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WE NEED *Airships*

AS TOLD TO
KYLE CRICHTON
BY REAR ADMIRAL
C.E. ROSENDAHL, U.S.N.

OF THE numerous problems now looming large on the world horizon, the many-faceted one of international air commerce is one of the most important. It will not be cracked by shadowboxing amateurs. The best of aeronautical and diplomatic brains, and probably vast financial and governmental aid, will figure heavily. The stakes are high and all the leading powers of the world may be expected to bid to the limit.

Today, on wartime missions, American airplanes are flying world oceans in droves. But what about peacetime? It behooves us at this very moment to take serious stock of how we are to achieve the important international aeronautical place to which as a leading power the United States is entitled. It is highly improbable that any country has any existing or legitimately contemplated form of commercial airplane that appreciably surpasses the best of any other nation. But the United States has another horse to enter in the race—a dark horse if you please, dark solely because we have failed to run it. So I nominate this other entry—that long-ranging, exclusively American workhorse of the skies, which in a fair, open race can give the United States the edge in international competition—yes, you've guessed it, the dirigible.

A few persons have held and voiced this opinion for years; yet the United States still has no ocean-going commercial dirigibles—"airships" as we should properly call them. Having had a ringside view of the battle of the air for many years, I am convinced the airship is a downright cinch bet for the United States. Why? Because we can have the airship, and no other country can have it. The reason: Helium, an exclusively American treasure.

Let's get down to the question of whether the airship is really any good for transocean travel or is only a fantasy of mine. Many people seem convinced that the destruction of the German airship Hindenburg at Lakehurst, N. J., on May 6, 1937, wiped the large airship off the books once and for all as a practical flying ship. Actually it did nothing more than interrupt progress.

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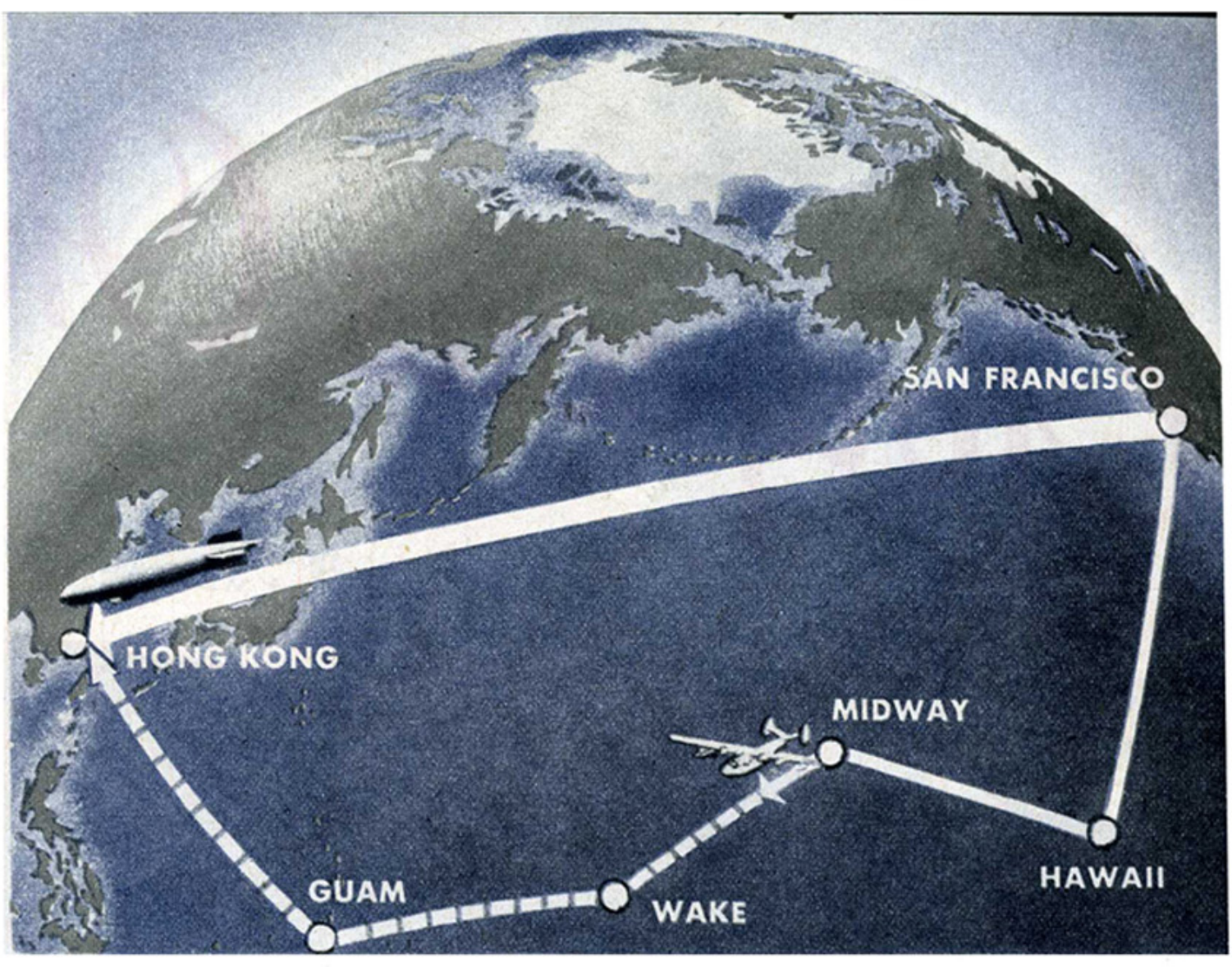

In 1929 the Graf Zeppelin airship flew from Japan to San Francisco nonstop in 69 hours. Airplanes, on the contrary, can only make the Pacific crossing in hops, subject to weather and mechanical delays that cut the average speed to as low as 33 m.p.h.

Lacking a safe inflation medium, the Hindenburg was of necessity filled with hydrogen, a highly inflammable gas. From a cause still enigmatic, it took fire on landing, the ship was consumed by flames, and thirty-six persons (thirteen passengers and twenty-three of the crew) out of the ninety-seven aboard perished. Had the airship contained the absolutely inert helium gas instead of the fickle hydrogen, the tragedy would never have happened.

But beyond even the fundamental helium consideration, there remains an impression that airships are not safe, and this must and can be answered. Superficial thought might lead also to an idea that an airship cruising at 75 miles an hour couldn't be nearly as dependable and punctual as an airplane cruising at about twice the speed.

Well, many persons would be startled by the comparison of actual scheduled commercial performances of ocean-going airships with those of the transoceanic commercial flying boats or "clippers" we have heard so much about. The airships have produced a far superior record for reliability, schedule-keeping, comfort, safety, and pay load. The slower—in miles per hour—airship has shown that in the long-range field, the race does not always go to the swifter clipper. And let's not forget the important feature of economy.

The simplest answer to the safety question is that if 100 per cent safety were the criterion we would have no transportation at all—no trains, steamers, rowboats, automobiles, airplanes, streetcars or even horse-drawn vehicles. No one suggests elimination of any of these, yet every one of them suffers an occasional fatal accident. But an even stranger answer lies in the record of commercial airships dating back to the very first crude model. In carrying some 459,000 passengers, commercial airships never had a single passenger fatality until the Hindenburg fire.

Although we still have repeated airplane crashes with resultant heavy loss of life and property, the public accepts this philosophically. It is seemingly not so with the fate of the ZR-2, the Shenandoah, the Akron, the Macon and the Hindenburg. Helium would have prevented the Hindenburg fire and consequent loss.

As for the others, let's remember they were not commercial but military ships, designed, pioneered, operated and experimented with by personnel just learning their business. I am fully aware also of the British R-101. There are full explanations for each, but briefly, what happened

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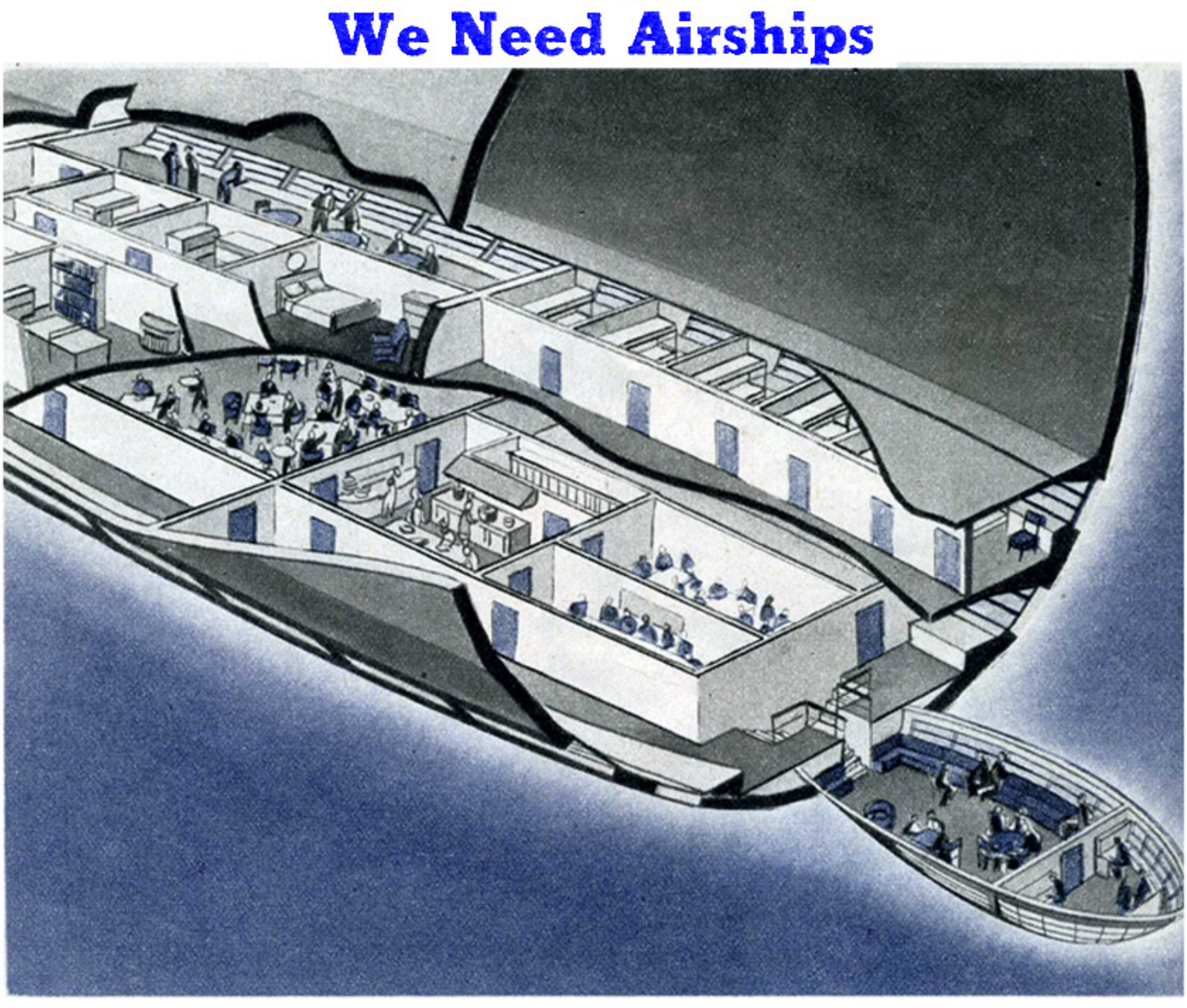


The airship is a flying hotel with staterooms, promenades, lounge, smoking room, bar. Meals are prepared on board from fresh supplies. Below: Utilizing the use of hook-on planes, extra loads can be transferred to the airship and passengers can be taken on en route

to them was what often happens to pioneer craft of all kinds and to pioneering projects in general. We can profit by this expensive experience if we get busy before such experienced personnel are gone, and new ones have to start all over.

The first and only airships designed for and employed in transoceanic commerce were the Graf Zeppelin and the Hindenburg. They set brilliant records. For six years the Graf Zeppelin carried on scheduled commercial service between Central Europe and South America. In 1929, during an unequaled globe-circling performance, that ship spanned the 5,200 miles between Japan and San Francisco nonstop in 69 hours, carrying more than 6,000 pounds of pay load in passengers, mail, baggage, souvenirs.

The larger, more modern, 1936-model Hindenburg in scheduled merchant service repeatedly flew both the 4,000 miles over the North Atlantic to this country and the 6,300 miles to South America, the latter in a four-day service which took two weeks by steamer. Besides passengers and mail, the diversified cargoes of these airships included automobiles, airplanes, canaries by the thousands, antelopes, and Susie the famous gorilla.

Now the clipper flying boats are fine in the fields for which they are suited, but they're far from being the permanent queens of all sea travel. Recently, the world's latest and largest cargo flying boat Mars received wide acclaim for her debut performance. Stripped to bare essentials and then overloaded for the occasion, the Mars flew a demonstration flight of slightly over 4,000 (statute) miles nonstop, carrying 13,000 pounds of mail.

"World records" were claimed for this as the "longest overwater flight" and the "longest nonstop cargo flight." Actually, however, both such "records" were several years ago surpassed by commercial airships in scheduled nondemonstration service, on at least 140 transocean flights. More recently, it has been stressed that the "improved" Mars could carry jeeps, field guns or airplane motors and will be capable of conversion into a hospital ship, a passenger transport or a troop carrier. The big rigid airship has always possessed such aptitude and versatility.

Let's look back at some comparative measurements in actual commercial service. Over the Pacific, commercial clippers made the trip from San Francisco to Manila and Hong Kong, not nonstop but, of necessity, in a series of stops. Stopping in Hawaii, Midway, Wake and Guam to

refuel and service, and to rest passengers and crew, this zigzag route added up to a total of 8,746 miles which the clippers *had* to fly to negotiate the actual 6,904 miles between San Francisco and Hong Kong.

Normally requiring a little less than one day, each of these legs was scheduled so that take-off and landing could be done during daylight, thus avoiding these tricky operations on the water during darkness. A starting delay of a few hours thus might require postponement of that leg until the next day, in order to avoid landing after dark. Comfort of passengers on such a long jaunt by airplane, too, had to be considered. There were delays due to weather and other causes en route and at these various resting points. Mechanical troubles and turnbacks took their toll in time. So the actual records are far from the printed timetable figures.

The traveler is interested primarily in how long it takes him to get to his destination after his scheduled departure time, and not in how fast he goes per hour while his craft is in motion. Thus the average speed he really cares about is found by dividing the shortest distance between the points of departure and arrival, by the total time spent between scheduled departure and actual arrival. On this basis, for the five-year period ending early December, 1941, we find that transpacific clippers between San Francisco and Hong Kong had an "effective" average speed of about 35 miles per hour westbound, and about 33 mph eastbound!

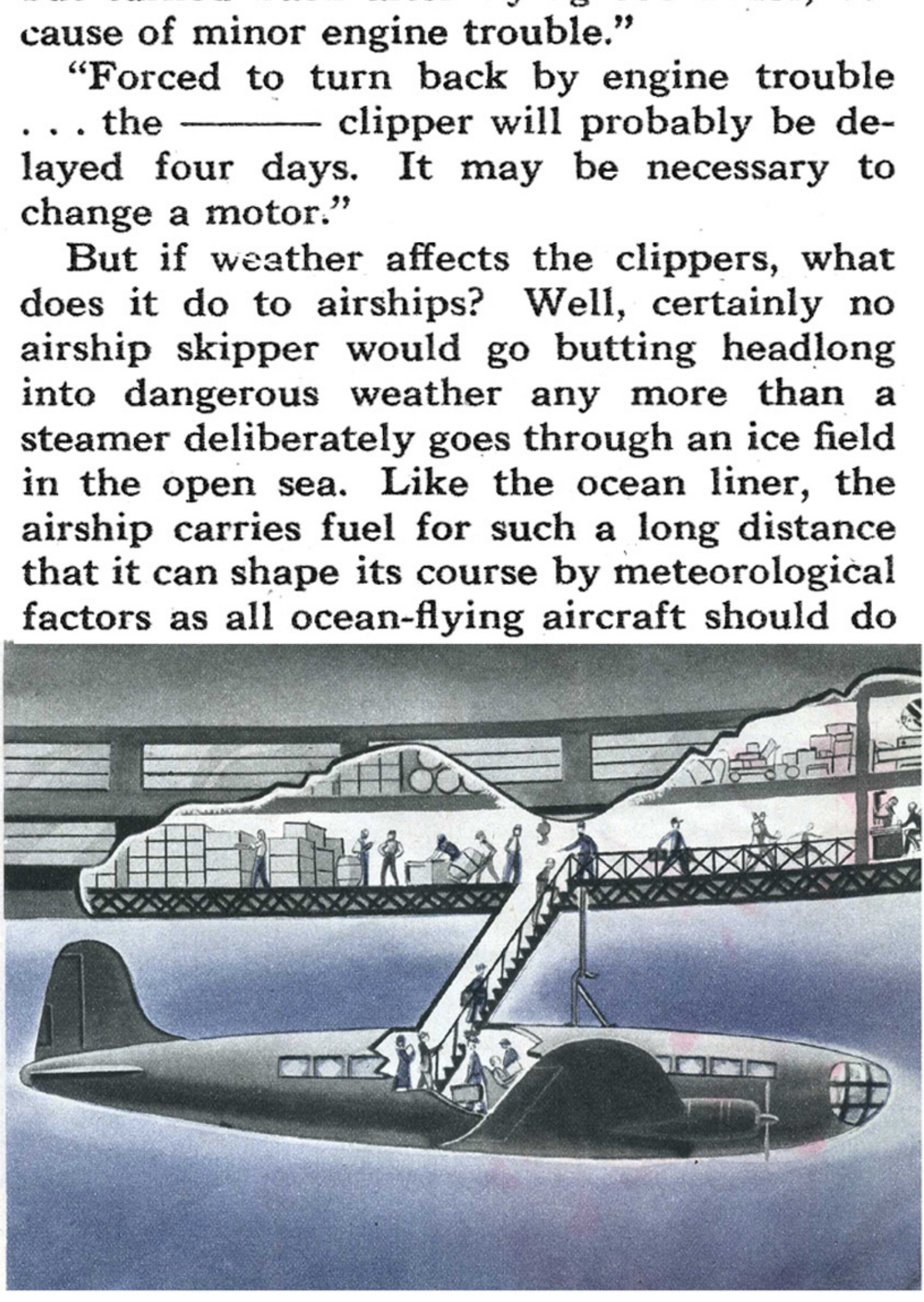
Somewhat surprising, these figures? We commonly think of flying boats and other airplanes streaking placidly through the skies at 150 and 200 miles per hour—which they can easily do—but we tend to overlook their troubles. They can't fly in all sorts of weather, and troubles of various kinds can and do bob up. A volume could be written, from newspaper reports, of clipper delays:

"Westbound clipper service, halted for 16 days by adverse winds and inclement weather between San Francisco and Honolulu, was resumed late today . . . The huge plane carried 2,000 pounds of air mail but no passengers or air express."

"The ——— clipper left Horta yesterday but turned back after flying 833 miles, because of minor engine trouble."

"Forced to turn back by engine trouble . . . the ——— clipper will probably be delayed four days. It may be necessary to change a motor."

But if weather affects the clippers, what does it do to airships? Well, certainly no airship skipper would go butting headlong into dangerous weather any more than a steamer deliberately goes through an ice field in the open sea. Like the ocean liner, the airship carries fuel for such a long distance that it can shape its course by meteorological factors as all ocean-flying aircraft should do



The airship is a flying hotel with staterooms, promenades, lounge, smoking room, bar. Meals are prepared on board from fresh supplies. Below: Utilizing the use of hook-on planes, extra loads can be transferred to the airship and passengers can be taken on en route

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—that is, avoid dangerous weather and utilize favorable factors.

With severe weather along its fixed path, the airplane, with its relatively shorter cruising range, generally must await passing of the danger, fight its way through, or turn back. But the westbound Hindenburg once took off with full knowledge of a North Atlantic hurricane. Not only was the storm circumnavigated by going as far north as Greenland, but, utilizing favorable tail-wind circulation on its periphery, the Hindenburg actually reached Lakehurst hours sooner than it had ever done by the direct route. Such meteorological navigation, of which the airship is capable, showed that the longer way round may sometimes be the quicker way home, and certainly the safer way.

As North Atlantic clipper passengers can testify, in winter months, weather forced clippers to traverse the 3,363 miles between Lisbon and New York via a circuitous southern route touching Africa, South America and the Caribbean, varying between 7,400 and 7,990 miles. Counting delays of various kinds, over the period for which public data are available, the average clipper time to negotiate the 3,363 miles between Lisbon and New York via this roundabout route was 4 days and 16 hours, and the average speed only about 30 miles per hour!

At the Whim of the Weather

Published information reveals the following record of the North Atlantic clipper service between May, 1939, and June, 1941:

a.	Trips scheduled	501
b.	Trips made	370 (74% of a)
c.	Trips not made	131 (26% of a)
d.	Trips started on schedule	154 (42% of b)
e.	Trips started late	216 (58% of b)

I don't make these points in derogation of heavier-than-air craft at all. But the public has been continuously told for years that the clipper is the full answer, and it would be the height of national folly not to see the full picture in its true perspective. Why should we overlook the airship—the one form of oceanic air transportation which no other nation can copy, the one which together with suitable heavier-than-air craft can give us supremacy? And there are other sound supporting features. For reliability and passenger comfort the airship has no equal. In economy it should surpass the clipper. In speed it far surpasses clippers in long nonstop service such as in the Pacific; it compares favorably with them in the North Atlantic and elsewhere.

Actual performances of the only comparable contemporary commercial types show that:

(a) Whereas the schedule of the 1939-model clippers between San Francisco and Hong Kong (6,904 miles) was 6 days and 7 hours, actually the average time required has been about 8 days and 8 hours. Based on the Hindenburg's average speed over a comparable route, the 1936-model airship could make the journey, nonstop, in 4 days and 15 hours, or on the average, the airship would beat the clipper to Hong Kong by 3 days and 15 hours!

(b) Whereas the clipper's eastbound transpacific schedule was 6 days, 20½ hours, actually the average time has been about 8 days, 19 hours. The airship could make the same journey, nonstop, in 3 days and 18 hours or, on the average, the airship could beat the clipper to San Francisco by five days!

There's a lot of misunderstanding also on

the subject of payload carried by clipper flying boats—actual rather than the advance untried "blueprint" figures. The 85,000-pound clipper flying boats placed in service in the Pacific and the Atlantic in 1939 are still occasionally referred to as "74-passenger" craft, but there is no such thing in service even today as a clipper capable of carrying 74 passengers over even the shortest nonstop distance in either the Atlantic or the Pacific. Seventy-four passengers and baggage would mean a payload of about 18,000 pounds.

Actually, the "average maximum amount available for payload" reported for this type clipper *in service* over the 2,410 miles between San Francisco and Honolulu was 6,985 pounds westbound and 6,210 pounds eastbound. In 1929, the 1928-model airship Graf Zeppelin, with only three quarters the horsepower of a clipper, in 69 hours flew the 5,200 miles between Japan and San Francisco nonstop, with over 6,000 pounds payload.

There are other interesting payload comparisons. The 1936 season of oceanic operations by the airship Hindenburg extended between March 31st and December 7th. The first year in which North Atlantic clipper service was in effect during corresponding months was 1940. Available statistics show that between March 31 and December 7, 1940, an average number of 3¼ clippers flew a total of 1,105,335 ton-miles of payload over the North Atlantic. Between March 31 and December 7, 1936, the Hindenburg singlehanded flew a total of 1,016,850 ton-miles of payload over the North and South Atlantic. The one airship, with only about one quarter their combined horsepower, thus did practically as much as 3¼ clippers.

But that isn't the whole story. The Hindenburg habitually carried a number of excess crewmen in training for her coming sister airships. An exorbitant weight of spares was also carried. These excessive items could have been converted into equivalent payload. Also, more load could have been put aboard in flight by transferring it by means of a hook-on plane. Adding up these available items, the Hindenburg in the period of comparison could have flown some 2,312,000 ton-miles of payload. Based on actual 1940 performance of that type, it would have taken nearly *seven* clippers of that vintage to do the possible useful work of one 1936-model airship, with these interesting comparative features:

	Engines	*Horsepower*	*Crew*
1 *Airship*	4	4,400	44
7 *Clippers*	28	42,000	77

True enough, the 7,000,000-cubic-foot Hindenburg used hydrogen which is a more efficient lifting medium than helium. But there has already been begun the design of an American airship of 10,000,000-cubic-foot capacity, which will have not only marked superiority over the Hindenburg in performance but also the enormous safety of American helium. And just as the airplane is expected to continue to improve, so will the airship, under the impetus of modern research, improved materials, etc., continue to develop its greater performance and utility.

Whereas the "74-passenger" blueprint figure for today's clippers had to be drastically reduced in actual service, the Hindenburg's original accommodations for 50 soon had to be expanded to take 72 passengers. Average airship cabin occupancy was nearly 90%, with abundant volume, floor space, and comfort for all. Airship accommodations included staterooms, promenades, writing room, lounge with grand piano, smoking room, bar and even a shower bath; meals

were not precooked or reheated but prepared in flight from fresh supplies. Relatively, the clipper is a flying "club car" or "parlor car," the airship a "flying hotel."

Vibrations and noises in the Hindenburg were reported the lowest measured in any form of transportation. Open, draftless windows added a great deal to passenger pleasure. In even the roughest weather, airship motion is only a moderate pitching and rolling, with slow rates of rise and fall, and no precipitous frightening "bumps." On one trip over the North Atlantic, while the Hindenburg was riding a 90-knot tail wind, the passengers were not in the least aware of the storm, except for glimpses through fog and clouds of the mountainous seas below. The operators of the Graf Zeppelin and the Hindenburg reported there never was a case of airsickness or seasickness in those ships.

Discomforts of Clipper Travel

Whereas the airship has carried many satisfied "repeat" customers in comfort over nonstop distances in excess of 6,300 miles, the New York Times reports that on their North Atlantic winter return route the clipper operators reduced the 3,120-mile nonstop leg between Bolama and Trinidad to two shorter ones because the hop "was too long for the comfort of the passengers." But breaking up a lengthy air journey apparently has its drawbacks, too.

Seasoned reporters who flew the transpacific clippers stressed the "Spartan aspect of routing out passengers at the most unearthly hours of the morning in preparation for a long day's flying." They remarked also that "the casual tourist, to whom the time element is not vital, will find that the transpacific sky grind calls for considerable fortitude." The airship passenger, on the other hand, stays aboard in comfort throughout the journey and continues his normal habits as though he were traveling by steamer.

Probably the most successful aircraft ever built, the moderate-sized Graf Zeppelin of 3,700,000-cubic-foot capacity, went into service in 1928 and operated in commercial overseas service—mainly to South America—until retired in 1937 after the Hindenburg fire. In addition to its famous 1929 world flight, it made many spectacular flights including an arctic flight to Spitzbergen and a trip to Egypt. The Hindenburg, completed and placed in service in 1936, was 7,000,000 cubic feet in volume, was Diesel-engine-driven, was faster and more comfortable than the Graf, and was the first of a series of four very large airships started by the Germans to bid for both North and South American commerce. Here are some totals piled up by these pioneer airships:

	Graf Zeppelin	*Hindenburg*	*Total*
Flights	590	63	653
Flight hours	17,177	3,088	20,265
Miles flown	1,053,618	209,527	1,263,145
Passengers	13,310	3,059	16,369
Mail and freight (pounds)	253,300	41,161	294,461
Ocean crossings	144	37	181

Here are a few interesting facts:

(a) Up until the Hindenburg fire, the commercial airship had a record for passenger safety that was perfect.

(b) No scheduled commercial airship flight was ever canceled or uncompleted.

(c) Contrary to clipper experience, never has an airship on a scheduled commercial flight turned back from oil leaks, magneto trouble, fuel shortage, head winds or bad weather; in fact, none ever turned back.

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The widely publicized experience of the Graf Zeppelin in May, 1929, when the ship turned back from mid-Atlantic with propeller shaft trouble, was during a demonstration flight. Even so, her safe return with four out of five engines inoperative was a remarkable demonstration of airship safety.

(d) The average amount of fuel remaining in the Hindenburg's tanks on arrival after each of her twenty North Atlantic commercial crossings was equivalent to 70% of the average amount consumed per crossing.

(e) On four out of ten trips to Lakehurst, when all commercial airplane flights in the vicinity were rightfully suspended on account of bad weather, the airship Hindenburg nevertheless departed on schedule.

(f) The most any Hindenburg arrivals were ever behind schedule was as follows:

North Atlantic . . . westbound—12 hours; eastbound—6 hours.

South Atlantic . . . southbound—14 hours; northbound—15 hours.

Earlier, I mentioned the recent "record" demonstration cargo flight of the Mars carrying 13,000 pounds of pay cargo nonstop for a little over 4,000 miles in 28 hours. Based on previous commercial airship experience, a 10,000,000-cubic-foot helium-filled airship cruising at an air speed of 75 mph could make the same journey in 56 hours and carry 130,000 pounds or *ten* times as much cargo.

Allowing 12 hours turn-around time at one end of the 4,000-mile nonstop flight and 48 hours at the other, we find that over a period of time on such a run it would take *seven* Mars flying boats to do the volume cargo transportation work of which *one* modern cargo airship conservatively is capable. Here are some interesting features of this comparison:

	One Airship	*Seven Mars*
Crew	40	7×15=105
Engines	6	7×4=28
Horsepower	7,200	7×8,800=61,600
Empty weight—	300,000 lbs.	7×75,000=525,000 lbs.

Thus superiority of the airship in these important items is outstanding. Note the relative "empty weights" and remember that the amounts of "critical" materials and man-hours to construct would be in almost the same proportions.

And note this: In doing the same volume cargo transportation under these conditions, the seven Marses would consume *six* times as much fuel and lubricating oil as the one airship. The importance of this feature cannot be overrated. The most reliable estimates yet made indicate that in simultaneous operation of four or more large airships, the cost of carriage of airship cargo would be on the order of ten cents per ton-mile. But even the most optimistic estimates for flying-boat operations that have yet come to my attention are several times this value.

Speed costs money, and economy influences speed. On land, trucks and passenger busses travel at speeds much lower than the highest of which the automobile is capable. Fast, premium rail traffic is a small amount of the total, most rail cargoes proceeding at only moderate speeds. At sea, there are few Queen Marys; the great bulk of cargo and passengers are carried at very moderate speeds. Why? For economy's sake. In the air also, speed is expensive. The airplane simply can't fly at speeds low enough to be truly economical. But the airship's speed *is* low enough to be economical and still exceeds severalfold the speeds of ocean-going steamers.

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Can Operate for a Profit

Hence, the important factor of economy clearly forces a place for the ocean-going airship. Doctor Eckener reported that in the Hindenburg's 1936 Atlantic service, 75 per cent of all conceivable costs and charges was covered by pay revenue, and that with the correction of such understandable items as elimination of "deadheads," spreading of overhead to several ships, etc., the potential ability to operate with reasonable revenue return was demonstrated.

The foregoing facts seem to me to make out an unassailable case for the large commercial airship. Much of the spadework has already been done. Continued neglect of airships could only be based on superficial judgment and wavering decisions or on disregard of facts. Has America lost the pioneering spirit of which we used to boast?

Our wartime blimp operations have shown us that we can operate airships under much worse conditions than we had imagined before. Their missions, while generally unspectacular, have been carried out well. They have been remarkably free from losses, the few we've had being due mainly to mistakes of inexperienced personnel. The lone loss of the K-74 by submarine gunfire must not be considered typical; a hairline break in its luck would have made the K-74 a hero.

In peacetime also, blimps have set an outstanding record. Until the U. S. Navy took over all their ships, Goodyear commercial blimps had made 152,441 flights, flown 93,096 hours and 4,166,390 miles, and had carried 407,171 passengers without so much as a scratch on a single one!

If our country is really to have a thorough system of transoceanic transportation, nothing useful should be omitted. We need cargo vessels and luxury liners; we need seaplanes and landplanes; we need the airship. Long nonstop oceanic routes are the role of the airship, with mail, freight, express, passengers.

As examples, the Pacific presents a particular challenge to the airship. The North Atlantic, too, should include dirigibles, no matter how many planes enter the field. A route between our East Coast and Africa has real possibilities. A particularly appealing and important link would be airship service from some U. S. port on the Gulf of Mexico as well as from Miami to important cities on both the east and west coasts of South America.

While these would be long nonstop voyages by the most comfortable form of travel known, intermediate traffic also could be easily included. By use of hook-on planes, a feature well solved by your Navy, both cargo and passengers can be picked up or landed en route without interfering with the airship's steady march to the main terminal. Does this seem fantastic? Well, it isn't.

Wartime needs have resulted in an enormous, economical helium production capacity, and nature has bestowed upon us not only a practically inexhaustible supply of helium but a world monopoly. Industry has trained airship engineers and skilled workmen, ready to build the greater ships needed. The blimp program has given us abundant high-type American men trained in at least the essentials of big airship operation. Many of the naval airship facilities along our continental coast lines could be utilized by commercial airships.

It would be a "Milquetoast" approach to build only one or two large airships and expect them to carry the load of proving the project. This country goes in on no such shoestring basis anywhere else. We need,

first, a training rigid airship of about the size of the excellent old Los Angeles, which in a weak moment we scrapped in spite of much remaining useful service.

We need at least a dozen airships of 10,000,000-cubic-foot capacity, each half again the size of the Hindenburg. We know we can build them—much improved over anything the world has yet seen. We know, too, that we can operate them. The only nation which tried commercial airships made a real success of them. Is there anyone today who thinks we cannot outdo the Germans in any endeavor for which we have the resolve?

Never has a nation had a greater opportunity for a unified, complete transportation system. We have our Merchant Marine, our flying boats and airplanes—with better ones sure to come. In addition, we among all the nations will have the airship—the best in the world, the only ones in the world. With me, the airship is not a matter of mere hap-chance sentiment. Not only will it be an added string to our national bow but it will pay its own way in revenue and prestige. We have at least as much reason for so believing in the airship as we did in our bold pioneering with the flying boat, which received lavish public acclamation and support. And with no need for numerous intermediate island bases, the international aspects of airship operation should be simpler.

It is interesting to note that the Germans refused to regard the airplane and the airship as rivals. The Lufthansa both controlled heavier-than-air commercial traffic and owned a considerable interest in the German Airship Operating Company. There was also a tie-up with the combined Hamburg-American and North German Lloyd steamship companies which acted as agents for the airships. Recently three large British steamship companies have indicated they would operate aircraft in conjunction with their steamship lines. Addition of the airship also to existing transportation systems of oceanic scope as another form of service seems entirely logical. Yet, of course, airship operating systems could be set up on an independent basis if so desired.

We need a strong national policy with regard to the airship. Our past indifference and indecision should be obliterated by a conscientious effort, immediately. Only a daring policy will be effective.