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## **The Imperial Airship Establishment and the Rejuvenation of the British Empire, 1919-2001**

### ***Introduction***

From our vantage point in the early 21<sup>st</sup> century, it is important to remember that few people alive in 1918 could have foreseen the unprecedented century of *Pax Britannia* which followed the Great War and its brief follow-on revolutionary conflagrations. In fact, to many war-weary pessimists, the blood spilled on the fields of Flanders seemed to presage the ultimate collapse of not only our great Empire, but the primacy of Europe itself.

At the time, even many loyal subjects questioned the wisdom of His Majesty's government when it spurned the duplicitous German armistice offer and sought instead to completely crush the demoralised Hun army and rid Europe of Prussian hegemony forever. France was exhausted by years of war and our American and Italian allies initially seemed far too willing to lick the Junker boot in exchange for "peace". However, forces of the Empire pushed on, driving into the heart of Germany and Austria, crushing the jackbooted grey hordes whenever they dared to mount any resistance, finally considering their work done only when the Royal Union was

raised over the gutted Reichstag on August 15, 1919<sup>1</sup>.

Now, almost 100 years after that glorious moment, it is difficult to imagine that the map of Europe ever contained anything other than the series of innocuous and pastoral German-speaking statelets we see today stretching from Denmark in the north to the Italian, Magyar, and Servian borders on the south. Hemmed in by France on the Rhine and by Poland along on the Odrze and Nysie rivers, these gelded Germanies are a far cry from the sprawling industrial and scientific colossus that dominated Europe for almost 40 years.

Besides ridding the world of the Germanic menace, complete victory allowed the Allies to claim for themselves all of the engineering skill and scientific wizardry that had

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<sup>1</sup> At several times the unilateral British offensive came close to breaking up the Alliance. The USA's Woodrow Wilson was particularly incensed, since the German government's armistice was offered in response to his "Fourteen Points". However, since the offensive never stalled, most the Allies came to decide that the more prudent course of action was to join in (France) or offer materiel assistance (the US).

heretofore been in the employ of the Kaiser's warlords, with the lion's share going to the clear leader of the victorious coalition, Britain. At the time, many well-meaning Britons questioned the establishment of the Royal Technical Corps and the ensuing British (and some French) appropriation of Germany's industrial base. The following brief excerpt from a February 1920 column in *The Economist* is typical of this thinking<sup>2</sup>:

*Although this newspaper supports tough German reparations, and even bringing the Kaiser, Ludendorff, and the rest to justice, the actions undertaken on our behalf by the Royal Technical Corps sound more like something the Kaiser himself, or perhaps Attila the Hun, would meet out to a vanquished foe. To ensure European peace, is it truly necessary to reduce Germany to a land of shepherds and potato farmers? Must we uproot thousands of scientists, industrialists, educators, tradesmen, and technicians from their homes and families to unwillingly ply their trades in London, Ottawa, Paris, or Sydney? Must we remove every factory from Dusseldorf and rebuild it in Dublin? This newspaper is thoroughly patriotic, but are we alone in believing we are doing nothing more than feathering our own caps at the expense of the*

*German people, millions of whom are sure to flock to the cause of Red Revolutionaries?*

Only with the hindsight of history do we now know how wrong *The Economist* was and what a boon to civilisation the de-industrialisation of Germany has been. Thanks to German technological knowledge, from the airships that bound our Empire together in the first half of the 20<sup>th</sup> century, to the atom smashers that light our cities today, and the rockets which will someday put men on the moon, civilisation owes many of its advances to the displaced former Germans and the skills they possessed. Divorced from their industrial centers, the Germanies also ultimately benefitted, albeit at the price of a few temporary serious dislocations in the 1920-1930 period. Today, 45 million content and Christian Germans have become the breadbasket of a peaceful and united western Europe – a Europe, which along with the United States, the British Empire-Commonwealth, the Soviet Russian Union, and Japan - still dominates the world<sup>3</sup>. This article records only one small success of this farsighted plan.

### ***British Rigid Airships Prior to 1919.***

Other than the German Empire, Britain was the only Great War combatant to experiment with rigid airships. From the beginning, however, Britain's programme suffered from lack of solid engineering data, unoriginality, and undue optimism. Cowed by the Germans' apparent success in adopting

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<sup>2</sup> Press reaction outside of the British Empire was even more forceful, claiming not only that the RTC actions punished German civilians excessively but that the real intent was to strengthen the British Empire at the expense of other Allies.

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<sup>3</sup> These five powers comprise the 1 "Star System" that, with one minor exception – the brief Soviet-Japanese War of 1937- has kept the peace since 1919 and ensured global stability.

the rigid airship to civil, military and naval uses, British designers slavishly copied Zeppelin concepts, but without sufficient understanding of the detailed engineering involved to succeed. The result was that British airship technology was always years behind Germany's. Not only were the earliest British ships obsolete the moment they were christened, in most instances they were incapable of matching the performance of the German ships they were intended to copy.

Although no British rigid airship built prior to 1919 can be considered an unqualified success, one can identify a general trend of gradual improvement. The first ships, from the prewar HMA-1 *Mayfly* through the HMA-23 classes were little more than crude attempts to copy the Zeppelin concept without any understanding of the detail design principles underlying Zeppelin practice. Not surprisingly, *Mayfly* herself was so heavy she could not even fly, while the others were militarily useless. Most of these ships were built by Vickers, although at Admiralty insistence, Beardmore, Armstrong & Whitworth, and Shorts were also engaged. Britain's first ships built with the advantage of German information were *R-31* and *R-32*, designed by the Royal Navy under the direction of a defected German Schutte-Lanz engineer. Unfortunately for the Royal Navy, Schutte-Lanz design principles involved use of a wood framework and other regressive technologies. Both ships were completed in 1918-1919. Although they least performed as expected, they were completely obsolete in terms of capability and design concept. In 1920, *R-31* was loaned to the US and, based in Britain; it served as the US Navy's

training airship ZR-1 *USS Tecumseh* until 1922. *R-32* was sold to Japan, where it was operated by the Asahi Newspaper group until a disastrous hydrogen fire in 1923. The last British airships designed prior to the appropriation of the Zeppelin works and its affiliated staff were *R-33*, and *R-34*, which were based on study of the German Naval airship, *L-33*, brought down over Britain in 1916. These were arguably the first two British rigid airships to compare favorably with their German prototypes, although they were also several years obsolete when finished in 1919-1920.

### ***The "Teutonicisation" of the British Airship Programme***

Upon the end of the Great War and the anticipated influx of German design data and staff, plans for the construction of airships *R-35* through *R-40* (based broadly on the *R-33* concept) were cancelled by the Admiralty. The elimination of Germany as a current and future military threat also resulted in drastic cuts in funding for all naval projects, as neither of the remaining naval powers of note, the USA and Japan, were seen as potential enemies<sup>4</sup>. The entire British airship programme was transferred to the Air Ministry. The

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<sup>4</sup> This was perhaps, at the time, a premature judgment. Although both Japan and the US were members of the Allied coalition, they had conflicting interests in South Asia and the Pacific, and both were engaged in a large naval buildup, clearly aimed at each other. Had the Second World Depression not intervened and the Star not developed, it is highly likely they would have gone to war, and this could have put the Empire in the awkward and unpopular position of assisting its strategic ally, Japan, and going to war with the United States, a nation with which it shared much more in common, culturally and politically.

Air Ministry in turn established a consortium of firms under the overall management of Vickers, Ltd to plan, develop and implement an Imperial Airship Establishment (IAE) on behalf of the Government. Chartered at Cardington though a Royal grant and supported with direct appropriations intended to be offset by future private earnings, the IAE was tasked with the following:

- (1) Working with the Royal Technical Corps, complete removal of all Zeppelin and Schutte-Lanz airships, hangers, fabricating plants, and design facilities to Britain, and destruction of all airship infrastructure which could not be moved;
- (2) Offering financial inducements to the chief executive officers, directors, and design staffs of the Zeppelin and Schutte-Lanz companies to voluntarily leave Germany and accept positions in the IAE; and for those who do not leave Germany voluntarily, implement the more drastic recruitment or retirement measures authorised by the Royal Technical Corps;
- (3) Working through the Royal Technical Corps to recruit the most experienced men from the trades necessary to build, maintain, and operate rigid airships, including former German naval personnel as appropriate;
- (4) Developing and expanding dedicated airship works at Cardington and secondary

- facilities in Pullman, Howden, and Montreal;
- (5) Negotiating with the United States an agreement providing sufficient quantities of non-flammable helium gas to support a commercial airship service, either alone or in combination with potential subsidiary American carriers;
- (6) Seeking to sell rigid airships to other friendly nations, in particular the United States to facilitate the availability of non-flammable helium gas;
- (7) Implementing, by 1924, short and medium range commercial airship service within the British Isles and, as determined by events abroad, extended service with France, Spain, Italy, and Scandinavia;
- (8) Implementing, by 1928, long range regular commercial airship service between Britain, North America, India, and Australia, with additional service possible with Japan, South Africa, and South America.

It is a measure of the dedication and hard work of the IAE that all of these goals were reached to one extent or another by the early 1930's.

Perhaps most advantageously, the IAE found that the vast majority of the directors, managers and designers formerly employed by the Zeppelin and Schutte-Lanz firms were more than happy to take up work in Britain. Not only was this the only way trained German technicians could avoid being

thrown into poverty as the former German Empire was partitioned and de-industrialised, many seemed to be genuinely excited by the opportunity to contribute their skills to the future of airship travel irrespective of the nation sponsoring it. In particular, Dr. Hugo Eckener, the managing director at Zeppelin since the Count's death, and more of an internationalist businessman than German patriot, saw this as part of the ultimate demilitarisation of aviation he favored. Dr. Eckener was instrumental in recruiting virtually the entire Zeppelin Company to join the IAE. Although the IAE was less interested overall in the Schutte-Lanz firm, a high priority was given to securing the services of Dr. Karl Lanz, the firm's co-founder and chief designer. Lanz also voluntarily joined the IAE and eventually assisted in the design of several Vickers commercial ships. All told, by late 1922, no fewer than 1,000 Germans had been moved to the IAE at Cardington, and were already instructing British airship engineers in the fine points of their art.

With the conquest of Germany, the Allies also obtained a number of former German Naval airships, to go with the remnants of the High Seas Fleet captured at Kiel<sup>5</sup>. Britain claimed the vast

majority of these spoils, including the navy airships L-56, L-63, L-71, and L-72 as well as Zeppelins LZ-115 and LZ-116, which were nearly complete when Zeppelin's Friedrichshafen facility was occupied by the Royal Technical Corps. All but one (L-72, which was given to France) were transferred to the IAE, and all existing British-built ships were scrapped to make room in their hangars for the new acquisitions.

All of these ships were far larger and far more advanced than any existing British airships. In response to pressure from Parliament, the IAE initially planned to adapt them immediately for high-speed passenger service between Britain and the Continent. However, Eckener argued vigorously against this, pointing out that all the surviving German airships had been built very lightly for extremely high-altitude bombing operations and would not easily be adapted to carry passengers at low altitudes, safely, or in any comfort. At first suspicious of Eckener, the Air Ministry was initially inclined to ignore his warnings, but agreed to an IAE request that the ships' structures be analysed before putting them into service. This analysis found that Eckener's warnings were correct, which had the combined effect of avoiding

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<sup>5</sup> No ships of which ever entered British service. It is uncertain if the Royal Navy ever seriously considered impressing any ex-German ships, but once their poor condition and lack of maintenance became apparent to naval inspectors, any British interest that may have existed in them quickly disappeared. All submarines were destroyed. Most light units were either scrapped or sold to France and Italy. With a few exceptions, battleships and battlecruisers put in service prior to 1914 were scrapped. Greece bought two *Heligoland*-class battleships to counter *Yavuz*, still in Turkish service. Both surviving *Derflinger*-class

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battlecruisers, the nearly completed *Mackensen*, and the two complete *Baden*-class battleships were offered for sale to other Allied states. The two *Derflingers* ended up being sold to Japan. In 1935 both ships were converted as aeroplane carriers. *Mackensen* was bought by France and eventually completed as the fast battleship *Lyon*. The battleships *Baden* and *Bayern* were split between France and Italy. As the French *Strasbourg*, *Baden* served until 1942 as the flagship of the Mediterranean fleet. *Bayern* never saw Italian service, being sunk by Croat mines at Trieste in 1921 as she was being refitted.

probable disaster and creating good will toward Eckener, whose loyalty to his British employers could now be trusted. The essential accuracy of Eckener's warnings was further verified when two other ships based on "height climber" technology (the French *Dixmude* and the Americans' ZR-2 *USS Shenandoah*) broke apart in low-level weather systems.

Renamed R-41, R-42, R-43, R-44, and R-45, the former German airships were initially operated by the IAE as training ships under the de facto command of former German officers. One advantage of training in these ships, and under German crews, was that it gave future British airshipmen a proper appreciation for caution in the operation of especially fragile rigid airships, no doubt a major factor in the overall safety of British commercial airship operations.

In 1923, R-44 and R-45 were given sufficient strengthening to permit their operation as high-speed mail carriers, a role they fulfilled between Britain and Paris until 1925, when purpose-built commercial airships became available. It was also in 1923 that the Air Ministry succumbed to popular pressure and allowed the IAE to begin assigning names to its ships in addition to their "R" number. Because of their experimental status, R-41 thru R-43 were never christened, despite persistent rumors they would have been named *HMA Faith*, *HMA Charity*, and *HMA Hope*. Rather unimaginatively, R-44 became *HMA Howden* and R-45 was named *HMA Cardington*. Following the introduction of the R-50 class (see below), *Howdon* and *Cardington* were stripped of all non-essential structure and used for high-altitude research,

including the testing of pressure suits and cabin pressurisation for aircraft<sup>6</sup>.

### *The Imperial Airship Service Takes Flight*

In 1923, the first three commercial airships were begun at Cardington, under the overall direction of Vickers. Although capable of transatlantic flights, the R-50 class were intended primarily as passenger carriers for medium-range flights within Britain and to Europe (including the Levant and North Africa). As the negotiations for helium from the United States had not yet been completed, the ships were filled with approximately 2,800,000 cubic feet of hydrogen and were 675 feet long. Power was supplied by 5 Rolls Royce Centaur diesels (German Maybach designs) in exterior power cars. Accommodation for up to 30 passengers and 12 tons of freight was provided. Passenger space was provided in a large combined control/passenger car near the bow, while freight and crew spaces were located inside the hull along the lower keel. Under normal power, the ships cruised at 65 kts, with a one-way cruise range of 5,000 miles. R-50, *HMA Good Hope*, was the first to finish in 1925, followed by R-51 *HMA Caledonia*, and R-52 *HMA Elizabeth I* in 1926.

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<sup>6</sup> During one un-powered test, *Cardington* reached the unprecedented altitude of 45,000 feet, well beyond the reach of contemporary aeroplanes or anti-aircraft artillery. The resulted in a temporary renewal of interest in such airships by both the Fleet Air Arm and the Royal Air Force. The IAE was asked to develop design studies for even larger modern height-climbers, but when it was determined that the resulting ships would be extremely large, expensive to build and operate, and fragile with only a token offensive payload the proposals were quickly tabled.

These first ships were something of an experiment, intended to solidify practice before larger, more luxurious, ships were built for the transatlantic and Imperial trade. Since most flights were expected to take 32 hours or less, individual staterooms were not provided. Rather, the passenger space boasted Pullman-style seats arranged in groups of four on each side of a wide aisle (referred to in IAE brochures as “roomettes”) adjacent to the many large windows. Curtains could be extended to increase the sense of privacy provided each “roomette” on overnight flights. A 15x20 foot public space was provided immediately aft of the ships’ control cabin, which could be laid out as a lounge for dining. In addition to the officers and men required to operate the ship, passenger needs were attended to by a full staff of stewards, stewardesses, and 2 full-time chefs working in an all-electric kitchen located just above the passenger car on the main keel. A spiral staircase provided access between the crews’ spaces and the passenger compartment’s public room.

From the beginning, the ships were a success, helped by the fact that booking fees were partially subsidised by the Ministry of Aviation. *Good Hope* and *Elizabeth I* established regular routes connecting Cardington with Marseilles (with a stop in Paris) and a seasonal Mediterranean circuit involving Rome, Athens, Cairo, Tunis, and Algiers. The French government constructed a two-ship hangar at Marseille, but at all other locations the ships were moored on temporary masts and serviced in open-topped “air docks”, which offered some shelter from high winds. *Caledonia*, as its name suggests, initially provided service to Edinburgh, and from there it

operated a North Sea circuit with stops at Oslo, Stockholm, Copenhagen, and Hamburg. This North Sea route was never as successful as the southern circuit. Frequent inclement weather affected schedules and because the ship’s passenger quarters were unheated, flights were limited to the warm summer months. *Good Hope* and *Elizabeth I* remained in service until 1933, whereupon they were replaced on the medium-haul routes by British Overseas Airways (BOAC) flying boats.

In 1935, *Good Hope* and *Elizabeth I* were sold to Soviet Russia and used for a short time as experimental high-speed military transports between Moscow and Vladivostok. Renamed *Internationale* and *Marat*, and stripped of all non-essential equipment, the ships were capable of transporting up to 200 armed infantrymen or three armored cars across Siberia far faster than contemporary railroads. The Molotov regime was so enamored with the potential of large airships as emergency long-distance troop transports that the USSR then ordered six much larger ships similar to the R-60 class (see below). However, upon the outbreak the Soviet-Japanese War in 1937, the Air Ministry refused to sanction the sale of any further airships to Russia, and none were delivered. On their own, the Soviets initiated the construction of several transport airships based on the R-50 design, but with additional bays added amidships, increasing hydrogen capacity to 3,500,000 cubic meters. At least two were completed in 1939-40, but they were apparently not particularly successful in Russian service. In 1941, the former *Good Hope* and both Russian-built R-50’s were sold to Manchukuo where they were allegedly

flown as bulk transports until 1944; the fate of the former *Elizabeth I* is unknown.

*Caledonia* had a much shorter career. The Scandinavian service was discontinued in 1929 and in 1930, she was temporarily transferred to the Royal Navy for use in aeroplane hook-on experiments. It was in this capacity she became involved in the first significant airship disaster associated with the IAE, when an aeroplane's pilot became disoriented during low visibility trapeze trials over the North Sea and crashed his machine into the ventral surface of the airship. The crash destroyed the fighter and killed its pilot, but damage to the airship initially seemed to be manageable. However, over the following several hours as *Caledonia* attempted to return to base, the damaged keel structure began to crumple, which caused the main rings to distort and rip huge gashes in several midships gas cells. Leaking hydrogen then mixed with oxygen – a deadly combination. It is unclear what ignited the hydrogen, but four hours after the initial accident, the ship exploded in mid-air and plunged in flames toward the Thames Estuary, killing all 46 men on board. Although no fault was laid at the design of the airship, the IAE restricted commercial airship flights until helium became available from the United States<sup>7</sup>.

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<sup>7</sup> The persistent delays in obtaining helium from the USA was a constant source of friction between the US and Britain in the late 1920's and early 1930's. Citing the Anglo-Japanese alliance, the US Senate was initially unwilling to ratify any helium-export treaty with Britain. In return, some in Parliament demanded that the IAE revoke all clauses in its Charter related to the United States as a source of helium gas and plan only for hydrogen as a lifting gas. Once again, Eckener entered the argument and,

### ***Linking the Empire with the World by Airship***

Work on the follow up transatlantic airships, the R-60 class, was begun in 1928. Initially planned as little more than marginally scaled-up versions of the R-50's, it was hoped the first ship of the class could be in service by late 1930. However, following the crash of *Caledonia*, the decision was made that all future IAE ships would use only non-flammable helium lifting gas, which was only available in quantity from the United States. Because helium was significantly less buoyant than hydrogen, the Air Ministry also ordered that the R-60's be substantially enlarged, requiring that the ships under construction be scrapped and new designs worked up.

Unfortunately for the IAE, successful negotiation of the Helium Export Treaty with the USA took far longer than initially anticipated. As the world's only source of helium gas, the United States not unexpectedly drove a very hard bargain before finally ratifying the treaty in 1933. Several major concessions were granted to the US, chief among them being the requirement that one of every three airships constructed by the IAE be transferred to Pan American Airways for use on US-flag transpacific routes linking the mainland US with Hawaii, the Philippines, Guam, Tokyo, and Shanghai. The Air Ministry and Parliament initially chafed under these terms, but the partnership which developed between the IAE and PanAm benefitted Britain far more than the USA. Lacking its own airship industry,

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assisted by the crash of *Cardington* in 1930 insisted that all British airships would be lifted by hydrogen or he would leave the program.



America always remained dependent on the IAE for its PanAm service, and the US-flag carrier was recognised as the junior partner in the endeavour.

Once the availability of helium was assured, a Vickers design team under the overall supervision by Barnes Wallis and Hugo Eckener finalised work on the R-60 class, intended for transatlantic and other pan-Imperial travel. As modified, the R-60's were a tremendous advance over the preceding ships. Containing almost 9 million feet of helium and over 850 feet long, they dispensed with the external passenger gondola of the R-50 class and located all accommodations within a two-level internal bay in the hull, immediately above a small control car. Individual staterooms were provided for up to 100 passengers in the lower level, with a large public space on the second level that could be organised as two lounges or one formal dining room. Large windows provided the public rooms with an outstanding view, while 1<sup>st</sup> class staterooms had a small window in the floor. In addition to passengers and crew, up to 20 tons of freight could be carried in capacious storage compartments along the keel. Power was provided by eight coupled Rolls Royce Centaur II diesel engines in four external power cars driving massive 4-bladed airscrews. At normal cruising power, the ships could fly nearly 10,000 miles without refueling at a speed of 75 kts.

Five R-60 ships were initially ordered, of which the third, R-62, was transferred to the USA as per provisions of the Helium Export Treaty. The four British ships, R-60 *HMA Britannia*, R-61 *HMA Arabia*, R-63 *HMA India*, and R-64 *HMA Aquitania*, all entered service in

1935. *Britannia* and *Aquitania* were placed on the North Atlantic run, providing regularly scheduled service to several eastern Canadian cities as well as New York, where the former R-62, now the Pan American Airways ship *Pan American Eagle* provided direct flights to San Francisco, and from there to Honolulu, Manila, Shanghai, and Tokyo. *Arabia* and *India* were used to pioneer routes connecting Britain with India and on to Australia. Both ships also provided stops in Paris and Rome as part of an arrangement granting the IAE rights to fly over French and Italian territory in Europe and the Middle East. New hangars capable of sheltering these large ships were erected at Cardington, Howden, Montreal, Marseille, and Bombay, with Pan American erecting similar sheds at New York, Honolulu, and San Francisco for its airship

The Australian route proved so popular that a 6<sup>th</sup> R-60 ship, R-65 *HMA Australia*, was completed in 1938 specifically for direct flights to Sydney, with only a brief refueling stop-over in Ceylon. A new hangar was also erected at Sydney. But by the end of the 1930's, the IAE was looking at yet another group of ships, the magnificent, yet troubled, R-70 class.

### ***Decline***

By 1939 it was becoming apparent that flying boats and even landplanes would eventually be able to provide faster and more efficient long-distance passenger air travel, while the continued expansion of rail and high-speed motorway networks would provide more reliable and much cheaper overland transport in Western Europe and North America. Dr. Eckener, who by now had become an

honored British subject and awarded a knighthood, could see the handwriting on the wall. In 1940, he proposed a class of ships to the Air Ministry which would far eclipse anything that had flown before or since. They would be purely luxury cruise ships, not scheduled liners, and would be marketed to people for whom price was simply no object.

As originally submitted to the Air Ministry, the R-70s would be over twice the size of the previous class, containing almost 19,000,000 cubic feet of helium in a hull which was approximately 1,500 feet long and 250 feet in diameter. They would be the largest moving objects ever built. The lift provided by this gigantic volume of helium would be used, not to carry 500 or 1000 “regular” passengers in a manner equivalent to the R-60 ships, but to carry no more than 200 highly pampered guests in a degree of luxury found only in fine hotels. Instead of the paper-thin walls and weight saving aluminum-framed fabricboard used in all earlier ships, staterooms and public areas would be finished in real woods with effective soundproofing, ornamental metals, ceramics, and several of the new plastics which emulated stone. As opposed to the earlier ships, which were neither air-conditioned nor heated, the R-70s would be provided with electric central heating in all passenger spaces as well as forced draught cooling in staterooms – which were given full size beds, closets, complete lavatories, and large exterior windows. The ships would be provided with enclosed public promenades, not only in the normal locations in the ventral passenger bay, but on a “crows nest” at the top of the ship as well. In addition, each R-70 class ship would also have a small auditorium and dance

floor for ship-board performances by a professional dance band. As the *piece de la resistance*, each ship would be equipped with a transparent fibreglass swimming pool in the bottommost deck of the main passenger bay, providing swimmers with a clear bottom through which they could enjoy the countryside passing below them as they floated weightlessly in the water.

Even to the most ardent supporters of the IAE in the Air Ministry, this proposal seemed highly extravagant and the design was tabled while two further R-60’s were built in 1941, R-66 *HMA Iberia* for service through Spain, French West Africa and on to South Africa, and R-67 *Las Americas* for Pan American’s service to the Caribbean and Brazil.

The decision to table development of the R-70’s proved wise when the Second World Depression of 1942-46 rocked the very foundations of the world economy. In the face of world-wide economic and political upheavals, the IAE was forced to abandon its air service to the South and East, forcing the retirement of *Arabia*, *India*, *Iberia*, and *Australia*, and the closing of all docks, maintenance, and supply facilities along these routes. There remained sufficient demand to retain the transatlantic service provided by *Aquitania* and *Britannia* to Canada, albeit on a reduced schedule. However, extreme political instability in the US forced bankruptcy of Pan American Airways, and the elimination of all American airship operations. *Pan American Eagle* and *Las Americas* were sold for scrap by the State of New York in 1944, and all other former Pan American assets were liquidated by the radical Constitutional-Populist Administration of President Hugh Long

after the restoration of Federal authority in 1947.

The world economy eventually recovered to pre-Crash levels in 1950, and with it the aviation industry<sup>8</sup>.

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<sup>8</sup> It was also at this time that the heretofore informal big-power arrangement that evolved after the Great War was codified by the London Accord of 1952, which established the five-sided “Star” system of interest areas and the Star Council comprising representatives from the British Commonwealth, the European Federation, the United States, Soviet Russia, the Japanese Prosperity Sphere and several invited minor powers. The Star system fixed global interest-area boundaries for each of the five founding Star nations and pledged each Star states to complete non-interference in the internal affairs of other zones. In essence much of the globe was divided into five “super states” dominated by a central power. Each power was free to administer its zone differently. Britain essentially incorporated its zone into the evolving structure of the semi-federal British Empire-Commonwealth. A similar pattern was followed by the French-dominated European Confederation. The Russians emphasized their Socialist ideology and fostered the creation semi-independent national Bolshevik Republics in an economic union under Russian oversight in its zone, referred to collectively as the Union of Soviet Socialist Republics. The United States received five-power recognition of its increased economic and political hegemony in much of Latin America, and Japan styled its system of colonies and semi-independent satellites in Asia an “Asian Co-Prosperity Sphere”. Some regions, most notably in the middle-east, central Asia, and South America remained independent of the five interest zones, but were placed under the overall protection of the Star Council. In recent years a number of smaller powers outside the original Star system, most notably Brazil and Persia have begun to exercise regional economic or ideological hegemon powers themselves. In addition, increasing Indian Hindi and Raj frustration with their under-representation in the Empire-Commonwealth parliament may lead to the eventual fission of the British Empire-Commonwealth into two independent, but allied, spheres. Almost certainly the Star system will evolve to address any and all of these changes.

However, by now, the aeroplane had clearly emerged as the main player. BOAC resumed service in Europe and the Empire-Commonwealth with its flying boats and multi-engine Avro Airliners. Several nationalized airlines in the USA, including American Airways, National Flyways, and Amigo Aviation were soon providing air services within the Americas with their huge multi-engine Hughes flying boats and Douglas-Vultee landplanes. Air France, Nippon Air, and Aeroflot also entered the market. Experiments with turbine-reaction engines indicated that future airplanes would eventually far surpass normal airships in speed, capacity, range, reliability, and perhaps even passenger comfort. In this market, the IAE soon found that the 100-passenger, 72kt, *Aquitania* and *Britannia* had become commercial dinosaurs. Both ships were kept in service until 1952, when they were retired and laid up at Cardington. Soon thereafter, the Air Ministry proposed closing the IAE altogether.

### ***The Phoenix Rises***

Yet, Sir Hugo was not finished. Along with others from the IAE, he lobbied incessantly for his vision of the “floating resorts”, as the original R-70s came to be called. For years, under successive Liberal-Labor or Social Labor governments, these calls fell on deaf ears. However, the Empire-Commonwealth elections of 1960 unexpectedly brought the New Conservatives to power in Britain, and with them, elimination of the rhetorical focus on the “common man” which had dictated so many previous government priorities. It was now acceptable for Her

Majesty's government to advocate and fund the creation of flying palaces which would benefit mainly the very wealthy and an industry which was increasingly seen by "the common man" as irrelevant to his needs.

Thus, in 1961, the IAE finally began work on the new generation of ships. Because it had been almost 20 years since the original R-70 designs had been developed, Eckener and his team had the opportunity to incorporate a host of new technologies, most importantly the adoption of atomic reaction power, solar helium superheating, radiosignal navigation, and lighter synthetic materials. In the redesign process, the ships became even larger, eventually emerging as 1,700 foot long behemoths with a gas volume of 22,500,000 cubic feet. A massive new building shed was erected at Cardington in 1963, followed by additional new hangars in Montreal, Bombay, and Sydney to service the giant ships.

*HMA Phoenix*, the first ship in the class, took to the air in 1968, followed by *HMA Elizabeth II*, in 1972. In all respects, these magnificent vessels proved to be the floating resorts Sir Hugo promised in 1940. With all onboard power provided by atomics or solar, and with expendable supplies and guests usually ferried to the ship by transport airplanes or autorotorcraft, the R-70s could remain aloft for months.

Public areas for 200 passengers (always referred to as "guests") were located in a huge, three-level bay at the center of the ship containing all the appportionments one would expect of a small boutique hotel with ballroom/concert hall and casino. Floor to ceiling transparencies on

the ships' hull provided breathtaking visibility from all three levels. Breaking from earlier practice, the ships' 100 staterooms were located in a two-level gondola beneath the accommodations bay, each room provided with full bath, and external windows or enclosed small balconies. Although the ships were capable of speeds in excess of 75 kts in an emergency, they rarely operated above 30 kts when cruising. This allowed adventurous guests to comfortably exercise their legs on a semi-enclosed teak promenade encircling the outside walls of the 300-foot long gondola.

Typical flights began at either Cardington or Sydney. *Phoenix* was based in Cardington, where she would take a leisurely sightseeing cruise circuit through the Mediterranean, down the west Coast of Portugal and Africa with flights over the Canary Islands, and then west to Brazil and up the eastern coast of South and North America, visiting numerous ports of call on both continents, the Caribbean, and the Bahamas. *Elizabeth II*, based in Sydney, would follow one of two wide scenic circuits in the Pacific or Indian Oceans. The longer cruise was essentially a wide circle around the Pacific Rim including the eastern coastline of Australia, thru the Dutch East Indies, and throughout the entire Pacific with visits to China, Japan, Alaska, Hawaii, California, Mexico, Panama, Peru, and Chili, eventually returning to Sydney via the Antarctic coast and New Zealand. *Elizabeth's* other route took her to Burma, the Dominion of India, Mesopotamia, to Cairo and then down south up Nile Valley to Lake Victoria, the Dominion of South Africa, and from there back

east via French Madagascar, to Darwin and then overland to Sydney.

The ships typically began their circuits at little over half capacity, with additional guests booking during the flight and joining the cruise by rotorcraft or hook-on shuttle planes at the many ports-of-call. Only a few guests - usually the independently wealthy idle rich and nobility - booked stays on the airships for the entire 2 to 3 month cruise circuits. Rather, most guests journeyed with the airships for much shorter stays ranging from five days to two weeks, arriving and departing by shuttlecraft. As a result, although maximum passenger capacity of each ship only 200 people, they typically carried between 2000 and 3000 paying guests over the course of each cruise.

This was never intended to be transportation for the masses – or for that matter even the well-healed middle class vacationer or business traveler. The economics of the operation required that all visits be offered at the highest price the market could bear – and this was not a typical traveler's market. Just the lodging during a full two-month stay aboard either ship was equivalent to the three-year year salary of a well-paid white collar manager, roughly 100,000 New Pounds, or 250,000 US Dollars in 1975. Shorter stays were prorated, but even the shortest lodging on the airships never fell below 20,000 New Pounds. When the cost of meals, entertainment, shuttle flights, booking fees, taxes, local transport, and gratuities was factored in, a typical 5-day stay for one guest usually would run upwards of 80,000 New Pounds. On the other end of the spectrum, some famous celebrities and royals were known to essentially live

aboard the ships for years and run up seven- or eight-figure expenses.

There was one opportunity for “regular” people to enjoy this aerial luxury. As part of the 1966 renegotiation of IAE's Royal charter, the Heath government required that an Empire-Commonwealth lottery be held every year, with 400 winners given all-expenses paid two-week stays on each airship. After several years of trying to include these “freeboes” (as they were derisively known by paying guests) in ones and twos as part of regular paid cruises, the IAE eventually set aside special “Winners' Cruises” for this purpose. In 1975 a Parliamentary investigation undertaken by the Social Laborites showed that participants in Winners' Cruises received significantly less service and lower quality food and entertainment than paying guests. As a result, the Air Ministry required IAE to provide Citizen Guests with the same amenities as paying guests.

During the period of sustained economic growth from 1960 through the 1990's, the astronomically high cost for stays on the airships was a price many American, Brazilian, Japanese, Commonwealth, and European *nouveau riche* were able and willing to pay. The ships were refitted and renovated at least twice to keep abreast of the latest styles in decor and fittings. Coupled with steady patronage by titled aristocracy and a variety of celebrities (many of whom booked repeated stays) the ships operated at full capacity throughout the remainder of the 20<sup>th</sup> century.

In 1994 the IAE proposed a new series of “Millennium Cloud Resorts”, construction of which would be initiated

during the pan-Commonwealth Millennium Celebrations in 2001, and ready for operation by 2010. These massive geodesic dome structures completely abandoned zeppelin principles and would have dwarfed even the *Phoenix* and *Elizabeth II*. They reflect an increasing IAE mania with aerial gargantua at which even the now long-dead Sir Hugo would have blanched. Fully two-thirds of a mile in diameter and over 500 feet thick at the center, each Millennium Cloud Resort would house a veritable small aerial resort town, complete with landscaped and vegetated terrain, individual cabins, restaurants, shops, and entertainment for 1000 people in the highest state of luxury imaginable. Once inflated with helium and kept aloft by the lifting gas, further augmented by solar superheating of the atmospheres within, they would never land, being kept in supply by a fleet of supply shuttles, rotorcraft, and tethered supply cables.

At present, it is doubtful the fantastically expensive Millennium Cloud Resorts will be supported by the current Social-Labor government. Further, the recent sharp rise of Moslem discontent in Soviet Central Asia and western parts of the Indian Dominion, coupled with unsettling fluctuations in stock markets, creates an atmosphere of international uncertainty which would make even New Conservatives reluctant to spend such public sums on flying pleasure domes for only a tiny number of the wealthiest people. However, they still have strong support within the leadership of the IAE, and if international tensions relax and markets stabilize, we may yet see such remarkable and ethereal creations rise from Cardington.

### ***Collateral Political and Social Trends in the Empire***

It is very difficult for the historian of today to differentiate between the history and rebirth of the British Empire in the 20<sup>th</sup> century and the rise of the Imperial Airship Establishment during the same period, so intertwined do these parallel events seem to a British subject. However, it has often been argued, particularly by those who do not see the inexorable hand of technological progress in these parallel stories, that there was nothing inevitable, or even particularly desirable, in the rebirth of the British Empire after the Great War or the importance of airships in these events.

This view is prevalent in university faculties on the Indian Subcontinent, where Hindu Nationalist sentiment remains popular<sup>9</sup>, or even among some

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<sup>9</sup> Noteworthy among the Indian scholars holding such views is Professor Maneka Patel, Ph.D. Senior Lecturer in History at Delhi University. Mrs. Gandhi is also the wife of Mr. Sanjay Gandhi, who for many years sat in Parliament as an Indian minister. Dr. Patel's book, *An Unexpected Empire*, makes the cogent case that the rebirth of Imperialism in Britain after the end of the Great War was both improbable and harmful to the democratization of the non-western world. Using India as an example, she points out that giving India voting seats in parliament had the effect of entrenching local elites and the British Raj. Because the Empire/Commonwealth treaty of 1949 did not establish a common electoral process over the entire Empire, the end result in most of the "non-white" dominions was that British émigrés and their local allies secured the overwhelming majority of seats in the Imperial Parliament, essentially freezing the burgeoning nationalist parties out of the political process. In addition,

British academics who favor a Marxian dialectic.

## ***Epilogue***

*Following completion of this article, the civilised world was shocked by the November 11, 2001 terror attack on HMA Elizabeth II as she was receiving passenger and supply shuttles during a routine call at Bombay. Although the details of the attack are cloudy and the eventual response of Her Majesty's Government to this outrage is as yet unknown, it is certain that the murder of 265 people, including 10 members of the Russian Duma on holiday believed to be the main target of the attack, will not go unpunished. At the very least, Russian authorities will increase the intensity of their police actions against Islamic-nationalist and Pushtun nationalist extremists in the Caucasus and Central*

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the gradual rise of a large middle class undercut popular support for nationalist parties to the extent that today the overwhelming majority of Indians, Hindu or Moslem, are essentially unrepresented in Parliament, and what is worse to Dr. Gandhi, they do not care. What Dr. Gandhi and others do not understand is the fact that the solidification of the British Empire was part and parcel of the Five-Power Star arrangement formalized in the reconstruction period after the World Depression. In this process the Five Powers agreed that any attempt to provide a global governing system that attempted to accommodate the separate interests of literally hundreds or thousands of nationalities and minor nations was fraught with difficulty and would almost certainly lead to increased conflict and economic uncertainty, possibly involving the major powers. As French Premier Pierre Laval noted in 1952, "the more power and authority is vested in a few reasonable hands, the better it is for all mankind."

*Asia, where the plot is believed to have originated. Very likely, Britain and the Indian Dominion participate directly in this response since the attack occurred over Indian soil, destroyed a British airship, and killed 208 Empire-Commonwealth subjects (many of them Indian-national crew members). Police action by all Star powers would not be out of the question.*

*Given the past Turkistani and Persian support for Russian outrages in the Southern Republics of the USSR, it is likely this could lead to the first large-scale military action by major powers since the Russian-Japanese conflict in Manchukuo over 60 years ago. Certainly, the use of a pirated Indian Air shuttle aeroplane to ram the airship in a suicide attack was a frightening new elevation in the sophistication and brutality of these brigands which will certainly result in major changes in how the remaining IAE airship, Phoenix, is operated in the future. Phoenix herself has been grounded until this situation sorts itself out. Only the future will tell if she, or any other flying resorts, will ever take to the skies again.*

