

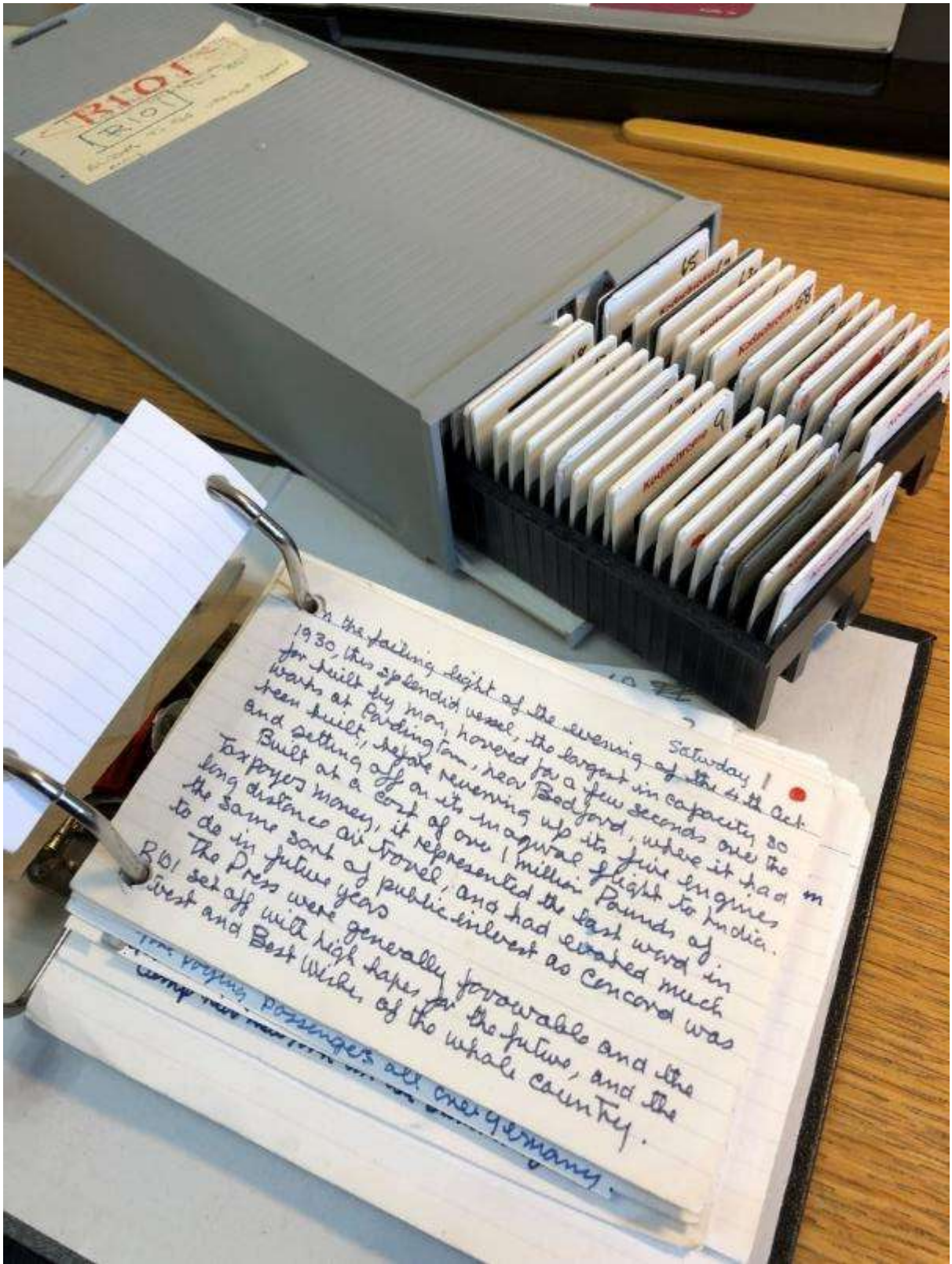
Airship R101 Presentation
by the late Paul Bell



Together with PowerPoint adaptation
by the late Colin Vosper

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in the falling light of the evening Saturday 1st Oct. 1930, this splendid vessel, the largest in capacity, 20 ft for built by man, honved for a few seconds over the works at Fordingham, near Bodeford, where it had been built, before rearing up its five engines and setting off on its inaugural flight to India. Built at a cost of one million Pounds of taxpayers money, it represented the last word in long distance air travel, and had evaded much the same sort of public interest as Concord was to do in future years. The Press were generally favourable and the RIOT set off with high hopes for the future, and the West and Best Wishes of the whole country.

Preface

Paul Bell

I never knew Paul Bell, but sometime after he died his widow gave his Presentation to my cousin with the idea that it should be used, rather than thrown away. Later my cousin passed it on to me in the hope that I may find a way achieve her wishes.

The label on the slide box gives the address of the Teignmouth & Shaldon Heritage Museum which my cousin knows well. However, what no one knew, was that there was also a USB stick in with the notes that contained a full PowerPoint Presentation created from the slides by Colin Vosper who had since died.

I asked my cousin for information about Paul Bell and Colin Vosper and he asked his friend David, who did know Paul, and these are the answers from David to the best of his knowledge: -

“Paul was in the Navy during WWII. He became a Qty Surveyor and an Architect. He was a Member of RIBA.

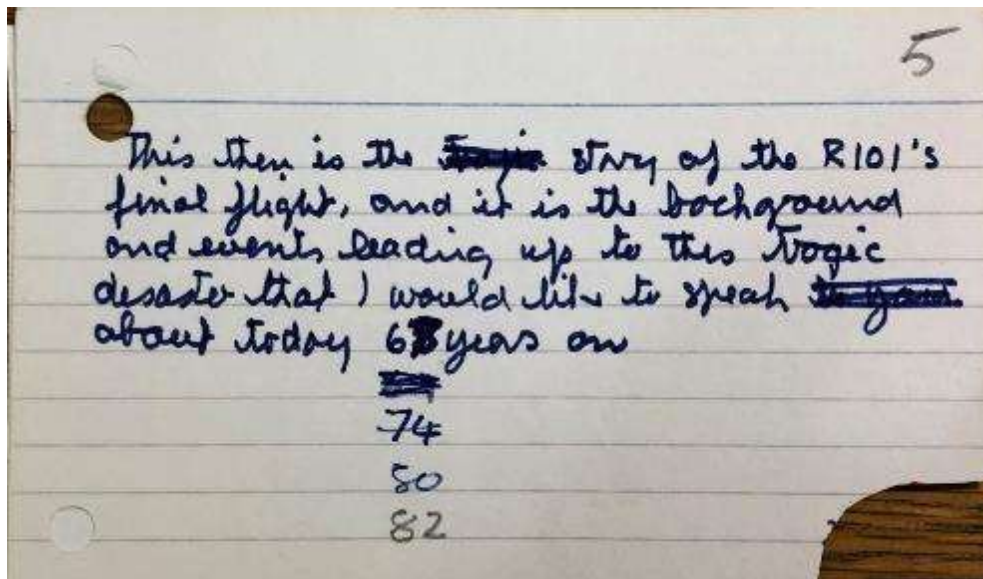
He had a wide interest in things Historical which ranged from Napoleon to Airships, +++.

He claimed to have seen either the R100 or 101, hence the interest.

The reference to our local Museum was that he gave his lecture there. David operated the projector!”

I could see from the dates on the slides that the photos are in three batches from films developed in Dec 94, Nov 95 and Dec 96 which gives an idea of when Paul created it.

The updates on note 5 shows that he gave it from 67 to 82 years after the final flight in 1930. ie: For 15 years from 1997 to 2012.



T.M. 010 774576
29 FRENCH ST
R101
TELEPHONE
TALK 851
SLIDER TO BE UPSIDE DOWN
ONLY.



Colin Vosper

Neither David nor my cousin knew of Colin Vosper or his PowerPoint adaptation of Pauls Bells Presentation. However, Googling "Colin Vosper" shows: -

"1943 – 2022 Retired lecturer from South Devon College undertaking research on a range of local history topics. Most of the topics have either not been previously researched or on topics where new aspects of the topics have come to light.

A trustee of Torquay Museum and member of Babbacombe and St Mary Church Local History Society."

With his connection to the Museum, it seems likely that, after Paul's death, Colin also wanted to preserve Paul's work by digitising it as a PowerPoint that others could enjoy.

The dates of the files on the USB show that Colin finished copying Pauls notes into Word on 26/8/2019 and the PowerPoint presentation file date is 13/12/2020, so it would seem he was working on it for at least 16 months. However, it is not sure if he ever finished editing, and unlikely he ever gave it before he also died.

Comparing Colin's Power Point with Paul Bells slides, which are photos of book pages, it is clear that he has improved them by scanning, cropping and separating multiple images. In some cases, he has added new ones and animations to the presentation. He has used Pauls original notes and added some extra comments of his own.



Preserving and Sharing both Presentations

As both of their creators have since died, I feel it is important to preserve both their works, but in a format, that makes it easy to share with as many generations as possible.

This requires simplifying the means to enable this. For example, the PowerPoint file is too large to attach to an email and it would only run on a desktop by someone who knows how to operate the software.

It is fairly easy to make Colin's PowerPoint slides into a video that could be put on YouTube. However, it would require a narration to be added. This was considered by a couple of us but felt that the notes would require further changes in order to achieve this. It would also be rather long.

Either of the above options would only be Colin's version and not reflect Paul's original work. It was therefore felt that this would not be a conservation that his widow wanted. However, no one is likely to use Paul's slides and notes to give his original presentation and they too could end up in another museum just gathering dust.

On reading Paul's original handwritten notes, I felt that they are very important as they record his take on the story of the R101 and airships in general. His amendments to his notes also show changes that he made during the course of giving it.

I wanted to convert his presentation to a simpler digital format so it could be viewed and read on one's phone or tablet. I therefore took pictures of his handwritten notes and rescanned his original slides and edited and saved them as a PDF.

Having done so, I found it easy to read on my tablet at my own speed. I could also zoom in on parts of the pictures in more detail as I wanted and go back to check things. I think others may find the same and also the younger may experience what slide presentations used to be like before computers.

It wasn't so easy to do this for Colin's work due to animations and overlapping images on some slides which overlaid the final slide picture, but finally managed it.

I have therefore combined both presentations into this one PDF document so they remain together and anyone can read and compare both Paul Bell and Colin Vosper's work.

Please feel free to share with as many as possible.

Andrew Ball, 15th December 2022

Andrewball1000@gmail.com

Paul Bells Original Notes and Slides

As received in October 2022

Saturday 1 ●

In the failing light of the evening of the 4th Oct 1930, this splendid vessel, the largest in capacity so far built by man, hovered for a few seconds over the works at Cardington, near Bedford, where it had been built, before reversing up its five engines and setting off on its inaugural flight to India.

Built at a cost of over 1 million Pounds of Taxpayers money, it represented the last word in long distance air travel, and had evoked much the same sort of public interest as Concord was to do in future years.

The Press were generally favourable and the R101 set off with high hopes for the future, and the best and Best Wishes of the whole country.



On board were high ranking representatives of the Government, the Civil Service, the armed forces, and the Airship Service, and the Officers and crew had been carefully selected from the most experienced men available, and the whole enterprise was expected to be a triumph of long distance air travel for Great Britain.

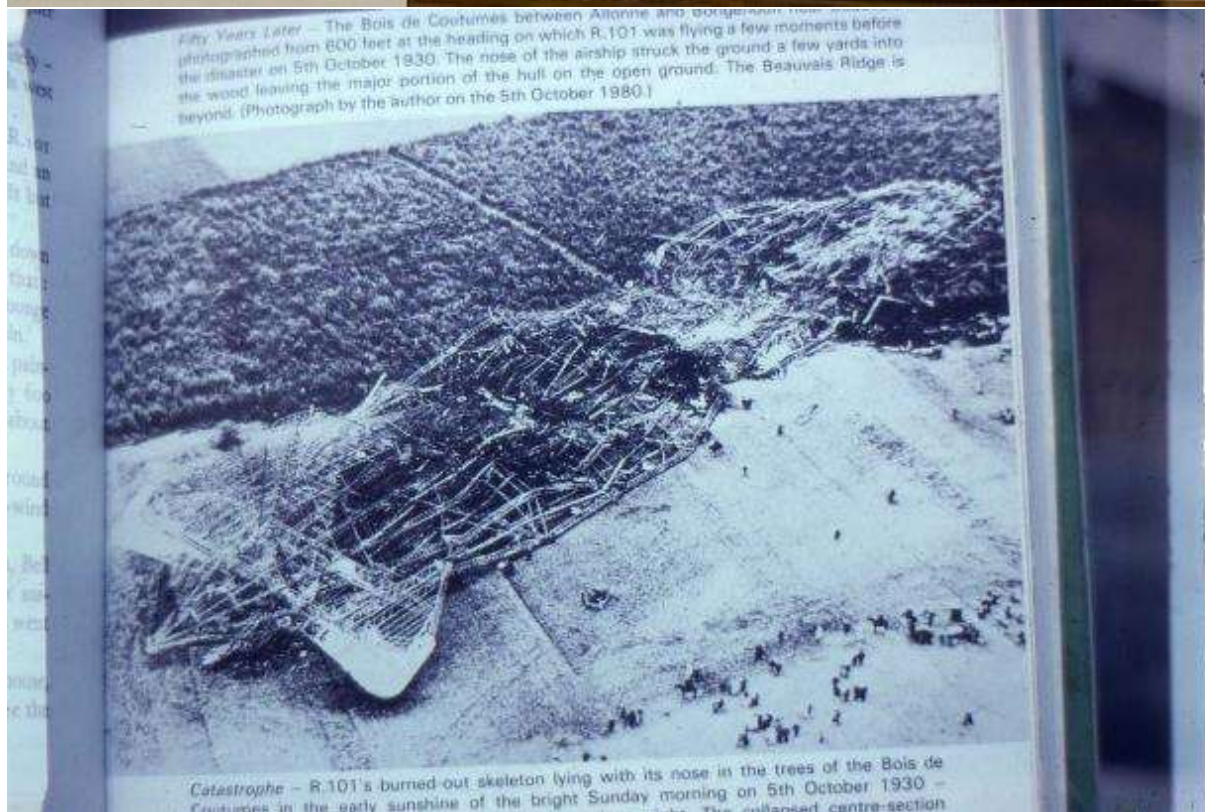
View of Wreck

Tragically

3

2
8

Less than 8 hrs later on a lonely
rain swept hillside in North Frasee,
nothing remained of the R101 but
a smouldering heap of wreckage
and of the 54 persons on board only
8 remained alive, and two of these
were to die of their injuries shortly
afterwards.



Slide 3

4

On hearing the news the whole nation went into a state of shock and sorrow in much the same way as it did on hearing the news of the Titanic disaster.

The bodies of the victims were brought back to England and given a state funeral, before being laid to rest in a common grave at Putney. Despite an enquiry nobody knows

to this day what went wrong to cause the crash. ~~to cause the crash.~~

5

This then is the ~~story~~ story of the R101's final flight, and it is the background and events leading up to this tragic disaster that I would like to speak ~~about~~ about today 68 years on

~~74~~
74

80

82

This picture taken from a wall painting at Pompeii shows the story of Icarus and his father attempting to fly to freedom by means of home made wings, with disastrous results, at least for Icarus, and illustrates that ~~from~~ from the very earliest times man has wanted to be able to fly like the birds.

It wasn't however until very recently in his history that his knowledge of science and technology was sufficiently advanced for him to be able to do so.

When we talk about flight we mean using the air which surrounds our planet to overcome

the force of gravity, and this can be achieved by two very different means.



Slide 4

~~methods~~.

7A

Firstly, there is dynamic flight, used by birds, aeroplanes and helicopters, where weight is kept aloft by engines or muscles, or in other words by the expenditure of fuel.

And secondly, there is lighter than air flight where the craft is lighter than the air it displaces and therefore floats up words, like a bubble in water, and to this category belong Balloons & Airships.



Slide 1

78

The airship is the direct descendant of the Balloon which was first built and flown by the Montgolfier brothers in Paris in 1783 using hot air which is lighter than cold air as the lifting agent. As shown in the picture

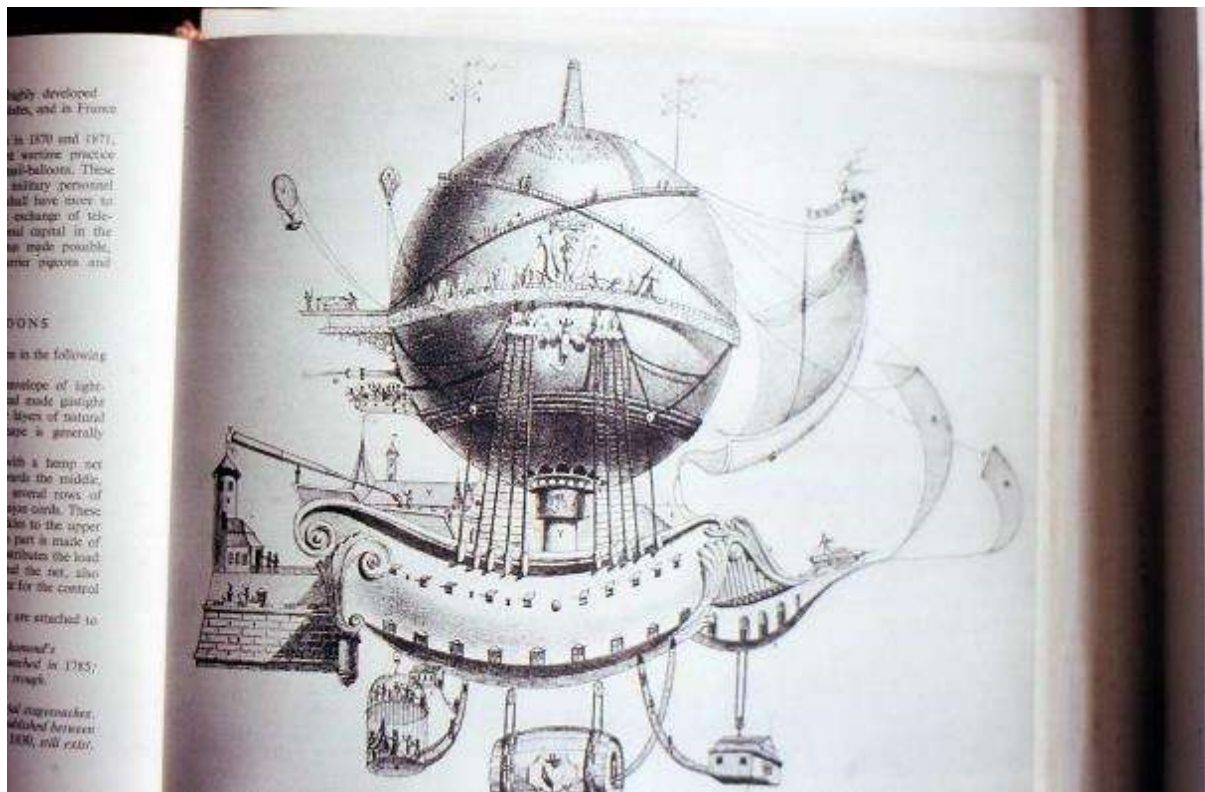
And it is interesting to note that the wheel has gone the full circle in the intervening ^{200 odd} years in that modern balloons are now using hot air in place of hydrogen or helium.

- ~~Fixed air~~
as the lifting agent

8

Once the principle of the lifting agent had been discovered balloons were continually developed over the next hundred years, with of course, more than a fair sprinkling of fantastic ideas such as this one which was intended to carry an entire invading army over enemy territory.

Although the first balloons used hot air as the lifting agent, hydrogen gas had been discovered by the scientist Boyle as early as 1766, and as this is the lightest gas known, and easy to produce in large quantities, it was soon in use in ballooning.



Slide 5

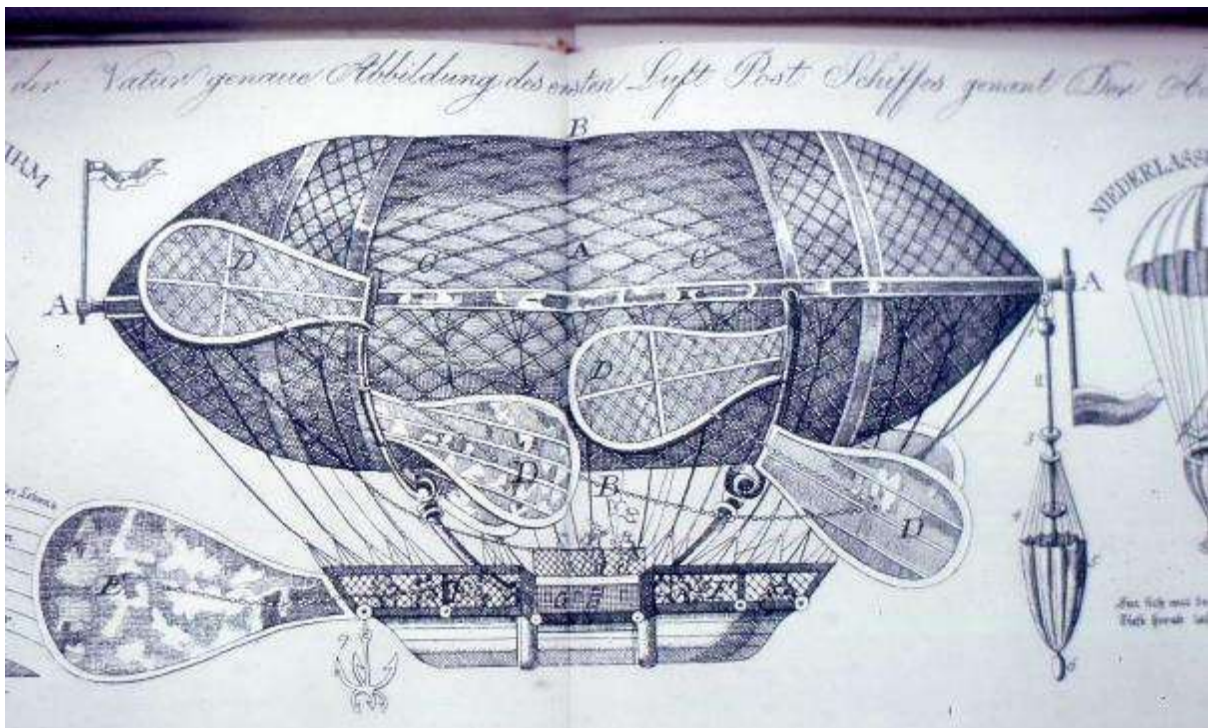
9
Now Balloons worked well enough in
the way: To go up you simply threw out
ballast: usually sand: and: to descend
you let out gas: But as far as direction
was concerned you were completely at the
mercy of the wind: which of course made
practical navigation from A to B impossible.

What was wanted was some means
of propulsion that was light enough to
be carried aloft: but powerful enough
to push the airship along.

Many ideas were unsuccessfully tried
out during which it was discovered that
an elongated or boat shaped vessel ~~is~~

was much easier to control and offered far less resistance to the air than the basic sphere.

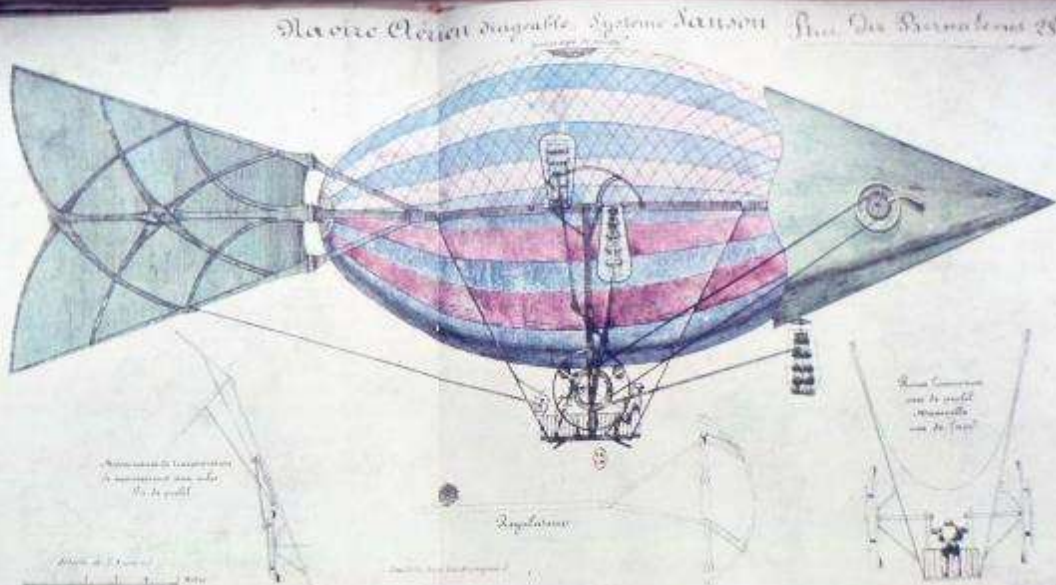
The picture shows one of the many early attempts to row an airship along with oars or paddles.



Here is another proposal, add
locking but on the right lines
with an elongated body a streamlined
nose, and a good big fish tailed
rudder for steering.

However the propulsion system
which was man powered was quite
useless.

MAN

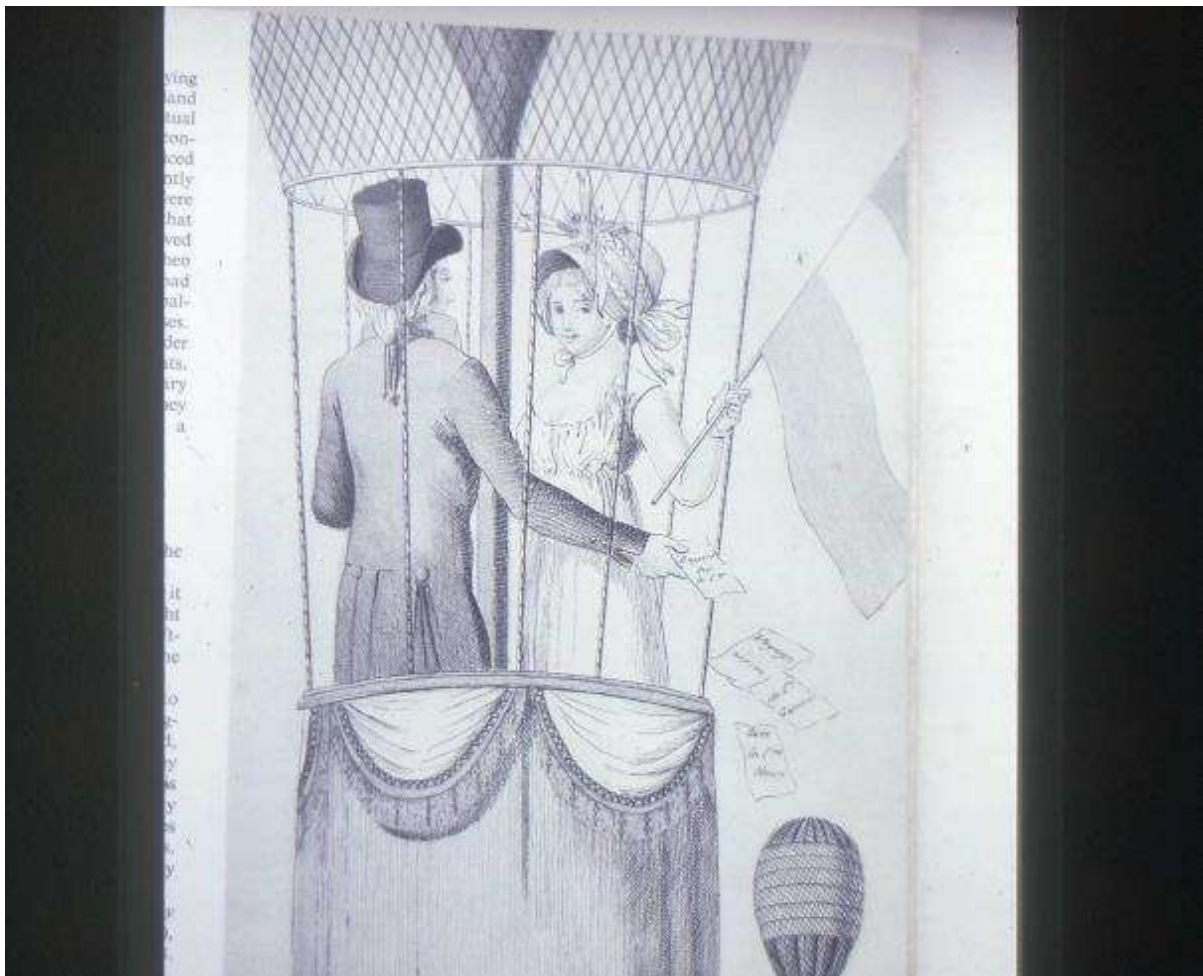


Slide 7

12.

In the latter part of Victoria's reign
ballooning had become a gentlemen's
sport, with the Royal Aero Club being
set up to serve the interests of its
members. Which seem to be well
illustrated in this picture.

Come up and see my belongings
from a height. my dear.

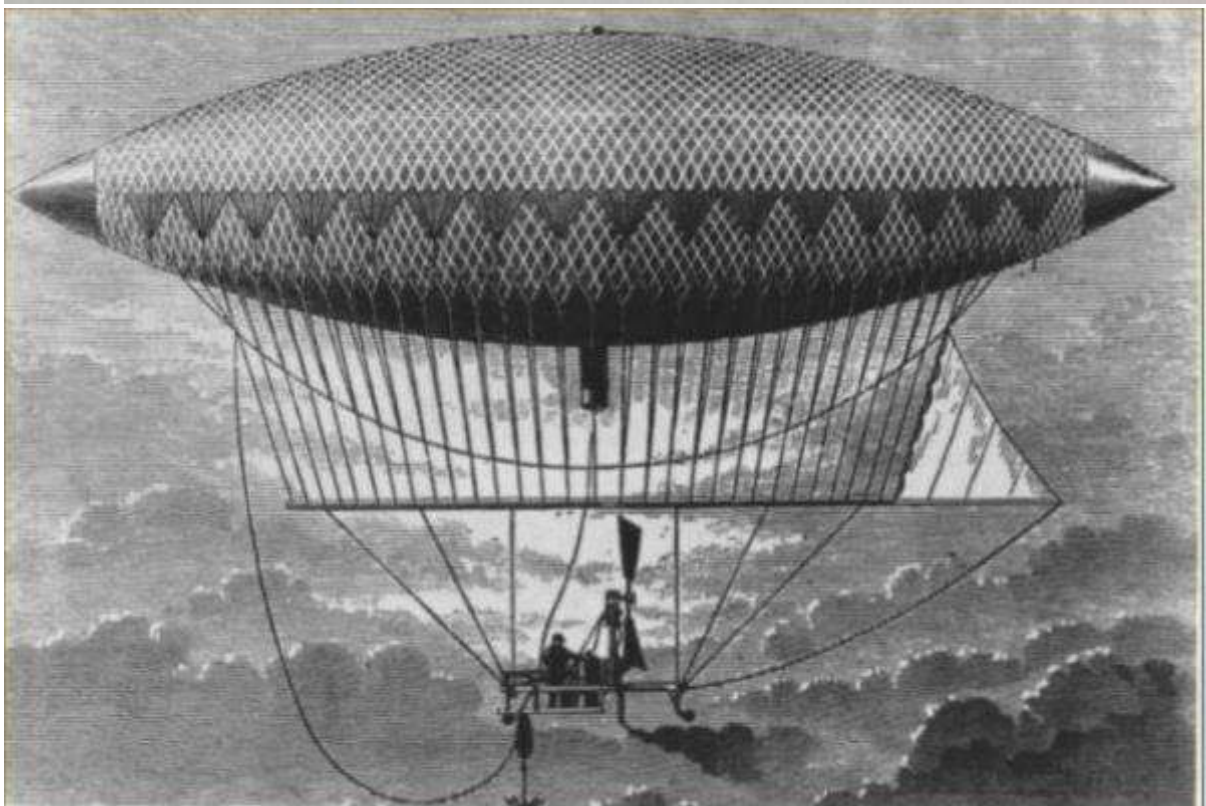


Slide 8

13
Although by the 1850's the steam engine in one form or another had been around for the best part of a 100 years, and had become a highly developed and sophisticated machine, it was by its very nature, an inherently heavy object: completely unsuited as a source of power for any ~~sort~~^{kind} of flight

Nevertheless attempts were made to build a steam plant light enough to do the job. And the picture on the screen shows an Airship built in 1852 by Henri Giffard a well known locomotive Engineer: powered with a steam engine that weighed only 250 lbs. Precisely how successful as a

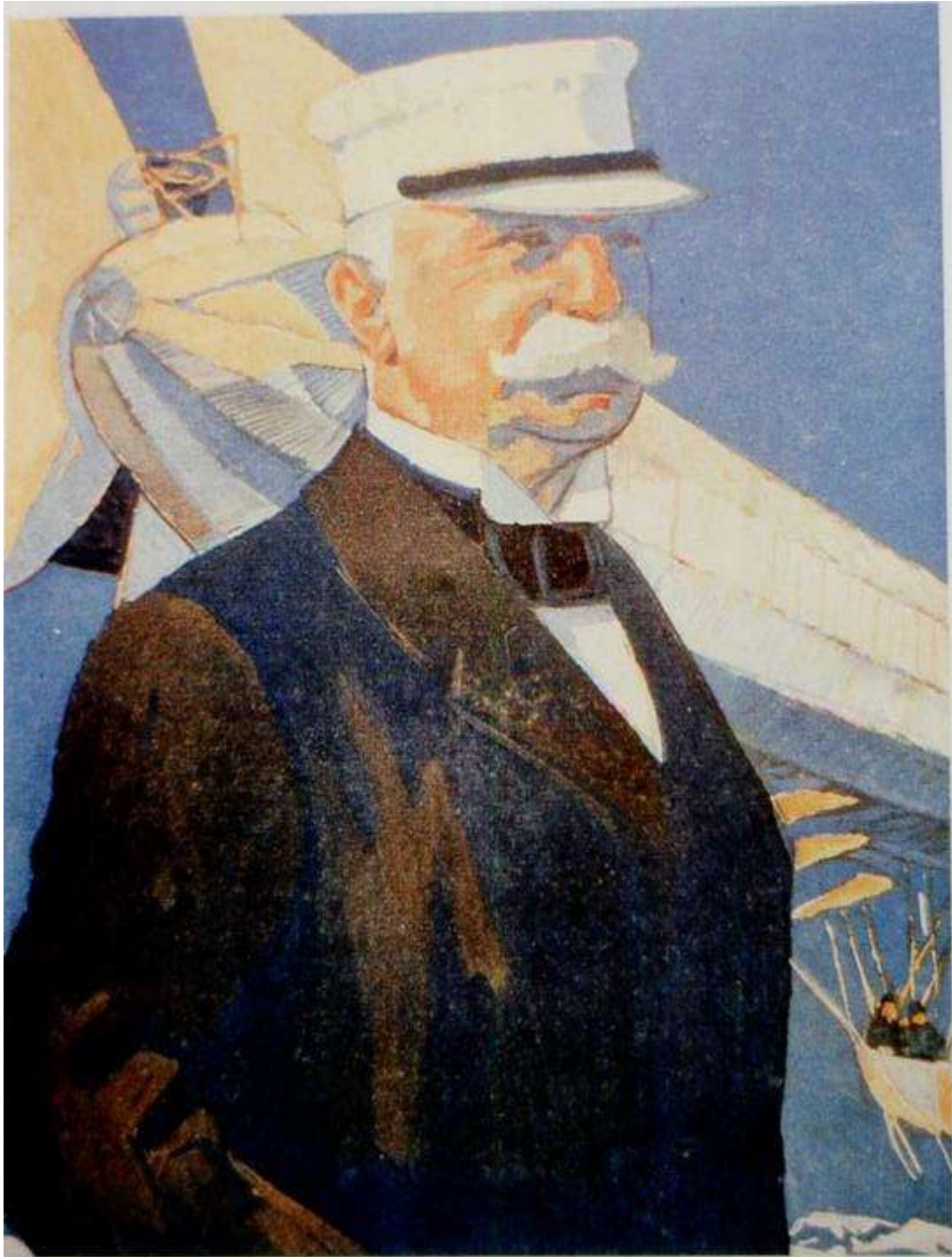
practical flying machine Giffard's Airship was unfortunately is not known



Paul's slide missing. Screenshot from Colin Vosper's copy

15
The next stage in the development of the Airship using internal combustion engines came about as a result of the work of a German Army Officer, Count Von Zeppelin, who conceived the idea of placing a row of small balloons inside a rigid metal framework which could be streamlined and covered with fabric to make a boat or ship shaped vessel, which would be manoeuvrable in the air, like a ship in the water.

14
The answer to the power problem came just ^{over} 100 years ago with the invention of the internal combustion engine which could develop a very high power with very little weight ~~weight~~ and from that moment on not only would the design of airships be different, but the whole history of man would be drastically altered for ever.



COUNT FERDINAND VON ZEPPELIN

This image of Count Ferdinand von Zeppelin has the quality of an icon, something he had most definitely

thirteen, and for a time he was determined to become a missionary. Later, as a young military

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- In the event building this type of craft proved to be much more difficult than expected, but by sheer determination and refusal to be discouraged, Zeppelins had by July 1900 built and flown his first rigid airship. which is seen here flying over Lake Constance, where she was built in a floating hangar.

- During the next few years several more ships were built, each ^{greatly} more superior ^{to} the last, until by the time of the outbreak of the Great War two small airships were regularly and safely carrying thousands of fare paying passengers all over Germany.
-

Needless to say these airships became known as Zeppelins.



Slide 11

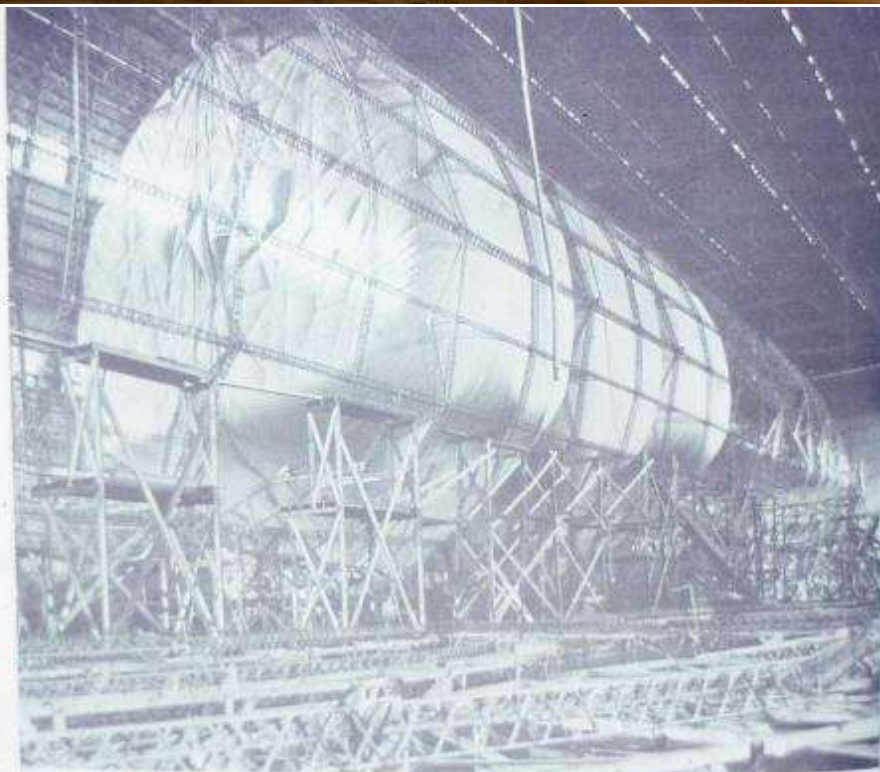
17

Here we see Zeppelins idea of an Auship taking shape

Three small ballons or gas bags are already in place within the rigid metal frame, which will, in due course, be covered with a linen fabric, and painted with a special aluminium paint

Beneath this huge bouyant cylindo will be hung two cars or gondolas containing the engines, radio room and control position ||

At this stage in its development, despite its huge size, the envelope or body of the Zeppeline contained nothing other than gas bags and fuel tanks.

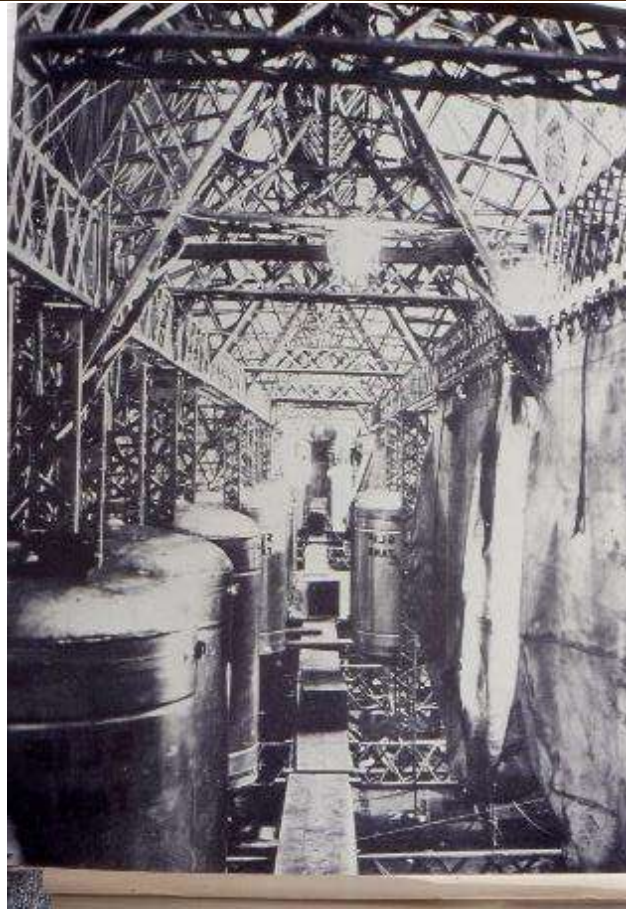


Slide 12

Here we see along the bottom ^{OR} heel of a typical Rigid airship or Zeppelin inside the hull.

On the left are fuel tanks, which are made to be capable of jettisoning in an emergency, and on the right are large subdivided bags containing water ballast, which can be released from the central cor, as required.

Everything else is made to be as light as possible, in particular the forest of aluminum girders which form the structural framework of the hull, and the two narrow footways for the crew.

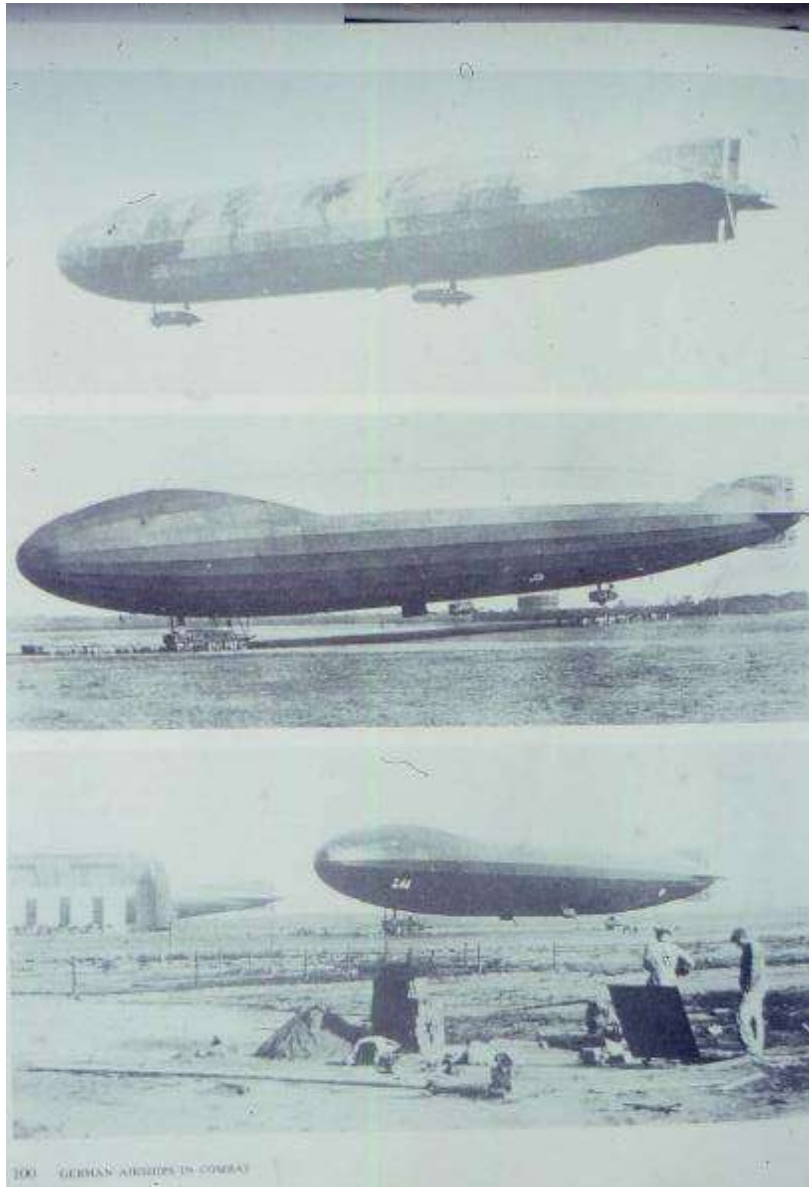


Slide 13

19

Unfortunately the military potential of this new form of transport was quickly realised: and to the dismay of the old count both the German Army: and the Navy began to experiment with Zeppelins for bombing and observation purposes.

During the 1914-18 war nearly 100 Zeppelins were built and took part in offensive action on various fronts: from the England || France || Belgium || Italy || etc.



Slide 14

20

Here we see a typical Naval Zeppelin returning from a raid on English towns in 1915

As part of its limited defense against attack from enemy aircraft, the Zeppelin had two machine gunners stationed on top of the envelope.

As raids usually took place on clear frosty nights one can only imagine how these men must have suffered being carried along at 60 mph through freezing air at anything up to 9000 ft above ground, with no protection other than their clothing.



Slide 15

another

Here we see the full side view of ~~an~~ early Naval Zeppelin about to land at the German Airship base of Norddeich near Bremerhaven, ~~is~~ ~~retains~~ one of a number of bases set up near the German north sea coast ~~retains~~ from where raids on England took place.

The two gondolas holding the engines hanging underneath can be clearly seen, as also the keel of the metal framework forming the main structure over which the canvas cover is stretched and fixed.

The cruciform shape of the control surfaces at the tail are somewhat similar to those of a

modern dart

These ships contained about a million cu ft of lather hydrogen, and could fly at about 60 mph.

Fig. 1.75 (production number LZ 40) was hoisted at Norddeich and became stranded at Hook Deep, where the crew were taken aboard.



lead ship, took part in the fourth Goetzlander Attack over England. A total of more than seven hundred hit London, Middlesbrough

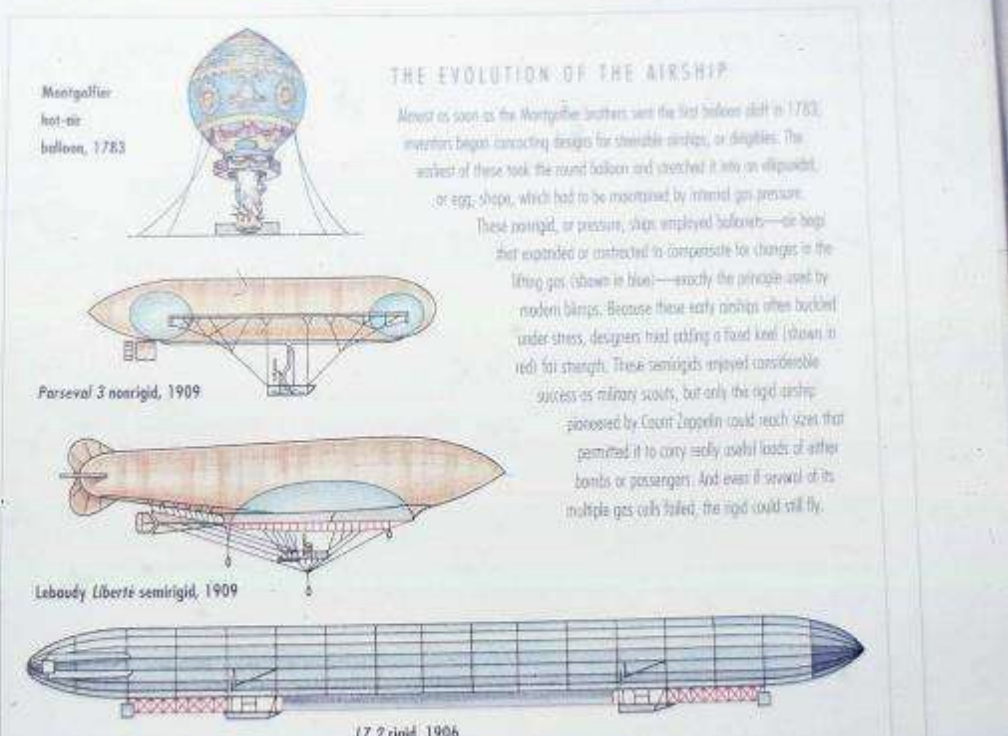
the city centre was lit up as if in gas attack. After passing Regent's Park the crew began dropping bombs near High Dobson - an altitude of about 7,000ft.

Here we see a diagram showing the evolution of the Zeppeline, or as they became known in Britain the Rigid Airship: Hence the prefix R. First the simple hot air balloon of 1783. Next the elongated balloon. Followed by the streamlined non rigid but mechanically powered airship. And finally, the true rigid airships of Count Zeppeline.

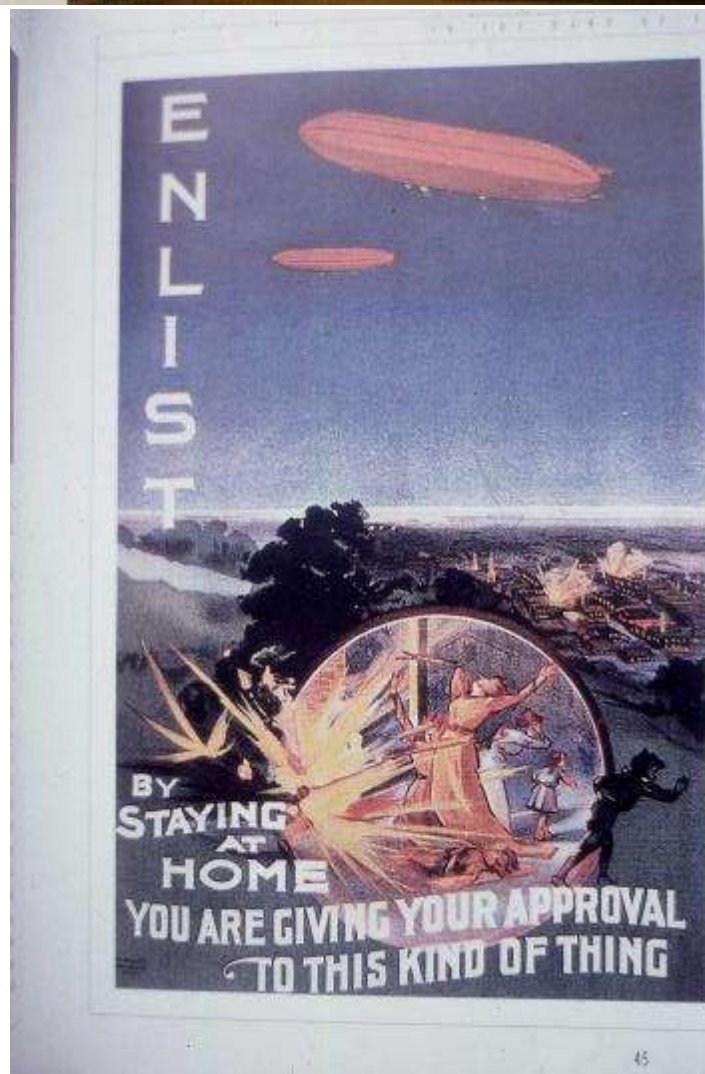
This diagram also illustrates how very large this form of flying machine was beginning to ~~become~~ get.

My second airship was built by me, and to his great contrary began to build a one by Pierre and Paul. The *Leboudy I*, had 2, setting endurance rare semirigid airship, depended on internal clope's shape, but had th. Airship historians the first truly practi-

ly to fly. But her first had to be aborted please, dragging her naging the steering's second attempt, on off the lake. But at much ballast and the set. Hit by a strong then came violently oling system for the vent dead. Then the wind now blew the ip, careening along red, northward



23
Although the Zeppelin raids on England did little in the way of material damage, they were a very effective terror weapon on a population that had always felt secure on their island, and caused the birth of a great deal of anxiety (as to begin with there was no means of combating ~~it~~ this form of attack). Although it was turned to use in the propaganda department as the contemporary poster shows



Slide 18

The answer came in 1916 with the invention of the incendiary bullet, which was able to set fire to the huge bulk of the highly inflammable Zeppeline once an aeroplane could get within range

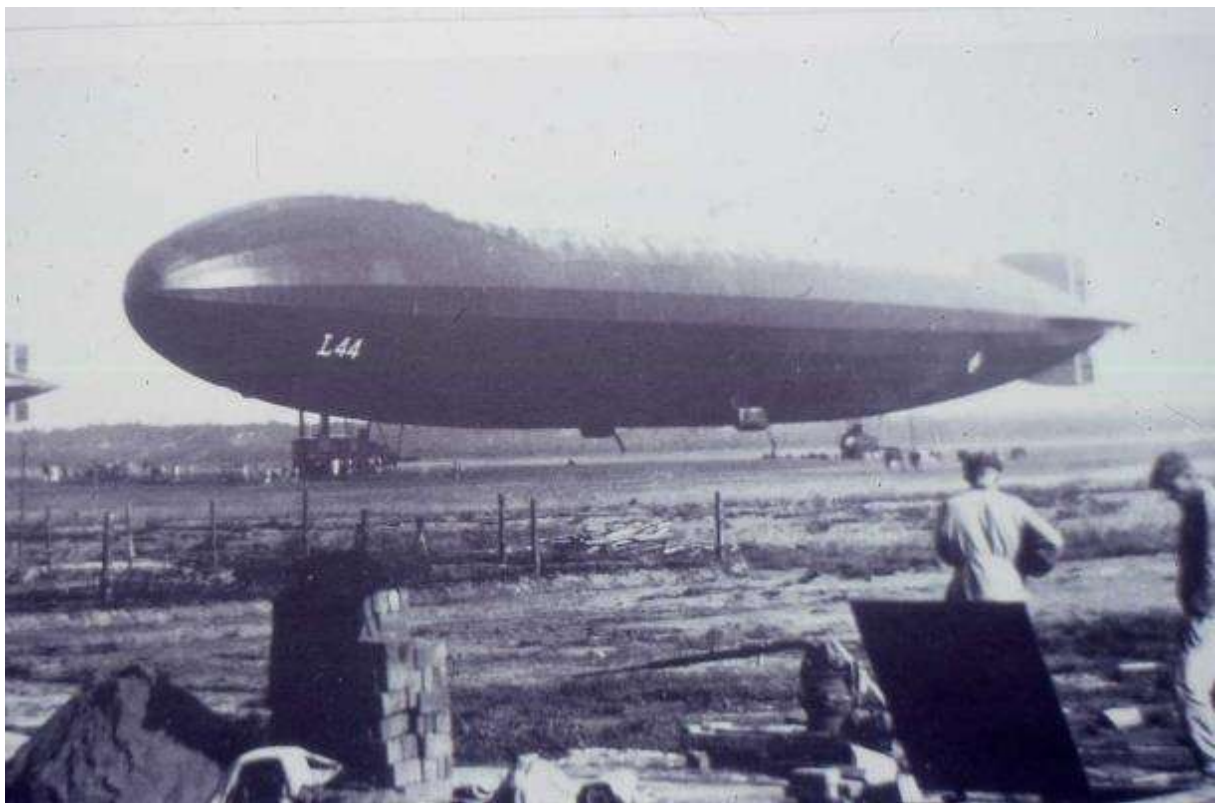
The airmen who shot down Zeppelins became national heroes, like Capt. Hef-Robinson shown here. ||

As can be imagined it was a terrible death for the Zeppeline crews, who were unable to take parachutes because of the weight factor, and were faced with the choice of jumping to their deaths or burning in the air. ||



In destruction of the Z-77 on September 3, 1916 (above), the

25 ●
In an endeavor to outfly
the defending aeroplanes ^{in 1916}, the Germans
produced the super-Zeppeline, an
height climber which could and
did ~~fly~~ fly in excess of 20,000 ft
an enormous height for those days
and terrible for the crew, who had
neither closed cockpits, ~~or~~ oxygen,
and who often passed out and died
of frostbite or brain damage.
But in the end the result was always the same.



Slide 20

This picture which is now in the Royal Aero Club, and is ~~of~~ of course apocryphal, as no Zeppelin raids could take place in daylight, shows graphically the terrible fate that befel so many German airman.

There are many accounts of Zeppelins being shot down in flames during the war, as the burning of a million cu ft of hydrogen high in the sky could be seen from miles around, and terrifyingly to the crews of other Zeppelins maybe 40 or 50 miles away.

Very few crew members survived being shot down and all are now buried in a special German War cemetery

near Derby.



Although a failure as a weapon of war: the Zeppeline had demonstrated that it could fly long distances carrying substantial loads in varying climates: and in this respect the voyage of the Zeppeline L 59 is ~~with~~ ~~significant~~ significant.

During the 14-18 War the Germans had a small beleaguered force in what was then German East Africa: which was running out of essential supplies.

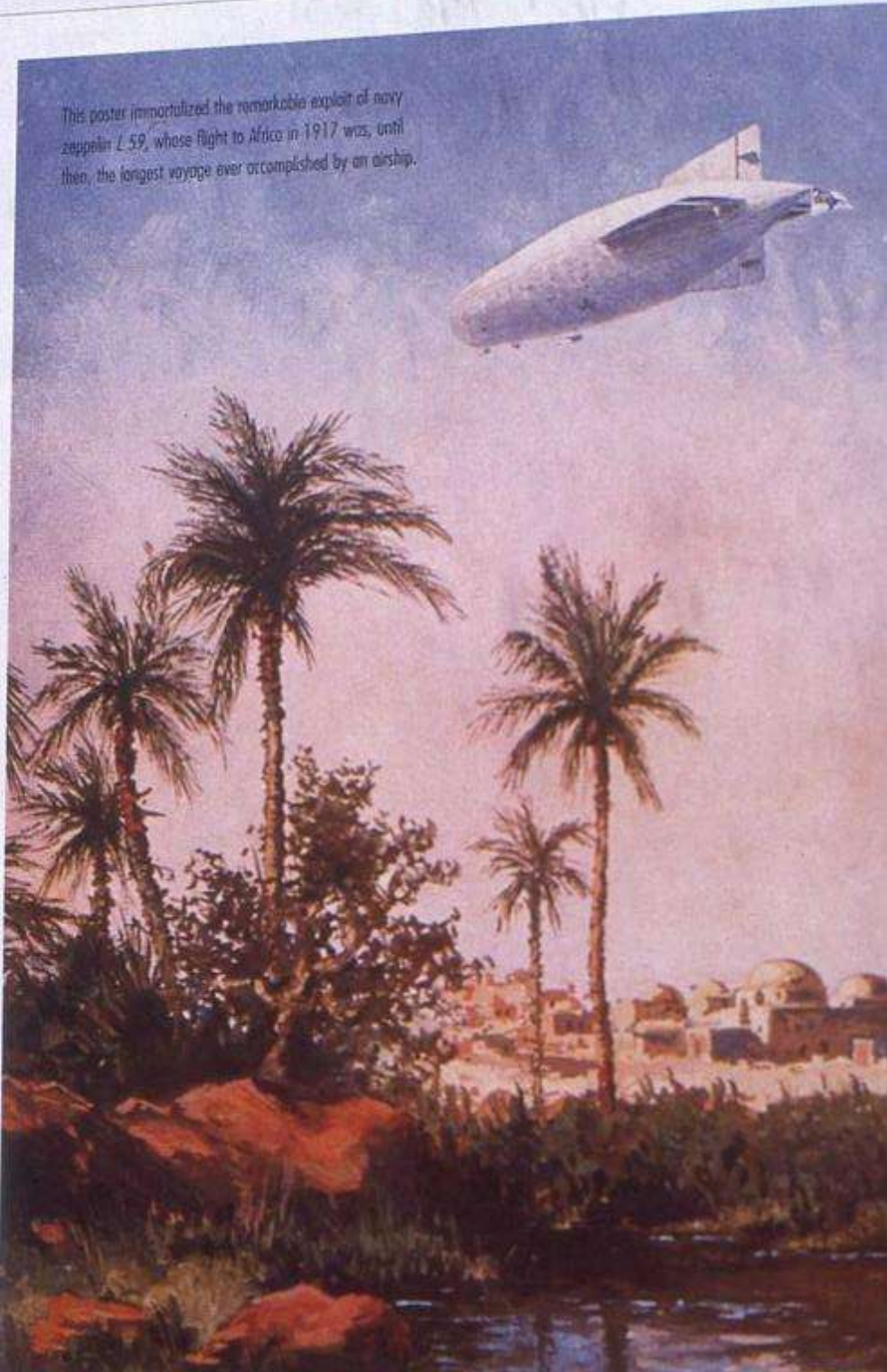
Relief by land or sea being impossible they lengthened one of their standard Zeppelines: covered it with cloth which could be made into uniforms: loaded it up with

ammunition, guns, medical supplies, food; and sewing machines: and sent it off via Turkey to Africa. where it flew half way across the Sahara to its destination: before being turned back by a late British intelligence message, saying that the German force had already surrendered.

On its return to Turkey the airship had flown no less than 4230 miles non-stop: an extraordinary achievement for the time: and one that set mens minds working in terms of its future potential as a long distance carrier.

H I N D E N B U R G — A N I L L U S T

This poster immortalized the remarkable exploit of navy zeppelin L 59, whose flight to Africa in 1917 was, until then, the longest voyage ever accomplished by an airship.



Slide 22

28

So now we come to the end of the Great War and the start of the Twenties, and must ask what was the state of aviation flying at that time.

To get the picture in perspective we must remember that we are barely 20 years beyond the very first aeroplane, which was built by the Wright brothers and flown by them at Kittyhawk in ~~Kentucky~~ Virginia in 1903

Here we see it flying in Europe



ABOVE CAPTAINS AND KINGS

AIR SERVICE

For instance ~~the~~^a regular daily ~~services~~
from London, Croydon, to Paris, Le Touquet,
~~to~~ ~~which~~ had just been started, ^{and} looked
like this.

An old Gout surplus wartime
biplane with a little cabin for
3 or 4 people built into the fuselage
and the pilot sitting in an open
cockpit up front.

where it had been brought on a
demonstration tour.

Although the Great War had stimulated
all forms of technological development
to an enormous degree, particularly
flying. It was still very primitive indeed
compared to what we take for granted
to day. And at the time aeroplanes were
not seen as serious rivals to ships
in terms of aerial transport



Slide 24

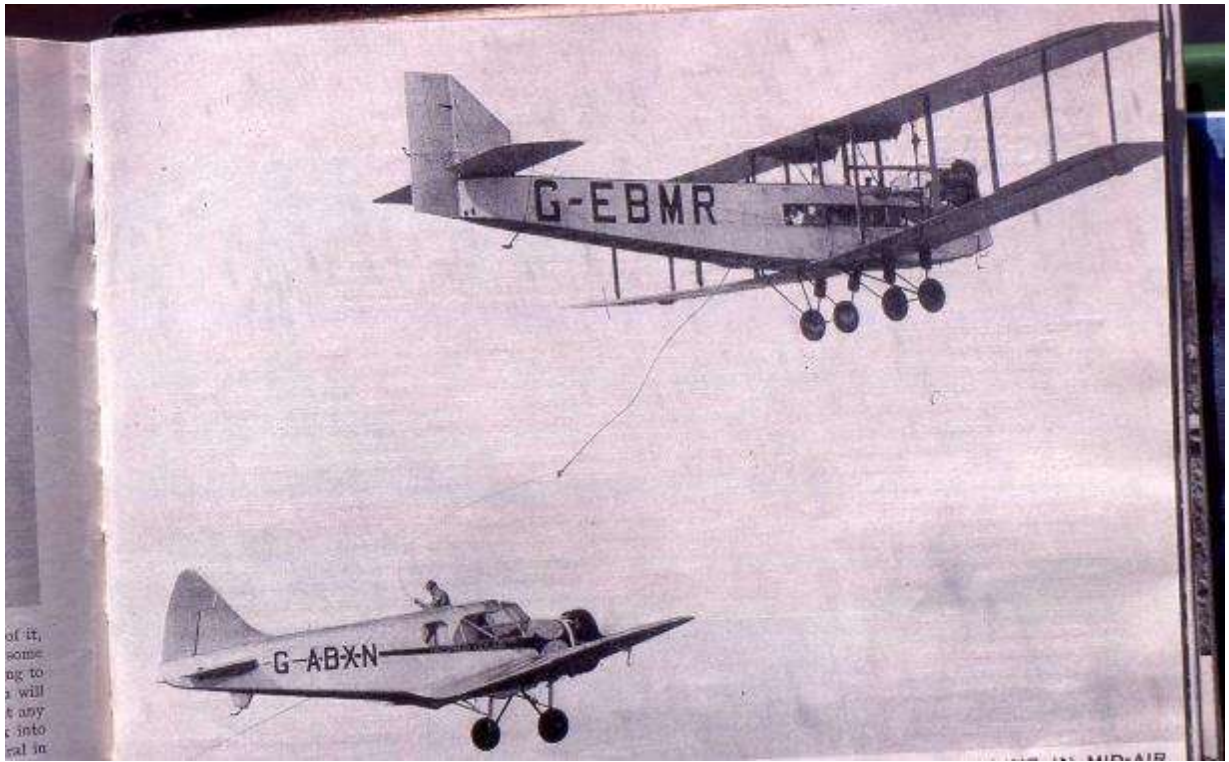
He got to Paris by following the L.P. & S.C. railway to Redhill junction turning left and following the S.E. & A.C. line through Tonbridge to Dover. ^{from here} Hopefully on a clear day he could see Calais tower Hall clock tower, ~~from here~~, and once Calais was reached it was easy to follow the direct railway line to Paris. Foggy days were a problem. and 21 miles over open sea a very real risk.

For the really sophisticated air line
like this ~~is~~ the Hony Page Argosy 30
which could carry 30 passengers
in some degree of comfort in a
pressurized cabin at 80 miles, we know
the intrepid traveller of 1920 would
have to wait another 9 years.

Even this airplane would be
based on a wartime bomber design

and the pilots would still be in an
open cockpit at the bow of the aircraft.

This picture which actually was taken well
into the thirties when the Argosy was outdated
is interesting in its own right as it shows
an early if not the first attempt to refuel
an aircraft in the air. The gentleman
standing up in the small plane has managed
to grab the weighted string lowered from the
Argosy and is pulling the hose down. One
would love to know what was going on up top
maybe a funnel & a jug!



Slide 25

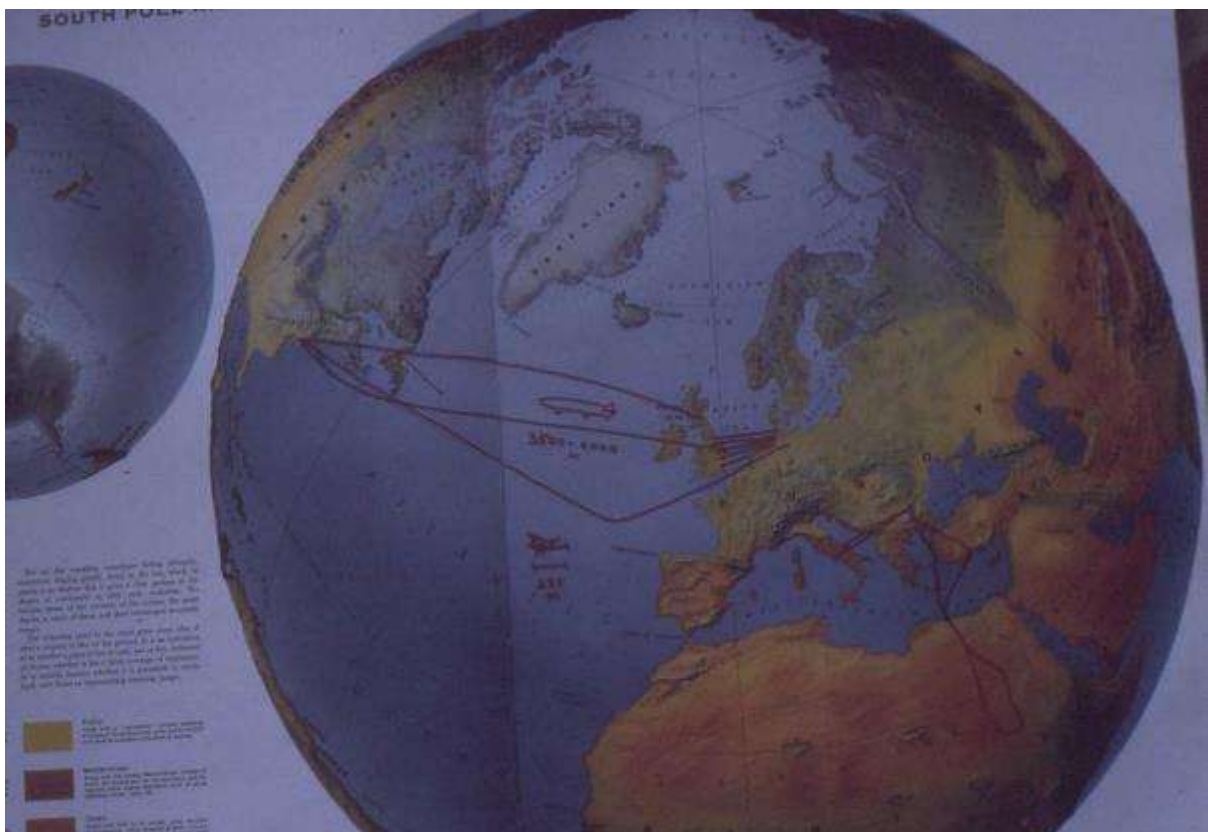
POOR MAP AIRSHIP FLIGHTS.

31

Bearing in mind therefore the still primitive state of air travel at this time it is easy to understand why Airships compared very favourably with the alternative Aeroplanes.

This map in fact demonstrates very graphically the much greater range of the former to which can be added their capacity to carry heavy loads.

It will be noted that in addition to the epic flight of the L59 across the Sahara during the war, there had by 1920 also been three successful crossings of the Atlantic by Airships, ~~two~~ two of them against the prevailing wind



Slide 26

32 $\frac{2}{6}$.

When therefore the question of improving communications within the ~~the~~ far flung British Empire came before Mr Ramsay MacDonald's first Labour Govt. It was quite natural that the use of airships should be put forward, and a generous budget approved for research and development in what was to become known as the Imperial Airship scheme.



The Cabinet - The Prime Minister, Mr James Ramsay MacDonald with his second Labour Cabinet at No. 10 Downing Street. Mr MacDonall is flanked, on his right by Mr Philip Snowden, Chancellor of the Exchequer and on his left by Mr Arthur Henderson, Secretary of State for Foreign Affairs. The Right Hon. William Wedgwood Benn, Secretary of State for India is 'outside left' (seated on the right of the photograph) and Lord Thomson of Cardington behind Mr Snowden with the first woman Member of the Cabinet, Miss Margaret Bondfield, Minister of Labour, on his right. (PLATE IV)

~~which was~~

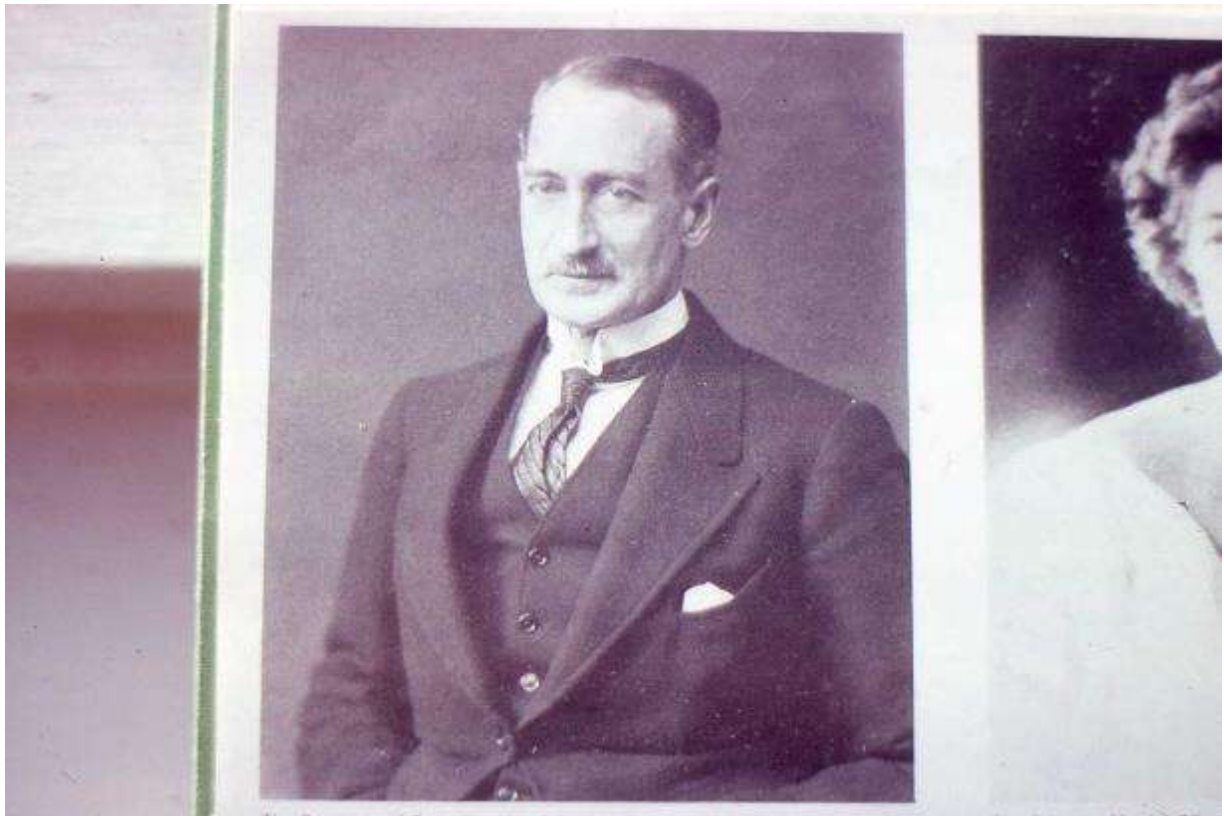
The idea of the scheme was to build a number of long distant Airships and establish a network of Airships Stations or bases throughout the Empire which would shorten the journey time and generally improve communications And in particular speed up the mails.

~~Here we see~~

~~Lord Thompson~~

32 5
A leading light in Ramsey MacDonald's Labour Govt was Lord Thompson of Cardington. A brilliant Career Officer in the Army who had been raised to the Peerage to enable him to serve in the Cabinet.

He was an Airship enthusiast and it did much to push forward the Imperial Airship scheme. Sadly he was to perish in the crash.



Slide 28

Although he was an Engineer
in the military sense, viewing all
the evidence at this length of time
suggests that he had only a rudimentary
idea of the technical details of airship
construction and flying, and that this
ommission was a contributing factor to
the tragedy that was to unfold.

34

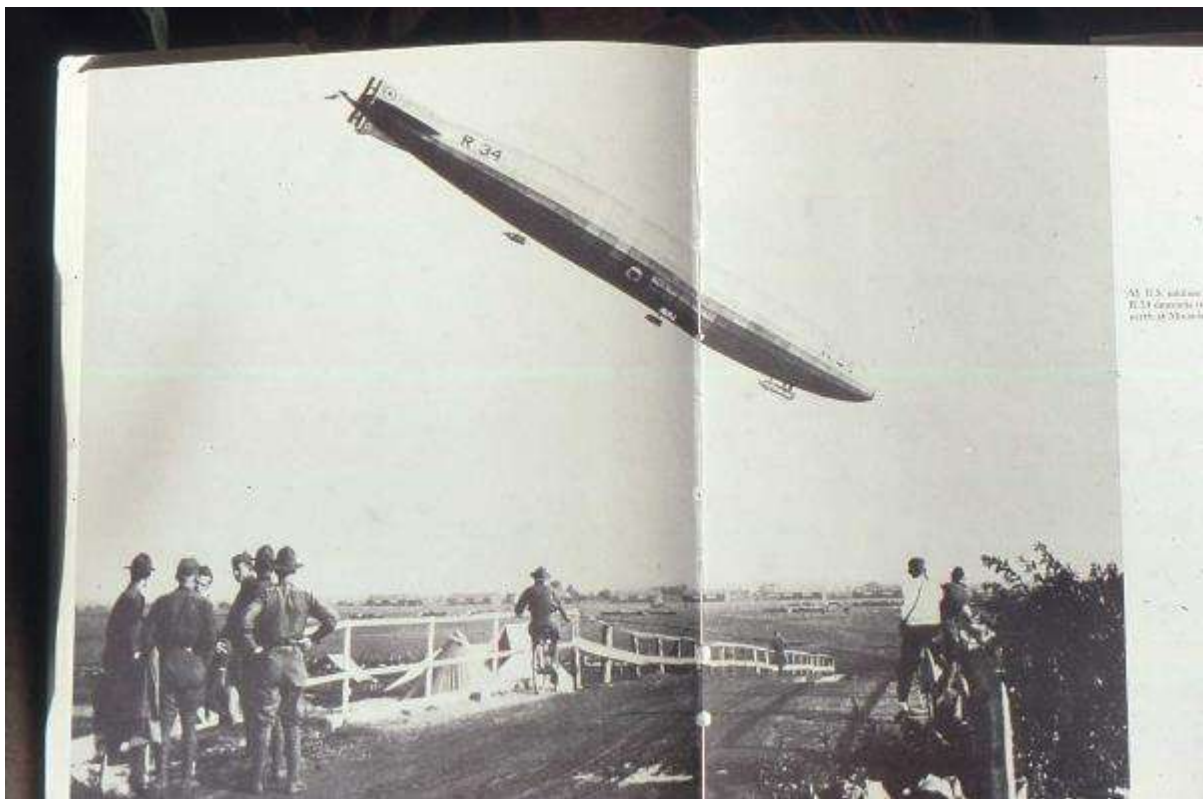
As we have seen by the end of the first World War Germany had built ^{nearly} more than 100 rigid airships and had more experience than anyone else in this field.

Great Britain on the other hand had only built 12 ships to its own design, none of which were really successful and all of which were of really inferior to those of the enemy.

The British had however built two ships the R 33 and R 34 which were copies of the Zeppelin L 33 which had fallen into their hands more or less intact.

Both these airships performed well and both in their own way made aviation history.

The R 34 shown here landing at a military camp near New York in the summer of 1919.



Slide 29

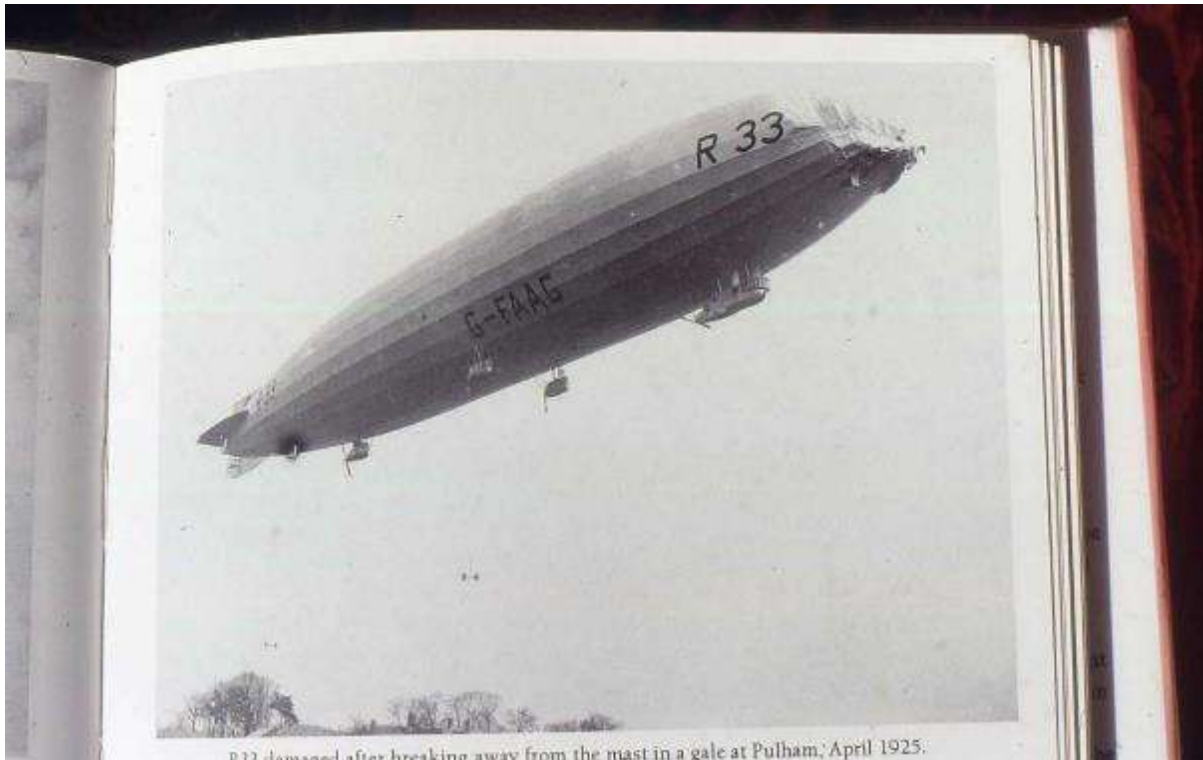
was the first aircraft to fly the Atlantic

leaving East Fortune in Scotland on July 2nd she reached N.Y. on the 6th, where she stayed until the 10 finally arriving back at Pulham in Norfolk on the 13. of July after a round trip of some 6000 miles

A fine model of this airship for many years hung in the main departure lounge at Heathrow airport. which some of you may have seen.

35

The R.33 her sister ship hit the headlines in 1925 when she was torn from her mast at Pulham by a violent storm, and blown across the North Sea to Holland. From where, with only a maintenance party on board, she was, against all odds brilliantly nursed back to her base and safely landed, by a young Officer Fl. Lt. Booth.



R 33 dived after breaking away from the mast in a gale at Pulham, April 1925.

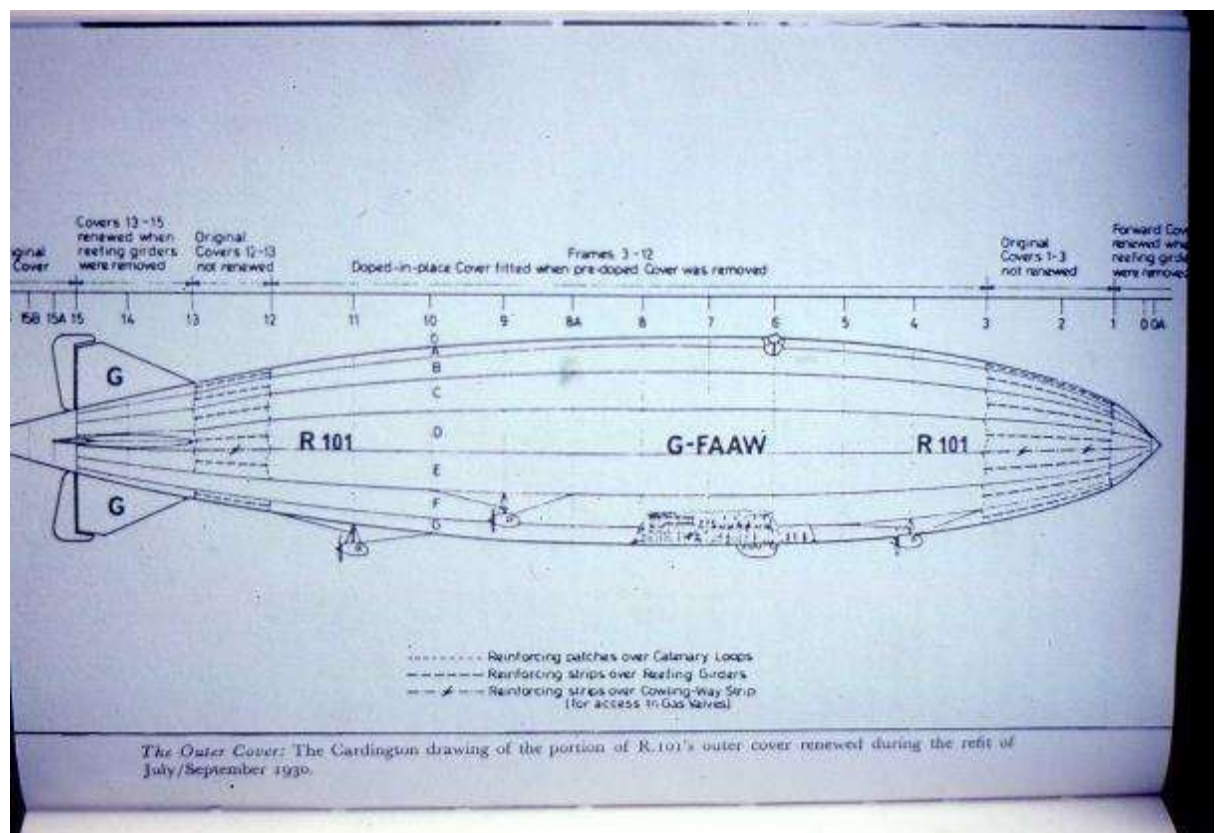
36 ●

Notwithstanding however the success of the two airships built to German design, when the time came to start work on the new Empire airship the British design team appeared to have turned their backs on the accumulated experience of Germany, which was freely available, and start again from first principles, a policy that was to cause them a lot of headaches and problems in the future.

Their task was to design and build an airship capable ~~of flying to a schedule in all normal weather conditions~~ ~~of flying to a schedule in all normal weather conditions~~ of flying to a schedule in all normal weather conditions carrying a paying load of passengers or freight over long distances, at a speed equivalent to twice that of the fastest passenger ship then in service.

37

The new ship would be designated R 101
R for Rigid, and 101 because 100 had
already been given to another large
Airship being built commercially by
Vickers Ltd, under what was known as the
Buney scheme which I will mention later.



Slide 31

Meeting these requirements gave rise to the following specification.

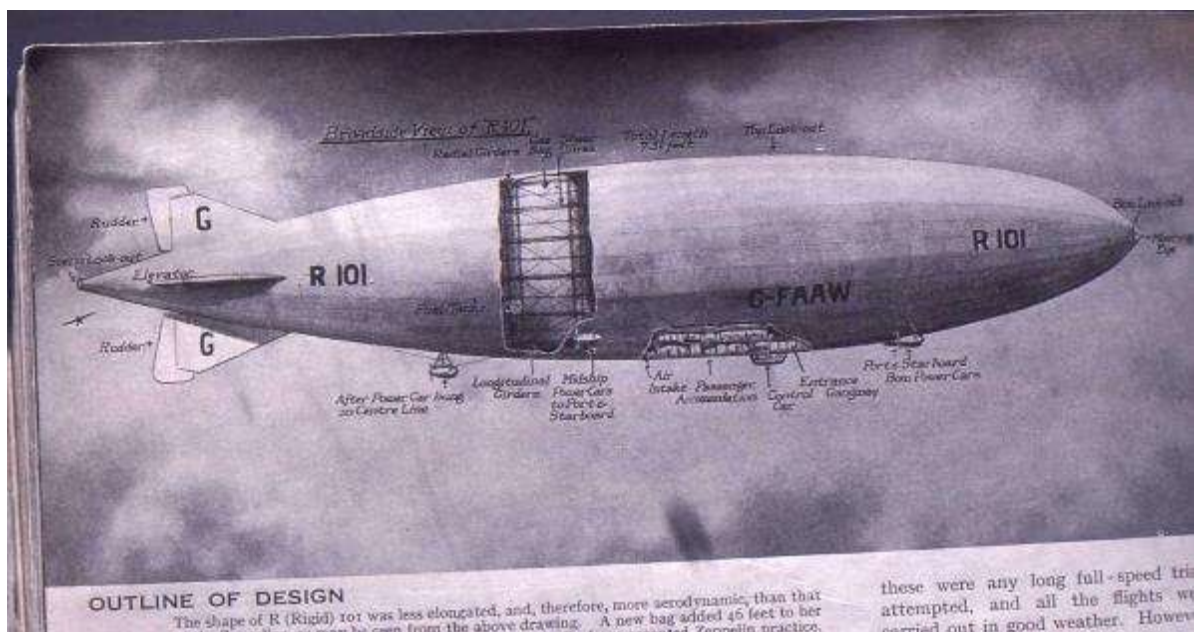
The ship would have to be capable of lifting a payload of 63 tons of freight, or 100 passengers housed in accommodation comparable with that of a steamship. Be able to fly 6000 miles without refuelling, and at a speed of 55 mph.

To achieve the foregoing the R101 would have to contain 5 million plus cubic feet of hydrogen to provide sufficient lift and this would make her 719 feet long, and 138 high at her middle point.

She would also need five engines to push her

through the air at the desired speed.

The picture on the screen is typical of the many artists impressions which were appearing in the press at the time



39

Here we see a diagram which illustrates the huge size of the R101 and two later Rigid Airships, namely, the Macon built for the US Navy, and Germany's last Zeppelin the Hindenburg both of which finally crashed with heavy loss of life.

For comparison we also see a modern Boeing 747 and the Titanic drawn to the same scale.

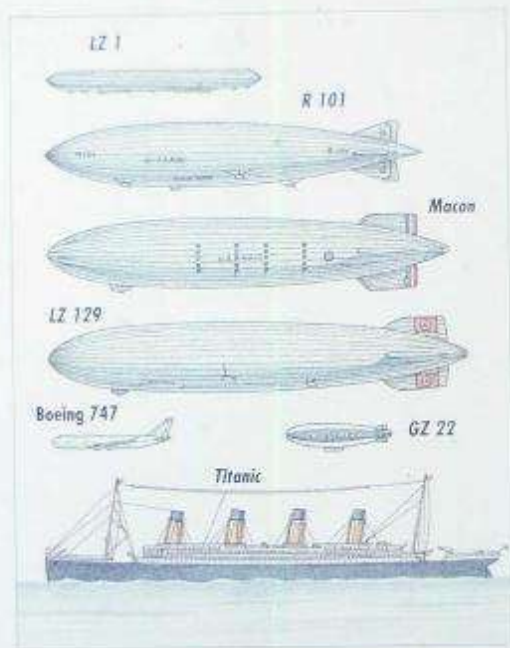
over 5 million cubic feet in gas attenuated version of the Graf, a dirigibles. But then came the filled R 101 in October 1930, and, if any, lives would have been were shelved in favor of the com-

largest aircraft that had ever flown. But, book *Graf Zeppelin & Hindenburg*, "the thoroughly conventional." Ludwig Dürer needs poorly-pooched the innovations they had worked into the *Akron* and the *Macon* on the foundation of the long tradition-

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The Hindenburg (LZ 129) and her sister the LZ 130 were the largest aircraft that ever flew, dwarfing both modern jumbo jets and Goodyear's most modern blimp, the Spirit of Akron (GZ 22). In fact, the Hindenburg was only 78 feet shorter than the 882-foot-long Titanic.

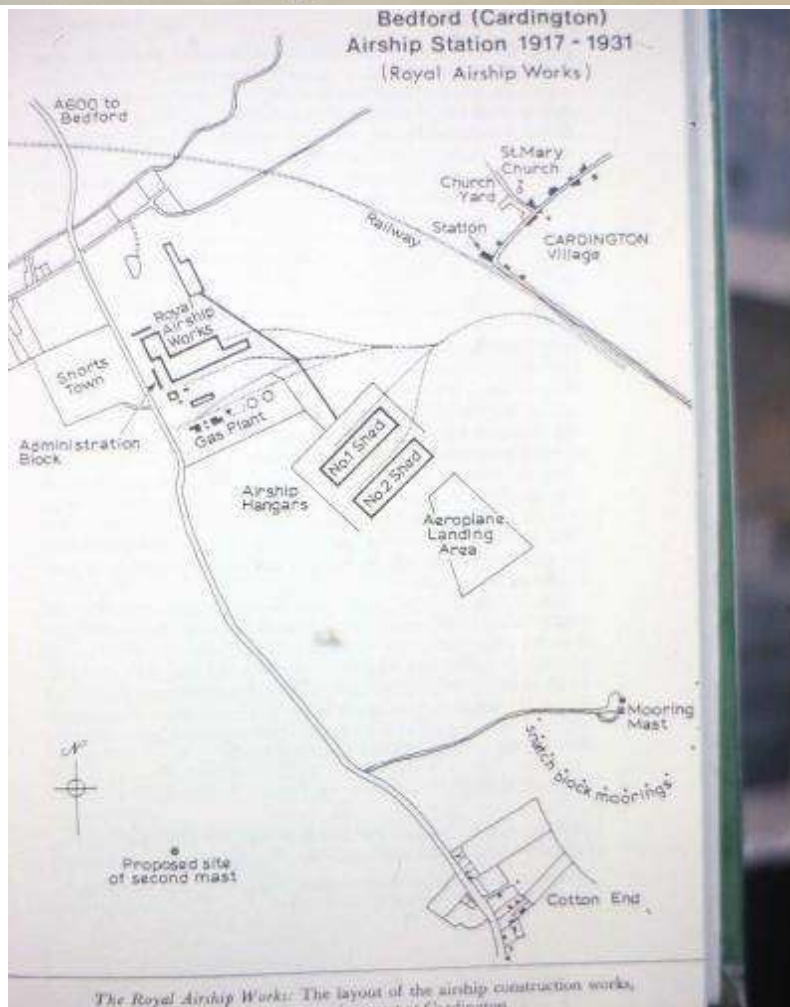
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To build the giant Airships a Works and base was set up at Cardington near Bedford.: which included two large assembly sheds or hangars: Workshops: gas plant: Railway sidings and admin offices: and: most importantly a tall steel tower or mooring mast,

In addition to these buildings a large area of land was acquired for the Airfield.

There was also a model Village set up nearby for the key staff called Shorts Town although at the height of production most of the labour came from Bedford which was only 3 miles away



~~Next one previously mentioned~~ The
mooring mast || ~~The~~ was a British Idea
which enabled an Airship to be moored
safely above ground where it would
be free to swing in any direction
according to the wind || Moored to the
mast it could also safely ride out
rough weather without damage || Something
that was extremely chancy on the ground.

The mast took the form of a steel
tower about 220 feet high and
contained a lift and staircase for the

passengers, gas water and electric ma
for supplying the airship, and a strong
winch for hauling her in.

To get from the tower to the Airship
a gangway was let down in the tow,
which reached to a balcony running round
the top of the tower.

Mooring masts were actually built at
Cardington, Montreal, Ismailia in Egypt
and Karachi in India, and the tower
that tops the Empire State Building in
the centre of Manhattan, was actually intended
as an Airship mooring mast also.

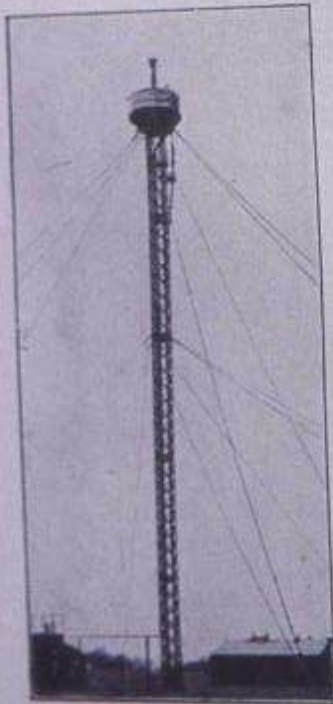


FIG. 4.—The old mast at Pulham.



FIG. 5.—The new mast at Cardington.

These photographs have been reproduced to scale to show the actual relative sizes of the two masts.

[To face p. 590.]

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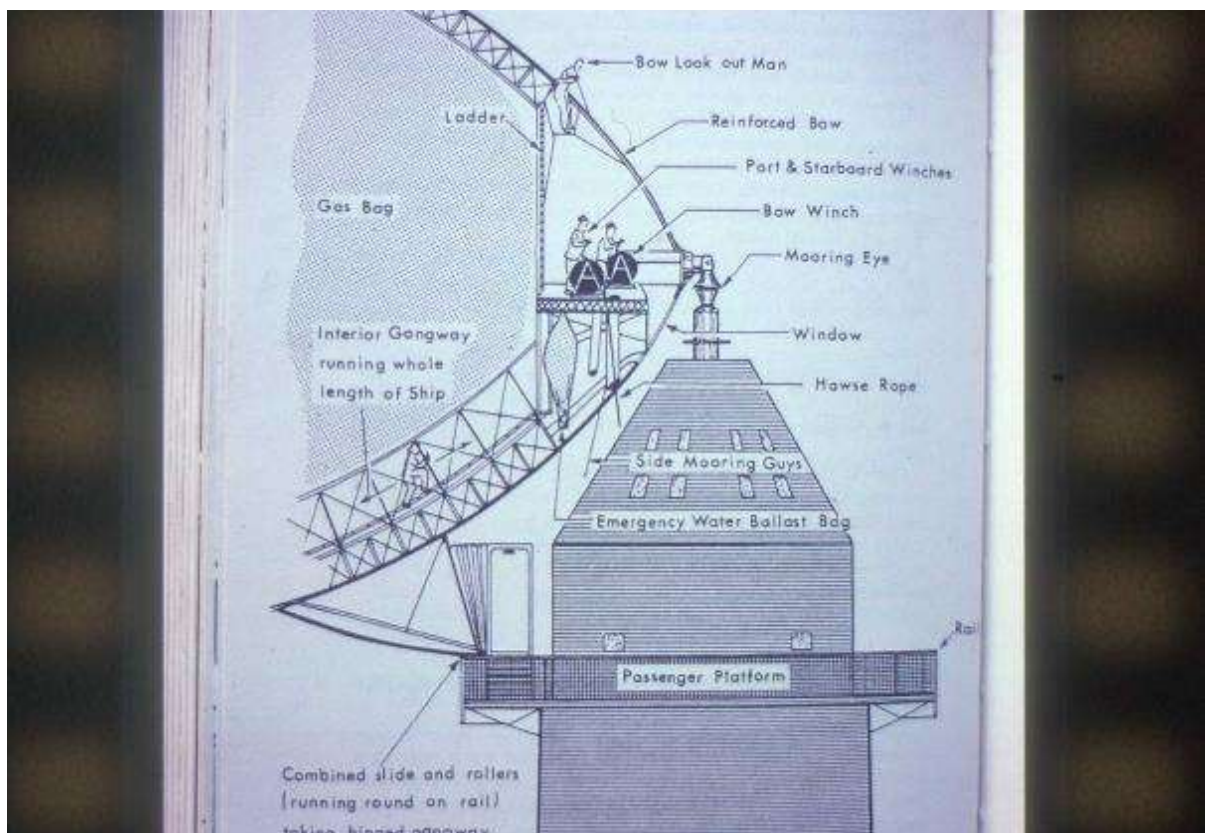
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42
This diagram shows the details of how the nose of the Airship was attached to the top of the tower. And the hairy gangway for the passengers which was let down from within the hull.

On coming down to be moored the Airship would first drop a wire from its nose, which in turn would be attached to one from the top of the tower after which both wires would be wound in until the bow could be coupled directly to the tower. Although this sounds simple and straightforward, it took nearly 40 minutes to achieve.



Slide 36

~~R101 at mast~~

Jumping ahead a bit here we see the mooring mast in use, and the passengers walking up the rather flimsy gangway without much protection. As this was going on some 200 feet above the ground it must have called for fairly strong nerves.

A good idea of the size of the airship can be gained from this picture.



PASSENGERS' ENTRANCE TO R101

When R101 was moored to her Cardington mast—200 feet high, and equipped with a lift and staircase—the passengers and crew entered and left the ship via the mast itself. Above is a party of M.P.s entering the mooring mast is shown in page 166

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Here we see a close up of the ~~actual~~ passenger gangway and steps at the top of the tower in use.

The man with the book is actually standing on the gangway which was let down rather like a drawbridge from the bow of the ship, whilst the 3 men are standing on a short flight of steps and a small landing which travelled round the top of the tower, with the ship, on the curved rail which can just be seen top right. The weight of everything going on board had to be carefully checked and loaded before each flight.



Slide 38

45

The R101 was to be built by a Government sponsored company called the Airship Guarantee Company, and the contract was signed in October 1924, with completion in 1929.

Here we see the ship under construction and beginning to take shape in the shed at Cardington.

The main aluminium framing is complete and one of the huge Gas bags is in position and inflated.

Several fuel tanks can also be seen and the level floor of the passenger accommodation stretching across the hull is also evident.



Slide 39

Unfortunately as work proceeded numerous problems began to manifest themselves, all naturally unforeseen, and many relating to the basic design itself which seriously threw into question the wisdom of departing in such a radical way from the tried and tested system used in the Jeppins.

As the work dragged on Politics began to creep into the picture with questions being asked about the ever increasing costs and the apparent slow rate of progress.

There is no doubt that the engineering staff at

Cardington were in a very unhappy position for most of the time being faced by circumstances to make makeshift modifications when the proper course should have been to make major alterations to the design or possibly even start again.

~~in on ed~~

47

The pressure on the staff at Cardington was also increased at this time by the emergence of the R100, which had been designed by Barnes Wallace and built by private enterprise in Yorkshire.

In many ways a far less sophisticated and attractive ship than the 101 it nevertheless succeeded in making a round trip to Montreal, and in so



Slide 40

~~Swains at Beauvais~~

doing attracted a great deal of publicity, which in turn reflected badly on the work going on at Lardigan as the R101 to an outsider seemed to be doing nothing, when it should have been emulating its rival.

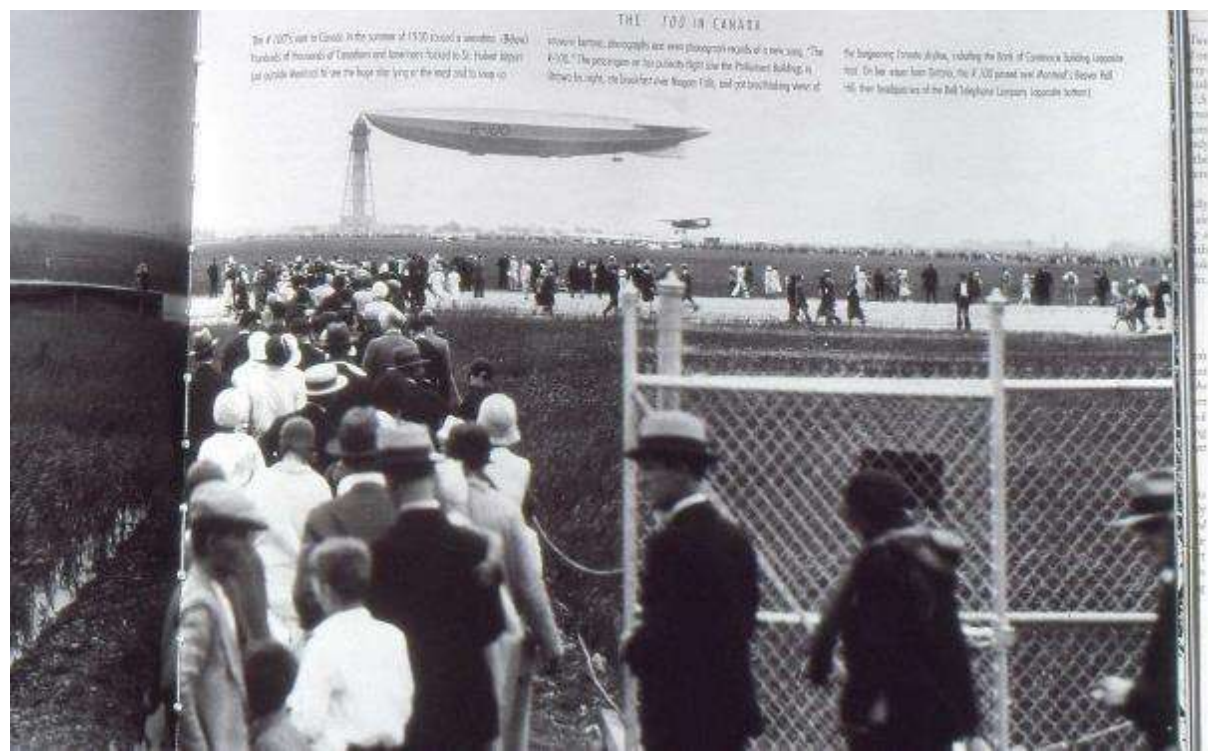
~~However we now know that R100 did just about as ma~~

48

Here we see the R 100 on the mast at Montreal, where she attracted a great deal of interest, and where the fact that she barely made the journey was kept quiet.

In reality, not only had she lost the use of one engine, but had suffered quite serious structural damage to the tail.

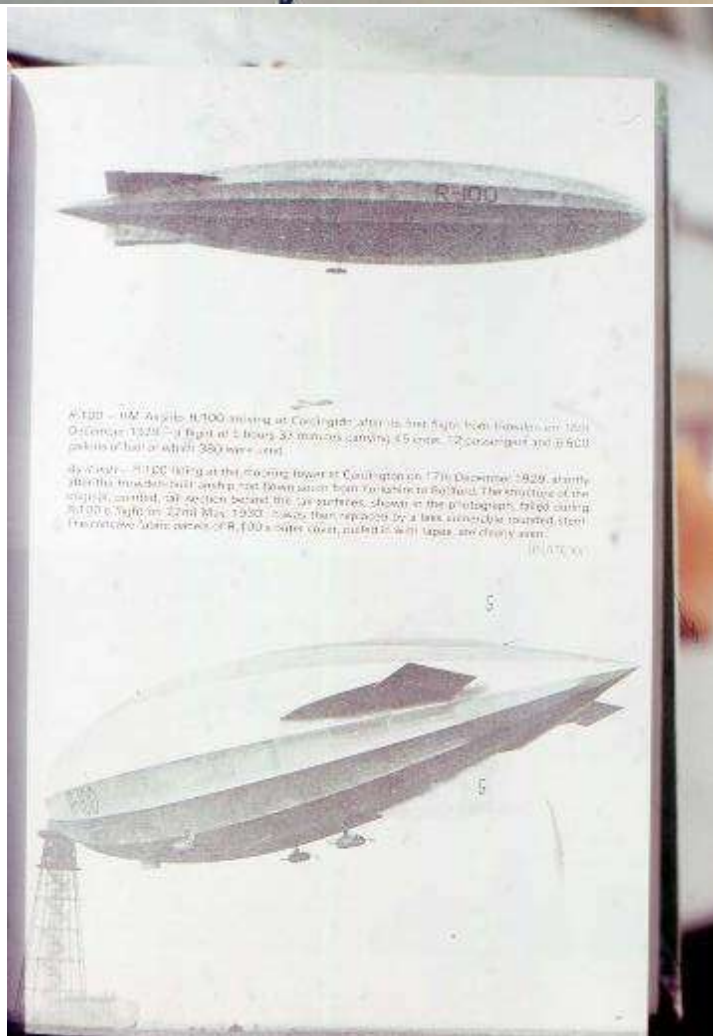
Setting off back home again was a calculated risk, which happily came off, the round trip being hailed as a great triumph for ~~the~~ British Airships.



Slide 41

However we now know that the R 100 had just about as many problems as the R 101, which in fact led to her being immediately grounded upon her return from Canada.

It must be remembered that both ships were quite unlike anything that had gone before, and in this respect were in reality experimental, which unfortunately was not realized by the public or the politicians who looked upon them as the finished articles, ready to be put to the work that they were intended for, the moment that they came out of the works.



Slide 42

The final blow to the morale ^{at Cardington} ~~of the engineers~~ came when the ship was completed and ready to be taken out of the shed. when it was found that she came nowhere near to meeting the design specification in that she could only lift a mere 31 tons against the 63 tons specified, so being the ~~the~~ amount of lift needed to get to India and back.

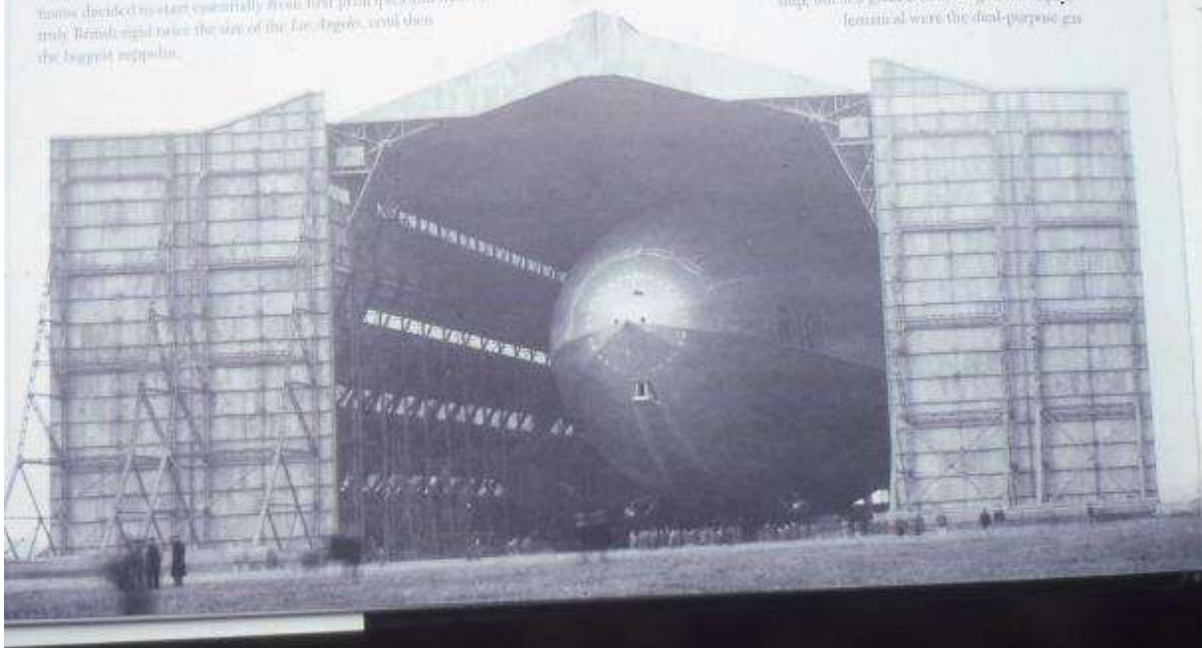
A desperate rush was now made to lighten the ship taking out many refinements and virtually all non essential items.

Somehow however this final ~~the~~ headache ~~was~~ and the other problems were ~~consequently~~ kept from the Public and Whitehall and when finally the huge doors of the hangar opened prior to

her being brought out, all who saw her great silver shape glinting in the sunlight were filled with admiration and a glow of national pride

ing on a development without ever having built a house. A more German, the British lacked a deep tradition of rigid airship construction. Most of their earlier airships had been copies of German designs. Both teams decided to start essentially from first principles and build a truly British rigid, twice the size of the *Zer* rigids, and then the biggest rigid yet.

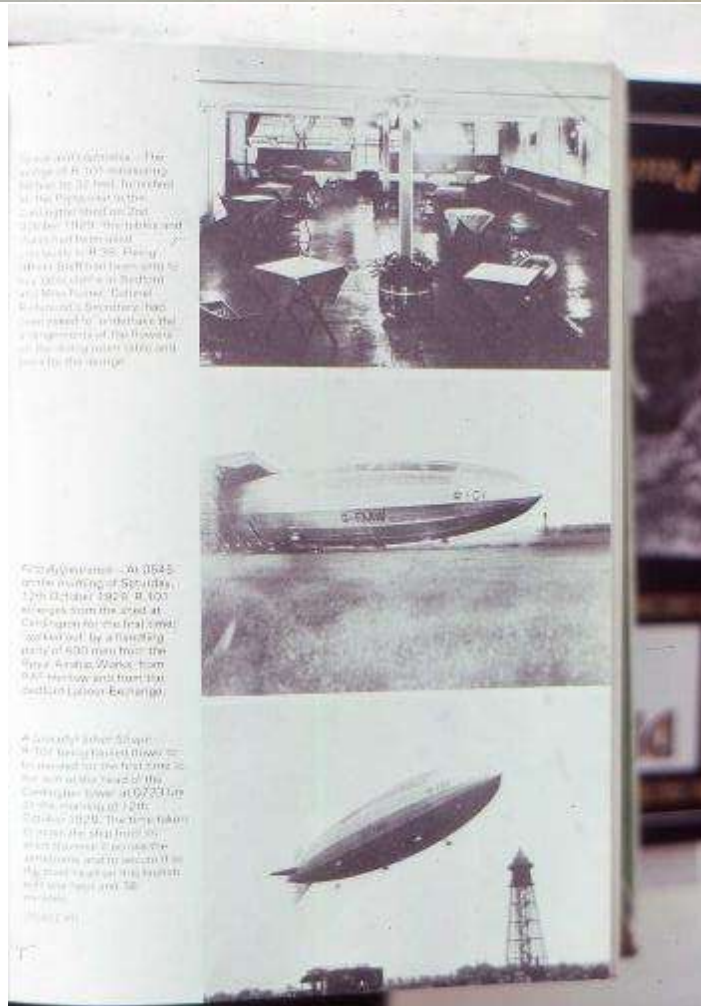
At the Royal Airship Works one experiment was the use of massive steel in the *R 101*'s main girders— heavier than Dornier's but definitely stronger. These produced a structurally stronger ship, but at a great cost in weight. More experimental were the dual-purpose gas



To actually get the Airship out of the shed without damage took the entire efforts of 400 men who took hold of her underside and literally walked her out until she was clear of the building.

An intensity of labour which would be quite unheard of today, and which even then showed up the impracticability of big Airships.

The middle picture shows the ship clearing the shed, and the bottom one being pulled down to the mast.



52

Here we see a close up of the bow as she finally floated clear of the shed on her way to the mooring mast
Clearly seen is the central ear and two of the five engine gondolas ~~slung~~ slung beneath the main envelope

Unlike previous airships, in order to reduce drag as much as possible, all the passenger accommodation and crews quarters etc, were placed within the framework of the hull itself. This gave an advantage in terms of speed, but at the expense of gas bag capacity and lift.



The rigidly mounted public seats of the R 101 included a combined dining cabin (opposite left). The rigidly mounted lounge (opposite right) ran the length of the ship and was flanked by raised promenade

walks in front of each of the 20 (12) engine nacelles to allow air circulation and to heat the nacelles at a fixed distance. Below left: Vessels intended for service would take place in the smoking cabin below the right, with its forward section, web and three main doors.

Slide 45

And here she is at last complete and
safely moored to the mast waiting to
go on her first flight, a pretty impressive
sight, which could be seen for miles
across the flat ~~country side~~ that lies
in ~~that part of Bedfordshire~~
Bedfordshire countryside.

Change Slides



Slide 47

55
There can be no doubt, that even
by today's standards the R101
provided a quite extraordinary
level of comfort for its passengers

The middle picture shows the
main lounge before it was furnished.
This room was 60 feet wide by 32 feet
across, and when finished was fitted
with chairs, tables, settees along the
walls, and even flowers and potted
plants.



The Innovator - Squadron Leader F. Michael Hope, Assistant Chief Designer at the Royal Aircraft Works, responsible for some of the most original and successful advances in the design and construction of R101. Michael Hope had led the design team which produced the outstanding nine-engine Zeppelin airship at Kingsnorth in 1917.



(CENTRE) Floor Plan - As being furnished, the 60 feet by 32 feet lounge of R101 looked across the beam of the airship to the 32 feet wide by 8 feet deep windows set into the sides of the outer hull at an angle of 45 degrees. The ceiling height of the lounge was 8 feet 4 inches. The pillars were diameter increased in bulk wood, the seats, painted fabric. (BOTTOM) Smoking Area - With an aluminium top and ceiling and asbestos walls, the smoking room on the lower floor of R101 measured 74 feet x 12 feet 8 inches and had seats for 24.

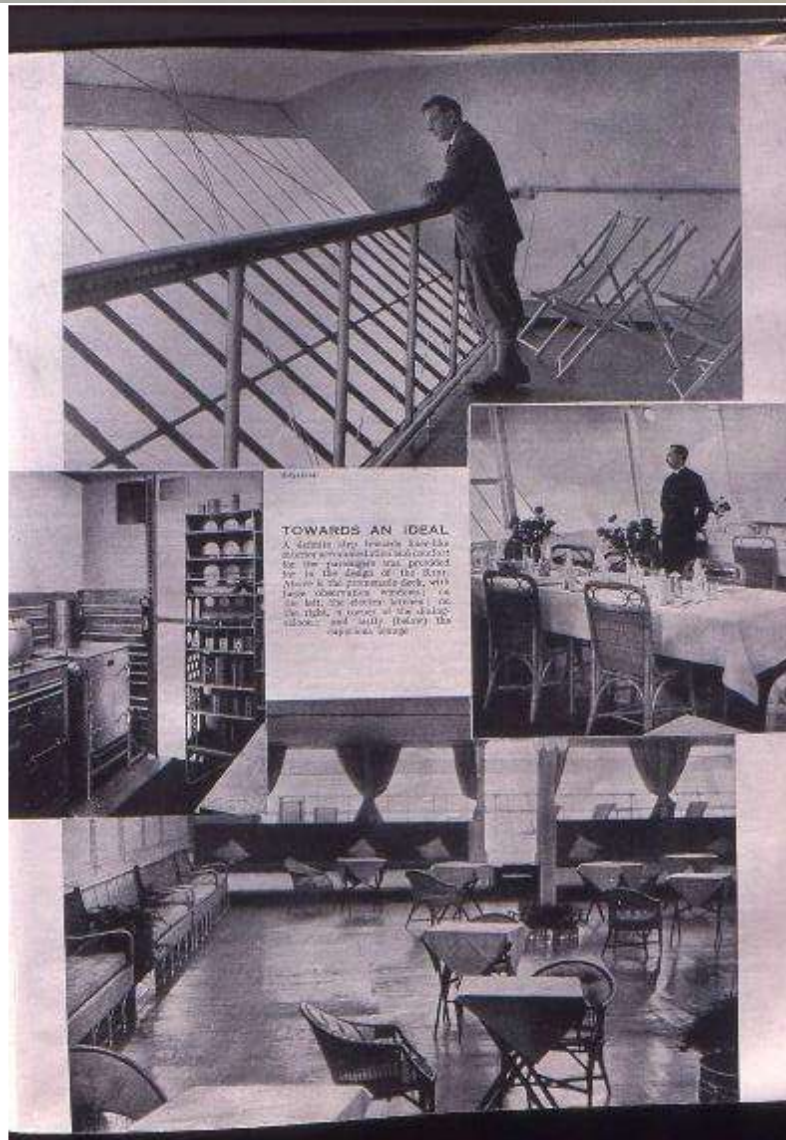
~~Rice~~

The lower picture shows the smoking room, an almost unheard of luxury in a hydrogen filled airship. Safety was achieved by keeping the air pressure in the smoking room slightly above that outside and thus ensuring that no hydrogen could enter.

56

On each side of the lounge there was a promenade deck 7'6" wide by 32 ft long, where passengers could either stand or sit and watch the ground passing beneath them, through large windows set in the hull.

The lower picture shows the lounge fully furnished with settees, occasional tables and chairs.



~~Final Interment~~
Dining Room.

57

For eating, the ship was provided with a separate dining room which could seat 50 people at a time, and serve 4 course hot meals, which were prepared in an electric gally on the deck below, and sent up on a dinner lift.

The crew included two cooks and two stewards

Despite the weight problem china crockery and heavy plated cutlery was provided

For sleeping there were 26 small two

luth passenger cabins rather like those in a sleeping car on a train.



Dining Afloat - A section of R.101's dining saloon laid with Royal Airship Works created cutlery

adequately showed determination had dete

At 0930 that r
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Major F. A. de
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† In a private m

58

As has been mentioned apart from the five engines gondolas the only object that projected beyond the streamline surface of the hull was the control car.

Seen here from inside. (Top Picture)

The control car commanded a wide view of the ground, and equated to the bridge of a ship where the oow stood



Unlike a ship however there were two wheels, the one in the front on the centre line was for steering port or starboard, and the one at the side, manned by the height coxwain, worked the elevators.

It was the height coxwain's job to watch the altimeter and keep the airship at the correct height. A job considered to be the most demanding, and calling for the greatest degree of skill in the ship.

Compared with aeroplanes, airships were very difficult to fly and subjected to a number



Courtesy of A. P. de Molegas

of variable factors which could not be allowed for in advance.

Ideally they should be able to fly in equilibrium where their weight just balances the lift of the gas, but as the lift of the gas is always falling due to the temp of the air through which they are passing, constant allowance for this has to be made.

They can't fly above a certain height without losing precious gas through expansion, and they lose weight and rise as they use up their fuel. They must ^{not} give up too much gas as ballast in flight as they necessarily use quite a lot of ballast in effecting a safe landing.

60

They have an enormous surface area exposed to the wind, and are therefore very difficult to handle on the ground.

Contrary to what one would expect the gas bags which were made from the skin lining of bovine intestine, were not actually tight, and allowed seepage ~~and~~ and loss of lift at a steady rate, and airships had to be constantly topped up with gas, which itself had to be re-purified regularly, as it absorbed other impurities and if not treated become highly explosive.

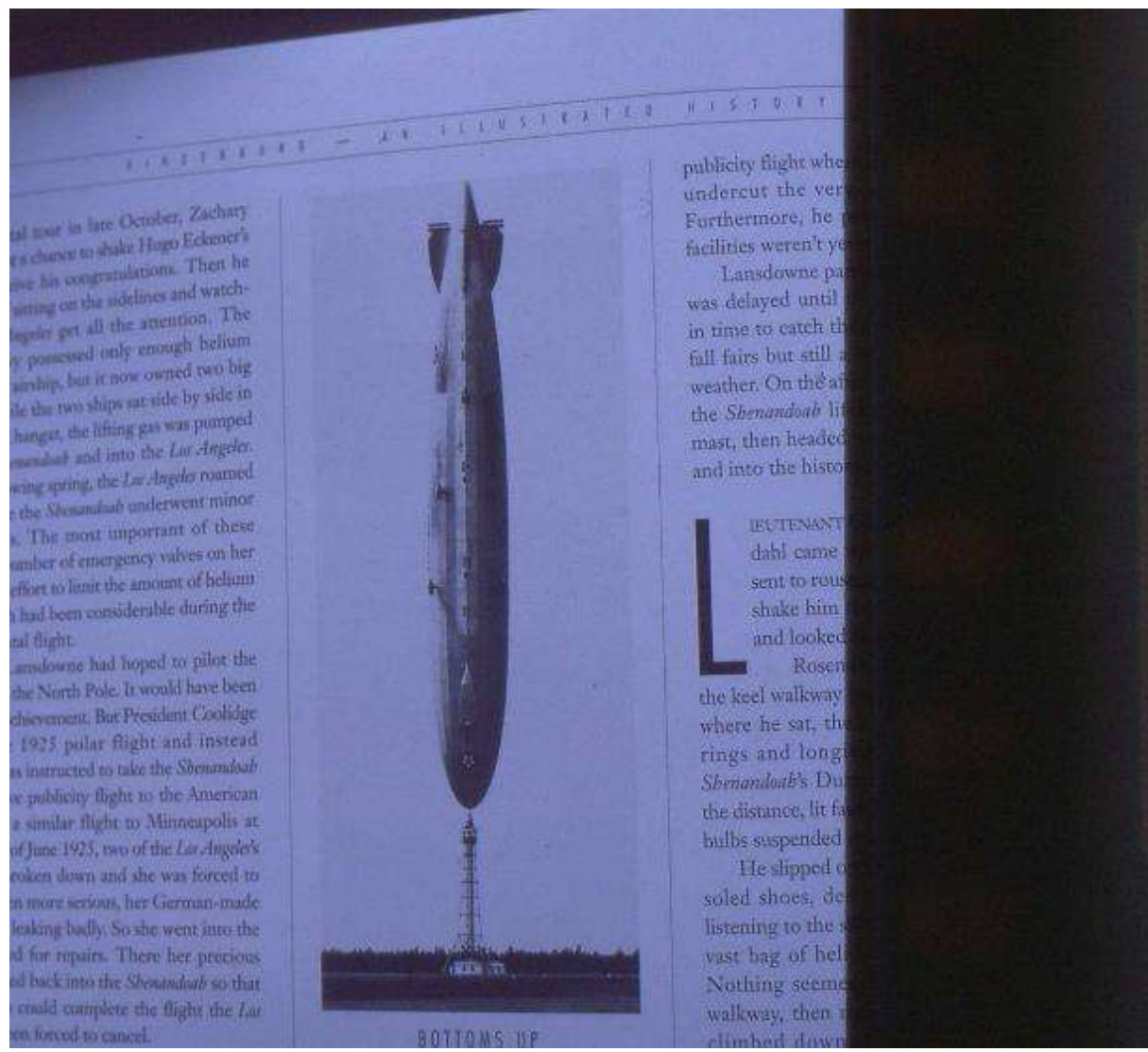
↓

For most of the time that they were in the air they were not in equilibrium and had to be flown dynamically, that is nose up, if too heavy or nose down, if too light.

The problem of losing weight as fuel was used up was a serious one, and various ideas were tried out in order to overcome it, including condensing the exhaust gases, and collecting rain water off the cone in gutters.

This picture which was censored by the United States Government for several years shows one of the U.S. Navys Rigid Airships standing on her nose at the mast, having been caught by nothing more serious than a sudden shift in the wind.

The airship went over the top rather than round the outside, and demonstrates how fickle this type of aircraft can be.



Slide 53

6270

The five engines were housed in these rather strange looking pods which were suspended on brackets from the main framework of the dirigible.

As the R101 was intended for use in the tropics heavy oil engines had been installed, as volatile petrol was considered too dangerous, and it was the weight and relatively poor performance of the engines which was to cause a lot of problems in the days to come.

The engines together produced 3,500 HP. almost
driving, pusher propellers 17 ft in diameter giving

Below: R101 engine car.

Overleaf: R101 split at frame 8, immediately aft of the passenger accommodation, for the insertion of a new bay.



P. mup

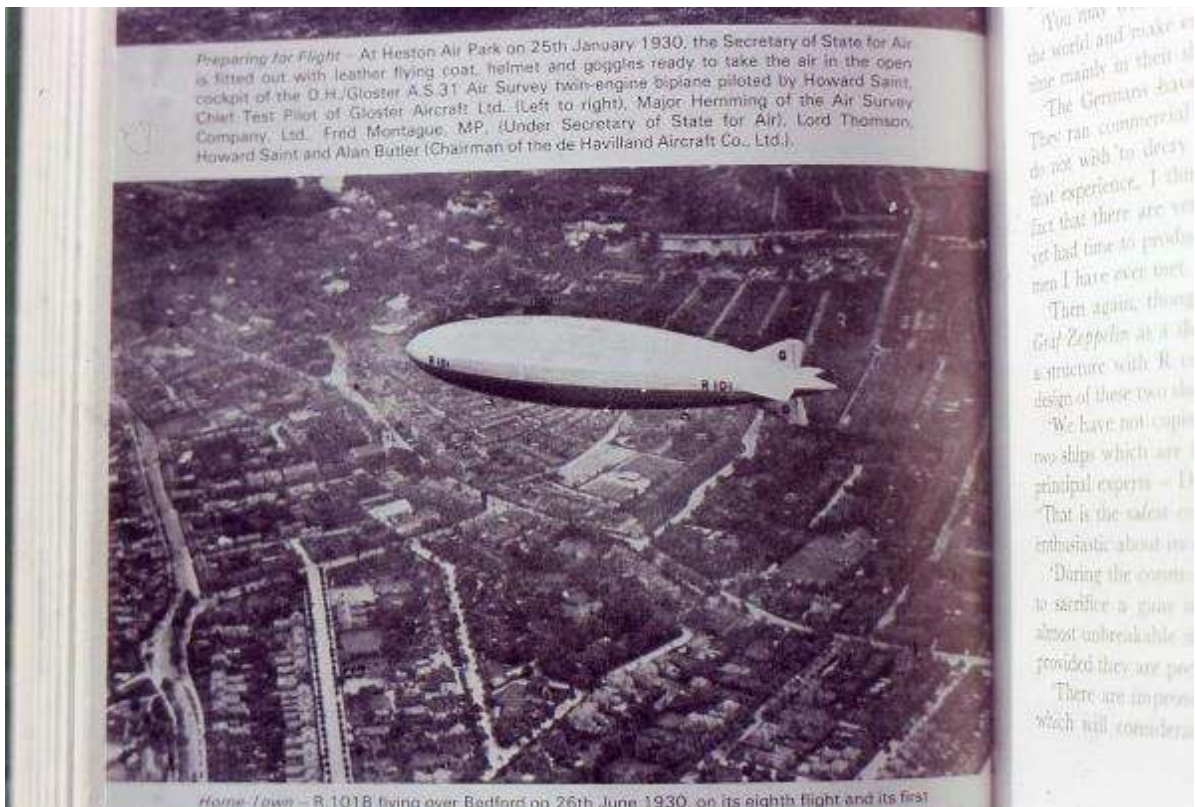
at a theoretical speed of 55 mps.

To get to the engines the mechanic on duty had to climb down the open ladder ~~is~~ shown from an opening in the hull above.

No doubt the 200 foot drop below encouraged him to hold on tight.

63 ~~71~~

The ship was now complete in the public's view, and flying trials began. Mostly of short duration with the airship being brought back to the mast at Cardington between each trip. Unfortunately these trials were hampered by dozens of official visitors who had to be given flights and entertained on board, and greatly added to the worry of the crew and



~~Control Cow and lounge~~

$\frac{1}{18}$

engineers trying to deal with some of the serious problems which were beginning to emerge

~~Have you seen the ship over Bedford~~

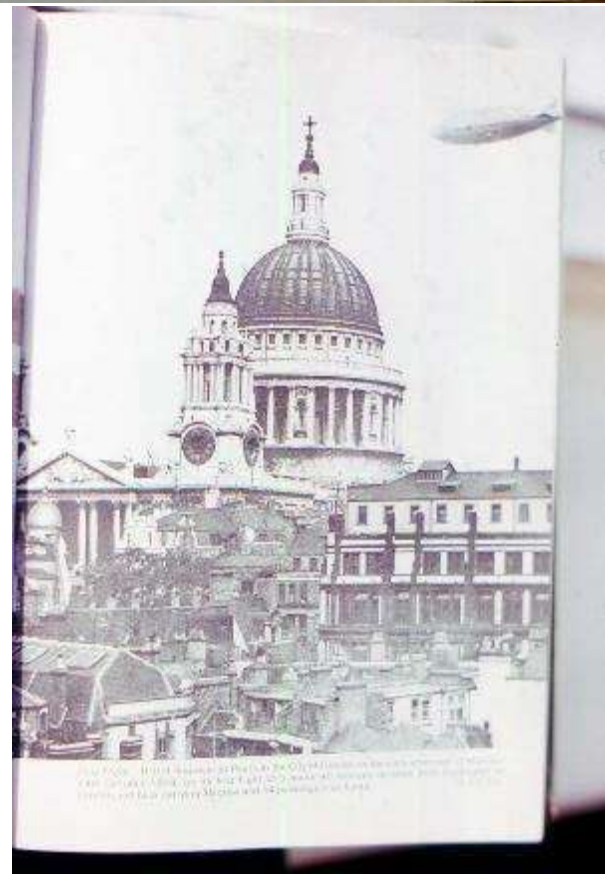
It was soon clear that the ship was seriously hoavy, that is to say less bouyant than it should be and was losing gas through ~~defective~~ defective gas bags at an unacceptable rate. Here she is flying over Bedford on a trial

67 72

Here she is again on another trial flight, this time over London

To add to the worries of Cardington it was now discovered that the outer cover had become very brittle, and was prone to develop splits and tears which had to be patched up with wide strips of adhesive tape, and worse still, the gas bags which had been let out beyond their design volume in order to increase lift were slow rubbing holes in themselves against the metal framework, and as a result losing lift at a steadily increasing rate.

In a word serious design faults were now showing up which should have been expected, and avoided in the next ships to come off the building line.



Slide 56

~~the~~ As however by this time 1929 Airships were being seriously challenged by aeroplanes the staff at Cardington saw that their own jobs were on the line, and that if this ship which had cost so much public money was shown to be a failure, they would be out.

In the circumstances that they found themselves in it is easy to see why they chose to keep as quiet as possible, to patch up as best they could and pray for good luck.

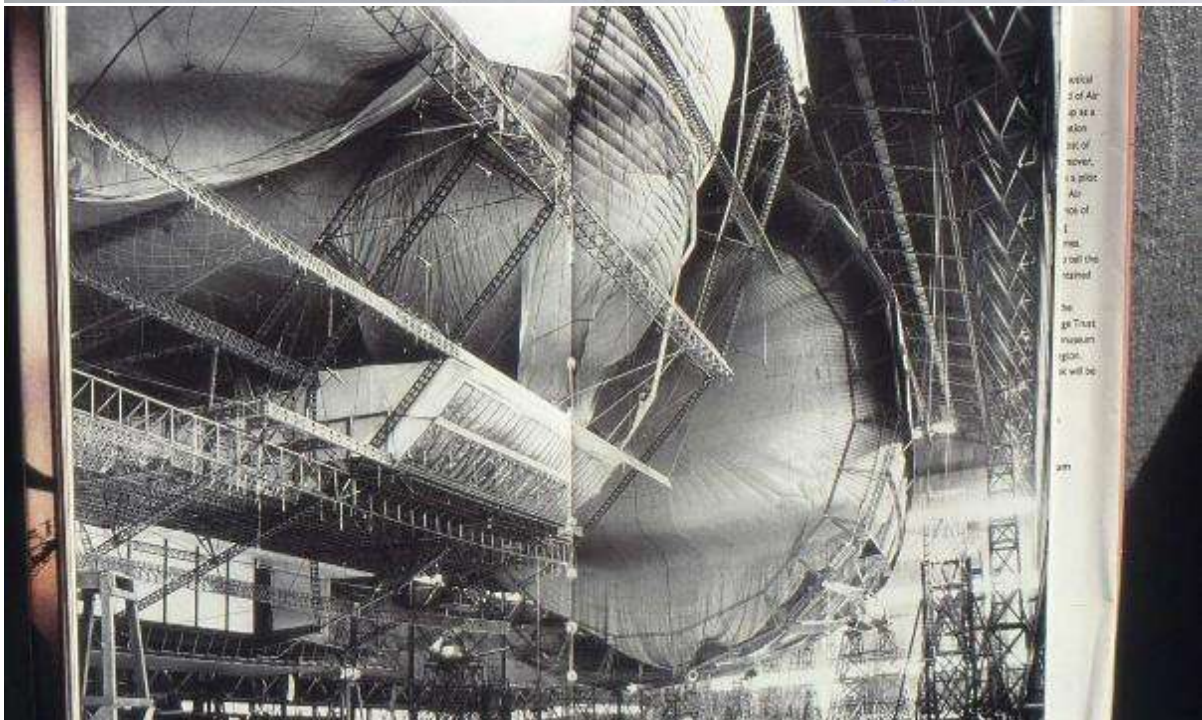
6573

There can be no doubt that by this time those in the know realized that the R101 was quite unfit to undertake the long trip to India, and from reading the official papers, it would seem that something like desperate measures were now resorted to.

Literally everything that wasn't essential was stripped out of the ship including half the passenger cabins, and finally the R101 was cut in two and a new bay inserted with an additional gas bag.

This increased her length by 40 feet and her lifting capacity to 51 tons, the barest minimum with which she could hope to get to India, with virtually no margin for unseen events.

In this picture you see her cut in two prior to the insertion of the new bay.



Slide 57

66 ~~77~~

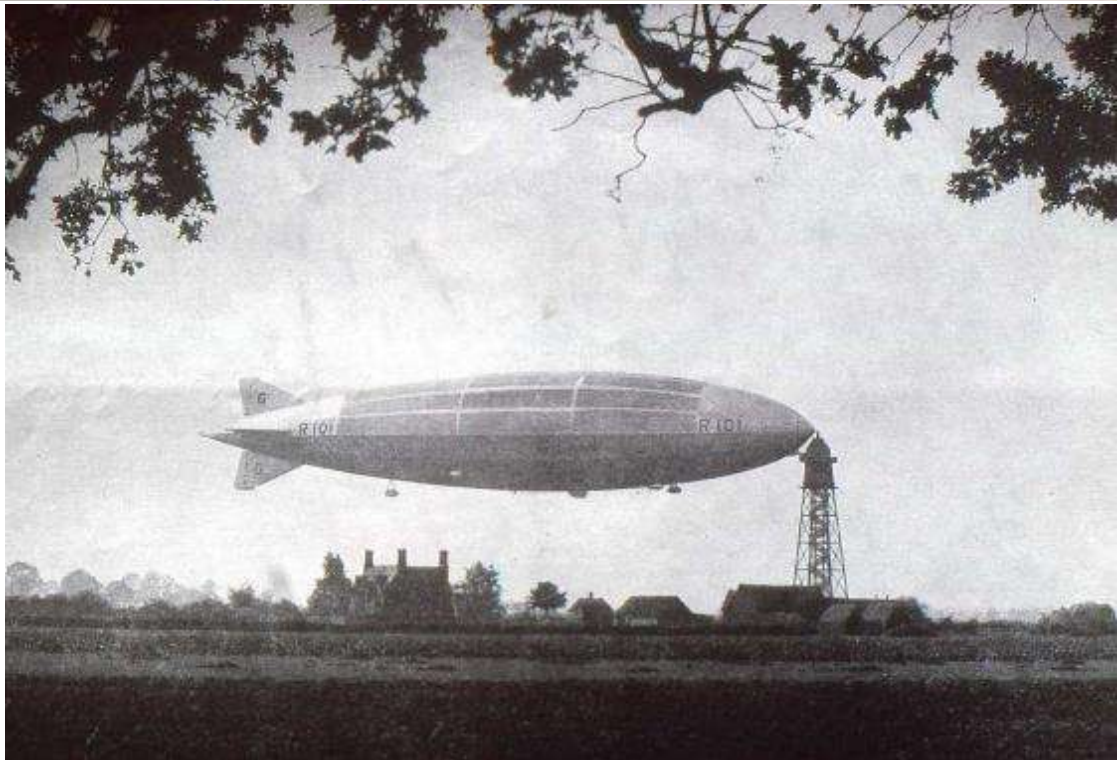
Whilst these unhappy scenes were taking place at Cardington pressure was building up in various quarters in London for the announcement of the date of departure.

Cardington kept stalling as long as they could but finally Lord Thompson got the Air Ministry to agree the 4th Oct as the starting date even though this was less than a month ahead, and the airship was at that time still in the hangar in two pieces.

In the event, this totally modified and virtually untried and tested, one might almost say, different vessel did not come out of the shed until the 1st of October, only few days before setting off on a major and possibly hazardous voyage over a route where no airship had flown before.

This was the stage set for what was to follow.

This picture shows her at the moor in her lengthened form



67 75

The reason for the pressure to start on the 4th October came what, was completely pitiful. Lord Thompson was to address a conference of Commonwealth heads of state in London on the 20th Oct at which he was to press them to join in the Imperial Airship scheme, and to contribute thereto.

He therefore wanted to be able to tell the conference that he had just flown to India and back in the new airship, which would be a tremendous boost to his scheme and his own ego, particularly as he was owing for the post of Viceroy of India.

It seems clear that he didn't realize the extent of the technical difficulties that were plaguing Cordellier and what a dangerous game he was playing by insisting on a finite date of departure.

Sadly

In fact, by 1930 he could have gone to India and back by aeroplane.



Ready to Go - The officers of H.M. Airship R. 101 pose with their Scott, in front of the hangar on the morning of Saturday, 21st September 1930, before the ship was taken out of the shed for the first trial flight. (Left to right) Squadron Leader Ernest C. Johnson (Navigator); Flight Lieutenant Carmichael Swan (Crewman); Herbert Scott (Assistant Pilot); Airship Development; Assistant Training; Lieutenant Commander Noel Gratimewsky (Atherstone's 1st Officer); Flying Officer William Staff (2nd Officer); in front of Atherstone's dog, Tin.



Eye of Departure - Officers and Crew of H.M. Airship R. 101 at Cardington on 30th September 1930, four days before the ship's departure for Egypt.



Airshipmen - Twenty-five members of the crew of R. 101 photographed in the No. 1 Shed at Cardington on 28th September 1930. In the back row, the engineer placed with power car in the No. 1 Shed and detailed to act also as the ship's photographer in the range of light. Blake added himself to the group. Extreme left in the back row are another photographer; second row are left to right: Charge Hand; Engineer G.W. Sheeh; Chief Engineer W.R. Scott; Chief Carpenter L.H. Hunt and Charge Hand (Engineer) G. Scott; Galley Man J.H. Haggard; extreme right.

PLATE XVII

but also included were Coxswain,
69 ~~77~~
Biggs, wireless operator, Cooks, stewards
and galley boys

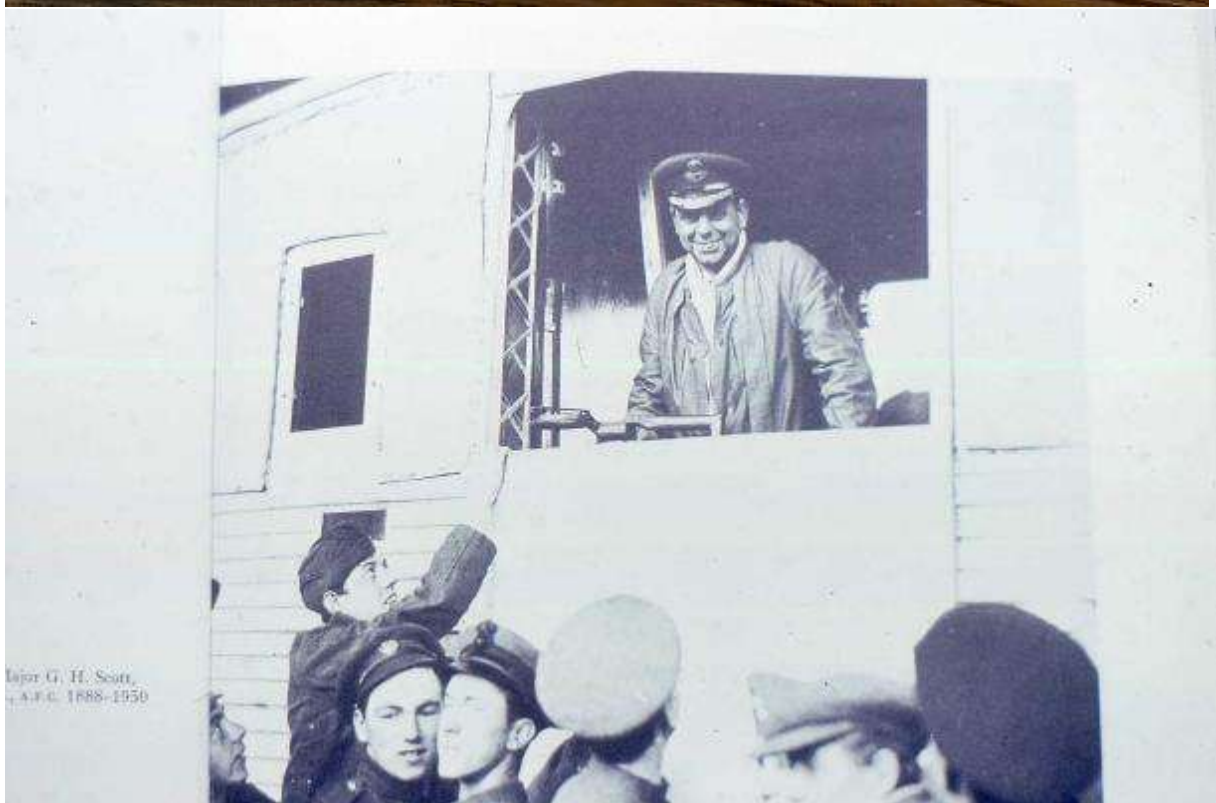
The officers were few in number
Captain Flt. H.C. Irwin RAF
Navigator Sq. Ldr. E.H. Johnson RAF.
1st Off. N.G. Atterstone Lt. Com. R.N.
2nd Off. Fl. Off. M.H. Steph RAF

The man in the middle is May Scott,
our most experienced ship's pilot
who was not given command as it
seems that he was seen to be losing
his skills, and by now possibly had
a drink problem. He was ~~in his~~ by
middle forties, this time in his middle
forties.

~~He had however successfully flown~~

He had however successfully flown ~~7~~ 780
~~a previous British Aviator~~ the R34
across the Atlantic and back in
1919, and also commanded the R100
on the round trip to Montreal.

He was not however in command
on this occasion and his position seems
to have been somewhat uncertain.



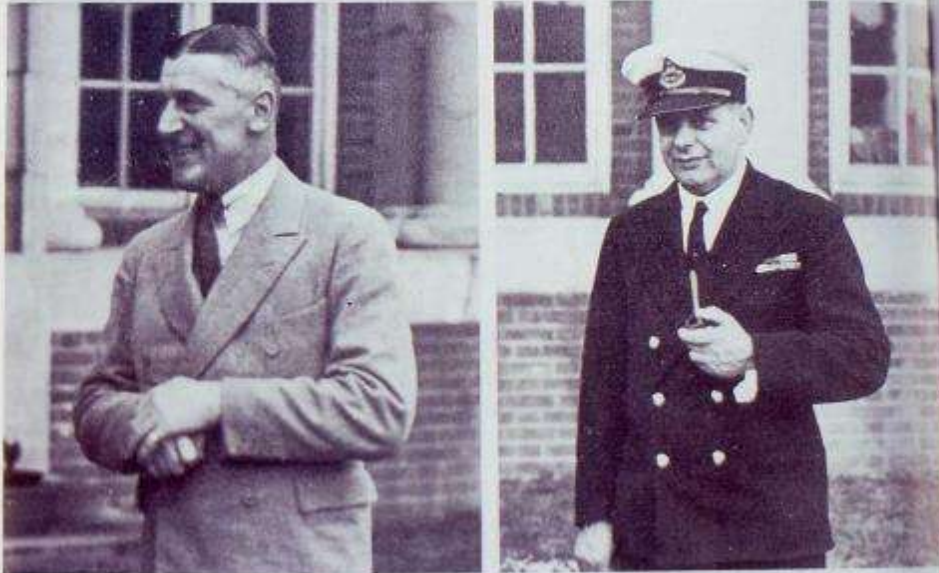
Slide 60

79

Here we see another picture of Scott this time with Sir Sefton Brachner Director of Civil Aviation who was ^{also} to go on the flight.



C.B.T. and C.L.B. - Lord Thomson and Sir Christopher Bullock at Gwydyr House, Whitehall, shortly after Thomson was appointed to his second term of office as Secretary of State for Air on 10th June 1929.



(LEFT) A Key Figure - Wing Commander Reginald B. B. Colmore (1887-1930) was appointed to the Royal Airship Works at Cardington in July 1924 as Assistant Director of Airship

Lieutenant Go
Walter Preston
The Grebe,
1914-18 War,
competitor to
first crossing
start. Now at
course in 7 1/2
147-73 mph,
offing a D.H.
So the air
pilots land
twenty out of
welcomed an
social gather
Aviation eve
At the en
presented to
Atchley at
Sir Charles
row of the
Philip Sme
Next day
* Later Ad
Vice-Marshal
Air Force
& Colonel M
Sir Richard

Slide 61 but does not fit with note

72-80

In addition to the 35 crew and 5 officers, there were on board six high ranking officials from the Royal Airship Works, six Government officials headed by Lord Thompson, Sec of State for Air, and Sir Sefton Brochner, who we have just seen.

All these people were therefore to gather at the foot of the mast at Cordington on that fateful Saturday afternoon and pass upward to the disappear into the great shaft floating above their heads.

Whether any of them had any doubts or misgivings we shall never know.

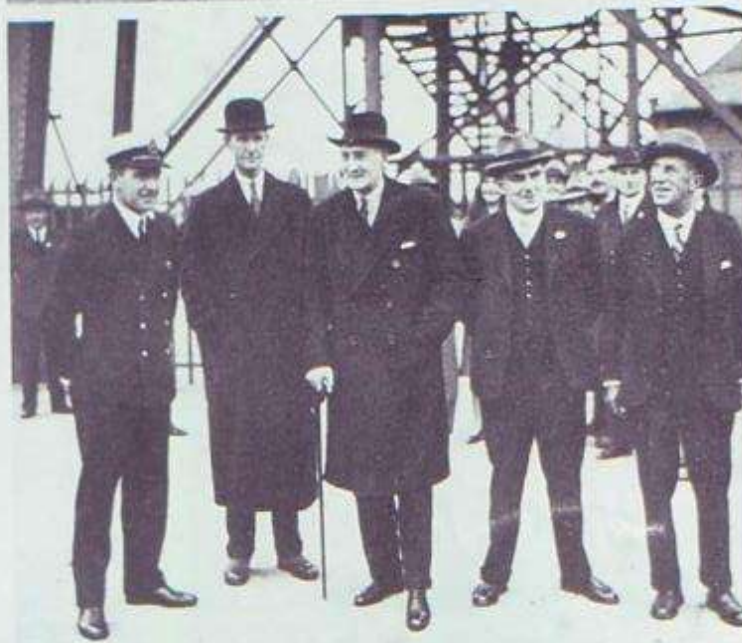
In this picture we see
Lord Thompson
S. S. Brochner
Col. Richmond designer of the R101
& The Navigator E. H. Johnson

All of whom have less than
10 hours left to live

Cardington - R.101C at the mooring mast at Cardington in the afternoon of 4th October 1930, with the No 2 Airship Shed in the background. At the moment of the photograph the airship was taking aboard 25 tons of fuel for its flight to Egypt, en route to Karachi.



Below - a last photograph at the foot of the mooring mast at Cardington on the evening of Saturday, 4th October, before the final group entered the lift to go on board R.101 en route for India. (Left to right Squadron Leader Ernest Johnson OBE, AFC, R.101's Chief Navigating Officer, Major Louis G.S. Reynolds (Principal Private Secretary to the Secretary of State for Air) who did not travel on the ship; Brigadier-General the Lord Thomson of Cardington, PC, CBE, DSO, His Majesty's Secretary of State for Air; Lieutenant-Colonel Vincent C. Richmond, OBE, (Assistant Director of Airship Development - Technical) Chief Designer of R.101 and Air Vice-Marshal Sir W. Sefton Brancker, KCB, AFC, Director of Civil Aviation at the Air Ministry.



Moment of Take-off - R.101 about to cast off from the Cardington Tower at 1936 hrs BST on the evening of 4th October 1930, en route for India with a crew of 42, 12 passengers and a load of 27 tons of fuel on board - the last photograph to be taken of the airship, at the time the largest vessel in the world.

(R.A.F. V.)



73 ~~87~~

Here then is the last photograph
of the R101 at her mast before
leaving on her final voyage. ~~months~~
~~after~~ ~~was~~ ~~expected~~ ~~to~~ ~~leave~~ ~~on~~ ~~Oct~~ ~~1930~~
All the repairs and modifications
that could be done in the time have
been done, the ship is loaded with
fuel, ballast and stores, and the
gas bags filled to capacity. The lift
in the Tower takes those that are not
going, safely to the mother earth.

Waddington Offices
Scott & Richmond.

Here is another picture of Major Scott this
time with Col. Richmond the designer of the
airship who was aboard on the fateful flight.

The die is cast and she is off.



Ready for off – R.101C swings at the Cardington mast with the lift half-way between the ground and the boarding gallery just before dusk fell on the evening of 4th October 1930. All five engines are ready to start and fuel and stores are now all stowed – the 12 passengers and 42 crew members going aboard. [PLATE XXIII]

74

~~82~~ ●

In all the R101 had made only 12 flights the routes of which are shown on this map.

The longest flight ~~made~~ was that to Scotland, returning via the Irish Sea and Liverpool which took about 29 hrs for a distance of roughly 1000 miles.

All the other flights ~~made~~ were of short duration and only 1 of the twelve was made after the airship had been lengthened, and was to all intents and purposes a new or different ship.

The final test flight was from Cardington to Southend ^{UP} the east coast to Yarmouth and

then back to Cardington a distance of 553 miles taking about 15 hrs.

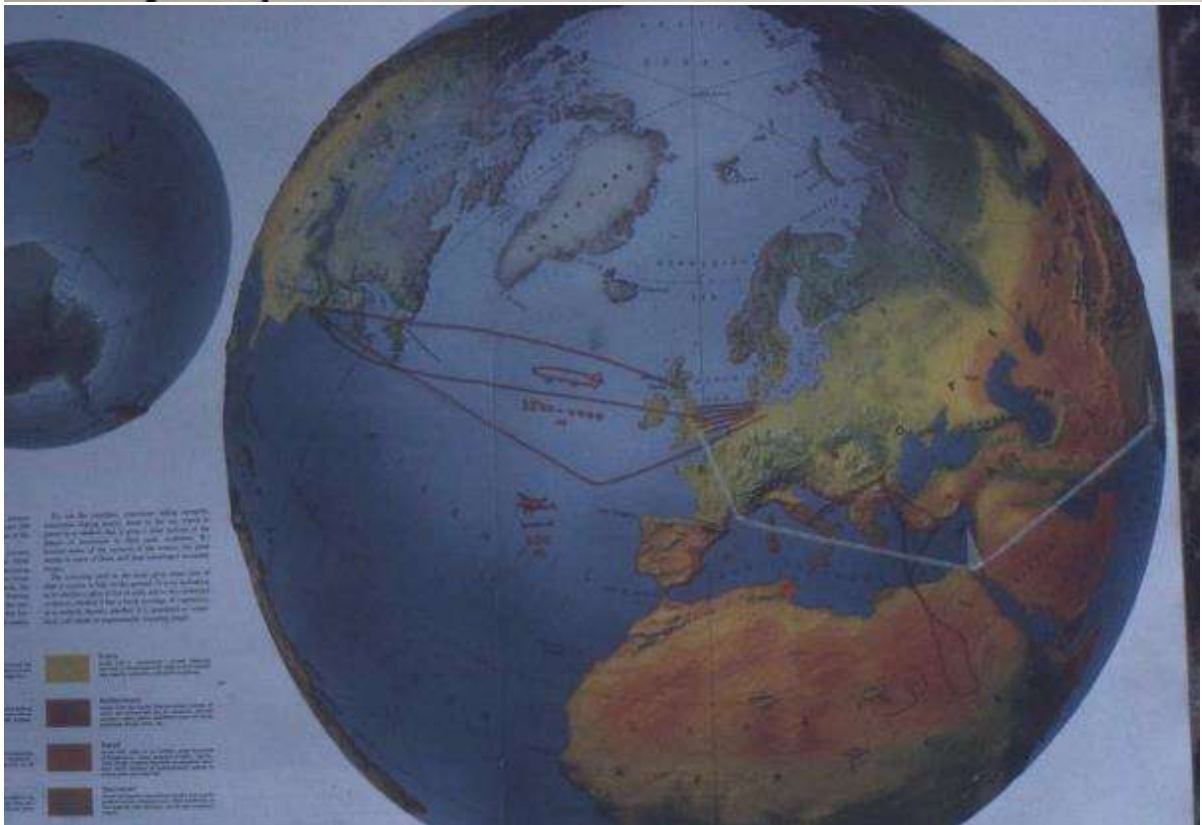
75 83

This map by contrast shows what this virtually untamed vessel was expected to achieve.

From Londinton to Ismalia where a refueling stop was to be made is 2700 miles, much of it over turbulent land masses, and flying into ^{the} high temperature, low lift areas of Egypt and the middle East.

From Ismalia to Karachi is a further 2200 miles over the burning Arabian desert where the lift would be so weak that the landings and take off would have to be made at night when the air temperatures were lower.

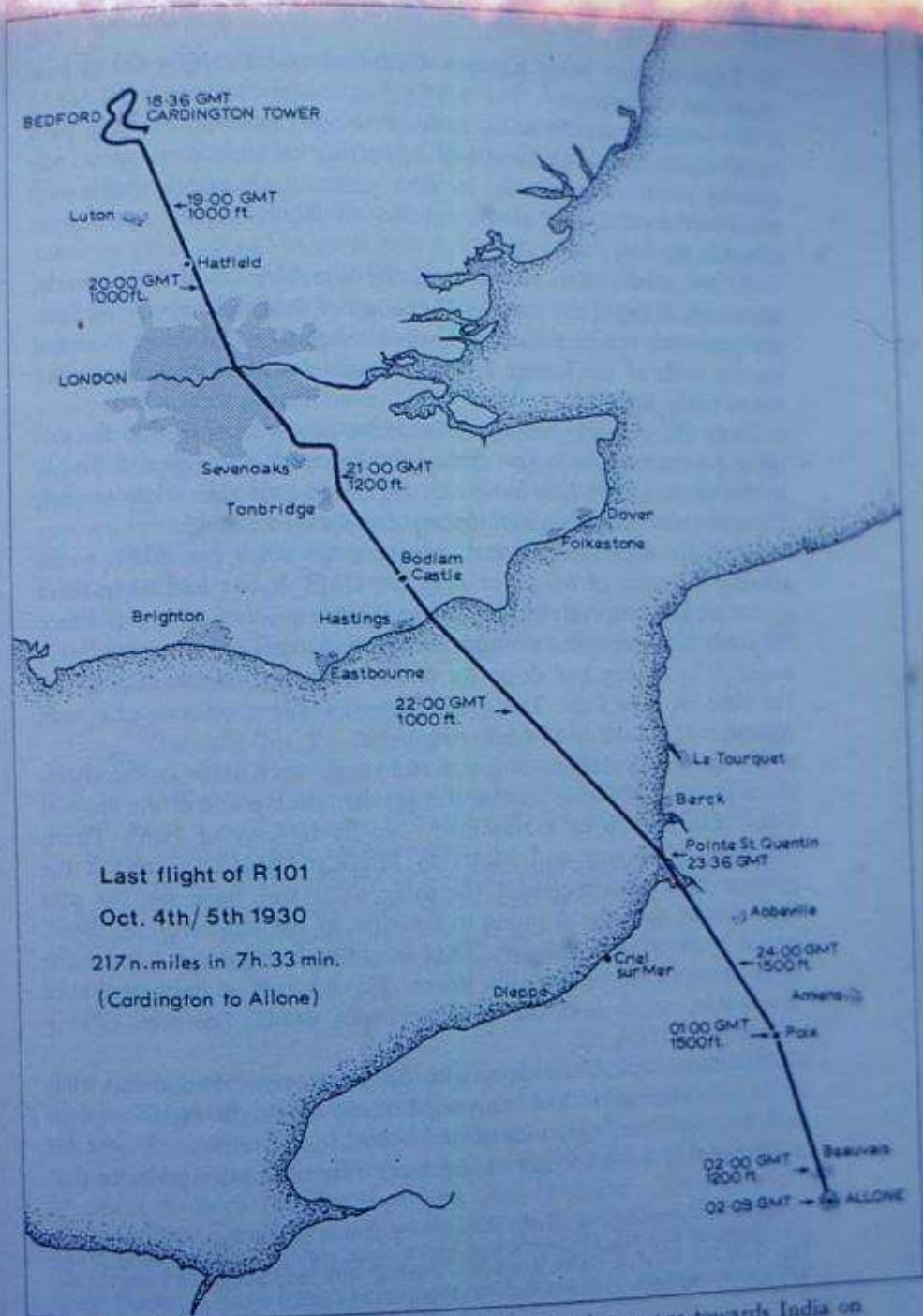
Looked at in retrospect it is apparent that to those in the know the flight was going to be a terrible gamble.



Slide 65

76 83
So back to Cardington as the R.101
disappeared into the night heading
south to London, the English Channel,
France and the Mediterranean.

The weather ^{when she left} was blustery, with
rain from the SW. which was right
on her nose, but with a weather forecast
that promised better weather once France
was reached.



Last flight of R 101
 Oct. 4th/ 5th 1930
 217 n.miles in 7h.33 min.
 (Cardington to Allone)

Final Flight: The course flown by R.101 on its voyage towards India on the night of 4th/5th October 1930, crossing the English coast just east of Hastings at 21.35 hrs GMT and arriving over France at the estuary of the Rover Somme one minute more than two hours later.

77 85A
In the event the weather got steadily worse as the evening wore on until ~~about midnight~~ ^{by 10 PM} the ship was plunging directly into a fierce storm with her ground speed right down to 28 mph.

many hundreds of people along her route across England saw her very low and battling against the elements.

78 85A
She was seen over London at 8.30. Sevenoakes at 9. pm and passed the coast near Hastings at about 9.30 The Channel crossing took about 2 hrs and by 11.30 she was flying over France heading for Paris

The storm was now at its height and the ship was taking a severe battering.

From MR. R. A. JAMES, Chapel Anthony, Tiverton, Devon. Telephone 2286

During the course of the voyage so far, 4 radio messages had been exchanged with Lardington mostly dealing with forecasts of the weather that they would be flying through.

At precisely midnight the last message from the R101 was received, confirming that all was well, and throwing in a bit of propaganda for Airship travel, which it was hoped, the Press would pick up and publish.

OVER
↓

POST CARD

THE ADDRESS TO BE WRITTEN ON THIS SIDE

It said.

After an excellent supper, our distinguished guests passengers smoked a final cigar, and having sighted the French coast, have now gone to bed to rest after the excitement of their leave taking.

All essential services are functioning satisfactorily. The crew have settled down to watch keeping routine. Message ends 2400

80 87
● At 1 o'clock on the morning of the 5th
she was over the little town of Poix
and ~~then~~ at 2.00 when the watch on board
was changed she was near the town
of Beauvais.

87
About 6 minutes later something
happened (~~which was a~~^{series}~~of~~~~explosions~~
~~and~~~~was~~~~heard~~) which caused the
ship to go into a steep dive, right
back and then dive again until

She struck the side of a shallow hill with ~~the~~ the underside of her bow.

Almost at once there was an explosion, and the cavity was lit up as $5\frac{1}{2}$ million cubic feet of hydrogen burned. Killing all but Eight of the 54 Persons on board.

There is strong evidence ^{to suggest} that the crew on watch knew that the ship was about to crash, but as those in the know all

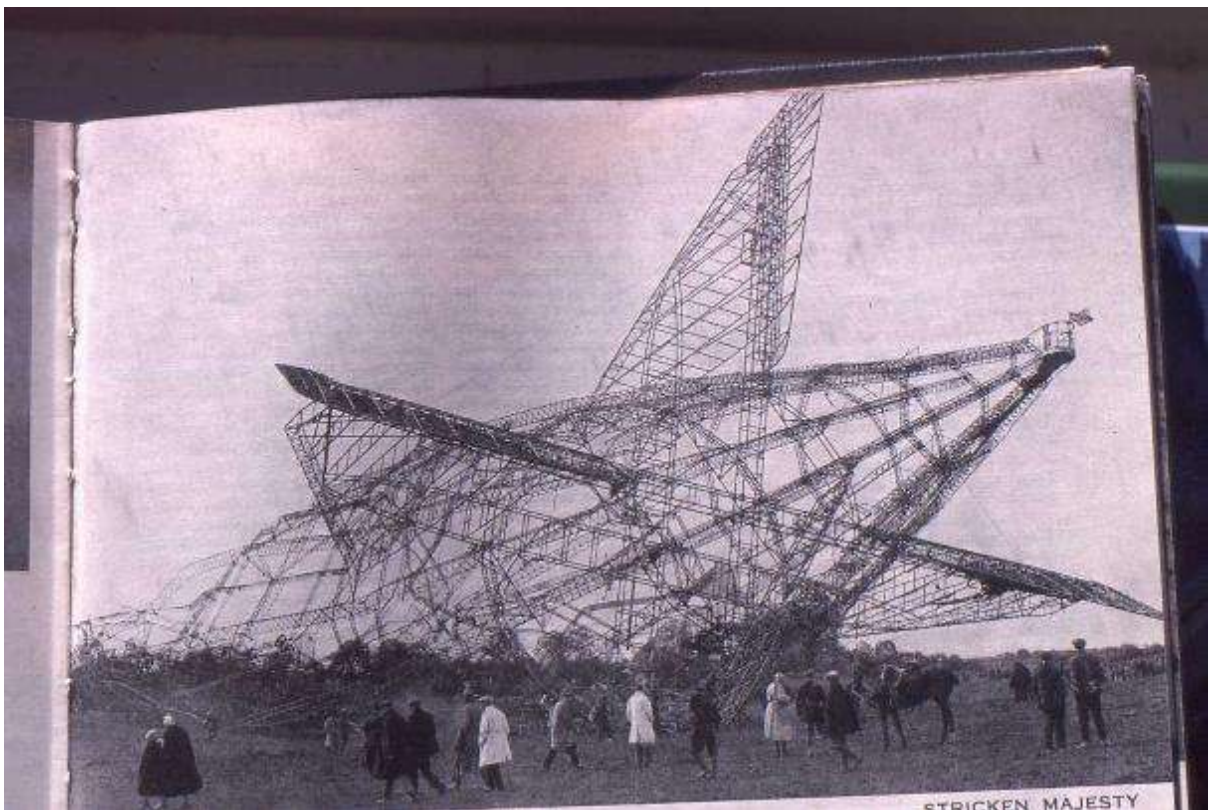
died the cause must remain a mystery.



Slide 67

82 ~~82~~

The strongest supposition is that the outer cover of the bow, known to be brittle gave way, exposing the forward gas bags to the full force of the elements, ~~causing~~ causing them to rupture and deflate, ~~which~~ which in turn produced the loss of buoyancy which caused the ship to dive and strike the ground.



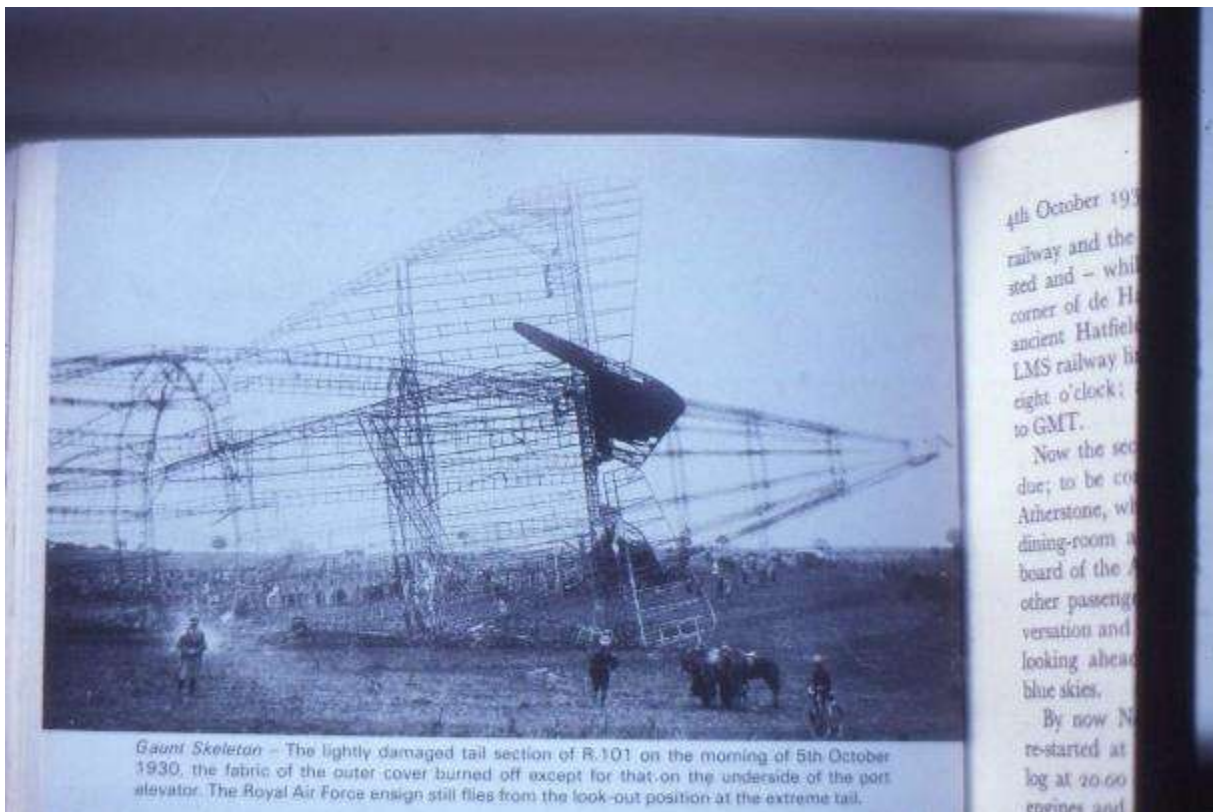
Slide 68

83

Only one man witnessed the catastrophe, a poacher setting traps within a few feet of where the airship crashed.

The sight and sounds were so shocking that he simply ran ~~off~~ away and hid for some time afterwards was unable to speak.

The wreck was totally consumed by the fire only a small piece of scorched fabric remaining on one of the tail planes, and patriotically the RAF ensign on the extreme end of the tail



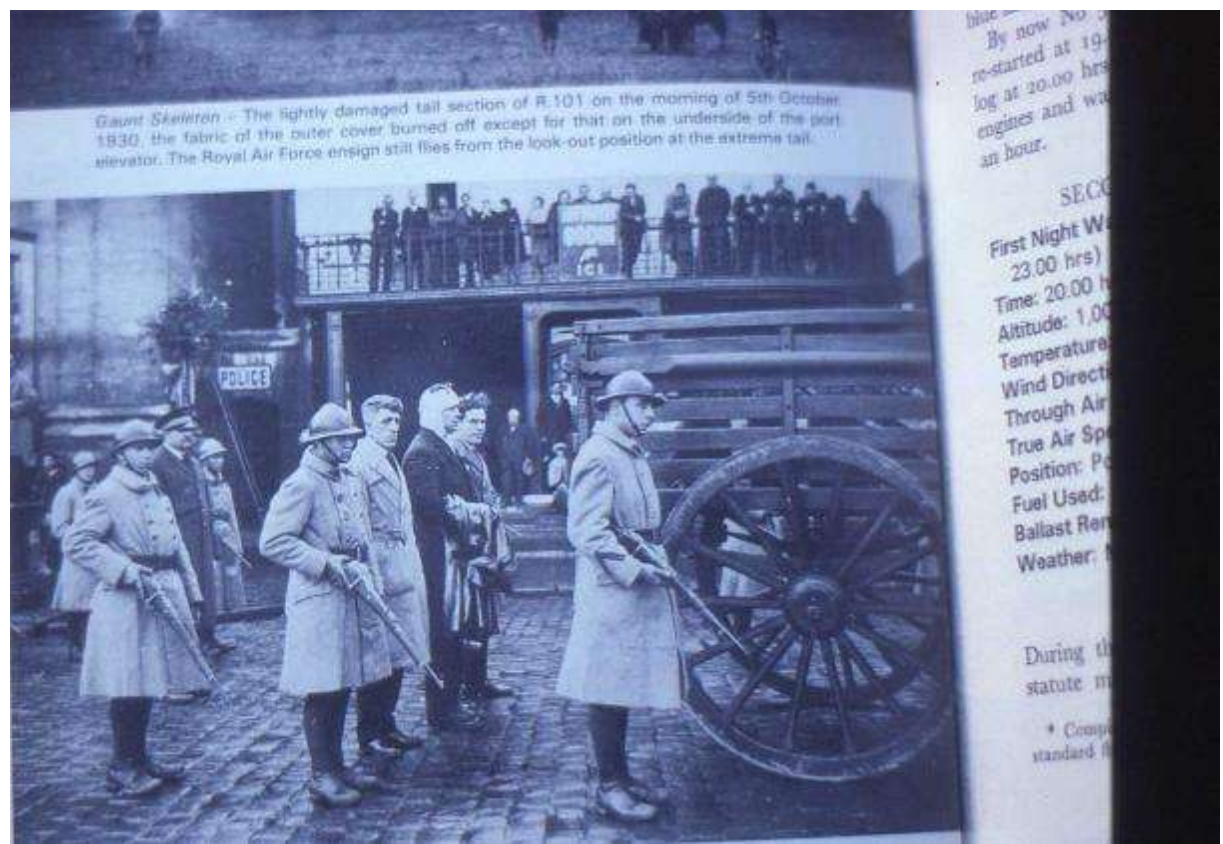
Slide 69

84 of

The French army undertook the sad task of recovering the bodies most of which could not be identified, and the coffins containing the remains were brought back to England to lie in state in Westminster Hall. Whilst a memorial service was held in St Pauls.

This picture shows the three survivors fit enough to walk/about to set off on the journey home behind the army transports carrying the coffins

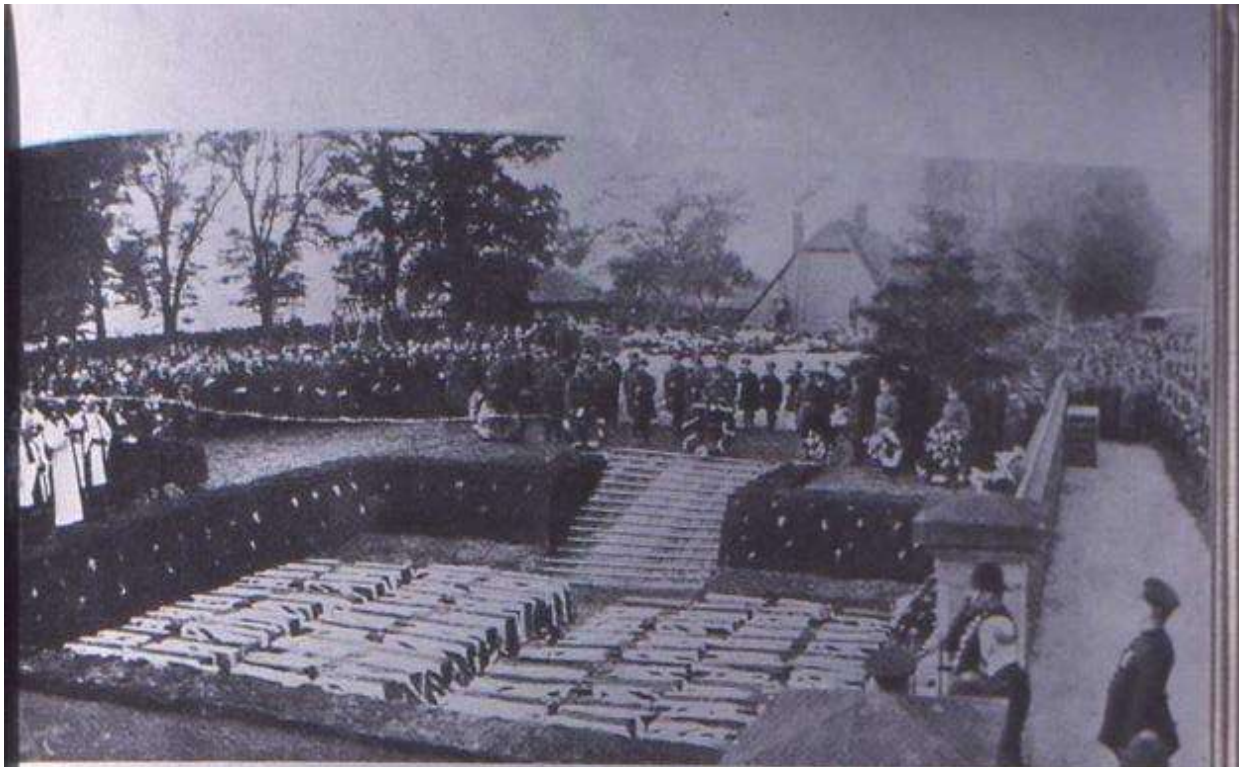
Dressed in borrowed clothes and still looking dazed by what had happened to them one can only guess at their mental state, and their fitness to take part in a highly emotional public event.



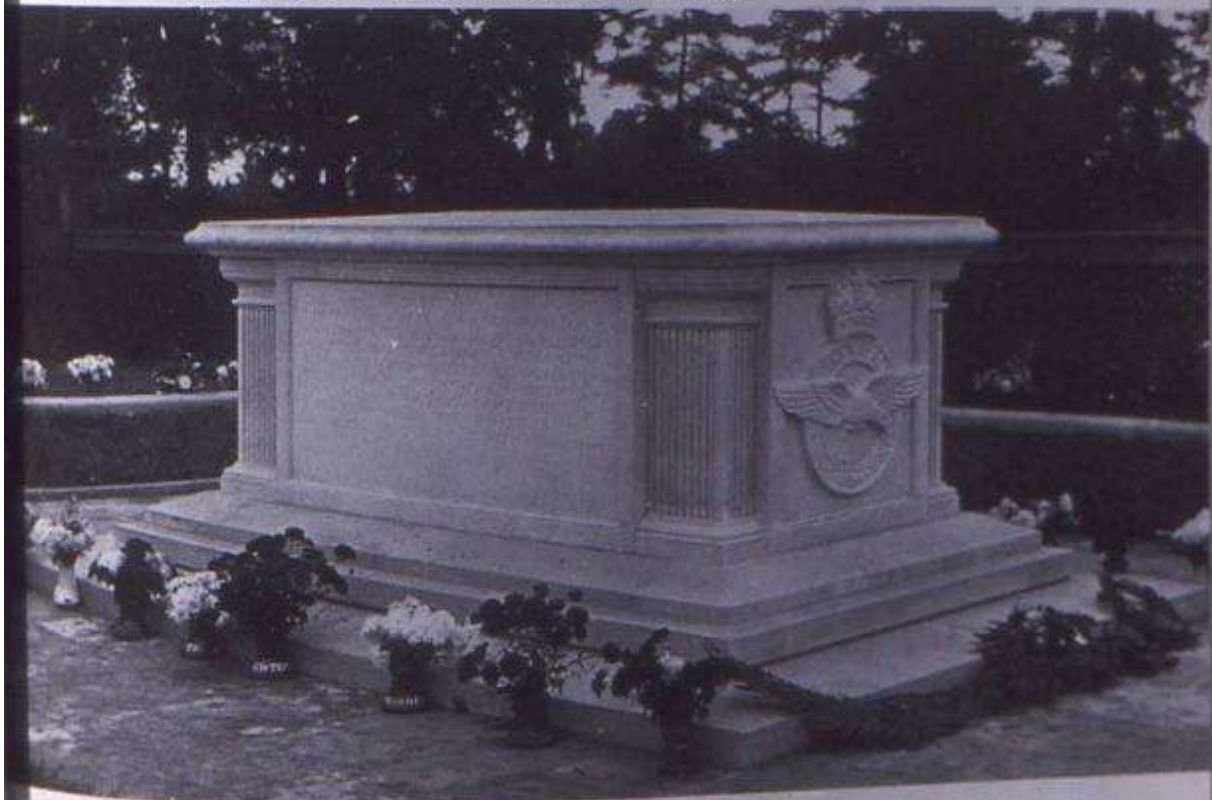
Slide 70

8592
All the bodies were buried in a
mass grave in Cardington Churchyard
where a single monument lists the
names.

The scorched and slightly burnt
flag of the R10A is preserved in
Cardington Church where it can be seen
to this day.



Cardington – The burial service in the churchyard of the parish church of St Mary, Cardington, on Saturday, 11th October 1930, when 48 dead of R.101 were laid to rest exactly a week from the day they had left with such high hopes on the voyage to India. In the photograph trumpeters of the Royal Air Force sound the Last Post.



Cardington – The memorial tomb in the churchyard of St Mary, Cardington.

[PLATE XXVII]



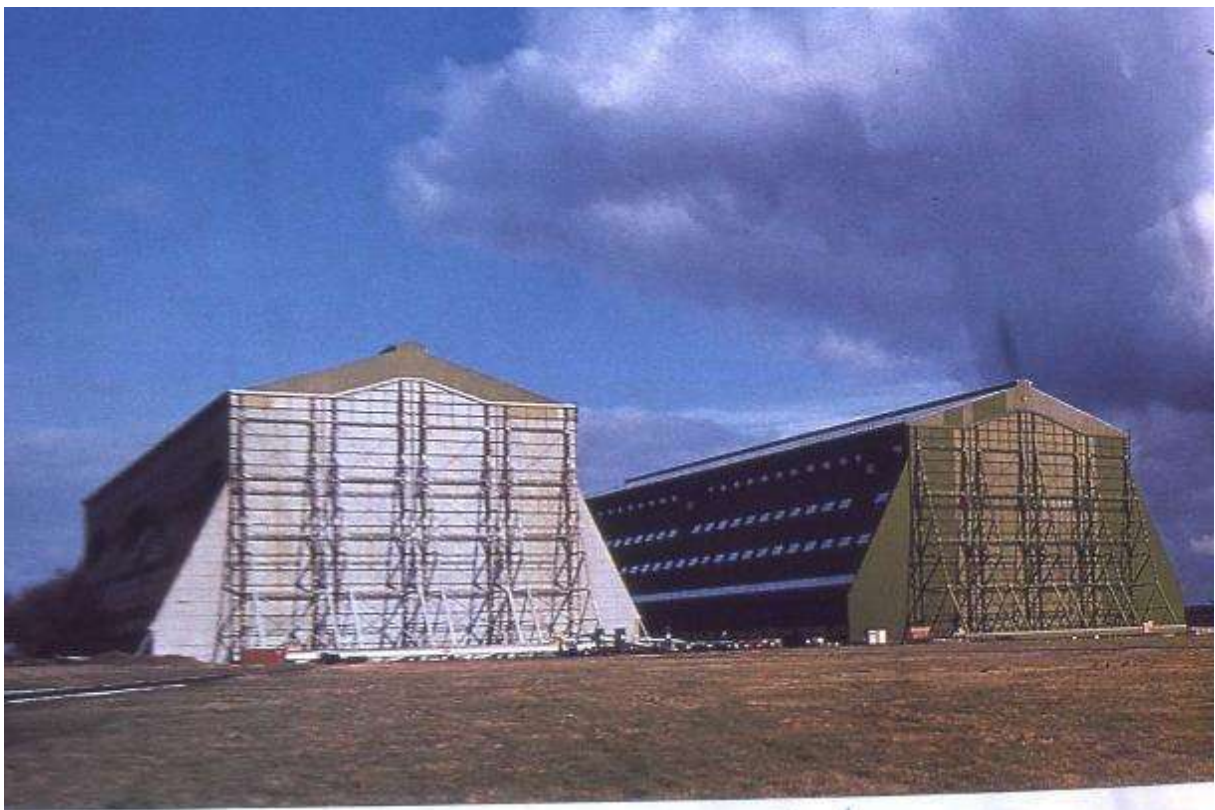
Slide 72

8693
Thus, in less than 5 minutes ended 6 years work, and the hopes and dreams of all associated with the world of airships in England.

The airship programme was abandoned and the R100 broken up and sold for scrap.

Cardington became a normal aerodrome used by the R.A.F. ~~and remain, as such~~ until given up quite recently ~~to this day.~~

The two large airship sheds are now listed buildings, poignant reminders of a form of flying as outdated as the Dinosaurs.



Slide 73

L & G. I thank you for notes

29

14.10.29

26.6.30

28.6.30

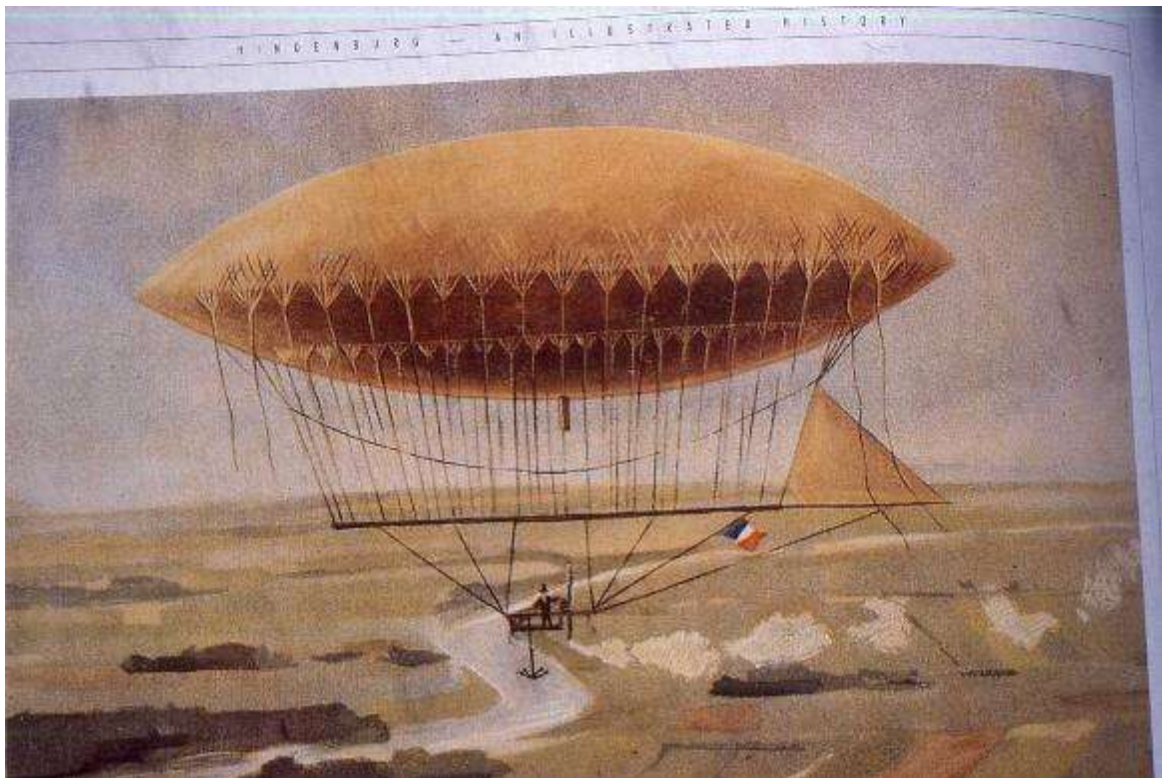
1.10.30

4.10.30

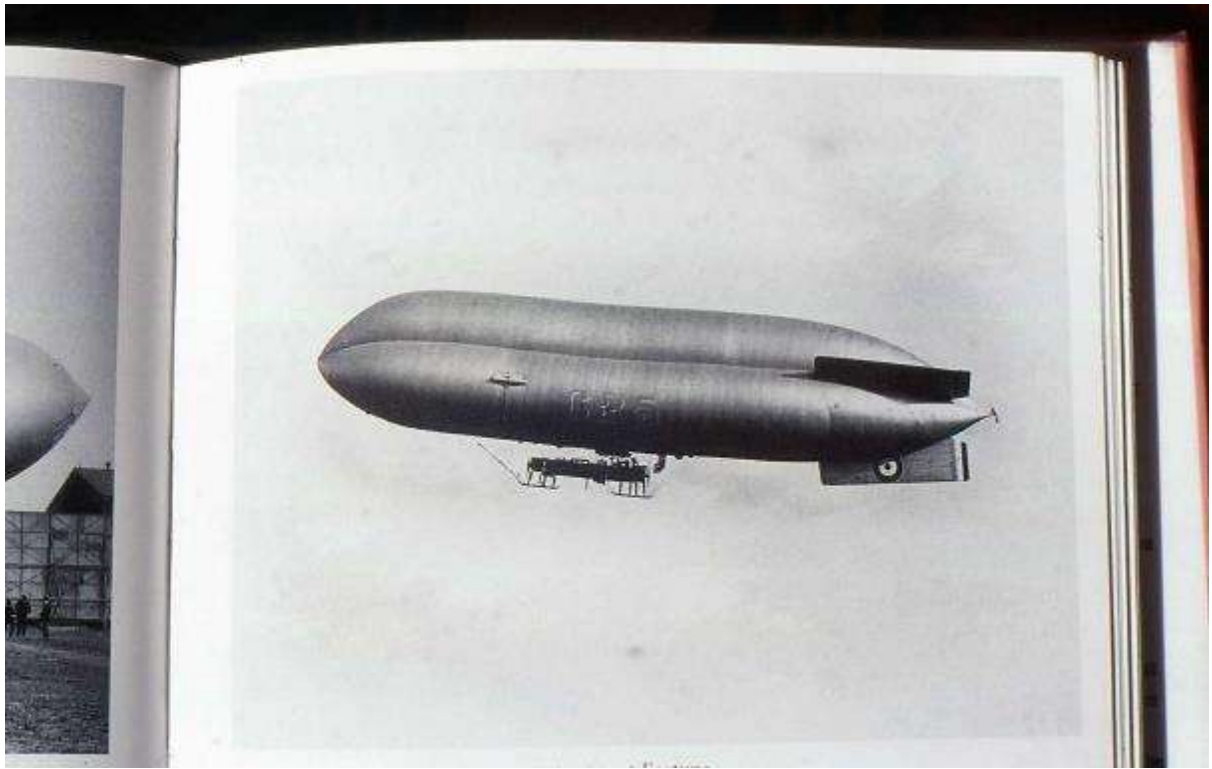
200 740

PERUWS

Not used slides



Slide 9



Slide 74

Colin Vosper's PowerPoint Slides and Notes

The tragically
short history of
His Majesty's Airship

R. 1 0 1



Lecture originally
compiled by the
late Mr. Paul Bell



Slide 2 CARD 1 – Ramsey McDonald’s Labour Government sponsored R101’s attempt to fly 5000k miles to INDIA

In the failing light of the evening of Friday 4th October 1930, this splendid vessel, the largest in capacity so far built by man, hovered for a few seconds over the works at Cardington, near Bedford, [50 miles north of London via M1] where it had been built, before revving up its five engines and setting off on **its inaugural 5,000 miles flight to India.**

Built at a cost of **over £1 million of taxpayers’ money**, it represented the last word in long distance air travel, and had evoked much the same sort of public interest as Concorde was to do in future years.

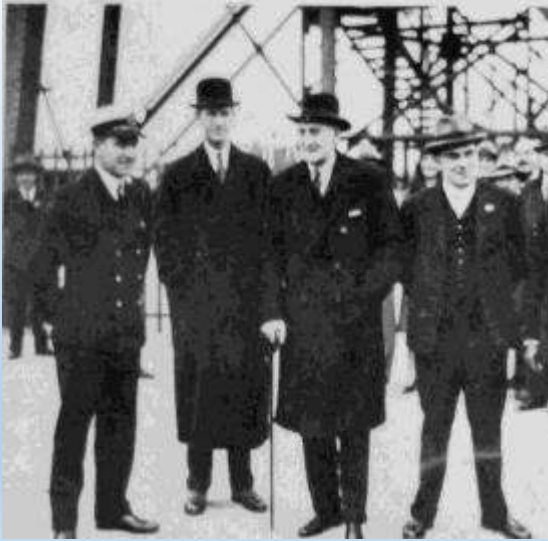
The **press were generally favourable** and the Airship R101 set off with high hopes for the future and the interest and best wishes of the whole country.



Slide 3 Card 75 Cont. – The challenging and untried 5,000 mile route to India

From the 'Royal Airship Works; Cardington to Ismailia is 2700 miles where a refuelling stop was to be made. Much of this section was over turbulent landmasses and flying into high temperatures, low-lift areas over Egypt and the Middle East.

From Ismailia to Karachi is a further 2200 miles over the burning Arabian Desert, where the lift would be so weak that the landings and take-offs would have to be made at night when the air temperatures were lower. Looked at in retrospect, it is apparent that to those in the know, knew the flight was going to be a terrible gamble.



Saturday 3rd October 1930

..... with only 10 hours to live

Lord Thompson

Air Vice -Marshal Sir Sefton Brancker

Lt Col. V. C. Richmond (R101 designer)

... with (left) the Navigating Officer
E. L. Johnson

... of the 12 passengers and
42 crew, only 6 survived

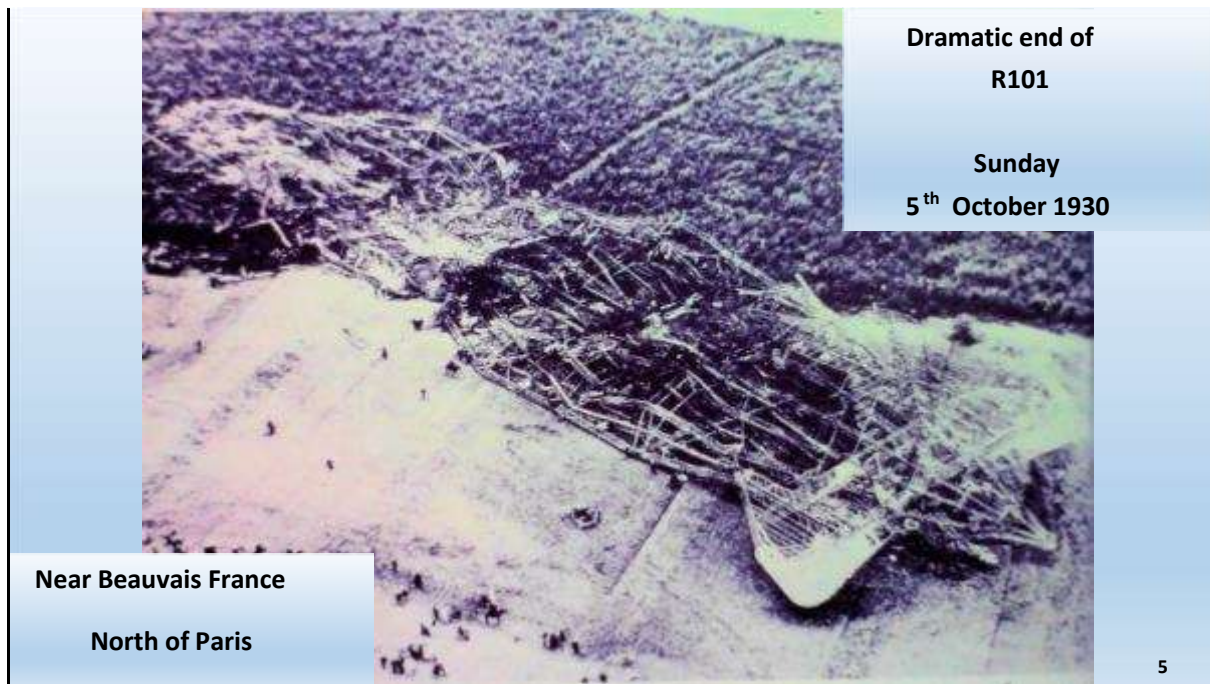
4

Slide 3 CARD 2 – On-board, were the elite of the air industry

On-board were the elite of the air industry, the high-ranking representatives of the

Government, the Civil Service and Armed Forces and the Airship Service and the officers and crew had been carefully selected from the most experienced men available. The whole **enterprise was expected to be a triumph of long-distance air travel for Great Britain.**

NOTE: A second aim was to link the Empire etc..... a third aim was militarily, as the German's had already used airships in the 1st WW.



Slide 4 CARD 3 – Around three hours after departure –TOTAL DISASTER

Less than three hours after departure, on a lonely rain swept hillside in northern France, little remained of HM R101 other than the smouldering heap of wreckage. Of the 55 persons on board, only 8 remained alive and two of these were to die of their injuries shortly afterwards ... (i.e., 49 lives lost)

NOTE: the RAF roundel of the flag on the tail was miraculously salvaged from the wreckage.

**A Nation
in shock**



**Mass burial - Cardington Parish
churchyard - 11th October 1930**

6

Slide 5 CARD 4 – British nation in shock

On hearing the news, the whole nation went into a state of shock in much the same way as it did on hearing the news of the Titanic disaster.

The bodies of the victims were brought back to England and given a State Funeral before being laid to rest in a common grave in the cemetery at St. Mary's Church, Cardington. Despite an enquiry, to this day nobody knows **precisely** what went wrong to cause the crash.

Brief overview
of the history of the
concept of
FLIGHT

Slide 6 CARD 5 - END of INTRO

This then is the story of HM R101's final flight and the background events leading up to this tragic disaster but first an over view of key developments in the history of flight.



Icarus
attempts
to fly ...
" like the birds"

8

Slide 8 CARD 6 – Greek wall fresco – Icarus attempts to fly

This picture, taken from a wall fresco in Pompeii, illustrates the story of Icarus and his father attempting to fly to freedom by means of home-made wings, with disastrous results, at least for Icarus and shows that ***from the very earliest times man has wanted to be able to fly like the birds.***

It wasn't however, until very recently in man's history that his knowledge of science and technology was sufficiently advanced for him to be able to do so. When we talk about flight, we mean using the air which surrounds our planet to overcome the force of gravity, and this can be achieved by two very different meanings.

Dynamic flight (aerodynamic)



Lighter-than-air flight (aerostatic)



could the future involve a hybrid aircraft?

9

Slide 9 CARD 7 - Dynamic flight compared to lighter-than-air flight

Firstly, there is **dynamic flight** (i.e. aerodynamics) used by birds, aeroplanes and helicopters where a body mass is kept aloft by engines or muscles or in other words, by the expenditure of fuel.

Secondly, there is **lighter-than-air flight** (i.e. aerostatics) all based on Archimedes Principle we all learned at school. Where the craft is lighter than the air it displaces and therefore it floats upwards like a bubble in water, and in this category belong balloons and airships.



A NEW ERA
Begins for
lighter - than - air aircraft

Montgolfier
brothers'
hot -air balloon
—
Versailles Paris
19th September
1783



Slide 10 - As early as 1783, the Montgolfier brothers caused a huge sensation throughout the civilized world when, before a crowd including Louis XVI and Marie Antoinette, they heated the air inside an envelope of alum-varnished taffeta and launched a sheep, a duck and a rooster on an eight-minute, two-mile flight across the royal palace of Versailles, the first flight ever to carry a living creature. The Montgolfiers, subsequently, were rewarded for their efforts with elevation to the nobility, and standard hot air balloons are to this day known as Montgolfiers.

CV1

Hydrogen

replaced
hot -air



Prof Charles himself and
Nicolas -Louis Robert were
the flight crew

A NEW ERA
Begins for
lighter - than - air aircraft

Dec 1st 1783

First manned flight
Three People
instead of farm animals

11

Now, at the same time the Montgolfier brothers were busy flying farm animals across the French countryside, Prof (inventor and scientist) Jacques Charles and two French engineering Robert brothers [**Anne-Jean Robert** (1758–1820) and **Nicolas-Louis Robert** (1760–1820)] were doing something similar BUT USING HYDROGEN.

They drew a large, paying crowd and with the THREE MEN as passengers.

The flight lasted a whopping 2hours 5 minutes and featured such advanced controls as a hydrogen release valve and sand-bag ballasts. Thereafter, the use of hydrogen as a lift element superseded hot air. (Helium, eventually, would come into play as the best alternative for lift, being both more buoyant than hot air and less volatile than hydrogen, but it was not produced in sufficient quantities for use with airships until after the First World War.)

CV1 Colins note to himself that text needs editing – indicates that he hadn't finished presentation



**Victorian era –
ballooning was a
gentleman's sport**

The **Royal Aero Club** set
up to serve the interests of
its members, which seems
to be well illustrated in this
picture.

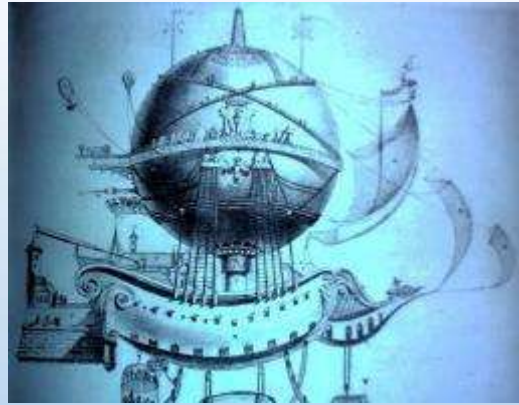
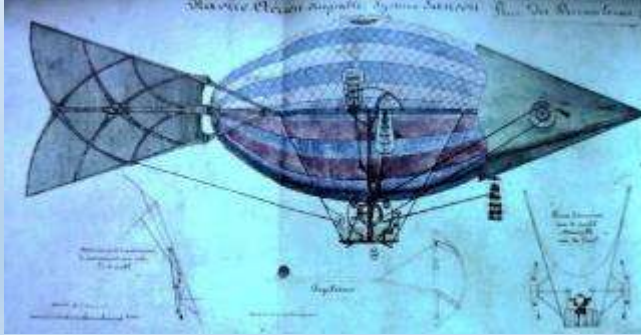
***"Come up and see my
etchings from a height,
my dear."***

12

Slide 12 CARD 12 - Victorian era– ballooning a gentleman's sport

In the latter part of Victoria's reign, ballooning had become a gentlemen's sport, with the Royal Aero Club set up to serve the interests of its members, which seem to be well illustrated in this picture.
"Come up and see my etchings from the height, my dear."

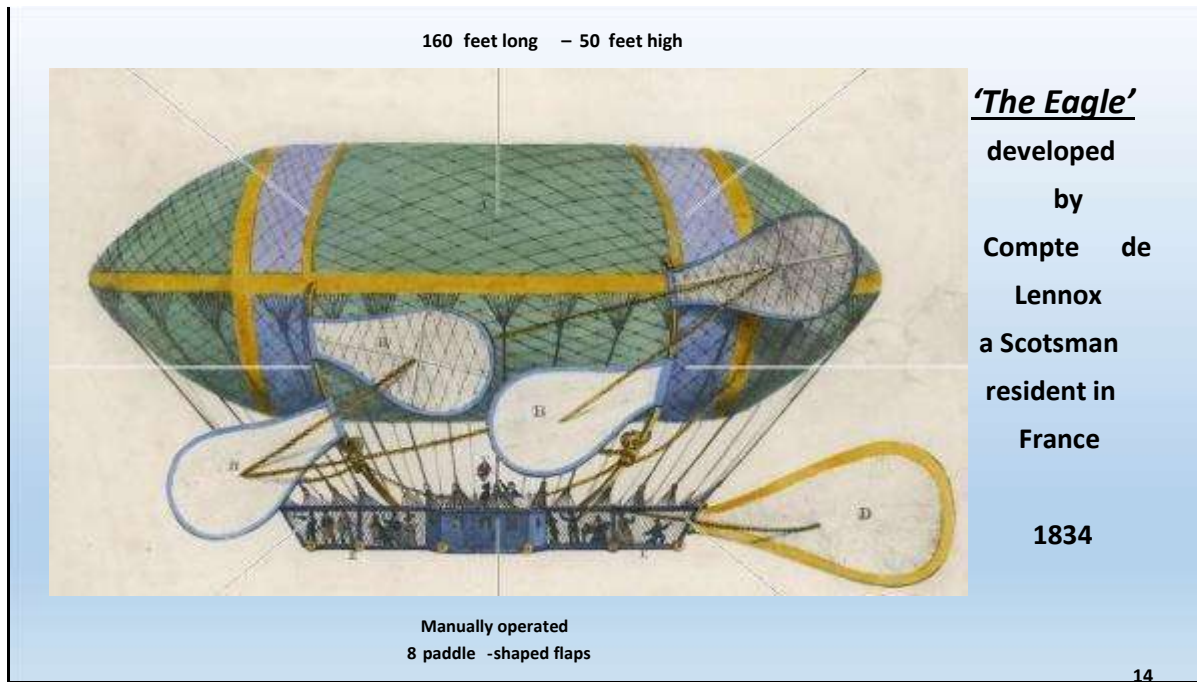
Over
the years
– a range of
creative ideas



13

Over the years there were many varied and wonderful inventions.

Creating controls over **direction** and providing a means of **propulsion** was the name of the game.....
Referred to as dirigible...from the French word to direct.



Slide 14 - 'The Eagle', developed (c 1834) by the Compte de Lennox, a

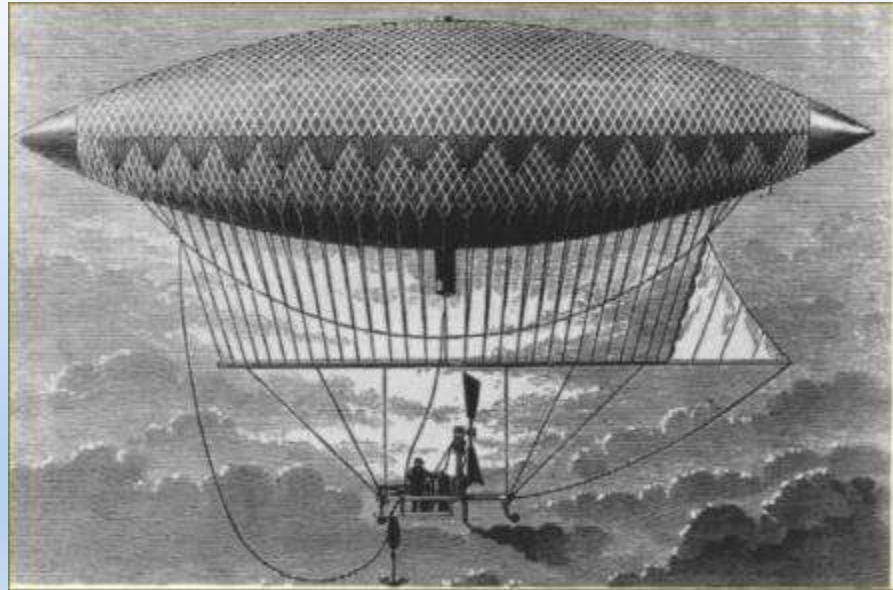
Scotsman living in France, was exhibited on the grounds of the Aeronautical Society in Kensington, London. It measured 160 feet long, 50 feet high and 40 feet wide, with a capacity of 98,700 cubic feet. The ship was cylindrical with conical ends and had eight paddle shaped flaps for propulsion and power, four on either side, like a giant rowing boat. The paddles were intended to be worked manually backwards and forwards manually by a series of cords and chains.

Colins animation shows linked rotation of flaps



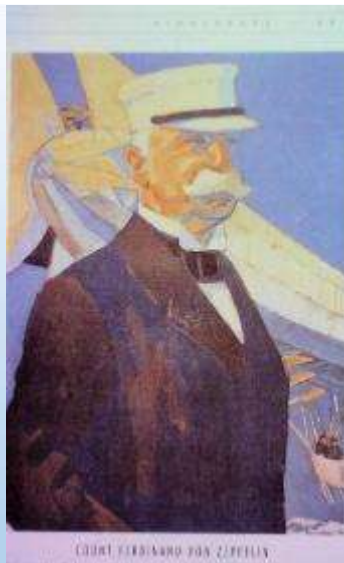
Henri Giffard

First powered
flight steam powered
Sept. 24, 1852
51 years before
the Wright
brothers first
flight.



Slide 15 CARD 13 – Attempts to use steam power

Although by the 1850s, the steam engine in one form or another had been around for the best part of 100 years and had become a highly developed and sophisticated machine. It was by its very nature, an inherently heavy object completely unsuited as a source of power for any kind of flight. Nevertheless, attempts were made to build a steam plant light enough to do the job. The picture on the screen shows an airship built in 1852 by Henri Giffard, a well-known French locomotive engineer. It was powered with a steam-injector engine that weighed only 250 pounds. **Giffard was the first person to make an engine-powered flight when he flew 27 km in a steam-powered dirigible (capable of being steered) airship.** It is totally unknown just how successful as a practical flying machine Gifford's airship was.

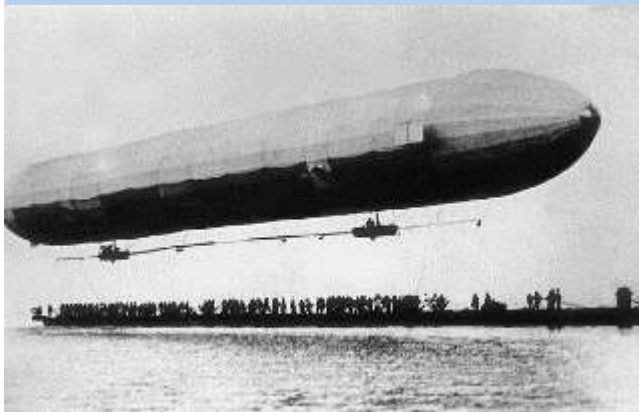


A New Airship Era Begins.....

German Army Officer
Count Ferdinand
Von Zeppelin

July 1900
Luftschiff
Zeppelin 1, or LZ 1

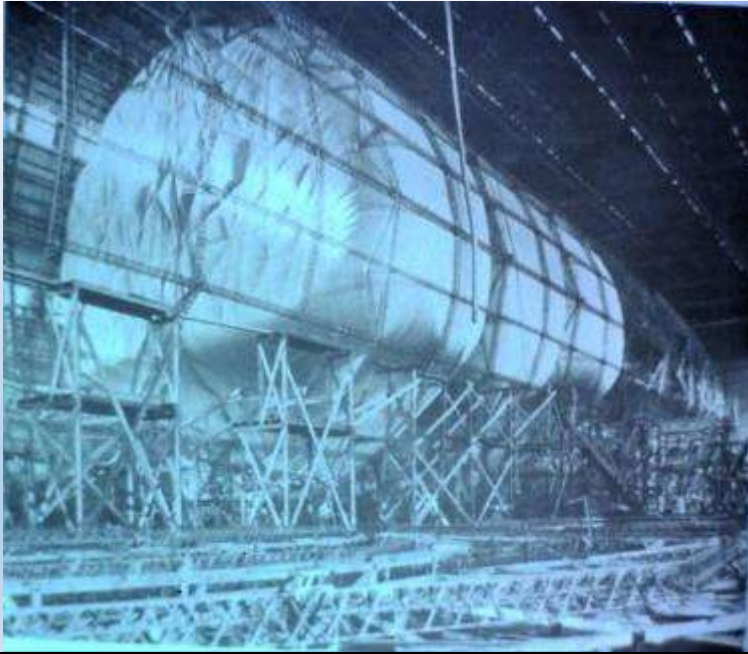
16



Air new era of airship development ...this time by the Germans:

The Luftschiff Zeppelin 1, or LZ 1, was launched before twelve thousand spectators on the banks of the Bodensee at 8 p.m. on the second of July, 1900. The Count himself was at the controls.

At **420 feet in length, and 38 feet in diameter**, the LZ 1 was then the largest thing ever built to fly and was the **first of the rigid airships**, dirigibles built with internal, aluminium skeletons that didn't depend on pressure to maintain their shape and so could be made larger, travel at greater speeds and withstand more inclement weather conditions.



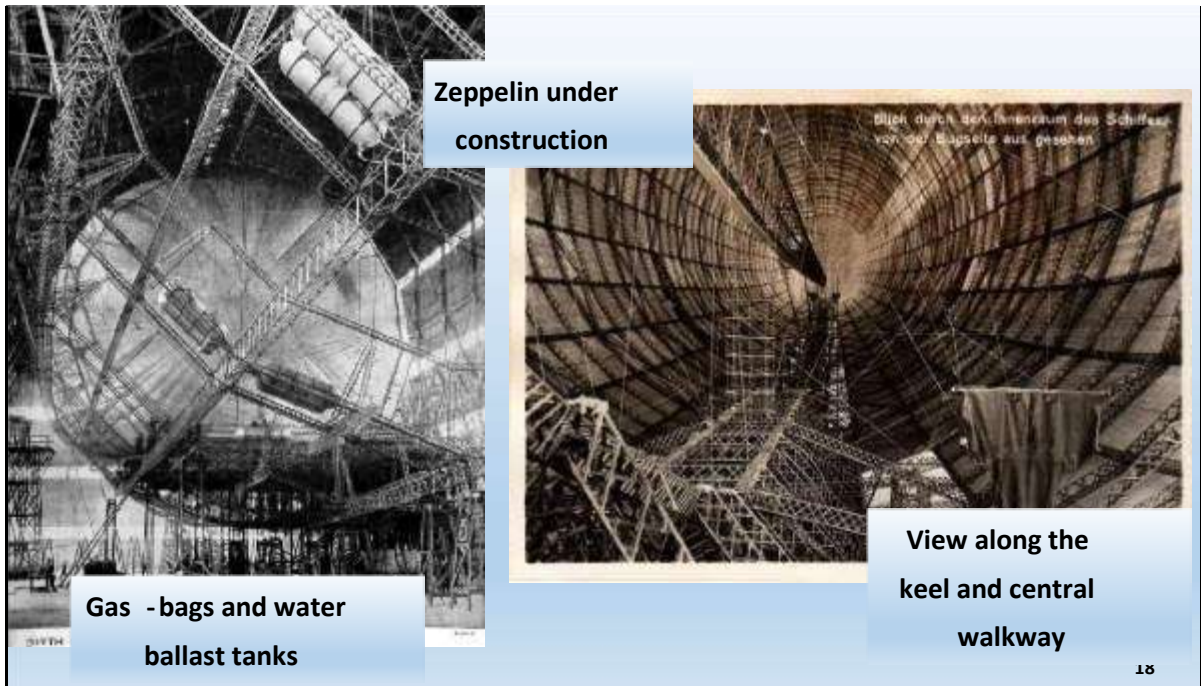
**Zeppelin airship
under construction**

**Shown here with
3 gas -bags
set within a rigid
metal frame**

17

Slide 17 CARD 17 – Zeppelins used a collection of large balloons enveloped inside a cage. Here we see Zeppelin's idea of an airship taking shape. Two large balloons or gasbag are already in place within the rigid metal frame which will, in due course, be covered with a linen fabric and painted with a special aluminium paint.

When complete, beneath this huge cylinder will be hung two cars or gondolas containing the engines, radio room and central position. At this stage in its development, despite its huge size, the envelope or body of the Zeppelin contained nothing other than gas-bags and fuel tanks.



Slide 18 CARD 18 – View inside a Zeppelin

On the left, the fuel tanks which are made to be capable of jettisoning in an emergency and on the right are large rubberised bags which contain water-ballast which can be released from the control car, as required.

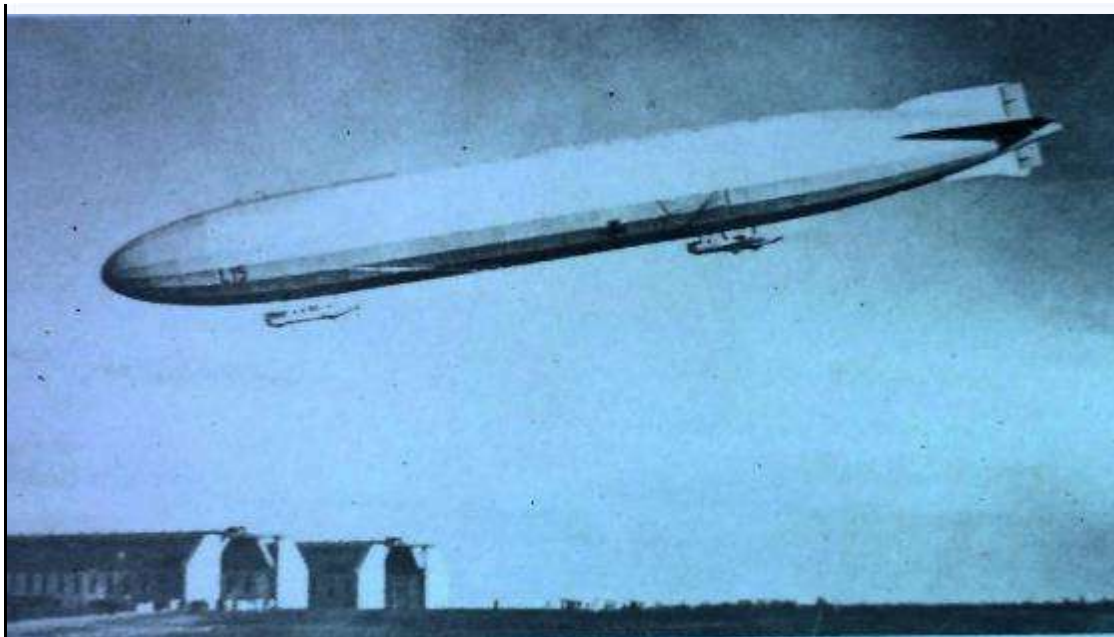
On the right, we see a view inside the hull looking along the bottom or keel showing the Zeppelin's Duralumin girders and frames. Just visible is the very narrow crew walkway running through the airship.



Slides 19 CARD 19 – Zeppelins built for bombing purposes.

The military potential of this new form of transport was quickly realised and to the dismay of the old and both the German Army and the Navy began to experiment with zeppelins for bombing and observation purposes.

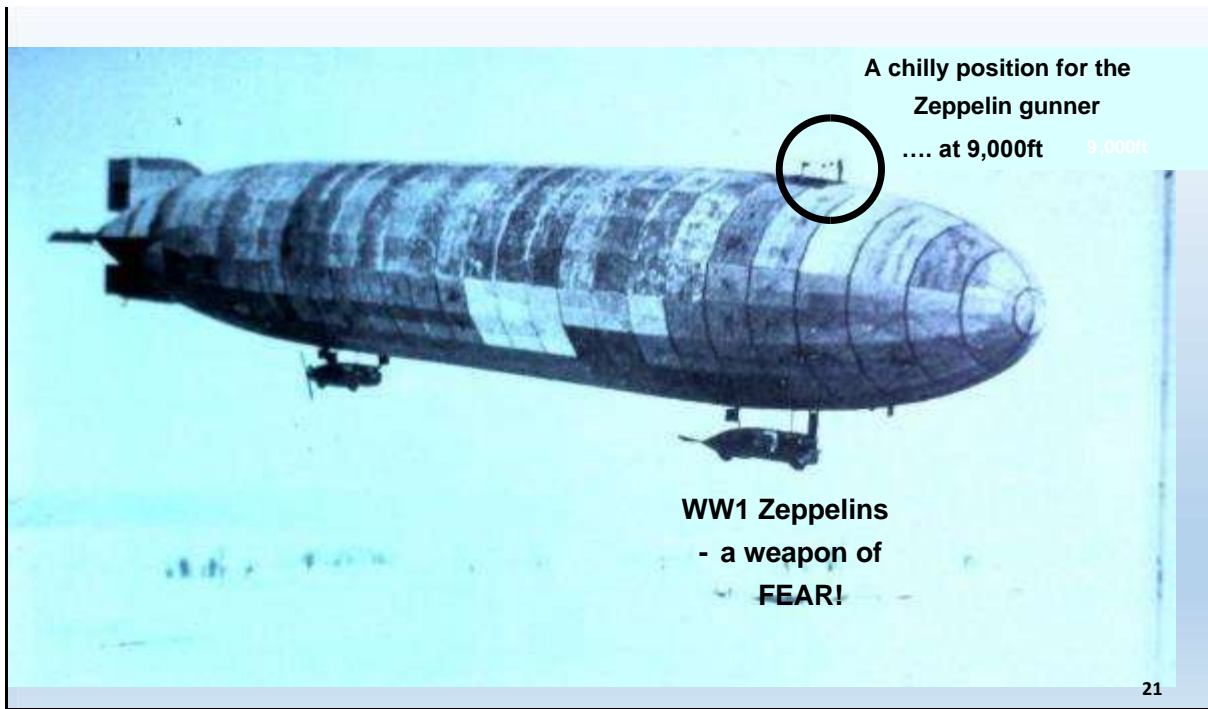
During 1914 -18 war, nearly 100 Zeppelins were built and took part in offensive action on various fronts bombing, England, France, Belgium and Italy.



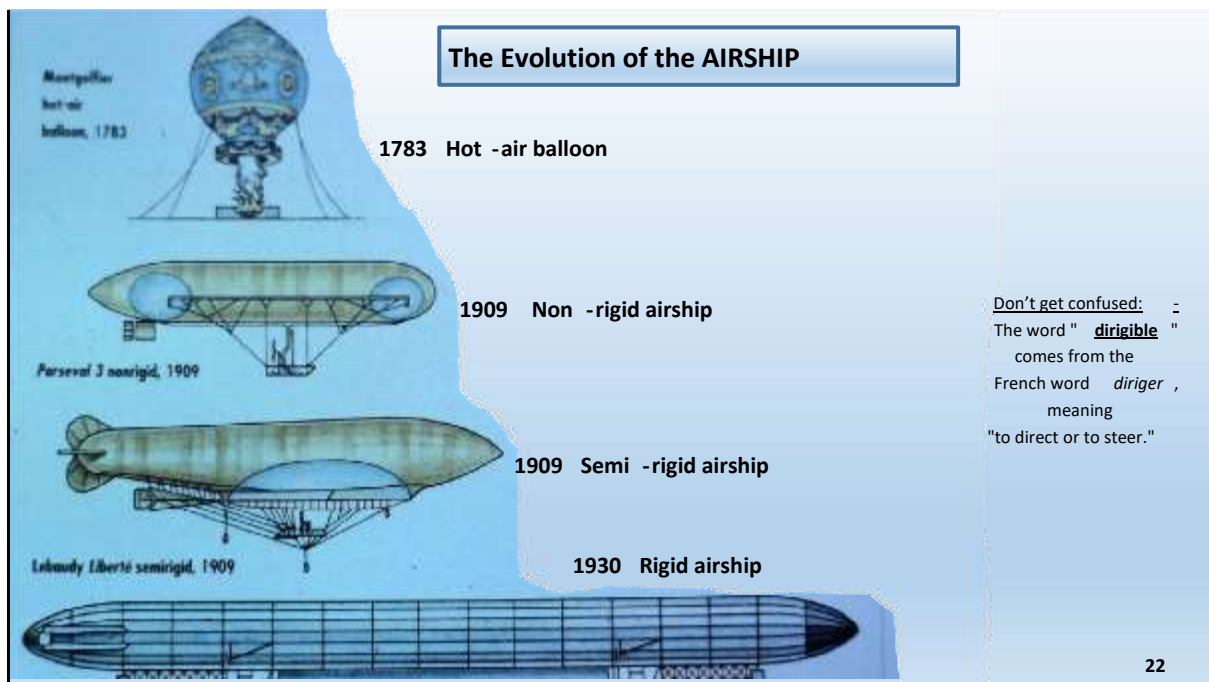
20

Slide 20 CARD 20

Here, we see a typical naval Zeppelin returning from a raid on English towns in 1915. Note the gondolas hung beneath the airship casing drag and not adding to the efficiency of the airships through the air.



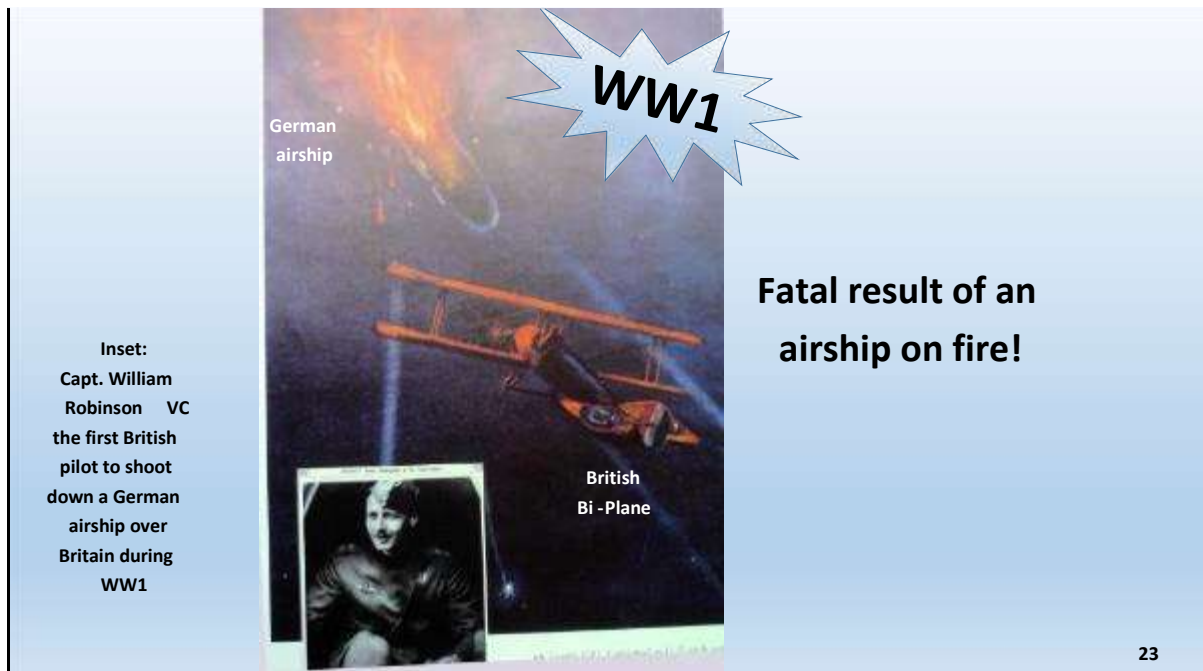
Slide 21 (Ref Card 21) As part of its limited defence against attack from enemy aircraft, the Zeppelin had machine gunners stationed on top of the envelope. As raids usually took place on clear frosty nights, one can only imagine how these men must have suffered being carried 60 miles an hour through freezing air anything up to 9000 feet above sea-level, with no protection other than their clothing.



Slide 22 CARD 22 - Historical evolution of airships Here we see a diagram showing the evolution of airships.

- 1 First, the simple hot-air balloon of 1783
- 2 Next, the elongated balloon.... With no internal framework.
- 3 Followed by the streamlined semi-rigid, but mechanically powered airship.
- 4 Finally, the true rigid airship of Count Zeppelin. [In Britain, the **R**igid Airship was denoted by the prefix **R**.]

This diagram also illustrates how very large, this former flying machine was becoming.



Slide 23 CARD 24v Incendiary bullets developed to set light to the hydrogen

In 1916, with the invention of the **incendiary bullets** there came into being a method of attacking enemy airships. Using the incendiary bullets British airmen were able to set fire to the huge bulk of the highly inflammable Zeppelins once an aeroplane could get within range.

The airmen whose shot down Zeppelins became national heroes like **Capt. William Leefe Robinson VC** (14 July 1895 – 31 December 1918) was the first British pilot to shoot down a German airship over Britain during the First World War - shown here.

SLIDE 19 As can be imagined, it was a terrible death for the Zeppelin crews who were unable to take parachutes because of the weight factor and were faced with the choice of jumping to their deaths or burning in the air.

CARD 25 – Super (high flying – +20,000ft) Zeppelins to counter attacks from the air.

In 1916, in an endeavour to outfly the defending aeroplanes, the Germans produced a super Zeppelin (or height-climber) which could and did fly in excess of 20,000 feet an enormous height of those days and terrible for the crew, who had neither closed cockpits or oxygen and who often passed-out and died of frostbite or brain damage but in the end the result was always the same.



**Fatal result of an
airship on fire!**

24

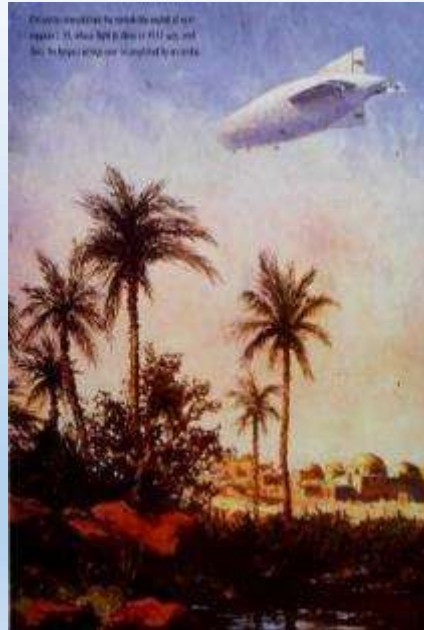
Slide 24 CARD 26 – Fatal results of an airship on fire!

In this picture, which is now I believe to be in the Royal Aero Club, shows the terrible fate that befell so many German airmen. There are many accounts of Zeppelins being shot down in flames during the war as the burning of 1,000,000 cu.ft. of hydrogen in the sky could be seen for miles around and terrifyingly to the crews of other Zeppelins, maybe 40 or 50 miles away. Very few crew members survived being shot down, and all are now buried in a special German war cemetery near Derby.



It was the later sister airship to this L44 which was to hit the headlines.....

This poster immortalises the remarkable exploit of Zeppelin L59 whose flight to Africa in 1917 was, until then, the longest voyage completed by any airship



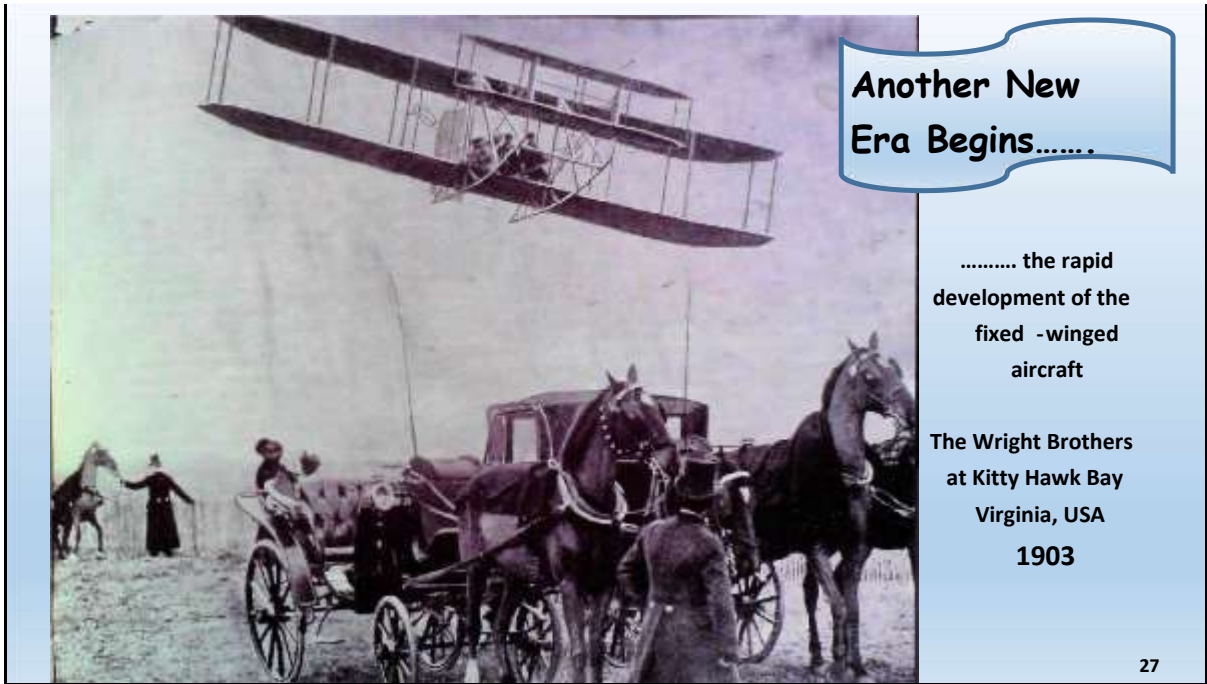
26

Slide 26 CARD 27 – Zeppelin proved the airship’s value for long-haul flights

Although a failure as a weapon of war, Zeppelin had demonstrated that it could fly long distances, carrying substantial loads in varying climates and in this respect, the voyage of the Zeppelin L59 is significant.

During the 1914/18 war. The Germans had a small beleaguered force in what was then German East Africa, which was running out of essential supplies. Relief by land or sea being impossible. They lengthen one of their standard Zeppelins, covered it with cloth which could be made later into uniforms, loaded it up with ammunition, guns, medical supplies, food and sewing machines and sent it off via Turkey to Africa, where it flew halfway across the sub-Sahara to its destination before turning back as a result of a fake British intelligent message, saying that the German force had already surrendered.

On its return to Turkey via ship, the L59 had flown no less than 4,230 miles non-stop an extraordinary achievement for the time and one that clearly set people thinking of its future potential as a long-distance load carrier.



Another New Era Begins.....

..... the rapid development of the fixed -winged aircraft

The Wright Brothers
at Kitty Hawk Bay
Virginia, USA
1903

27

Another new era began in the history of flight when the famous Wright **brothers** began their experiments in 1896 at their bicycle shop in Dayton, Ohio. They selected the beach at **Kitty Hawk** as their proving ground because of the constant wind that added lift to their craft. In 1902 they came to the beach with their glider and made more than 700 successful flights.

SLIDE 27 CARD 28 – Airships were the FUTURE .. without doubt!?!??

So now we come to the end of the Great War and started the 1920s, I must ask, what was the state of civilian flying at that time? To get the picture in perspective, we must remember that we are barely 20 years beyond the very first aeroplane, which was built by the Wright brothers and flown by them at **Kitty Hawk Bay in Virginia in 1903**, he received flying in Europe, where it had been brought on a demonstration tour.



The rapid
development
of the
fixed -wing
aircraft

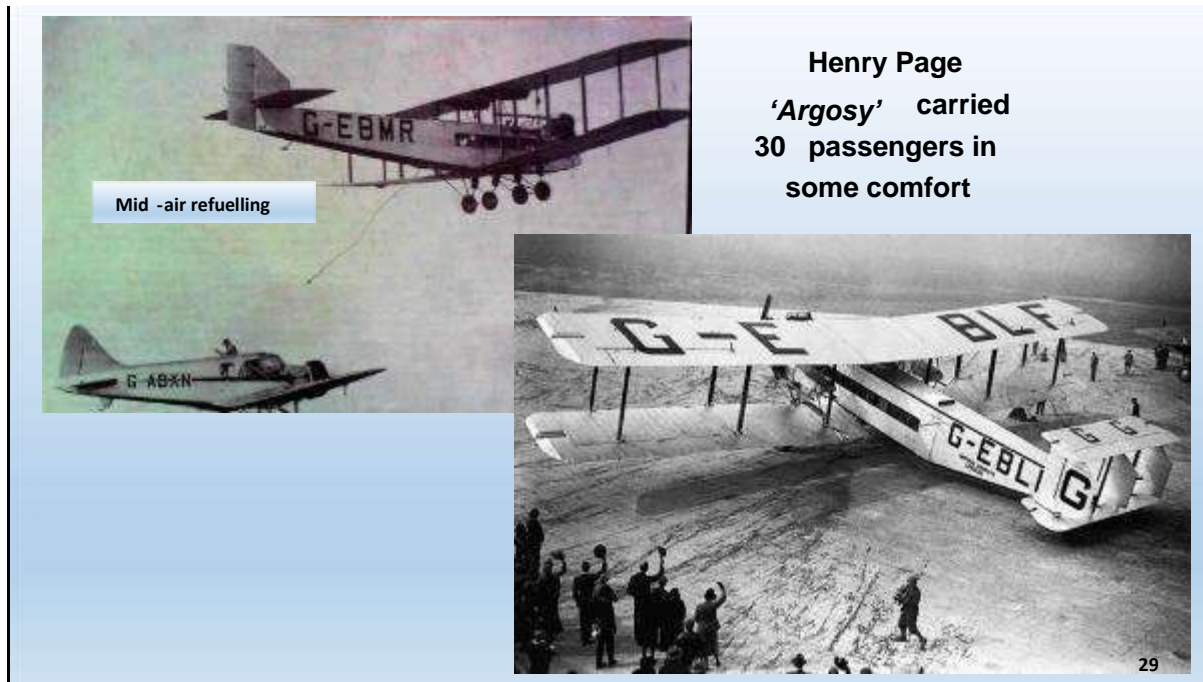
28

Slide 28 CARD 29 – A flight London to Paris by plane

Although the Great War (1914-18) had stimulated all forms of technical development to an enormous degree, particularly flying. It was still very primitive. Indeed, compared to what we take for granted today. And at that time aeroplanes were not seen as serious rivals to airships in terms of aerial or long-haul transport.

(Colin Vosper) planes = noisy, rickety, unreliable, took few passengers, drafty and uncomfortable. For instance, a regular daily US service from London, Croydon to Paris, Le Touquet had just been started and looked like this. An old government surplus wartime biplane with a little cabin for three or four people built into the fuselage and the pilots sitting in an open cockpit upfront.

The pilot navigated to Paris by following the railway to Redhill junction, turning left and following the South Eastern rail line through Tonbridge to Dover. Hopefully from here on a clear day he could see Calais, and once Calais was reached, it was very easy to follow the railway line to Paris. *Foggy days were a problem and 21 miles over open sea seemed a very real risk.!!*

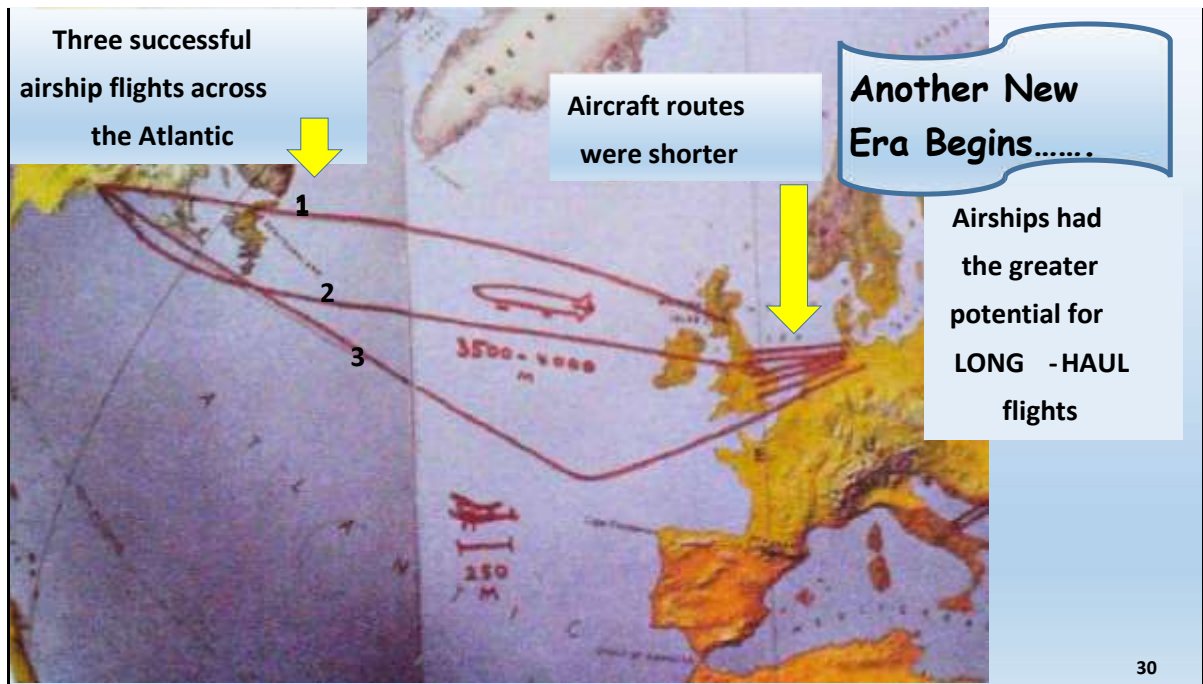


Slide 29 CARD 30 – 'Argosy' carried 30 passengers

The intrepid traveller of 1920 would have to wait another nine years for this really sophisticated Henry-Page 'Argosy' airliner seen in the right-hand photo. The Argosy could carry 30 passengers in some degree of comfort in a proper cabin and at 80 miles an hour.

Even this aeroplane would be based on a wartime bomber and the pilots would still be in an open cockpit at the bow of the aircraft. This picture was actually taken well into the 30s when the Argosy was already outdated.

However, top left is an interesting photo as it shows an early if not the **first attempt to refuel aircraft in the air**. The gentleman standing up in the small plane has managed to grab the weighted string lowered from the Argosy and is pulling the hose down. One would love to know what was going on up-top, maybe a funnel and jug!



Slide 30 CARD 31 - Airships had greater potential than aeroplanes

It will be noted that in addition to the big flight of the L59 across the Sahara during the war, they had by 1920 also been three successful crossings of the Atlantic by airships, two of them against the prevailing wind.

Bearing in mind therefore the still primitive state of air travel at this time, it is easy to understand why airships compared very favourably with the alternative short-haul aeroplanes.

This map demonstrates very graphically the much greater **range** of the format, to which can be added their capacity to carry heavy loads.

UK
Government's
initiative...



Labour Prime Minister:
Mr. Ramsay MacDonald's Cabinet
...approved the
"IMPERIAL AIRSHIP SCHEME"

31

Slide 31 CARD 32 – Transport links to link the British Empire

The question of improving communications within the far-flung British Empire came before **Mr Ramsay MacDonald's first Labour government.** It was quite natural that the use of airships should be put forward, and a generous budget approved for Research and Development in what was to become known as the *"Imperial Airships Scheme"*.

NB Notice the first woman member of the cabinet Miss Margaret Bondfield ...in the back row 4th from left.

**Lord
Thompson
of Cardington**
HM Secretary of
State for Air

-
***“airship
enthusiast”***
Died in the final
R101 flight



32

Slide 32 CARD 33 – LORD THOMPSON – an ‘Imperial Airship Scheme’ advocate

Lord Thompson of Cardington was a leading light in Ramsay MacDonald's Labour government. He had been a brilliant career officer in the Army who had been raised to the peerage to enable him to serve in the Cabinet. He was an airship enthusiast and did much to push forward the **Imperial Airship Scheme**. Sadly, he was to perish in the R101 crash.

Although he was a military engineer, however it would appear that he had only a rudimentary idea of the technical details of airship construction and flying - and some questioned whether this omission was a contributing factor to the tragedy that was to unfold. **(NOTE: This is NOT an issue quoted elsewhere.)**

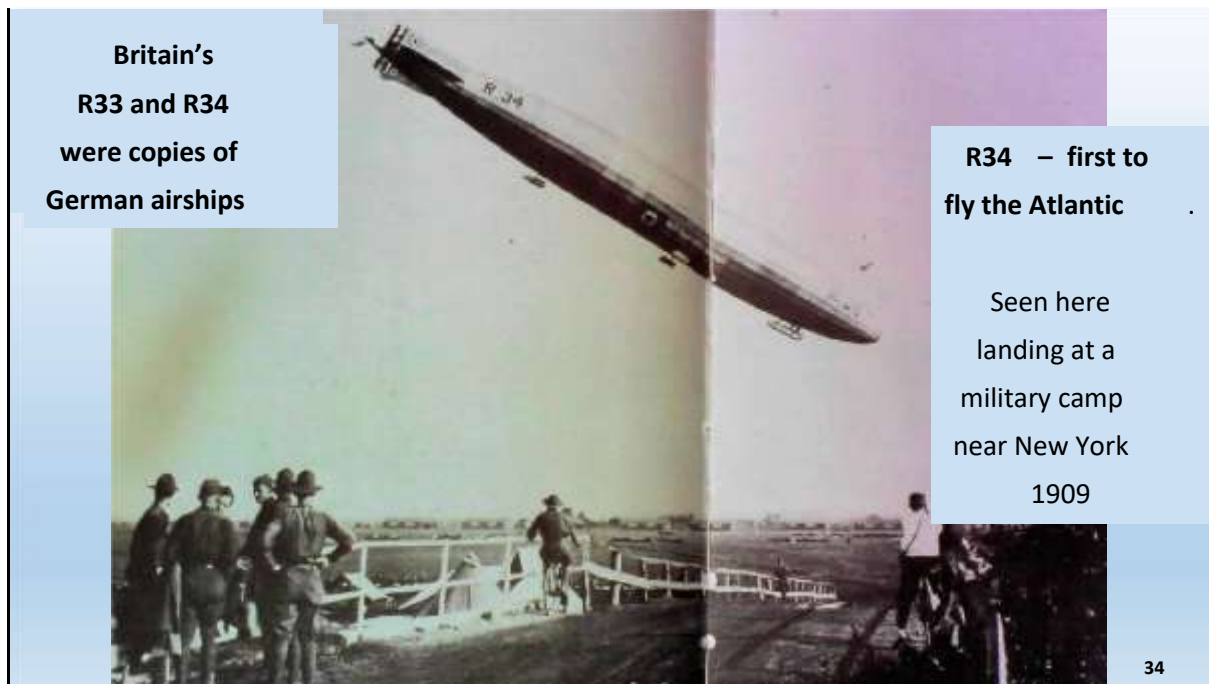


The British built two airships, the R33 and R34 , both were copies of the Zeppelin L33

33

Slide 33 CARD 34 – Germany’s rigid airships copied by Britain as R33 and R34

By the end of the First World War **Germany had built nearly 100 rigid** airships and therefore had more experience than anyone else in this field. **Great Britain on the other hand, had only built 12 airships** to its own design, none of which were really successful and all of which were greatly inferior to those of the Germans who were of course, ‘the enemy’.



Slide 34

The British had built two airships the **R33** and **R34**, which were copies of the Zeppelin L33, which had fallen into their hands more or less intact. Both these airships performed well. The R 34 is shown here landing at a military camp near New York in the summer of 1909 was the first aircraft to fly the Atlantic.

Leaving East Fortune in Scotland on July 2nd 1919, she reached New York on July 6th, where she stayed until July 10th finally arriving back at Fulham in Norfolk on July 13th after a round trip of some 6000 miles.

[PS - A model of this airship for many years was displayed in the main departure lounge at Heathrow Airport, which some of you may have seen.]

CARD 35 Trouble docking the R33 (copy of a Zeppelin)

The R 33, the sister-ship hit the headlines in 1925, now she was torn from a mooring mast by violent storm blown across the North Sea to Holland. From where with only a maintenance party on board, she was against all odds, brilliantly returned to her base and safely landed by young officer Flight Lt. Booth.

Cardington
Airship Station

Nr Bedford

50 miles north of London
by M5
1917 - 31

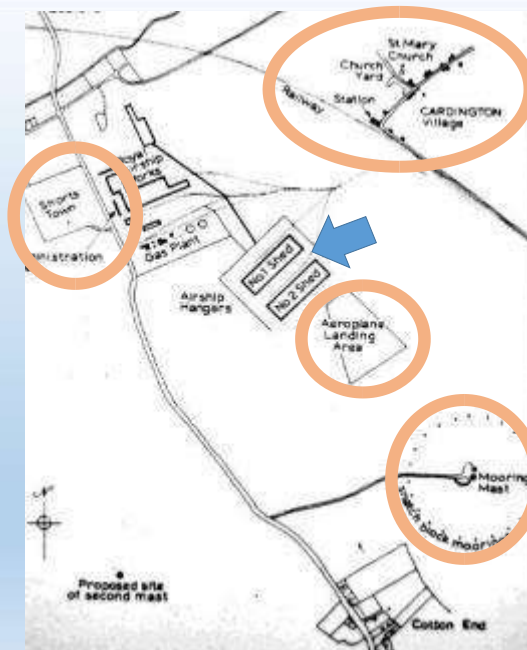
- known as

'Royal Airship

Works'

aka

"The Works"



35

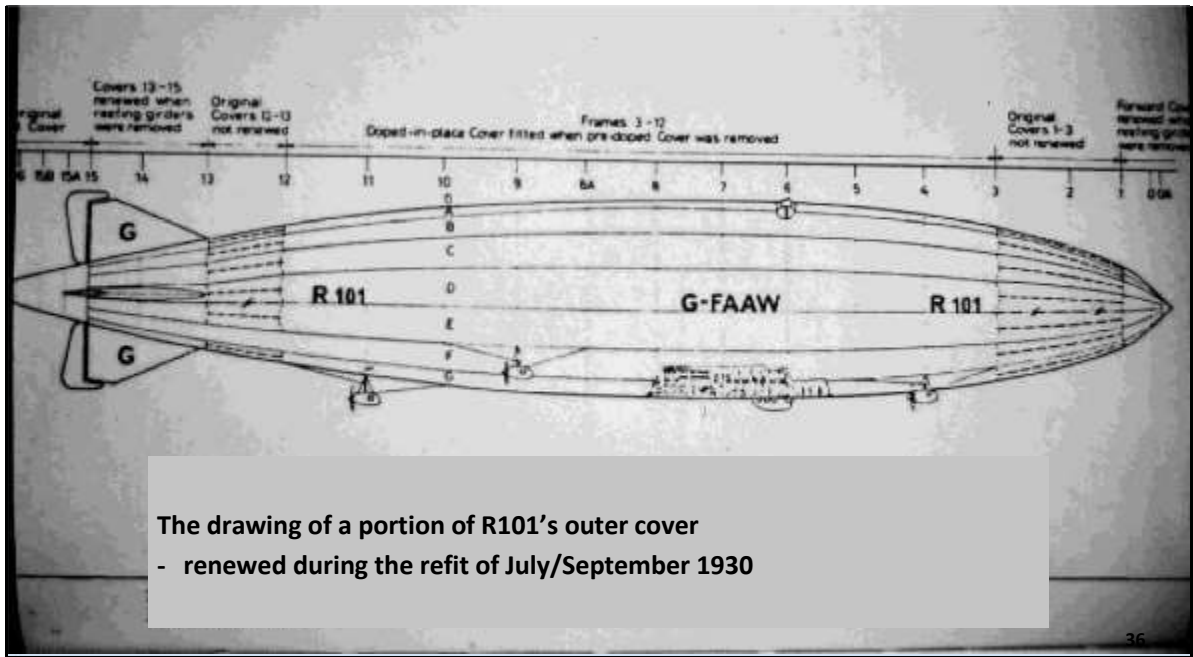
Slide 35 CARD 40 - Cardington – location of “the Works” and development of Shortstown

To build this giant airship, works and base was set up at Cardington village, near Bedford, which included 2 enormous assembly sheds or hangers, workshops, gas plant, railway sidings and administrative offices and importantly, a tall steel tower or mooring mast.

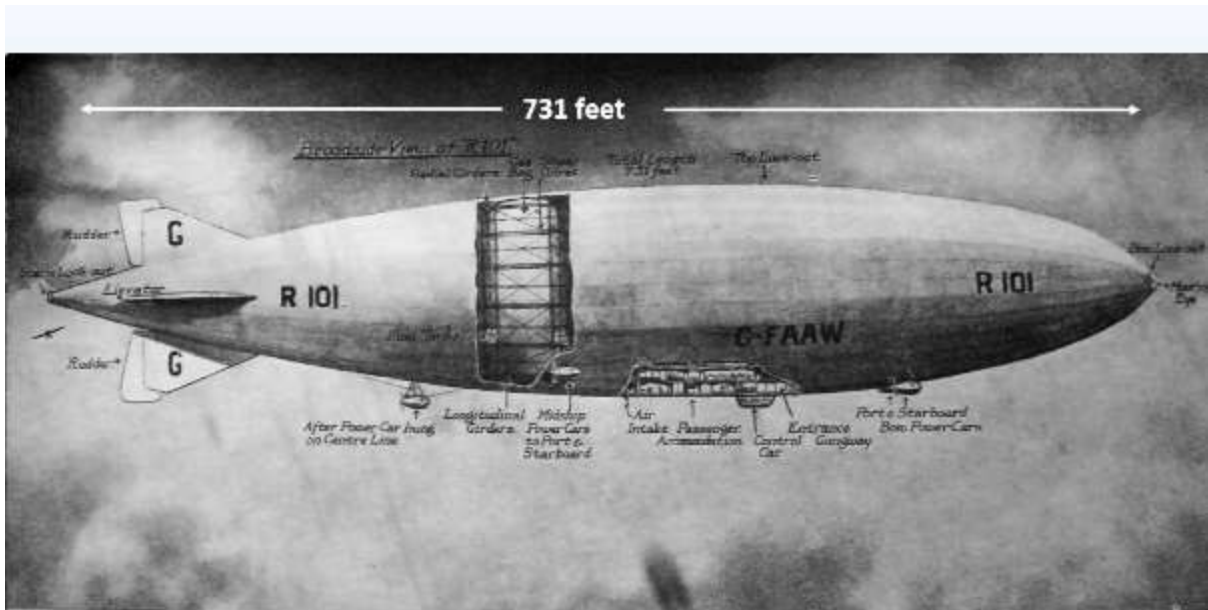
In addition to these buildings. A large area of land was acquired for the airfield.

There was also a "model" village set up nearby for the key staff called **Shortstown**. (NOTE named after the engineering company who was originally to be located at Cardington – **Shorts Brothers**)

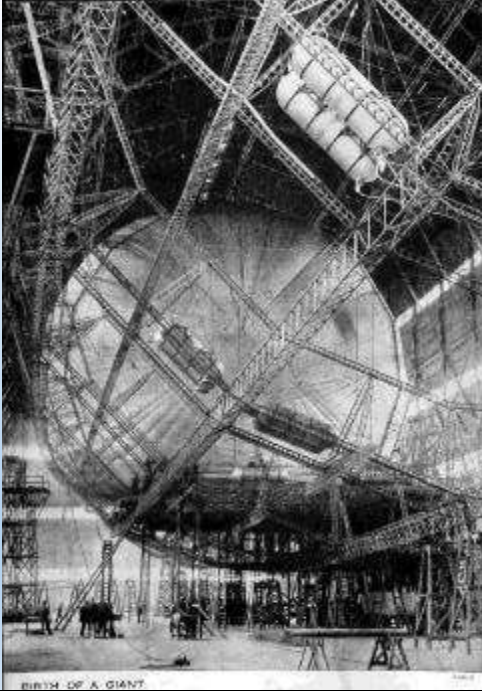
At the height of production most of the labour came from Bedford, which was only 3 miles away.



The drawing of a portion of R101's outer cover
 - renewed during the refit of July/September 1930



Drawing of R101 showing the addition
 of another gas bag
 to elongate it and so make the airship more aerodynamic



The R101 airship under construction in the shed at Cardington.

Construction was by The Airship Guarantee Company

[Labour Government Sponsored]

38

Slide 38 Card 45 – Government contract for construction

The R101 was to be built by a government-sponsored company called ***'The Airship Guarantee Company'*** and the contract was signed in October 1924, with completion planned for some time in 1929.

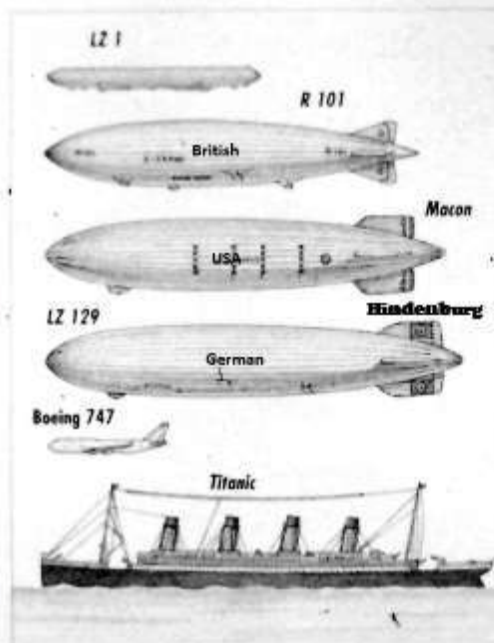
Here we see the R101 airship under construction beginning to take shape in the shed at Cardington. The main aluminium framing is complete and one of the huge gas bags is in position and inflated.

Card 46 – Problems manifested themselves "Make do and mend" philosophy

Unfortunately, as work proceeded numerous problems began to manifest themselves. All unforeseen and many relating to the basic design itself, which seriously through into question the wisdom of departing in such a radical way from the tried and tested system used in the Zeppelins.

As the work dragged on, politics began to creep into the picture with questions being asked about the ever-increasing costs and the apparent slow rate of progress. There is no doubt that the engineering staff at Cardington were in a very unhappy position for most of the time being forced by circumstances to make makeshift modifications when the proper course should have been to make major alterations to the design or possibly even start again.

Comparing the SIZE of airships



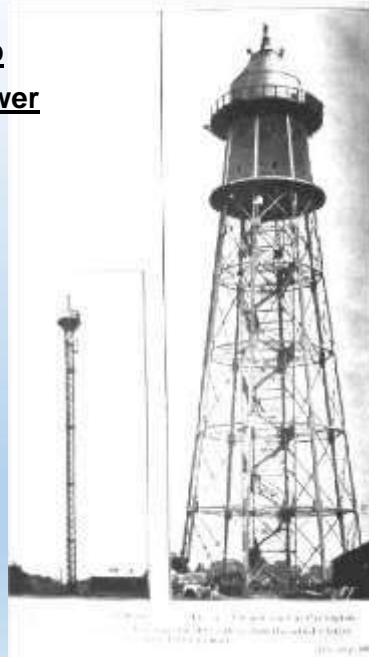
39

Slide 39 CARD 39 - Comparison of airships

Here we see a diagram which illustrates the huge size of the R101 and 2 later rigid airships, namely the Macon built for the U.S. Navy and Germany's last Zeppelin, the Hindenburg, (LZ129) both of which finally crashed with heavy loss of life.

For comparison, we also see a modern Boeing 747 and the Titanic drawn to the same scale.

Airship
Mooring Tower



An ingenious idea by

Major
George Scott

Britain's most experienced
airship pilot



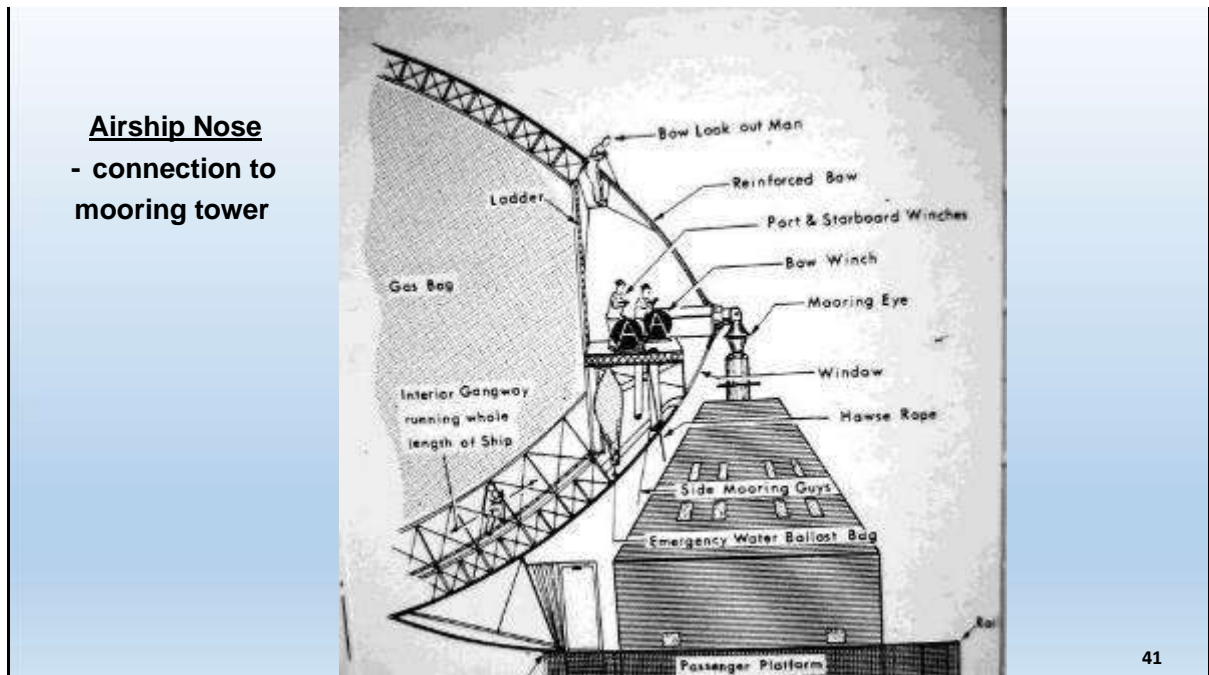
40

Slide 40 CARD 41 – Mooring tower – an idea by Maj. Scott

The mooring mast was a British idea which enabled an airship to be moored safely above ground where it would be free to swing in any direction, according to the wind. Mooring to the mast meant it could safely ride out rough weather without damage, which would have been something that was extremely chancy on the ground. The steel mast was about 220 feet high and contained a lift and staircase for the passengers, gas, water and electric mains for supplying the airship and a strong winch for hauling her in.

To get from a tower to the airship a gangway was let down from the airship to link to a balcony running round the top of the tower. Mooring masts were actually built at Cardington, Montréal, Ismailia in Egypt, in Karachi in India. Curiously a tower was built into the top of the Empire State Building in the centre of Manhattan and it was originally intended as an airship mooring tower.

Airship Nose
- connection to
mooring tower



Slide 41 CARD 42 - Airship nose -- connection to mooring tower

This diagram shows the details of how the nose of the airship was attached to the top of the tower. A precarious gangway for the passengers, was let down from within the hull to link to the passenger platform.

On coming down to be moored the airship would just drop a wire from its nose in turn will be attached to one from the top of the tower, after which both wires will be wound in until the ban could be coupled directly to the tower. Although this sounds simple and straightforward. It took me 40 minutes to achieve.

Airship Nose
- connection to
mooring tower



Passenger
arrival aboard

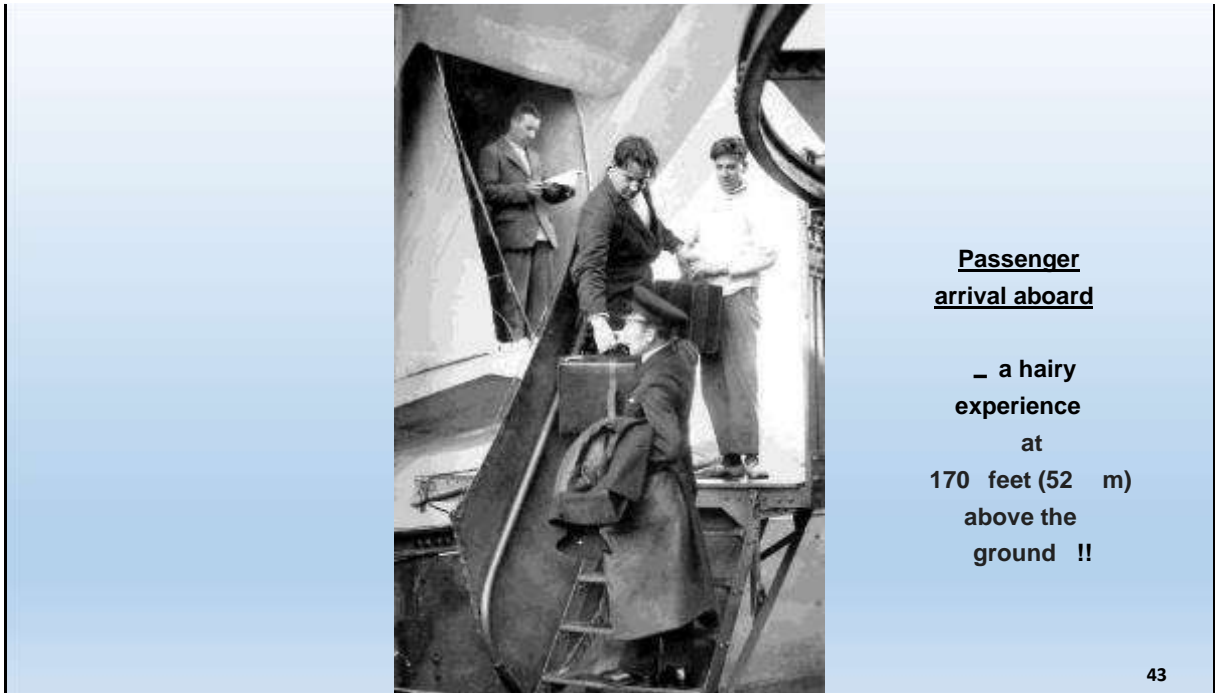
– a hairy
experience
at 170 feet
(52 m) above
the ground!!

42

Slide 42 Card 43 – Passenger arrival aboard – a hairy experience!!

Jumping ahead of it. Here we see the mooring mast in use and the brave passengers walking up the rather flimsy gangway without much protection. As this was all at some 200 feet above the ground the passengers must have had nerves of steel and a good head for heights.

This photo gives a good idea of the size of the airship.

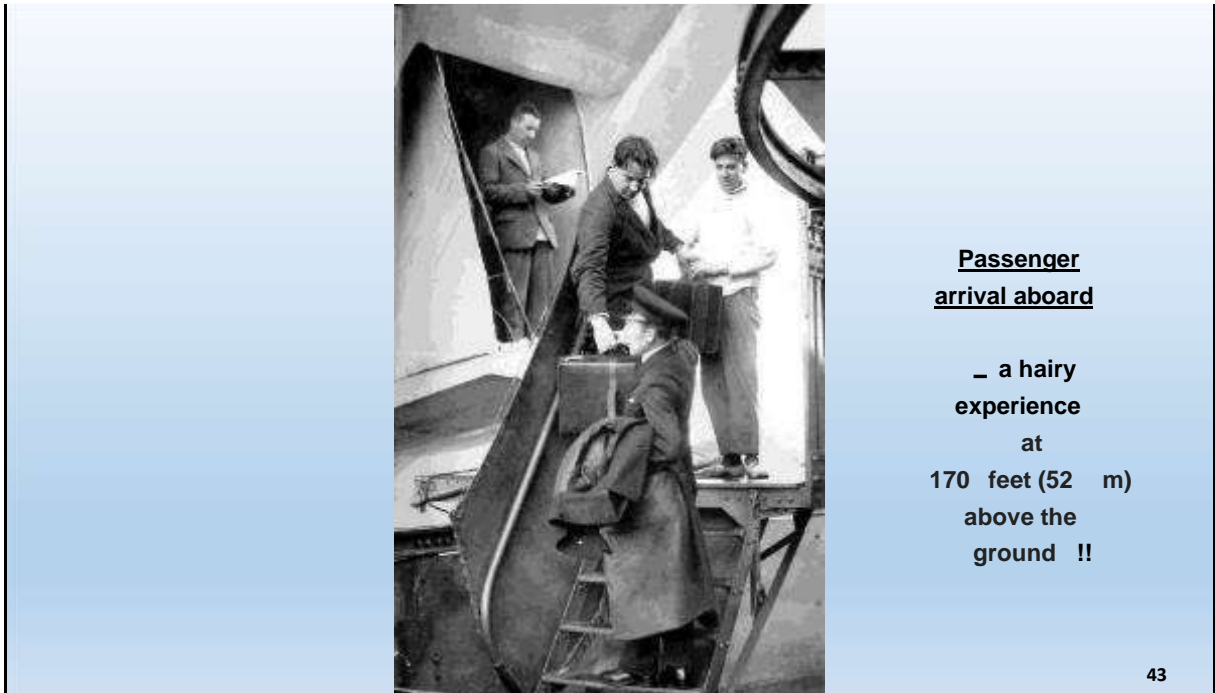


Slide 43 Card 44 – Passenger gangway - 200ft above ground

Here we see a close-up of that passenger gangway which drops down like a drawbridge from the bow of the airship. with its integral steps – remember all at 200 feet above the ground.

The 3 men are standing on a short flight of steps and a small landing, which travelled round the top of the tower with the ship on the curved rail, which can just be seen top right.

The weight of everything going on board had to be carefully checked and noted before each flight.



Slide 43 Card 44 – Passenger gangway - 200ft above ground

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Slide 44 Card 47 – R100 moored in Montréal, Canada No 1

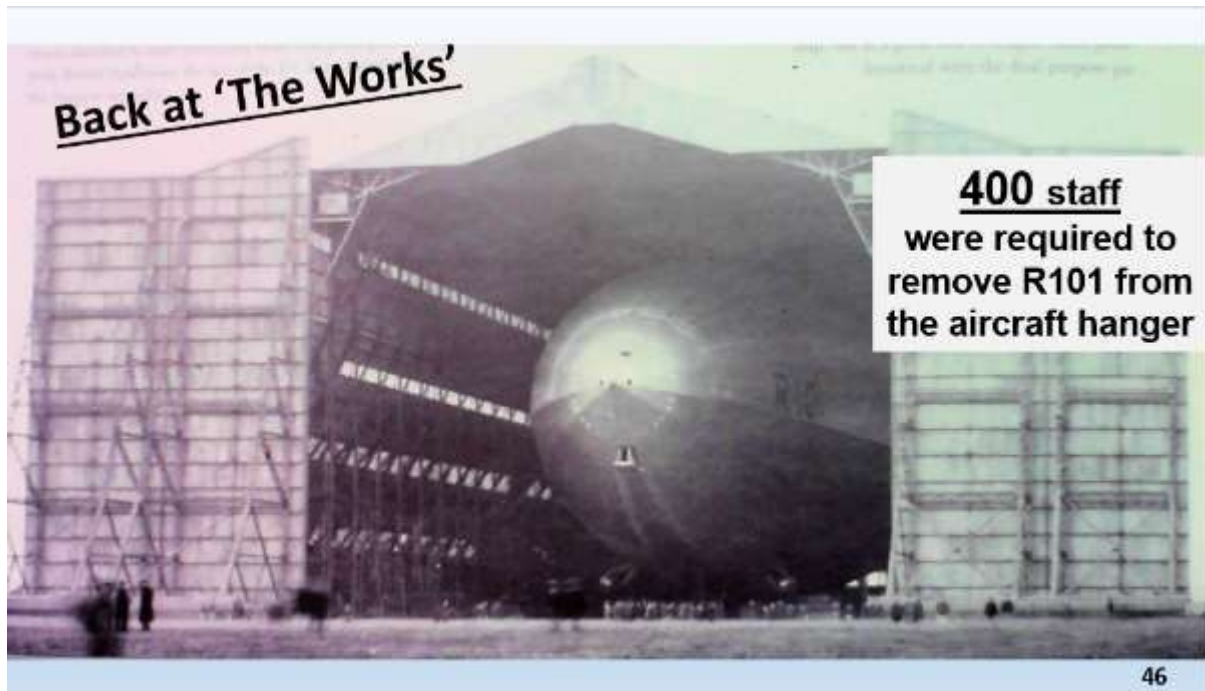
Pressure on the staff at Cardington was also increased by the completion of the private sector competitor the R 100, which had been designed by Barnes Wallis and built in Yorkshire. In many ways, it was a far less sophisticated and attractive ship than the R101, nevertheless, it **succeeded in making a round trip to Montréal.** In so doing, the R100 attracted a great deal of publicity which in turn reflected badly on the work going on at Cardington, as the R101, to an outsider, progress seemed to be lagging behind its rival.



Slide 45 Card 48 - R100 moored in Montréal, Canada No 2 Large crowds

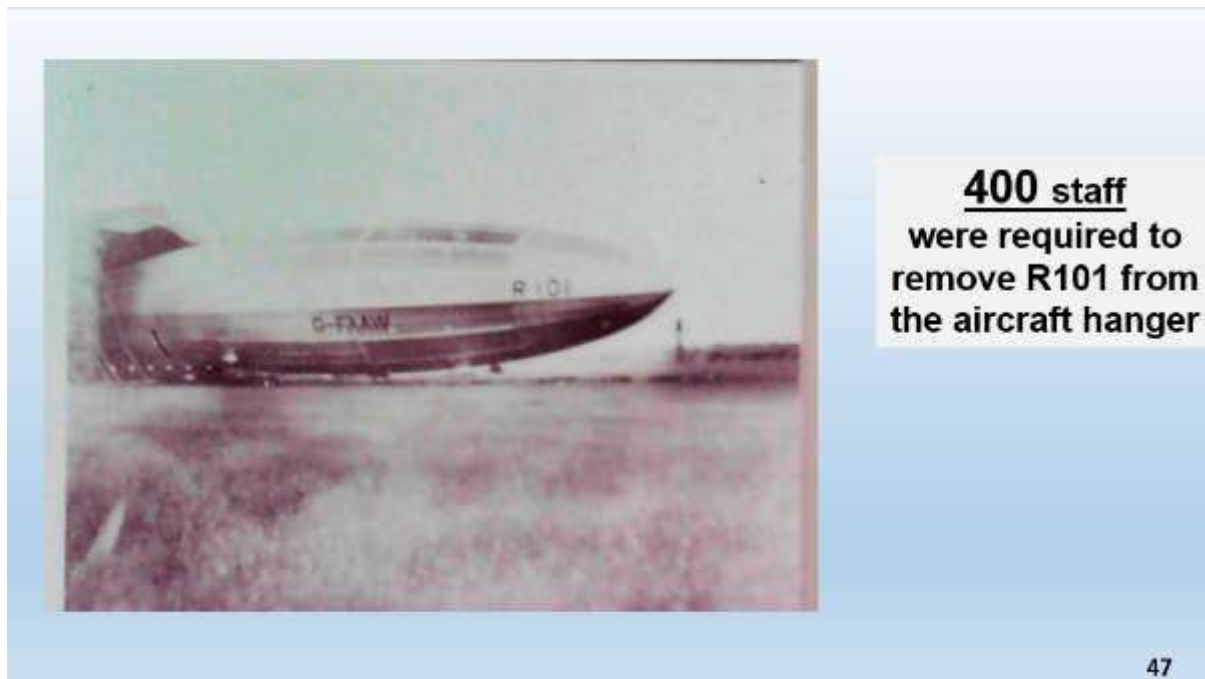
Here we see the R100 on the mast at Montréal, where she attracted a great deal of interest even though it was kept quiet about the fact that she had only just about made the journey due to a variety of reasons.

In reality, not only had she lost the use of one engine, but has suffered quite serious structural damage to the tail. Setting off back home again was a calculated risk, which happily came off, the round-trip being hailed as a great triumph for British airships.

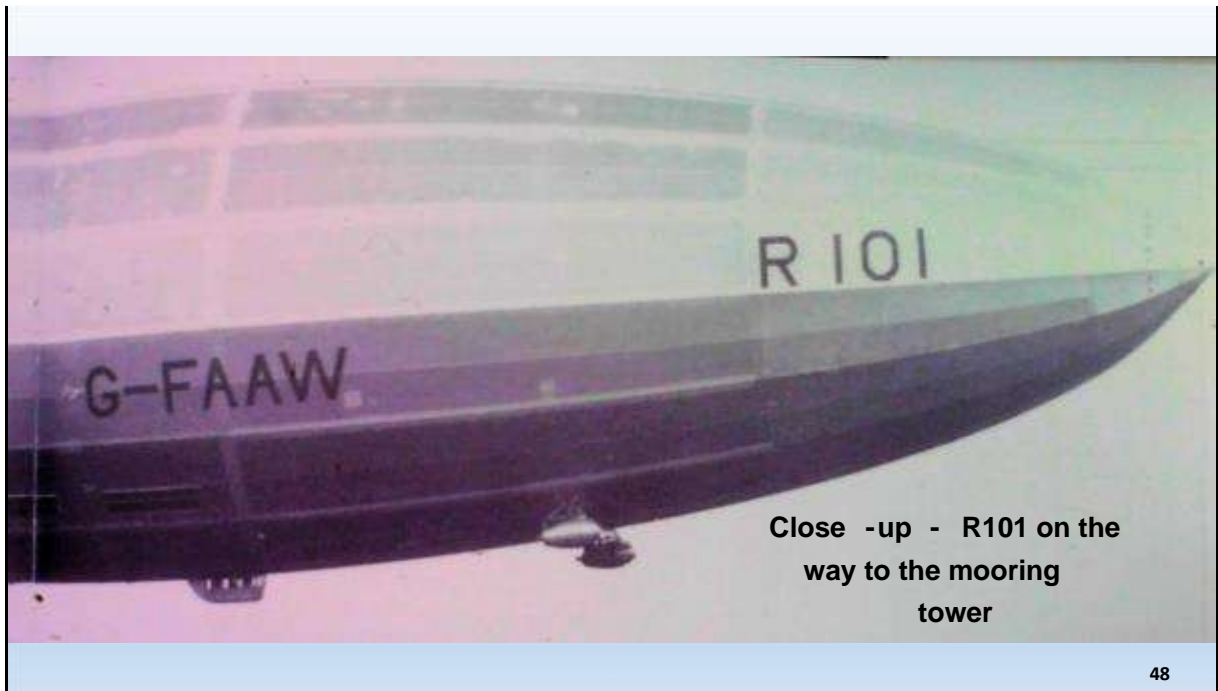


Slide 46 Card 51 - 400 men needed - Manual labour was cheap in those days!

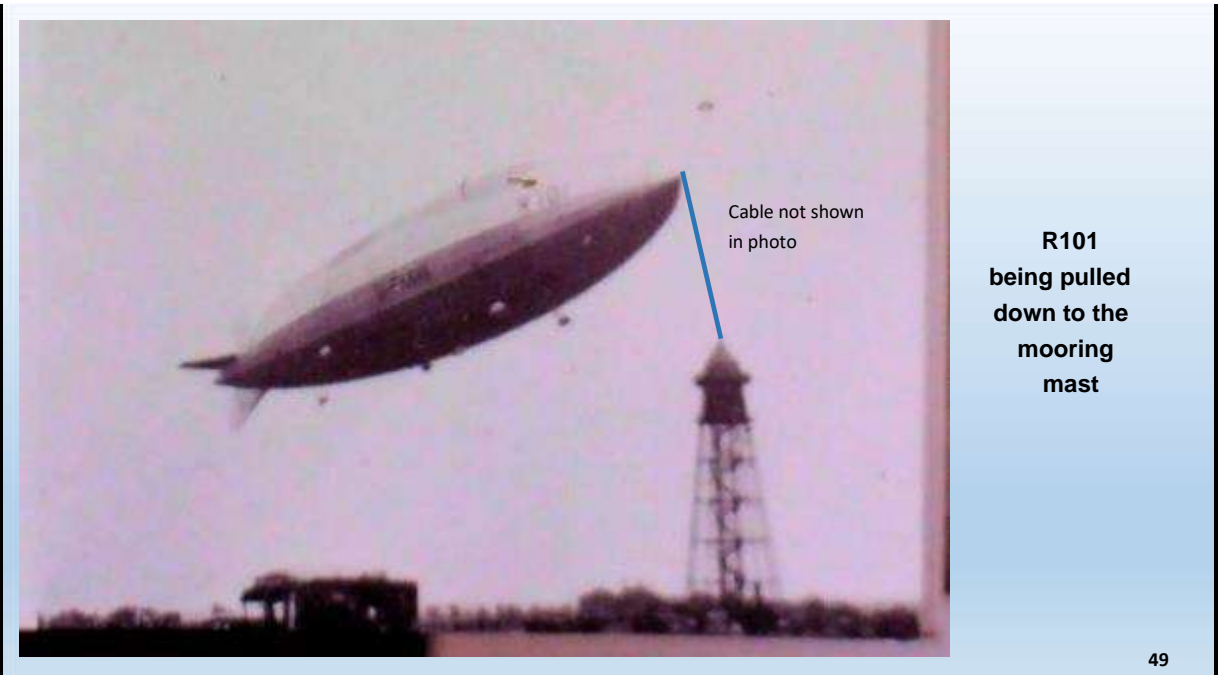
To actually get the airship out of the shed without damage took the entire efforts of the 400 men who took hold of her underside and literally walked her out until she was clear of the building. Such mass use manpower would be quite unheard of today and which even then showed up the impracticality of the airships.



Slide 47 Card 51 This photo shows the ship, just about to clear the shed.



Here is a close-up of the R101 on the way to the mooring tower.



Slide 49

This photo shows her being pulled down to the mast.

Clearly seen are the control car and to the 5 engine gondolas slung underneath the main envelope.

Unlike previous airships, in order to reduce drag as much as possible, all the passenger accommodation and crew quarters etc. were placed *INSIDE* the framework of the hull itself. This gave an advantage in terms of speed, but helped cut the cost of having too many gas-bags.



**Hauling R101
down to lock -on
to the top of the
mooring tower**

50

Slide 50 Card 53 – Hauling R101 down to lock-on to the top of the mooring tower

This picture shows another view of the air ship actually in the process of being hauled down to the top of the mooring mast. The wire dropped down from the nose has been connected to one attached to the top of the tower and the two will be wound in until the airship is locked-on and free to swing with the wind.

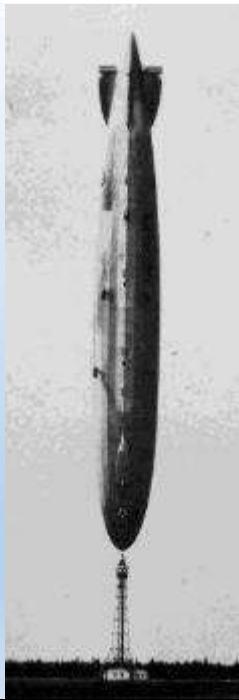


**R101 safely
moored**

Slide51 Card 54 – R101 moored and ready to go.... or was she?

And here she is a last complete and safely moored to the mast waiting to go on her next flight. A pretty impressive sight, which could be seen for miles across the flat, Bedfordshire countryside.

**The danger of a
sudden wind-shift
and wind strength**



“Bottoms -Up”

American photo

August 25th 1927

Los Angeles


52

Slide 52 Card 61 – USA photo shows the dangers of sudden wind shifts and strengths

This picture, which was censored by the United States government for several years shows one of the United States Navy's rigid airships standing on her nose at the mooring mast having been caught by nothing more serious than a sudden shift in the wind.

The airship went over the top rather than round the outside and demonstrates how fickle this type of aircraft can be.

R101 displaying a surprising level of comfort



The top photograph shows a large, empty lounge area with a polished floor, several white columns, and long wooden benches along the walls. The bottom photograph shows a smaller, more intimate smoking room with several wicker chairs and small round tables arranged in a corner.

SPACIOUS LOUNGE
- before completion

SMOKING ROOM
- a risky luxury?

53

Slide 53 - Card 55 – R101 displaying a surprising level of space and comfort.

There can be no doubt that even by today's standards, the R101 provided a quite extraordinary level of comfort for its passengers.

The top picture shows the main lounge before it was finished. This room was 60 feet wide by 32 feet across and when finished, was fitted with chairs, tables, settees along the walls and even flowers and potted plants.

The lower picture shows the smoking room, and almost unheard-of luxury in a hydrogen filled airship. Safety was achieved by keeping the air pressure in the smoking room slightly above that outside and thus ensuring that no hydrogen could enter.



R101
Promenade
Deck
with viewing
windows

54

Slide 54 Card 56 - R101 Promenade deck with viewing windows.

On each side of the lounge there was a promenade deck 7'6" wide by 32 feet long, where passengers can either stand or sit and watch the ground passing beneath them through large windows set in the hull.



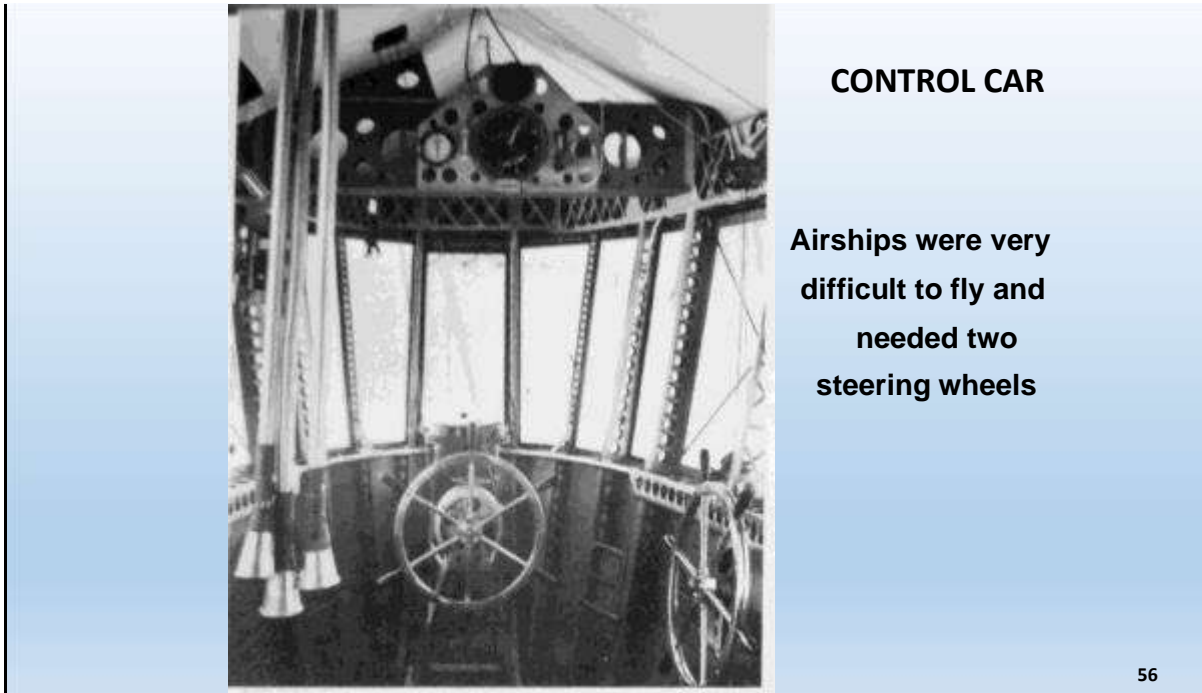
Dining Room
with seating
for 50

55

Slide 55 Card 57 R101 –The 50 seat Dining Room

The airship was provided with a separate dining room, which could seat 50 people at a time and serve for course hot meals, which were prepared in an electric galley on the deck below and send up on a dinner lift. The crew included 2 cooks and 2 stewards.

Despite the weight problem, China crockery and heavy plated cutlery was provided. For sleeping there were 26 small two berth passenger cabins rather like those in a sleeping car on a train.



CONTROL CAR

Airships were very difficult to fly and needed two steering wheels

56

Slide 56 Card 58 – Streamlined hull – with only engine pods and Control Car projecting.

Apart from the 5 engine gondolas, the only object that projected beyond the streamlined surface of the hull was the Control Car - seen here from inside.

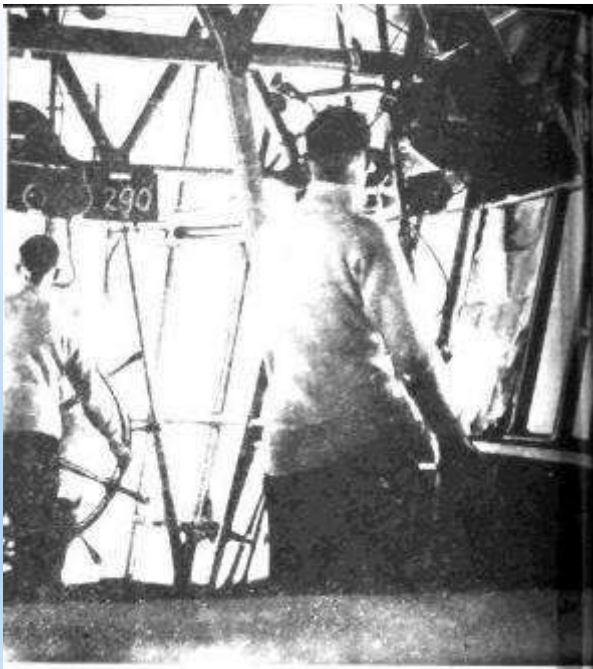
The control car commanded a wide view the ground and equated to the bridge of a ship where the officer of the watch stood.

Card 55 - Airships were very difficult to fly with two key steering wheels

Unlike a ship, however, there were 2 (steering) wheels, the one in the front of the centreline was the steering for port or starboard and one at the side worked the elevators and was manned by the height coxswain

It was the flight coxswain's job to watch the altimeters and keep the airship at the correct height. The job considered be the most demanding and calling for the greatest degree of skill in the airship. Compared with aeroplanes, airships were very difficult to fly and subjected to a number of variable factors which could not be allowed for in advance. Ideally, they should be able to fly in equilibrium, where their weight just balances the lift of the gas, but as the lift to the gas is always altering due to the temperature of the air to which they are passing, constant allowance has to be made.

They can't fly above a certain height without losing precious gas through expansion and they lose weight and rise as they use up their fuel. They must not give up too much gas or ballast in-flight as they necessarily use quite a lot of both in effecting a safe landing.



**Airships were very
difficult to fly and
needed two
steering wheels**

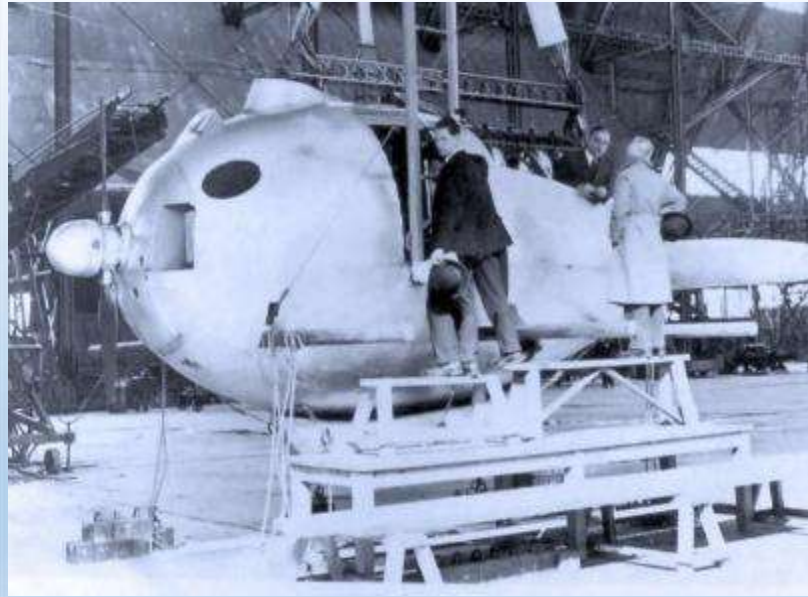
***Achieving a steady
horizontal position
was a challenge!***

57

Slide 57 Card 60 – Achieving a steady horizontal position was a challenge

They have an enormous surface area exposed to the wind and are therefore very difficult to handle on the ground. Contrary to what one would expect the gas bags which were made from the skin lining of bovine intestines were not actually gas-tight and allowed seepage and hence loss of lift at a steady rate and airships had to be constantly topped up with gas, which itself had to be re-purified regularly as it absorbed other impurities and if not treated became highly explosive!!

For most of the time that they were in the air, they were not in equilibrium and had to be flown dynamically, that is, nose up if too heavy or nose down if too light. The problem of losing weight as the fuel was used up was a serious one, and various ideas were tried out in order to overcome it, including condensing the exhaust gases and collecting rainwater from the cover in gutters.



**The
precarious
engine pods
with a
challenging
access for
engineers**

58

Slide 58 Card 62 - The precarious engine pods with a challenging access for engineers

The 5 engines were housed in rather strange looking pods, which was suspended on brackets from the main framework of the airship.

As the R101 was intended for use in the tropics, heavy oil engines had been installed as volatile petrol was considered too dangerous and it was the weight and relatively poor performance of the engines, which was to cause a lot of problems in the days to come. The five engines together produced almost 3500 HP driving (pusher) propellers 17 feet in diameter, giving her a theoretical speed of 55 mph.



To get to the engines. The mechanic on duty had to climb down the open ladders from an opening in the hull above, as shown in this sketch.

No doubt the 2000-foot drop below him encouraged the mechanic to hold on very tight!

**R101
Completed
... but trials
revealed serious
problems**



59

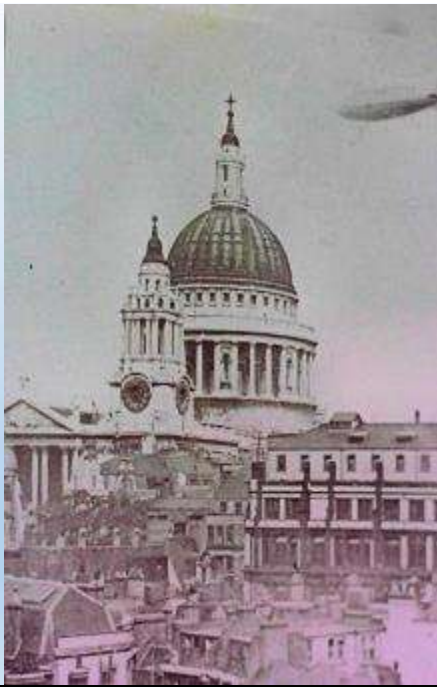
Slide 59 Card 63 – R101 trials completed, but serious problems revealed.

The airship was now complete in the public's view and **flying trials began**. Mostly trial flights were of short duration, with the airship being brought back to the mast at Cardington between each trip.

Unfortunately, these trials were hampered and interrupted by **droves of official visitors** who had to be given flights and entertained on board and greatly added to the worry of the crew and engineers trying to deal with some of the serious problems which were beginning to emerge.

It was **soon clear that the airship was seriously heavy**, that is to say, less buoyant, than it should be and was **losing gas through defective gas bags** at an unacceptable rate.

Here she is flying over Bedford on a trial flight.



**R101
Trial flight over
London**

Problems:

- **outer cover brittle**
- **gas -bags leaking**

60

Slide 60 Card 64 – Outer cover – gas bags ...serious problems were emerging

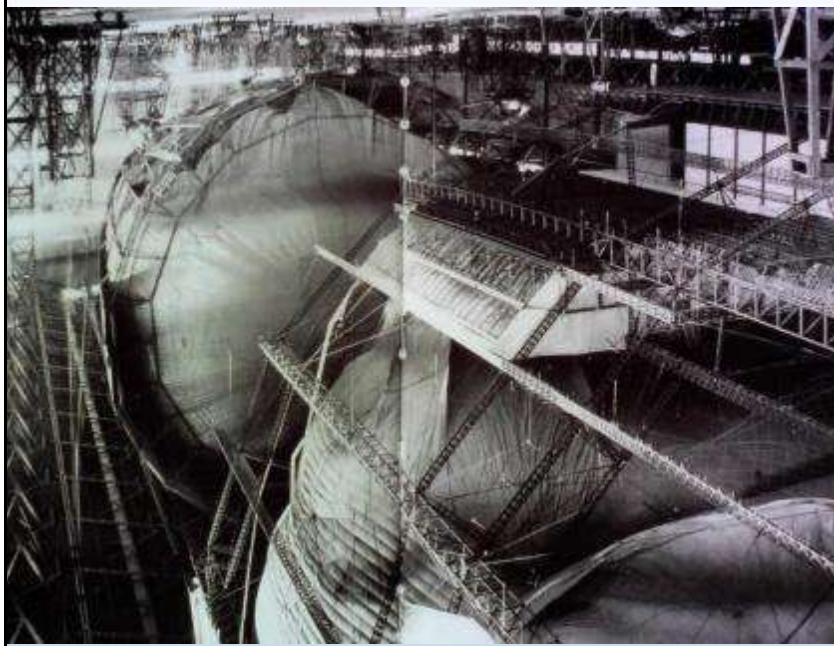
Here she is again on another trial, this time over London.

It was now discovered that the outer cover had become very brittle and was prone to develop splits and tears, which had to be patched up with wide strips of adhesive tape.

The gas bags, which had been enlarged beyond their design volume in order to increase lift were now rubbing holes in themselves as they rubbed against the metal framework and as a result, losing lift at a steadily increasing rate. In a word serious design faults were now showing up, which would have been noted and certainly avoided in the next airship to come off the construction line.

By this time, 1929, airships were being seriously challenged by aeroplanes. The staff at Cardington saw that their own jobs were threatened and that if the R101 which had cost so much public money was shown to be a failure they would be out of a job.

In the circumstances that they found themselves in, it is easy to see why they chose to keep problems as quiet as possible, and this led to temporarily “fixing things” as best they could and praying for good luck!



Non -essential items stripped out and extra gas -bags fitted within an enlarged hull

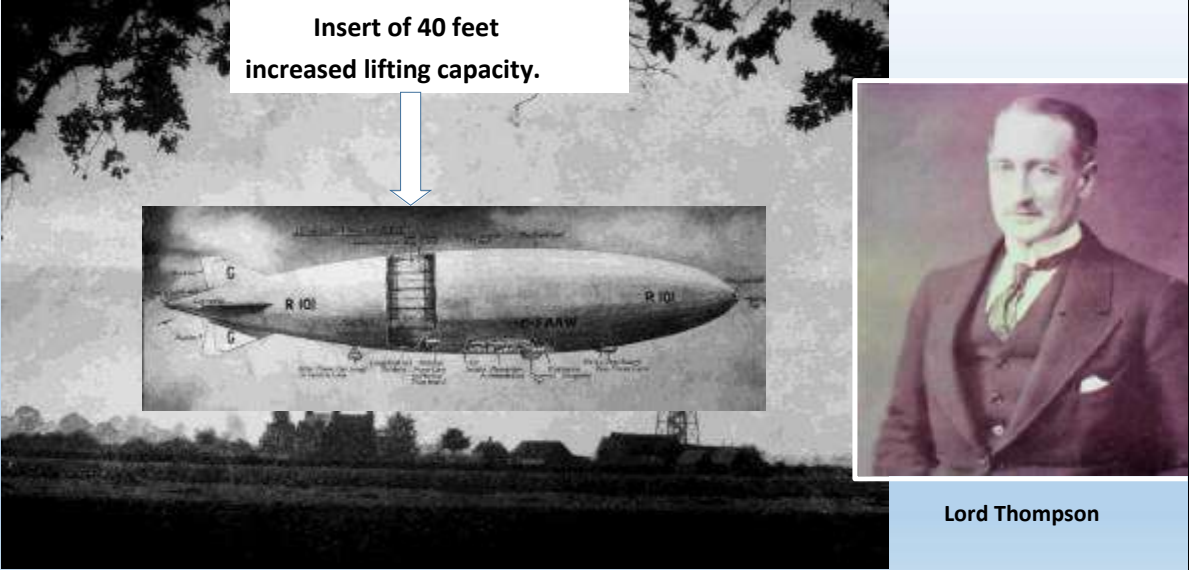
61

Slide 61 Card 65 – Excessive weight now a problem (insufficiently buoyant) ...drastic / risky solutions implemented.

There can be no doubt that by this time, those in the know realised the **R101 was quite unfit to undertake the long trip to India** and from reading the official papers it would seem that something like desperate measures were now resorted to!

Literally everything that wasn't essential was stripped out of the ship, including half the passenger cabins and

Insert of 40 feet
increased lifting capacity.



Lord Thompson

62

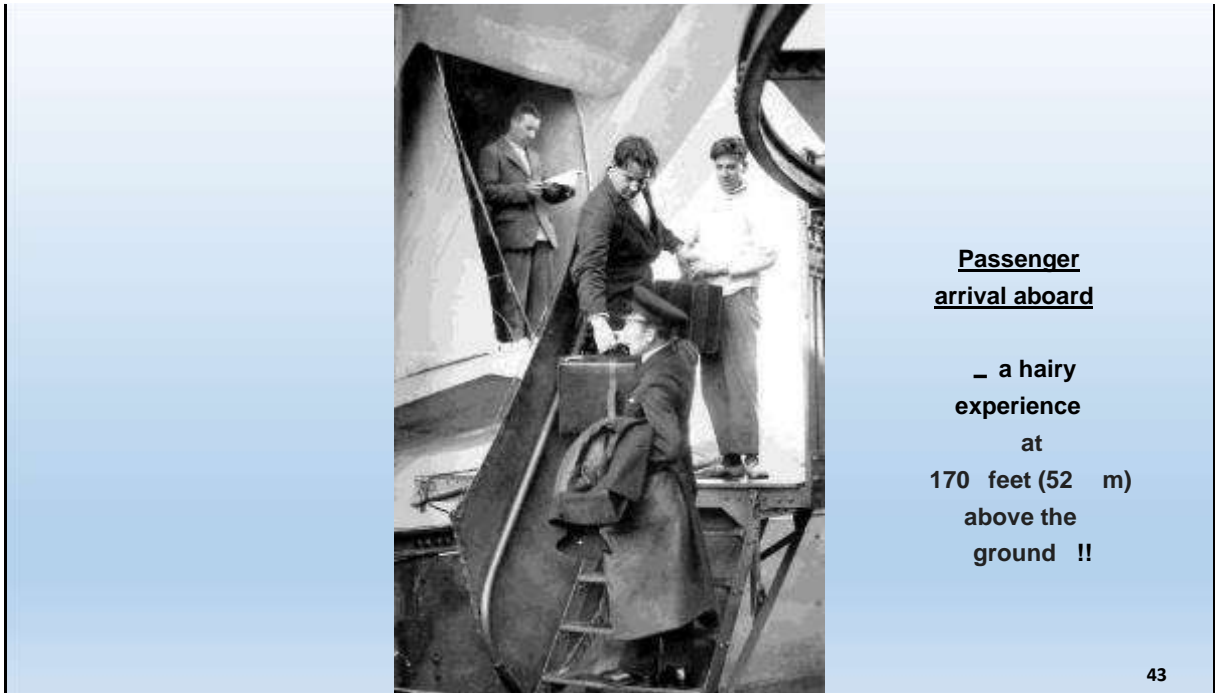
The image is a composite. At the top center, a white box contains the text 'Insert of 40 feet increased lifting capacity.' with a blue arrow pointing down to a technical drawing of the R101 airship. The drawing shows a section of the airship's hull cut out, with a ladder-like structure inside. To the right of the drawing is a portrait of Lord Thompson, a man in a dark suit and tie. Below the portrait is a blue box with the text 'Lord Thompson'. In the bottom right corner of the slide is the number '62'.

Slide 62 Card 65 cont.)

.... finally, the R101 was cut in two to allow for additional gasbags.

This increase length by 40 feet and lifting capacity to 51 tons which was the barest minimum, with which she could hope to get to India, **with virtually no margin for unseen events.**

In this picture you can get an idea of where R101 was cut in two, prior for the insertion of the additional bags.



Slide 43 Card 44 – Passenger gangway - 200ft above ground

Here we see a close-up of that passenger gangway which drops down like a drawbridge from the bow of the airship. with its integral steps – remember all at 200 feet above the ground.

The 3 men are standing on a short flight of steps and a small landing, which travelled round the top of the tower with the ship on the curved rail, which can just be seen top right.

The weight of everything going on board had to be carefully checked and noted before each flight.



Slide 44 Card 47 – R100 moored in Montréal, Canada No 1

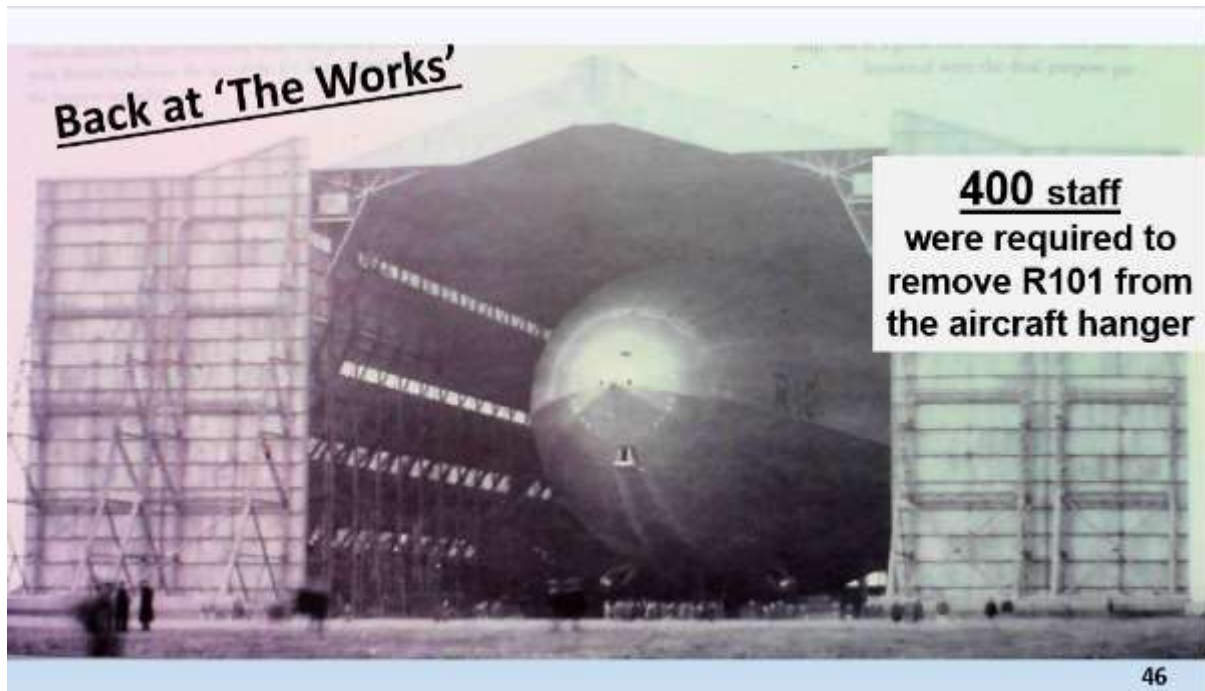
Pressure on the staff at Cardington was also increased by the completion of the private sector competitor the R 100, which had been designed by Barnes Wallis and built in Yorkshire. In many ways, it was a far less sophisticated and attractive ship than the R101, nevertheless, it **succeeded in making a round trip to Montréal.** In so doing, the R100 attracted a great deal of publicity which in turn reflected badly on the work going on at Cardington, as the R101, to an outsider, progress seemed to be lagging behind its rival.



Slide 45 Card 48 - R100 moored in Montréal, Canada No 2 Large crowds

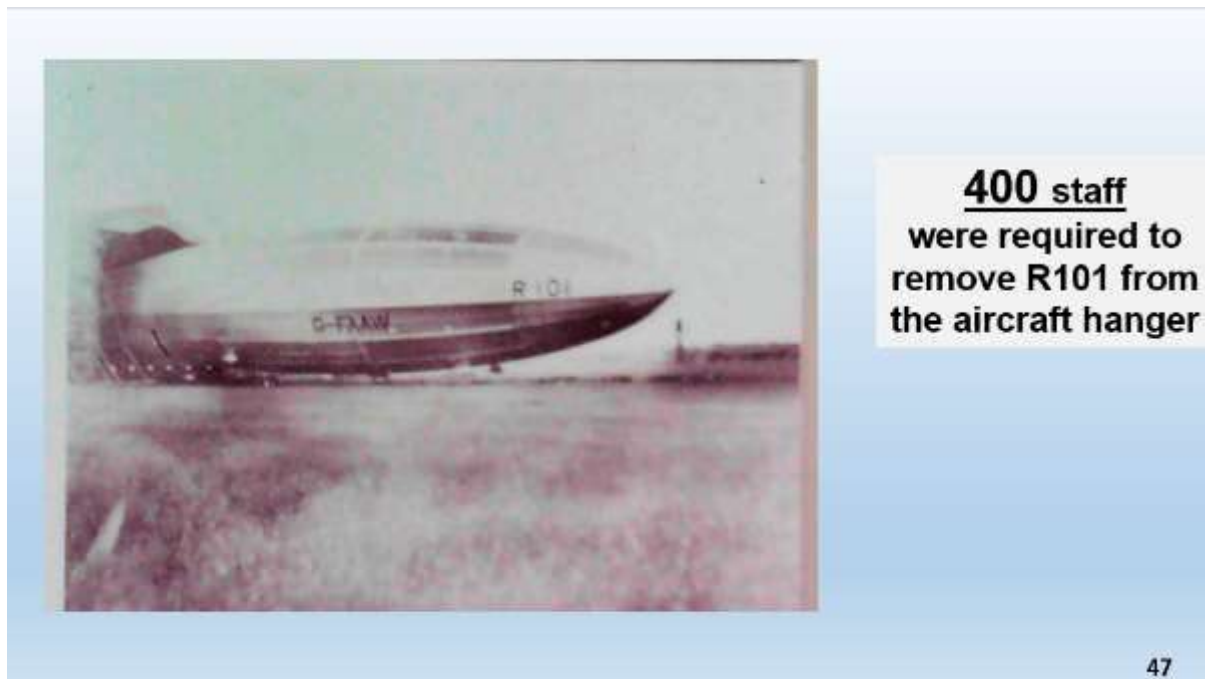
Here we see the R100 on the mast at Montréal, where she attracted a great deal of interest even though it was kept quiet about the fact that she had only just about made the journey due to a variety of reasons.

In reality, not only had she lost the use of one engine, but has suffered quite serious structural damage to the tail. Setting off back home again was a calculated risk, which happily came off, the round-trip being hailed as a great triumph for British airships.

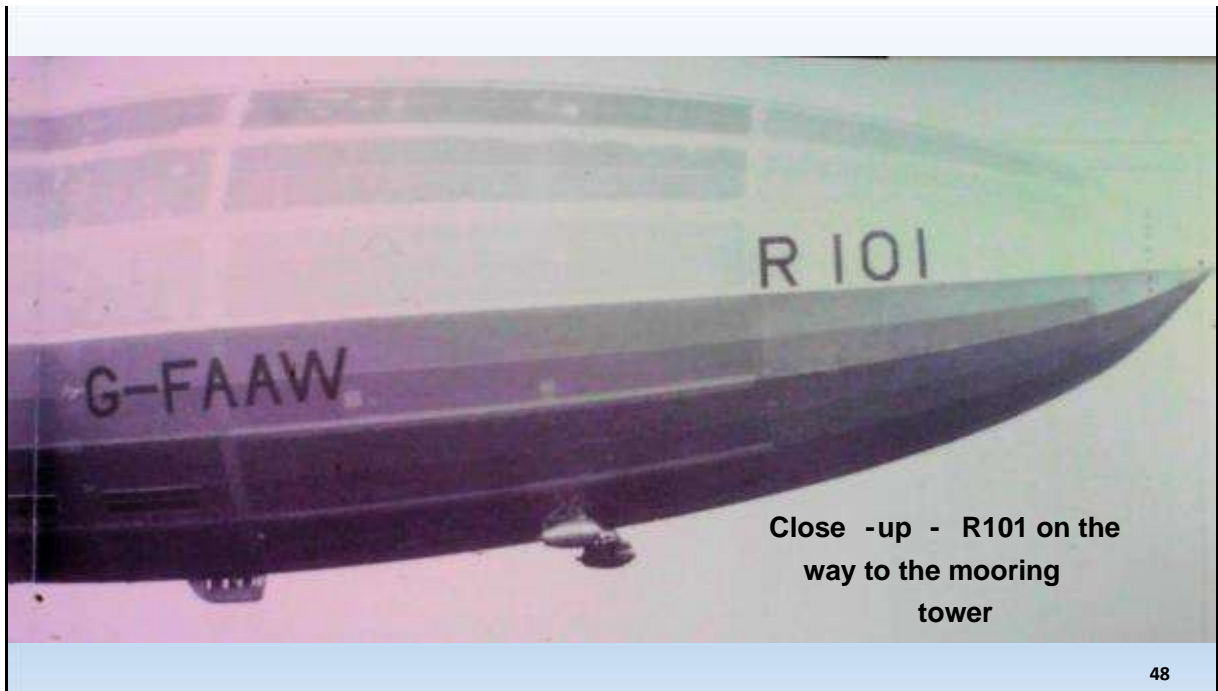


Slide 46 Card 51 - 400 men needed - Manual labour was cheap in those days!

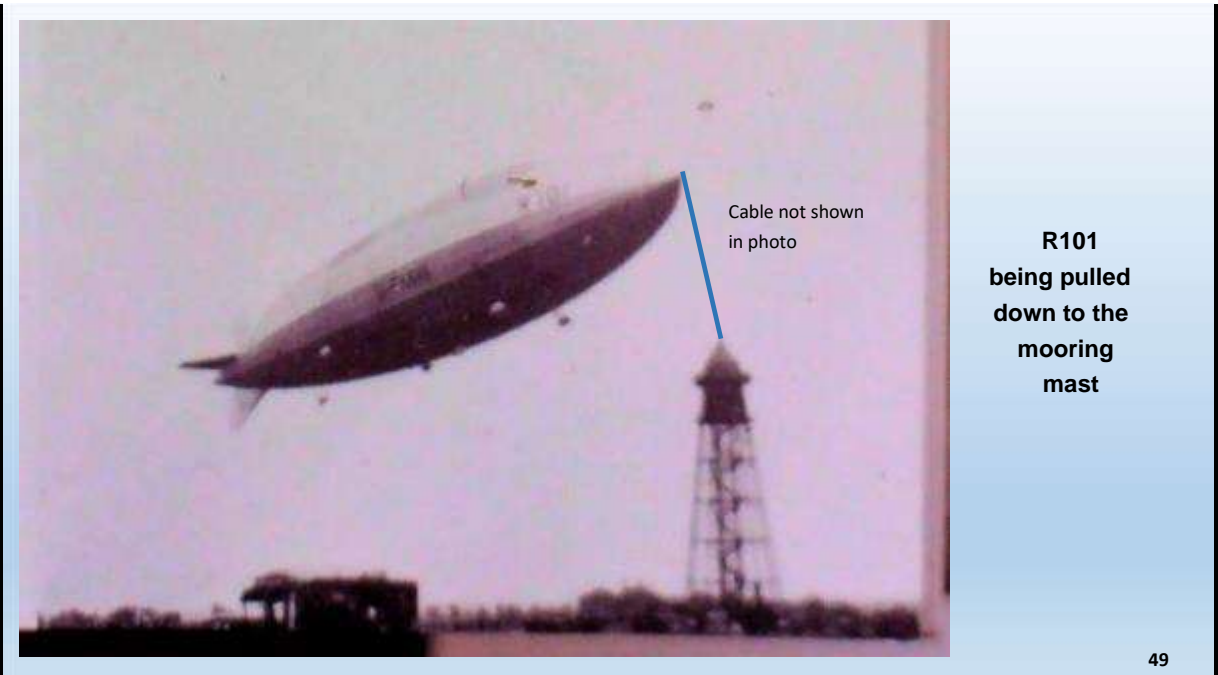
To actually get the airship out of the shed without damage took the entire efforts of the 400 men who took hold of her underside and literally walked her out until she was clear of the building. Such mass use manpower would be quite unheard of today and which even then showed up the impracticality of the airships.



Slide 47 Card 51 This photo shows the ship, just about to clear the shed.



Here is a close-up of the R101 on the way to the mooring tower.



Slide 49

This photo shows her being pulled down to the mast.

Clearly seen are the control car and to the 5 engine gondolas slung underneath the main envelope.

Unlike previous airships, in order to reduce drag as much as possible, all the passenger accommodation and crew quarters etc. were placed *INSIDE* the framework of the hull itself. This gave an advantage in terms of speed, but helped cut the cost of having too many gas-bags.



**Hauling R101
down to lock -on
to the top of the
mooring tower**

50

Slide 50 Card 53 – Hauling R101 down to lock-on to the top of the mooring tower

This picture shows another view of the air ship actually in the process of being hauled down to the top of the mooring mast. The wire dropped down from the nose has been connected to one attached to the top of the tower and the two will be wound in until the airship is locked-on and free to swing with the wind.

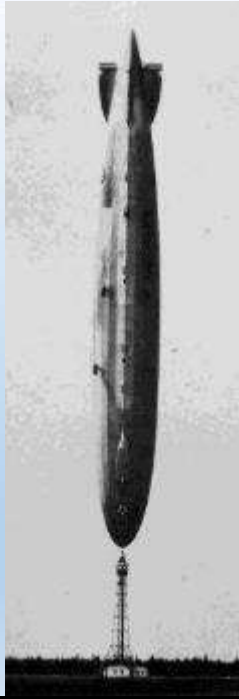


**R101 safely
moored**

Slide51 Card 54 – R101 moored and ready to go.... or was she?

And here she is a last complete and safely moored to the mast waiting to go on her next flight. A pretty impressive sight, which could be seen for miles across the flat, Bedfordshire countryside.

**The danger of a
sudden wind-shift
and wind strength**



“Bottoms -Up”

American photo

August 25th 1927

Los Angeles


52

Slide 52 Card 61 – USA photo shows the dangers of sudden wind shifts and strengths

This picture, which was censored by the United States government for several years shows one of the United States Navy's rigid airships standing on her nose at the mooring mast having been caught by nothing more serious than a sudden shift in the wind.

The airship went over the top rather than round the outside and demonstrates how fickle this type of aircraft can be.

R101 displaying a surprising level of comfort



The top photograph shows a large, empty lounge area with a polished floor, several white columns, and long wooden benches along the walls. The bottom photograph shows a smaller, more intimate smoking room with several ornate, upholstered chairs and small round tables.

SPACIOUS LOUNGE
- before completion

SMOKING ROOM
- a risky luxury?

53

Slide 53 - Card 55 – R101 displaying a surprising level of space and comfort.

There can be no doubt that even by today's standards, the R101 provided a quite extraordinary level of comfort for its passengers.

The top picture shows the main lounge before it was finished. This room was 60 feet wide by 32 feet across and when finished, was fitted with chairs, tables, settees along the walls and even flowers and potted plants.

The lower picture shows the smoking room, and almost unheard-of luxury in a hydrogen filled airship. Safety was achieved by keeping the air pressure in the smoking room slightly above that outside and thus ensuring that no hydrogen could enter.



R101
Promenade
Deck
with viewing
windows

54

Slide 54 Card 56 - R101 Promenade deck with viewing windows.

On each side of the lounge there was a promenade deck 7'6" wide by 32 feet long, where passengers can either stand or sit and watch the ground passing beneath them through large windows set in the hull.



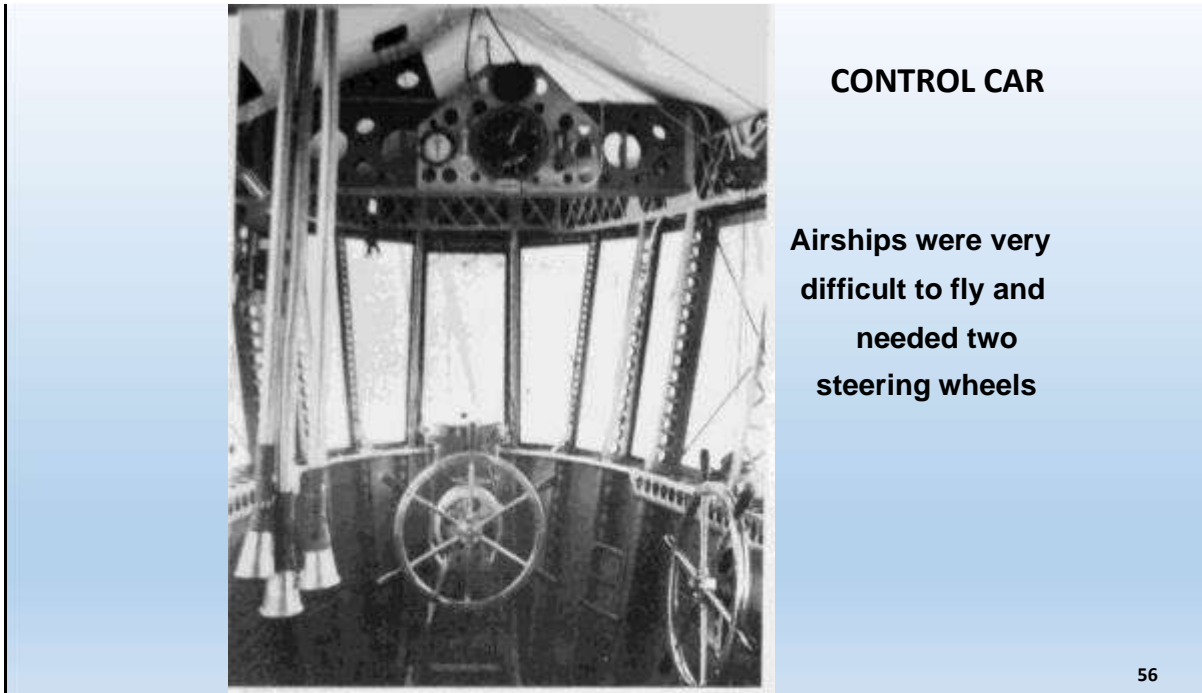
Dining Room
with seating
for 50

55

Slide 55 Card 57 R101 –The 50 seat Dining Room

The airship was provided with a separate dining room, which could seat 50 people at a time and serve for course hot meals, which were prepared in an electric galley on the deck below and send up on a dinner lift. The crew included 2 cooks and 2 stewards.

Despite the weight problem, China crockery and heavy plated cutlery was provided. For sleeping there were 26 small two berth passenger cabins rather like those in a sleeping car on a train.



CONTROL CAR

Airships were very difficult to fly and needed two steering wheels

56

Slide 56 Card 58 – Streamlined hull – with only engine pods and Control Car projecting.

Apart from the 5 engine gondolas, the only object that projected beyond the streamlined surface of the hull was the Control Car - seen here from inside.

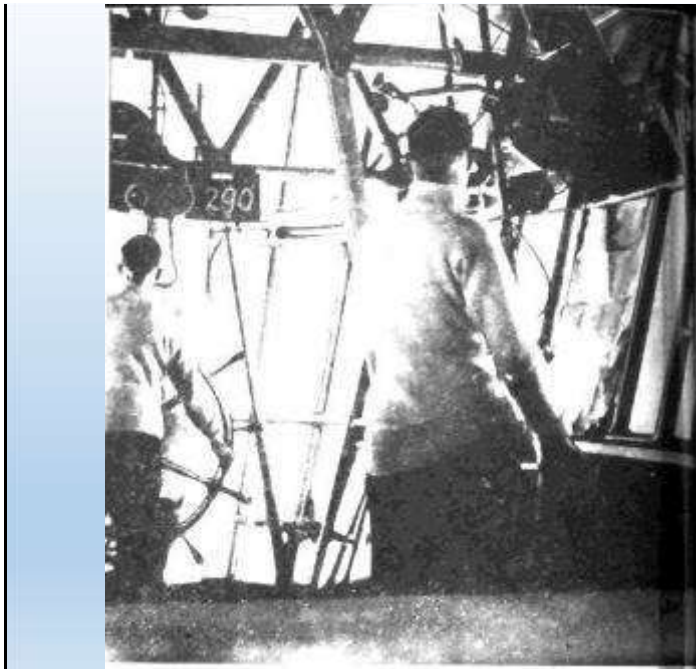
The control car commanded a wide view the ground and equated to the bridge of a ship where the officer of the watch stood.

Card 55 - Airships were very difficult to fly with two key steering wheels

Unlike a ship, however, there were 2 (steering) wheels, the one in the front of the centreline was the steering for port or starboard and one at the side worked the elevators and was manned by the height coxswain

It was the flight coxswain's job to watch the altimeters and keep the airship at the correct height. The job considered be the most demanding and calling for the greatest degree of skill in the airship. Compared with aeroplanes, airships were very difficult to fly and subjected to a number of variable factors which could not be allowed for in advance. Ideally, they should be able to fly in equilibrium, where their weight just balances the lift of the gas, but as the lift to the gas is always altering due to the temperature of the air to which they are passing, constant allowance has to be made.

They can't fly above a certain height without losing precious gas through expansion and they lose weight and rise as they use up their fuel. They must not give up too much gas or ballast in-flight as they necessarily use quite a lot of both in effecting a safe landing.



**Airships were very
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needed two
steering wheels**

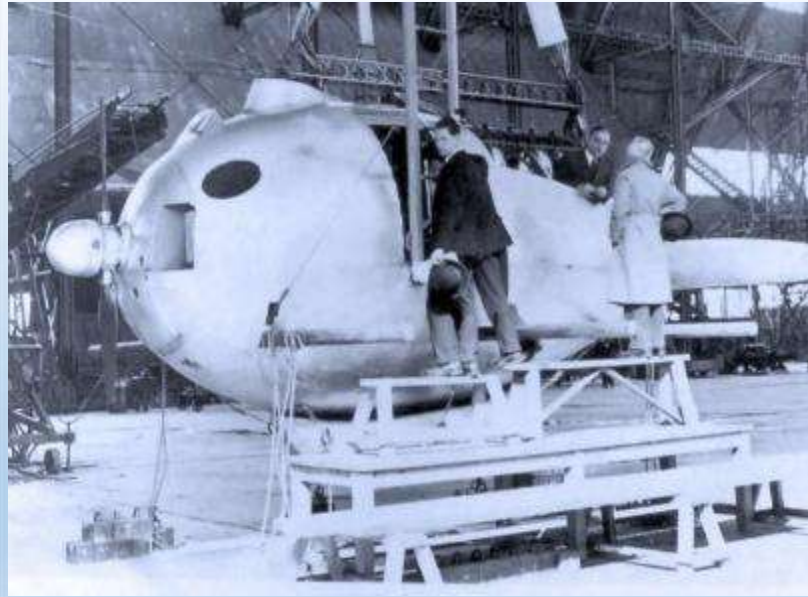
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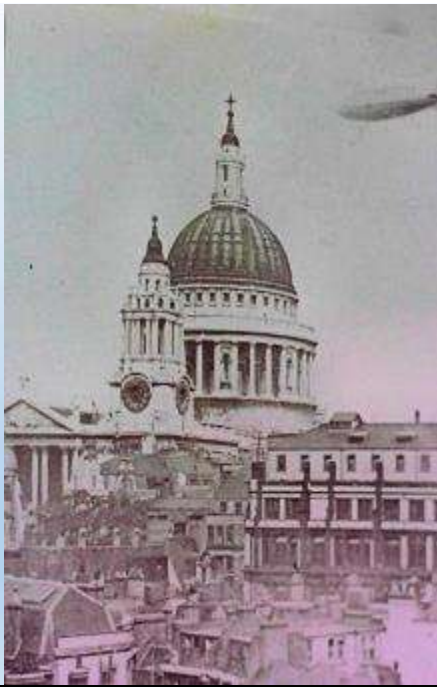
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Slide 60 Card 64 – Outer cover – gas bags ...serious problems were emerging

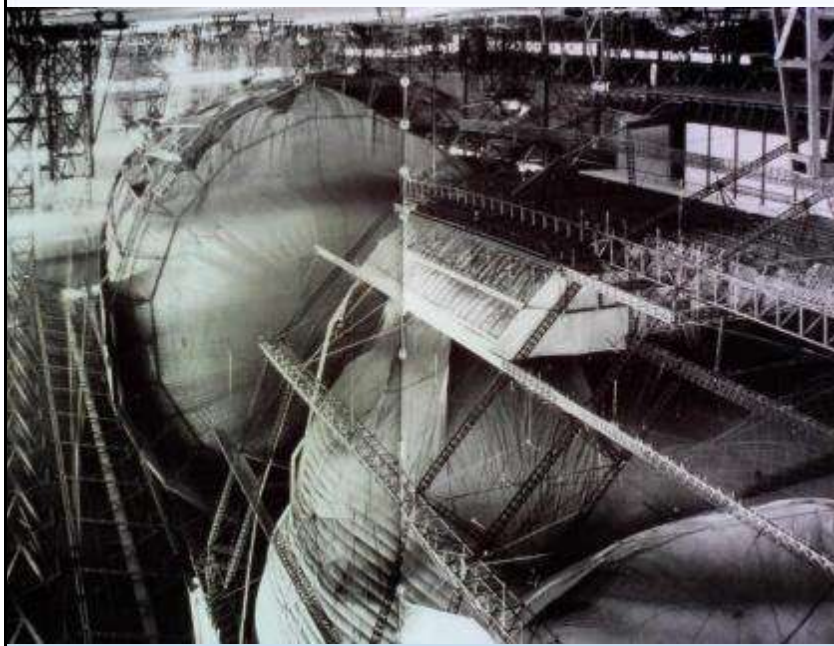
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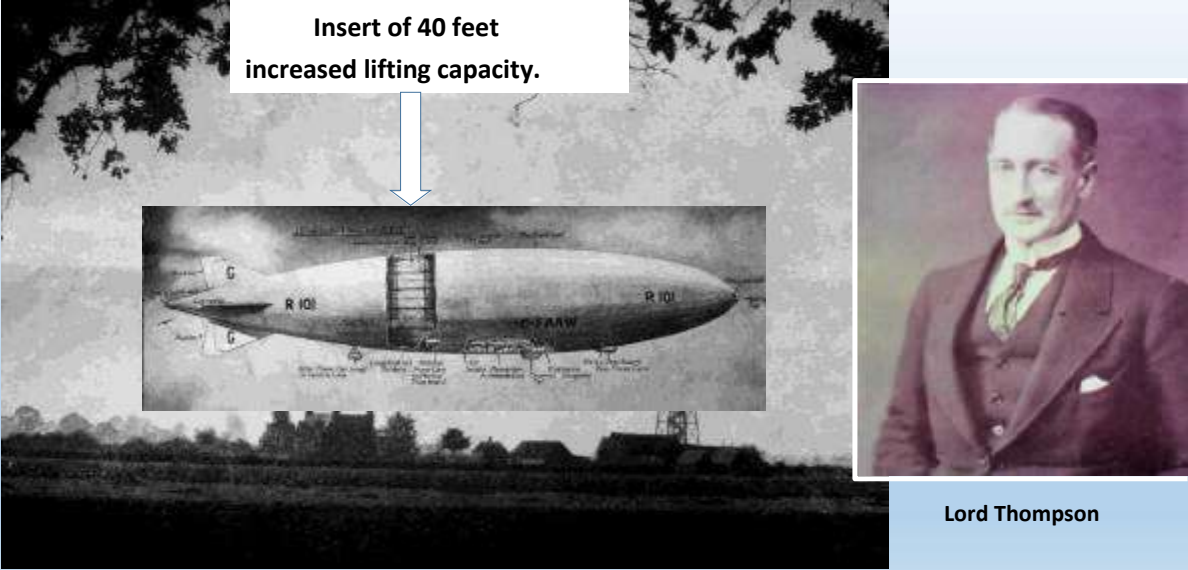
61

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Literally everything that wasn't essential was stripped out of the ship, including half the passenger cabins and

Insert of 40 feet
increased lifting capacity.



The image is a composite. On the left, a technical drawing of the R101 airship is shown with a 40-foot section cut out of its middle. A white arrow points from a text box above to this cut. On the right, there is a portrait of Lord Thompson, a man in a dark suit and tie. The background of the entire slide is a dark, grainy photograph of the R101 in flight over a landscape.

Lord Thompson

62

Slide 62 Card 65 cont.)

.... finally, the R101 was cut in two to allow for additional gasbags.

This increase length by 40 feet and lifting capacity to 51 tons which was the barest minimum, with which she could hope to get to India, **with virtually no margin for unseen events.**

In this picture you can get an idea of where R101 was cut in two, prior for the insertion of the additional bags.

Time pressures outstripped wisdom!

Lord Thompson's two major problems:-

1. He didn't realise the extent of the technical difficulties
2. He under-estimated the major construction issues ... in his great haste!



63

Slide 63 Card 67 – Lord Thompson underestimated the major construction issues

The reason for the pressure to start the long-haul flight to India on 4th October 1930, come what may, was completely political. Lord Thompson was to address a conference of Commonwealth Heads of State in London on 20th October, at which he was to press them to join in the '*Imperial Airship Scheme*' and contribute money to it.

He therefore wanted to be able to tell the conference that he had just flown to India and back in the new airship (during the period the Conference was running) which would be a tremendous publicity boost for his scheme and his own ego, particularly as he was angling for the post of Viceroy of India.

It seems clear that he didn't realise the extent of the technical difficulties that were plaguing the Cardington workforce and what a dangerous game he was playing by insisting on a definite date for departure. In fact, sadly, by 1930 he could have gone to India back by aeroplane in that same time!!!

Planned Flight
to India

Friday 3rd October
1930



5 Officers

Who was aboard?



35 General Crew

65

Slide 65 Card 68 – Who was aboard for the Planned flight to India??

Let us now look at who was to fly on this epic and much publicised flight.

Although under the control and budget of the Air Ministry, the RAF saw no future for the use of airships within the RAF and officially took no interest in the project. The Royal Navy thought likewise.

The 5 officers and 35 general crew and were not civilians in the legal sense and so the airship men were a force who nobody wanted to “own”.



5 Officers

Who was aboard?

Captain : Flight Lt. H. C. Irwin RAF.

Navigator : Squadron Leader E.L. Johnson RAF

1st Officer : Lt Cdr. N.G. Atherstone RN

2nd Officer : Flying Officer M. H. Steff RAF.

Chief Met Officer : Mr M.A. Giblett

66

Slide 66 Card 69 – Who was aboard? The officers

The **FIVE officers** were: -

Captain Flight Lieutenant H. C. Irwin RAF.

Navigator Squadron Leader E.L. Johnson RAF **1st Officer** N.G Atherstone Lt Cdr RN **2nd Officer** Flight Officer, M. H. Steff RAF.


The man in the middle. Maj. Scott, (aged 42) our most experienced airship pilot was not given command as it seems that he was perceived to be losing his flying skills by now possibly had a drink problem.

Who was aboard?

Coxswains,
Engineers
Wireless operators

Engine Mechanics
Riggers
Cooks

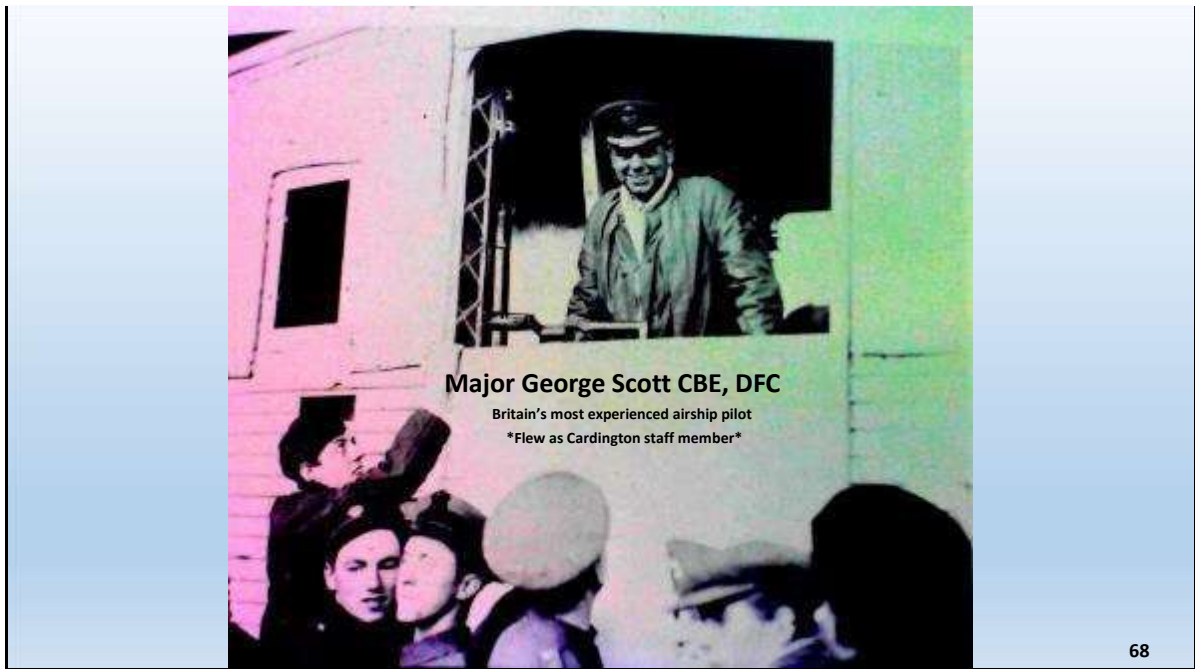
Stewards
Galley boys



35 General Crew
incl. Petty Officers
& Charge Hands

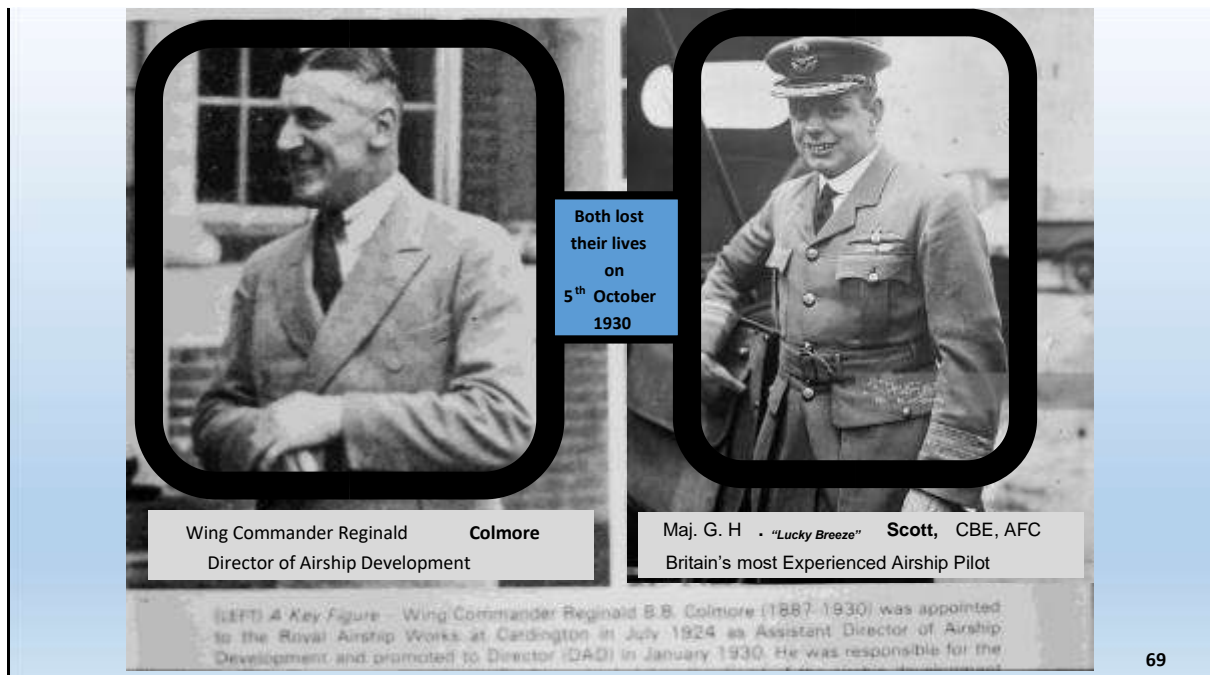
67

Slide 67 The General Crew (not the officers) were dressed in the uniform of what the Royal Navy called "number 3 dress" normally worn by cooks, stewards, writers and petty officers etc. They were mostly RAF personnel and the majority of them were mechanics to look after the engines. Also included were coxswains, riggers, wireless operators, cooks, stewards and galley boys.



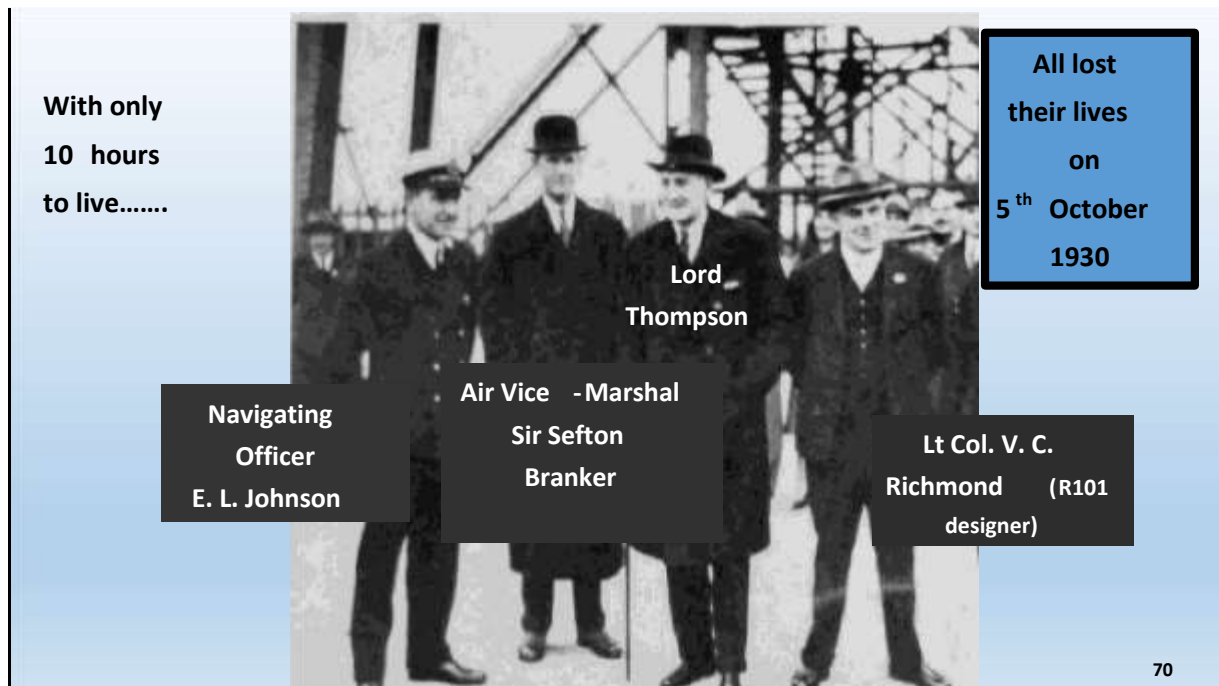
Slide 68 Card 70 – Maj. Scott’s unspecified position on the final flight

Returning to Maj. Scott. He had acquired an impressive airship record as he had successfully flown across the Atlantic and back in 1919, and also commanded the R100 on her round trip to Montréal. He was not however in command on the occasion of the first flight of the R101 and his position seems to have been somewhat “uncertain”??



Slide 69 Card 71 - Maj. Scott with the Director of Airship Development

Here we see another picture of Maj. Scott, this time with Wing Commander Reginald Colmore Director of Airship Development who was also to go on the flight. He was a man who was severely criticised later as having had insufficient practical design knowledge.



Slide 70 Card 72 – Who was aboard? The high-ranking official guests

Also, on board were

- 6 high-ranking officials from the Royal Airship Works,
- 6 government officials headed by Lord Thompson, Secretary of State for Air and Sir Sefton Branker.

All these people were therefore, together at the foot of the mast at Cardington on that fateful Saturday afternoon (4th October 1930) and pass upward to disappear into the great shape floating above their heads. Whether any of them had any doubts or misgivings, we shall never know.

In this picture, we see Lord Thompson, Sir Sefton Branker, Col Richmond designer of the R101, the navigator E.L Johnson. All of whom have less than 10 hours left to live.

**The last
photo of
R101**

... taken at
dusk on
Saturday
4th October
1930



**The 12
passengers and
42 crew were
aboard and vital
stores had been
stowed.**

71

Slide 71 Card 73 – Last photo of R101

This is reputed to be the last photograph of the R101 at her mast before leaving on her final voyage.

All the repairs and modifications which could be done in the time had been done.

The airship is loaded with fuel, ballast and stores and the gas-bags filled to capacity.

The passenger lift in the mooring tower was busy taking those who were not going to fly safely back to 'Mother Earth'.

The die is cast and the experimental R101 is off on her long-haul flight to India.



**R101 had made
12 trial flights
B U T
only ONE since
her hull was
lengthened!**

72

Slide 72 Card 74 - After 1 trial flight after her extension, R101 was set for India.

In all, the R101 had previously made only 12 trial flights. The 12 routes are shown on the map in red. The longest flight was to Scotland, returning via the Irish Sea and Liverpool, which took about 29 hours for distance of roughly 1000 miles.

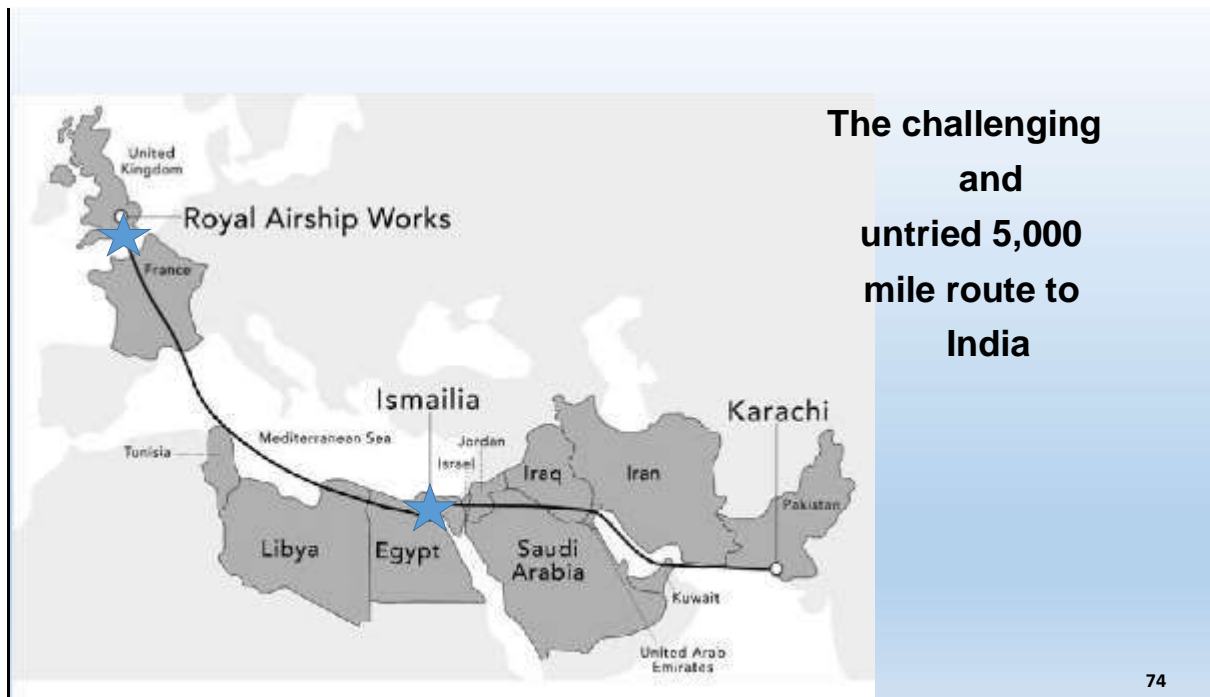
All the other flights were of short duration, and only one of the 12 was made after the airship had been lengthened and was to all intents and purposes a new and different airship..... Especially in terms of its flight characteristics.

The final test flight (in yellow) was from Cardington skirting central London, flying over Southend, up the East Coast to Yarmouth and then back to Cardington a distance of 553 miles, taking about 15 hours.



Slide 73 Card 75 – The challenging and untried 5,000-mile route to India

This map, by contrast, shows what this virtually untried airship was expected to achieve.




Slide 74 Card 75 Cont. – The challenging and untried 5,000-mile route to India

From the 'Royal Airship Works; Cardington to Ismailia is 2700 miles where a refuelling stop was to be made.

Much of this section was over turbulent landmasses and flying into high temperatures, low-lift areas over Egypt and the Middle East.

From Ismailia to Karachi is a further 2200 miles over the burning Arabian Desert, where the lift would be so weak that the landings and take-offs would have to be made at night when the air temperatures were lower.

Looked at in retrospect, it is apparent that to those in the know, knew the flight was going to be a terrible gamble.



UNITED KINGDOM
Cardington

Hastings

English Channel

River Somme

2200 GMT
Very strong
head winds

Last flight of R 101

THE FINAL FLIGHT

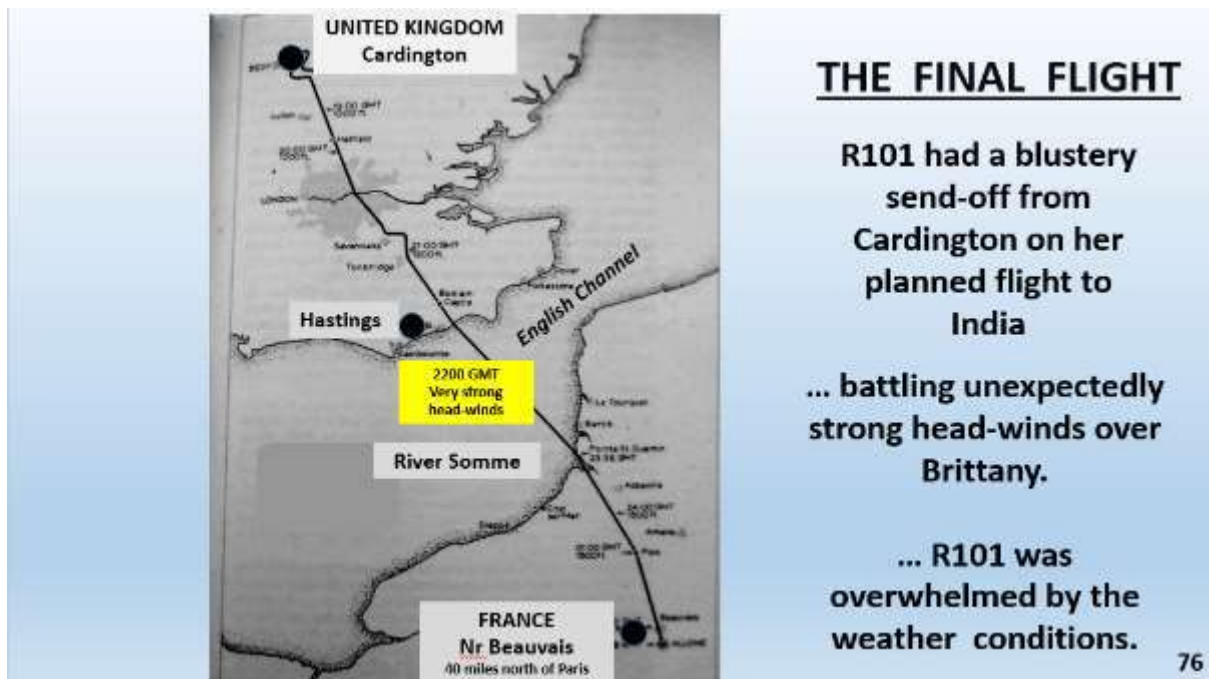
R101 had a blustery and damp send-off from Cardington on her planned flight to India

but first, the route across the Channel to France with **STRONG headwinds**

75

Slide 75 Card 77 – FINAL FLIGHT Weather forecast was seriously inaccurate

In the event the weather got steadily worse as the evening wore on, until by 10 PM the airship was ploughing directly into fierce storm with her ground speed down to 20 mph. Many hundreds of people along the route across England saw her very low and battling against the elements.



Card 76 – The storm raged – R101 takes a battering

She was seen over London at 8.30 PM, Sevenoaks at 9 PM and past the coast near Hastings at about 9:30 PM.

The channel crossing took about 2 hours so by 11.30 PM she was flying over France heading for Paris. The storm was now at its height in the airship was taking a severe battering.

THE FINAL MESSAGE 4th October 2400 hrs (Midnight)

"After an excellent supper our distinguished passengers smoked a final cigar and having sighted the French coast have now gone to bed to rest after the excitement of their departure.

All essential services are functioning satisfactorily. The crew have settled down to watch-keeping routine."

77

Slide 77 Card 79 – Press release – “all is well” ... but it was spoof news

During the course of the voyage so far, 4 radio messages had been exchanged with Cardington, mostly dealing with forecasts of the weather that they would be flying through.

At precisely midnight the last message from the R101 was received confirming that all was well and throwing in a bit of propaganda for airships travel which it was hoped the press would pick up and publish, it said: -

"After an excellent supper our distinguished passengers smoked a final cigar and having sighted the French coast have now gone to bed to rest after the excitement of their leave takings.

All essential services are functioning satisfactorily. The crew have settled down to watch keeping routine."

Message ends, timed out 24:00 hours.

UNITED KINGDOM
Cardington

Hastings

English Channel

2200 GMT
Very strong
head-winds

River Somme

FRANCE
Nr Beauvais
40 miles north of Paris

THE FINAL FLIGHT

R101 had a blustery send-off from Cardington on her planned flight to India

... battling unexpectedly strong head-winds over Brittany.

... R101 was overwhelmed by the weather conditions.

78

Slide 78 Card 80 – 2 a.m. over the French town of Paix several uncontrolled dives.

At 1 AM on the morning of 5th October the airship R101 was over the little town of Paix.

At 2 a.m. when the watch on board was change, the R101 was near the town of Bauvais. About 6 minutes later, something happened which cause the airship to go into a steep dive, right itself and then dive again until.....

Card 81 – Bow hits the hillside ... a spark and an inferno started

..... she struck the side of a shallow hill with the underside of her bow.

Almost at once, there was an explosion in the countryside was lit up by 5 ½ million cubic feet of hydrogen burning and instantly killed all 8 of the 54 persons on board.

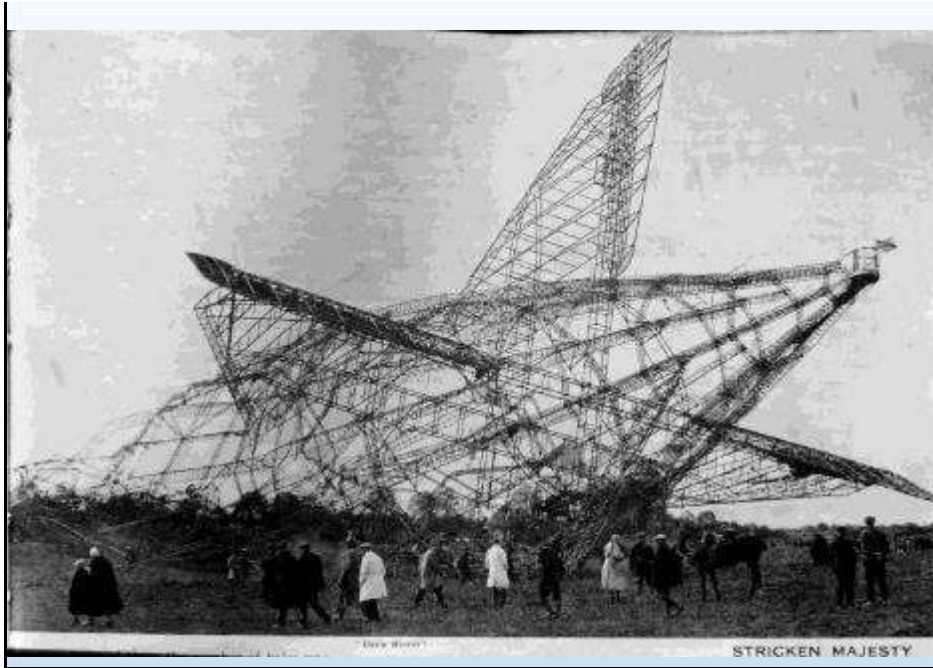


Crash site
near
Beauvais



Slide 79 Card 82 – Theory of how the disaster unfolded

The unproven theory for the crash was that the outer cover of the bow, known to be brittle, gave way, exposing the forward gas bags to the full force of the elements causing them to rupture and deflate, which in turn produced the loss of buoyancy which caused the airship to dive and strike the ground.



Crash site
near
Beauvais

...only one
witness

80

Slide 80 Card 83 - Only one witness.

It is said that only one man witnessed the catastrophe, a poacher setting traps within a few feet of where the airship crashed. The sight and sound of the disaster were so shocking that he simply ran away and hid and for some time afterwards was unable to speak.

The wrecked airship was totally consumed by the fire. Only a small piece of scorched fabric remained on one of the tail planes and pathetically, also the RAF ensign on the extreme end of the tail.

There is no certain reason for the tragic accident.....

BUT later three problems were later identified....

1. The flight was too late in the year - equinoctial gales,
2. Insert to hull added extra length but made airship increasingly unstable.
3. Designer Vincent Richmond lacked detailed technical design experience.



**French army
organised
the sad task
of collecting
the bodies**

81

Slide 81 Card 84 – Bodies recovered – St. Paul’s Memorial Service back in the UK

The French Army undertook the sad task of recovering the bodies, most of which could not be identified, and the coffins containing the remains were brought back to England to lie in state in Westminster Hall. Whilst a memorial service was held in St Paul's Cathedral.

This picture shows the 3 survivors who were fit enough to walk just about to set us on the journey home behind the Army transports carrying the coffins. They were dressed in borrowed clothes and still looking dazed by what had happened to them. One can only guess at their mental state and their fitness to take part in a highly emotional public event.

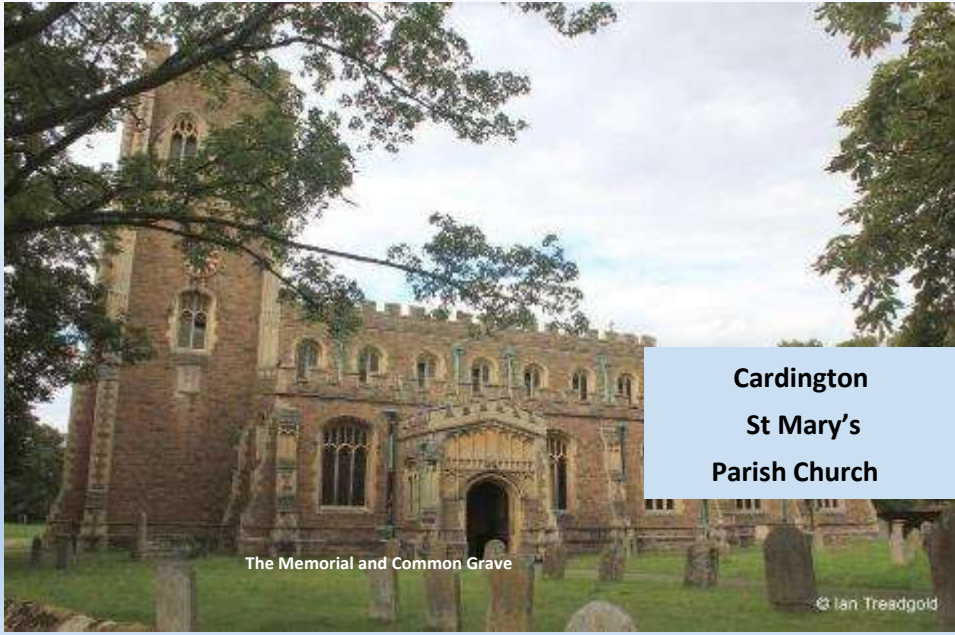


Mass burial - Cardington Parish
churchyard - 11th Oct 1930

82

Slide 83 Card 85 – Mass burial Cardington Parish churchyard -11th Oct 1930 All the bodies were buried in a mass grave in Cardington churchyard next slide

..... where simple monument lists the names.



**Cardington
St Mary's
Parish Church**

The Memorial and Common Grave

© Ian Treadgold



No Commentary necessary ... **SILENCE**



The scorched and slightly burnt flag of the R101 is preserved in Cardington St Mary's Parish Church

84



Slide 84

The scorched and slightly burnt flag of the R101 is preserved in Cardington church where it can be seen to this day.



Side 85 Card 86 – 1931 - British airship programme officially abandoned.

With the dramatic crash of 1930, in less than 5 minutes, came the end of 6 years work and the hopes and dreams of all associated with the world of airships in England.

In 1931, the airship programme was abandoned and the R100 broken up and sold for scrap.

The 2 large airship sheds are now listed buildings (180 feet high), poignant reminders of ***a form of flying as outdated as the dinosaurs.***or is it?

Link to video <https://historicengland.org.uk/listing/thelist/list-entry/1114165>



Slide 86 - FILM Re Revolutionary AIRLANDER 10 2018

Originally the AIRLANDER for US Army – as a multi-intelligence vehicle HAV 304 – contract cancelled 2013

Brought back to Cardington and modified to be civilian hybrid air vehicle

£25m PROJECT: 92 m (301ft) Ht 26m (85ft) wingspan 43m (143ft)

Helium filled (no internal framework) – 38m m cube (= 1million party balloons)

Both (hybrid) aerostatic 40% and aerodynamic (60%)

2/3 less fuel over any distance but SLOW 90mph max

4 diesel engines powered propellers.

Easy to land and on any terrain. Controllable

The End

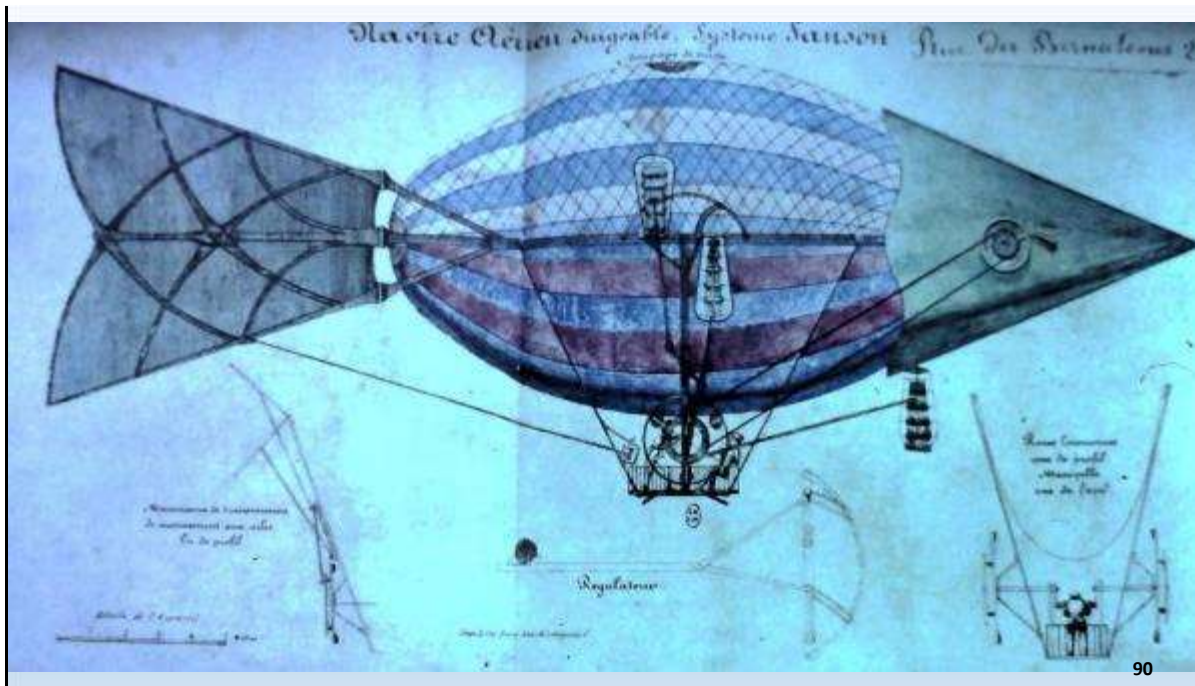
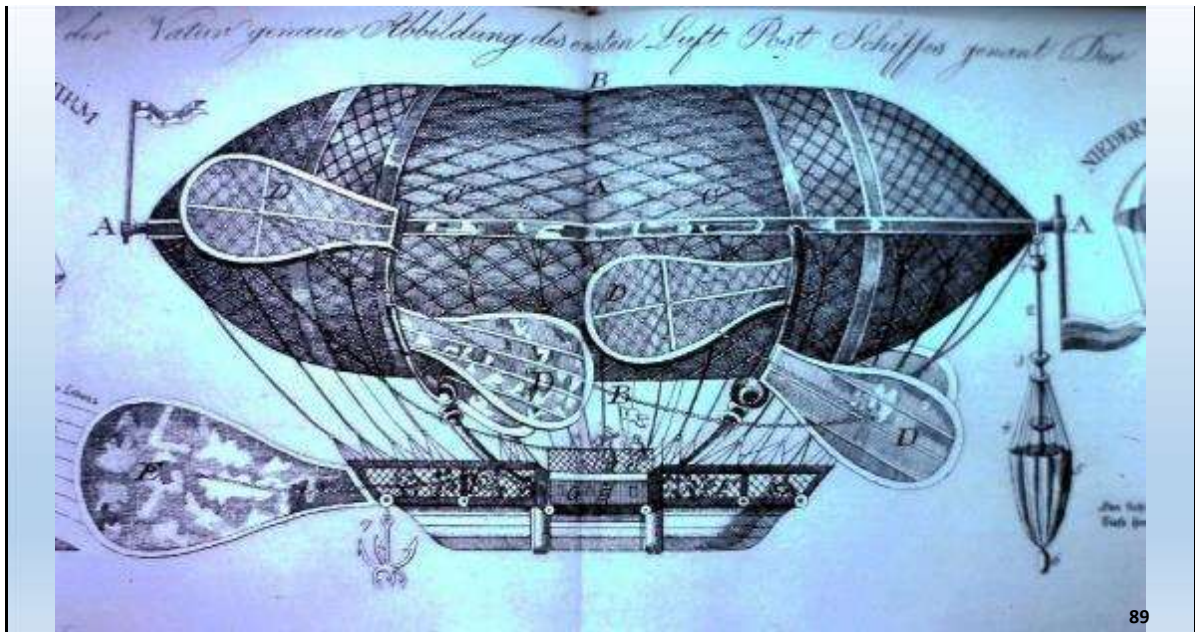
..... or will there be a new
B e g i n n i n g
in the development of
21st century airships?

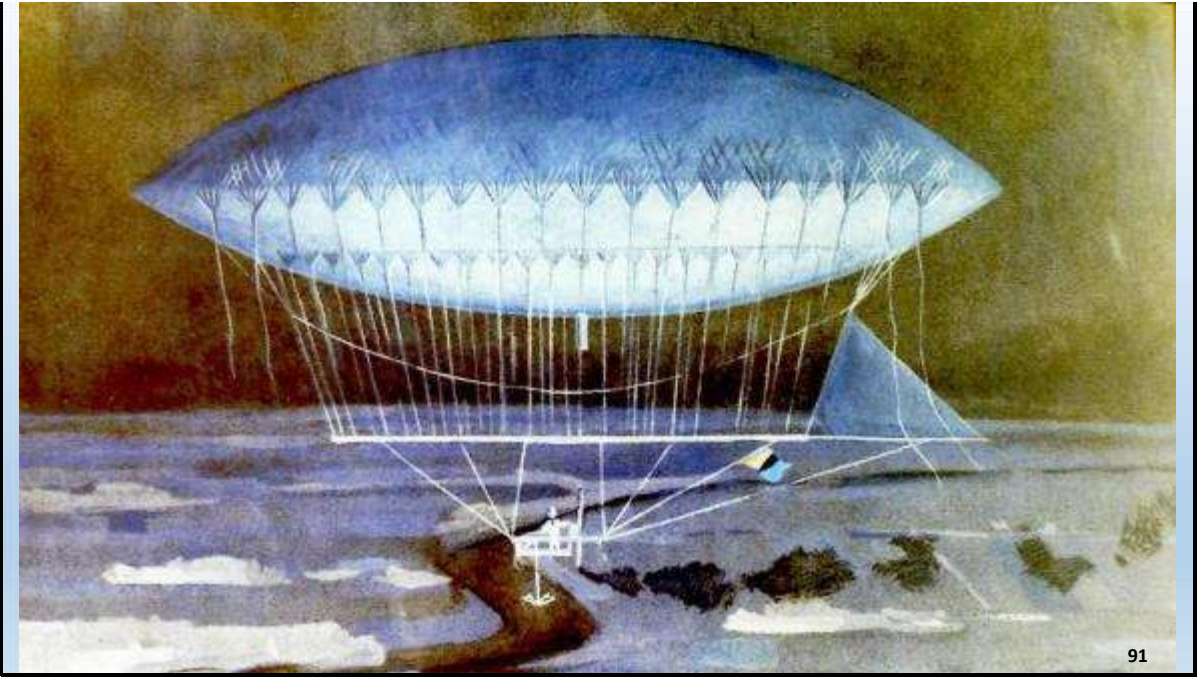
*Thanks for
your attention*

87

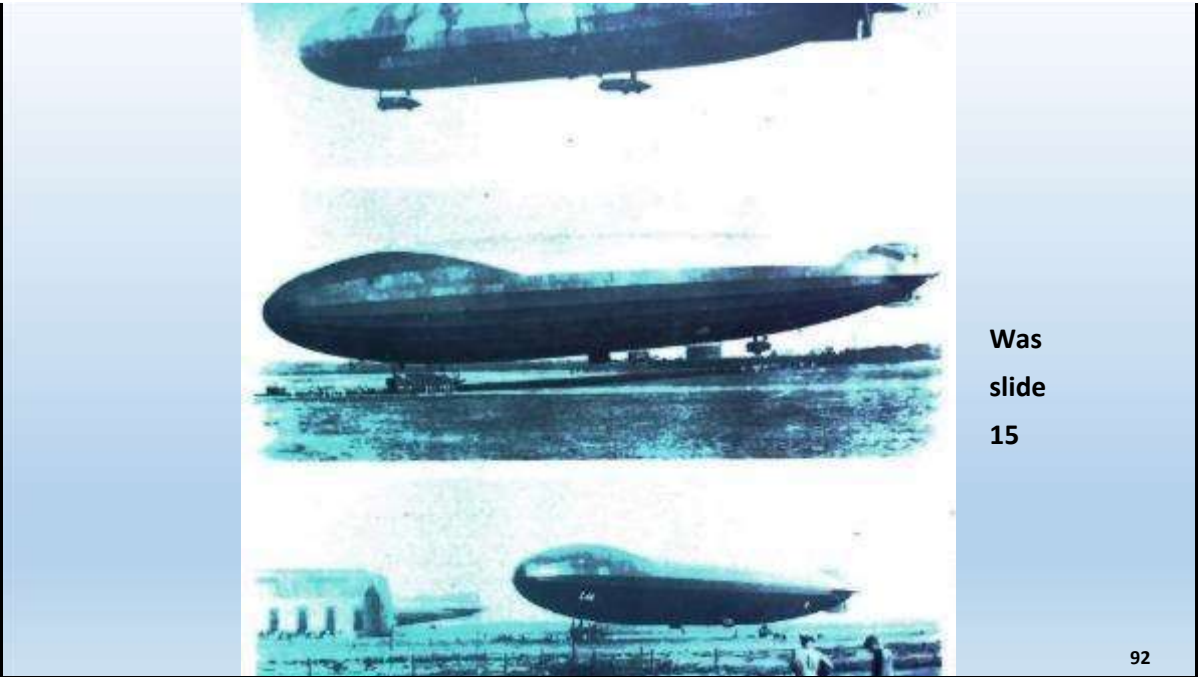
WATCH THIS SPACE!!!!

Spare slides not used



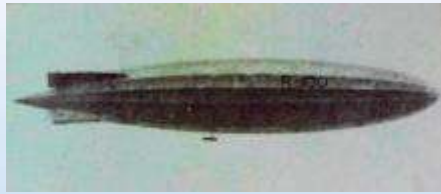


91



Was
slide
15

92



Airship R100
arriving at Cardington on
16th December 1929.
The first flight from
Yorkshire took
5 hours 37 minutes with
45 crew and 12 passengers



Airship R100
riding at the Cardington
mooring tower.
Photo taken on
17th December 1929