wasp-1960

pic464



SRN1 1959

Black Arrow - 1971



pic109



SRN4 1969

# Late 1950s on: More organisation changes and the Saunders-Roe name disappears

In 1956 de Havilland Holdings Ltd. acquired an interest in the Saunders-Roe Company which then became the Saunders-Roe Division within the de Havilland Group.

Cancellation of the SR53 project and work on the production version, the SR177, as a result of the notorious 1957 Defence White Paper, produced under the aegis of Sir Duncan Sandys, was a serious setback for Saunders-Roe. After this event Saunders-Roe's activities were restricted to helicopter development and production. In 1959 the history of Saunders-Roe as an independent company came to an end when it was absorbed into Westland Aircraft Ltd.

Development of the hovercraft principle as the basis for various types of craft for civil and military uses continued at Cowes and the division became the British Hovercraft Corporation within the Westland Group.

Later organisational and ownership changes meant that the Cowes operation formed a part of Westland Aerospace within the Westland Group in 1985. The former Saunders-Roe Cowes works operate today as GKN Aerospace Services following acquisition of the Westland Company by the GKN Group in 1994.



# Saunders-Roe and the Princess Flying Boat

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## Columbine Works Site Evolution 1906-2007



# 1906-2007 Columbine Works Evolution



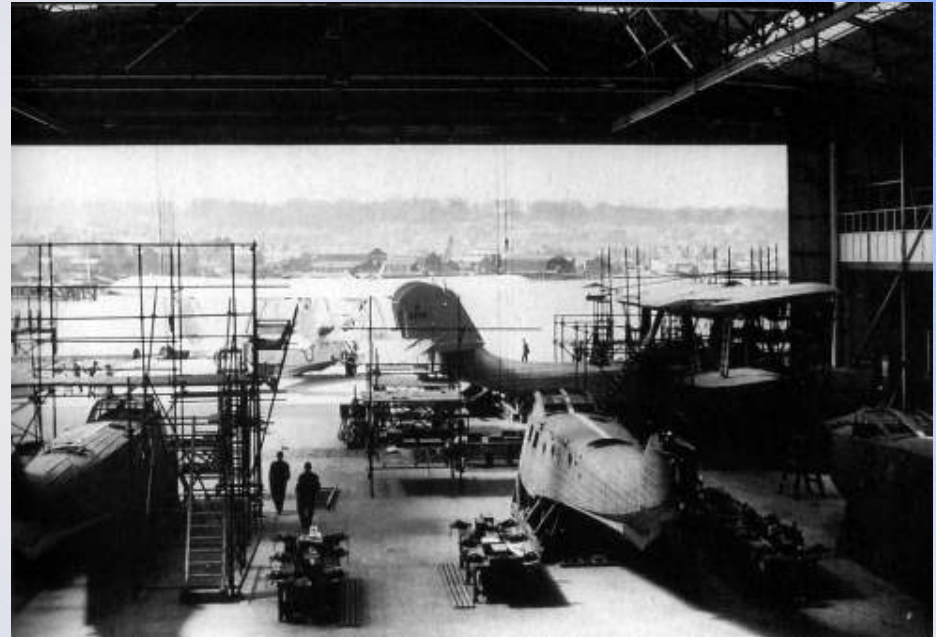
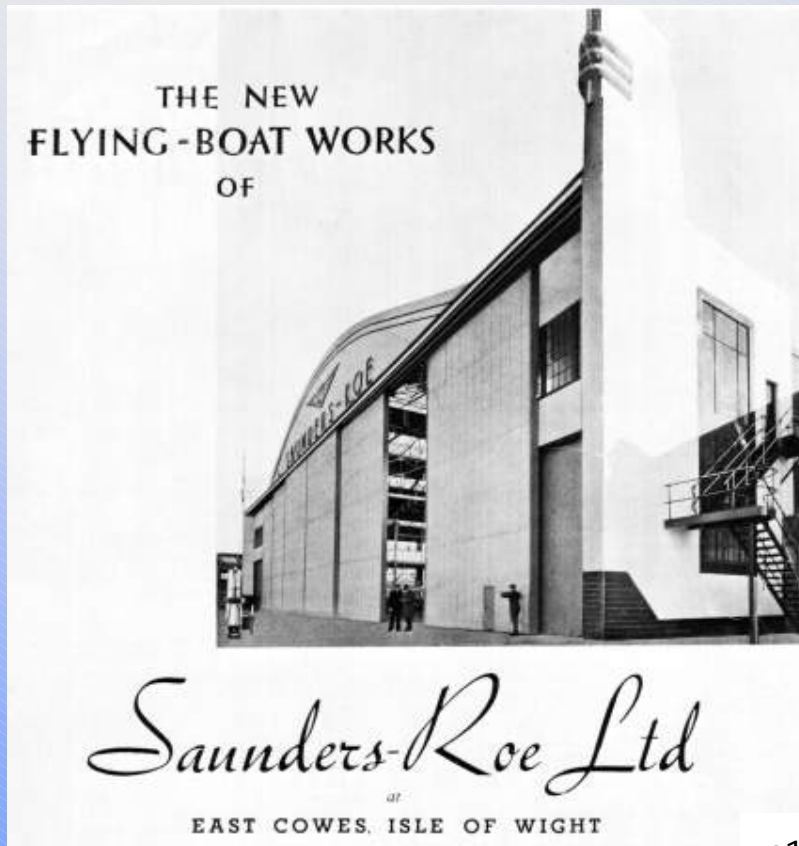
C1906 The derelict Columbine Yard was taken over by Sam Saunders for use by the Saunders Patent Launch Building Syndicate.

# 1906-2007 Columbine Works Evolution



By 1928 several new buildings had replaced the old Columbine Yard workshop

# 1906-2007 Columbine Works Evolution



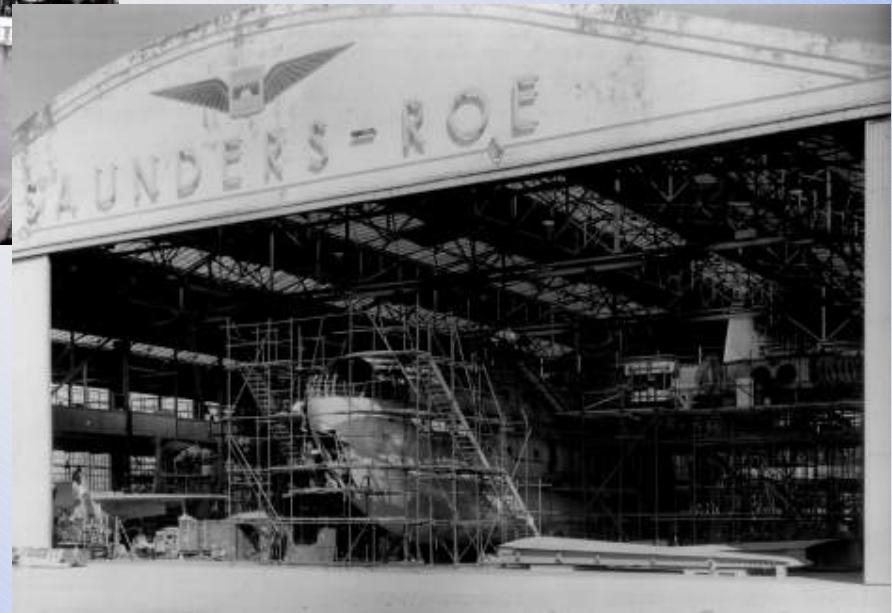
c1936: The new Columbine Hangar was opened and used for production of the Saro London

# 1906-2007 Columbine Works Evolution



c1944: Supermarine Sea Otter amphibious aircraft assembly lines occupied the Columbine Works

# 1906-2007 Columbine Works Evolution



1952: The Columbine Hangar and adjacent workshops were fully committed to the Princess project

# 1906-2007 Columbine Works Evolution



c1962: An SRN2 hovercraft departs from the Columbine Hangar slipway. The hangar frontage now bears Westland Aircraft titling



2001: Now with a large Union Jack painted on the main doors, the Columbine hangar carried GKN titling.



2007: The Columbine hangar is now re-titled as Venture Quays. The art deco design features make this building somewhat unique as an example of industrial architecture.

# Saunders-Roe and the Princess Flying Boat

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## The Saunders-Roe Princess Flying Boat Project

# Saunders-Roe and the Princess Flying Boat

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## Origins of the Large Flying Boat Concept



# Flying Boats Seen as the Solution for Long Range Air Routes

- ❑ With the rapid development of aviation during the First World War attention was turned in the 1920s to the development of commercial air transport services.
- ❑ The airship was seen as a possible solution for long range air transport but achieved little success due to their susceptibility to headwinds, ground handling problems and safety concerns.
- ❑ During the late 1920s and early 1930s the flying boat was promoted as the answer for long distance air routes:
  - ❑ Germany led the way in 1929 with the 12 engined Dornier Do X.
  - ❑ Imperial Airways had adopted flying boats such as the Short Calcutta biplane type for routes to Africa, India and the Far East.
  - ❑ USA pioneered flying clipper services to South America and later across the Pacific using Sikorsky, Glenn L. Martin and Boeing flying boat types.
- ❑ In 1935 a British government policy decision to establish the Empire flying boat service for the carriage of mail and passengers resulted in a large fleet of Short C Class flying boats being ordered "off the drawing board".
- ❑ At the time the flying boat reigned supreme with the Empire flying boat fleet continuing to operate overseas routes throughout World War 2.

# Flying Boats Seen as the Solution for Long Range Air Routes

With the rapid development of aviation during the First World War attention was turned in the 1920s to the development of commercial air transport services. Initially the aircraft used were converted bombers and light aircraft, later purpose built land-planes and flying boat designs emerged, but these were generally limited in carrying capacity and range. The airship was seen as a possible solution for long range air transport but were destined to achieve little success due to their susceptibility to headwinds, ground handling problems and safety concerns.

During the late 1920s the flying boat was promoted as the answer for long distance air routes. Germany led the way in 1929 with the 12 engined Dornier Do X. Imperial Airways had adopted flying boats such as the Short Calcutta biplane type for routes to Africa, India and the Far East. Interest in long range flying boats was also shown by the USA with the flying clipper services to South America and later across the Pacific using Sikorsky, Glenn L. Martin and Boeing flying boat types.

In 1935 a British government policy decision to establish the Empire flying boat service for the carriage of mail and passengers resulted in a large fleet of Short C Class flying boats being ordered "off the drawing board". At the time the flying boat reigned supreme with the Empire flying boat fleet continuing to operate overseas routes throughout World War 2.

However, during World War 2 the development of aircraft as bombers and for long range transport as land based aircraft, together with the construction of concrete runways world-wide as part of the war effort, was destined to change the face of commercial air transport in the post-war era; although there remained some specialised uses for the large flying boat such as military logistics support, maritime patrol and fire-fighting.

# Inspiration from Dornier Do X Large Flying Boat



pic095



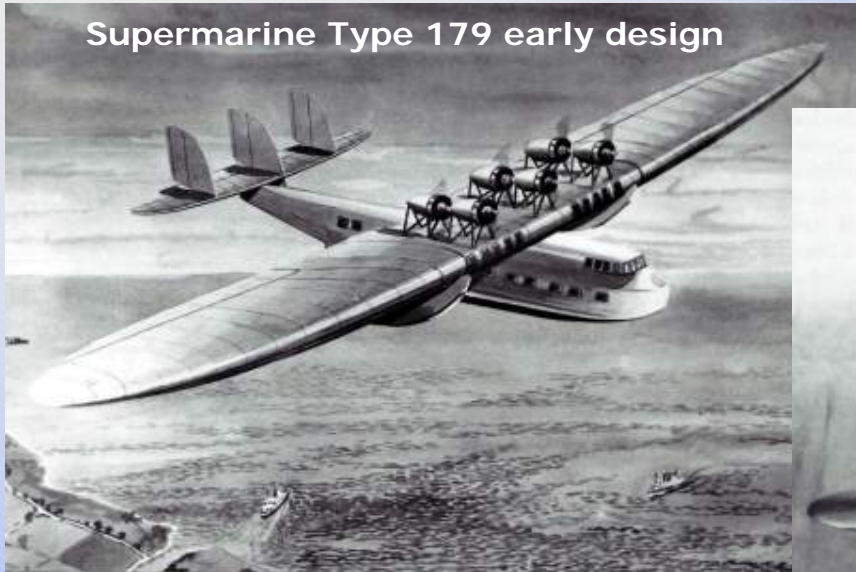
pic427



pic152

Although unsuccessful, the giant Do X flying boat created much interest during its visit to Southampton Water in August 1930. The craft was open for viewing to invited guests including a party from the Saunders-Roe company. The Do X is likely to have inspired many to consider the large flying boat as the way of the future for air transport over long distances.

# Supermarine Type 179 Giant



During the 1920s Supermarine's Chief Designer R J Mitchell had produced a number of flying boat designs, notably the Supermarine Southampton and the revolutionary S4, S5 and S6 seaplanes for the Schneider Trophy contest. Inspired by the Do X, the company designed the Supermarine Type 179 Giant in 1930. The Air Ministry placed a contract for the 185 foot wingspan Type 179 and the keel was laid down early in 1931. However, early in 1932 the contract was cancelled due to the severe economic problems at the time. If the Type 179 had been built, Supermarine would have become pre-eminent in the large passenger carrying flying boat field.

# Imperial Airways and the Golden Age of Travel by Flying Boat

During the 1930s Imperial Airways fleet of Shorts C class Empire flying boats provided world-wide carriage of mail & passengers between Britain & the furthest reaches of the British Empire.



pic117



pic420a



pic115

# Imperial Airways Empire Flying Boat Service



THE EMPIRE COURIER

pic158



COMFORT IN THE AIR



ALL ABOARD FOR THE EMPIRE

pic159



pic150



CANOPUS

pic160

Scenes showing various aspects of Imperial Airways' Empire flying boats in operation.

# Large Flying Boats Used by the USA & France for World Wide Air Services

The Boeing 314 "Flying Clipper" was the last of the USA's flying boats to undertake regular air services



pic601



Pan American Airways Boeings operated routes across the Pacific & the Atlantic oceans & to South America



France produced a number of large flying boats in the 1930s. The largest was the Latecoere 631 type. The design originated from a 1936 specification. Of 9 craft built, the first was flown in 1942 and the remainder from 1945 after hostilities had ceased.



pic600

# Hughes Aircraft Builds the Hughes H-4 "Hercules"

pic603



pic606



Although destined to make only one flight in 1947, the controversial Hughes H-4 Hercules is the largest flying boat ever built. Another claim to fame is the fact that the airframe was the largest ever to be constructed of wood.

Conceived in 1942 as a long range troop transport to support WW 2 operations in the Pacific theatre, delays in construction meant that by the time it had been built the war was over leaving lawyers, politicians & the enigmatic Howard Hughes embroiled in acrimonious wrangling over who was to blame for the alleged waste of public funds.



# Examples of Other Large Flying Boats of the 1940s



Martin Mars (USA) - designed as a military transport these craft have seen many years of service as fire bombers in California, USA and in the Vancouver region of Canada. Despite several threats of retirement the Martin Mars is still in service.

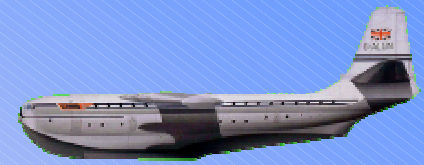
Convair Tradewind (USA) - Ordered in 1946 and flown in 1950, the Tradewind saw limited service in a logistics support role for the US Navy, its service life was curtailed due to insurmountable engine and propeller problems



Blohm & Voss Bv222 (Germany) - this type was one of several large flying boat designs from the Blohm & Voss company

**Saunders-Roe and the  
Princess Flying Boat**

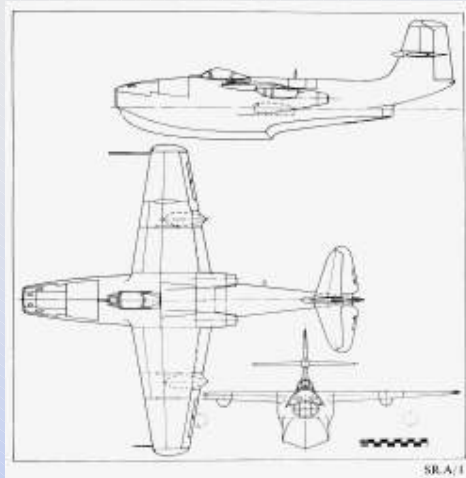
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# **Saunders-Roe A/1 Jet Flying Boat Fighter Project**

**Design experience, skills &  
technology applied to SR45 project**

# Saunders-Roe SRA/1 Jet Flying Boat



pic182



pic183



pic099

The Saunders-Roe SRA/1 jet powered flying boat fighter was designed at the end of World War 2 to meet a potential requirement for fighters capable of operating in regions where a land base was not available. The SRA/1 was designed at the Beaumaris office in Anglesey, N. Wales, production & flight trials were undertaken at Cowes. Three aircraft were produced for trials & evaluation.

Although performance of the SRA/1 was comparable to or better than contemporary land based fighters no production contract was forthcoming as the original military requirement no longer applied in the post war era. The SRA/1 demonstrated Saunders-Roe's innovative & adventurous approach to aircraft aerodynamic & hydrodynamic design.

# Saunders-Roe and the Princess Flying Boat

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## Saunders-Roe SR45 Large Flying Boat Project Gets Underway

# Outline Chronology of Events

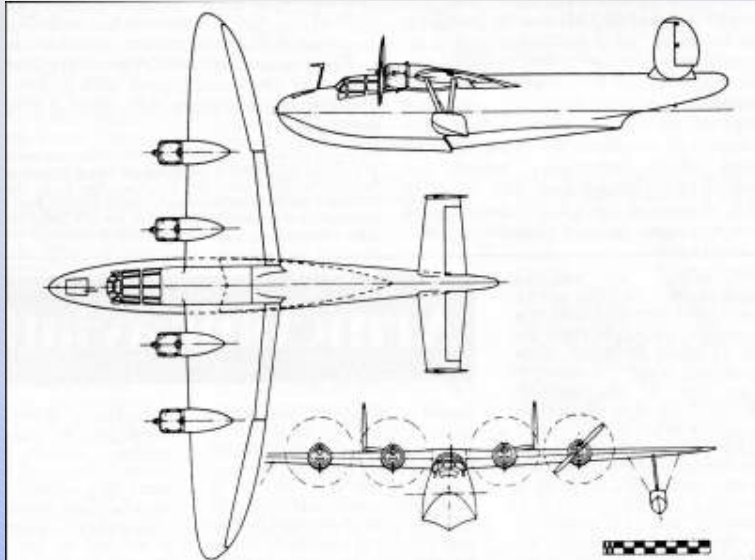
- 1939 Shorts develop large flying boat concepts, Saunders-Roe (SARO) designs & builds a scaled down flying boat, the Shrimp, to develop hull designs for future large flying boats
- 1943-44 Arthur Gouge moves from Shorts to become Saro Vice Chairman; plans drawn up for post war development of a large passenger carrying flying boat to replace Shorts " C Class"
- 1946 Contract let to Saunders-Roe for SR45 flying boat project, later to be named the Princess
- 1948 SR45 Princess construction commenced at East Cowes
- 1950 Delays encountered due to engine supply problems
- 1952 First flight of Princess G-ALUN on 22nd August 1952
- 1952 Princess makes an appearance at the SBAC Farnborough Air Show
- 1952-1953 Company flight testing and handling assessment for the Marine Aircraft Evaluation Establishment (MAEE), Felixstowe
- 1953 Uncompleted airframes put into long term storage at Calshot and dismantled there in 1965
- 1954 Princess G-ALUN brought ashore for Cocooning and stored at West Cowes.
- 1954-Investigations of possible alternative use:
- Aquila airways makes an offer for use if routes are guaranteed*
  - Nuclear powered version studied*
  - Landplane transport conversion scheme put forward*
  - Proposal for twin hulled conversion as heavy lift flying boat for Saturn V rocket*
- 1967 First Princess G-ALUN towed from Cowes to be broken up for scrap at Southampton

# Shorts & Saunders-Roe & Large Flying Boats

- ❑ Shorts & Saunders-Roe develop concepts for successor to C Class & G Class Empire flying boats;
- ❑ Saro Shrimp designed & built in 1939 to develop hull designs;
- ❑ Evolution of the large flying boat concept during World War 2 as a post war project;
- ❑ Arthur Gouge moves from Shorts to Saunders-Roe in 1943 as Vice Chairman to supervise the Short Shetland project joined up with Chief Designer Henry Knowler to develop the large flying boat concept that became the SR45 project;
- ❑ Short Shetland built as a Sunderland replacement & for civil use as a joint Shorts & Saunders-Roe project - *Military prototype destroyed by fire at MAEE Felixstowe in 1946. Shetland II built for civil use and flown in 1947 but the project was curtailed shortly afterwards.*

# Saro Shrimp Flying Boat used for Hull Design Proving & Performance Evaluation

pic094



pic093



pic092

The Saro Shrimp was designed and built in 7 months and flew from Cowes in early October 1939. As a scaled down version of a projected large flying boat it was used to trial & verify hull design concepts. The Shrimp was later modified with a single fin & rudder for further trials to support design & development of the Short Shetland.

# SR45 Princess Project Inspiration

Following the success of long range flying boat services in the late 1930s the idea of a next generation of large flying boats emerged. Around 1943 a new large flying boat design was projected for the post war era that would be capable of challenging the supremacy of ocean liners on the lucrative transatlantic route and win a major share of the passenger traffic.

It is fair to say that the SR45 Princess project was largely inspired by one man, Arthur Gouge, a visionary and obsessive champion of the cause of the large flying boat. He joined Short Brothers at Rochester in 1915 as an apprentice mechanic and by 1930 had risen to become Chief Designer and General Manager. His experience and knowledge of flying boat design and hull hydrodynamics, and his design leadership of the Shorts Empire C Class, G Class and Sunderland flying boats with Short Brothers, meant that he was widely recognised as the leading authority in this field.

Arthur Gouge's vision of the large flying boat's potential led to him teaming up with Saunders-Roe Chief Designer Henry Knowler when he was appointed Vice Chairman of Saunders-Roe in 1943 . Gouge and Knowler became the driving force behind formulation of design proposals that, in 1946, resulted in a Ministry of Supply (MoS) contract being placed with Saunders-Roe by the UK Government for design and construction of three SR45 long range flying boats.



# Key People



pic169

Arthur Gouge  
*(later to become Sir Arthur Gouge in  
May 1948) -  
Saunders-Roe Vice Chairman & Chief  
Executive*



pic170

Henry Knowler - *Saunders-Roe  
Chief Designer*



pic167

Maurice Brennan - *Saunders-Roe  
Deputy Chief Designer*



pic168

Geoffrey Tyson - *Saunders-Roe  
Chief Test Pilot*

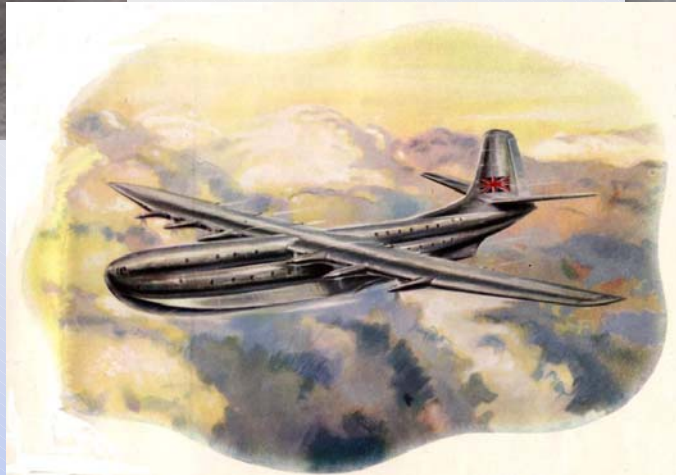
# Large Flying Boat Design Studies & Concepts



pic501b



pic501a



pic219



pic009SaroMag

Early large flying boat concepts studied by Arthur Gouge & Henry Knowler evolved as a 140 ton craft, with a pressurised hull, six propeller gas turbines and luxury accommodation for over 100 passengers

# Flying Boat Terminal Concepts



Respectfully submitted to the Admiralty

**SUPREME FOR OCEAN TRAVEL – THE BRITISH FLYING BOAT**

**BAY 4**

**ON TIME FROM SOUTH AMERICA**

*The 4.50 arrives at No. 4 Bay*

Journey's end, and the great British flying boat is safely docked at the terminal base. No transhipment to tenders in a choppy sea. No exposure to the elements during disembarkation.

**SAUNDERS-ROE**  
*Designers and Constructors of Large Flying Boats*  
49, PARLIAMENT STREET, WESTMINSTER, S.W.1. TEL. WHITEHALL 7291.



**SUPREME FOR OCEAN TRAVEL – THE BRITISH FLYING BOAT**

*and now*

**THE WATER DROME**

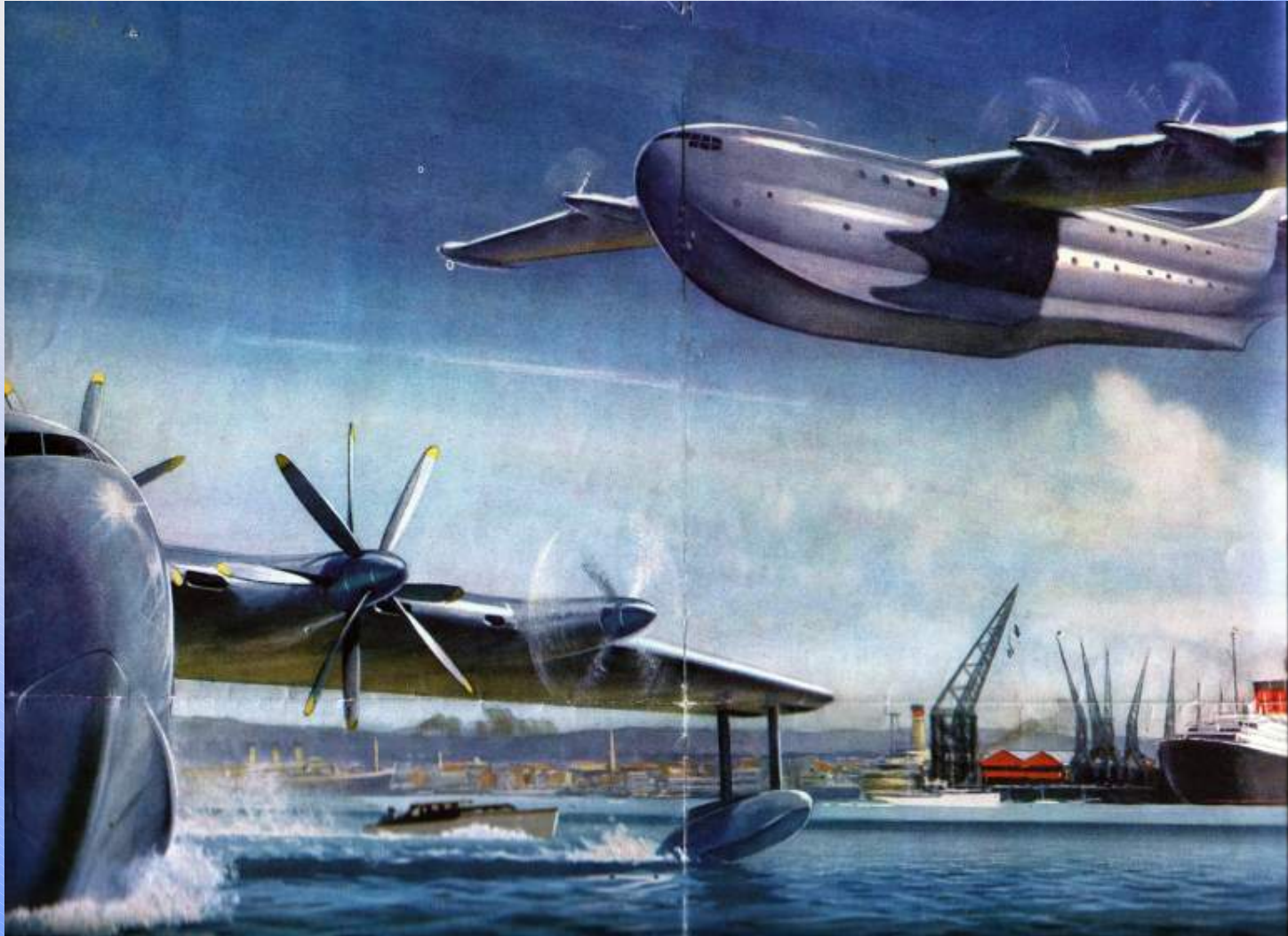
Disembarkation into a small craft in choppy water is not a fitting end to a comfortable journey by flying boat. Both traveller and operator look for something more in accord with modern ideas of comfort and efficiency. Now, thanks to a revolutionary but simple scheme evolved by Saunders-Roe, they can have it. Direct disembarkation within the shelter of a covered dock, with no loss of time and no exposure to the elements, can now be realised. We are ready to discuss this scheme with operators and others seriously interested.

**SAUNDERS-ROE**

SAUNDERS-ROE LTD., 49, PARLIAMENT STREET, LONDON, S.W.1. TEL. WHITEHALL 7291.

Saunders Roe advertisements dating from 1945 presented the flying boat terminal of the future

# Vision of Future Princess Flying Boat Operations to Rival Ocean Liners

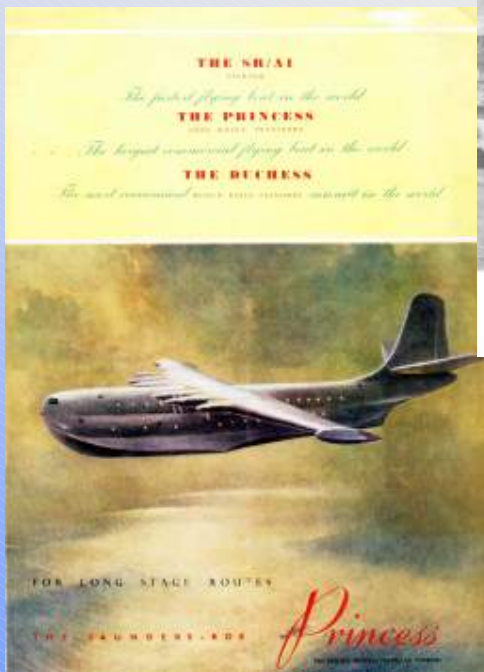


# Saunders-Roe Brochures & House Journals Feature Princess



pic110

pic107



pic066



# Selection of Saunders-Roe Advertisements from *Flight & Aeroplane* 1945-1949

pic355



pic352



pic353



Pic354



pic358

# Selection of Saunders-Roe Advertisements from *Flight & Aeroplane* 1949 on

pic361



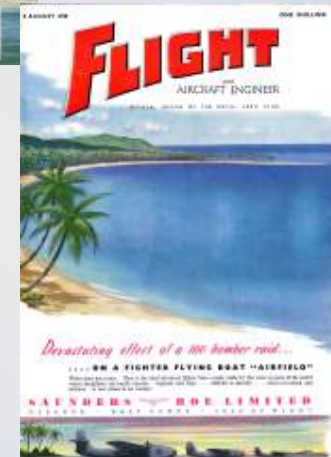
pic360



pic356

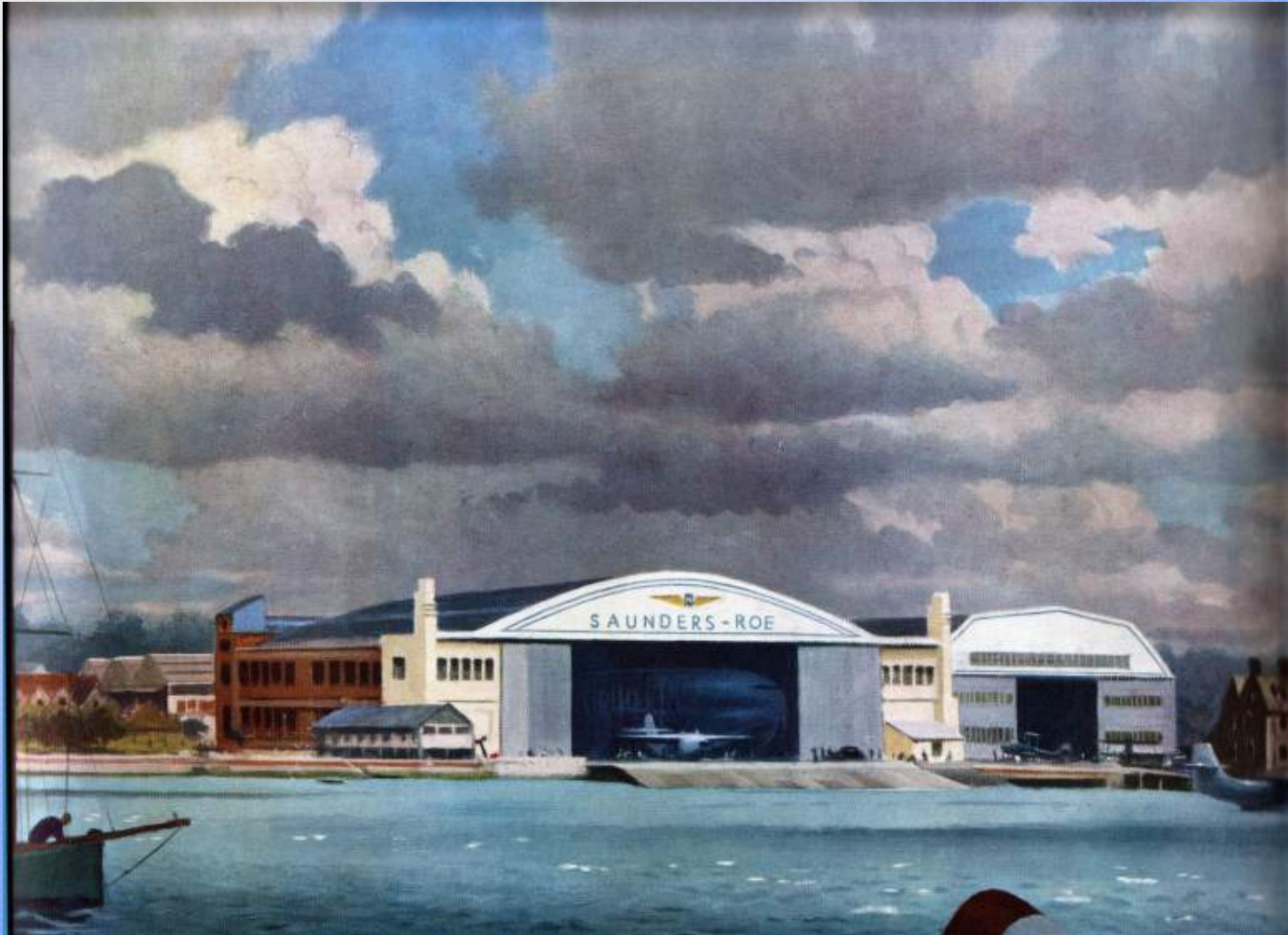


pic469



pic365

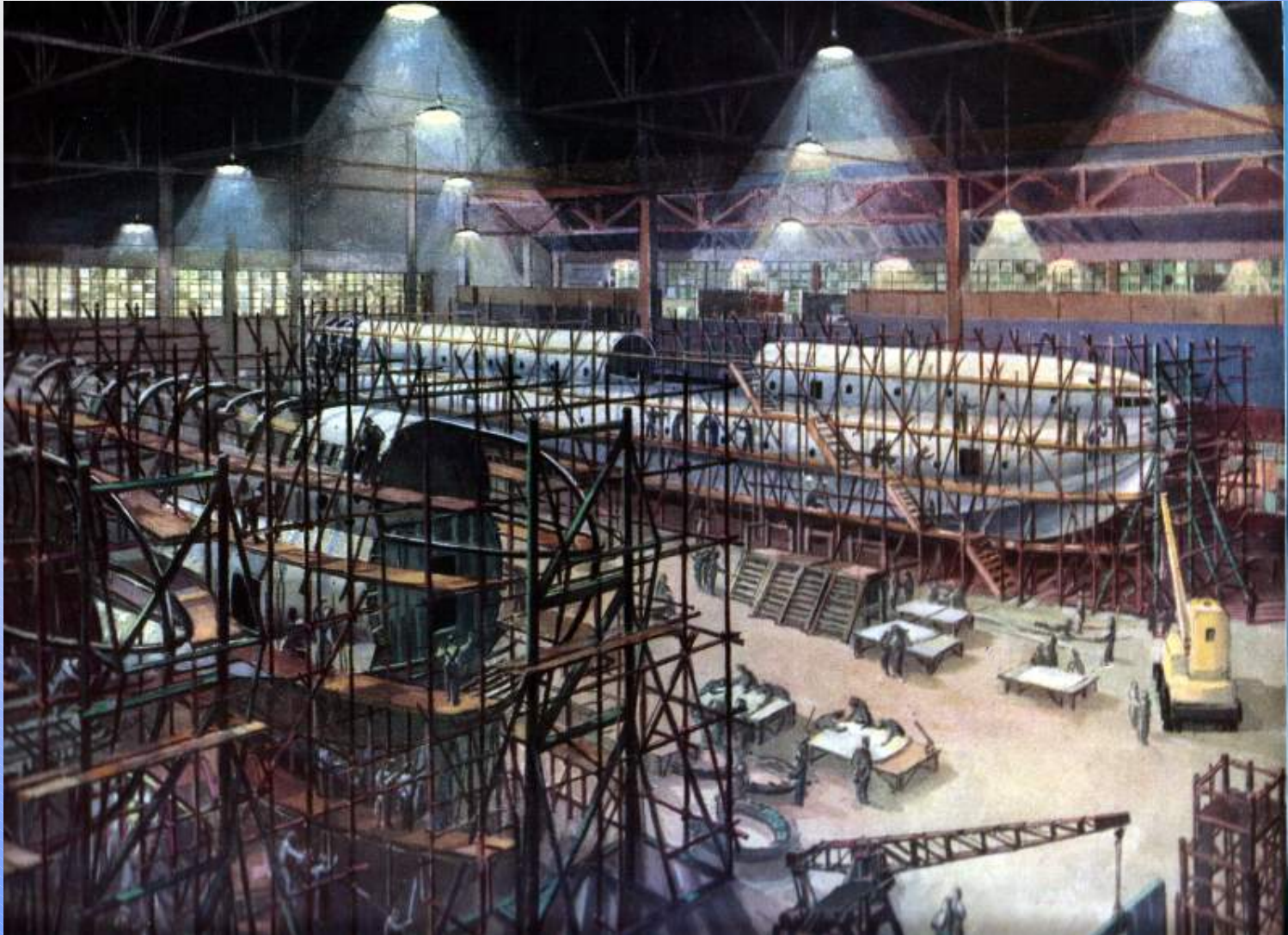
# Saro Works at East Cowes - Painting by Roy Nockolds



pic068Sarobrochure



# Princess in Production-Painting by Cavendish Morton



# The Future on the Water -Painting by Roy Nockolds



pic070Sarobrochure

# The Future in the Air

-Painting by Roy Nockolds



# Stylish Interior Design Concept



pic073Sarobrochure

# World-wide Air Route Structure Envisaged for the Princess



# Contract Arrangements

- ❑ Contract let in 1946 by the Ministry of Supply for Saunders-Roe to design & build three large passenger carrying flying boats designated type SR45
- ❑ Ministry of Aviation also directly involved on behalf of BOAC and civil operators
- ❑ Contract value was £2.8 million\*, at this stage the engines were priced optimistically at £400,000\*  
[ \* 1946 prices ]

# Saunders-Roe Relies Upon British Aircraft Industry's Comprehensive Capability

- ❑ Like any major project it was necessary for Saunders-Roe to organise the work to make the best use of prime contractor skills and capabilities and to draw in expertise, products and materials from partners, sub-contractors and suppliers.
- ❑ Despite the fact that Saunders-Roe was a relatively small company it not only managed the overall design and construction aspects but also undertook fabrication of all the airframe structures and detail parts.
- ❑ Apart from the major sub-contracts let for design and build of the engines, propellers and powered flying controls, a vast range of more detailed sub-contracting and procurement activities had to be organised and managed.
- ❑ For the Princess project the wide ranging capability of the British Aircraft Industry in the post-war era meant that virtually the whole of the project could be considered as "British Made".

# Main Sub-contractors

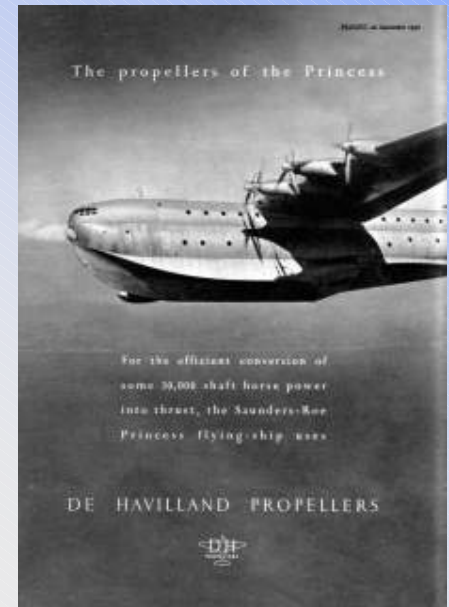
pic194



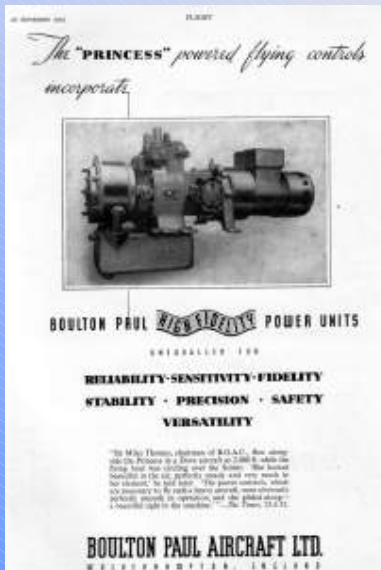
Bristol Aeroplane Co,  
Engine Division.

de Havilland Propellers

pic191



pic187



Boulton Paul Aircraft



# ..... and Other Contractors & Suppliers.....

pic188

**FIT FOR A PRINCESS**

**SMITHS**      **KELVIN HUGHES**

**SMITHS AIRCRAFT INSTRUMENTS LTD**  
The Engine Division of Smiths & Son (England) Ltd.  
Telephone: London 267-1200

pic198

**EKCO airborne search radar**

**EKCO electronics**

**MARSTON flies with the "PRINCESS"**

**MARSTON EXCELSIOR LIMITED**  
FERRISSEUX, MULHOUSE-FRANCE

pic190

**Let's talk of skeletons**

**... and skins**

**CHOBERT**  
SYSTEM OF RAPID RIVETING  
USED ON THE  
SAUNDERS-ROE "PRINCESS"

**AVIATION DEVELOPMENTS LTD., Kingsdown House, 225-231, High Holborn, London, W.C.1. Tel. Chiswick 3411**

pic197

**FIBREGLASS** is used in the  
'Princess' for thermal and sound  
insulation and the reinforcement of  
plastic laminates.

**FIBREGLASS LIMITED, 25, Abchurch Lane, London, E.C.4**

LONDON OFFICE: 215F BUCKLEBY, LONDON, W.1. (BRAND) 215F

**NORMALAIR**  
EQUIPMENT

*The Princess - first Postwar  
passenger carrying transport  
Operation without runway  
restrictions and - thanks to  
NORMALAIR  
EQUIPMENT - without altitude restrictions*

**NORMALAIR LTD. MANUFACTURED BY JOHN JAMESON CORP. NEW YORK, ENGLAND.  
WIND - RESISTANT - BARRAGEMENT - TREATMENT**

pic189

**LUCAS**

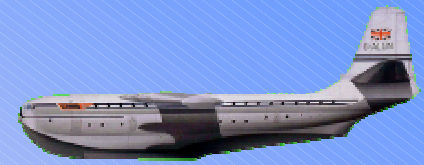
**Fuel and Control Systems for Six Turbine Engines**

**LUCAS**

pic195

# Saunders-Roe and the Princess Flying Boat

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## Saunders-Roe Works at East Cowes-

Provided skills, workshops and tools needed to build the Princess

# Map Showing Location of Saunders-Roe Premises at East Cowes c1950

East Cowes Main Works (North Site)



Osborne Head Office & Design Offices.

Osborne Development & Test Works & Apprentices Training Centre

# Construction of the New Flying Boat Works 1936

In 1936 the new purpose built flying boat factory building for Saunders-Roe was opened. The buildings were designed & constructed by Boulton & Paul Ltd. of Norwich.

Initially used for production of the Saro London flying boat the new works have served as the main assembly floor at East Cowes ever since.

The hangar, concrete apron & slipway formed the Columbine Works section of the complex of Saunders-Roe premises at East Cowes.

The art deco style frontage became a landmark on the River Medina and today the main doors are decorated with what is reputed to be the largest Union Jack emblem in the World.



pic200a

2001



pic119

# East Cowes Works Elevated View c1951

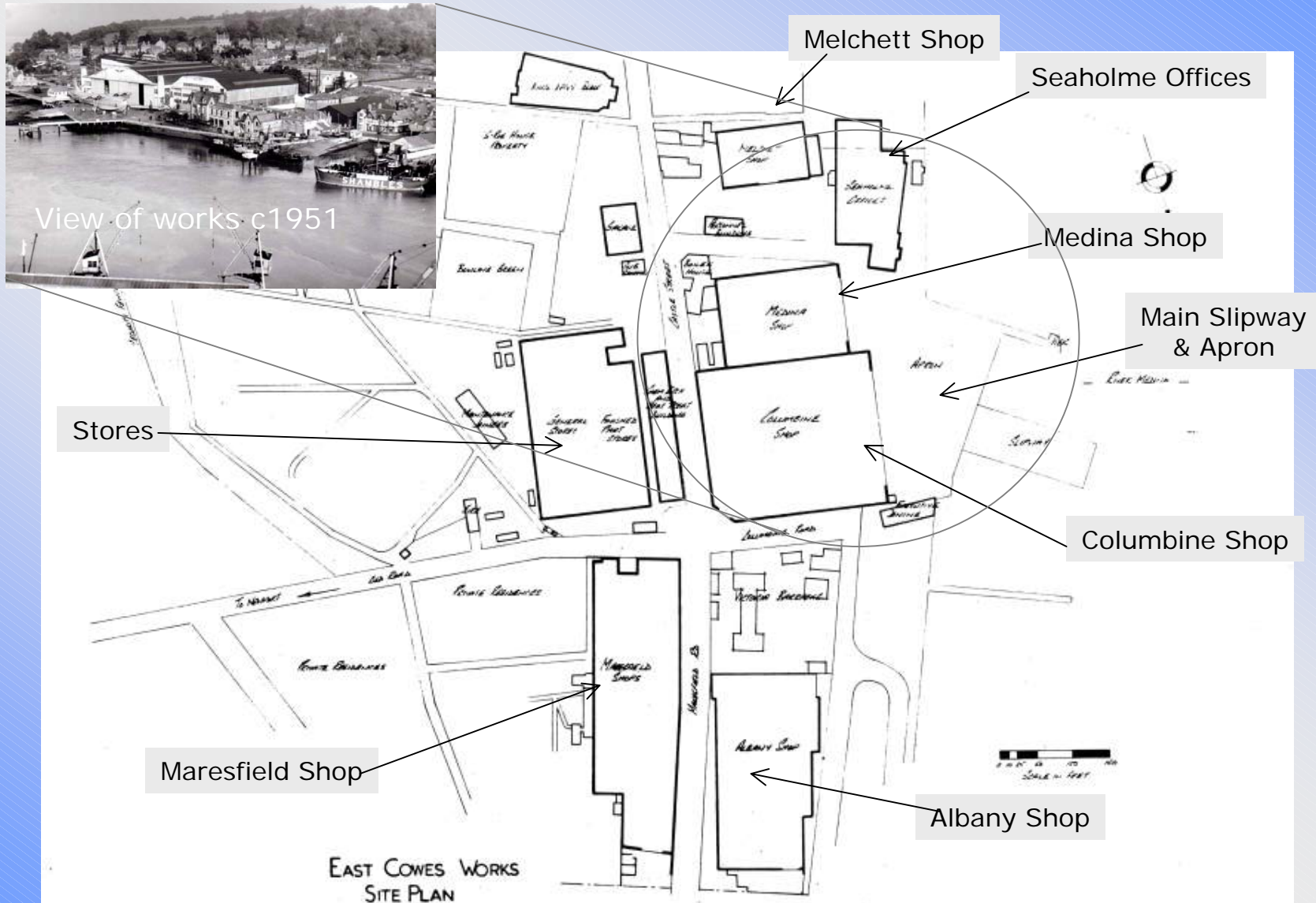


pic508b

This photograph of Saro's East Cowes works was almost certainly taken from the vantage point offered by JS Whites "hammerhead" crane on the West bank of the River Medina.

# Main East Cowes Works Location Map

pic508b



pic153

# Columbine Shop Main Floor & Galleries

Columbine gallery detail  
fitting & assembly shop

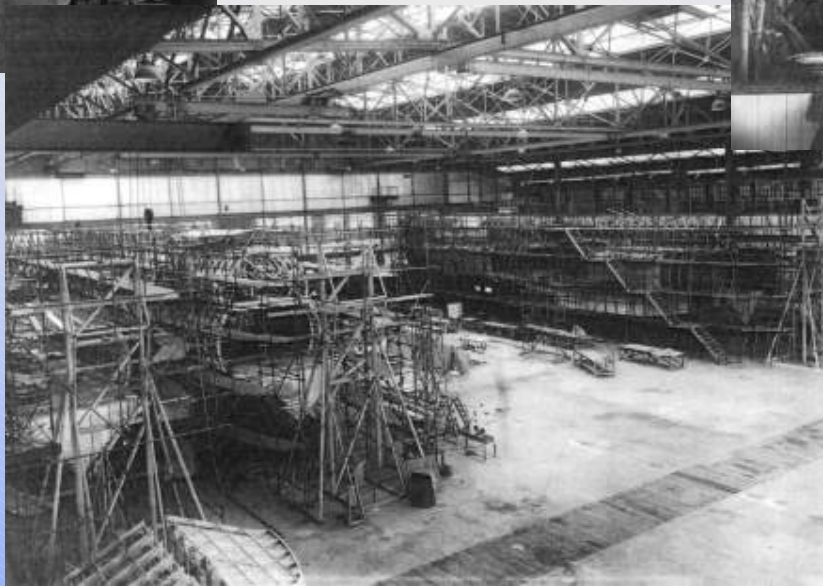


pic203

Columbine gallery  
sheet metal dept.



pic204



pic202

Columbine shop main floor

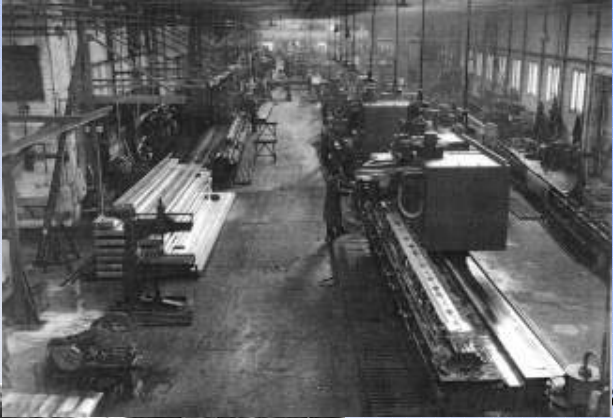
# Sub-Assembly Shops & Machine Tools

pic206



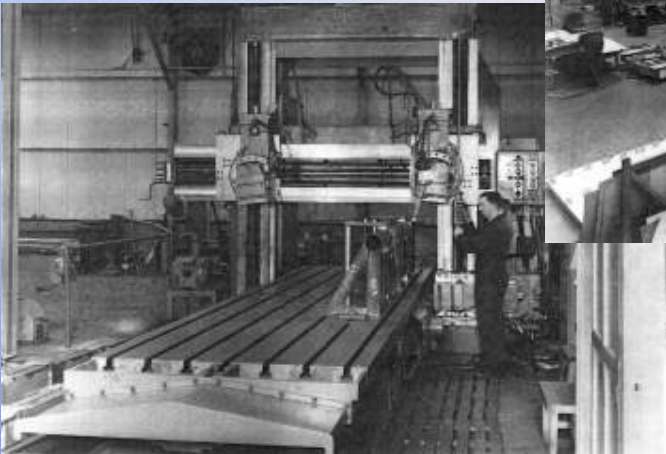
Melchett shop Hufford stretch wrap forming machine

Billeter planing machine



Medina sub-assembly shop main floor

pic209



Spar milling machine

pic205



# Press Shop, Capstan Lathe Shop & Milling Machine



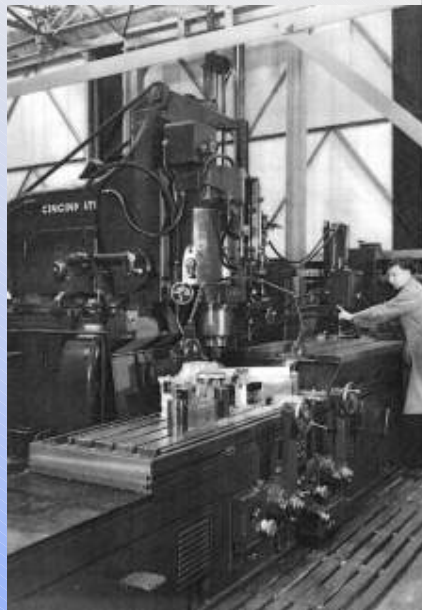
Maresfield  
press shop

pic210



Albany shop  
capstan lathe bay

pic211



Hydrotel milling  
machine

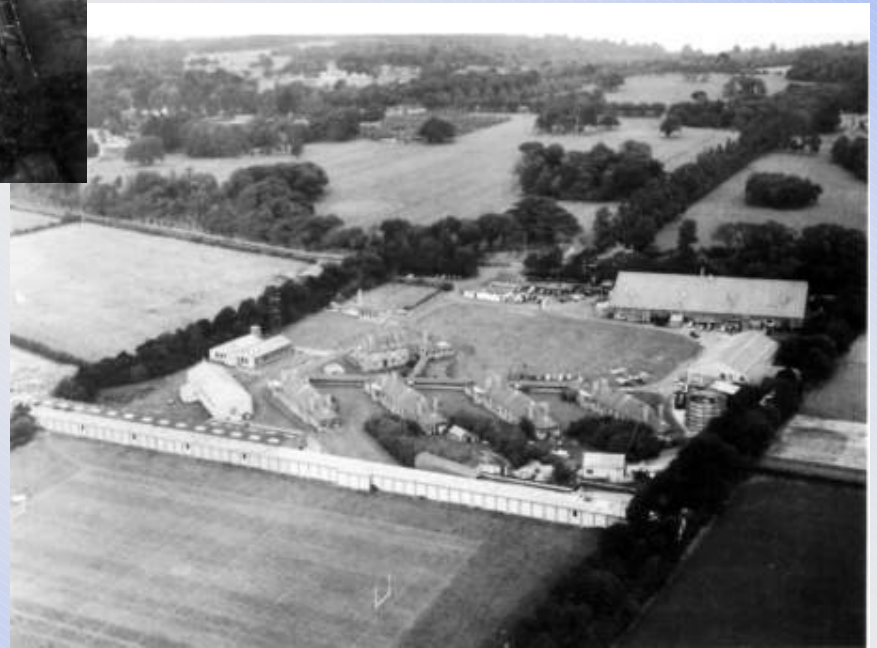
pic212

# Design Offices & Development Laboratories at Osborne



pic232

Saunders-Roe Head Office & Design Offices were situated at Osborne in a converted stable block that once formed part of the Osborne House Estate



pic231

The development works, hydrodynamic test tank and other test facilities were also situated at Osborne. This site also housed the Saunders-Roe apprentices training school & hostel.

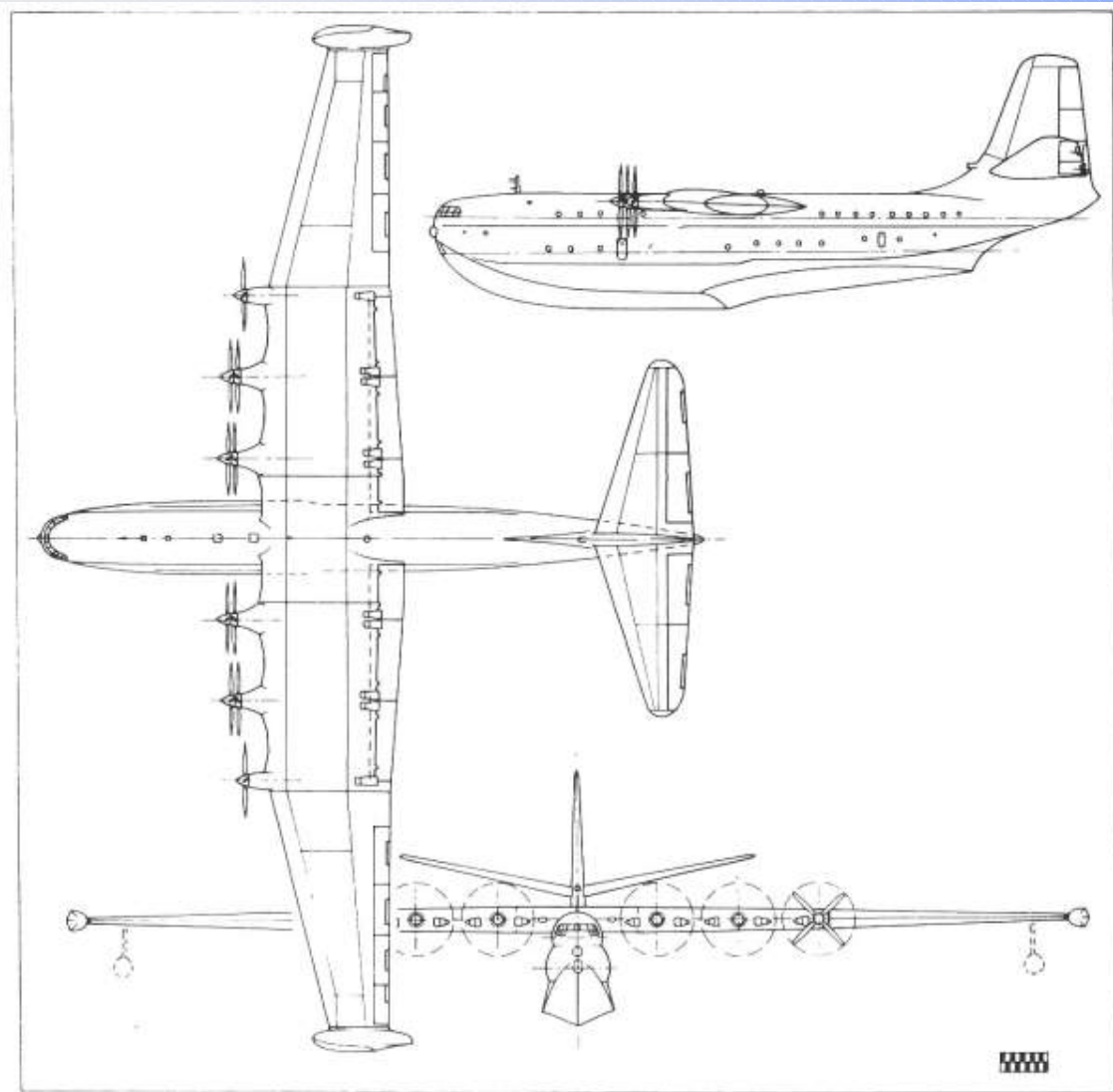
# Saunders-Roe and the Princess Flying Boat

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**Princess Design is  
Completed Ready for  
Production**

# Princess General Arrangement



SR.45 Princess

pic082

# Principal Characteristics

## Dimensions

Overall length	148 ft
Wingspan (floats up)	219 ft 6 in
Wingspan (floats down)	209 ft 6 in
Height (tail up)	55 ft 9 in
Wing area (gross)	5,019 ft <sup>2</sup>
Aspect ratio	8.74 (0.62) effective
Aerofoil section (basic)	Goldstein (developed)
Aerofoil section (root)	Goldstein (developed)
Aerofoil section (tip)	NACA 4415 (mod.)
Std mean chord	23 ft 4 in
Root chord	30 ft
Tip chord	12 ft 6 in
T/C ratio, root	18%
T/C ratio, tip	15%
Wing dihedral	0 deg
Wing incidence (to hull datum)	4 deg 30 min
Washout (wing tip only)	2 deg
Tailplane span	77 ft 2 in
Area (incl elevators)	1,103 ft <sup>2</sup>
Fin aspect ratio	5.4
Tailplane dihedral	12 deg
Fin & rudder area	569 ft <sup>2</sup>
Fin & rudder aerofoil	Goldstein (developed)
Fin & rudder aspect ratio	2.08

## Weight, Volume & Pressurisation

All up weight	330,000 lb
Max wing loading	65 lb/ft <sup>2</sup>
Empty weight, fully equipped, less fuel & payload	190,000 lb
Fuel capacity (kerosene)	14,500 gall (117,450 lb)
Max landing weight	250,000 lb
Floor area	1400 ft <sup>2</sup>
Passenger cabin volume	15,403 ft <sup>3</sup>
Pressurisation level	8 lb p.s.i.

## Propulsion

Prototype - de-rated Proteus 2 type giving from 2,500 to 2,850 s.h.p.
Planned - Proteus 3 fully rated at 3350 s.h.p. or 3,780 e.h.p. taking account of residual exhaust thrust
Propellers (coupled Proteus 710 engine units) de Havilland contra- rotating hollow steel propellers of 16 ft 6 in dia.
Propellers (single Proteus 700 engine units) de Havilland hollow steel propellers of 16 ft 6 in dia.

# Predicted Performance with Proteus 3s

Power loading(take-off)	8.7 lb/e.b.h.p.
Climbing speed (184 m.p.h. @ sea level)	1,900 ft/min
Climbing speed, one coupled engine out (184 m.p.h. @ sea level)	1,350 ft/min

Stalling speed( flaps down)	113 m.p.h.
Stalling speed( flaps up)	127 m.p.h.

Absolute ceiling	32,000-39,000 ft
Service ceiling	30,000-39,000 ft

Still air range with 50,000 lb payload @ 365 m.p.h. @ 32,600 ft - 3,640 miles

Still air range with 20,000 lb payload @ 365 m.p.h. @ 34,500 ft - 5,190 miles

Payload 105 passengers

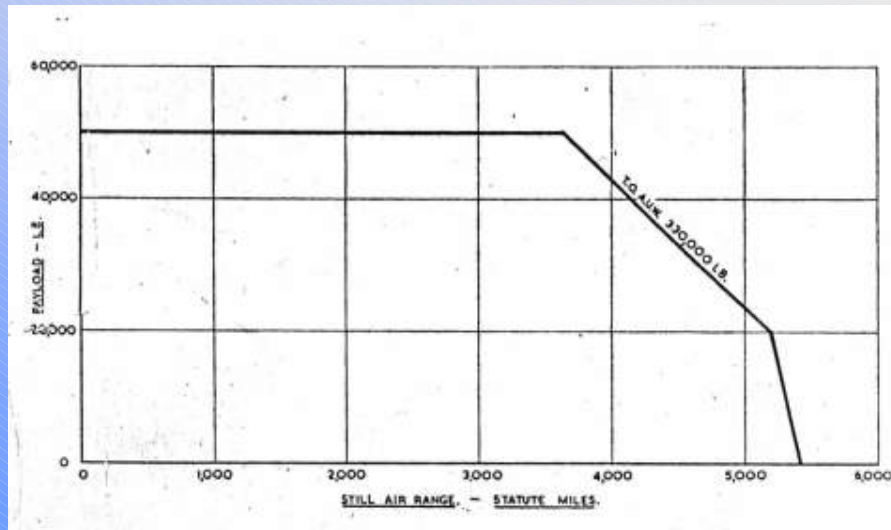
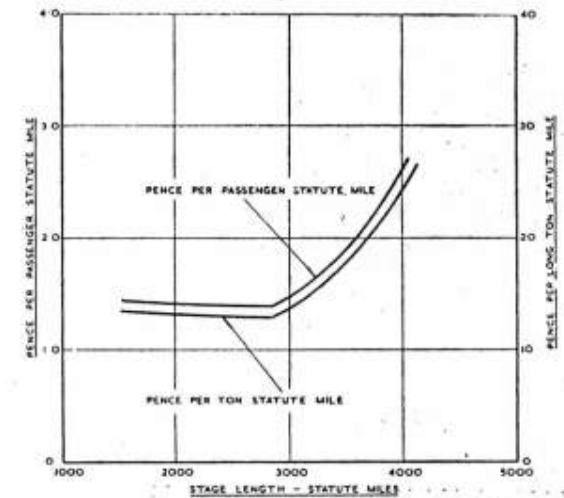


Fig. 1 (left).—Payload for still air range (no allowances)

Fig. 2 (right).—Performance curves in terms of pence per long ton mile and pence per passenger mile plotted against still air stage length



# Princess Technical Specification

## **Power Units:**

Ten Bristol Proteus Propeller Turbines arranged as four coupled pairs and two single engines in the outboard positions

Total power – 30,000hp

## **Typical performance capability:**

Speed:

360 mph at 34,500 feet altitude

Range:

5000 nautical miles (20,000lbs Payload)

## **Overall Dimensions:**

Wingspan:

219 feet 6 inches

Wing Area:

5019 sq ft

Length:

148 feet

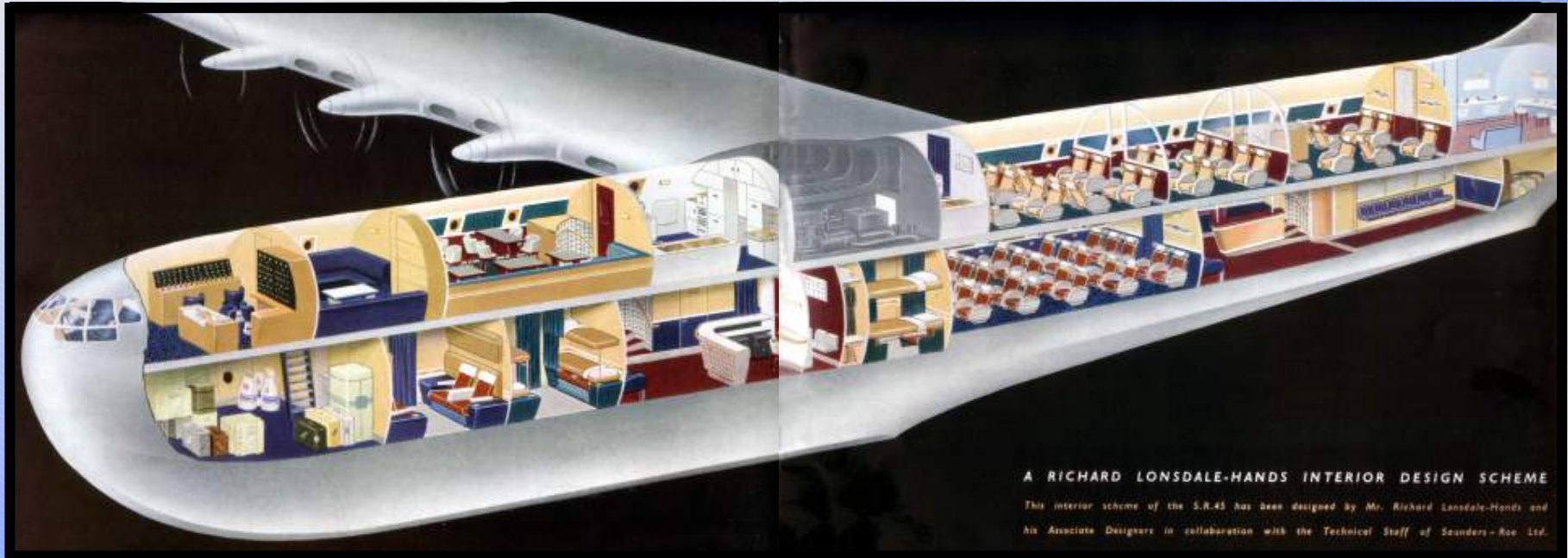
Height:

55 feet 9 inches

All up weight:

330,000 pounds

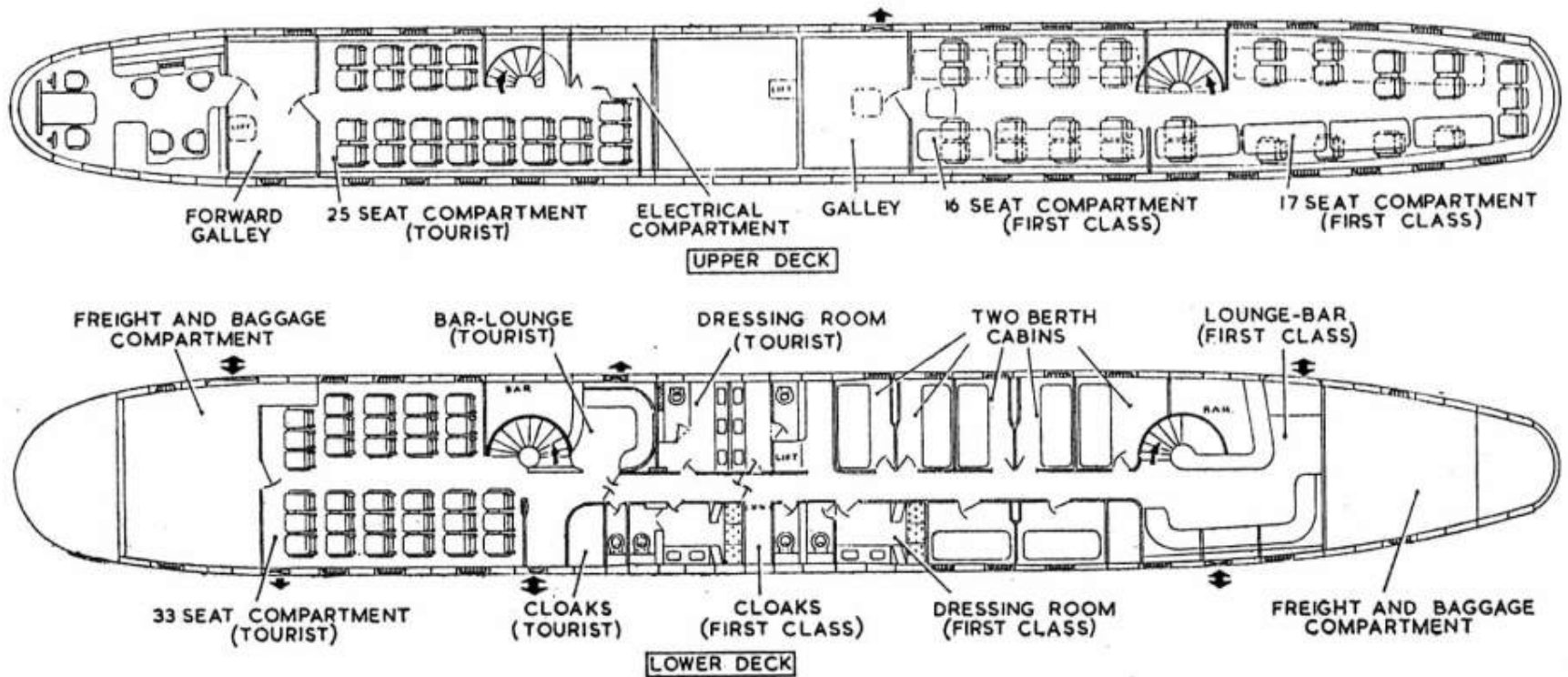
# Proposed Passenger Accommodation Arrangement



Original interior layout design scheme for the Princess produced by consultants for Saunders Roe sales brochure



# Princess Accommodation Seating Plan for Transatlantic Service

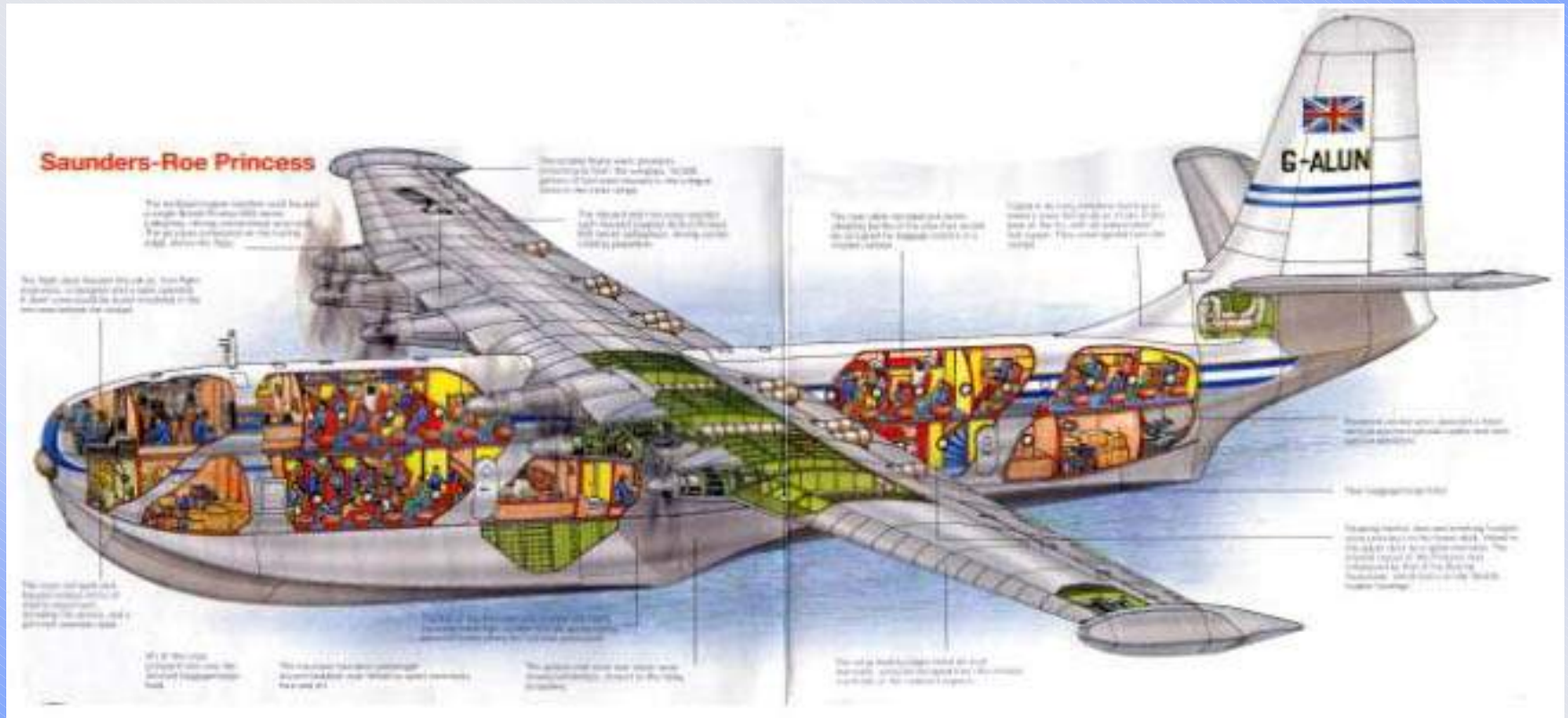


Transatlantic seating arrangement for 105 passengers

pic402

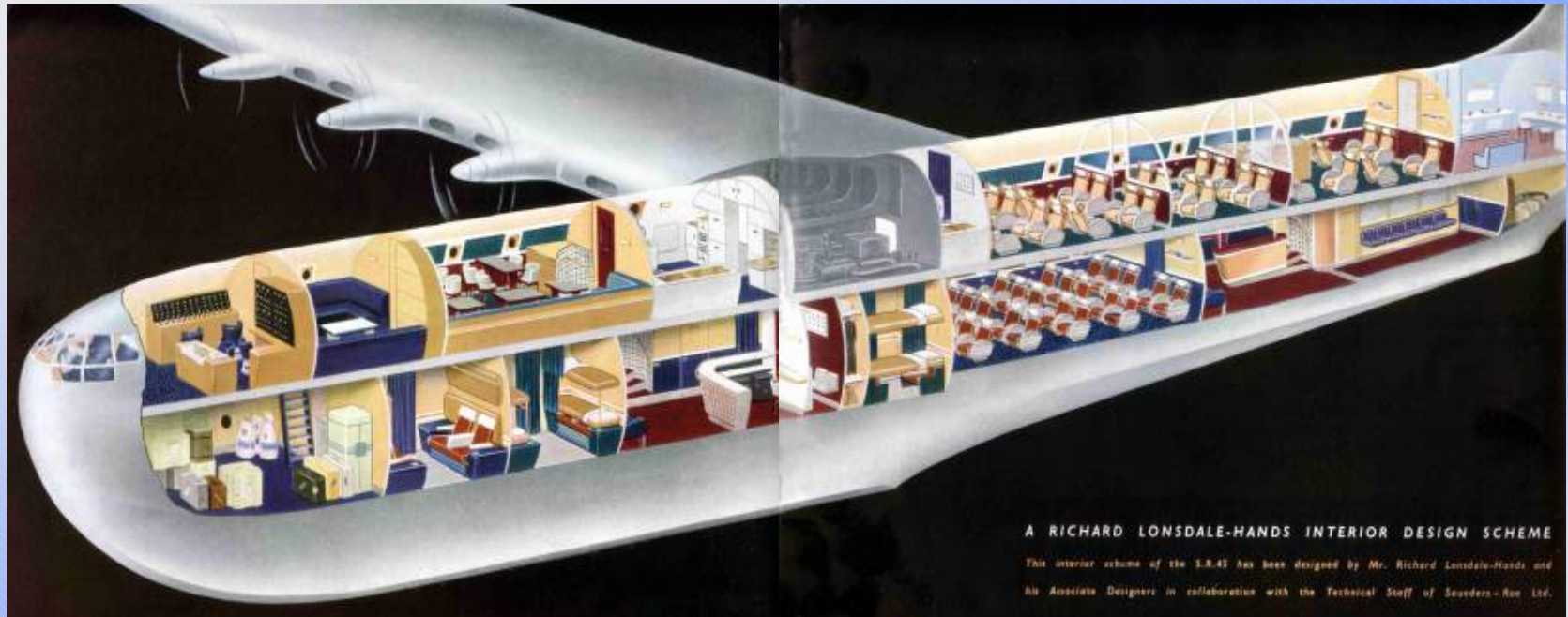
The 105 seat passenger accommodation was arranged on two decks with many features offering comfort & luxury for the transatlantic traveller.

# Princess Cutaway View



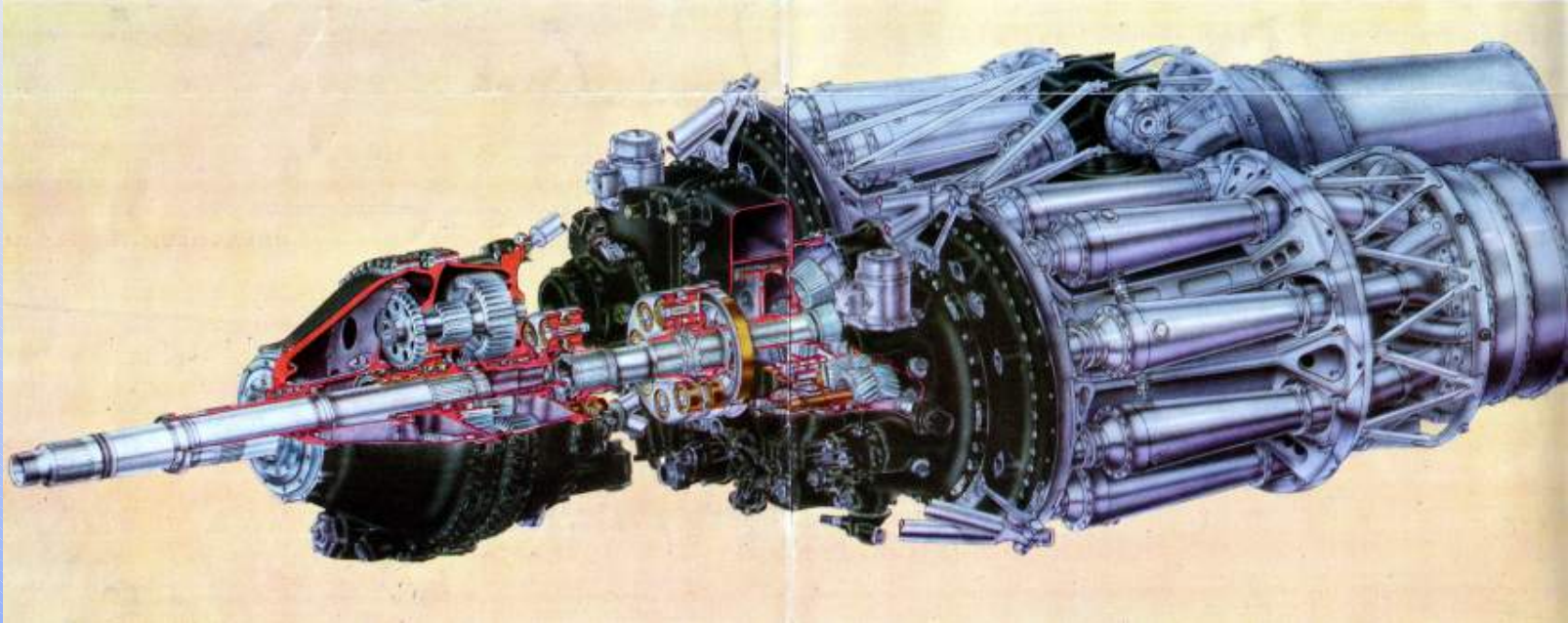
pic087

# Proposed Passenger Accommodation Arrangement



A proposed interior layout of the Princess for BOAC had seating for a total of 105 passengers in First & Tourist classes and included some sleeping berths.

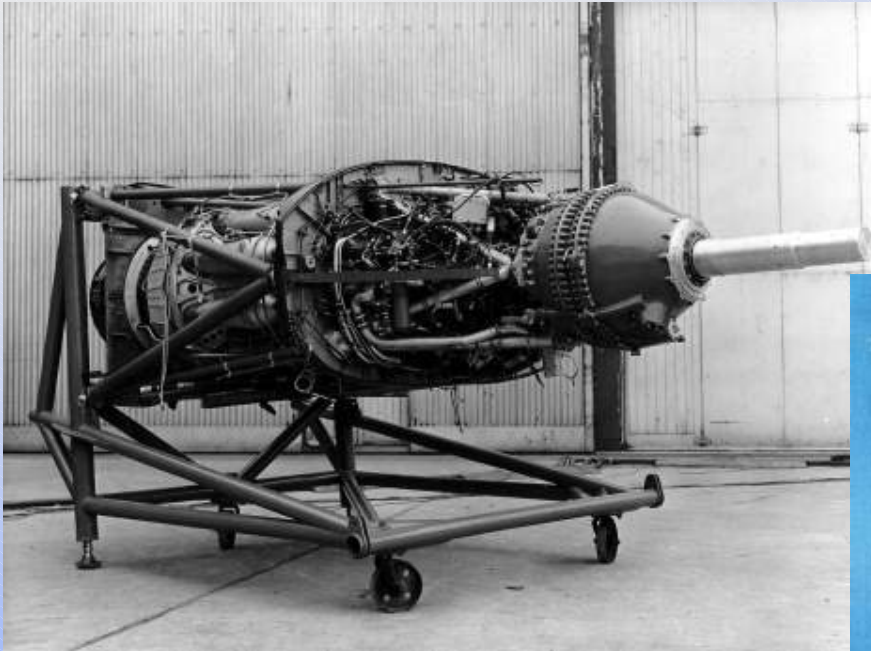
# Bristol Proteus Engine Selected



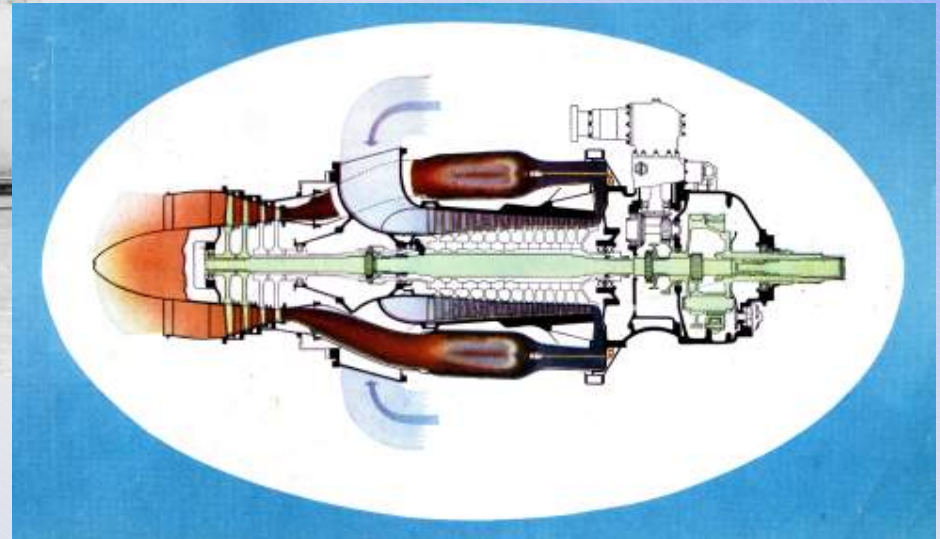
pic063Sarobrochure

Bristol Aeroplane Co. Twin Proteus II Propeller Gas Turbine Engine Set - each engine was designed to produce 3500 shp, but those originally supplied for the Princess were down-rated development engines only capable of delivering around 2500 shp.

# Bristol Proteus Engine Offered a Compact Layout

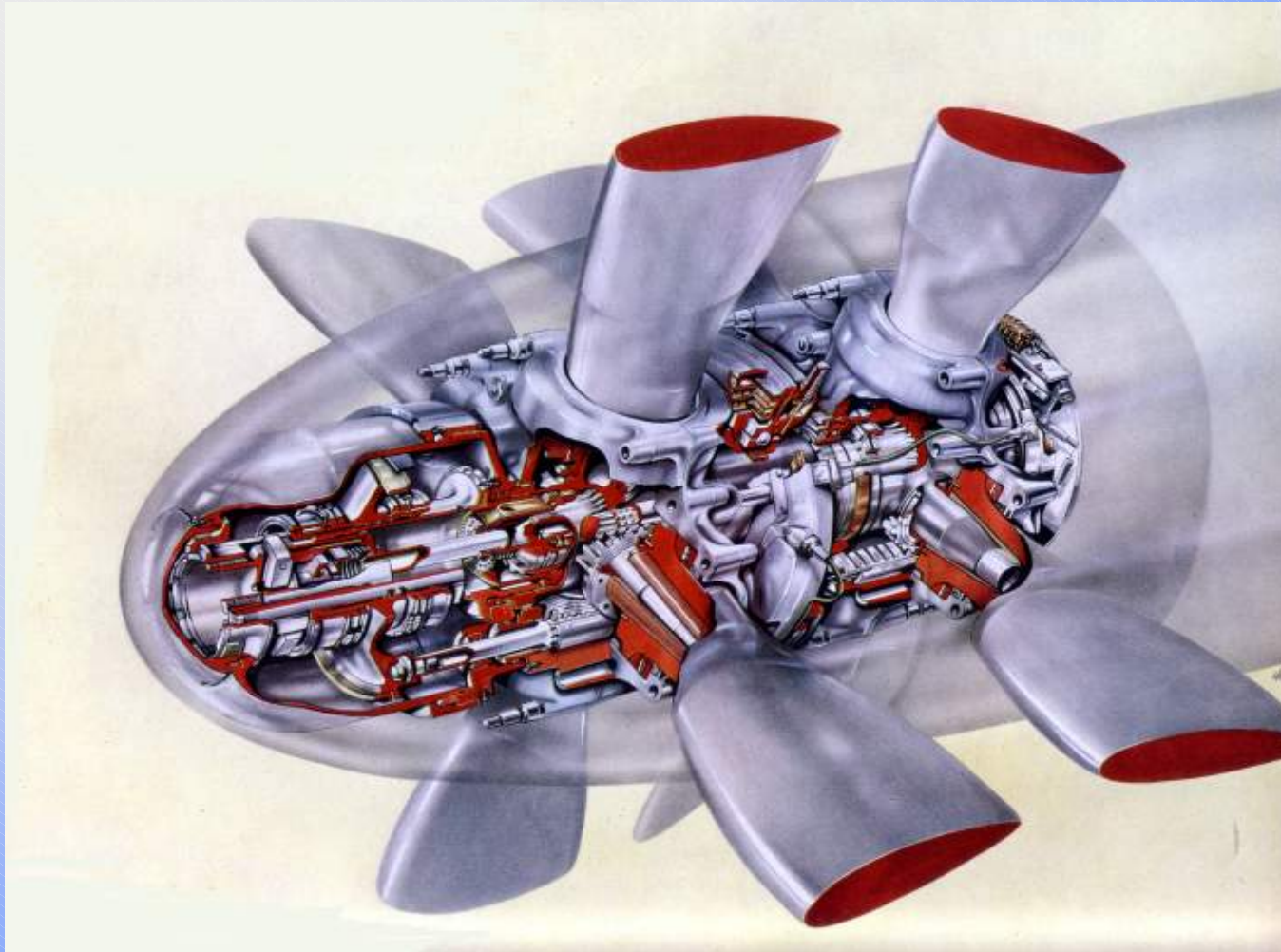


pic155



The Bristol Proteus adopted a “reverse flow” arrangement giving a relatively short & compact engine layout. Unfortunately for the Princess the design was not at a sufficiently advanced stage to deliver the rated power, although the engine was subsequently to realise its potential in both aviation & marine applications.

# de Havilland Provides Propellers

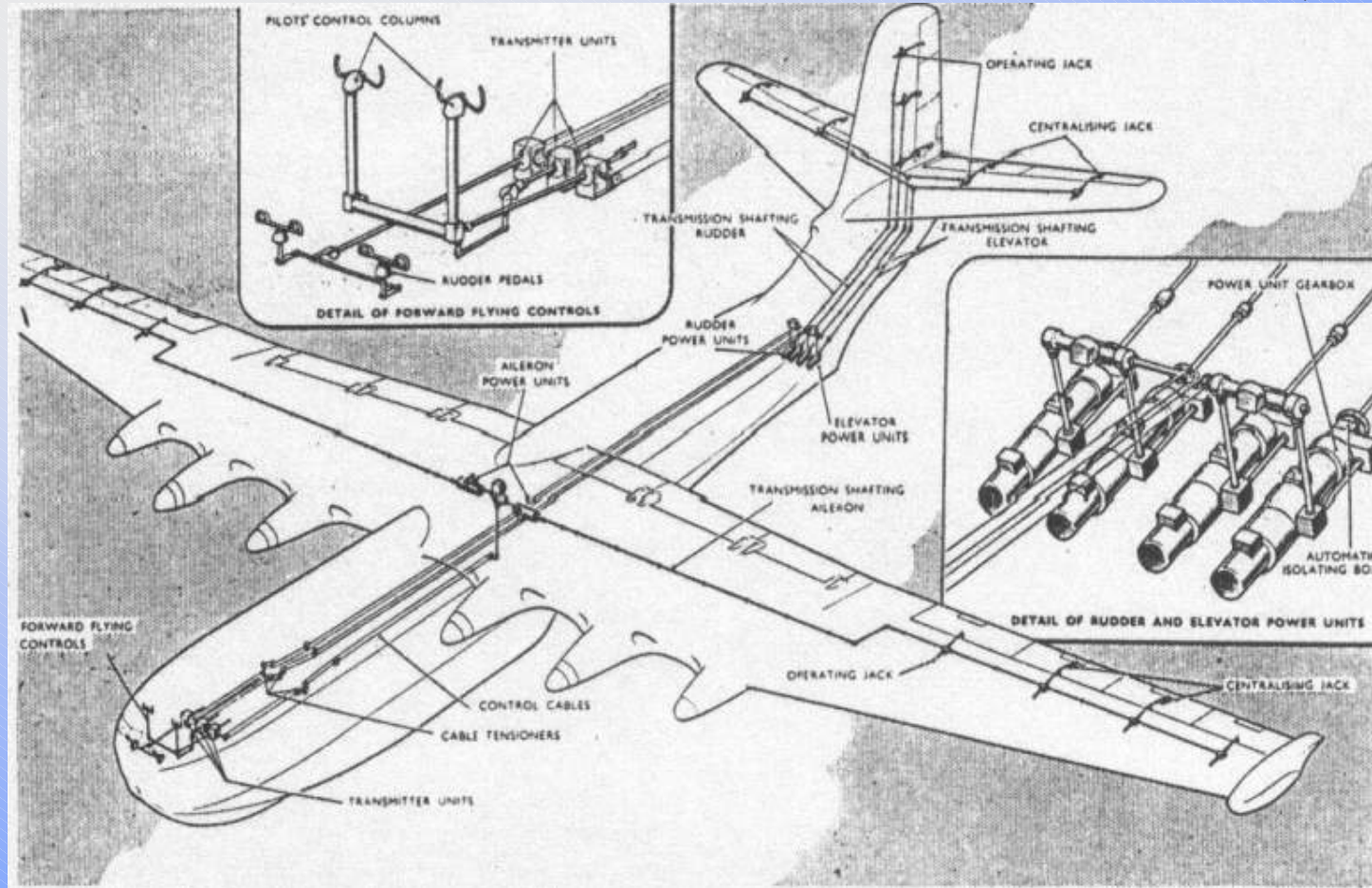


pic062Sarobrochure

de Havilland designed contra-rotating propeller assembly for the Princess as fitted to the four coupled pairs of engines.

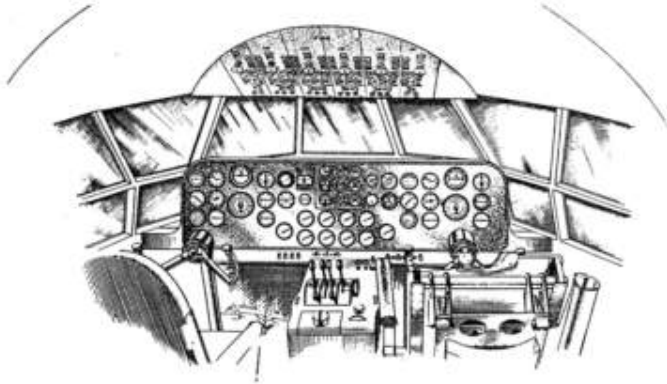
# Boulton Paul Provides Powered Control System

pic104

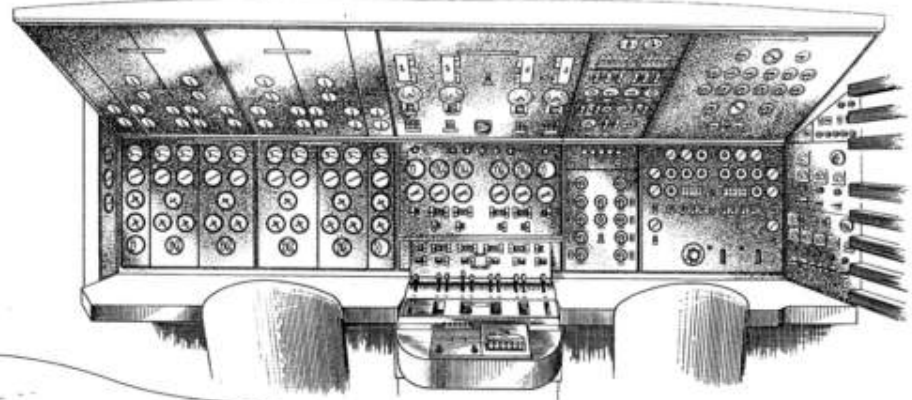


Advanced Powered Flight Control System developed by Boulton Paul from a Saunders-Roe Design Concept. A Sunderland flying boat fitted with powered controls was used as a trials platform to prove the design for the Princess.

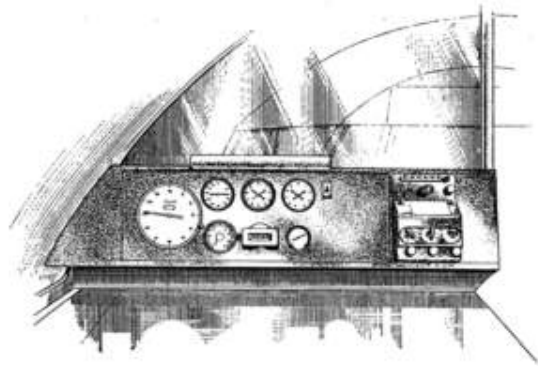
# Flight Deck Layout



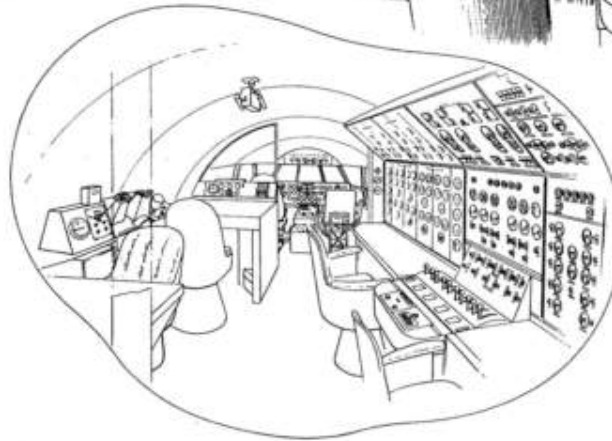
PILOTS STATION



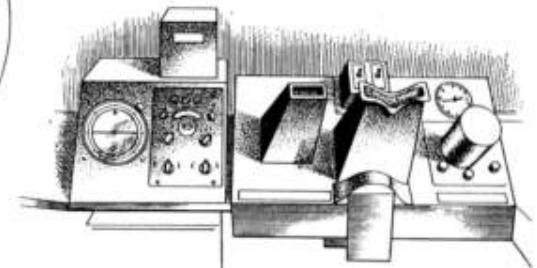
ENGINEERS STATION



NAVIGATOR'S STATION



Flight deck layout

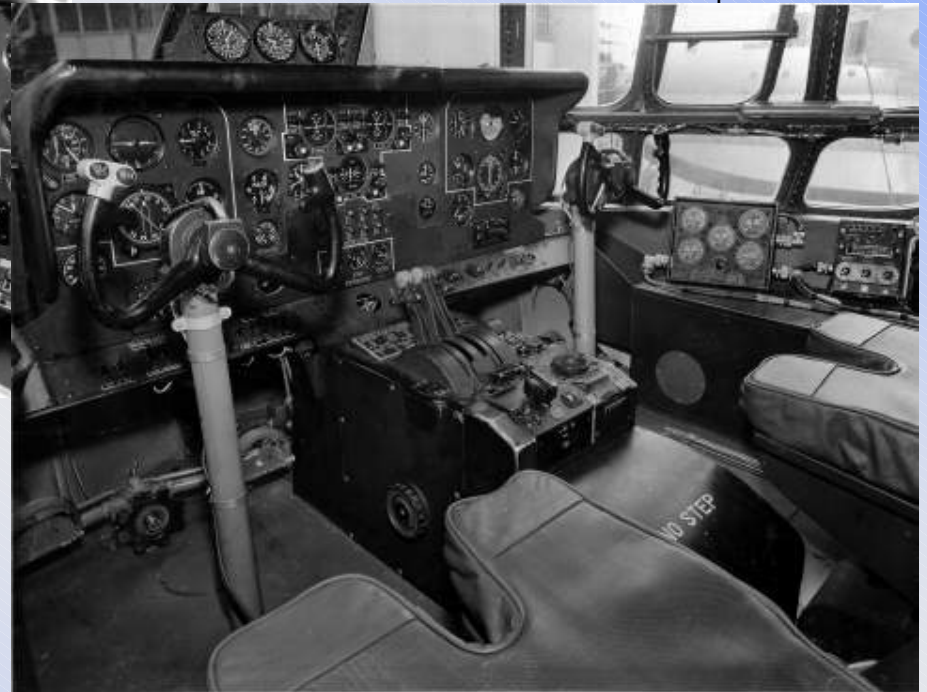


PART OF RADIO OPERATOR'S STATION

pic404



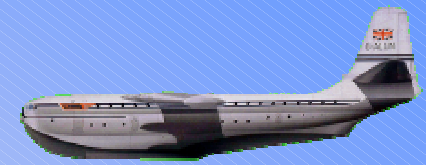
# Princess Controls and Instrument Panel



Simple & compact control layout - all engine controls and gauges located separately at flight engineer's position

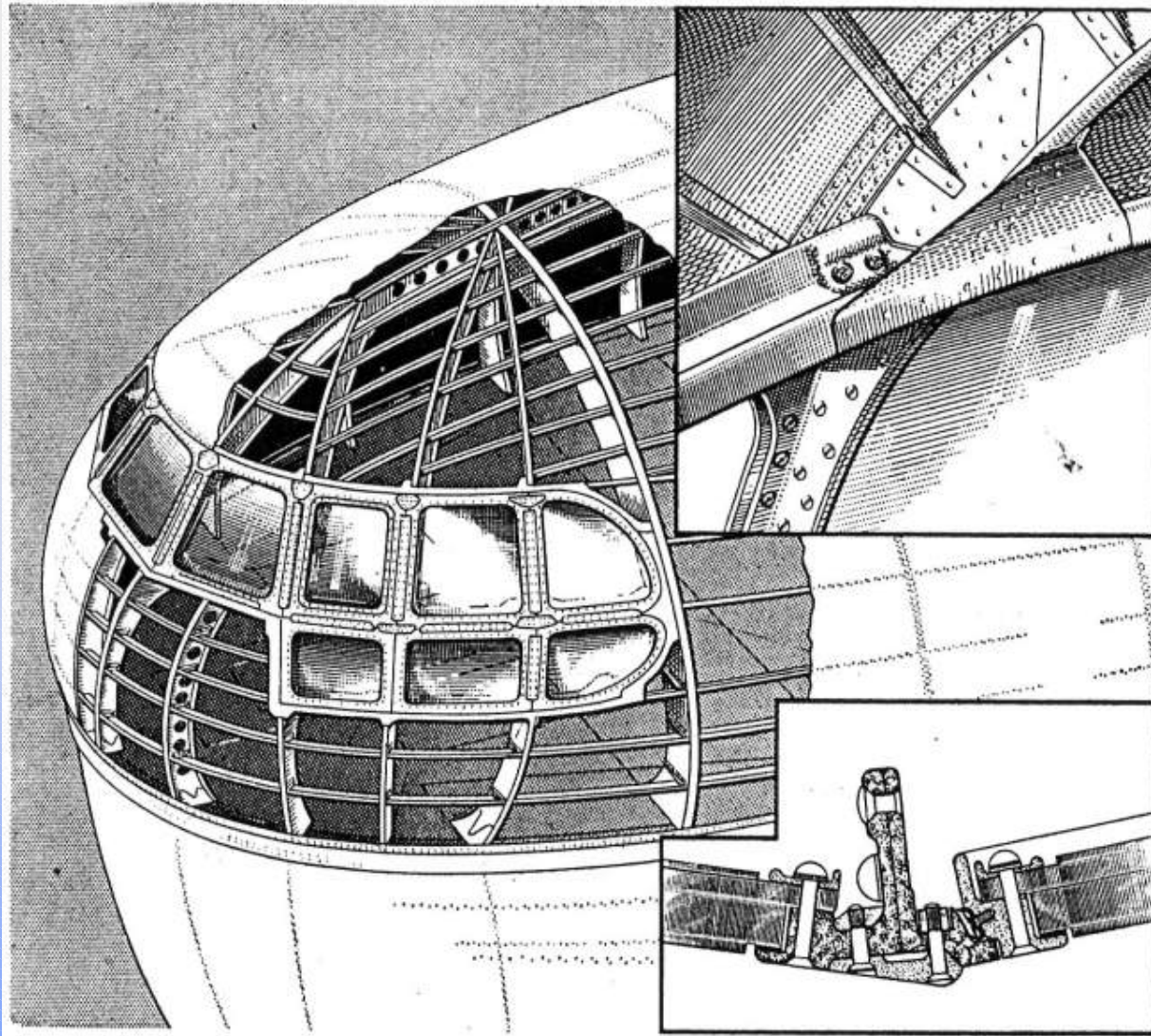
# Saunders-Roe and the Princess Flying Boat

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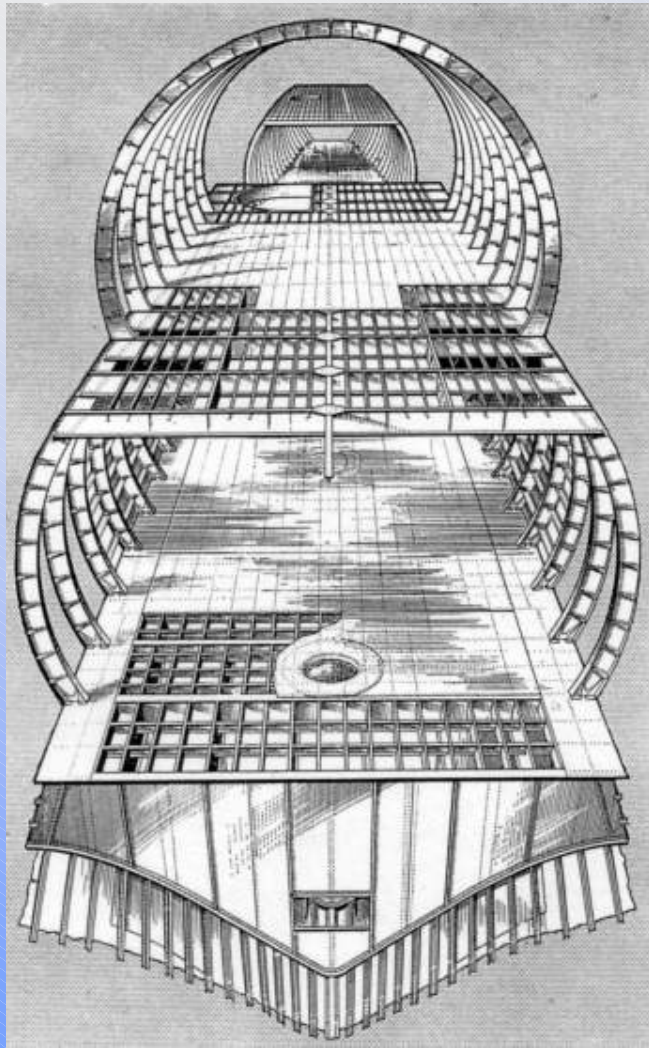
## Princess Design Detail

# Nose Section

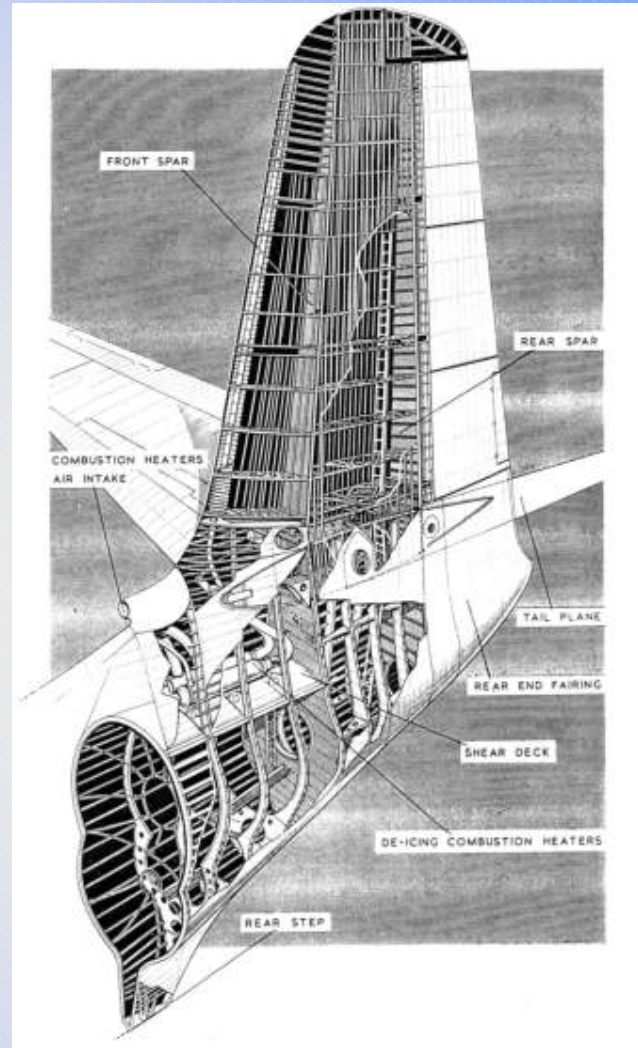


pic415

# Hull & Tail Section

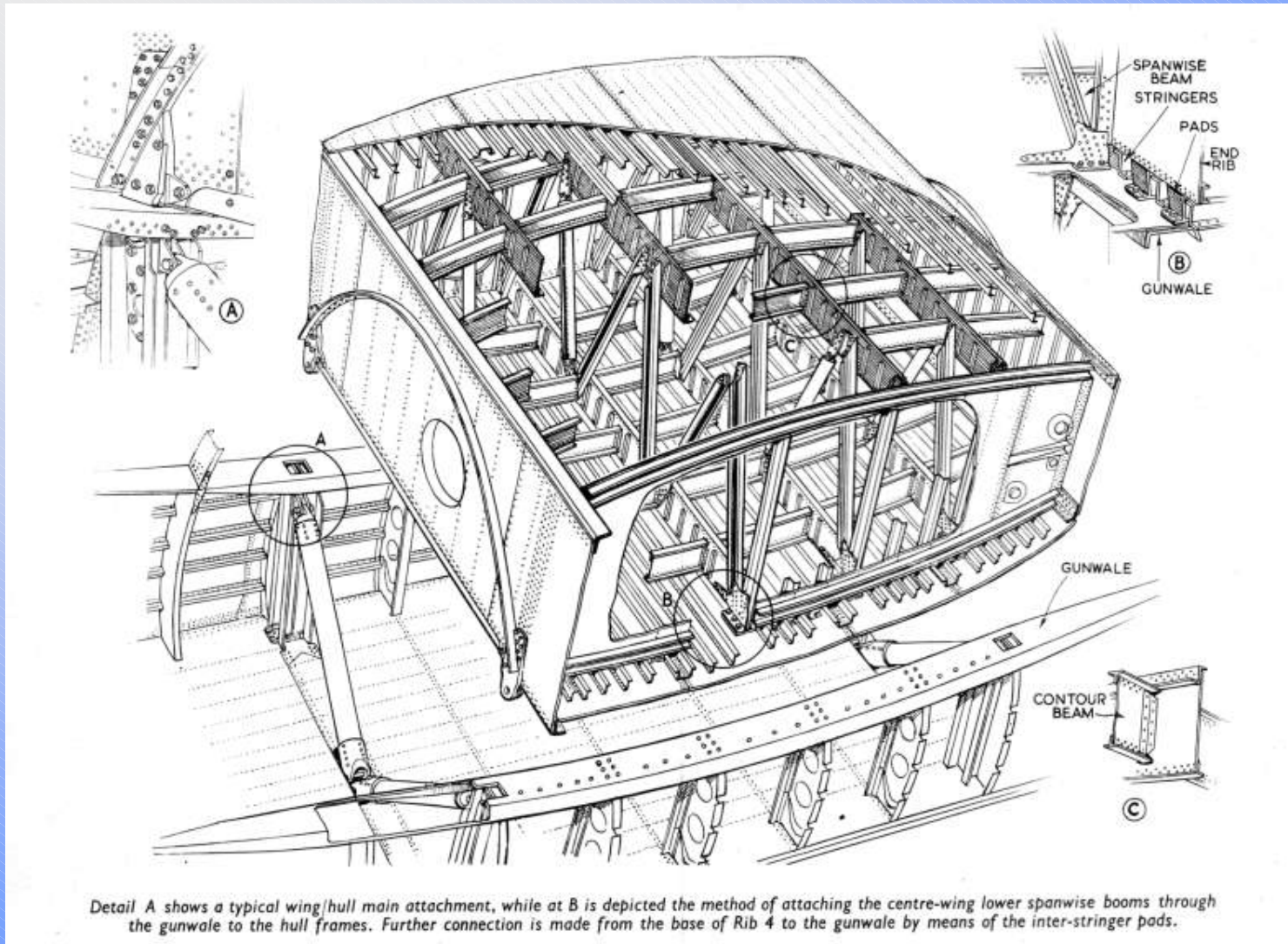


pic414

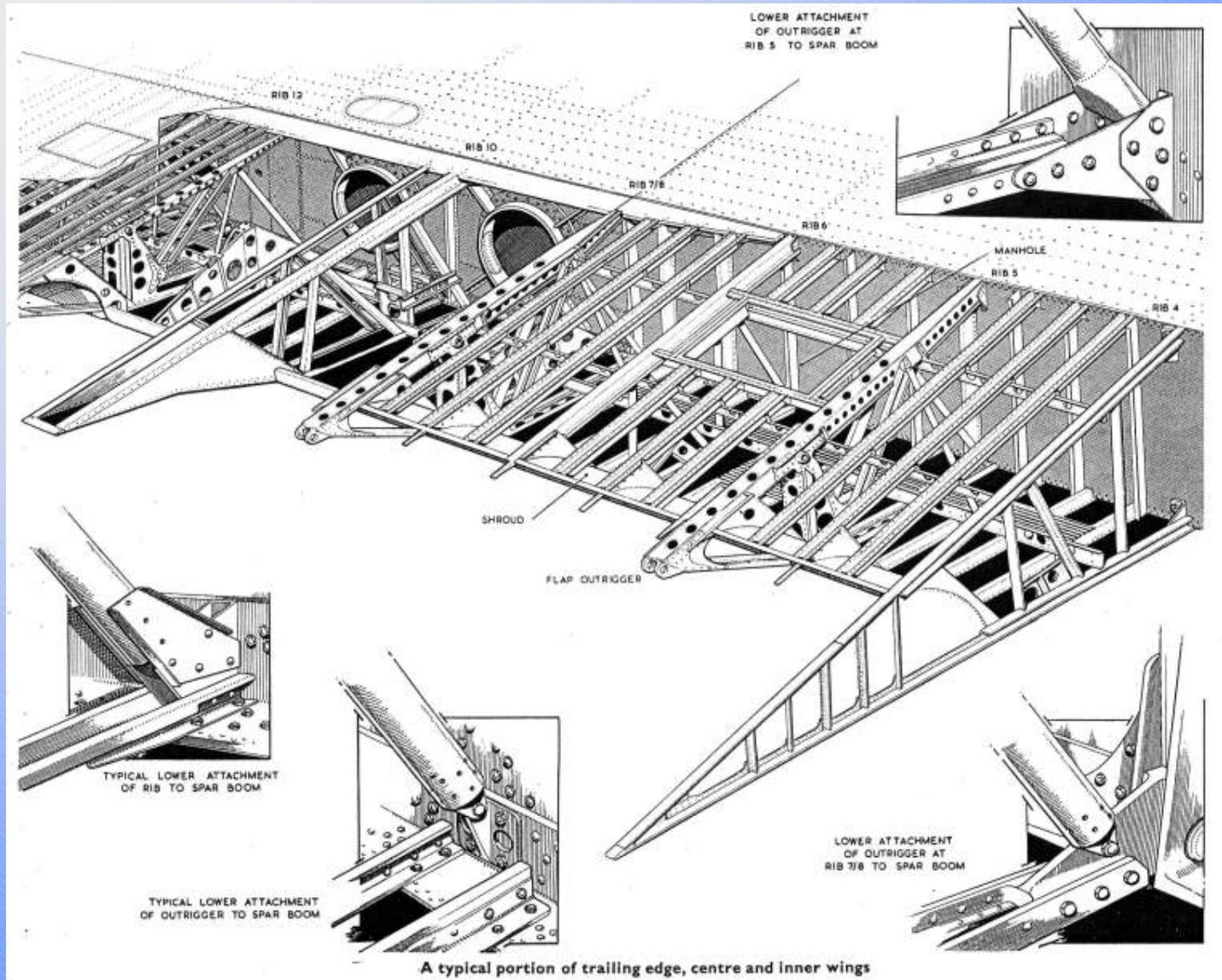


pic418

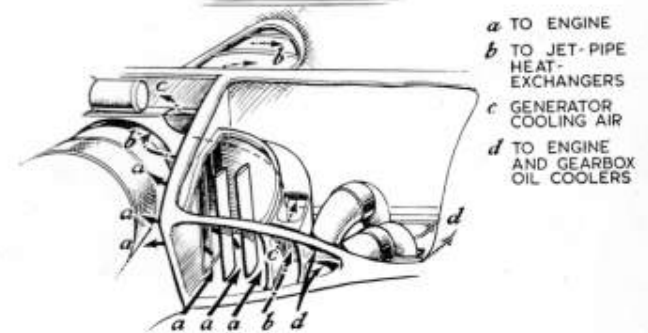
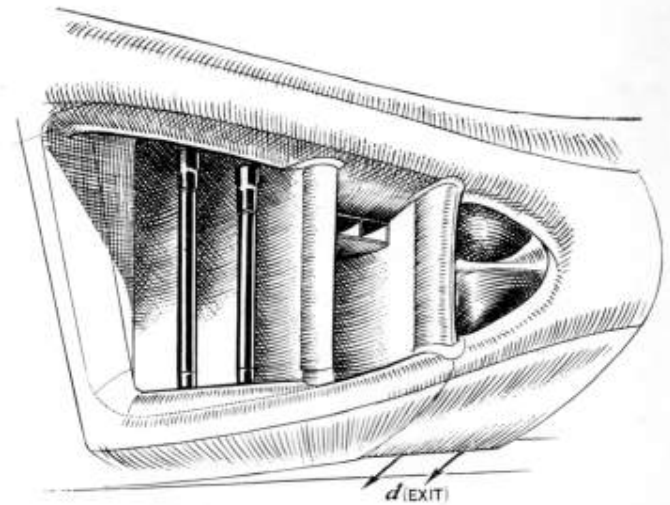
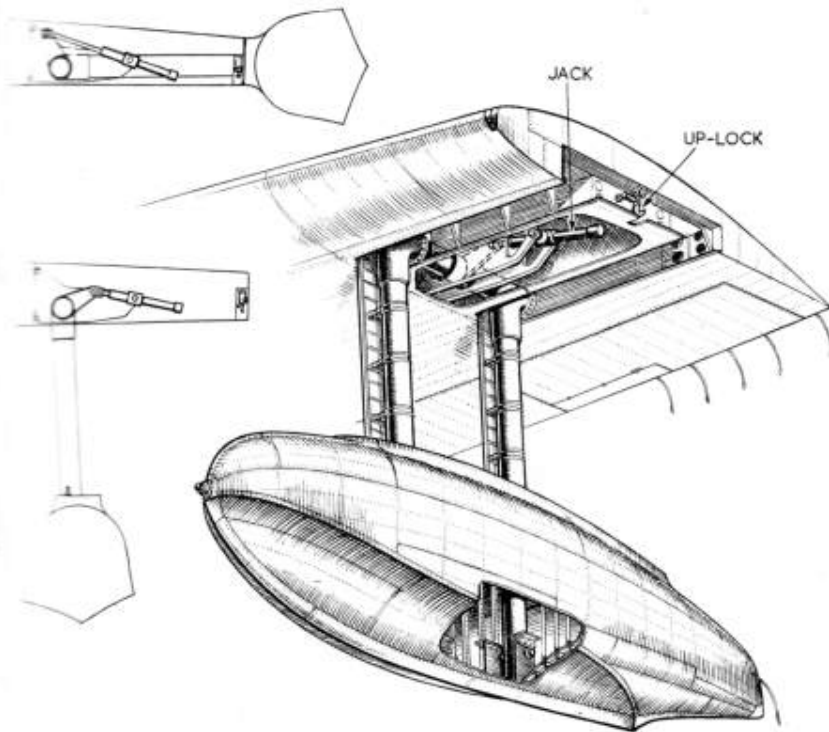
# Wing/Hull Attachment



# Wing Trailing Edge

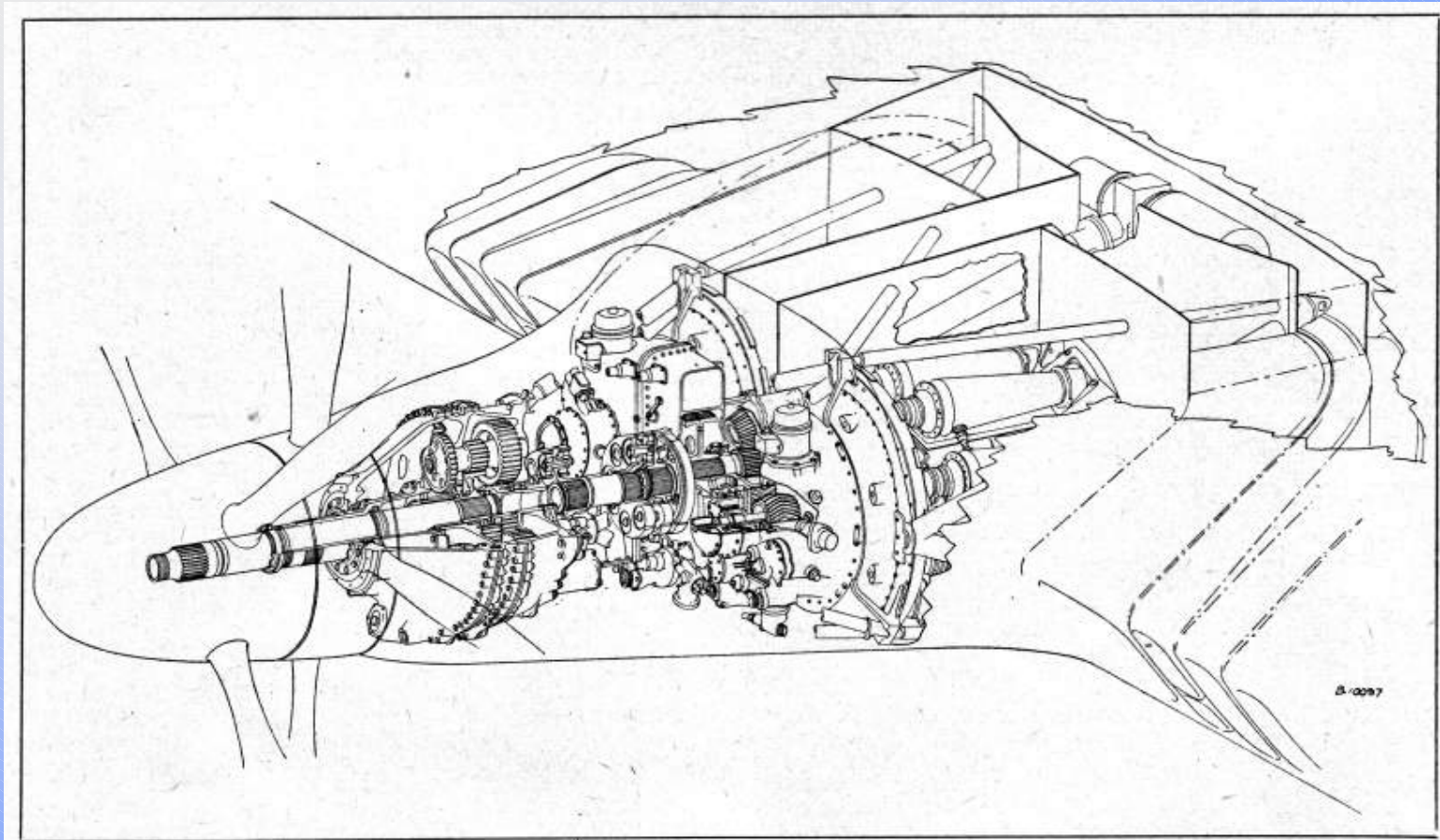


# Float Assembly & Air Intake



Wing-tip float retraction is eminently simple (left). A peg on the float decking engages with a jack-operated up-lock hook within the wing tip. The leading-edge air intakes (right) are less simple than they appear. The lower sketch shows that, although there is only one beside each engine, the airflow is ducted to four distinct destinations. Within the main engine air duct are two vertical vanes which can be turned through 90 deg to blank off the intake in case of fire. A secondary purpose for these vanes is the sealing of the ram intake in conditions of severe icing, when additional flush intakes—now under development—become operative.

# Paired Proteus Engine Installation

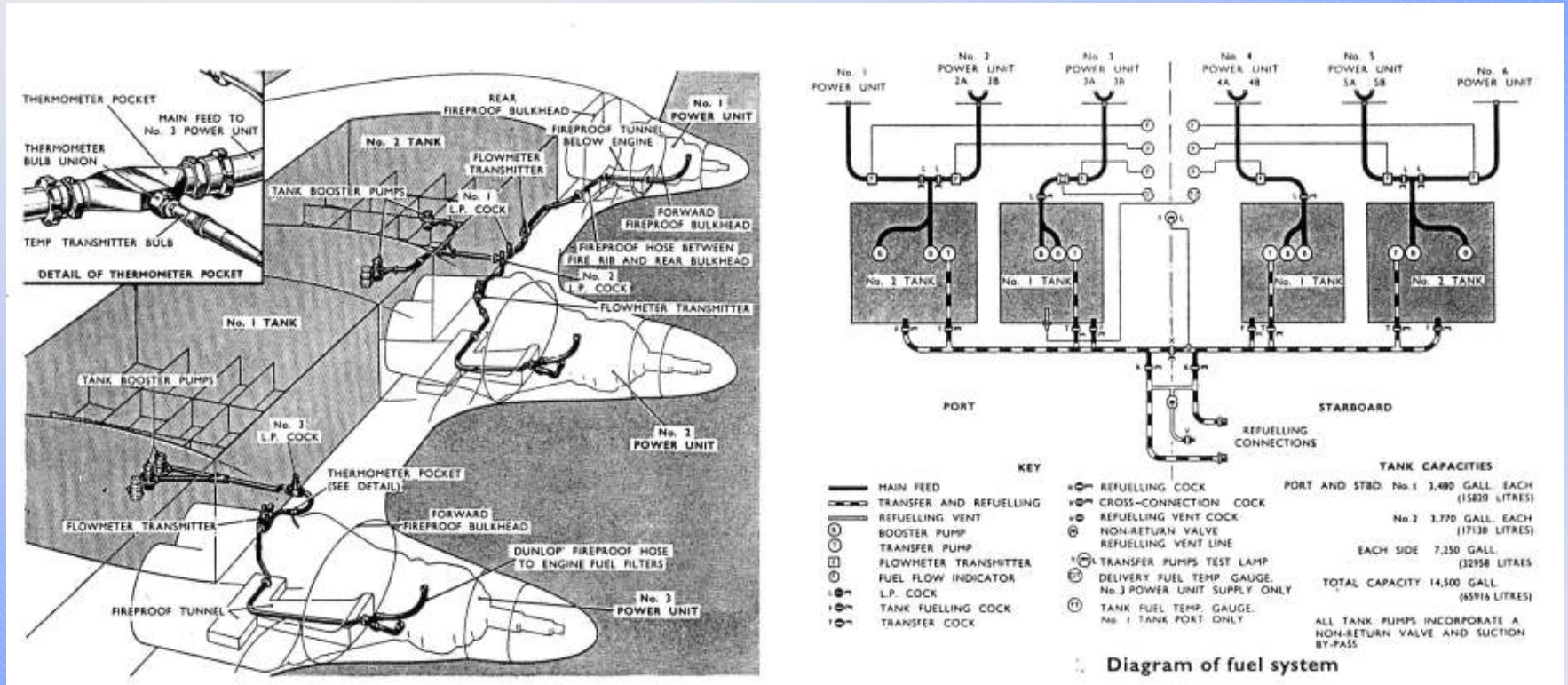


**TWO IN ONE.** — This paired Proteus installation for the Saunders-Roe S.R./45 shows the method of coupling the engines and the location of the reduction gear and contra gear-box in relation to the other accessories. The S.R./45 and Brabazon Mk. II arrangements differ only in detail—in both cases the air is taken in from an intake behind the most effective part of the airscrew disc and passed to a plenum chamber towards the rear portion of the engines.

pic262

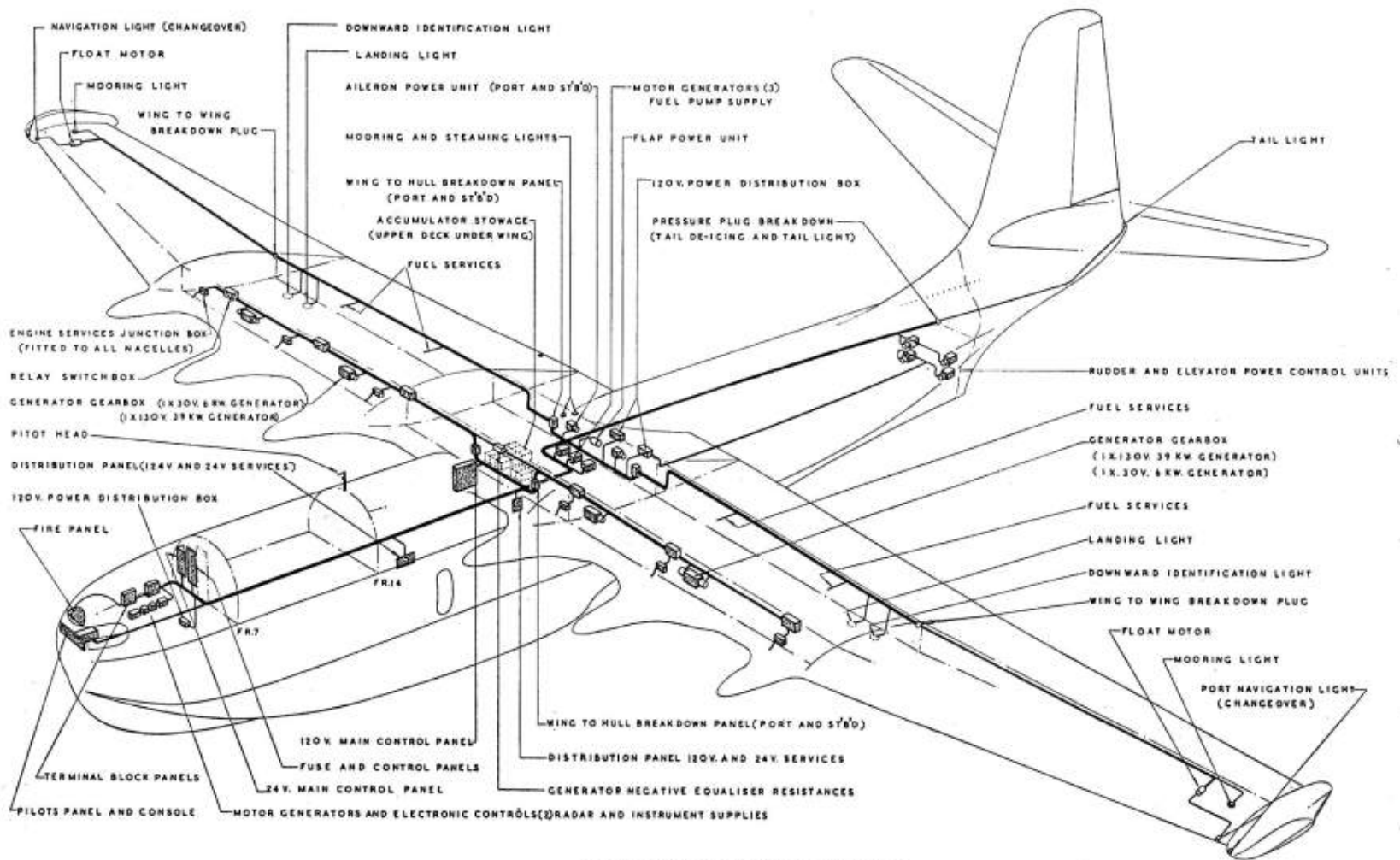


# Fuel System



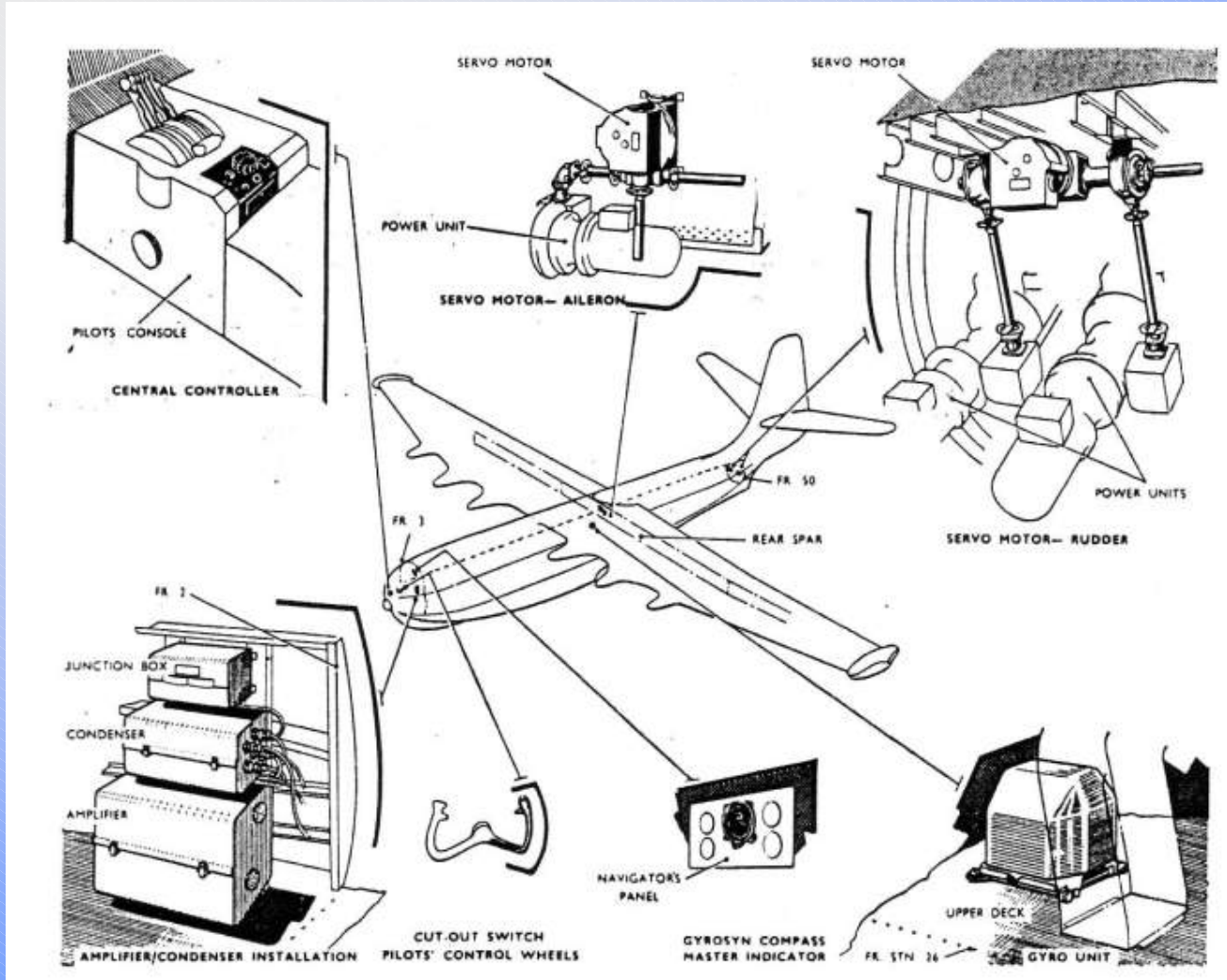
pic410

# Electrical System

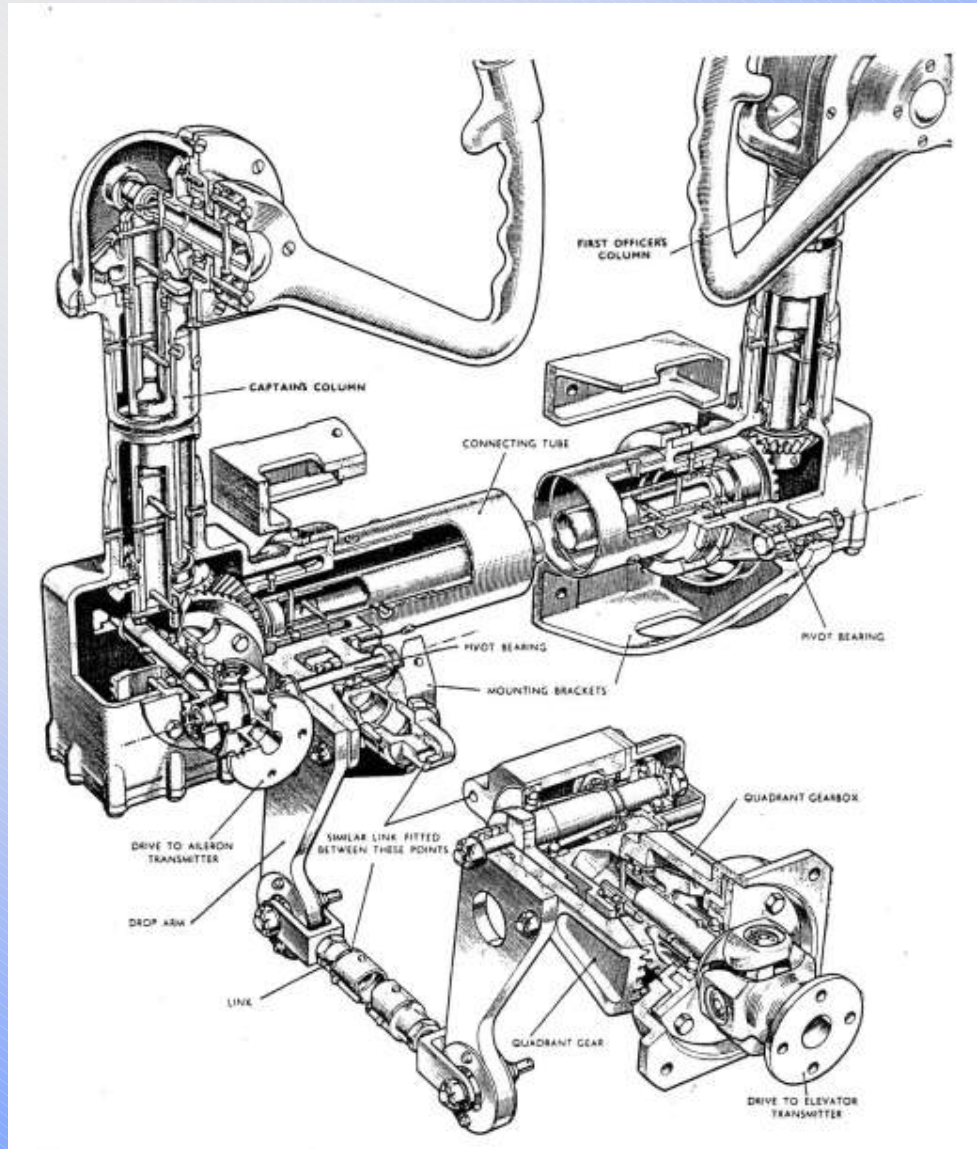


Layout of main electrical cable runs

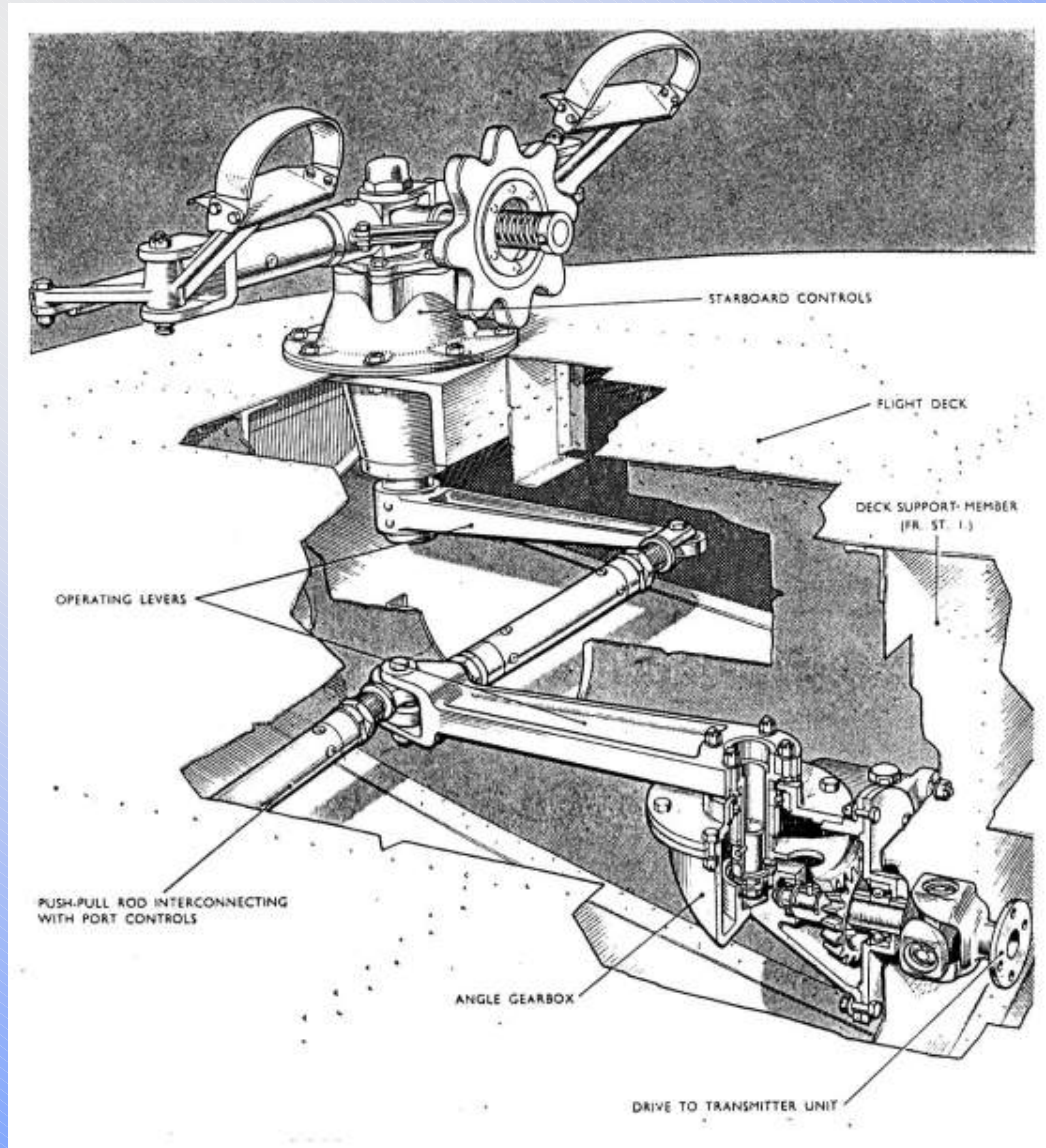
# Autopilot System



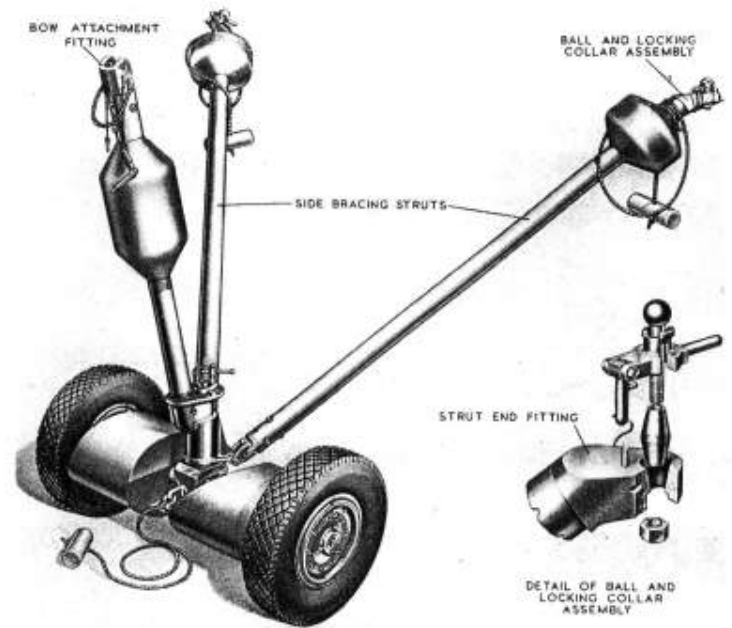
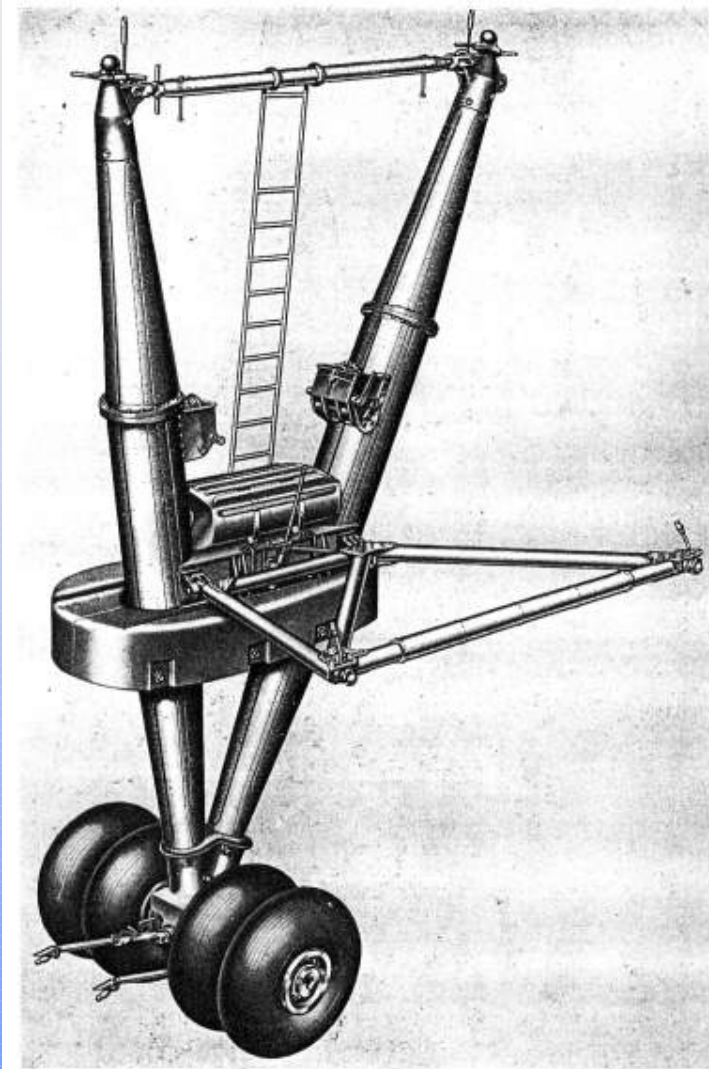
# Control Column & Control Linkages



# Control Transmitter Unit



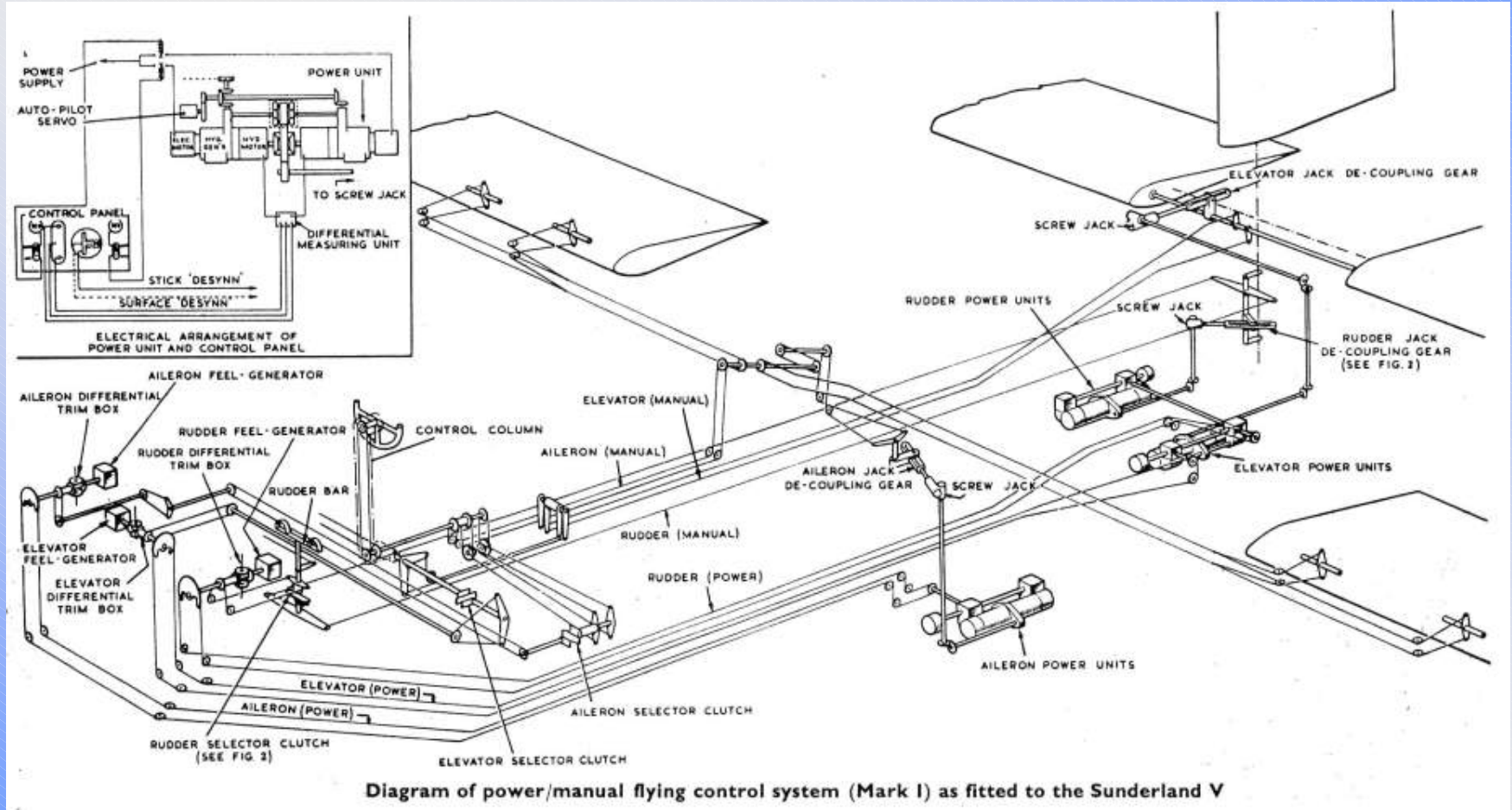
# Beaching Chassis



(above).—Bow beaching chassis

(left).—Main beaching chassis

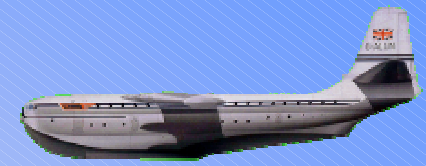
# Sunderland Tests Powered Flying Controls



pic419

# Saunders-Roe and the Princess Flying Boat

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## Verifying the Princess Design



# Full Size Hull Mock-up Constructed

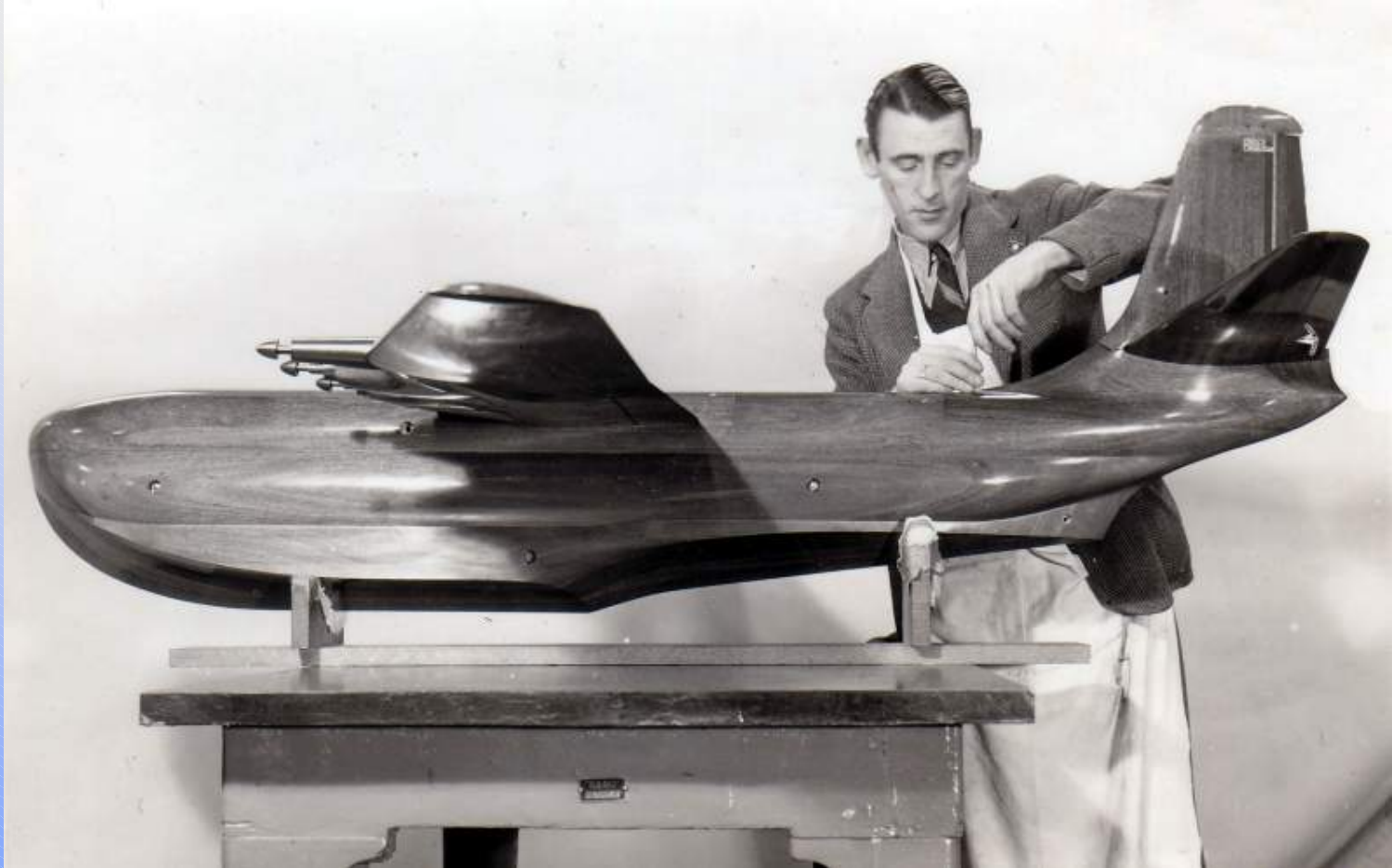
pic507a



A full size mock-up of the Princess hull was constructed to verify layouts and to assist draughtsmen with design detailing

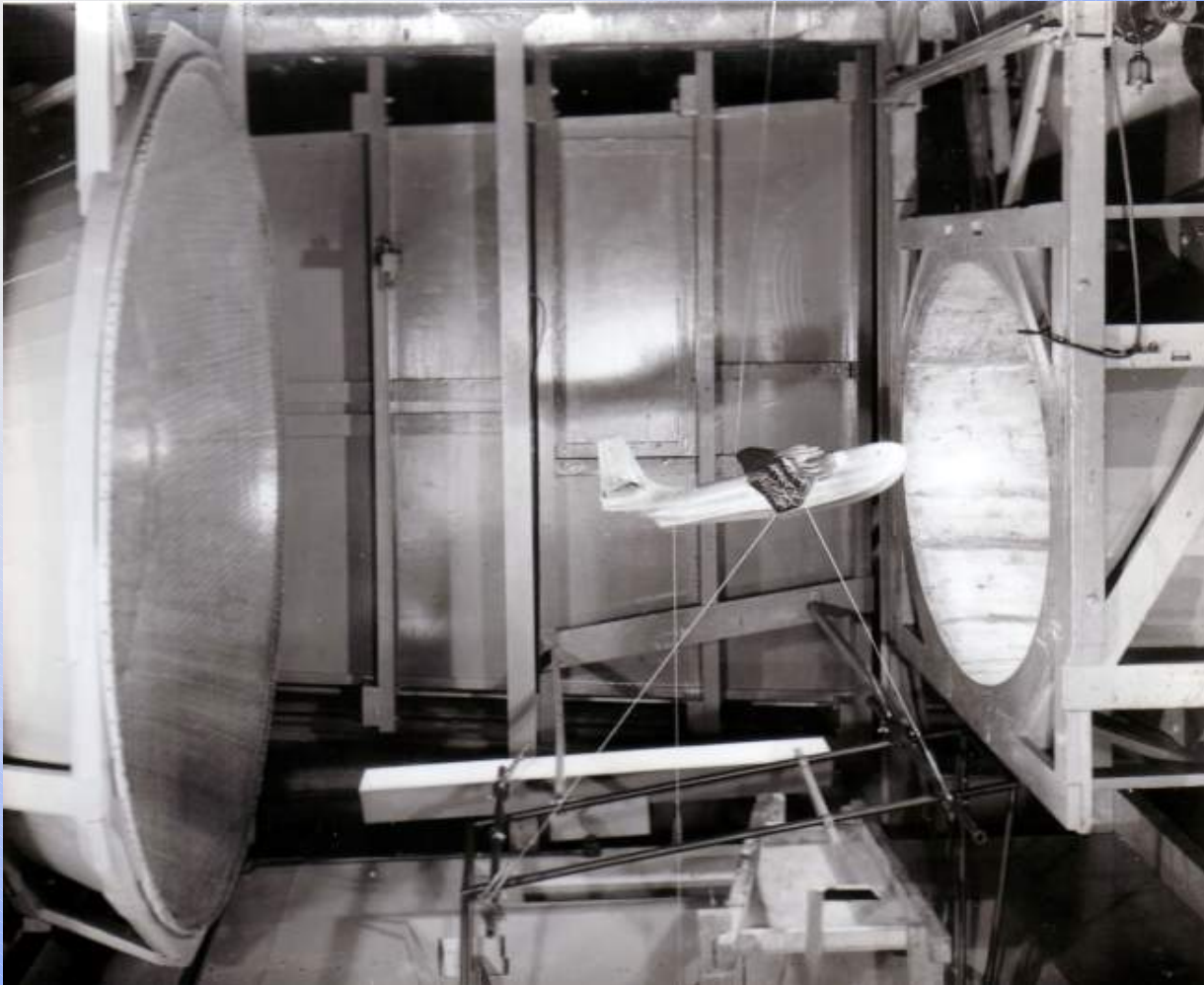
# Scale Models are Constructed

pic507b



A Saunders-Roe craftsman puts the finishing touches to a scale model of the Princess used for testing & design proving

# Wind Tunnel Tests at Osborne



pic505a

Aerodynamic testing in progress using  
Saunders-Roe low speed wind tunnel at Osborne

# Tank Tests to Verify Hydrodynamics

pic001SaroMag



Hydrodynamics testing in progress using Saunders-Roe test tank at Osborne

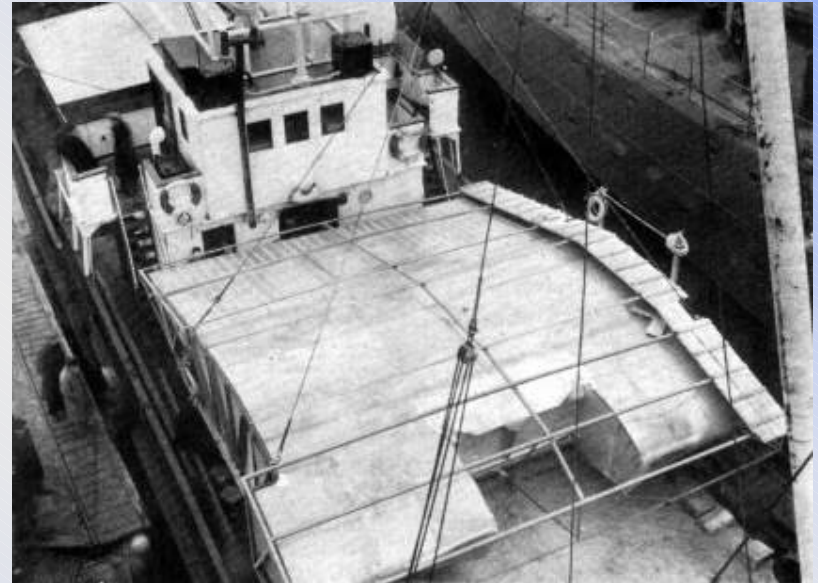
# Structural Testing & Development Rig Tests Verify Design

pic013SaroMag



Half-scale fuselage section built for testing at Farnborough

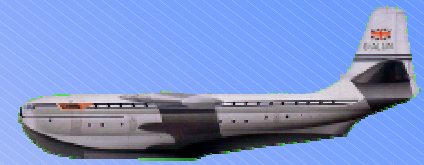
pic008SaroMag



Wing test specimen being shipped from Cowes to Bristol in March 1950 for installation of a coupled Proteus engine for a series of engine trials

# Saunders-Roe and the Princess Flying Boat

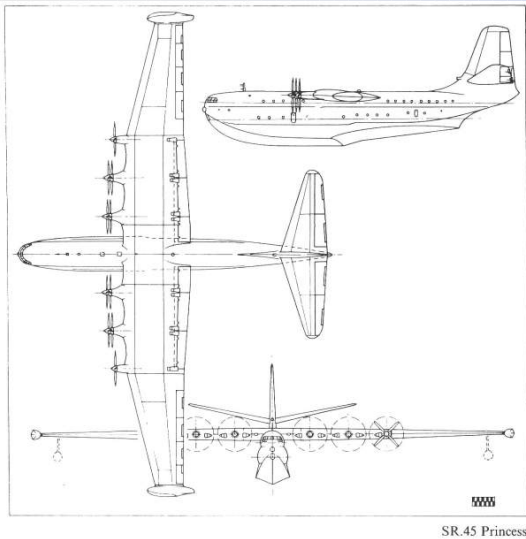
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## Prototype Princess G-ALUN Nears Completion

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Moved to Slipway Apron for Final  
Assembly & Checks



# BUILDING THE PRINCESS

## CONSTRUCTION STAGES

STAGE 1: HULL CONSTRUCTION

STAGE 2: CENTRE SECTION ATTACHMENT

STAGE 3: TAIL SECTION ATTACHMENT

STAGE 4: INNER WING SECTION ATTACHMENT

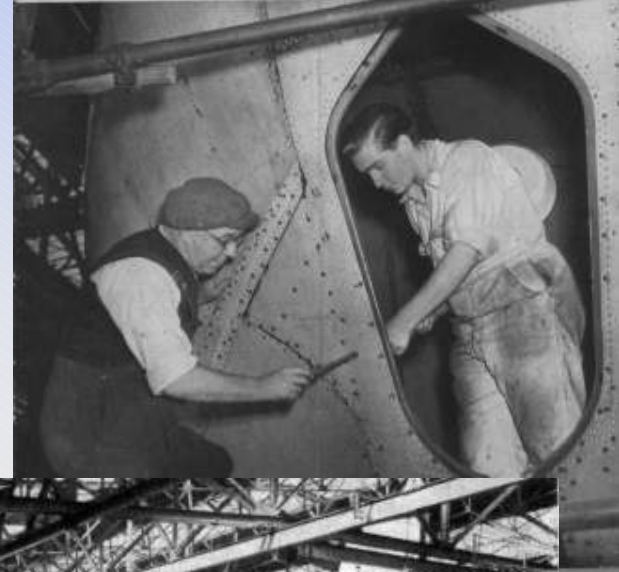
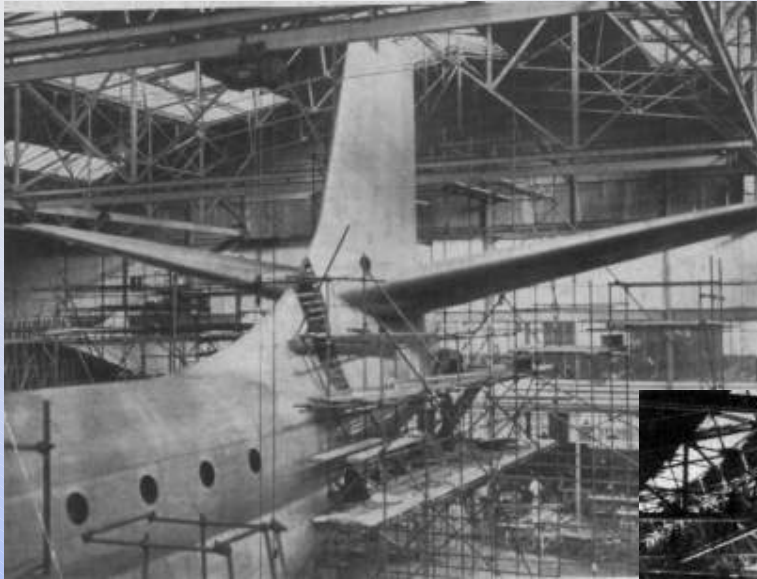
STAGE 5: OUTER WING SECTION ATTACHMENT

STAGE 6: ENGINES & PROPS INSTALLATION

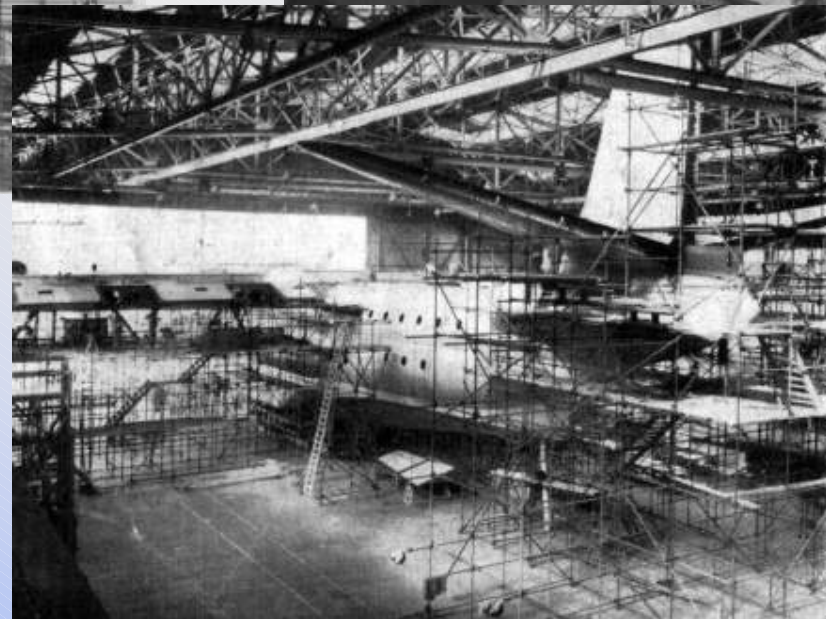
# Hull Construction fills Columbine Hangar

pic010

pic003SaroMag



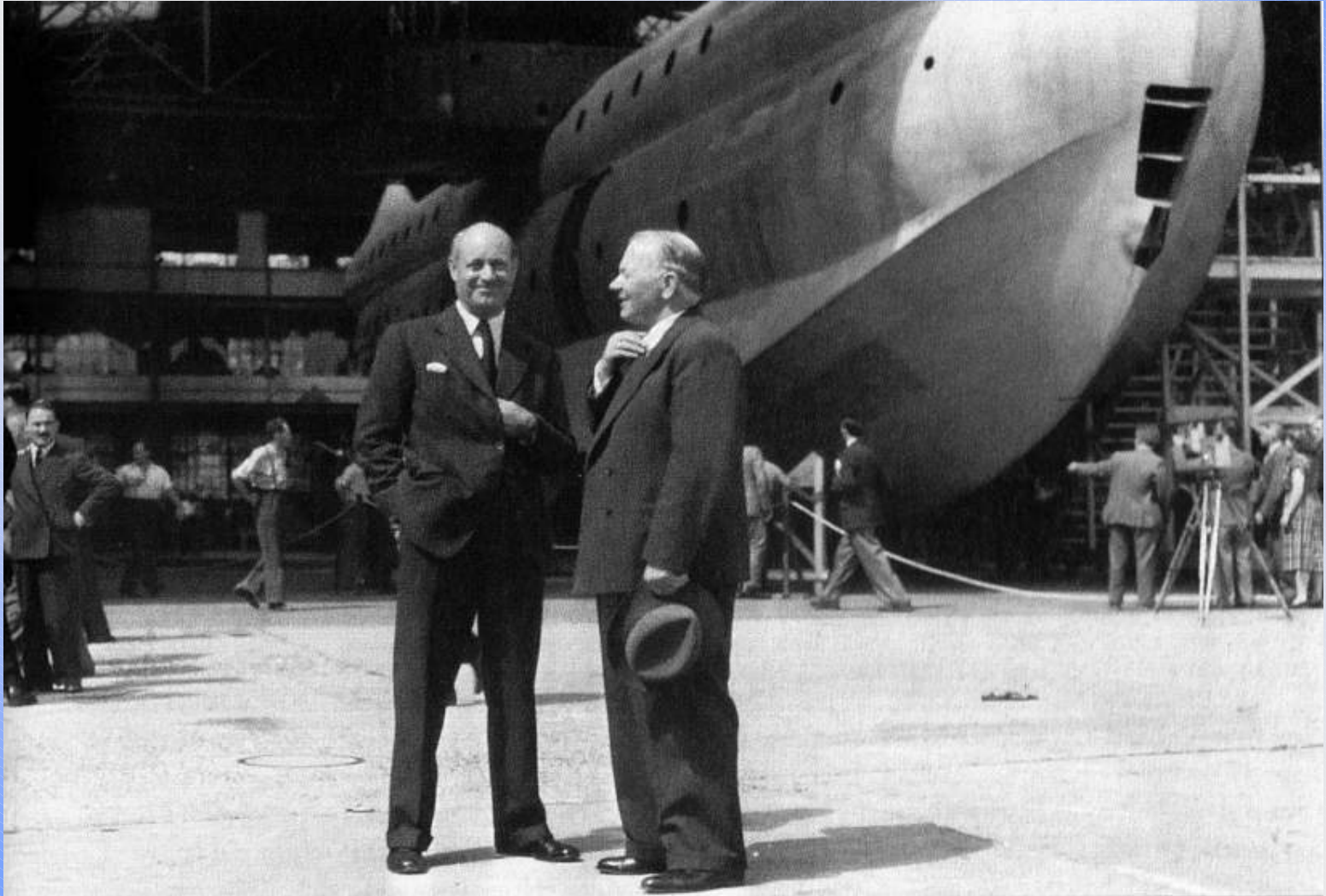
The size of the Princess hull and main assemblies meant that the production area in the Columbine Shop took on more of the appearance of a shipyard than an aircraft factory.



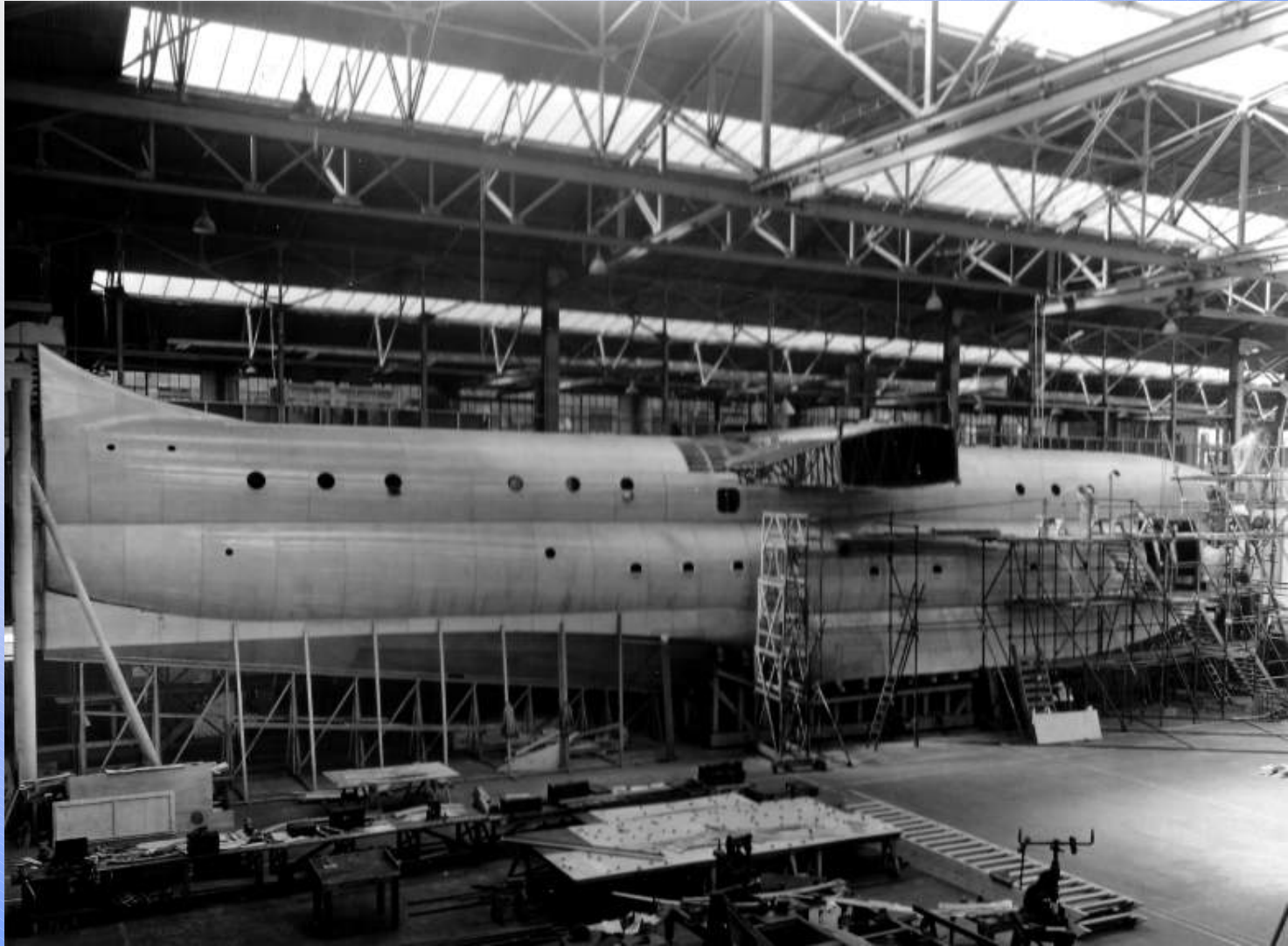
pic004SaroMag



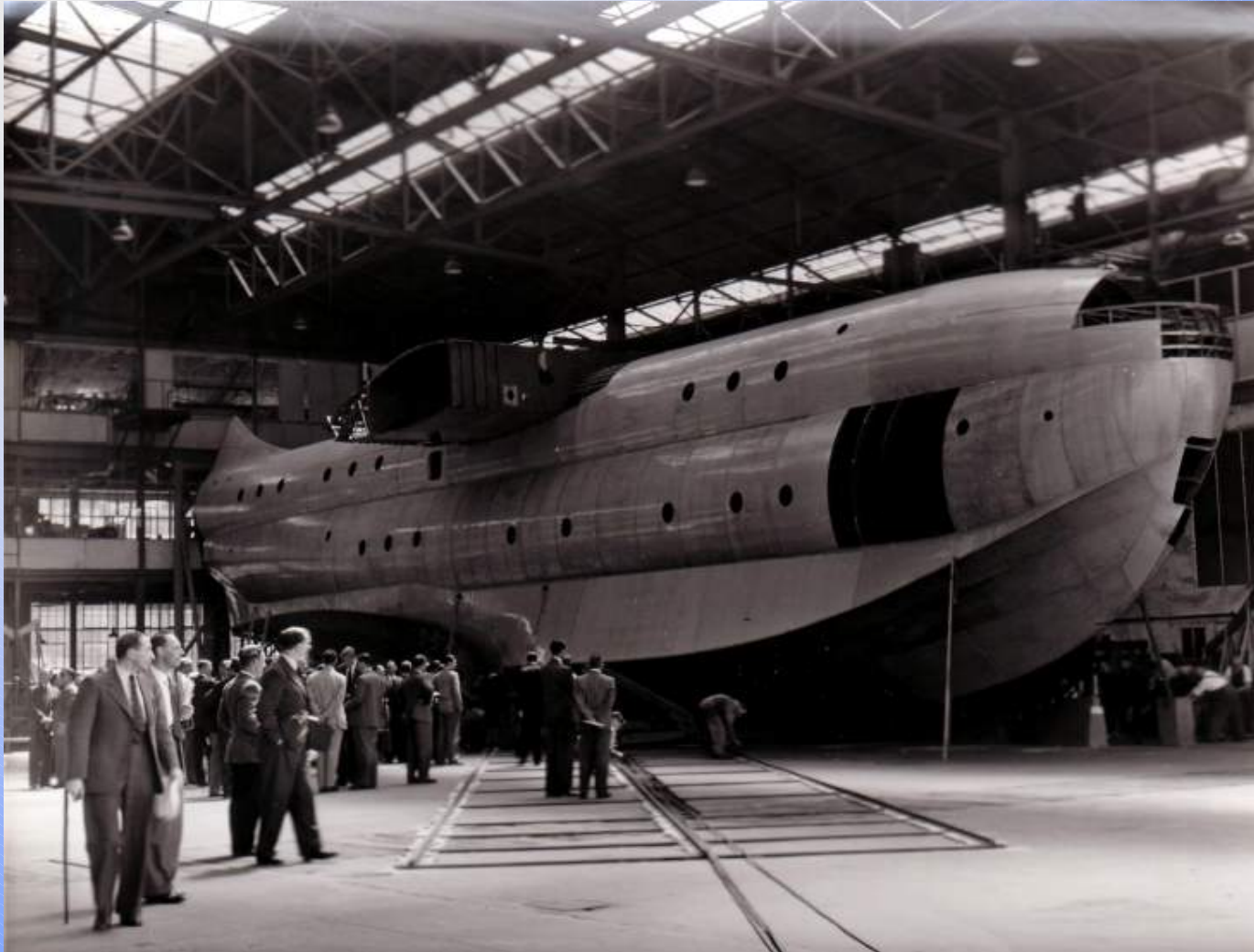
# Sir Arthur Gouge (r) & Henry Knowler (l) in Attendance at the Princess Hull Unveiling



# Princess Hull in Final Assembly



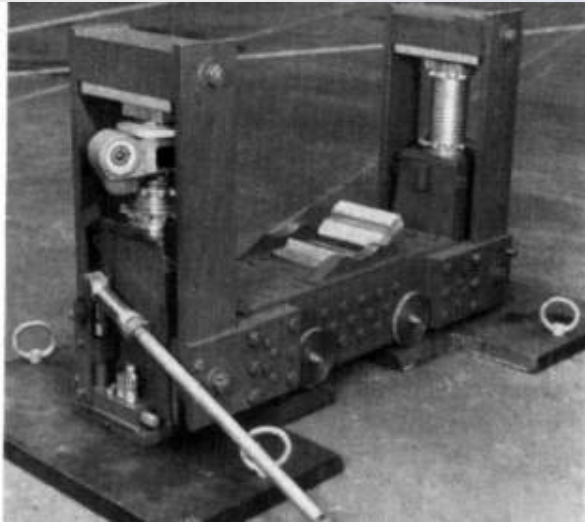
# Princess Hull & Major Components Assembled



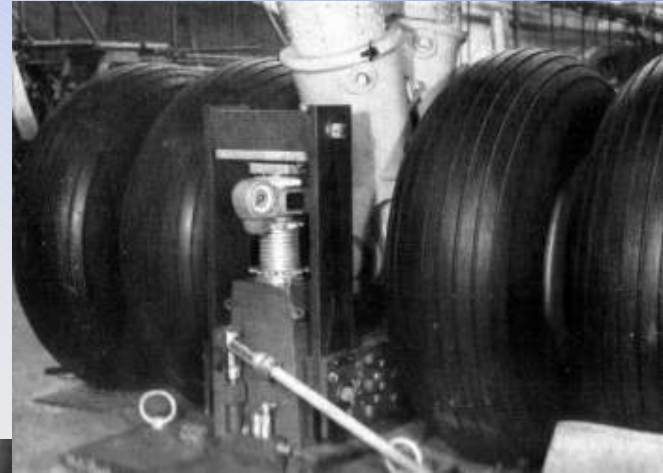
pic503a

# Weighing the Princess

pic025SaroMag



pic024SaroMag



Special provisions were made to set up a method for weighing the Princess. 25 ton hydrostatic weighing units were acquired from BOAC to take the weight at the main chassis position, existing portable platform scales were used for taking the weight at the bow chassis



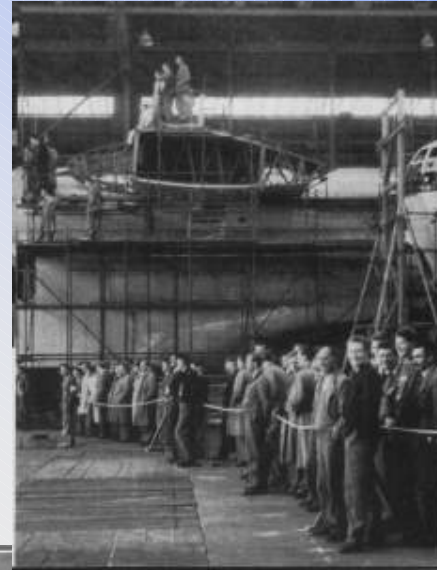
pic023SaroMag

# The Big Move-Anxious Moments, Helpers & Spectators Gather

pic028SaroMag



pic031SaroMag



pic026SaroMag



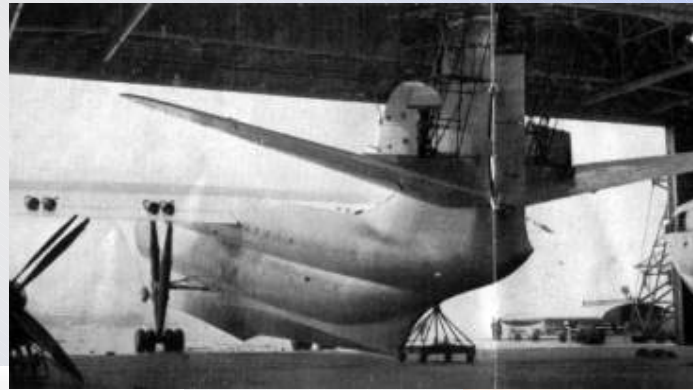
pic027SaroMag

# Princess G-ALUN Moved onto the Slipway Apron for Final Preparation

pic020SaroMag



pic033SaroMag



pic021SaroMag



pic504b



pic431

A complex series of operations was required to move the prototype Princess G-ALUN from Columbine hangar onto the slipway apron for final assembly work completion.

# Beaching Gear in Use for Move to Slipway Apron



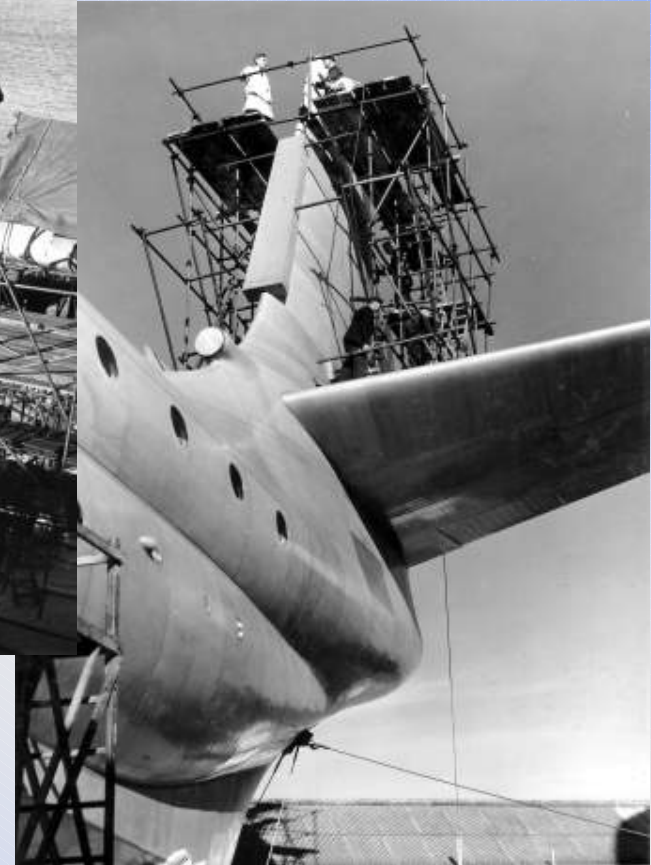
# Princess Ready for Final Assembly on Slipway Apron



pic506a



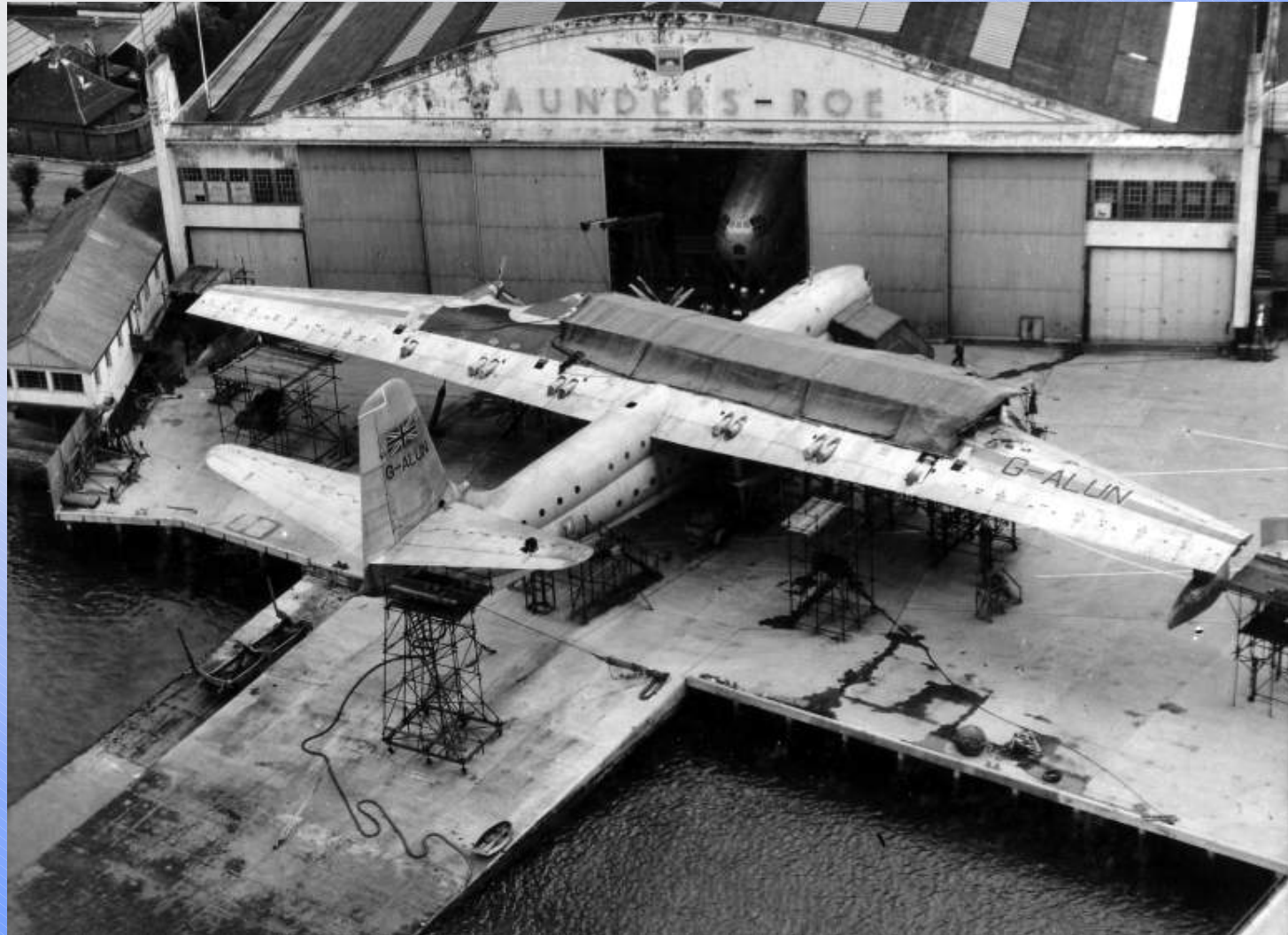
# Outer Wing Sections & Tail Fin Fitted



# Installation of Proteus Engines and Propellers



# With Engines and Propellers Installed the Prototype Princess Nears Completion



# View of Princess G-ALUN from West Cowes



G-ALUN as seen from West Cowes framed by the wing & hull of Sunderland flying boat serial number RN297 used to develop the powered control system for the Princess.

# Saunders-Roe and the Princess Flying Boat



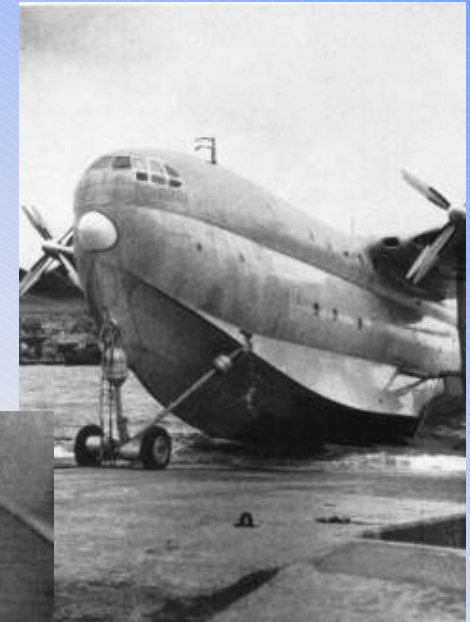
## Princess G-ALUN is Launched & Prepared for a First Flight

# First Flight Preparations



pic039SaroMag

Following final preparations on the slipway, the Form 1900 was signed giving the Princess formal clearance for flight.



pic038SaroMag



pic045SaroMag

# Strong Wind Delays Princess Launch on 19th of August 1952



It was planned to launch the Princess on the 19th of August 1952. A large contingent of Saunders-Roe employees and invited guests await the event. However, due to adverse wind conditions, the launch was delayed.

# Delays due to Adverse Weather Required a Night Launch on 20th/21st of August 1952



pic506b



pic083



# On the Water at Last !



pic192

# Flight Test Crew



**Crew for the first flight :**

pic048SaroMag

**Standing, left to right: R.B. Stratton, S. Ingle, W.Worner, G.A.V. Tyson, J.S. Booth, S.Welford, H. New, G. Jones**

**Front row, left to right: H. Palmer, M.Mabey, A. Walker, R.J. Wraith**

# Initial Taxi Trials Underway



pic048

# More Taxi Trials



pic421

# Princess Prepares for Take Off – 22nd of August 1952

pic050SaroMag



pic154



picGKN348b

Weather conditions on the 22nd of August were perfect. As the Princess taxied out for take-off the liner Mauretania was making her way to Southampton Docks presenting a remarkable sight for spectators at Cowes.



pic202

# Taking Off for the First Flight



After taxiing around the Solent for about 28 minutes the Princess took off at 12:28 to make a 35 minute first flight around the South Coast region.

Geoffrey Tyson reported that he was very pleased with the handling and no significant problems were encountered.



# On Flight Test Over Tennyson Down



picGKN

As most of the Princess test flying took place from Cowes, the sight and sound of the aircraft became very familiar to the Isle of Wight inhabitants.

Many in flight pictures of the Princess were taken with easily recognisable parts of the Island in the background. The view seen above shows the Princess passing Tennyson Down and approaching the Needles.

# Princess in Flight over Southampton Docks



The Princess is captured in flight over Southampton Docks Ocean Terminal, near the BOAC Flying Boat base off Town Quay, shortly after the first flight in August 1952.



# Princess in Flight



pic425

The grace & elegance of the Princess is clearly evident in this air to air photograph.

# On Flight Test Over the Solent Region



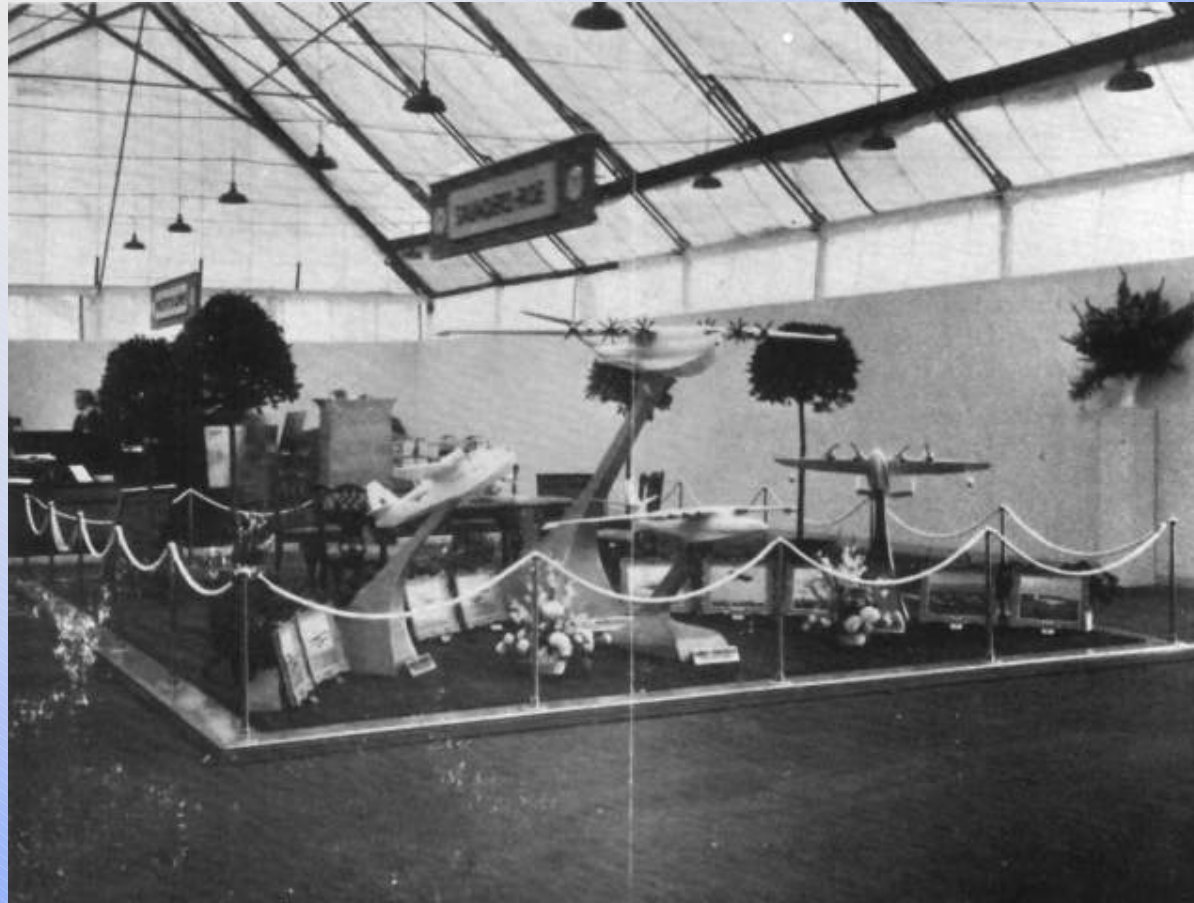
# Princess Flight Test Instrumentation



Banks of test instrumentation filled the cabin of the Princess. Here a flight test engineer monitors some of the instruments during a test flight. A film record of the instrument panel is taken during each test flight for analysis on the ground.

# Saunders-Roe Stand at 1952 SBAC Farnborough Show

pic011SaroMag



The flying boat theme dominated the Saunders-Roe stand at the SBAC Farnborough Show. An elegant model of the Princess formed the centrepiece of the display.

# Princess G-ALUN Makes an Appearance at the 1952 SBAC Farnborough Show

The Princess was able to make an appearance on the VIP day at the 1952 SBAC Show at Farnborough.

The spectators were no doubt impressed by the size and elegance of the Princess as nothing quite like it had ever been seen at previous SBAC Shows.



# Princess Flypast at Filton

On 27 March 1953 Princess G-ALUN made a flypast at Filton during test flight no. 9



# New Paint Scheme for 1953



Princess G-ALUN was given an attractive paint scheme during the early in 1953 lending it more of an airliner feel in comparison with the bare aluminium finish at the time of the first flight.

# G-ALUN Emerges in New Colour Scheme



Preparations underway on the main slipway apron

pic505b



pic502b

Low level flypast for spectators



# Princess Flight Demonstration at the 1953 Farnborough Airshow

The Princess was one of the main attractions at the 1953 SBAC Farnborough Show.

Geoffrey Tyson gave an impressive demonstration of the Princess's handling qualities with a series of graceful low passes as part of the daily flying display.



pic101



pic102

Sadly this was the last public appearance of the Princess before test flying was curtailed at the end of the MoS contract

# Princess Flight Test Records

Princess G-ALUN undertook a total of 47 test flights and accumulated a flying time of 97 hours 50 minutes during the period from 22nd of August 1952 to the 27th of May 1954.

The majority of test flights were under the command of Saunders-Roe Chief Test Pilot Geoffrey Tyson. Saunders-Roe test pilot John Booth took charge of 9 test flights during the later stages of the test programme.

Dick Stratton was Chief Flight Engineer on all the Princess flights except number 35 when Mr Gareth Jones of Bristol Aircraft Engine Division deputised as Flight Engineer.

## **Notable flights included:**

Flight No 1	22/8/52	All contra-prop gearbox temperatures "in the red "
Flight No 6	5/9/52	Only 8 engines running, fuel pump drive failures
Flight No 8	19/3/53	Auto-pilot engaged
Flight No 12	15/4/53	No 6 engine failure
Flight No 13	14/5/53	Reached altitude of 20,000 feet
Flight No 14	21/5/53	No 3 engine failure
Flight No 20	29/6/53	7 hour endurance flight
Flight No 36	5/11/53	Minister of Civil Aviation, Lord Thornycroft on board
Flight No 40	24/2/54	No 5 engine failure at 30,000 feet
Flight No 47	27/5/54	Last flight, stalling tests

# Princess Development Problems

- ❑ Proteus engine supply problems cause serious delays to construction schedule
- ❑ BOAC withdraw support - RAF use seen as a possibility
- ❑ Proteus engines lacking in power - engines supplied deliver 2500 shp not 3500 shp as planned
- ❑ Reliability problems afflict engine and propeller gearboxes

# Saunders-Roe Princess G-ALUN Over Cowes



*Artwork by Ivan Berryman*

pic234c

**Saunders-Roe and the  
Princess Flying Boat**

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# **Duchess Jet Powered Flying Boat**

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**Next generation flying boat design  
proposed by Saunders-Roe c1950**

# The Duchess Intermediate Range Jet Flying Boat

Future development of a jet powered flying boat was being studied by the Saunders-Roe design team under Henry Knowler before the Princess had flown.

The Saunders-Roe Duchess design, with its 6 de Havilland Ghost gas turbines enclosed in the wing section, had a unique sleekness and elegance.



pic067bSarobrochure

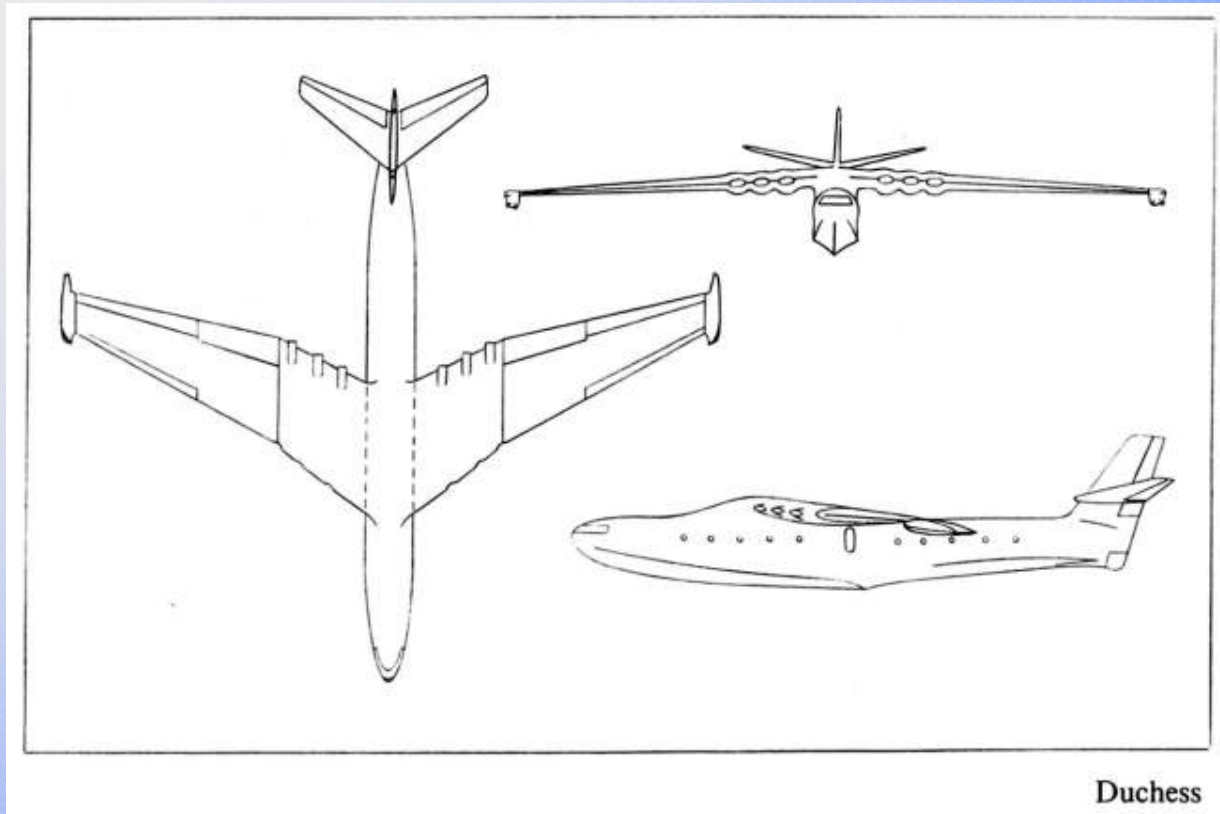
# Artist's Impression of The Duchess

An artist's impression of the Saunders-Roe Duchess appeared in the Saro New Slipway journal for June 1950.

The Duchess design offered a similar level of performance to the contemporary Comet jet airliner but with the inherent operational flexibility of the flying boat



# Duchess General Arrangement, Dimensions & Characteristics



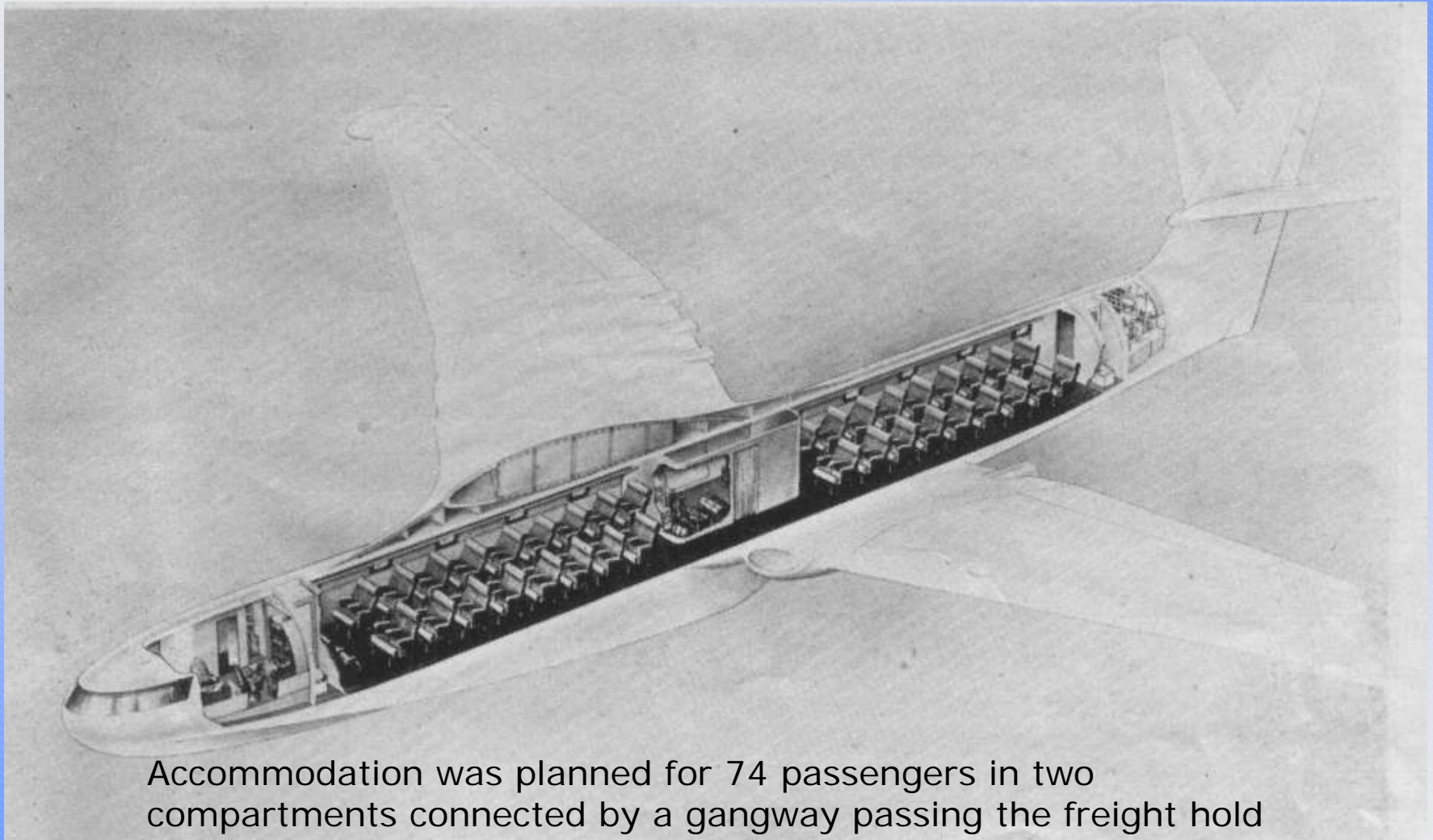
pic610

All up weight	130,000 lb
Wing span	129 ft
Length	124 ft 6in
Wing area	2,364 ft <sup>2</sup>

Max payload	20,908 lb
Baggage	4,884 lb
Freight	3,500 lb
Max speed	550 mph @ 12,000 ft
Cruising speed	500 mph @ 30,000 ft
Range with max payload	2,600 miles



# Duchess Passenger Accommodation Layout



Accommodation was planned for 74 passengers in two compartments connected by a gangway passing the freight hold

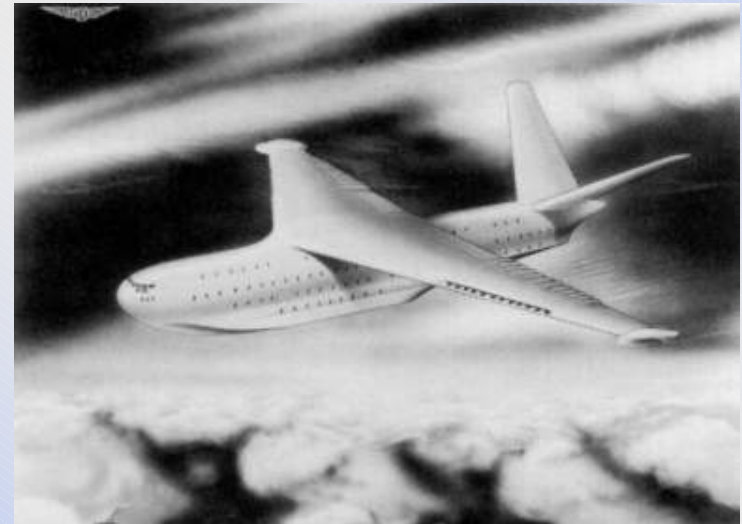
# Other Jet Flying Boat Concepts Studied



pic162

In 1956 the Saunders-Roe P192 proposal was submitted to the P&O Company as a giant cruise liner of the air in 1956. With a 313 foot wingspan, projected all up weight of 1,500,000 lbs and powered by 24 RR Conway jet engines, this monster could accommodate 1000 passengers on 4 decks in luxurious accommodation.

A larger twin deck jet flying boat evolution from the Duchess featured a tail-plane mounted engine installation.



pic172

# Saunders-Roe and the Princess Flying Boat

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## Princess Hulls Preserved in Cocoons Pending Disposal Decision

# Princess G-ALUN During Cocooning Process

Following termination of the Princess contract the three Princesses were enclosed in a protective plasticised coating using the Cocooning process together with dessicant bags to avoid a build up of moisture inside the hull.

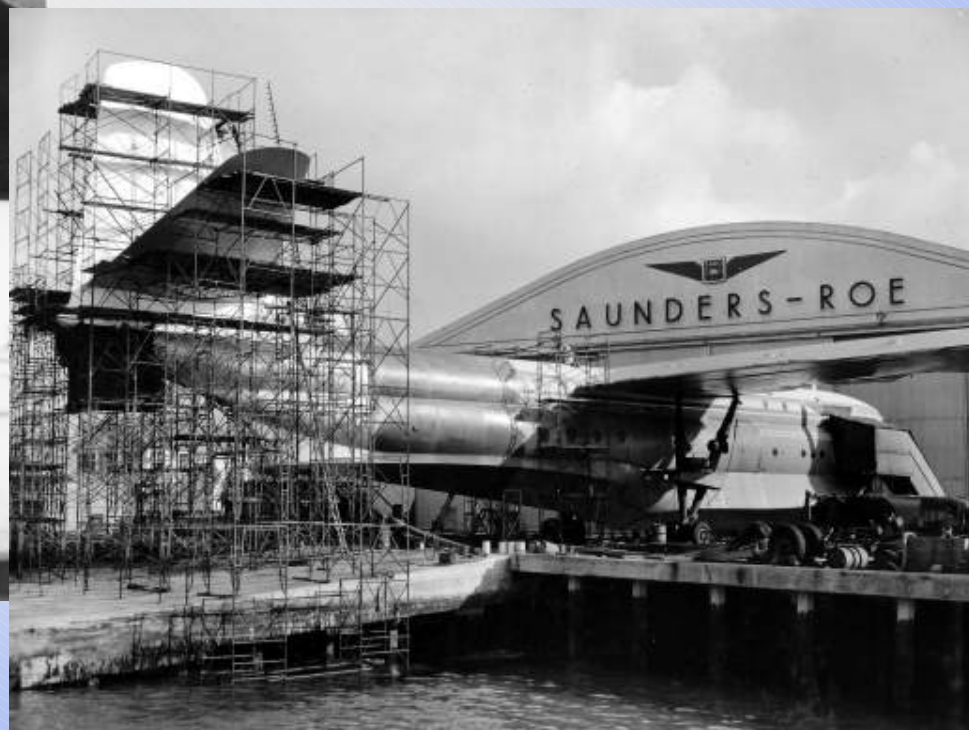


These precautions were aimed at keeping the Princesses free of corrosion and to maintain them in a sound condition pending a decision on their fate.

# Cocooning the Bow and Tail Section of Princess G-ALUN



pic054



picGKN

# Sealing the Engine Mounting Apertures during Cocooning of Princess G-ALUN



pic059

# Princess G-ALUN on JS White's Slipway at East Cowes after Cocooning



# Princess G-ALUN Manoeuvred Across the River Medina in Darkness



pic058

The prototype Princess G-ALUN was Cocooned at East Cowes and then transferred to West Cowes for long term storage.



# Princess G-ALUN in Storage at West Cowes



pic103



pic060



pic061

# Aerial View of Storage Site at West Cowes



After being Cocooned Princess G-ALUN was stored on the site of the old Solent Works at West Cowes. The works had been demolished after receiving a direct hit during an enemy air raid attack on Cowes in May 1942

pic508a

# Princesses G-ALUO & G-ALUP Stored at Calshot from 1953

pic959

Ironically the two un-flown Princesses were stored at the former RAF flying boat base at Calshot from 1953 until they were broken up there in 1964.

The main reason for their destruction was that the Cocooning seal had been broken when there was a possibility of shipping the craft to the USA. As the plans came to nothing and the Cocooning was not re-instated severe corrosion took hold with an inevitable consequence.



# Saunders-Roe and the Princess Flying Boat

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## The Princess Dream Fades

Project is Put on Hold & Alternative  
Uses are Investigated

# Military Transport Role Considered

Use of the Princess as a troop transport received serious attention. Up to 230 fully equipped troops could be carried over a distance of 3700 miles. Portable pontoons were designed by Saunders-Roe to enable loading & unloading at temporary bases.

Following BOAC's decision to cease flying boat operations, the three Princesses were offered to the RAF for possible operational use. After a period of study & debate it was apparent that the RAF had no interest in the Princess as a long range troop transport, leaving the Princess with no real customer or end user.



# BOAC Ceases Flying Boat Operations in 1950, Hopes for Princess Put in Doubt

British Overseas Airways Corporation (BOAC) resumed flying boat services from Southampton at the end of the war and in 1948 a purpose built flying boat terminal was built in Southampton docks. Initially ex RAF Sunderlands were converted as the BOAC Hythe Class, later these were supplemented by another conversion, the Short Sandringham, later to be replaced by a new flying boat design, the Short Solent.

pic368



pic378

Hopes that the Princess would be taken into service with BOAC were dashed when it was announced in 1949 that the post-war flying boat operation would be run down. The decision was not rescinded and by November 1950 all BOAC flying boat operations had ceased. Some BOAC routes were taken over by Aquila Airways as the only airline operating flying boat services in the UK. Aquila Airways remained active flying routes from Southampton to Portugal and Madeira until September 1958, when the airline ceased operating.

# Formation of BOAC Princess Unit in 1951 Keeps Hopes for Future Alive

- ❑ Conflicting views surrounded the future use of the Princess for long passenger services.
- ❑ Despite the announcement in 1948 of a policy decision by BOAC to cease flying boat operations, BOAC continued to maintain an interest in the Princess project.
- ❑ As late as 1951 BOAC had formed a Princess Unit to prepare for the introduction into service of the three craft under construction.
- ❑ The Princess Unit was in the charge of Captain H.W.C. Alger a former flying boat captain who had flown over 2 million miles and for more than six years had been responsible for operation of BOAC's flying boat services.
- ❑ Principal duties of the Unit included:
  - *planning provision of engineering equipment and other technical facilities;*
  - *route surveys;*
  - *provision of economic and financial information about development and operation of the Princess;*
  - *development of special operational methods and procedures;*
  - *development of the BOAC's Hythe base for use by the new craft.*

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# Saro and Airwork Establish Princess Air Transport Co., BOAC Interest Diminishes,

- ❑ Despite the action taken by BOAC to set up their Princess Unit, by mid 1951 that the airline's interest in the Princess was on the wane.
- ❑ In December 1951, Saro and Airwork formed the Princess Air Transport Co. Ltd. to "study the factors affecting the operation of Princess flying boats and to tender for their operation should the opportunity arise". Captain Alger from the BOAC Princess unit was seconded to the company as general manager.
- ❑ Although BOAC chairman Sir Miles Thomas witnessed the first flight of the Princess from his company aircraft, BOAC's intentions became more and more tentative.
- ❑ At the time Sir Miles claimed BOAC was "tremendously interested" in the Princess. However, in October 1952 Sir Miles expressed the view that in his opinion the Princess was out of date technically.
- ❑ By this time the full scale of the work needed to remedy deficiencies in the engines had become evident and this, coupled with cost escalation and delay to the project and the declared BOAC policy directive that terminated the airlines flying boat operations, effectively sealed the project's fate.

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# Princess Contract is Completed

- ❑ Princess G-ALUN made a last flight on the 27th of May 1954 and with the completion of the MoS Contract this aircraft was also Cocooned pending a decision on the way ahead.
- ❑ In just over 97 flying hours a substantial part of the manufacturer's test flying requirements had been accomplished. The Princess had also been subject to a handling assessment on behalf of the Marine Aircraft Experimental Establishment at Felixstowe, receiving a favourable report.
- ❑ Contract arrangements were made with Saunders-Roe to conduct regular care & maintenance checks of the Cocooned aircraft to prevent structural deterioration due to dampness and corrosion.
- ❑ Saunders-Roe and the MoS pursued various possible uses for the Princess over a number of years without success.
- ❑ Although it seemed that an agreement to sell had been finalised on a number of occasions, no firm proposals that appeared to be commercially viable or were supported by the appropriate level of financial backing ever emerged and the three Princesses built had all been scrapped by mid 1967.

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# Aquila Airways Offers to Buy Princess Flying Boats from the Government

Aquila Airways was formed in 1948, as the inspiration of Barry Aikman an ex RAF pilot, to operate air services by flying boat from Southampton. Initially equipped with Short Hythes & Sandringhams, by the early 1950s Aquila had acquired most of the Hythe and Solent flying boats formerly operated by BOAC. From 1950 to 1958 Aquila was the only airline operating flying boats in the UK.



pic607



Aquila Airways Hythe off Funchal, Madeira, September 1950.

pic608



Aquila Airways Solent arrives at Southampton May 1954.

Aquila Airways had an obvious interest in the fate of the Princess flying boats and in late 1953 the airline offered 3 million pounds to the British Government for their purchase. Despite much lobbying and negotiation the offer was turned down by the Government. Although the reasons for this rejection are debatable it appeared that Aquila wished to obtain guaranteed routes from the Government as part of the deal and this may have been seen as detrimental to the interests of the state owned airline BOAC.

# Saunders-Roe Continue to Discuss Princess Development Proposals with BOAC

□ Throughout 1954 BOAC continued to discuss proposals with Saunders-Roe for an extended and re-engined Princess that could revive BOAC's interest in flying boat operations.

□ By this time Maurice Brennan had been appointed the Saunders-Roe Chief Designer and he took the lead in formulating the Princess design changes and presenting the economic case to BOAC.

□ *The principal design changes proposed included a 10 foot extension to the hull and replacement of the 10 Proteus engines with 6 Bristol BE25 Orion turbines planned to deliver around 8,000 shp each.*

□ *These changes were aimed at increasing the payload carried, overcoming the power deficiency of the Proteus and simplifying the design by eliminating the complex gear boxes and counter-rotating propellers of the coupled Proteus engines.*

□ A series of meetings was held with BOAC from early in 1954 through to 1955 to evaluate the proposals. However, the development of jet transports such as the Comet and the 707, the fact that no more than three Princesses were ever likely to be built together with the risks associated with a new engine type that was in the early stages of development, and apparently on the "Secret" list, acted against any change of policy regarding BOAC's interest in flying boat operations.

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# Attempts Made to Acquire Princess for Airline Use

- ❑ In 1958 a plan was revealed to operate the three Princesses on services between Southampton and the Great Lakes in Canada and to Rio de Janeiro in Brazil. Backers of this ambitious plan were a Southampton businessman Mr. B.G. Halpin and the former Managing Director of British South American Airways and wartime pathfinder hero Air Vice Marshal Don Bennett.
- ❑ It was envisaged that the Princess fleet would be modified by installing six Rolls Royce Tyne 11 engines in place of the ten Proteus engines thus giving the craft the power it desperately needed. Bennett and Halpin were kept waiting over a year for a decision from the Ministry of Supply on their offer and in March 1960 the idea was abandoned.
- ❑ In November 1960 a new company called the "British Princess Flying Boats Ltd" was registered , the founder being a Mr. B.G. Halpin. Despite his lack of success in association with Don Bennett, he was still interested in operating the Princess and the new company was eager to buy all three aircraft if the Government would guarantee operating rights on at least one high density route. Halpin envisaged operating the Princess on regular services linking Southampton with Baltimore, Chicago and Detroit. Again proposals to adopt Tyne engines were mooted and Halpin hoped to start services in late 1962. No route guarantee was given, however, and Halpin's interest in the project ceased.



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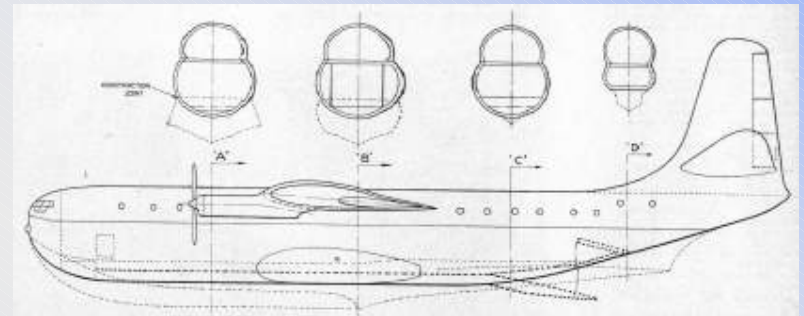
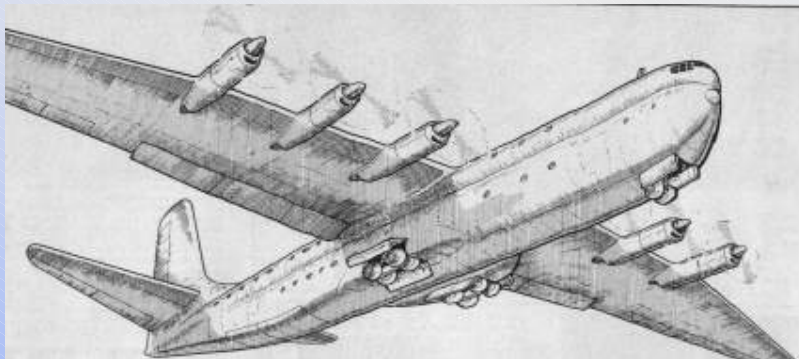
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# Princess Landplane Concept

Saunders-Roe studies of a possible Princess landplane conversion showed that this would have been technically feasible. Proposals were submitted to the MoS in September 1957.

pic078



pic079

Use of the runway at RAF Thorney Island was proposed as a take off point, with the Princess being towed as a floating landplane on the 20 mile journey from Cowes to be prepared for its first flight at the RAF station.

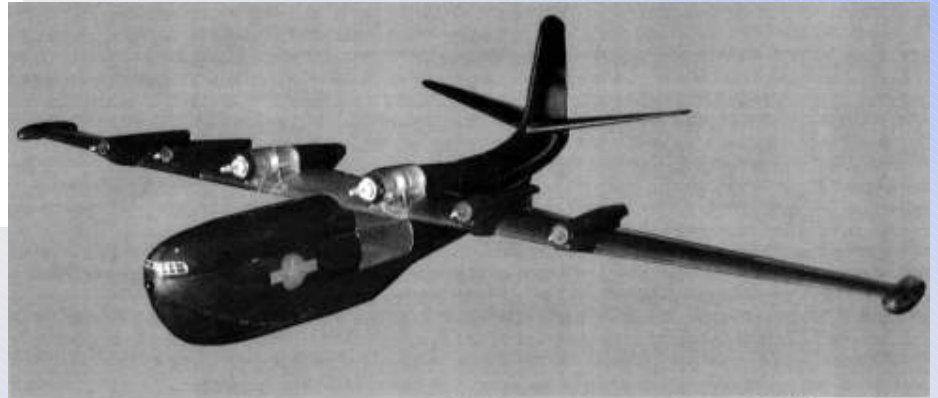
Modifications envisaged included removal of the planing hull, incorporation of a podded multi-wheel undercarriage and replacement of the ten Proteus engines originally fitted with six Rolls Royce Tyne powerplants.

# Nuclear Powered Princess Concept

pic173



pic447

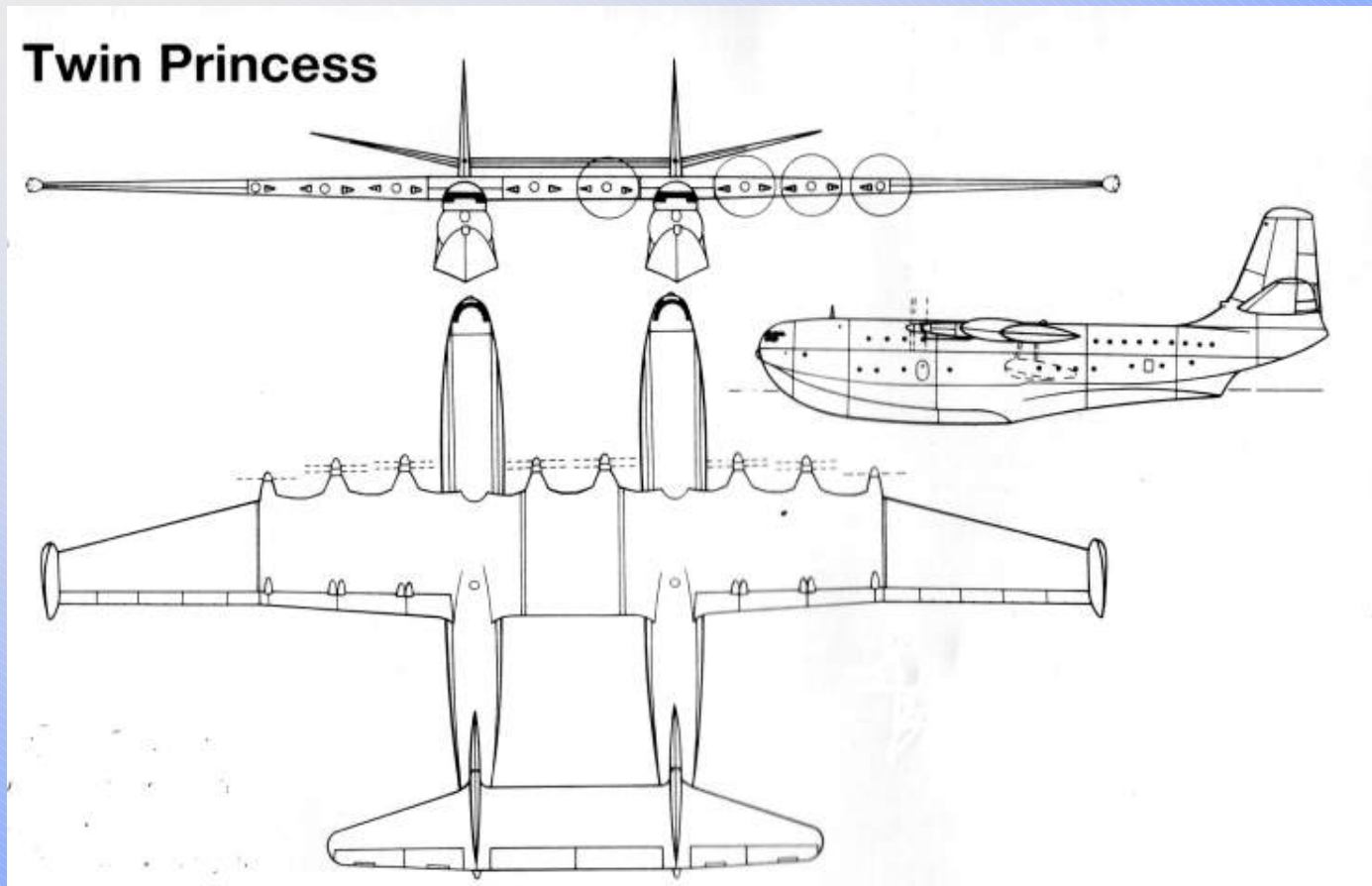


*Tow tank model of the "nuclearized" Saunders-Roe Princess with P&W NJ-2B reactor/engines combination in highlighted area. (US Navy)*

In 1956 some interest was shown by US Authorities in conversion of the Princess to fly a nuclear powerplant. Studies were undertaken and tank test models constructed by the Glenn L Martin Company of Baltimore, USA. US Navy interest in the project diminished and nothing came of the venture.

# Princess Twin Hull Conversion Concept

pic089



A heavy lift flying boat concept put forward in the late 1950s was for a twin Princess configuration. This was to have been produced by an American company as a long range hauler of oversized cargo.

# Saunders-Roe and the Princess Flying Boat

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## End of an Era

Princess Flying boats are scrapped



# End of an Era



Completion of the Princess contract represented the end of large flying boat development in the British Isles. Saunders-Roe and Cowes had been synonymous with the design and construction of flying boats for over 40 years, In 1912 S.E. Saunders Ltd. constructed the hull for one of first successful flying boats, the Sopwith Batboat, and in 1929 Sam Saunders and A.V.Roe formed the Saunders-Roe company. The Princess project, although not commercially successful, demonstrated what could be achieved by a relatively small company with a carefully chosen team of designers and skilled craftsmen.

After a period of indecision following the initial series of test flights from August 1952 until the last flight of the Prototype Princess G-ALUN in July 1954, the three examples of the Princess that had been built were put into long term storage and ignominiously scrapped by 1967. Thus the large flying boat era was brought to a sad end.

Although times were difficult after the Princess contract was terminated, the design and manufacturing skills at Cowes were soon applied to other unique and demanding projects including:

- ❑ SR53 rocket propelled interceptor,
- ❑ Black Knight atmosphere re-entry test vehicle,
- ❑ Black Arrow satellite launch vehicle,
- ❑ development of the SRN 1, the world's first full size hovercraft,
- ❑ design and construction of one of the largest air cushion vehicles in the world, the SRN 4 cross channel hovercraft.

# Princess Hulls Broken Up at Calshot c1964



pic055



pic804

The sight of the magnificent Princess being torn apart at Calshot appears as a cruel and callous act but in the light of circumstances has to be acknowledged as somewhat inevitable.

# Princess G-ALUN Under Tow from Cowes



pic056

After being de-Cocooned in May 1966 in anticipation of sale to Aero Spacelines in the USA, hull deterioration problems were a factor in the deal falling through.

On the 12th of April 1967 G-ALUN made the final journey from Cowes to a Southampton breakers yard on the River Itchen.



# Final Views of Princess Interior



pic706



pic707

These photographs showing views of the Princess interior are believed to have been taken at the Southampton breakers yard in late 1967.

# Princess Hulk used as Scrapyard Office, River Itchen c 1971



pic097

The forward hull section of Princess G-ALUN remained in use for a few years at the breaker's yard as an office & workshop. This picture was taken from a train on the Southampton to Portsmouth railway line alongside the River Itchen c1971.

# Saunders-Roe and the Princess Flying Boat

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**Saunders-Roe Re-  
deploys Skills &  
Capabilities to  
Undertake New &  
Varied Projects**

# Saunders-Roe Projects - 1950s & 60s



pic108

SR53 Rocket propelled  
interceptor demonstrator

Black Arrow  
development vehicle on  
the launch pad at  
Woomera S. Australia.



pic114



pic113

Black Arrow satellite  
launch vehicle

Black Arrow  
successfully launches  
Prospero satellite 31st  
October 1971



pic109

SRN4 Mountbatten class  
cross-channel hovercraft

A number of innovative projects were undertaken by Saunders-Roe in the 1950s & 1960s.

Through takeovers and re-organisation the Saunders-Roe Company became a division of the Westland Aircraft Company in 1959 and later became the British Hovercraft Corporation in 1966.

The Cowes works now operates as GKN Aerospace Services, part of the GKN Group.

# Saunders-Roe Helicopter Division Expands



pic184



pic185

The Saunders-Roe Helicopter Division was formed in 1951 through acquisition of the Cierva Company based at Eastleigh Airport near Southampton. The Skeeter light helicopter achieved some success with sales to the British Army & the German Air Force.

The Saunders Roe P531 helicopter type, that first flew in July 1958, was developed as the basis for the highly successful Wasp and Scout types, these enjoying a good sales record and service life both at home, for the Royal Navy & the Army, & for a number of overseas armed forces.

# Saunders-Roe and the Princess Flying Boat

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## Reminders of the Past - Princess Artefacts, Models, Artwork & Publications

# Princess Postcard



pic105

The Princess featured in a popular postcard series in the 1950s. These cards are now a collector's item.

# Ivan Berryman's Paintings



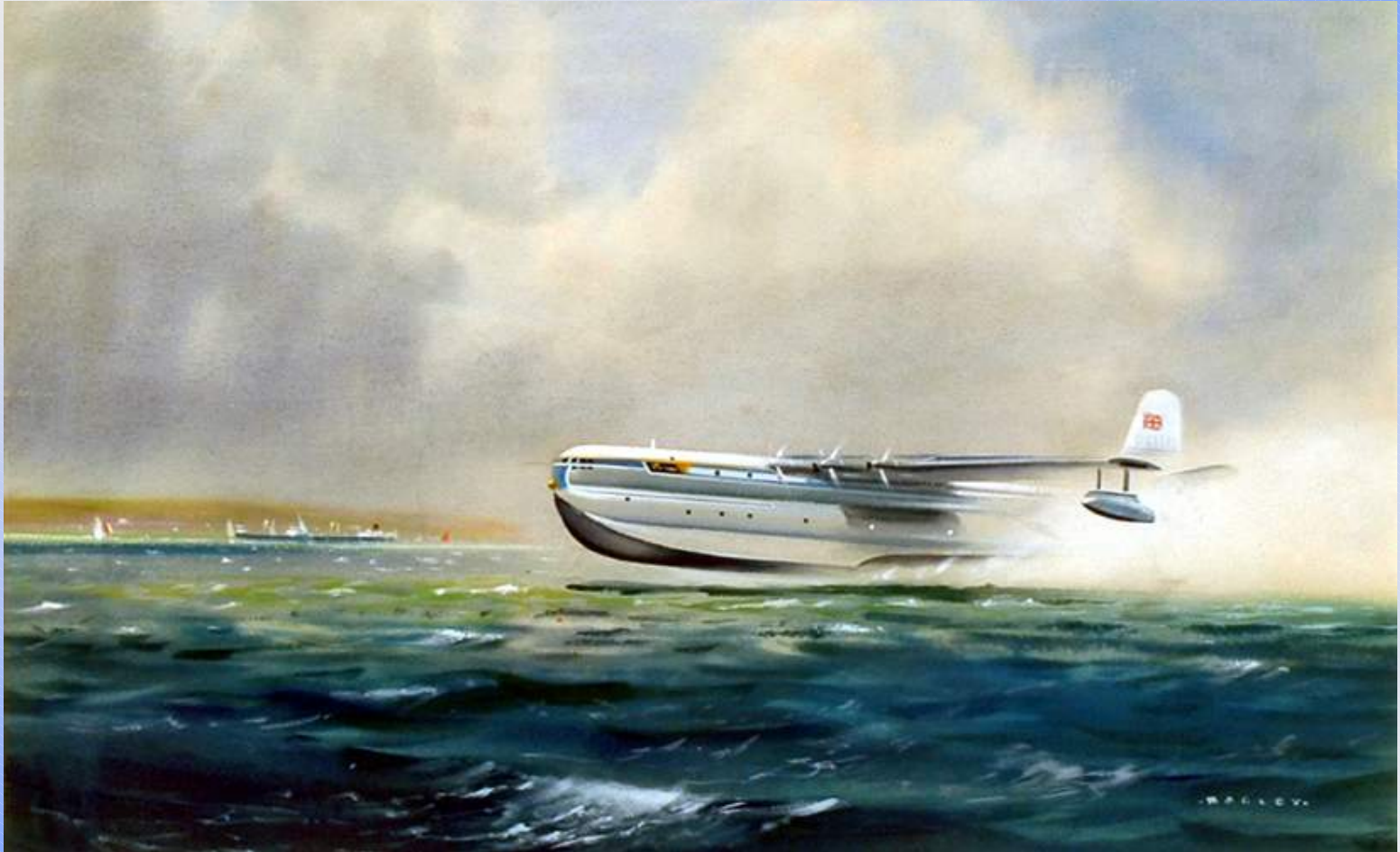
pic445



pic234b



# Laurence Bagley's Painting



# Reference Books

## Prime sources of reference information:



- From River to Sea R. Wheeler



- From Sea to Air R. Wheeler & A.E. Tagg

# Musee de l'Hydraviation Display at Biscarrosse



The Hydraviation Museum at Biscarrosse is on the site of the former Latecoere Company flying boat works situated on the shore of a large fresh water lake southwest of Bordeaux. The museum contains a comprehensive display of models and other artifacts related to the history of flying boats and seaplanes worldwide and includes a section devoted to the Saunders-Roe Company and the Princess.

# East Cowes Heritage Centre Display

pic090



The 1952 SBAC Farnborough Show Princess model is exhibited at the East Cowes Heritage Centre in Clarence Road at East Cowes. The Centre also features pictures & other memorabilia associated with S.E. Saunders Ltd. & the Saunders-Roe Company.

# Calshot Castle Princess Model & Display



At Calshot, once an RAF flying boat base and where the un-flown Princesses were stored, the Calshot Castle Museum includes a 1/72 model of the Princess and related information display

# Princess Float in the RAF Museum Store at Stafford

GKN104b



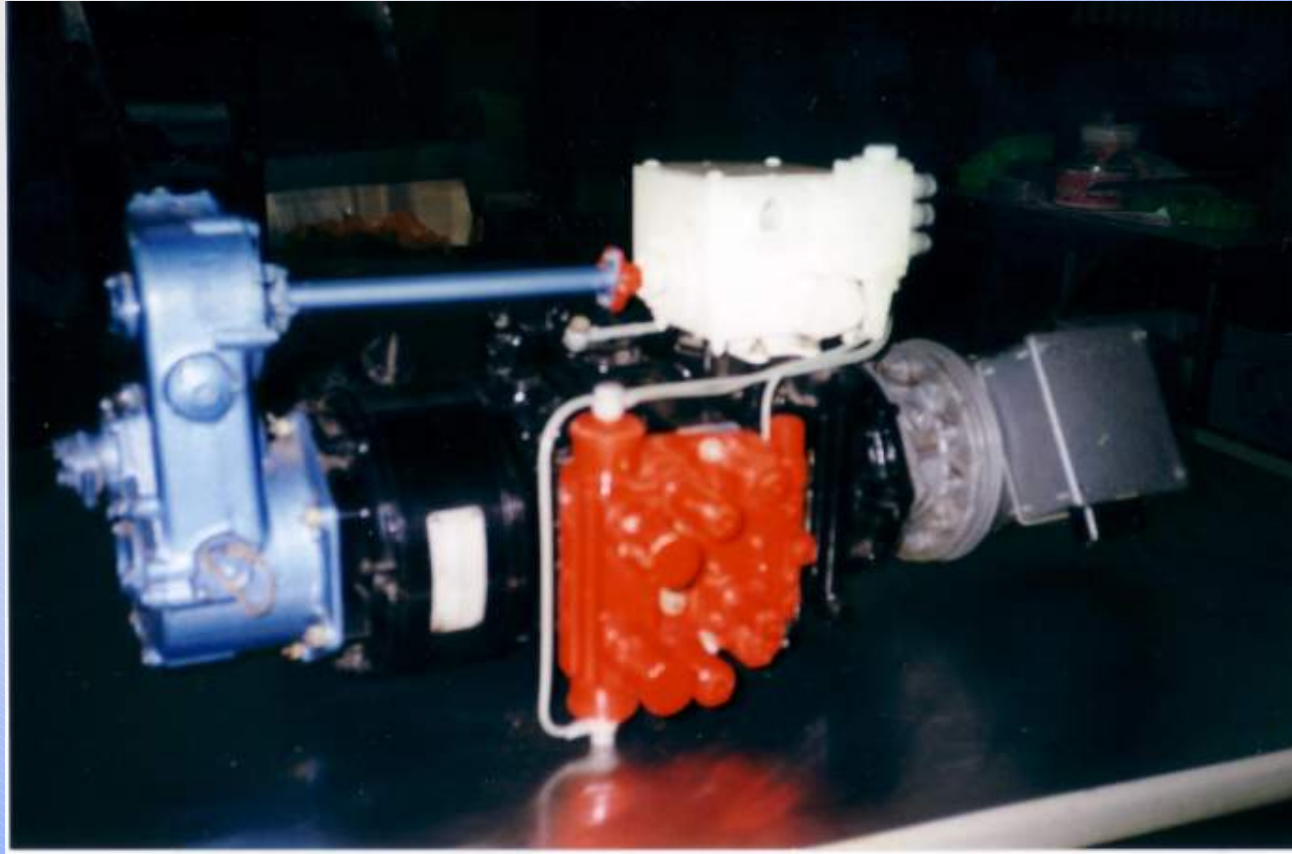
Princess float  
under construction  
c1951



Princess float at the  
RAF Museum store  
Stafford 2002

One of the wingtip floats removed from one of the Princesses that was broken up at Calshot was somehow retrieved and is now held by the RAF Museum in their store at Stafford. The float has suffered a little damage here and there and still bears traces of Cocooning material.

# Boulton Paul Association's Restored Power Control Unit Display



pic468

Restored Princess powered control unit on display at the Boulton Paul Association's Museum in Wolverhampton. This type of equipment has been used in the control systems for several British aircraft over the years, including the RAF's current VC10 tanker fleet.

# Princess Components on Display at the Solent Sky Aviation Museum, Southampton

pic091



Some of the only tangible reminders of the Princess are the control column, pilot's seat and a window from Princess G-ALUN that are displayed at the Solent Sky Aviation Museum, Southampton, alongside the only surviving Saunders-Roe A/1 jet flying boat fighter TG263. This aircraft has survived in almost factory fresh condition and is a tribute to the craftsmen at Cowes that were responsible for its construction. 208



# George Dexter's Princess Model



pic116



Model of the Princess as a radio controlled glider with a 9 foot wingspan, designed, built & flown by George Dexter of Newport, IoW.

# Crescent Models Princess Model



Crescent Models' 1/144 collector's limited edition Saunders Roe Princess set new standards for accuracy and detail

# Saunders-Roe and the Princess Flying Boat

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## The Princess Legacy

# Princess Project Technical Advancements

Despite the fact that the Princess did not enter operational service, the project nevertheless contributed to the advancement of the British aircraft industry's capability in a variety of ways including:

- ❑ design and construction of large pressurised aircraft and structures by Saunders-Roe, now part of GKN Aerospace,
- ❑ realisation of high powered gas turbine engines in the form of aero & marine versions of the Bristol Proteus engine from the Bristol Aeroplane Co. Engine Division, now part of the Rolls Royce Engine Co.
- ❑ design of large propellers and associated gearboxes,
- ❑ adoption of fully powered aircraft flight controls designed by Boulton Paul Aircraft, now part of the Dowty Group.

# Saunders-Roe Tradition & the Spirit of the Princess

The Princess story is one of human endeavour in overcoming daunting technical & organisational challenges to create a machine that was capable of fulfilling the commitments undertaken by its constructor, the Saunders-Roe Company.

The fact that the Princess was actually flown in the face of the extreme difficulties encountered is a tribute to the perseverance & resolve of all those involved.

Originally intended to take the art of flying boat design to new heights under the guidance of the most eminent flying boat practitioners in the country, the harsh reality of the market place won the day.

The knowledge & experience gained from the Princess project was of significant benefit to the Saunders-Roe Company and its skilled workforce. This was clearly demonstrated by the Company's ability to undertake a number of innovative & challenging projects beyond the Princess era.

Ownership changes & takeovers meant that the Saunders-Roe Company name faded from view about 30 or more years ago. However, it is fair to say that despite many setbacks and disappointments the spirit of the Princess, as a symbol of human endeavour, & the traditions of the Saunders-Roe Company remain alive at Cowes to the present day under the banner of the GKN Company as GKN Aerospace Services.

# Acknowledgements

This presentation could not have been produced without the assistance of a number of people including Reg Grover, David Cheek, GKN Aerospace; Sarah Burdett, East Cowes Heritage Centre; Tony Butler, Curator of Human History, IWCC Museum Services; Jez Gale, Southampton Echo; Archive Custodian, Cowes Maritime Museum; Ivan Berryman; George Dexter; Mr C.W. Plimmer, Boulton Paul Association; Paul Johnson, Meridian TV; Keith Hayward, BA archivist; Paul Gladman, Flight Collection; Ralph Steiner, de Havilland Aircraft Heritage Museum; Colin Van Geffen and archivists at Solent Sky; Dave Etheridge, Fawley Historians; R.B. Stratton; Brian Riddle, Librarian, Royal Aeronautical Society; Geoff Chalmers.

Invaluable reference information has been obtained from the following publications and sources:

- The New Slipway
- Saro Progress
- Flight
- Aeroplane
- Aeroplane Monthly
- Aircraft Engineer
- Aircraft Production
- Saunders & Saro Aircraft since 1917
- From Sea to Air
- From River to Sea
- A Solent Flight
- Wings Over the Island



# The End



*The Saunders-Roe Company 1929-1959*

