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# AIRWAYS TO PEACE

AN EXHIBITION OF GEOGRAPHY FOR THE FUTURE

*The Bulletin of* THE MUSEUM OF MODERN ART

11 WEST 53 STREET, NEW YORK 19, N. Y.

1 VOLUME XI AUGUST 1943

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## AIRWAYS TO PEACE

TEXT BY WENDELL L. WILLKIE



AIRWAYS TO PEACE, an exhibition planned and directed by Monroe Wheeler. Herbert Bayer, designer; Rand Warren, production manager; Richard Edes Harrison, consultant cartographer. The exhibition will be on view through October 31 and will later be sent on a tour of the country.

SPECIAL CONSULTANTS: L. F. V. Drake, John K. Wright, Eric Sloane, Major Lester D. Gardner, William S. Friedman, Walter W. Ristow, George T. Renner.

SPECIAL ADVICE AND ASSISTANCE have been received from S. Whittemore Boggs, William A. M. Burden, Lt. Commander Edward Steichen, Edward H. Dodd, Jr., Juan T. Trippe, Russell W. Davenport, Harry Hopkins, Colonel Arthur R. Christie, Richard C. Walker, Mr. and Mrs. C. S. Hartman, Charles T. Keller, Frank Vitullo, Jean Volkmer,

Mrs. Joseph J. Thorndike, Jr., Allen Porter, Robert H. Pfeiffer, Joseph A. Allegro, Helmuth Bay and Harold E. Group.

LENDERS: The Honorable Franklin Delano Roosevelt, United States Army, United States Navy, Irving Fisher, R. Buckminster Fuller, Norman Bel Geddes, Vilhjalmur Stefansson, Richard Edes Harrison, S. Paul Johnston, The Hispanic Society of America, the Institute of the Aeronautical Sciences, Civil Aeronautics Administration, American Geographical Society, Semitic Museum of Harvard University, Pan American Airways System, United Aircraft Corporation, Consolidated Vultee Aircraft Corporation, Rand McNally and Company, Time, Inc., Duell, Sloan and Pearce, Bronzart Metals Company, and Aviation Magazine.

COVER: Vought Corsair, F 4 U. S. Navy Photo. Installation photos by Gottscho-Schleisner, Newspictures, and Sunami.

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## AIRWAYS TO PEACE

BY WENDELL L. WILLKIE\*

We have always known two kinds of geography. Nature drew the oceans, continents, mountains, rivers and plains. Men etched in cities and national boundaries. For our well-being, we have tried to harmonize natural and man-made geography.

But the modern airplane creates a new geographical dimension. A navigable ocean of air blankets the whole surface of the globe. There are no distant places any longer: the world is small and the world is one. The American people must grasp these new realities if they are to play their essential part in winning the war and building a world of peace and freedom. This exhibition tells the story of airways to peace.

\*Throughout this *Bulletin*, Mr. Willkie's text appears in large bold face type.

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	MoMA Exhs.	236.3

## HOW MAN HAS DRAWN HIS WORLD

From the beginning of history, man has made maps to match his expanding knowledge of his surroundings. Homer's world, a little flat disk around the Mediterranean, grew slowly into a sphere.

Since the sixteenth century, Mercator's projection has been accepted as a reasonably workable picture of the world. Mariners have used it for hundreds of years. But its conception is dangerously misleading in our air age. The course over the top of the world is now clearly the shortest and the speediest way to friend and enemy alike, a course impassable to ocean ships. But the frozen waters and icy wastes around the North Pole offer no major obstacles to the swift ships of the air. Man must re-draw his world.



*Homer's World, ca. 900 B.C. No maps used by the early Greeks have survived, but from their writings we can reconstruct their conception of the earth they inhabited. Thus to Homer the world was a disk surrounded by the stream of ocean and roofed with the dome of heaven.*



*Partial view of the map section, which shows that the aviator did not have to have new types of maps. Even before Mercator published the projection which has served mariners so well, the most useful projections for the conquest of the air had been discovered. But they had been neglected for some time.*

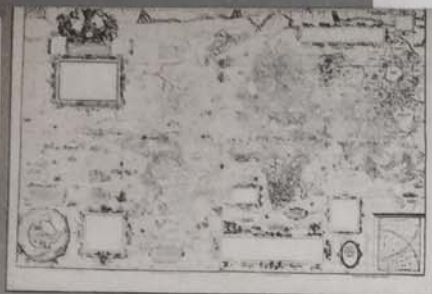
*Most adults have learned geography from Mercator maps, and it is hard to readjust the eye and the imagination to other maps better suited to the air age.*

*If we understand the purpose for which each map is made, and remember that no flat map can portray the world accurately, we cannot be misled. When in doubt, look at a globe, not a map.*

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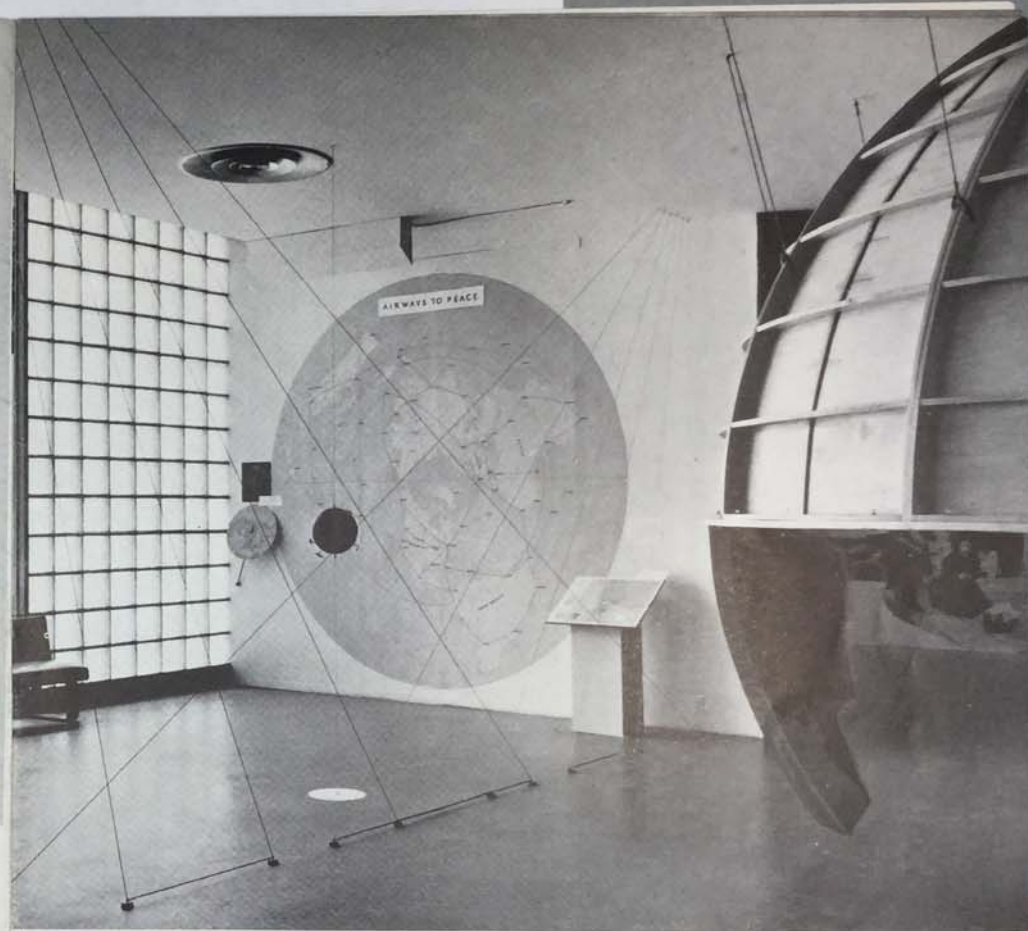
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#### HOW MUCH DOES MERCATOR DISTORT?

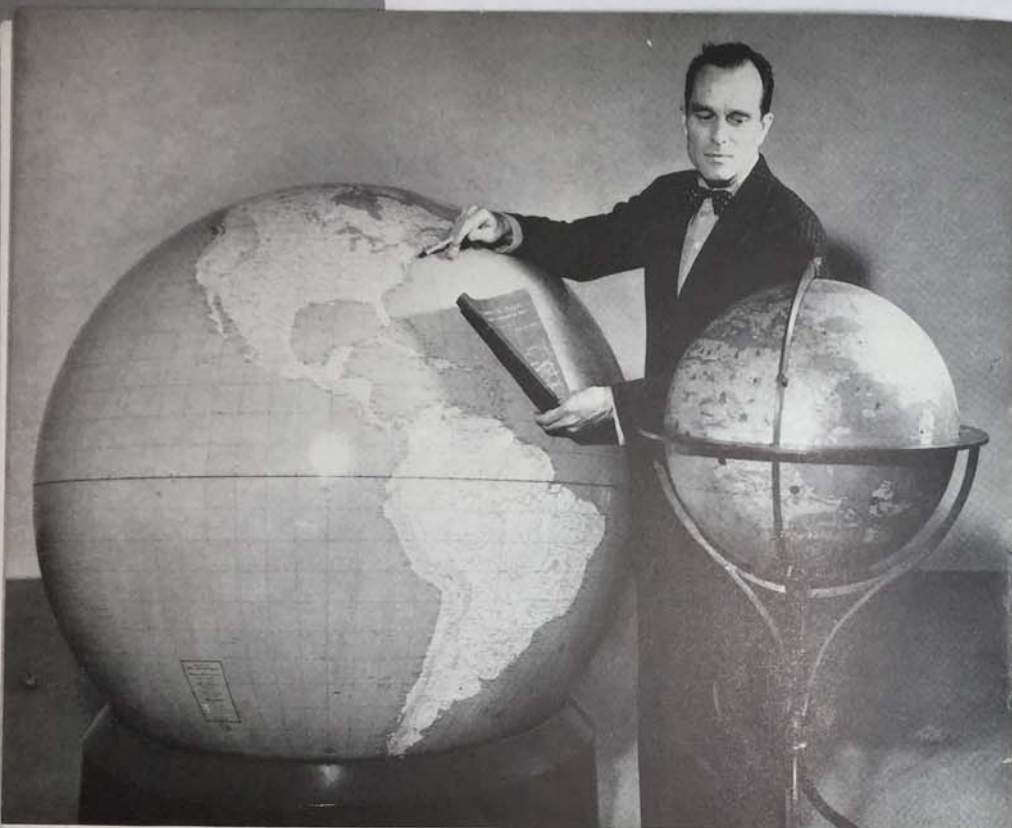
*All flat maps are distorted, and the greater the extent of the surface of the earth included on them, the worse the distortion. Furthermore, their inaccuracy is not evenly distributed. Here is a Mercator map, the length of which along the Equator is the same as that of the adjacent globe. The Equator is its center of accuracy. As the eye travels away from that center, the inaccuracy increases. This display compares Greenland on the globe with Greenland on the map.*

*In the upper lefthand corner may be seen a reproduction of the first publication of Mercator's famous world map, 1569. Its modern version, shown below, is still found indispensable for surface navigation.*



*On the wall in the background may be seen an eleven-foot polar projection (azimuthal equidistant) upon which are shown the major air routes of the future. At the right is the suspended "outside-in" globe (page 9).*

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#### MOST ANCIENT AND MOST MODERN GLOBES

Monroe Wheeler, director of the exhibition, compares the Behaim globe of 1492, oldest extant terrestrial globe, with President Roosevelt's Fifty-Inch Globe, the largest and most modern in existence, which he has graciously lent to the exhibition. The globe ordinarily stands behind the President's desk in the White House. The scale of the globe is one ten-millionth of the size of the earth, and it contains over 17,000 place names. It is mounted upon universal rubber bearings, permitting easy rotation, so that any part of the surface may be measured and examined freely. It was given to the President by the Army at Christmas, 1942.

Behaim had only one ocean on his globe—the Atlantic, bounded by Europe and Africa on the east and by China and India on the west. No North or South America was then known to exist. Replica of Behaim globe lent by the American Geographical Society.



#### OUTSIDE-IN GLOBE

This fifteen-foot globe is an innovation especially designed for the exhibition. Less than half of the conventional globe can be seen at one time; and, as we have seen, all flat maps must distort. But when the land areas are shown on the inside of a sphere, one can more readily see all the continents in their true relationship at one glance.

This "outside-in" globe also emphasizes a fact of paramount importance in the strategy of war and the vision of peace: the most populous nations of the world are clustered about the North Pole, within easy flying distance of one another.



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	MoMA Exhs.	236.3



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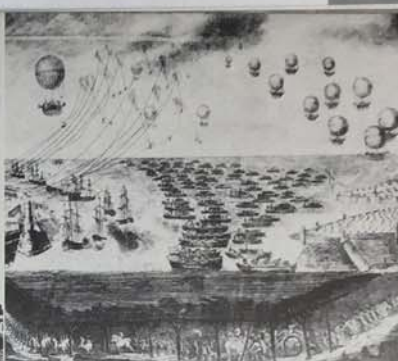
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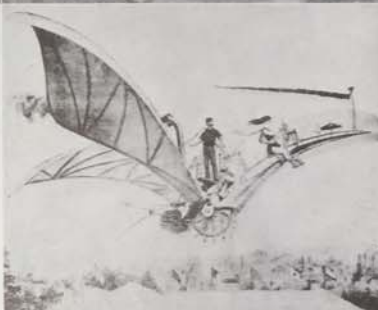
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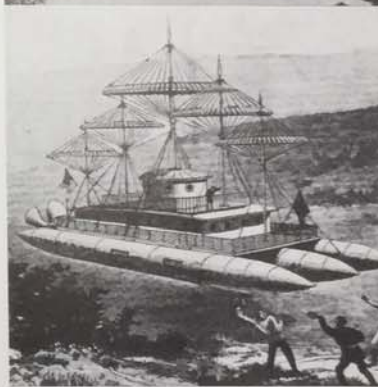
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## THE PROGRESS OF FLIGHT

Men's imaginations have been excited by the soaring of birds since before the dawn of history. Among our most cherished legends is the daring tale of Icarus with his wax-fastened wings. Leonardo, in that great awakening of minds, the Renaissance, dreamed of flight. Whenever there was intellectual ferment in the world, men wrestled with the problem. With Montgolfier's balloon the ancient dream began to come true. It was on a memorable December seventeenth in 1783 that Orville Wright first rose from the ground in a power-propelled machine, Wilbur standing on the ground to steady the slight wings as his brother took off from a monorail. Man had begun his conquest of the air. In the years since, intrepid adventurous spirits, often at the cost of life itself, have triumphed again and again. Today, so vast is the vision that the giant planes which fill our skies seem mere experiments for the accomplishments of tomorrow.

Americans have been pacemakers in the new science of the air which has revolutionized geography. And our inventive and industrial genius will play a leading role in re-shaping the world through the progress of that science.

On these pages are shown a few of the sixty photo enlargements in the exhibition, indicating the development of flight.

- 1 The fall of Icarus. Flying on wings of wax and feathers which his father, Daedalus, had made, Icarus was the first air casualty.
- 2 Da Vinci filled a volume with notes on bird-flight mechanics. He designed a hand-operated ornithopter, a helicopter and a parachute.
- 3 300,000 saw the first balloon rise, when the Montgolfier brothers sent up a hot-air balloon of linen-lined paper at Annonay, France, on June 5, 1783.
- 4 J. A. C. Charles and M. Robert in the first human ascent in a balloon; Paris, Dec. 1, 1783. The first use of gas, barometer, ballast and valve.
- 5 Dr. John Jeffries of Boston and M. J. P. Blanchard, the first to cross the English Channel by air (Jan. 7, 1785). Dr. Jeffries paid a fare of £100.
- 6 Napoleon's plan for an invasion of England included air-borne troops (right). The defending balloon barrage (left) has its counterpart in World War II.
- 7 In 1798 Pierre Testu-Brissy rode a horse into the sky. The animal had been trained to stand quietly on the platform beneath the balloon.
- 8 Professor Harriman's Flying Machine. 19th Century Circus Poster. Lithograph by E. P. Roe.
- 9 Frank Reade, Jr's, Catamaran of the Air. (From a Frank Reade dime novel, actually 5¢.) 1894.
- 10 Jacob Degen, Vienna clockmaker, built a balloon-ornithopter with taffeta wings. Upon its failure, Degen was beaten and ridiculed.

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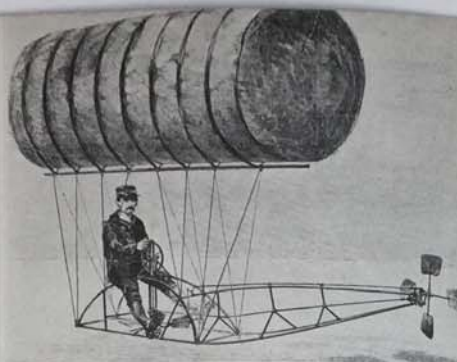
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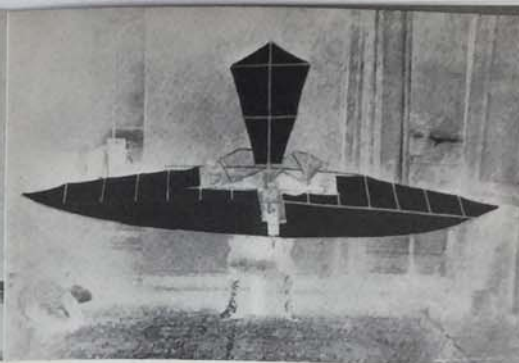
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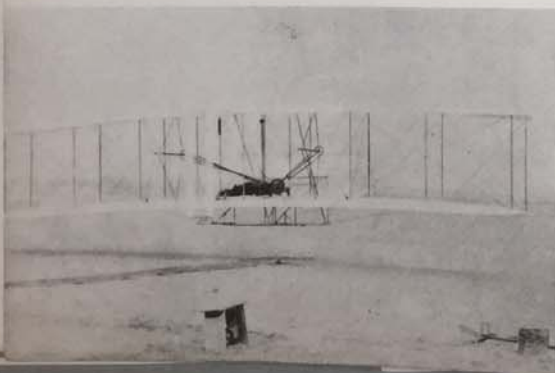
**THE PROGRESS OF FLIGHT (continued)**

Benjamin Franklin saw the first balloon rise over Annonay, France, on June 5, 1783. Five months later, after witnessing the first human ascent, he wrote to his friend, Jan Ingenhaus, the court physician in Vienna:

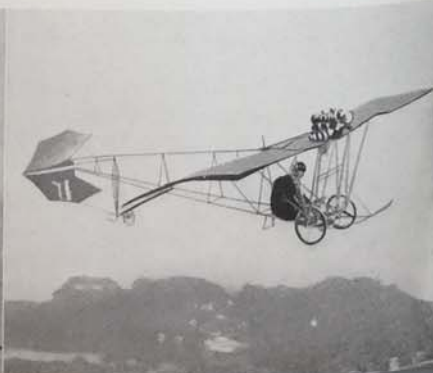
"It appears to be a discovery of great importance and what may possibly give a new turn to human affairs. Convincing sovereigns of the folly of wars, may perhaps, be one effect of it, since it will be impracticable for the most potent of them to guard his dominions. Five thousand balloons, capable of raising two men each, could not cost more than five ships of the line; and where is the prince who can afford so to cover his country with troops for its defense, so that ten thousand men descending from the clouds might not, in many places, do an infinite deal of mischief before a force could be brought together to repel them?"

- 1 *Different Systems of Sailing in the Air.* Harper's Weekly, Jan. 2, 1864.
- 2 John Wise's Daily Graphic balloon, with 600,000 cu. ft. gas capacity, 1873. On its New York-London test trip it came down in the Catskills.
- 3 Professor Ritchell of Hartford constructed a foot-power dirigible. It rose 200 feet on June 12, 1878, remaining aloft an hour.
- 4 John Stringfellow first flew an airplane under its own power, at Chard, England, 1848. In 1866 he built a triplane, but it never flew.
- 5 Otto Lilienthal, after many ornithopter experiments (1860-91), built a machine with an engine. In a glider test it fell; Lilienthal died (1896) a martyr.
- 6 Orville and Wilbur Wright did with the airplane what Montgolfier had done with the balloon and Zeppelin with the airship. Orville made the world's first flight in a heavier-than-air machine at Kitty Hawk, Dec. 17, 1903: 120 feet in 12 seconds. Later that day Wilbur flew 852 feet in 59 seconds.
- 7 The Brazilian Santos-Dumont was the first to build, control and steer airships for long flights. In 1909 he flew the Demoiselle (59 lbs.) at 55 miles an hour.
- 8 Glenn H. Curtiss, great American aviation pioneer, in the June Bug, July 4, 1908.
- 9 Charles A. Lindbergh's Spirit of St. Louis, May 20, 1927.

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## WAR OVER THE WORLD

Over Sicily and Attu, over Panama and Guadalcanal, America's flying men are mobilized against the enemies of democracy. From Africa and Australia, from England and China, they patrol the air. All over the globe, in concord with their Allies, they are smashing at the bastions of tyranny.

The airplane holds the power of life or death over civilization. We are using this mighty weapon to the utmost to defeat the aggressors. When that job is done, we must determine to dedicate the wings of the world to the purposes of peace.

- 1 Curtiss C-46 Troop Carrier. Official Photograph, U. S. Army Air Forces.  
2 The Army, the Navy and the Marines planning the runway ramps for seaplanes on a South Pacific island. U. S. Navy Photo.



A ninety-foot photographic mural of war around the planet, seen against the outline of a full-size Liberator bomber. From both sides of the ramp the visitor looks down upon aerial photographs.

- 3 P-40. Army Warhawks, with Navy Catalina in foreground, at Amchitka, Aleutians. U. S. Navy Photo.  
4 This picture, made from a Flying Fortress, shows bombs falling on the Monserrato airfield near Cagliari in Sardinia. U. S. Army Air Forces Photo.  
5 Catalina Navy Patrol Bomber cruising over the Alaskan peninsula. U. S. Navy Photo.



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## GLOBAL STRATEGY

The Axis plan of world conquest was founded on geopolitics. This doctrine has backfired on its sponsors.

Germany has failed to subjugate Russia. The Mediterranean lies open to the ships of all the Allies. Those steppingstones to the Americas, Iceland and Greenland, Dakar and Natal, are in the hands of the United Nations. The plan has failed.

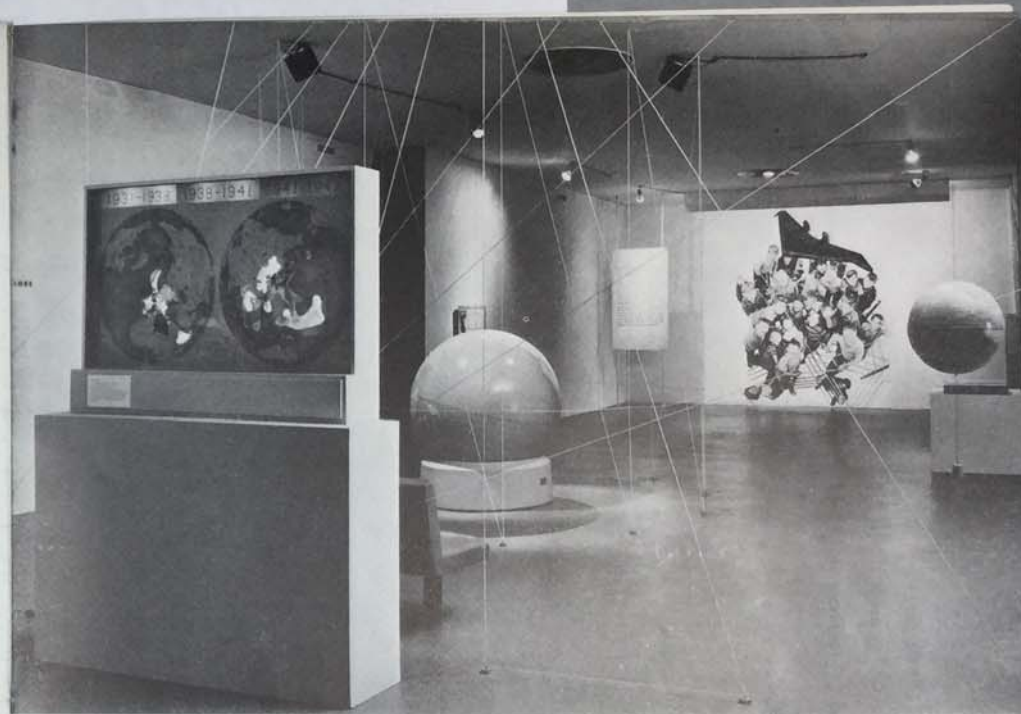
The United States, Russia, the British Commonwealth and China, and all the United Nations, working together, have strategic advantages of geography and resources which the enemy can never hope to match.

It is true that the supply lines from the Allied arsenal to the fighting fronts are long; that planes and ships can be destroyed. But the air and water on which they move are indestructible. The Axis network of railroad and highway transportation is shorter, but bombers can cripple it beyond repair.

### MACKINDER'S FAMOUS MAP

Although made by an Englishman in 1904, this is the most important map of German geopolitics. It demonstrated that Eurasia and its Heartland were all-important in their scheme of world domination, and speciously proved to them that North America was not important.

In spite of its oval frame, this map is on a Mercator projection, with North America relegated to the "outer crescent."



ABOVE. At the left may be seen the electrically animated map showing Axis aggression from 1931 to 1943, and in the background the final mural, by Eliot Elisofon, of children below a Northrop Flying Wing.

BELOW. Herbert Bayer's series of meteorological panels illustrating the nature of the atmosphere and its changing conditions.



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**AIRWAYS, AIRPORTS, AIR TRAINING AND AIR TRANSPORT**

The planning, educational and traffic control functions of the Civil Aeronautics Administration, and the prodigious wartime attainments of the Army Air Transport Command and Air Service Command give us a vision of the future of American civilian aviation. The illustrations on this and the facing page are from a section of the exhibition depicting the scope of these activities.



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**PROJECTED FLIGHT SCHEDULES AND FARES**

FROM NEW YORK TO	EXPRESS		One Way	Round Trip
	Flights Daily	Hours in Flight		
BERMUDA	10	3:40	\$20.70	\$37.50
MEXICO, D. F. (Mexico)	10	8:15	61.50	112.70
BAHIA (Canal Zone)	10	9:15	69.00	124.50
FAIRBANKS (Alaska)	3	13:00	87.50	172.50
LONDON (England)	3	13:48	102.50	184.50
LIMA (Peru)	10	14:48	111.00	199.50
PARIS (France)	1	15:00	113.50	222.50
BRUSSELS (Belgium)	1	16:00	120.00	234.00
RIO DE JANEIRO (Brazil)	10	18:00	143.50	256.50
MOSCOW (Russia)	1	18:15	144.00	258.50
HONOLULU (Hawaii)	4	20:15	151.50	273.70
SANTIAGO (Chile)	1	21:00	157.50	284.50
BUENOS AIRES (Argentina)	10	21:04	163.00	291.00
CAIRO (Egypt)	1	23:12	174.00	313.50
TOYO (Japan)	1	27:04	207.00	371.00
BOMBAY (India)	1	23:00	240.00	423.00
CAPE TOWN	1	24:00	253.00	449.00
AUCKLAND (New Zealand)	1	27:04	282.00	507.00
MANILA (Philippines)	1	27:04	283.00	507.00
SYDNEY (Australia)	1	43:00	319.00	587.00
SINGAPORE (Malaya)	1	43:00	323.50	592.50
HONG KONG (China)	1	44:00	330.00	594.00

Photographs 2-7 courtesy of the C. A. A.

- 1 Curtiss-Wright Commando, C-16. The most efficient two-engine cargo carrier for trips under 1,500 miles. Carries 40 paratroopers or several jeeps or 2 light tanks. Can carry its own loading ramp and hoisting gear, and is fitted for gliding, too. Photo U. S. Army Air Forces.
- 2 Washington, D. C., National Airport. The U. S. has nearly 1,000 major airports, most of them Government constructed under C. A. A. specifications on sites designated by the Army and Navy.
- 3 Airport traffic controller directing local aircraft movements.
- 4 An Instrument Class of the C. A. A. War Training Service cross-country and Link Instrument training. The C. A. A. War Training program gives initial flight training to all Army and Navy fliers.
- 5 To produce a straight radio path for blind landing, several transmitting antennae are used. Ten antennae are used at Washington National Airport to overcome effect of nearby steel buildings on localizer path.
- 6 The highest C. A. A. beacon in the U. S., Bill Williams Mountain, Williams, Ariz.
- 7 Flight progress board at an airway traffic control center. By telephone and radio the position of all planes in flight is recorded.
- 8 Overhauling the motors of transport planes. Photo American Airlines.
- 9 Vought-Sikorsky helicopter. Generally considered as the likeliest possibility for the postwar private market. Life Photo.
- 10 Probable timetable, 1948. Prepared by Pan American Airways System especially for the Airways to Peace exhibition.

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*Lockheed Constellation. The largest land-based transport plane yet built, and the newest development for post-war commercial passenger use. Designed to carry 55 passengers, it is now being used as a troop carrier.*

## TRANSITION TO PEACE

Our one great aim, beyond military victory, must be to create a world of freedom, opportunity, justice and lasting peace. Only so can the cruel cost of war be justified.

Vision and courage will be as necessary for the winning of the peace as for the winning of the war. We must learn that narrow nationalism and racial and religious intolerance are suicidal. We must understand that economic freedom is as important as political freedom. We must accept our full responsibility for America's share in the tremendous tasks of reconstruction.

Peace must be planned on a world basis. Continents and oceans are plainly only parts of a whole seen from the air. And it is inescapable that there can be no peace for any part of the world unless the foundations of peace are made secure throughout all parts of the world. Our thinking in the future must be world-wide.



*Pan American Airways Clipper Flying Cloud (Boeing Stratoliner 307). The latest land-based plane in current commercial use.*

*Stephen C. Clark, Wendell L. Willkie, and Vilhjalmur Stefansson examining the transparent glass antipode globe. By sighting past a point at the center of the globe, the antipode (opposite point) of any major city may be located.*



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	MoMA Exhs.	236.3

## A NOTE ON THE EXHIBITION

The purpose of the exhibition Airways to Peace is to assist the layman to orient himself in relation to the air age. The evolution and new uses of the airplane have made this a global war, and changed our way of looking at the world. Whether we like it or not—whether we can adjust our national defense and political idealism to it or not—the airplane has changed the vast vague geography of the past into one small indivisible globe.

The exhibition consists of six sections, each of which (except that on meteorology) is prefaced with text especially written by Wendell L. Willkie. The entire display was designed by Herbert Bayer, who has used free-flowing space to symbolize man's conquest of the atmosphere. Richard Edes Harrison served as chief consultant cartographer. The subdivisions are:

### I. HOW MAN HAS DRAWN HIS WORLD.

The progress of map-making is surveyed in twenty-five exhibits, from the earliest known map, of Ga-Sur, Assyria, ca. 2400 B.C.; a model of Homer's world; the world as conceived by Anaximander; Roman road maps; and the epochal maps of Ptolemy, Leardo and Mercator; the Behaim globe of 1492; the visionary polar projection of Glareanus (1510); and so on to the latest polar projections showing the air routes of the near future. Great circle routes are demonstrated, and a special gauge permits the visitor to measure great circle distances in miles and hours of flight between any two points on the globe.

In a war which knows no boundaries, it is necessary for the civilian to have a true concept of the globe. Flat maps convey it only distortedly by means of projections, which are misleading unless their specific purpose is understood. For general understanding we

must turn to the three-dimensional globe, and for this reason the Museum constructed an "outside-in" globe, fifteen feet in diameter.

Upon entering this globe, the spectator finds the land areas depicted on the *inside* of the globe, enabling him to observe at a glance how three-quarters of the earth's land is in the northern hemisphere, and the extraordinary proximity around the North Pole of the most populous and powerful nations, within easy flying distance of one another—a fact which is the crux of history today. In spite of its great size, the "outside-in" globe is of demountable construction and can easily travel with the exhibition to other cities.

**THE PRESIDENT'S GLOBE.** A unique addition to the New York showing of Airways to Peace is President Roosevelt's Fifty-Inch Globe, the largest printed globe in the world (page 8). It was the Army's Christmas present last year to its Commander in Chief, and at the same time a replica was presented to Prime Minister Churchill.

Another feature of the map section is a five-foot layered relief model of Europe by Norman Bel Geddes, made to assist aviators in distinguishing the terrain and anticipating the height of vertical elevations.

A glass antipode globe permits the visitor to sight through a point at the center of the earth to find the antipode (opposite place) of any of the great cities of the world.

**II. THE PROGRESS OF FLIGHT** is summarized in sixty photographic enlargements which trace the evolution of flight from the pterodactyl of fifty million years ago to today's helicopter, the latest war planes and the transport planes which foretell the future of civilian aviation.

Man's desire to fly began in the obscure dawn of history, in envy and emulation of

birds, and the mere dreams of men of overweening imagination were given reality by reasonable scientists who, little by little, solved the mysteries of aerodynamics. The decade of the French Revolution saw the first actual flight, and we see now that of these two contemporaneous events the latter may have been the more profoundly revolutionary. It marked the coming of a new era not only in world politics but in the technique of warfare and the everyday life of every man in time of peace.

Aviation did not become a practicable matter until the Wright brothers flew the *Kitty Hawk* on December 17, 1903, but from then on innovations and improvements have been so swift as to bewilder the layman. But he already knows that tomorrow he will fly easily and far; and to appeal to his imagination, the Museum asked Pan American Airways to prepare a peace-time world timetable, dated 1948, which has been included in the exhibition.

**III. WAR OVER THE WORLD.** The role of the airplane in carrying war across the earth is pictorially suggested by a photographic mural displayed against the background of the full-size silhouette of a *Liberator* bomber with a wingspread of 110 feet. These fifty-five pictures show more nations on broader battlefields than have ever been known before, and help us to see at a glance the innovations of offense and defense for which the airplane is responsible. Furthermore, they cannot fail to stimulate one's imaginings in regard to the political and economic changes which must occur as part of this great mutation of history which modern science has evoked.

**IV. AIR STRATEGY.** Once we have attained the airman's view of the world, the strategic problems of the war become re-

markably clear. Mr. Willkie has pointed to the Germans' lack of the global concept as the basic flaw in their strategy. They planned their conquest on Mercator maps and relegated the United States to the fringe of their world. To demonstrate this and other essential factors of an air-age war, an important section of the exhibition, consisting of spheres and "outside-in" hemispheres, shows Germany's tragic misinterpretation of geopolitical theory, Japan's scheme of Pacific conquest, the possibilities of long-range bombing, the chances of dislocating war industries inside Germany's enslaved and fortified Europe, and the importance of Allied air bases in China.

The formidable extent of Japanese conquest in the Pacific, compared with German conquests in Europe, is forcefully depicted by an animated electric map of Axis aggression from 1931 to the present.

**V. THE NATURE OF THE ATMOSPHERE.** The private citizen of the air age, who will soon be flying his own helicopter, must have some idea of the rudiments of the new world into which the scientist and the aviator have led us. We can no longer think of the earth as a simple solid eight thousand miles in diameter, studded with mountains and immersed in ocean. Our planet is a ball of liquid gases, perhaps fifty thousand miles in diameter, with a solid core. Then comes the troposphere, which is the air we breathe; then the stratosphere, in the lower regions of which we now can fly; and then the ionosphere, which divides our human realm from the infinite.

In a series of brilliant paintings, made especially for Airways to Peace, Herbert Bayer has portrayed this entirety of the earth as we now know it, with its multiple elements of cloud forms and weather currents. In a little analogical model, man

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appears as he is in reality, beneath a three-fold sky at the bottom of the atmosphere, like a fish at the bottom of the sea—a deep-air mammal.

VI. TRANSITION TO PEACE. Today the air is necessarily an immense battlefield. But amid the necessities of war the personnel of the aviation of the future is being trained on an undreamed-of scale, these future airports of domestic and international air transportation are being constructed, and systems for the safe and orderly regulation of air traffic are being perfected.

This year approximately thirteen million aircraft movements—ninety-five per cent of them military—will be handled by the traffic control centers of the Civil Aeronautics Administration, which serves the Army and Navy Air Transport Services in the movement of cargo and personnel (a complete hospital was recently flown to Alaska in thirty-six hours).

The extent of these operations and their revolutionary consequences are shown in the concluding section of the Airways to Peace exhibition.

If we imagine this revolutionizing travel of

the time to come, it is easy to read the moral of Airways to Peace. Not only in idealistic theory but in actual fact the world today is one unit: air neighbors are near neighbors. No national boundary can have the importance it had in the past. No selfish interest can devise a separate security in ignorance of other nations. Whether we like it or not, each nation is a portion of the world-nation. Over our heads the airways have woven a web of intimacy, a new scene of mutual advantages, a world-brotherhood.

War, from now on, will all be civil war among nations which can no longer isolate themselves. With this new proximity we must begin to exercise an imagination as far flung as our air routes, an international intelligence and world-conscience which will match the great new machines we have invented.

The present war and its aftermath of trouble and reconstructive labor may last a lifetime, but the children of tomorrow, the new generation born with wings—whom we see in the photo-mural at the close of the exhibition—must have a modernized and law-abiding world to grow up in.

MONROE WHEELER

#### PRESS COMMENTS UPON AIRWAYS TO PEACE

*Newsweek*—"It is a stunningly designed show which will undoubtedly succeed in its aim of reorienting visitors to an air age. . . . If *Road to Victory* was a hit, *Airways to Peace* should be a sensation."

*The New York Times*—"A unique display of the world's expanding horizons . . . timely reminder of the change, growth, and ever-new responsibilities entailed in the progress of civilization."

*New York Herald Tribune*—"Installed in dramatic sequences. . . . Shows how the predicted air age will be of crucial importance in international politics."

*New York Daily Worker*—"Deserves the attention of every victory-minded citizen. . . . The designer, Herbert Bayer, has presented the material in a most striking and dramatic way. The material is arranged in lucid sequence and convincingly makes its point."

*Town and Country*—" . . . should be seen more than once, by even the most intelligent observer, and there is such a richness of invention and so much aesthetic pleasure that no encore will be a chore."

*New York World Telegram*—"Extremely interesting and informative. The openness of the installation . . . seems almost a symbol of the wide, clean openness of the stratosphere."

*Art Digest*—"This show is tantalizingly close to painting shows by Dali and Tchelitchev and a number of other surrealists who have come, in natural course of events, to these same walls."

*South Norwalk, Connecticut, Sentinel*—"No movie packs in more drama and visual entertainment."

*Time*—"A brilliant educational exhibition."

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# AIRWAYS TO PEACE

AN EXHIBITION OF GEOGRAPHY FOR THE FUTURE

*The Bulletin of* THE MUSEUM OF MODERN ART

11 WEST 53 STREET, NEW YORK 19, N. Y.

1 VOLUME XI AUGUST 1943

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## AIRWAYS TO PEACE

TEXT BY WENDELL L. WILLKIE



AIRWAYS TO PEACE, an exhibition planned and directed by Monroe Wheeler. Herbert Bayer, designer; Rand Warren, production manager; Richard Edes Harrison, consultant cartographer. The exhibition will be on view through October 31 and will later be sent on a tour of the country.

SPECIAL CONSULTANTS: L. F. V. Drake, John K. Wright, Eric Sloane, Major Lester D. Gardner, William S. Friedman, Walter W. Ristow, George T. Renner.

SPECIAL ADVICE AND ASSISTANCE have been received from S. Whittemore Boggs, William A. M. Burden, Lt. Commander Edward Steichen, Edward H. Dodd, Jr., Juan T. Trippe, Russell W. Davenport, Harry Hopkins, Colonel Arthur R. Christie, Richard C. Walker, Mr. and Mrs. C. S. Hartman, Charles T. Keller, Frank Vitullo, Jean Volkmer,

Mrs. Joseph J. Thorndike, Jr., Allen Porter, Robert H. Pfeiffer, Joseph A. Allegro, Helmuth Bay and Harold E. Group.

LENDERS: The Honorable Franklin Delano Roosevelt, United States Army, United States Navy, Irving Fisher, R. Buckminster Fuller, Norman Bel Geddes, Vilhjalmur Stefansson, Richard Edes Harrison, S. Paul Johnston, The Hispanic Society of America, the Institute of the Aeronautical Sciences, Civil Aeronautics Administration, American Geographical Society, Semitic Museum of Harvard University, Pan American Airways System, United Aircraft Corporation, Consolidated Vultee Aircraft Corporation, Rand McNally and Company, Time, Inc., Duell, Sloan and Pearce, Bronzart Metals Company, and Aviation Magazine.

COVER: Vought Corsair, F 4 U. S. Navy Photo. Installation photos by Gottscho-Schleisner, Newspictures, and Sunami.  
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## AIRWAYS TO PEACE

BY WENDELL L. WILLKIE\*

We have always known two kinds of geography. Nature drew the oceans, continents, mountains, rivers and plains. Men etched in cities and national boundaries. For our well-being, we have tried to harmonize natural and man-made geography.

But the modern airplane creates a new geographical dimension. A navigable ocean of air blankets the whole surface of the globe. There are no distant places any longer: the world is small and the world is one. The American people must grasp these new realities if they are to play their essential part in winning the war and building a world of peace and freedom. This exhibition tells the story of airways to peace.

\*Throughout this *Bulletin*, Mr. Willkie's text appears in large bold face type.

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## HOW MAN HAS DRAWN HIS WORLD

From the beginning of history, man has made maps to match his expanding knowledge of his surroundings. Homer's world, a little flat disk around the Mediterranean, grew slowly into a sphere.

Since the sixteenth century, Mercator's projection has been accepted as a reasonably workable picture of the world. Mariners have used it for hundreds of years. But its conception is dangerously misleading in our air age. The course over the top of the world is now clearly the shortest and the speediest way to friend and enemy alike, a course impassable to ocean ships. But the frozen waters and icy wastes around the North Pole offer no major obstacles to the swift ships of the air. Man must re-draw his world.



*Homer's World, ca. 900 B.C. No maps used by the early Greeks have survived, but from their writings we can reconstruct their conception of the earth they inhabited. Thus to Homer the world was a disk surrounded by the stream of ocean and roofed with the dome of heaven.*



*Partial view of the map section, which shows that the aviator did not have to have new types of maps. Even before Mercator published the projection which has served mariners so well, the most useful projections for the conquest of the air had been discovered. But they had been neglected for some time.*

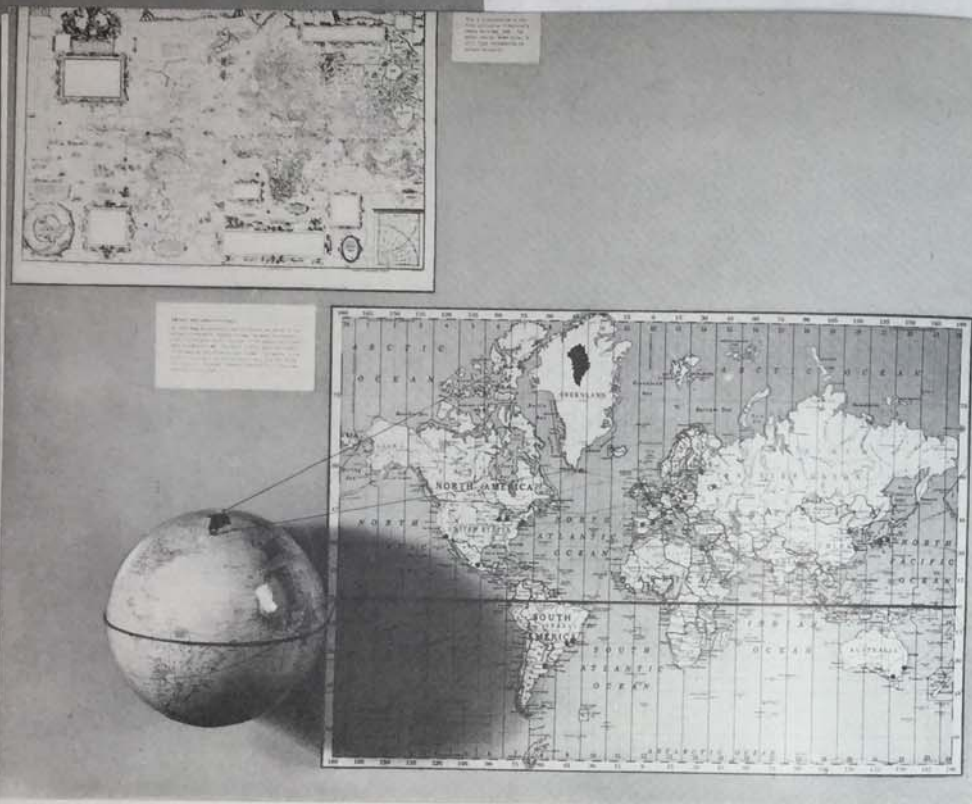
*Most adults have learned geography from Mercator maps, and it is hard to readjust the eye and the imagination to other maps better suited to the air age.*

*If we understand the purpose for which each map is made, and remember that no flat map can portray the world accurately, we cannot be misled. When in doubt, look at a globe, not a map.*

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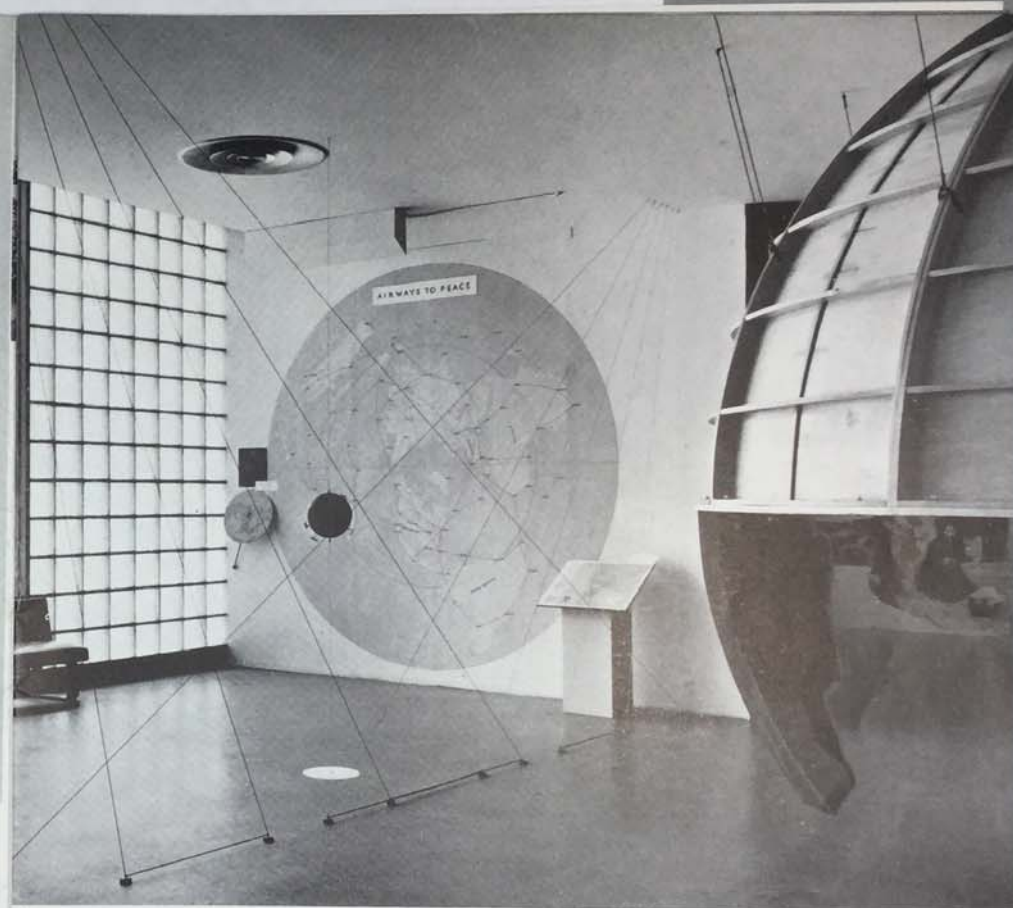
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#### HOW MUCH DOES MERCATOR DISTORT?

*All flat maps are distorted, and the greater the extent of the surface of the earth included on them, the worse the distortion. Furthermore, their inaccuracy is not evenly distributed. Here is a Mercator map, the length of which along the Equator is the same as that of the adjacent globe. The Equator is its center of accuracy. As the eye travels away from that center, the inaccuracy increases. This display compares Greenland on the globe with Greenland on the map.*

*In the upper lefthand corner may be seen a reproduction of the first publication of Mercator's famous world map, 1569. Its modern version, shown below, is still found indispensable for surface navigation.*



*On the wall in the background may be seen an eleven-foot polar projection (azimuthal equidistant) upon which are shown the major air routes of the future. At the right is the suspended "outside-in" globe (page 9).*

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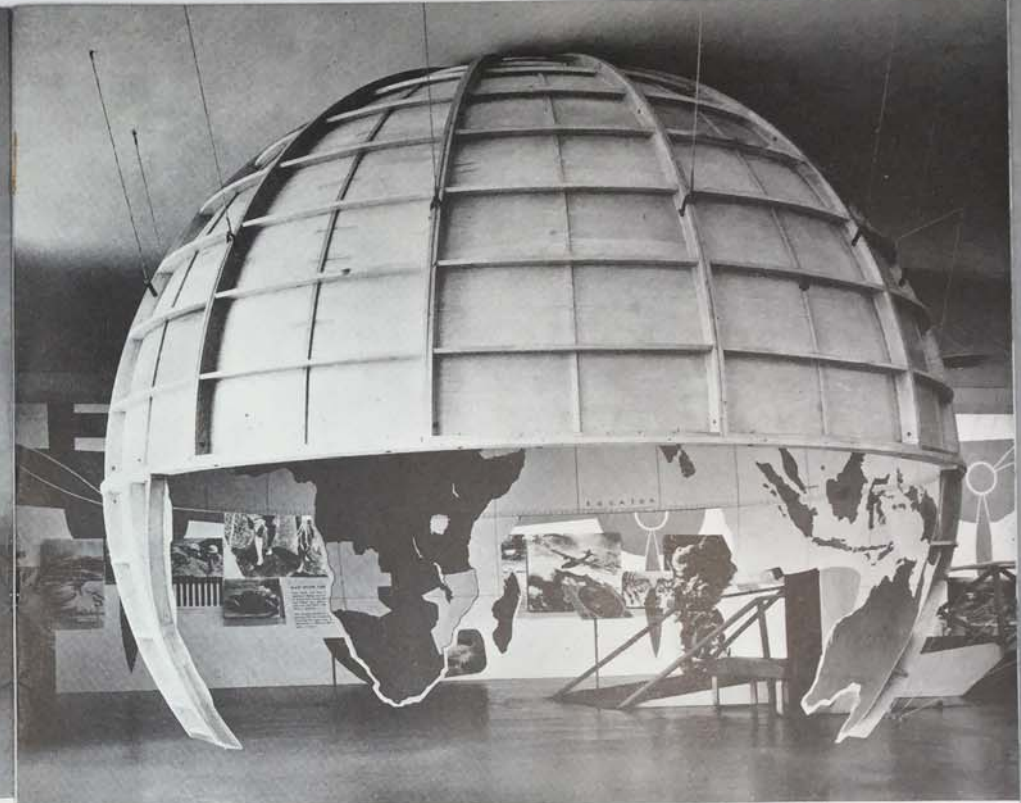
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#### MOST ANCIENT AND MOST MODERN GLOBES

*Monroe Wheeler, director of the exhibition, compares the Behaim globe of 1492, oldest extant terrestrial globe, with President Roosevelt's Fifty-Inch Globe, the largest and most modern in existence, which he has graciously lent to the exhibition. The globe ordinarily stands behind the President's desk in the White House. The scale of the globe is one ten-millionth of the size of the earth, and it contains over 17,000 place names. It is mounted upon universal rubber bearings, permitting easy rotation, so that any part of the surface may be measured and examined freely. It was given to the President by the Army at Christmas, 1942.*

*Behaim had only one ocean on his globe—the Atlantic, bounded by Europe and Africa on the east and by China and India on the west. No North or South America was then known to exist. Replica of Behaim globe lent by the American Geographical Society.*



#### OUTSIDE-IN GLOBE

*This fifteen-foot globe is an innovation especially designed for the exhibition. Less than half of the conventional globe can be seen at one time; and, as we have seen, all flat maps must distort. But when the land areas are shown on the inside of a sphere, one can more readily see all the continents in their true relationship at one glance.*

*This "outside-in" globe also emphasizes a fact of paramount importance in the strategy of war and the vision of peace: the most populous nations of the world are clustered about the North Pole, within easy flying distance of one another.*



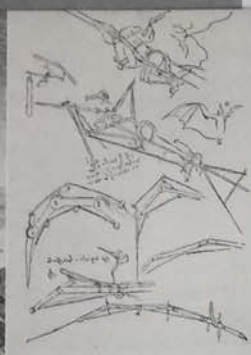
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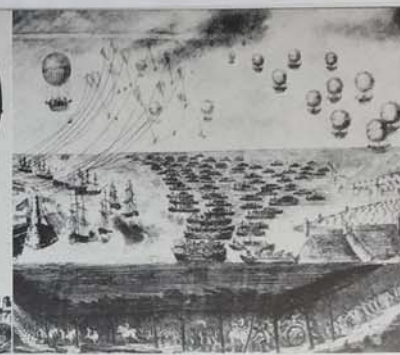
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## THE PROGRESS OF FLIGHT

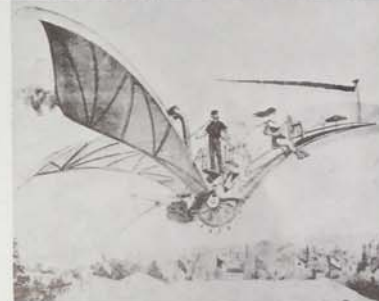
Men's imaginations have been excited by the soaring of birds since before the dawn of history. Among our most cherished legends is the daring tale of Icarus with his wax-fastened wings. Leonardo, in that great awakening of minds, the Renaissance, dreamed of flight. Whenever there was intellectual ferment in the world, men wrestled with the problem. With Montgolfier's balloon the ancient dream began to come true. It was on a memorable December seventeenth in 1783 that Orville Wright first rose from the ground in a power-propelled machine, Wilbur standing on the ground to steady the slight wings as his brother took off from a monorail. Man had begun his conquest of the air. In the years since, intrepid adventurous spirits, often at the cost of life itself, have triumphed again and again. Today, so vast is the vision that the giant planes which fill our skies seem mere experiments for the accomplishments of tomorrow.

Americans have been pacemakers in the new science of the air which has revolutionized geography. And our inventive and industrial genius will play a leading role in re-shaping the world through the progress of that science.

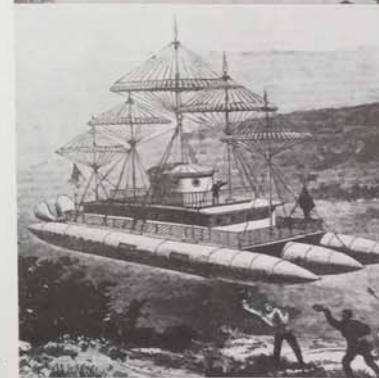
On these pages are shown a few of the sixty photo enlargements in the exhibition, indicating the development of flight.

- 1 The fall of Icarus. Flying on wings of wax and feathers which his father, Daedalus, had made, Icarus was the first air casualty.
- 2 Da Vinci filled a volume with notes on bird-flight mechanics. He designed a hand-operated ornithopter, a helicopter and a parachute.
- 3 300,000 saw the first balloon rise, when the Montgolfier brothers sent up a hot-air balloon of linen-lined paper at Annonay, France, on June 5, 1783.
- 4 J. A. C. Charles and M. Robert in the first human ascent in a balloon; Paris, Dec. 1, 1783. The first use of gas, barometer, ballast and valve.
- 5 Dr. John Jeffries of Boston and M. J. P. Blanchard, the first to cross the English Channel by air (Jan. 7, 1785). Dr. Jeffries paid a fare of £100.
- 6 Napoleon's plan for an invasion of England included air-borne troops (right). The defending balloon barrage (left) has its counterpart in World War II.
- 7 In 1798 Pierre Testu-Brissy rode a horse into the sky. The animal had been trained to stand quietly on the platform beneath the balloon.
- 8 Professor Harriman's Flying Machine. 19th Century Circus Poster. Lithograph by E. P. Roe.
- 9 Frank Reade, Jr.'s, Catamaran of the Air. (From a Frank Reade dime novel, actually 5¢.) 1894.
- 10 Jacob Degen, Vienna clockmaker, built a balloon-ornithopter with taffeta wings. Upon its failure, Degen was beaten and ridiculed.

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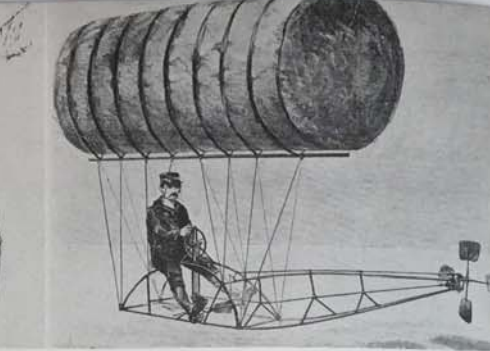
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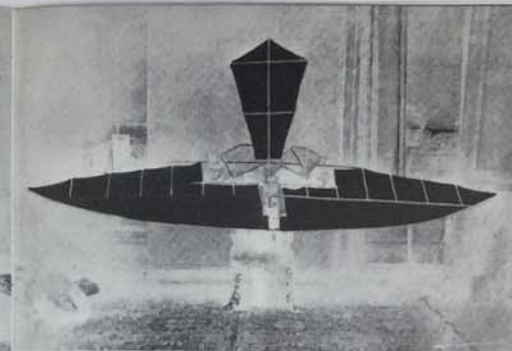
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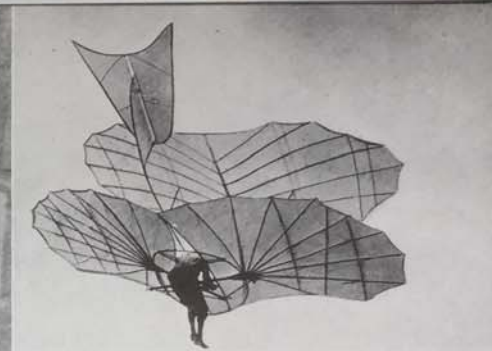
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**THE PROGRESS OF FLIGHT (continued)**

Benjamin Franklin saw the first balloon rise over Annonay, France, on June 5, 1783. Five months later, after witnessing the first human ascent, he wrote to his friend, Jan Ingenhaus, the court physician in Vienna:

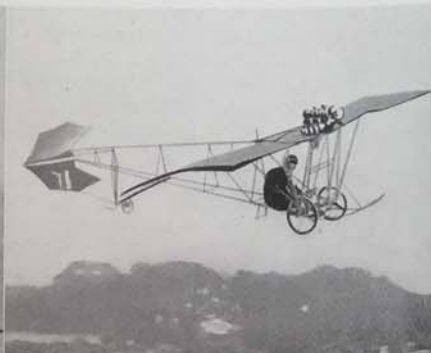
"It appears to be a discovery of great importance and what may possibly give a new turn to human affairs. Convincing sovereigns of the folly of wars, may perhaps, be one effect of it, since it will be impracticable for the most potent of them to guard his dominions. Five thousand balloons, capable of raising two men each, could not cost more than five ships of the line; and where is the prince who can afford so to cover his country with troops for its defense, so that ten thousand men descending from the clouds might not, in many places, do an infinite deal of mischief before a force could be brought together to repel them?"

- 1 *Different Systems of Sailing in the Air.* Harper's Weekly, Jan. 2, 1864.
- 2 John Wise's Daily Graphic balloon, with 600,000 cu. ft. gas capacity, 1873. On its New York-London test trip it came down in the Catskills.
- 3 Professor Ritchell of Hartford constructed a foot-power dirigible. It rose 200 feet on June 12, 1878, remaining aloft an hour.
- 4 John Stringfellow first flew an airplane under its own power, at Chard, England, 1848. In 1866 he built a triplane, but it never flew.
- 5 Otto Lilienthal, after many ornithopter experiments (1860-91), built a machine with an engine. In a glider test it fell; Lilienthal died (1896) a martyr.
- 6 Orville and Wilbur Wright did with the airplane what Montgolfier had done with the balloon and Zeppelin with the airship. Orville made the world's first flight in a heavier-than-air machine at Kitty Hawk, Dec. 17, 1903: 120 feet in 12 seconds. Later that day Wilbur flew 852 feet in 59 seconds.
- 7 The Brazilian Santos-Dumont was the first to build, control and steer airships for long flights. In 1909 he flew the Demoiselle (59 lbs.) at 55 miles an hour.
- 8 Glenn H. Curtiss, great American aviation pioneer, in the June Bug, July 4, 1908.
- 9 Charles A. Lindbergh's Spirit of St. Louis, May 20, 1927.

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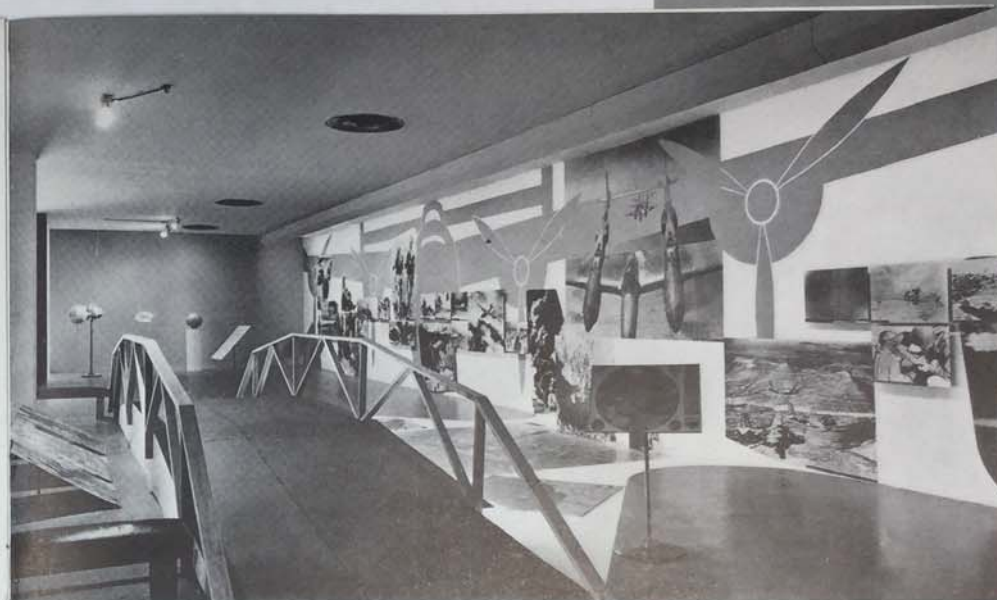
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## WAR OVER THE WORLD

Over Sicily and Attu, over Panama and Guadalcanal, America's flying men are mobilized against the enemies of democracy. From Africa and Australia, from England and China, they patrol the air. All over the globe, in concord with their Allies, they are smashing at the bastions of tyranny.

The airplane holds the power of life or death over civilization. We are using this mighty weapon to the utmost to defeat the aggressors. When that job is done, we must determine to dedicate the wings of the world to the purposes of peace.

- 1 Curtiss C-46 Troop Carrier. Official Photograph, U. S. Army Air Forces.
- 2 The Army, the Navy and the Marines planning the runway ramps for seaplanes on a South Pacific island. U. S. Navy Photo.



A ninety-foot photographic mural of war around the planet, seen against the outline of a full-size Liberator bomber. From both sides of the ramp the visitor looks down upon aerial photographs.

- 3 P-40. Army Warhawks, with Navy Catalina in foreground, at Amchitka, Aleutians. U. S. Navy Photo.
- 4 This picture, made from a Flying Fortress, shows bombs falling on the Monserrato airfield near Cagliari in Sardinia. U. S. Army Air Forces Photo.
- 5 Catalina Navy Patrol Bomber cruising over the Alaskan peninsula. U. S. Navy Photo.



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## GLOBAL STRATEGY

The Axis plan of world conquest was founded on geopolitics. This doctrine has backfired on its sponsors.

Germany has failed to subjugate Russia. The Mediterranean lies open to the ships of all the Allies. Those steppingstones to the Americas, Iceland and Greenland, Dakar and Natal, are in the hands of the United Nations. The plan has failed.

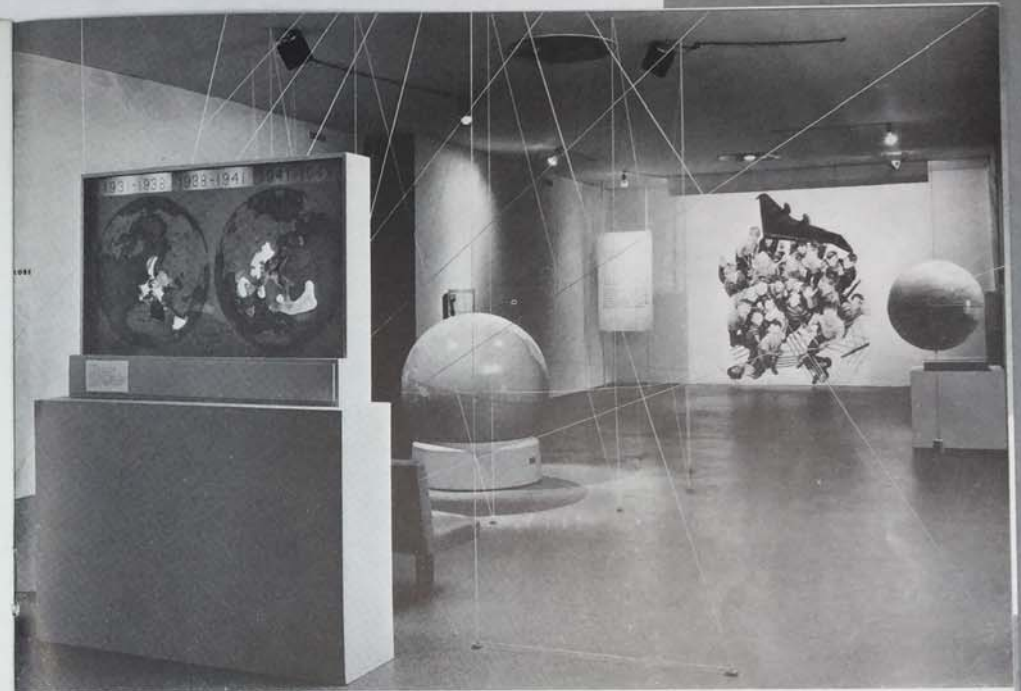
The United States, Russia, the British Commonwealth and China, and all the United Nations, working together, have strategic advantages of geography and resources which the enemy can never hope to match.

It is true that the supply lines from the Allied arsenal to the fighting fronts are long; that planes and ships can be destroyed. But the air and water on which they move are indestructible. The Axis network of railroad and highway transportation is shorter, but bombers can cripple it beyond repair.

### MACKINDER'S FAMOUS MAP

Although made by an Englishman in 1904, this is the most important map of German geopolitics. It demonstrated that Eurasia and its Heartland were all-important in their scheme of world domination, and speciously proved to them that North America was not important.

In spite of its oval frame, this map is on a Mercator projection, with North America relegated to the "outer crescent."



ABOVE. At the left may be seen the electrically animated map showing Axis aggression from 1931 to 1943, and in the background the final mural, by Eliot Elisofon, of children below a Northrop Flying Wing.

BELOW. Herbert Bayer's series of meteorological panels illustrating the nature of the atmosphere and its changing conditions.



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**PROJECTED FLIGHT SCHEDULES AND FARES**

FROM NEW YORK	TO	EXPRESS		One Way	Round Trip
		Flights Daily	Hours in Flight		
BERMUDA	.....	10	2-40	\$26.70	\$37.36
MEXICO, D. F. (Mexico)	.....	10	8-13	41.50	110.70
BAHIA (Cruz Verde)	.....	10	8-13	46.00	124.30
FAIRBANKS (Alaska)	.....	2	13-00	97.50	173.50
LONDON (England)	.....	5	12-48	103.50	184.50
LIMA (Peru)	.....	10	14-48	111.00	199.80
PARIS (France)	.....	2	15-00	112.00	202.20
BERLIN (Germany)	.....	2	16-00	126.00	234.00
RIO DE JANEIRO (Brazil)	.....	10	19-00	142.50	254.50
MOSCOW (Russia)	.....	2	19-15	144.00	256.20
HONOLULU (Hawaii)	.....	4	20-15	151.50	273.70
SANTIAGO (Chile)	.....	2	21-00	157.00	284.30
BUNDOU ABES (Argentine)	.....	10	21-30	163.00	291.60
CAIRO (Egypt)	.....	2	23-15	174.00	313.20
TOKYO (Japan)	.....	2	27-30	202.00	373.40
OSAKA (Japan)	.....	2	27-30	240.00	433.00
CAPE TOWN	.....	2	24-00	233.00	448.00
AUCKLAND (New Zealand)	.....	2	27-30	283.00	507.60
MANILA (Philippines)	.....	2	27-30	283.00	507.60
SYDNEY (Australia)	.....	2	43-00	315.00	547.80
SINGAPORE (Malaya)	.....	2	43-00	322.00	560.50
HONG KONG (China)	.....	2	44-00	330.00	574.00

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**AIRWAYS, AIRPORTS, AIR TRAINING AND AIR TRANSPORT**

The planning, educational and traffic control functions of the Civil Aeronautics Administration, and the prodigious wartime attainments of the Army Air Transport Command and Air Service Command give us a vision of the future of American civilian aviation. The illustrations on this and the facing page are from a section of the exhibition depicting the scope of these activities.

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Photographs 2-7 courtesy of the C. A. A.

- 1 Curtiss-Wright Commando, C-46. The most efficient two-engine cargo carrier for trips under 1,500 miles. Carries 40 paratroopers or several jeeps or 2 light tanks. Can carry its own loading ramp and hoisting gear, and is fitted for gliding, too. Photo U. S. Army Air Forces.
- 2 Washington, D. C., National Airport. The U. S. has nearly 1,000 major airports, most of them Government constructed under C. A. A. specifications on sites designated by the Army and Navy.
- 3 Airport traffic controller directing local aircraft movements.
- 4 An Instrument Class of the C. A. A. War Training Service cross-country and Link Instrument training. The C. A. A. War Training program gives initial flight training to all Army and Navy fliers.
- 5 To produce a straight radio path for blind landing, several transmitting antennae are used. Ten antennae are used at Washington National Airport to overcome effect of nearby steel buildings on localizer path.
- 6 The highest C. A. A. beacon in the U. S., Bill Williams Mountain, Williams, Ariz.
- 7 Flight progress board at an airway traffic control center. By telephone and radio the position of all planes in flight is recorded.
- 8 Overhauling the motors of transport planes. Photo American Airlines.
- 9 Vought-Sikorsky helicopter. Generally considered as the likeliest possibility for the postwar private market. Life Photo.
- 10 Probable timetable, 1948. Prepared by Pan American Airways System especially for the Airways to Peace exhibition.

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*Lockheed Constellation. The largest land-based transport plane yet built, and the newest development for post-war commercial passenger use. Designed to carry 55 passengers, it is now being used as a troop carrier.*

## TRANSITION TO PEACE

Our one great aim, beyond military victory, must be to create a world of freedom, opportunity, justice and lasting peace. Only so can the cruel cost of war be justified.

Vision and courage will be as necessary for the winning of the peace as for the winning of the war. We must learn that narrow nationalism and racial and religious intolerance are suicidal. We must understand that economic freedom is as important as political freedom. We must accept our full responsibility for America's share in the tremendous tasks of reconstruction.

Peace must be planned on a world basis. Continents and oceans are plainly only parts of a whole seen from the air. And it is inescapable that there can be no peace for any part of the world unless the foundations of peace are made secure throughout all parts of the world. Our thinking in the future must be world-wide.



*Pan American Airways Clipper Flying Cloud (Boeing Stratoliner 307). The latest land-based plane in current commercial use.*

*Stephen C. Clark, Wendell L. Willkie, and Vilhjalmur Stefansson examining the transparent glass antipode globe. By sighting past a point at the center of the globe, the antipode (opposite point) of any major city may be located.*



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## A NOTE ON THE EXHIBITION

The purpose of the exhibition Airways to Peace is to assist the layman to orient himself in relation to the air age. The evolution and new uses of the airplane have made this a global war, and changed our way of looking at the world. Whether we like it or not—whether we can adjust our national defense and political idealism to it or not—the airplane has changed the vast vague geography of the past into one small indivisible globe.

The exhibition consists of six sections, each of which (except that on meteorology) is prefaced with text especially written by Wendell L. Willkie. The entire display was designed by Herbert Bayer, who has used free-flowing space to symbolize man's conquest of the atmosphere. Richard Edes Harrison served as chief consultant cartographer. The subdivisions are:

### I. HOW MAN HAS DRAWN HIS WORLD.

The progress of map-making is surveyed in twenty-five exhibits, from the earliest known map, of Ga-Sur, Assyria, ca. 2400 B.C.; a model of Homer's world; the world as conceived by Anaximander; Roman road maps; and the epochal maps of Ptolemy, Leardo and Mercator; the Behaim globe of 1492; the visionary polar projection of Glareanus (1510); and so on to the latest polar projections showing the air routes of the near future. Great circle routes are demonstrated, and a special gauge permits the visitor to measure great circle distances in miles and hours of flight between any two points on the globe.

In a war which knows no boundaries, it is necessary for the civilian to have a true concept of the globe. Flat maps convey it only distortedly by means of projections, which are misleading unless their specific purpose is understood. For general understanding we

must turn to the three-dimensional globe, and for this reason the Museum constructed an "outside-in" globe, fifteen feet in diameter.

Upon entering this globe, the spectator finds the land areas depicted on the *inside* of the globe, enabling him to observe at a glance how three-quarters of the earth's land is in the northern hemisphere, and the extraordinary proximity around the North Pole of the most populous and powerful nations, within easy flying distance of one another—a fact which is the crux of history today. In spite of its great size, the "outside-in" globe is of demountable construction and can easily travel with the exhibition to other cities.

**THE PRESIDENT'S GLOBE.** A unique addition to the New York showing of Airways to Peace is President Roosevelt's Fifty-Inch Globe, the largest printed globe in the world (page 8). It was the Army's Christmas present last year to its Commander in Chief, and at the same time a replica was presented to Prime Minister Churchill.

Another feature of the map section is a five-foot layered relief model of Europe by Norman Bel Geddes, made to assist aviators in distinguishing the terrain and anticipating the height of vertical elevations.

A glass antipode globe permits the visitor to sight through a point at the center of the earth to find the antipode (opposite place) of any of the great cities of the world.

**II. THE PROGRESS OF FLIGHT** is summarized in sixty photographic enlargements which trace the evolution of flight from the pterodactyl of fifty million years ago to today's helicopter, the latest war planes and the transport planes which foretell the future of civilian aviation.

Man's desire to fly began in the obscure dawn of history, in envy and emulation of

birds, and the mere dreams of men of overweening imagination were given reality by reasonable scientists who, little by little, solved the mysteries of aerodynamics. The decade of the French Revolution saw the first actual flight, and we see now that of these two contemporaneous events the latter may have been the more profoundly revolutionary. It marked the coming of a new era not only in world politics but in the technique of warfare and the everyday life of every man in time of peace.

Aviation did not become a practicable matter until the Wright brothers flew the *Kitty Hawk* on December 17, 1903, but from then on innovations and improvements have been so swift as to bewilder the layman. But he already knows that tomorrow he will fly easily and far; and to appeal to his imagination, the Museum asked Pan American Airways to prepare a peace-time world timetable, dated 1943, which has been included in the exhibition.

**III. WAR OVER THE WORLD.** The role of the airplane in carrying war across the earth is pictorially suggested by a photographic mural displayed against the background of the full-size silhouette of a *Liberator* bomber with a wingspread of 110 feet. These fifty-five pictures show more nations on broader battlefields than have ever been known before, and help us to see at a glance the innovations of offense and defense for which the airplane is responsible. Furthermore, they cannot fail to stimulate one's imaginings in regard to the political and economic changes which must occur as part of this great mutation of history which modern science has evoked.

**IV. AIR STRATEGY.** Once we have attained the airman's view of the world, the strategic problems of the war become re-

markably clear. Mr. Willkie has pointed to the Germans' lack of the global concept as the basic flaw in their strategy. They planned their conquest on Mercator maps and relegated the United States to the fringe of their world. To demonstrate this and other essential factors of an air-age war, an important section of the exhibition, consisting of spheres and "outside-in" hemispheres, shows Germany's tragic misinterpretation of geopolitical theory, Japan's scheme of Pacific conquest, the possibilities of long-range bombing, the chances of dislocating war industries inside Germany's enslaved and fortified Europe, and the importance of Allied air bases in China.

The formidable extent of Japanese conquest in the Pacific, compared with German conquests in Europe, is forcefully depicted by an animated electric map of Axis aggression from 1931 to the present.

**V. THE NATURE OF THE ATMOSPHERE.** The private citizen of the air age, who will soon be flying his own helicopter, must have some idea of the rudiments of the new world into which the scientist and the aviator have led us. We can no longer think of the earth as a simple solid eight thousand miles in diameter, studded with mountains and immersed in ocean. Our planet is a ball of liquid gases, perhaps fifty thousand miles in diameter, with a solid core. Then comes the troposphere, which is the air we breathe; then the stratosphere, in the lower regions of which we now can fly; and then the ionosphere, which divides our human realm from the infinite.

In a series of brilliant paintings, made especially for Airways to Peace, Herbert Bayer has portrayed this entirety of the earth as we now know it, with its multiple elements of cloud forms and weather currents. In a little analogical model, man

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appears as he is in reality, beneath a three-fold sky at the bottom of the atmosphere, like a fish at the bottom of the sea—a deep-air mammal.

VI. TRANSITION TO PEACE. Today the air is necessarily an immense battlefield. But amid the necessities of war the personnel of the aviation of the future is being trained on an undreamed-of scale, these future airports of domestic and international air transportation are being constructed, and systems for the safe and orderly regulation of air traffic are being perfected.

This year approximately thirteen million aircraft movements—ninety-five per cent of them military—will be handled by the traffic control centers of the Civil Aeronautics Administration, which serves the Army and Navy Air Transport Services in the movement of cargo and personnel (a complete hospital was recently flown to Alaska in thirty-six hours).

The extent of these operations and their revolutionary consequences are shown in the concluding section of the Airways to Peace exhibition.

If we imagine this revolutionizing travel of

the time to come, it is easy to read the moral of Airways to Peace. Not only in idealistic theory but in actual fact the world today is one unit: air neighbors are near neighbors. No national boundary can have the importance it had in the past. No selfish interest can devise a separate security in ignorance of other nations. Whether we like it or not, each nation is a portion of the world-nation. Over our heads the airways have woven a web of intimacy, a new scene of mutual advantages, a world-brotherhood.

War, from now on, will all be civil war among nations which can no longer isolate themselves. With this new proximity we must begin to exercise an imagination as far flung as our air routes, an international intelligence and world-conscience which will match the great new machines we have invented.

The present war and its aftermath of trouble and reconstructive labor may last a lifetime, but the children of tomorrow, the new generation born with wings—whom we see in the photo-mural at the close of the exhibition—must have a modernized and law-abiding world to grow up in.

MONROE WHEELER

#### PRESS COMMENTS UPON AIRWAYS TO PEACE

*Newsweek*—"It is a stunningly designed show which will undoubtedly succeed in its aim of reorienting visitors to an air age. . . . If *Road to Victory* was a hit, *Airways to Peace* should be a sensation."

*The New York Times*—"A unique display of the world's expanding horizons . . . timely reminder of the change, growth, and ever-new responsibilities entailed in the progress of civilization."

*New York Herald Tribune*—"Installed in dramatic sequences. . . . Shows how the predicted air age will be of crucial importance in international politics."

*New York Daily Worker*—"Deserves the attention of every victory-minded citizen. . . . The designer, Herbert Bayer, has presented the material in a most striking and dramatic way. The material is arranged in lucid sequence and convincingly makes its point."

*Town and Country*—" . . . should be seen more than once, by even the most intelligent observer, and there is such a richness of invention and so much aesthetic pleasure that no encore will be a chore."

*New York World Telegram*—"Extremely interesting and informative. The openness of the installation . . . seems almost a symbol of the wide, clean openness of the stratosphere."

*Art Digest*—"This show is tantalizingly close to painting shows by Dali and Tchelitchev and a number of other surrealists who have come, in natural course of events, to these same walls."

*South Norwalk, Connecticut, Sentinel*—"No movie packs in more drama and visual entertainment."

*Time*—"A brilliant educational exhibition."

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NEW YORK MUSEUM OF SCIENCE AND INDUSTRY  
R. C. A. BUILDING, 30 ROCKEFELLER PLAZA  
NEW YORK

TELEPHONE: CIRCLE 6-2075

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ROBERT P. SHAW, *Director*

September 22, 1943

Miss Helen Ward  
Assistant to Mr. Wheeler  
The Museum of Modern Art  
11 West 53 Street  
New York, N. Y.

Dear Miss Ward:

The kodachrome slides on the "History of Flight"  
have been received. Thank you very much for their  
return.

Very truly yours,

*D. W. Anderson*

D. W. Anderson  
In Charge of Operation

DWA:w

A to P.  
Mus. of  
Science &  
Industry

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Mus. of Science & Industry  
AIRWAYS

19

September 10, 1943

Mr. D. W. Anderson  
Museum of Science and Industry  
30 Rockefeller Plaza  
New York, New York

Dear Mr. Anderson:

Mr. Wheeler has asked me thank you very much indeed for your kindness in lending the kodachrome slides on the History of Flight. They have been very helpful to us and we appreciate your cooperation.

Very sincerely yours,

Helen Ward  
Assistant to Mr. Wheeler

w

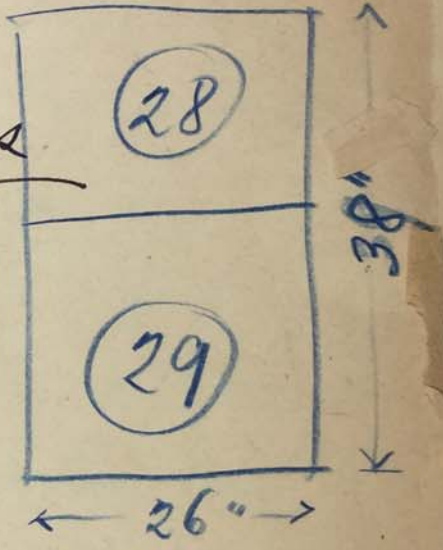
The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
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(2)

be one effect of it, since it will be ~~unpracticable~~  
unpracticable for the most potent of them to guard  
his dominion. For though I believe

Glen Martin Mars

Helicopter



Harzinger

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Development of Flight - Notes ① AIRWAYS

About 400 B.C.,  
~~Archytas~~ Archytas, according to Gellius, constructed and  
 flew a wooden pigeon, about 400 B.C.

Archimedes, <sup>287-212</sup> ~~date 287-212 B.C.~~, conceived <sup>of</sup> that the world was  
 round and constructed a moving sphere.

The first balloon is said to have been constructed in  
 China in the 13<sup>th</sup> century.

Marco Polo reports having seen the Great Airmillery  
 there constructed ~~by~~ for Kubla Khan by his court  
 astronomers in the 13<sup>th</sup> century.

Benjamin Franklin witnessed the ascension of the first Montgolfier  
 balloon at <sup>FRANCE</sup> ~~France~~ France on June 5, 1783 and later wrote  
 that it appeared to be "a discovery of great importance  
 and that may possibly give a new turn to human affairs."  
 Commencing with the folly of man may perhaps OVER

saw de Rozier make the first human ascension in air history.

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②

be one effect of it, since it will be ~~impracticable~~  
 impracticable for the vast potent of them to guard  
 his dominions. Five thousand Balloons, capable of  
 raising two men each, would not cost more than five  
 ships of the line. And where is the prince who can  
 afford to so cover his country with troops for its defence,  
 as that ten thousand men descending from the clouds,  
 might not in many places do an infinite deal  
 of mischief before a force could be brought together to  
 repel them. Letter <sup>from Paris</sup> to Dr Ingenhous, Vienna,  
 Jan. 16, 1784.

---

Herzlinger

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SECTION III THE DEVELOPMENT OF FLIGHT—page 2

7 [ a ]  
[ b ]

15. Jacob Degen's Flying Machine.

16. Professor Harrison's Steam Airship.

8 [ a ]  
[ b ]

17. Lilienthal's Biplane Glider. The first man to fly a heavier-than-air device under control.

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JUNE 19, 1943

MR. AVERY MCBEE  
GLEN L. MARTIN CO.  
BALTIMORE, MD.

PLEASE RUSH BEST PHOTOS OF MARTIN MARS FOR ENLARGEMENT IN  
THE MUSEUM'S AIRWAYS TO PEACE EXHIBITIONS OPENING NEXT WEEK.  
URGENT.

MONROE WHEELER  
DIRECTOR OF EXHIBITIONS  
MUSEUM OF MODERN ART

RE: AIRWAYS TO PEACE

[ b ]

27. Frank Ready, Jr.'s, Catamaran of the Air. 1894.

14 - sep  
end of  
series

15 [ a ]  
[ b ]

28. Wright Brothers' KITTY HAWK. 1903.

29. Santos Dumont's Demoiselle.

16 [ a ]  
[ b ]

30. Curtiss Flying Fish.

31. Henry Farman. The first airplane to fly a ki

The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	MoMA Exhs.	236.3

SECTION III THE DEVELOPMENT OF FLIGHT—page 2

7 

a
b

- 15. Jacob Degen's Flying Machine.
- 16. Professor Harriman's Steam Airship.

8 

a
b

- 17. Lilienthal's Biplane Glider. The first man to fly a heavier-than-air device under control.
- 18. John Stringfellow's steam airplane. The first motor-powered plane ever to fly.

9 

a
b

- 19. Henson's (?). Flying Steam Company to China in Twenty-four Hours Certain. Solomon
- 20. Andrews' Aereon.

10 

a
b

- 21. The first aerial photograph. Boston. C. 1860.
- 22. First military air reconnaissance. U. S. Civil War. Photo by Matthew Brady.

11 

--

- 23. Different Systems of Sailing in the Air. Harper's Weekly. January 2, 1864.

12 

a
b

- 24. Marriott's Aerial Steam Carriage "AVITOR." 1869.
- 25. Professor Ritchell's foot-power dirigible. 1878.

13 

a
b

- 26. The Interior of the Great Transatlantic Balloon. 1873.
- 27. Frank Ready, Jr.'s, Catamaran of the Air. 1894.

14 - sep end of series

15 

a
b

- 28. Wright Brothers' KITTY HAWK. 1903.
- 29. Santos Dumont's Demoiselle.

16 

a
b

- 30. Curtiss Flying Fish.
- 31. Henry Farman. The first airplane to fly a ki

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SECTION III THE DEVELOPMENT OF FLIGHT--page 3

17. 

a
b

32. Baldwin Airship; Curtiss motor; the ~~first~~ U. S. Army's first airship. 1908.

33. Louis Bleriot. Type XII. 1908.

#17

18. 

a
b

34. U. S. Army's First Flying School. Showing General H. H. Arnold. 1911.

35. First gun fired from an airplane. Sheepshead Bay, New York, 1910.

19. 

a
b

36. Early biplane (Martin).

37. Rare photo of aerial combat in World War I.

20. 

a
b

38. Lindbergh's "The Spirit of St. Louis."

39. Eaker (Captain).

21. 

a
b

40. Stratosphere balloon EXPLORER II. 1935.

41. Substratosphere airplane.

22. 

a
b

42. Sikorsky S-42. First trans-Pacific and trans-Atlantic passenger service.

43. Boeing 307 B. Stratoliner. First altitude-conditioned commercial liner.

23. 

a
b

44. Pan American Clipper. First South American passenger service.

45. B-17. Boeing Flying Fortress.

24. 

a
b

46. B-24. Consolidated Liberator. *Express*

47. The most recent biplane. *fighter*

Frederick  
Air News

The last type Navy biplane fighter in actual use.



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Counter-mounted cardboard 1

- J ✓ 1490 Johnston's Horizons Unlimited. Center page 134. Leonardo's sketches of flying apparatus
- ✓ 1493 Miller's World in the Air, page 77, Vol. I. Engraving of Daedalus and Icarus.
- ✓ 1493 " " " " " " 104, " " Wood engraving of Albrecht Dürer (age 21) Spiegel der Wahren Rhetorik, Riederer, Freiburg, 1493. *his*
- ✓ 1675 " " " " " " 110, center left. Besnier, a French locksmith, designed gliding machine operated by arms and legs.
- Miller Vol I p. 120*  
✓ 1783 Goya (1748-1828). Les Hommes Volants *Spain*
- J 1783 Benjamin Franklin witnessed the first ascension of Montgolfier's balloon June 5, 1783. Saw the first humans, de Rozier and d'Arlandes, make their ascent November 21, 1783, and that same evening Montgolfier and d'Arlandes visited him to discuss the flight.
- ✓ 1783 *Miller, Vol. I, p. 124. Montgolfier's ascent.*
- ✓ Nov. 21 1783 Miller's World in the Air, Vol. I, page 147. Professor Charles and M. Robert, the first humans, ascend in a balloon.
- ✓ Jan. 7 1785 Miller, Vol. I, page 183. An American, Blanchard, and Jeffries. First crossing of English Channel, Jan. 7, 1785. *Blanchard's boat*
- ✓ 1798 Miller, Vol. I, page 227. Pierre Testu-Brissy. First equestrian ascent. *173*
- no* 1804 Miller, Vol. I, page 232. Project for grand descent on England.
- ✓ 1843 Miller, Vol. I, page 298. "England to China." Henson's "Ariel." *3 12*
- ✓ 1865 *Miller, Vol. I, p. 315*  
Miller's Systems of Aerial Navigation *American Gene*
- N. ~~1862~~ Miller, Vol. II, page 22. Matthew B. Brady. U.S. Gov't's first military balloon. First artillery ever directed by balloon. Gen'l. Sherman.
- no* 1863 Miller, Vol. II, page 25. Andrews "Aeron"
- no* 1863 Miller, Vol. II, page 26. La Landelle model
- ✓ 1848 Miller, Vol. II, page 30 (top). Stringfellow. Built and flew *his file*
- ✓ 1869 Miller, Vol. II, page 31. Marriott's Aerial Steam Carriage.
- no* 1889 Miller, Vol. II, page 59. R. J. Spalding's Flying Man. (Also in Horizons Unlimited, page 142.)
- ? Chanute. Horizons Unlimited, page 191.
- no* 1896 Miller, Vol. II, page 75 (top). Langley (Aerodrome No. 5)
- ✓ 1901 Miller, Vol. II, page 83. Alberto Santos-Dumont
- no* 1900 Miller, Vol. II, page 86. Zeppelin
- Dec. 17 1903 Wright Brothers. Miller, Vol. II, pages 104-5. First successful airplane in the world.

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- ✓ Jan. 13 1908 Miller, Vol. II, pages 130-31. Farman first kilometer.
- 1908 ✓ " " " " 145. First U. S. Airship.
- July 25 1909 " " " " 186 (bottom). Flight across English Channel. (Eliot.)
- Jan. 26, 1911 " " " " 238. Curtiss. Hydro-airplane.
- 1914-1918 ✓ " " " " 272-3. Air Battle photographs 1918.
- 1919 ~~Johnston, Horizons Unlimited, page 296. U. S. Navy. N.C. 4.~~
- 1919 ~~no~~ Miller, Vol. II, page 279 (top). First transatlantic airship voyage.
- 1919 ~~no~~ " " " " 280. First passenger airline in America. New York to Atlantic City.
- 1924 ~~no~~ Miller, Vol. II, page 289 (top). First airship transcontinental round trip. Shenandoah.
- 1926 ~~no~~ " " " " First airship over South Pole. Amundsen.
- 1927 ✓ Lindbergh. The St. Louis. (get photo)
- J 1927 ✓ Johnston, Horizons Unlimited, page 299. Lexington and Saratoga. Navy's first aircraft carrier.
- J 1938 Johnston, Horizons Unlimited, page 316. Howard Hughes and his Lockheed 14. Around the world in 3 days, 19 hours
- J 1931 " " " , page 331 Boeing single-engine Monomail.
- J 1933 " " " Pan American. Sikorsky S 42 Flying Boat
- 1935 The China Clippers
- 1940 The Atlantic Clippers

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APPENDIX (Page references are to The First Century of Flight in America Milbank)

- get exact date if possible*
- ✓ 1864 Conception of styles of flying. Harper's Weekly, January 2, 1864 (p. 70)
  - ✓ 1844 Aerostatic invention of Muzio Muzzi (p.71)
  - ✓ ? Daily Graphic balloon (p. 102)
  - ✓ ? First aerial photograph of the United States (of the city of Boston) (f. p. 150)
  - ✓ ? Charles F. Ritchel's flying machine (f. p. 150)
  - ✓ ? 19-th century broadside entitled "Professor Harriman's Steam Airship" (p. 166)
  - ✓ ? Cover from one of Frank Reade's dime novels (p. 190)

- 8. B-47B (Mikoyan Flying Boat)
- 9. B-43 (Mikoyan Flying Boat)
- 10. Curtiss-Wright Corsican (Army 626)
- 11. Navy JRM-1 Martin "Mara" Flying Boat
- 12. Boeing 314 Flying Boat
- 13. Fairchild C-82 (50,000 lb. post-war cargo plane)
- 14. C-75 Boeing 307 Stratoliner
- 15. TB-42 "Flying Ape"
- 16. Boeing 247
- 17. Lockheed 10

7

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APPENDIX (Page references are to The First Century of Flight in America Milbank)

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- ✓? 19-th century broadside entitled "Professor Harriman's Steam Airship" (p. 166)
- ✓? Cover from one of Frank Reade's dime novels (p. 190)

- 8. B-128 (40-400) Flying Boat
- 9. B-43 (Primary Flying Boat)
- 10. Curtiss-Wright Curves (Army 096)
- 11. Navy JRB-1 Curtiss "Wren" Flying Boat
- 12. Boeing 314 Flying Boat
- 13. Fairchild G-42 (50,000 lb. port metal wing plane)
- 14. G-75 Boeing 307 Stratoliner
- 15. WB-41A "Flying Ace"
- 16. Boeing 247
- 17. Lockheed 10

7

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PRINCIPAL TRANSPORTATION AIRCRAFT

1. Navy SRS-1,2 engines (amphibious)
2. Navy R4D1,3,4 and 5 Douglas DC3
3. Navy PB4Y-1; Consolidated Liberator Transports and Bombers (Army C 87)
4. Navy R5D Douglas DC4 Skymaster (Army C54)
5. Navy HK-1 Kaiser-Hughes Flying Boat. All Plywood (320 ft. wing spread)
6. Navy R50-1,2,3,4 (Lockheed Lodestar)
7. Martin 130 Flying Boat
8. S-42B (Sikorsky Flying Boat)
9. S-43 (Sikorsky Flying Boat)
10. Curtiss-Wright Caravan (Army C76)
11. Navy JRM-1 Martin "Mars" Flying Boat
12. Boeing 314 Flying Boat
13. Fairchild C-82 (50,000 lb. part metal cargo plane)
14. C-75 Boeing 307 Stratoliner
15. VS-44A "Flying Ace"
16. Boeing 247
17. Lockheed 10

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Red  
Figures

(Eredman?)

for double space large label

BENJAMIN FRANKLIN saw the first balloon rise over Annonay, France,  
Five

18  
m

Amphibians

Curtiss - Amphibian  
 Solving " " Ansat  
 Grumman " "  
 Sikorsky  
 Lockheed

6. The first large airplane, the Sikorsky Grand which was flown successfully in 1913. It was the father of all modern four-engined aircraft, and was considered the first real transport airplane. (Thompson)

7. Benoist's flying boats began the first regular airline operation in 1914 on a twice daily schedule from Key West to the Florida mainland. This was the prototype for all later flying boats, the ancestor of all modern water transport aircraft. Thompson.

8. The World War forced air research acceleration to a greater degree than the infant industry had ever known. At the outbreak of war,

omit temporarily

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Red  
Figures

(Friedman?)

for double space large label

18/11  
Monty  
Bodini

BENJAMIN FRANKLIN saw the first balloon rise over Annonay, France, ~~Five~~ on June 5, 1783. ~~Three~~ months later, after ~~visiting~~ <sup>his friend</sup> witnessing the first human ascent, he wrote to Jan Ingenhaus, the court physician in Vienna:

"It appears to be a discovery of great importance and what may possibly give a new turn to human affairs. Convincing sovereigns of the folly of wars may, perhaps, be one effect of it, since it will be impracticable for the most potent of them to guard his dominions. Five thousand balloons, capable of raising two men each, could not cost more than five ships of the line; and where is the prince who can afford so to cover his country with troops for its defense, as that ten thousand men descending from the clouds might not, in many places, do an infinite deal of mischief before a force could be brought together to repel them?"

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omit temporarily

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*Red Engines*

*(Friedman?)*

Progress in flight

The oldest record of man's will to fly goes back as far as the temple of Selenius at Palermo. History is dotted with geniuses and fakers who thought they could make man immitate the birds by artificial means. Their basic failure was usually traceable to two causes: One was lack of knowledge of air physics, the other was the absence of proper power plants. Experimenters in human flight included such geniuses as Leonardo da Vinci and Bishop Wilkins, patent fakers like de Gusman and men like Allard, Bessener and Bacqueville whose attents wound up in disaster.

The success of various type of lighter-than-air machines attracted scientific minds away from heavier-than-air craft for two centuries. Great minds were refocussed on the problem of power-craft only toward the end of the 19th century, with the work of Otto Lillenthal, who accomplished the first scientifically succesful man-carrying flights from 1894-96, when he was killed trying out a new control on his glider.

- ✓ 1. View of one of Lillenthal's advanced biplane gliders
- ✓ 2. Octave Chanute was the link between Europe and America in heavier-than-air flight. Lillenthal was still alive when Chanute, studying his work, defined the basic problems which had to be overcome before safe flight could be accomplished. He built five gliders, all of which flew with signal success. View shows A.M. Herring (later a partner of Glenn Curtiss) flying a Chanute glider on the sand dunes East of Chicago in 1896.
- ✓ 3. The Wrights, in many ways were disciples of Chanute. They conquered the art of gliding, thus achieving positive lateral control by warping the wing tips of their biplane glider. The next step was the successful addition of power, resulting in the immortal flight at Kitty Hawk on December 17, 1903.
- ✗ 4. The first flight between nations in the first type of successful monoplane-- Bleriot flies from Sangatte in France to Dover in England in 37 minutes, July 28, 1908. (Print from the Thompson collection.)
- ✓ 5. Curtiss flies the first important cross-country flight from Albany to New York, a distance of 150 miles in 2 hours and 51 min. on May 29, 1910. (Thompson painting by Charles Hubbel)
- ✗ 6. The first large airplane, the Sikorsky Grand which was flown successfully in 1913. It was the father of all modern four-engined aircraft, and was considered the first real transport airplane. (Thompson in 1914)
- ✗ 7. Benoist's flying boats began the first regular airline operation, on a twice daily schedule from Key West to the Florida mainland. This was the prototype for all later flying boats, the ancestor of all modern water transport aircraft. *Thompson.*
- 8.

*omit temporarily*

The World War forced air research acceleration to a greater degree than the infant industry had ever known. At the outbreak of war,

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	MoMA Exhs.	236.3

aircraft were used chiefly for reconnaissance. Germany had the air edge, having many crude ships, like the Rumpler Taube monoplane shown here.

✓ 9. Sky battle, Fokker monoplane engages a BE-2. This was the earliest type of real air combat, using machine guns instead of the random rifle. Fokker perfected a method for synchronizing machine guns to fire through the propeller arc.

10. Night Patrol. Operations made night flying necessary later in the war. Combat lighted by anti-aircraft searchlights and the bursts of "Archie" (anti-aircraft) shells. World War types which engaged in this type of work included the British Bristol Fighter and Germany's Aviatik. This type of operation produced the operational information on which night mail and transport flights were conducted later.

11. As a reprisal for Germany's Zeppelin raids against England, Britain built such giant landplanes as the Handley Page, which was capable of taking three tons in explosives over Germany from French bases. These giants were well armed and would have been capable of inflicting telling damage against Germany's industrial areas, had not the end of the war prevented their full military exploitation.

12. One of Germany's final contributions in the latter days of World War I was the Junkers contour fighter. This was one of the first all-metal airplanes ever successfully operated. With her supply of usable aircraft woods virtually depleted, Germany was forced to turn to other structural materials. Dr. Hugo Junkers developed a structural system for building aircraft from aluminum alloy, corrugated for greater structural strength.

✓ 13. The war's end saw a lull in air activity. Experiment and manufacture virtually ceased. Governments dumped war surplus on the markets, and it was virtually impossible to sell new equipment. The most important exploratory flights were performed under service sponsorship, like the first transatlantic flight in the NC-4 May 16-27, 1919 in the Curtiss seaplane.

Omit 14. Their flight was followed shortly by a non-stop hop in a Vickers Vimy twin-engined biplane from St. Johns, Newfoundland to Clifden, Ireland, June 14-15, 1919. Both of these flights showed the possibilities and limitations of ships built at the end of the first World War.

✓ 15. With thousands of pilots released from the armed services, the problem arose as to what employment could be found for the new airmen. The Air Mail systems, created under the direction of the Post Office could only absorb a few of them. Large numbers returned to their former jobs and gave up flying. Others bought surplus Curtiss "Jennies" and Standard J-1 biplanes, and barnstormed all over the country, frequently doing reckless aerobatics and stunts to attract crowds. The standard price for airplane rides for many years was a dollar a minute. While these flying circus pilots may not have been the best type of operators one might imagine, they still provided the best contact between the public and aviation in the lean years between.

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	MoMA Exhs.	236.3

16. Establishment of the first transcontinental airmail, July 1, 1924. Picture, Jack Knight delivers the night mail. Thompson collection.

✓ 17 Lindbergh's flight to Paris, which refocused public attention on the romance of flying. May 20-21, 1927.

18. Opening of Pan American Airways in Fokker Trimotors, 1927-28 from Key West to Havana. (Picture available through Pan American Airways; see Mr. Devon Francis)

19. Transcontinental airlines develop, first by air-rail hookup, then all the way by air. Ford Trimotors are among the earliest equipment (1929)

✓ 20 The demand for more cabin space produced such aircraft as the Curtiss Condor which was capable of carrying a more profitable load of passengers and mail. (1930)

21 The need for still greater speed produced the ancestor of all modern transports, the Boeing 217. Equipped with retractable landing gear, this was the first three mile a minute ship, which, in 1933 was capable of crossing the continent in 19 1/2 hours.

✓ 22 Military aviation got an unhealthy stir when Glenn Martin produced his B-10 bomber which was capable of outspeeding all of the existing single-seater fighters. This forced the abandonment of military biplanes except as trainers.

✓ 23 The Douglas D.C.3 was one of the first landplanes that showed it could produce a sufficient margin of profit at a high operating speed to make the air transport business sound and profitable. It became virtually the standard transport for a decade, and was in the widest use of any type of commercial landplane anywhere in the world until the outbreak of war.

✓ 24 The increased demand on space in aircraft made and the demand for faithfully-kept schedules produced a ship that could carry a good payload at an altitude above most westerly irregularities. This was the Boeing Stratoliner, which was equipped with a supercharged cabin in which passengers could be comfortable at pressures inside the cabin equal to that of normal flying levels, despite the fact that the ship was flying in the sub-stratosphere.

✓ 25 The Boeing Clipper which is currently crossing the ocean with ferry-like regularity, is a lineal descendant of two other ocean crossers, the Sikorsky S-42 and the Martin Clipper. (Pictures of both of these types are available through Pan American Airways.)

✓ 26. The arrival of war sharply curtailed private flying, which had collected thousands of devotees, and held promise of making 100 miles a regular home-to-office commuting distance. Type shown is the Stinson 105 three passenger private plane. Its operating cost was about the same as the average Vee-8 car.

✓ 27 Modern fighter craft suffered radical changes since the rude awakening provided by the Martin B-10. It compelled such new developments as the Boeing P-26 (Get from Army). *and Curtiss P-36 (27)*

✓ 28. Review of aircraft in current use:  
U.S. Heavy Bombers. Boeing B-17. Flying Fortress. Better Kodachrome available through N.W. Ayer, 30 Rockefeller Plaza. See Mr. Tom Collison. Consolidated B-24 (Liberator) See Mr. Dakin, Hill & Knowlton, Empire State Building.

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	MoMA Exhs.	236.3

II

SECTION III THE DEVELOPMENT OF FLIGHT

1. 

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 1. Engraving of Daedalus and Icarus. Symbol of man's preoccupation with flight.
  
2. 

a
b
c

 2. The pterodactyl, winged reptile of fifty million years ago, antedated the bird.
3. Homing pigeon rising in flight.
4. The gannet, landing. Six-foot wing spread.
  
3. 

o	b
c	d

 5. Leonardo da Vinci. Design for manual ornithopter.
6. Leonardo da Vinci. Wing design from Codex Atlanticus.
  
7. Montgolfier. First balloon ascent at Annonay. June 5, 1783.
7. 

a	b
c	d

 8. Charles and Robert. First human ascent. Paris, December 1, 1783.
9. Blanchard and Jeffries. First flight across English Channel. January 7, 1785.
10. 18th-century conception of paddle balloon, to control direction.
  
5. 

a	b
a	b

 11. Teste Brissy. First equestrian balloon ascension. C. 1796.
12. Early conception of air battle.
  
6. 

a	b
a	b

 13. Napoleon's plan for the invasion of England. -1809
14. Petin's Grand Flying Machine.

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	MoMA Exhs.	236.3

Lockheed Constellation - 5

Largest American land transport yet built.  
newest development for postwar passenger use  
Carries 55 passengers. 250-300 mph.

Boeing Northwind Constellation etc.

Now largest aircraft <sup>now</sup> in existence

Originally built as many bodied bomber - now  
converted to wing span 200 ft.

for 2000 h.p. engine.

DC. 4 the most efficient plane for operations of over 1500 miles.

Boeing Constellation - most efficient plane for

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Medium Bombers

B-25-- North American Mitchell. Get new 'chrome from North American, Inglewood, Calif.

B-26 -- Martin Marauder. Contact Avery McBee, Glenn L. Martin, Baltimore.

Attack bombers.

Douglas A-20 Havoc. Contact Douglas Aircraft, Santa Monica, Mr. A.M. Rochlen

Vultee Vengeance. A-31 Hill and Knowlton.

Patrol Bombers-- Consolidated Catalina and Coronado-- Hill and Knowlton.  
Martin Mariner McBee at Martin.

Navy torpedo planes. Grumman Avenger. See Grumman Aircraft, Bethpage, L.I.

Single seaters. Lockheed P-38, Maxwell Styles, Lockheed Aircraft Corp.  
North American P-51 North American, Inglewood, Calif.  
Curtiss P-40. Mr. Mark Nevils, Curtiss-Wright, 30 Rockefeller Plaza.  
Navy. Grumman Avenger. Grumman, Bethpage.  
Navy Vought Corsair. Mr. Henry Moberly, Vought-Sikorsky, East Hartford, Conn.  
Bell Airacobra (P-39) Mr. Walter Bonney, Bell Aircraft Buffalo, N.Y.

For chromes of representative British Types, contact Mr. Rene McColl, British Press Service, 30 Rockefeller Plaza .

A group of authentic Axis 'Chromes are available through Mr. Max Haas of European Photo Service, New York.

Aviation of the future. Secure pix of Sikorsky Helicopter through Mr. Moberly of Vought-Sikorsky.

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	MoMA Exhs.	236.3

III War over the World

from Action Show

1 California Hit at Pearl Harbor W-PH-53-13974

Bombing Middle East - Army Air Force.

Top photo by Stroke of America revenue in just hand having  
killed Jap.

# Snapshot 3363 - Russian at Stalingrad

Pearl Harbor ~~Hickok Field~~  
Naval Air Station

WPH 67-13982

✓ Desert Victory BM-22582  
E-20502

Singapore photo + grandmothers morning loss of  
child. 76 946-497 Intercontinental

Lendy

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	MoMA Exhs.	236.3

Vertical elevations

~~of the terrain, mostly all the  
paths between~~

SCALE:

Vertical layers up to 100 ft.  $\frac{1}{16}$ "

" " 100-500 ft.  $\frac{1}{8}$ "

" " 500 ft and over  $\frac{1}{4}$ "

Horizontal scale 1 inch equals  $8\frac{1}{3}$  miles

to anticipate the height of

war.  
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	MoMA Exhs.	236.3

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Layered Relief ~~Map~~ Model  
of Europe from the English  
Channel to Switzerland, By  
Norman Bel Geddes

---

This relief map was made to  
enable aviators to distinguish  
the terrain more readily and  
to anticipate the height of

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	MoMA Exhs.	236.3

LABEL

AIR SUPPORT

America may have a half million planes by the end of the war.  
What does the maintenance of such a force require?

One thousand Flying Fortresses cost three million dollars and  
a sixty-two million man hours. To operate them ten thousand  
men are required in the air and one hundred thousand on the  
ground. A six-hour bombing attack by these bombers requires  
one million gallons of high-octane gasoline.

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	MoMA Exhs.	236.3

Air war is probably the costliest activity ever undertaken by the human race. A force of 1,000 Flying Fortresses costs 300 million dollars and requires 62 million man hours. To keep these thousand planes in operation requires 10,000 men in the air and 100,000 on the ground. ~~One~~ 6-hour bombing attack by such a force requires one million gallons of high octane gasoline. ~~This constitutes only a small portion of our air force,~~ the problem of providing for an air force of which this is only a small part, ~~stagger~~ <sup>startles</sup> the imagination. The cost of operating an air fleet in addition to that of maintaining the armed forces and constructing adequate transport and combat vessels necessitate <sup>for the American people</sup> ~~on the part of the American civilian~~ harder work, a reduced standard of living and a more resolute idealism.

The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	MoMA Exhs.	236.3

Aviation Industry of America

WINGED AMERICA

**Music:** "The March"

**Bagles:** The world war! The frail "service" available now that our observations  
of the National Advisory Committee for Aeronautics, the new airplane  
development will be possible. That world's great airplane  
**Drone and Zoom of Planes**

**Fanfare:**

**Voice:** Ladies and Gentlemen: The Aviation Industry of America in Cooperation  
with the New York Museum of Science and Industry welcomes you to  
"Winged America", a pageant that glimpses the past and portrays the  
present of an industry that this nation gave to the world and in which  
today it is supreme.  
And the crash and roar of the old Western Front Aviation shows its  
first place as a military weapon. Peaceful and serene, we yet, undressed of.

**Music:** "Semper Fidelis"

**Music:** Early History

**Voice:** Man with wings, the peer of the bird in its mastery of the air  
engage the skilled flyers. In 1919, America's Navy men fly the NC 4  
Across the Atlantic, followed soon by the Skyship, Alcock and Brown.

**Music:**

**Voice:** Man's oldest dream - the boldest challenge to his adventurous spirit.  
"God Josephine is My Loving Partner"

**Music:** How flourish the barnstormers. Ho-ho-yo yoo, looping curves away  
places, wing-walk at county fairs and pilot sight-seeing trips over  
the country-side.

**Voice:** Through four centuries he sought to make this dream come true.

**Music:** "Daisy, Daisy"

**Music:** "Spirit of Air" Wrights

**Voice:** And come true it did. December, 1903, a man with wings flies 120 ft.  
Wilbur and Orville Wright inaugurate an industry destined to build a  
new world.

**Music:** Pause "Sidewalks" Curtiss

Seven years pass. Glenn Curtiss flies from Albany to New York. "Just  
another daring stunt", says a skeptic world. Actually the toddling  
step of the new industry.

The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	MoMA Exhs.	236.3

- 2 -

- 3 -

Music: "Over There"

Music: World War  
The World War! The frail "crates" available are used for observation  
The National Advisory Committee for Aeronautics, the airlines and  
purposes--  
manufacturers write in research. Wind tunnels mount full-size planes.

Music: Laboratories by the score, technical experts by the thousand are at  
Under war-time pressure, swifter planes of easy control are designed  
as real "warships of the air".

Music:

Battle Sounds: Instruments  
Instruments by the hundred, of super-human efficiency, aid the pilot.  
World War  
Amid the crash and roar of the old Western Front Aviation sweeps to  
first place as a military weapon. Peaceful uses are, as yet, undreamed of.

Music:

"Solid" or "slide" of the plane and the "Cypripilot" holds it to its  
course without human help. NC 4 & A.B.  
The speed of war days now falters to a walk. Long-distance flights

Music:

engage the skilled flyers. In 1919, America's Navy men fly the NC 4  
Across the Atlantic, followed soon by the Englishmen, Alcock and Brown.

Music: "Come Josephine in My Flying Machine"

real efficiency. The Federal Government by all-level meteorology and  
two-way radio controls every plane movement. Barnstormers  
Now flourish the barnstormers. Ex-army pilots, buying surplus army  
to see modern aviation in action.  
planes, wing-walk at county fairs and pilot sight-seeing trips over

Music:

the country-side.

Music: "Fairest of Fair"

Private Flying  
Here we see private flyers of America! 10,000 planes, 11,000 civilian  
pilots, nearly 1,000 of them women.

Music:

Lindbergh  
In 1927, the solo flight from New York to Paris of Charles A. Lindbergh,  
writes his name in Aviation's Hall of Fame, electrifies the world with  
a vision of a winged future.

Music:

Flying and gliding clubs dot the country and the pooling of experience,  
makes widely available this new thrill of "flight". Boon and Factories  
The boon that follows is without parallel in the history of human  
progress. Early factories, in remodelled barns, develop into great  
industrial centers, (producing planes with the speed and precision of  
the best American tradition.) Engines leap from 4 cylinders to 24, horse  
powers, from 25 to 2500, (weighing only one pound per horse power.)

The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	MoMA Exhs.	236.3

- 3 -

Music: "El Cantor"  
Music:

Research  
The National Advisory Committee for Aeronautics, the airlines and  
manufacturers unite in research. Wind tunnels mount full-size planes.  
Laboratories by the score, technical experts by the thousand are at  
work on the planes of tomorrow.

Music: Instruments

Instruments by the hundred, of super-human efficiency, aid the pilot.

Music: (Solo)

The "radio beam", by clear sound signals, directs him, even through  
fog, into his home port. The artificial horizon shows the "bank",  
"climb" or "glide" of the plane and the "gyropilot" holds it to its  
course without human help.

Music:

Music: (Army Air Corps March)

Airports

Modern airports, like La Guardia Field, just a mile from here, hum with  
real efficiency. The Federal Government by all-level meteorology and  
of college training. In a 3-month course at a privately-owned school  
two-way radio controls every plane movement. Visit La Guardia Field,  
to see modern aviation in action.

Music:

go four times a year.

Private Flying

Here we see private flyers of America! 10,000 planes, 11,000 civilian  
pilots, nearly 1,000 of them women.

Music:

Gliding in motorless "sailplanes" now counts enthusiasts by the thousand.  
Flying and gliding clubs dot the country and the pooling of expenses,  
makes widely available this new thrill of "riding the winds".

Music:

U. S. Navy  
The Navy has her air station at Pensacola. Fledgling youths by rigorous  
training become brave "Sea O'ber Birds". Proud in the Navy of its air-  
craft carriers, sea-going airports with landing, take-off, and servicing  
facilities in skillfully condensed form.

The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	MoMA Exhs.	236.3

- 4 -

Music: "El Capitan"

National Defense, foreign  
Once again the air forces of all front-rank nations are engaged in problems of aerial defense. England has her Bristol-Blenheims as bombers: Lysanders and Hawker-Hurricanes for pursuit and combat: France her Breguets and Italy her Savoia-Machettis: Germany her Heinkel bombers: her Junkers as "Stukas" for dive-bombing, her Messerschmitts for pursuit.

Music: "Walls of Babylon"

Music: (Bugles)

U. S. Army  
The Army Air Corps is an acknowledged leader in trim design and efficient performance of their "Battle wagons of the blue". Streamlined, super-efficient war planes. Colossal, speedy bombers, agile combat planes, wasp-like "interceptors" equip the Army for any type of aerial combat.

Music:

Music: (Army Air Corps March)

Army Training  
Army pilots must be young men, near perfect physically, with two years of college training. In a 3-months course at a privately-owned school of aviation they learn to fly. Then follows a second 3-months of "Basic Training" at Randolph Field, Groups of half a thousand come and go four times a year.

Music:

Music:

The successful ones progress to Kelly Field for a final 3-months of advanced practice. Then only are they trained pilots. From the top flight graduates of such training courses come the pilots of the commercial airlines.

Music:

Music: "Anchors Aweigh"

U. S. Navy  
The Navy has her Air Station at Pensacola. Picked youths by rigorous training become human "Men O'War Birds". Proud is the Navy of its aircraft carriers, sea-going airports with landing, take-off, and servicing facilities in skillfully condensed form.

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	MoMA Exhs.	236.3

- 5 -

Music:

The Navy can boast of its patrol planes, and of those specially designed as "dive bombers". A naval patrol can spot and destroy underwater craft of the enemy or they can lay smoke screens to protect their sister ships on the surface from either underwater or surface attackers.

Music:

"Halls of Montezuma" a day of valuable time.

Marines & Coast Guard

The Marines now make their patrols by plane. The Coast Guard intercept contraband and make thrilling rescues from ships far at sea. Enormously over the seas all continents are now reached by the airplanes of the Navy. The popular Clipper ships serve 65 other countries or colonies.

Music:

60 passengers over a range of 3000 miles

Air Mail

The "Air Mail" began in 1918 with short day-time routes. Now on the wings of commercial companies, it flies by day and night with a regularity that rivals the sun. Now serve all of Latin America. Westward they open the Pacific to Hawaii,

Music:

The Philippines, the Orient, - and Australia. Ground Schools C.A.A. Colleges Training in the special skills, required by the air services, calls for a new type of school, solely technical and geared to high speed efficiency.

Music:

And well must this teaching be done. Human lives and valuable property can depend upon proper inspection of a pipeline as well as upon the skill of the pilot!

Music:

Moreover, nearly 500 American colleges are at work on a program to produce, by 1945, 100,000 licensed pilots with college training.

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	MoMA Exhs.	236.3

Music:

Airlines, domestic  
America's Airlines now provide a network of routes that reach any part of the country with speedy regular service. are 18 to 20 ground employees

Music:

for every flight crew member. After every trip every part of plane and engine is given its separate microscopic examination. Finally, the Many inter-city trips are scheduled in minutes when only yesterday engine is torn down, inspected and rebuilt, after only 300 hours of they consumed half a day of valuable time. service in the air.

Music:

(Hawaiian)  
Airlines, Intercont.  
Over the seas all continents are now reached by the airlines of America. The popular Clipper Ships serve 55 other countries or colonies, - number is the perfect record of American air passenger service for the Giant aircraft, they speed at 300 m.p.h., carrying 5 tons of cargo and 60 passengers! over a range of 3000 miles!

Music:

See us fly  
Millions say it is a delight to fly. Reports prove it was to fly and Cruising high over the trade routes of Old Spain, our Flying Clippers "All Stars to Fly". The cost of air travel is now within the range of now serve all of Latin America. Westward they span the Pacific to Hawaii, nearly across. Fascinating vacation spots, new business opportunities the Phillipines, the Orient, - and Australasia. Northward they speed are within sight reach than ever before, with total pleasure and across Alaska. They bridge the Atlantic. Under their magnificent turbines an extra dividend to every investor in rapid transportation. serial strides, the world shrinks to one-sixth its former size.

Music:

Advantages of Air Travel  
Wherever you fly, America's air services provide a wealth of interest and advantages unapproached by other means of transport. The magnificent scenic views, the superb comfort of sound-proof cabins, the delightful and complimentary meals are but a few of the highlights. The delicate guest relationship maintained by the trained steward or hostess adds the last touch to this unique experience in modern transportation.

Music:

all airlines crossed the ocean route. They were the carriers of history explorers and those of commerce, civilization and culture to the people

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	MoMA Exhs.	236.3

- 7 -

Music:

to the far corners of the world. In the construction of Maintenance, etc.  
And guarding you every minute you are aloft is a system of inspection  
unapproached by any other industry. There are 15 to 20 ground employees  
for every flight crew member. After every trip every part of plane and  
engine is given its separate microscopic examination. Finally, the  
engine is torn down, inspected and rebuilt, after only 500 hours of  
service in the air.

Music:

Exhibit of 1943 are the standard bearers for Safety Record  
A year of operation without a single fatality to passenger or crew  
member is the perfect record of American air passenger service for the  
twelve months just passed.

Music:

They make us say safely leave our hopes for the Pays to Fly  
Millions say it is a delight to fly. Records prove it safe to fly and  
"it Pays to Fly". The cost of air travel is now within the means of  
nearly everyone. Fascinating vacation spots, new business opportunities  
are within easier reach than ever before, with novel pleasures and  
luxuries as extra dividends to every investment in winged transportation.

Music: "Stars and Stripes"

What lies ahead no man can foresee, but research is reaching out to  
meet demands yet to come. Indeed, we may look to the future with  
confidence that Aviation will meet all requirements of the New Age of  
the Air.

Music:

In the earlier days of civilization the wind-driven sailing ships of  
all nations covered the seven seas. They were the carriers of daring  
explorers and then of commerce, civilization and culture to the peoples

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	MoMA Exhs.	236.3

- 8 -

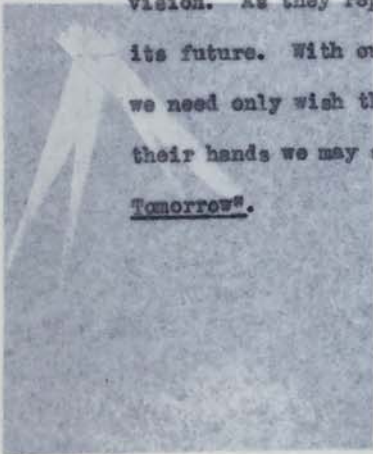
## Board of Missions

in the far corners of the world. So in the coming Age of Flying we shall see the ocean of the air traversed in all directions by flying craft carrying those who fly for pleasure or to advance the commerce of the world.

Music:

# LINDBERGH!

With the Aviation Industry of America rests our part in the fulfillment of this dream of a glorious future. The sponsors of the Aviation Exhibit of 1940 are the standard bearers for America in realizing this vision. As they represent the industry of today so will they control its future. With our compliments upon the marvelous work already done we need only wish them comparable success in the years just ahead. In their hands we may safely leave out hopes for the "Winged America of Tomorrow".



And out of the night came a silver bird bearing a boy who carried letters of introductions to Paris.

July 11, 1940

I enclose you with the "Winged America of Tomorrow" and if needed. This is approximately 100 inches high. Pictures for public press.

By nationality and designation Lindbergh's heroism our respect to you and the public.

Very truly yours,

By truly yours,

Enclaves to Robert James Nelson  
Executive of Museum of Modern Art  
111 West 57th Street, Philadelphia, Pa.  
(Copyright)

Compliments of  
THE HELPER, 212 Chestnut Street,  
PHILADELPHIA, PA.

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REV. PAUL SPERRY, PRESIDENT  
1824 PARK ROAD  
WASHINGTON, D. C.

PHILIP M. ALDEN  
VICE-PRESIDENT  
807 N. CHESTER ROAD  
SWARTHMORE, PA.

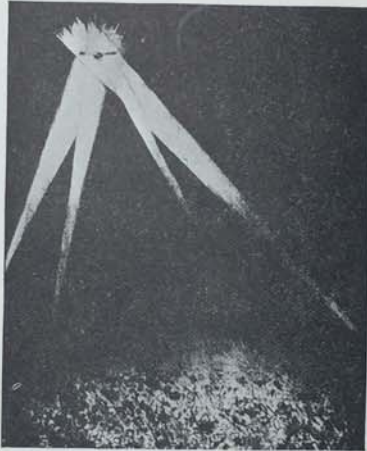
REV. LESLIE MARSHALL  
GENERAL SECRETARY  
380 VAN HOUTEN ST.  
PATERSON, N. J.

CHESTER T. COOK, TREASURER  
73 COLUMBIA ROAD  
ARLINGTON, MASS.

Board of Missions

# LINDBERGH!

1943



And out of the night came a silver bird bearing a boy who carried letters of introductions to Paris.

Etching by Robert James Malone

Courtesy of McClees Galleries  
1507 Walnut Street, Philadelphia, Pa.  
(Copyright)

Compliments of

THE HELPER, 2129 Chestnut Street,  
PHILADELPHIA, PA.

Manager  
Museum  
New York

Dear Sir

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*Marshall*

1943

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1624 PARK ROAD  
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PHILIP M. ALDEN

## Board of Missions

### FIRST HEAVIER THAN AIR CRAFT DESIGN

Since Charles A. Lindbergh's epoch-making feat of flying across the Atlantic, without pause or mishap, in thirty-three hours, the "conquest of the air" has been the topic of the day, and one hears on every side, "Will wonders never cease."

Lindbergh, it may be noted, is descended on his father's side from a distinguished Swedish family, and his paternal grandfather was a member of the Swedish parliament. Lindbergh's father was formerly a member of the Minnesota House of Representatives. All this is of no little interest to those familiar with the works of Swedenborg (1688-1772)—considered by many to be one of the two or three great world-geniuses of any age. And more particularly so by reason of the fact that it is almost exactly 200 years since the Swedish scientist and prophet gave to the world the first particularized draft for an airplane; said to be the oldest conception extant.

Leonardo Da Vinci is credited with having made a plan of a mechanical flying carriage, and, going back to the days of antiquity, tradition has it that the mathematician Arcytas of Tarentum, 400 years before the Christian era, "took off" one day in a contraption propelled and sustained by "hidden and enclosed air."

According to F. A. Waterhouse, writing in the *New-Church League Journal* for January, 1910, Swedenborg's draft in some respects resembled what would be a plan for a Bleriot or Latham plane. It was to be "... driven forward by wings, but the lifting power was to be generated by the resistance offered to the wind by the concave surface of the supporting planes. In a word, the wings of Swedenborg's machine were to do precisely the work accomplished by the propeller of the modern aeroplanes.

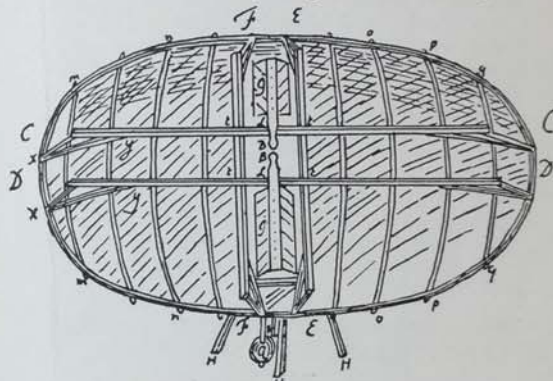
"Swedenborg's machine," Mr. Waterhouse continues, "has no tail, but at either side of the car are placed wings to be worked up and down by huge springs. The entire machine rests on a tripod fitted with wheels or rollers. To quote Swedenborg, 'A machine such as this one, with only a moderate propelling force, can be made to go when there is a strong wind, otherwise it will remain quiet.'"

Mr. Waterhouse deduced that whereas Swedenborg's conception of an airplane was by no means a perfect one, "... the fundamental theory on which the airplane rests is entirely correct; for modern aviators have demonstrated beyond doubt that in heavier-than-air machines the supporting surface must be rigid, and that planes similar to the wings of a bird are impracticable. Had Swedenborg lived in these days of the perfected gasoline motor, there

is little doubt that he would have designed the first successful flying machines," (as Mr. Waterhouse concludes.)

Swedenborg's anticipation of the flying machine, successfully piloted two hundred years later by the youthful and courageous Lindbergh, once more demonstrates the basic truth that the ideas of the Creator are necessarily infinite, and ever expressed, and that they make themselves manifest for man's use only as he is prepared to receive them and use them.

LESLIE MARSHALL,  
Contributing Editor, *The Helper*.



SWEDENBORG'S AIRPLANE DRAWING  
RECOGNITION IN "A HISTORY OF  
AERONAUTICS"

"The eighteenth century was almost barren of experiment. Emanuel Swedenborg, having invented a new religion, set about inventing a flying machine, and succeeded theoretically, publishing the result of his investigation as follows:

'Let a car or boat or some like object be made of light material such as cork or bark, with a room within it for the operator. Secondly, in front as well as behind, or all around, set a widely-stretched sail parallel to the machine, forming a ship. Thirdly, place wings on the sides, to be worked up and down by a spiral spring, these wings also to be hollow below in order to increase the force and velocity, take in the air, and make the resistance as great as may be required. These, too, should be of light material and of sufficient size; they should be in the shape of birds' wings, or the sails of a windmill, or some such shape, and should be tilted obliquely upwards, and made so as to collapse on the upward stroke and expand on the downward. Fourth, place a balance or beam below, hanging down perpendicularly for some distance with a small weight attached to its end, pendent exactly in line with the centre

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## Board of Missions

of gravity; the longer this beam is, the lighter must it be, for it must have the same proportions as the well-known vectis or steeple-yard. This would serve to restore the balance of the machine if it should lean over to any of the four sides. Fifthly, the wings would perhaps have greater force, so as to increase the resistance and make the flight easier, if a hood or shield were placed over them, as is the case with certain insects. Sixthly, when the sails are expanded so as to occupy a great surface and much air, with a balance keeping them horizontal, only a small force would be needed to move the machine back and forth in a circle, and up and down. And, after it has gained momentum to move slowly upwards, a slight movement and an even bearing would keep it balanced in the air and would determine its direction at will.

"The only point in this worthy of any note is the first device for maintaining stability automatically—Swedenborg certainly scored a point there. For the rest, his theory was but theory, incapable of being put to practice—he does not appear to have made any attempt at advance beyond the mere suggestion."

(Extract from "A History of Aeronautics" by E. C. VIVIAN and W. LOCKWOOD MARSH, London, England.)

### THE AERO-TRANSPORTATION CONFERENCE HEARS ABOUT SWEDENBORG

The Engineers Club of Philadelphia a short while ago held a conference on "Aero-Transportation, Its Present Status and Its Future Possibilities."

The President of the Club, Clayton W. Pike, in introducing the subject, said that air navigation had occupied the thought of wise men since the beginning of civilization.

Naming the individuals who had investigated and contributed something to the subject, he came to the time and mentioned the name of Leonardo da Vinci (1690-1732.)

Then he added: "And Emanuel Swedenborg, too, whom we know as a religious leader."

Although we had been well aware that the illustrious Seer of the North had included (in the many subjects about which he had written) a treatise upon air-flying devices, we were much surprised to hear this public recognition of the fact before a very large company of distinguished engineers and aeronauts, including Sir Sefton Brancker, Air Vice-Marshal of Great Britain, who was the guest of honor. (Dinner, Bellevue-Stratford Hotel, Philadelphia, Pennsylvania, March 16, 1926.)

It is worthy of note that the two renowned sages of Europe, da Vinci and Swedenborg, have been mentioned recently in "The (Cleveland, O.) Plain Dealer."

We congratulate our Exchange Editor upon his success in this kind of a "campaign of education."  
—The Helper Editor.

(Printed also in *The Helper*, Vol. 77: No. 17)  
(Continued in *The Helper*)

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*Marshall*

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**Board of Missions**  
of the  
**New Jerusalem Church**  
in the United States of America  
(Swedenborgian)

July 12, 1943

July 23, 1943

Dear Sir:

May we have a reply to our  
letter of July 12?

Sincerely yours,

*L. Marshall*  
LESLIE MARSHALL  
380 VAN HOUTEN ST.  
PATERSON, N. J.

As there is a link by nationality and occupation  
at least, between Swedenborg and Lindbergh's forebears our  
suggested display might be of interest to you and the public.

We shall be glad to hear from you.

Very truly yours,

*Leslie Marshall*

Enc.

JUL 14 1943

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**Board of Missions**  
of the  
**New Jerusalem Church**  
in the United States of America  
(Swedenborgian)

July 12, 1943

Manager  
Museum of Modern Art  
New York, N. Y.

Dear Sir:

We regret to learn that in your very interesting display of sketches and models of "airships" from early times to date, that the invention of Emanuel Swedenborg, the noted eighteenth century scientist and philosopher, is not represented.

We shall be happy to supply you with photographs of Swedenborg's "flying machine" and if desired will loan you a display model. This is approximately twenty-eight inches wide and twenty inches high. Pictures of it have sometimes appeared in the public press.

As there is a link by nationality and occupation at least, between Swedenborg and Lindbergh's forebears our suggested display might be of interest to you and the public.

We shall be glad to hear from you.

Very truly yours,

*Leslie Marshall*

Enc.

JUL 14 1943

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THE GLENN L. MARTIN COMPANY

BALTIMORE

AIRWAYS  
NEW JERUSALEM CHURCH  
re Swedenborg's  
"flying machine"

August 12, 1943.

Dear Dr. Marshall:

Mr. Wheeler has just left for Chicago, but he asked me to let you know that he has considered very carefully your suggestion that a model of Swedenborg's "flying machine" be added to the Museum's current exhibition, Airways to Peace. Unfortunately, Mr. Wheeler has not been able to find space for the model, and regrets very much that he cannot take advantage of your very kind offer to lend it to the exhibition. He wished me to assure you, however, that he deeply appreciates your courtesy and thoughtfulness in this connection and only wishes that space were available.

With renewed thanks I am

Very truly yours,

Assistant to Mr. Wheeler

Reverend Leslie Marshall  
380 Van Houten St.  
Paterson, N. J.

CH:lf

THE MUSEUM OF MODERN ART

Re: Body material  
Date: June 17, 1943

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THE GLENN L. MARTIN COMPANY  
BALTIMORE

Glenn Martin  
A top?

THE MUSEUM OF MODERN ART

Exhibition Museum  
of Modern Exhibit  
11 West 53rd St.  
New York, New York

Date June 17, 1943

To: Mrs. Newhall

Re: Brady material

From: Mr. Wheeler per Mrs. Hartman of the Martin Co.

We hope they will be suitable for your purpose.

Thanks so much for the Brady material. Mr. Wheeler has kept one negative and one print, and herewith returns the rest.

*Edmund Caster*  
Edmund Caster  
Public Relations Department.

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THE GLENN L. MARTIN COMPANY  
BALTIMORE

June 21, 1943

Mr. Monroe Wheeler  
Director, Exhibition Museum  
of Modern Exhibit  
11 West 53rd St.  
New York, New York

Dear Mr. Wheeler:

In reply to request received from you, we are enclosing  
herewith several photographs of the Martin Mars.

We hope they will be suitable for your purpose.

Sincerely,

Edmund Coster  
Public Relations Department.

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Glenn Martin  
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Gardner -  
Inst. of Aeronautical  
Sciences  
AIRWAYS

August 25, 1943

July 20, 1943

Major Lester D. Gardner  
The Institute of the  
Aeronautical Sciences have returned to you some  
30 Rockefeller Plaza very kindly lent to Mr. Wheeler  
New York, New York of our current exhibition,  
AIRWAYS TO PEACE. This material was most helpful.

Dear Major Gardner: see once more our thanks for  
your kind cooperation.

I want you to know how very greatly we appreciate the  
wonderful cooperation extended by the Institute of the  
Aeronautical Sciences to the Museum of Modern Art in  
the assembling of the AIRWAYS TO PEACE exhibition. We  
should never have been able to present the section on  
the development of flight so well without your gener-  
osity in lending us material from your files. Your  
model of the Kitty Hawk looks extremely well in the case  
which we built for it, and it has been much admired.

As far as possible, we followed your suggestion that we  
emphasize American achievement in aviation history. The  
exhibition is proving exceedingly popular, and has  
evoked great approval and response from educators in  
particular. We are making every effort to keep the show  
up to date.

With renewed thanks for your very kind collaboration,  
I am

Sincerely yours,

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MARTIN  
AIRWAYS

(Mars)

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MR. MONROE WHEELER  
THE MUSEUM OF MODERN ART  
11 WEST 53RD STREET  
NEW YORK, NEW YORK

Gentlemen:

Under separate cover we have returned to you some photographs which you very kindly lent to Mr. Wheeler during the preparation of our current exhibition, AIRWAYS TO PEACE. This material was most helpful, and we wish to express once more our thanks for your kind cooperation.

IF AT ANY TIME YOU WISH TO BORROW OTHER PARTS OF OUR COLLECTIONS, PLEASE LET ME KNOW.

Very sincerely yours,  
  
Sincerely yours,  
(Mrs. C. S. Hartman)  
Assistant to Mr. Wheeler

Glenn L. Martin Company PRESIDENT  
Baltimore  
Maryland

CH:mjm

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JULY 23, 1943

MR. MONROE WHEELER  
THE MUSEUM OF MODERN ART  
11 WEST 53RD STREET  
NEW YORK, NEW YORK

DEAR MR. WHEELER:

THANK YOU FOR YOUR COURTEOUS LETTER OF JULY TWENTIETH. WE ARE GLAD THAT WE COULD BE OF SOME ASSISTANCE WITH YOUR EXHIBIT.

IF AT ANY TIME YOU WISH TO BORROW OTHER PARTS OF OUR COLLECTIONS, PLEASE LET ME KNOW.

SINCERELY YOURS,

PRESIDENT

LDG:MR

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MR. MONROE WHEELER  
THE MUSEUM OF MODERN ART  
11 WEST 53RD STREET  
NEW YORK, NEW YORK

DEAR MR. WHEELER:

I HAVE BEEN RATHER EXPECTING A LETTER FROM YOU ABOUT THE MISUSE OF THE PHOTOSTAT WE LOANED YOU WHICH WAS USED BY "TIME" ON PAGE 55 OF THE JULY 26TH ISSUE.

AS I TOLD YOU WHEN YOU CAME TO SEE ME AT MR. BURDEN'S SUGGESTION WE ALMOST INVARIABLY HAVE HAD UNFORTUNATE AFTERMATHS WHEN WE LOANED MATERIAL FOR EXHIBITION PURPOSES BUT AS THE MUSEUM OF MODERN ART HAD BEEN HELPFUL TO US AT THE SUGGESTION OF MR. ARTHUR PACKARD, WE SAID WE WOULD LET YOU HAVE WHAT YOU WANTED INCLUDING OUR MOST PRIZED MODEL "THE WRIGHT FLYER".

NOW WE READ IN "TIME" THAT PROFESSOR HARRIMAN'S FLYING MACHINE PICTURE (A CIRCUS POSTER) HANGS IN THE MUSEUM OF MODERN ART, A PART OF A "BRILLIANT EDUCATIONAL EXHIBIT" AND THAT THE MUSEUM "HAS ABSOLUTELY NO INFORMATION" ABOUT IT.

I PROBABLY WOULD HAVE FORGOTTEN THE MATTER BUT I AM DISTURBED OVER POSSIBLE COPYRIGHT COMPLICATIONS. WE NEVER LOAN MATERIAL FOR REPRODUCTION FOR FEAR OF THIS COMPLICATION.

THE POSTER WAS PURCHASED SOME YEARS AGO FOR \$100 FROM THE ARTIST E.P. ROE. FROM THE CIRCUS TENT BELOW THE PICTURE IT IS OBVIOUS THAT IT WAS A FANTASTIC CIRCUS IDEA LIKE THE DIME NOVEL COVERS. ON THE POSTER IS PRINTED "S. H. BARRETT AND Co's. NEW UNITED MONSTER RAIL-ROAD SHOWS" AND "POSTER MADE BY STROBRIDGE LITHO Co., CINCINNATI, OHIO".

A CINCINNATI MUSEUM HAS A COPY ALSO AND I FEAR THAT THEY MAY WRITE ONE OF THOSE FLIP LETTERS TO "TIME". WE CERTAINLY DO NOT WISH TO CORRECT THE ERRORS AS I HAVE ALWAYS FOUND THAT "THE DENIAL NEVER CATCHES UP".

I KNOW THAT YOU WILL REGRET THE MISUSE OF THIS PICTURE AS MUCH AS WE DO. I HAVE MADE OUR APOLOGIES TO OUR GENEROUS FRIEND MRS. LANDAUER.

SINCERELY YOURS,

*Lester D. Gardner*

PRESIDENT

LDG:MR

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Gardner Aeronautical  
Inst. of Aeronautical  
Sciences  
AIRWAYS

August 5, 1943.

August 12, 1943

Dear Major Gardner:

I am indeed exceedingly distressed at the error which appeared in Time Magazine regarding the E. P. Roe drawing of Professor Harriman's flying machine.

Time Magazine called on a weekend when there was no one here to give them specific information, and the Publicity Department had only the information which appeared on the back of the photograph which you had lent to us. Mrs. Landauer has since given us the correct data for the picture. We are taking especial care in the Bulletin we are issuing on Airways to Peace to see that proper credits are given to the Institute for the valuable cooperation you have given us.

We have also conveyed our apologies to Mrs. Landauer, who says she understands how the error regarding the Roe picture occurred. I regret very much the error which has occurred.

With renewed thanks for your great assistance.

Very sincerely yours,

(Mr. G. E. Hartman)  
Assistant to Mr. Gardner

Major Lester D. Gardner, President  
Aeronautical Archives of the  
Institute of the Aeronautical Sciences  
30 Rockefeller Plaza  
New York 20, N. Y.

MW:lf

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August 23, 1943.

Mr. L.D. Hartman  
The Museum of Modern Art  
11 West 53rd Street  
New York, New York

August 18, 1943

Dear Mrs. Hartman:

We have received several of our photostats which were loaned to The Museum.

Major Lester D. Gardner  
The Institute of the Aeronautical Sciences  
30 Rockefeller Plaza  
New York, New York

My dear Major Gardner:

Sincerely yours,

Mr. Wheeler has been in Chicago during the past week, but before he left he asked that I return to the Institute, with his profound thanks, material on the development of aviation which you very kindly lent him while he was preparing the AIRWAYS TO PEACE exhibition. Mr. Wheeler found this material invaluable to him in his research and wished me to express his gratitude to you once more. I trust that you have received, under separate cover, these photographs and photostats.

Very truly yours,

(Mrs. C. S. Hartman)  
Assistant to Mr. Wheeler

CCH:cv

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E. E. Wilson

August 23, 1943.

Mrs. C.S. Hartman  
The Museum of Modern Art  
11 West 53rd Street  
New York, New York.

Dear Mrs. Hartman:

We have received several of our photostats which were loaned to The Museum.

On June 21st Mr. Keller borrowed positive photostats of The Aeronauts and the Wright airplane of 1903. These two have not been returned.

Sincerely yours,

Lester D. Gardner  
President

LDG:mhs

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MW

Gardner  
Inst. of Aeronautics  
Science  
AIRWAYS

September 2, 1943

Major Lester D. Gardner  
The Institute of the Aeronautical Sciences  
30 Rockefeller Plaza  
New York, New York

My dear Major Gardner:

Upon receipt of your letter concerning the material which the Museum borrowed during the preparation of our AIRWAYS TO PEACE exhibition, I investigated the matter of our not having returned the Wright Brothers' Kitty Hawk photograph and that of "The Aeronauts." I am returning herewith the former, but in connection with the latter, Mr. Keller tells me that it was the Andrews "Aereon," which I believe was included. If we can be of any further assistance, however, please let us know.

Very truly yours,

(Mrs. C. S. Hartman)  
Assistant to Mr. Wheeler

352-400

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	MoMA Exhs.	236.3

Inst of Aeronautical  
Sciences

19

AIRWAYS

July 27, 1943  
November 5, 1943

Dear Mr. Conning:

I acknowledge with very warm thanks the receipt of the several  
Also Major Lester D. Gardner  
Institute of the Aeronautical Sciences  
30 Rockefeller Plaza  
New York 20, New York

Dear Major Gardner:

We have returned to you the models listed on the  
enclosed receipt and we should be very grateful in-  
deed if you will sign it properly and return it to  
us in the enclosed envelope.

May I take this opportunity to thank you for your  
generosity in lending these models to us for the  
AIRWAYS TO PEACE exhibition.

Very sincerely yours,

MW:hw

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	MoMA Exhs.	236.3

*Airways to Peace*

*Miss [unclear]*

These cards let us compliment you on the excellence of your exhibit and  
hope as always to this exhibit which the "Airways" have and will people will receive  
a vivid explanation of what they may look forward to in aviation in the post-war  
era.

Very truly yours

July 27, 1943

GENERAL AIRCRAFT CORPORATION

Dear Mr. Geuting:

*Joseph T. Geuting, Jr.*

I acknowledge with many thanks the photograph of the General  
Aircraft Skyfarer, which you were kind enough to send me for  
possible inclusion in our current exhibition Airways to Peace.  
The section on the development of flight was not intended  
to be at all comprehensive but merely indicative of the  
swift progress which had been made throughout the centuries.  
Out of nearly 2,000 pictures our selection was limited to  
about 50. I am keeping the photograph in hopes that we may  
be able to find a way of including it in its proper sequence.  
Meanwhile, let me thank you again for your kind remarks  
about the exhibition which is meeting with great success, and  
which will, I am sure, go far toward orienting the layman to  
this new air age.

Very sincerely yours,

Mr. Joseph T. Geuting, Jr.  
General Aircraft Corporation  
43-02 Ditmars Boulevard  
Astoria, L. I., N. Y.

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	MoMA Exhs.	236.3

GENERAL AIRCRAFT CORPORATION

-2-

July 19, 1943

*Miss Asubina*

Once again let me compliment you on the excellence of your exhibit, I have no doubt as this travels about the country more and more people will receive a lucid explanation of what they may look forward to in aviation in the post-war era.

Very truly yours

GENERAL AIRCRAFT CORPORATION

*Joseph T. Geuting, Jr.*  
Joseph T. Geuting, Jr.,  
Vice-President

jtg/bk

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GENERAL AIRCRAFT CORPORATION

-2-

July 19, 1943

*Miss Hawkins*

Once again let me compliment you on the excellence of your exhibit, I have no doubt as this travels about the country more and more people will receive a lucid explanation of what they may look forward to in aviation in the post-war era.

Very truly yours

GENERAL AIRCRAFT CORPORATION

*Joseph T. Geuting, Jr.*  
Joseph T. Geuting, Jr.,  
Vice-President

jtg/bk

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GENERAL AIRCRAFT CORPORATION  
43-02 DITMARS BOULEVARD  
ASTORIA, L. I., N. Y.

July 19, 1943

Museum of Modern Art  
11 West 53rd. Street  
New York, N. Y.

Attention: Mr. Monroe Wheeler, Director of Exhibitions

Gentlemen:

It was my good fortune to view your very fine exhibition "Skyways to Peace" and I must compliment you on the excellence of the exhibit. This is particularly true of the various historical material which you have assembled and in your picturizations of the use of maps and the manner in which air travel is going to shrink the world and change the trade routes.

In the matter of historical material I should like to call your attention to an aircraft manufactured by this company known as the Skyfarer, a picture of which I am enclosing. This aircraft is notable in that it employs a revolutionary new patented method of flight which makes it possible to eliminate the rudder which is a part of the conventional aircraft. The elimination of the rudder also eliminates consequent rudder controls and, in aeronautical language the airplane is known as a "two-control" aircraft as compared with the standard "three-control" aircraft.

This simplification of flight control is accomplished by the use of aerodynamic forces and is not brought about by mechanical means, which has been done somewhat in the past, but with considerably less success. This aircraft has perfect flying characteristics and has been certified by the Civil Aeronautics Administration as being "Incapable of Spinning", which makes it an unusually safe aircraft. (Leighton Collins, an exponent of safety in flight and Editor of Air Facts Magazine, in a recent article indicated that approximately 70% of flying accidents come about as the result of a spin). Despite the elimination of one complete control there has been no sacrifice in necessary flight maneuverability.

It is our feeling that you would be interested in including a picture of this aircraft in your exhibit inasmuch as it not only has a certain historical value, because of its new and simplified flight control, but also because it is an aircraft which this company will produce in the post-war era and which will take its place on the "Skyways of Peace". I should also be glad to furnish you with a model of the aircraft should you find it useful.

Keep 'Em Flying!

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MW

AIRWAYS

**GENERAL AIRCRAFT CORPORATION**  
43-02 DITMARS BOULEVARD  
ASTORIA, L. I., N. Y.

July 30, 1943

Mr. Monroe Wheeler, Director of  
Exhibitions and Publications  
The Museum of Modern Art  
New York, N. Y.

Dear Mr. Wheeler:

Thank you so much for your letter of July twenty-seventh acknowledging receipt of the data on the Skyfarer. I note that you are keeping the photo in the hopes that you will be able to find a way of including it in its proper sequence.

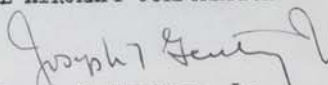
I certainly want to agree with you that the exhibition should go far towards orienting the layman to this new air age. The responsibility for keeping the Aircraft Industry a great one is more than the responsibility of just the Aircraft Industry itself, and it is heartening to representatives of the Industry to see outside groups take such an active interest in this important problem.

In truth, if the Aviation Industry were allowed to collapse after the war as it did after the World War, it could have very serious consequences on the pocketbooks of everyone of us because of the enormous size which it has now reached.

With my kind regards, I am,

Very truly yours

GENERAL AIRCRAFT CORPORATION

  
Joseph T. Geuting, Jr.,  
Vice-President

jtg/bk

Keep 'Em Flying!

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	MoMA Exhs.	236.3

SEP 22 1943

CHARLES PHILIP FOX  
MILWAUKEE

9/18/43

Museum of Modern Art  
New York, N.Y.

Gentlemen,

In the Art section of the July 26th issue of Time there appeared a picture of Professors Harriman's Flying Machine. The caption stated that you had absolutely no information on this Machine.

Perhaps what I have to offer may be of interest to you.

I have a collection of Circus Lithographs and noticed that this exact same picture is used on one of them, namely the S.H. Barrett Show.

This circus travelled as a railroad show from 1882 to 1888 at which time it was taken over by the Sells Bros.

I am enclosing a photograph of this poster for your perusal.

Sincerely

*C. P. Fox*

C.P. Fox  
Route 4  
Oconomowoc,  
Wisconsin

FOX  
P

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FOX  
A.D.P.

INSPECTION

Common sense, patience and good finger dexterity are requisites for inspection personnel and it is in this capacity that the Indian here again proved unusually capable. Former school teacher, fan of models, works conscientiously, with results, as the result of fairchild's...

**S.H. BARRETT & CO'S: NEW UNITED MONSTER RAIL-ROAD SHOWS.**



**FOREMOST IN THE RANK OF ENERGY AND ENTERPRISE. COMMANDING POPULAR FAVOR BY DESERVING IT. INTRODUCING THE MOST IMPRESSIVE ARRAY OF 100 PICKED ARTISTS. FROM THE FAMOUS HIPPHODROMES OF PARIS & MADRID, THE PRINCIPAL CIRCUSES OF AMERICA AND ENGLAND, AND FROM THE BEST SCHOOLS OF EQUESTRIANISM THE WORLD CAN PRODUCE.**

**THE COMING MODE OF TRAVEL. PROF. HARRIMAN'S STEAM AIR SHIP.**

**ORIENTAL CIRCUS, EGYPTIAN CARAVAN AND UNIVERSAL EXPOSITION & LIVING WONDERS.**

Mr. Charles Philip Fox  
Route 4  
Oconomowoc, Wisconsin

MMV:joc

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FOX

AWP

INSPECTION

Good sense, patience and good finger dexterity are requisites for inspection personnel and it is in this capacity that the ladies here again proved unusually capable. Former school teacher, fashion models, clerks.

C. P. Fox  
Route 4  
Oconomowoc,  
Wisconsin

Mr. Charles Philip Fox  
Route 4  
Oconomowoc, Wisconsin

MW:joc

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FOX  
AWP

... patience and good finger dexterity are requisites for  
inspection personnel and it is in this capacity that the ladies have been  
proved unusually capable. Former school teachers, fashion models, clerks,  
secretaries, waitresses, as the result of Fairchild training, have developed  
into competent inspectors of raw materials, fabricated parts, and finished  
products. They have become expert in the use of all kinds of testing  
and measuring equipment from micrometers to lens collimators and similar  
testing apparatus. About 80% of all inspectors are women.

September 28, 1943

Dear Mr. Fox:

I want to thank you for your kind letter about the  
lithograph of Professor Harriman's Flying Machine,  
which appeared in Time Magazine in connection with  
our Airways to Peace exhibition. We are delighted  
to have the photograph you sent of the original  
poster.

Actually, we did have more information than Time re-  
vealed, but they called our Publicity Department on  
a Saturday afternoon when no one was in that office.  
The lithograph was made by E. P. Roe. I enclose  
herewith a Bulletin of our Airways to Peace exhibi-  
tion in which you will see it reproduced again.

With many thanks for your courtesy and interest, I  
am

Very sincerely yours,

Mr. Charles Philip Fox  
Route 4  
Oconomowoc, Wisconsin

MW:joc

The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	MoMA Exhs.	236.3

INSPECTION

Common sense, patience and good finger dexterity are requisites for inspection personnel and it is in this capacity that the ladies have again proved unusually capable. Former school teachers, fashion models, clerks, housewives, waitresses, as the result of Fairchild training, have developed into competent inspectors of raw materials, fabricated parts, and finished products. They have become experienced in the use of all kinds of testing and measuring equipment from micrometers to lens collimators and shutter testing apparatus. About 30% of all inspection personnel are women.

A graduate in fine arts from Pratt Institute, Harriet Stair gave up her job as school teacher, when the war began to train herself for war industry work. She took a special month's course at Delehanty in bench assembly and inspection. At Fairchild she was trained to operate a Rockwell Hardness Tester. No camera or instrument part subject to great strains or stresses escapes this test.

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AIRWAYS

FAIRCHILD AVIATION CORPORATION

88-06 VAN WYCK BOULEVARD, JAMAICA, N.Y.

ADDRESS REPLY TO:  
475 TENTH AVENUE  
NEW YORK CITY

April 21, 1943.

Mr. Monroe Wheeler,  
Museum of Modern Art,  
11 West 53 St.,  
New York, N.Y.

Dear Mr. Wheeler:-

At the suggestion of Mrs. Newhall I am pleased to enclose herewith an 8x10 print of the picture selected, from my portfolio of the "Women at Fairchild Aviation Corporation".

When you are ready for it, I shall be glad to send you an 11 x 14, or 16 x 20 print of this picture.

Attached is the caption which we used.

If I can be of any further service, please do not hesitate to let me know.

Sincerely yours,

*Lee Novogrod Burrows*  
Lee Novogrod Burrows

Enc. 1 print.

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*Mr. Keller*



FAIRCHILD AERIAL SURVEYS, INC.  
21-21 FORTY-FIRST AVENUE, LONG ISLAND CITY, N. Y.

TELEPHONE: STILLWELL 4-4630  
CABLE ADDRESS: "FAIRMAP N. Y."

July 7, 1943

Museum of Modern Art  
11 West 53rd Street  
New York, N. Y.

Attention Miss Catherine Weinstein

Gentlemen:

With reference to the 14 aerial photographs which you secured from our files on consignment on June 15, we are writing to inquire if you desire to keep these views so that we may invoice you accordingly and make up new prints for our files.

The favor of your early reply will be appreciated.

Yours very truly,

FAIRCHILD AERIAL SURVEYS, INC.

*R. S. Eldon*  
R. S. Eldon 2nd

RCE:EW

WARNING

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FROM  
**EASTMAN KODAK COMPANY**  
ROCHESTER, N. Y.

INVOICE NO. **0 45178** CK  
YOUR ORDER NO. **C 815**

CONTENTS—MERCHANDISE—POST-MASTER: This package may be opened for postal inspection if necessary. If not delivered notify us, giving Invoice No. Forwarding or return postage guaranteed.

**SIKORSKY AIRCRAFT**  
SOUTH AVE  
BRIDGEPORT CONNECTICUT

*Bray at Metals*  
**T CORPORATION**  
WOOD AVENUE  
BALO, N.Y.  
*14 - airplanes*  
**AIRWAYS**  
JULY 6, 1943

MJR 8 3 18 43 MISC

PARTIAL SHIPMENT

PUR REQ NO 160571  
VS-300 FILM

16 1/2 KODACHROME DUPLICATE

AA-1 PRIORITY

PACKING MEMO

**WARNING**

Small articles are sometimes overlooked in unpacking goods. Please examine the packing material carefully before discarding it.

IN CASE OF ERROR PLEASE RETURN THIS PACKING MEMORANDUM TO EASTMAN KODAK COMPANY, ROCHESTER, N. Y.

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**BELL AIRCRAFT CORPORATION**

2050 ELMWOOD AVENUE  
SUFFALO, N.Y.

*Bronzart Metals  
re - airplanes  
AIRWAYS*

July 8, 1943

June 22, 1943

Mr. Allen Porter  
The Museum of Modern Art Film Library  
22 West 53rd. Street  
New York, Mr. Joseph A. Allegro, President  
Bronzart Metals Company  
129 Grand Avenue

*Aviation Magazine  
3 photos -  
Northrup planes -*

*Check up -  
to return if not*

*in use -*

... telephone conversation, I am writing  
courtesy of your collaboration upon the  
TO PEACE, which the Museum will inaugurate.  
Lt. Col. Nathaniel F. Silsbee, of the  
Air Corps, has suggested that you might  
s for this exhibition painted models of  
. We shall be glad to have any models  
following,\* and, acting upon your own  
d be happy to receive five or six models  
s, according to your own selection.

give due credit in our public acknowledg-  
t Metals Company for the loan of models.

ow that you will be able to deliver these  
ay of this week. With many thanks for  
oration, I am

Very sincerely yours,

- (Company); A-20 (Douglas Aircraft)
- ircraft) P-38 (Lockheed Aircraft)
- American P-39 (Bell Aircraft)
- n) P-40 (Curtiss Airplane)
- P-47 (Republic Aviation)

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**BELL AIRCRAFT CORPORATION**

2050 ELMWOOD AVENUE  
BUFFALO, N.Y.

*Bronzart Metals  
re - airplanes  
AIRWAYS*

July 6, 1943

June 22, 1943

Mr. Allen Porter  
The Museum of Modern Art Library  
11 West 53rd Street  
New York, Mr. Joseph A. Allegro, President  
Bronzart Metals Company  
Dear Mr. Allegro:  
129 Grand Avenue  
Brooklyn, New York

Dear Mr. Allegro:

In confirmation of our telephone conversation, I am writing you to request the courtesy of your collaboration upon the exhibition, AIRWAYS TO PEACE, which the Museum will inaugurate on July first. Lt. Col. Nathaniel F. Silsbee, of the War Department, Army Air Corps, has suggested that you might be willing to lend us for this exhibition painted models of Army and Navy planes. We shall be glad to have any models you may have of the following,\* and, acting upon your own suggestion, we should be happy to receive five or six models of recent Navy planes, according to your own selection.

We shall be glad to give due credit in our public acknowledgments to the Bronzart Metals Company for the loan of models.

We are pleased to know that you will be able to deliver these models to us by Friday of this week. With many thanks for your generous collaboration, I am

Very sincerely yours,

- \*B-17 (Boeing Airplane Company); A-20 (Douglas Aircraft)
- B-24 (Consolidated Aircraft) P-38 (Lockheed Aircraft)
- B-25 and P-51 (North American Aviation) P-39 (Bell Aircraft)
- B-26 (Glenn L. Martin) P-40 (Curtiss Airplane)
- P-47 (Republic Aviation)

MW:CH

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	MoMA Exhs.	236.3

TELEPHONE  
RIVERSIDE 2600

CABLE ADDRESS  
"BELLCRAFT"

## BELL AIRCRAFT CORPORATION

2050 ELMWOOD AVENUE  
BUFFALO, N.Y.

ADMINISTRATIVE OFFICES  
NIAGARA FALLS PLANT  
NIAGARA FALLS, N. Y.

ADDRESS ALL MAIL  
TO BUFFALO OFFICE

July 6, 1943

Mr. Allen Porter  
The Museum Of Modern Art Film Library  
11 West 53rd. Street  
New York, New York

Dear Mr. Porter:

Your letter of May 27, to Mr. Hapke has been turned over to this department, and I am sending you a series of six flight pictures of the P-39 Airacobra. I hope these pictures will be satisfactory for your use; and if not, we will be very glad to send you a further selection.

Mr. Hapke is no longer with Bell Aircraft but is connected with Republic Aviation.

Very truly yours,

BELL AIRCRAFT CORPORATION

*J. W. Baxtresser*  
Jay W. Baxtresser  
Mgr., Photographic Dept. *plu*  
*E. S.*

JWB:EBS

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AIRWAYS

Bell Aircraft

August 17, 1943

August 17, 1943

Mr. Jay W. Baxtresser, Manager  
Photographic Department  
Bell Aircraft Corporation  
2050 Elmwood Avenue  
Buffalo, New York

Dear Mr. Baxtresser:

Under separate cover we are returning some photographs which you very kindly sent to Mr. Allen Porter in connection with the preparation of the Museum's AIRWAYS TO PEACE exhibition. These photographs were helpful to Mr. Wheeler, and he has asked me to tell you how greatly he appreciates your courtesy and cooperation in the matter. The exhibition has proved to be unusually successful, and will continue through October 31. We hope that you may be able to see it.

Very truly yours,

(Mrs. C. S. Hartman)  
Assistant to Mr. Wheeler

CCH:cw

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AVIATION MAGAZINE

AIRWAYS

August 23, 1943

Gentlemen:

Under separate cover we have returned to you some photographs which you very kindly lent to Mr. Wheeler during the preparation of our current exhibition, AIRWAYS TO PEACE. This material was most helpful, and we wish to express once more our thanks for your kind cooperation.

Very sincerely yours,

(Mrs. C. S. Hartman)  
Assistant to Mr. Wheeler

Aviation Magazine  
330 West 42 Street  
New York 18, New York

CH:mjm

The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	MoMA Exhs.	236.3

19

Aviation Magazine

AIRWAYS

(Nothing Allwing Airplane)

September 16, 1943

Aviation Magazine  
330 West 42nd Street  
New York, 18, New York

Gentlemen:

Under separate cover we are returning to you one photograph which you very kindly lent us during the preparation of our current exhibition, AIRWAYS TO PEACE. At the moment this seems to be the only photograph bearing your stamp which we have in the office. If this, together with the photographs returned to you August 23, does not complete the collection originally lent to the Museum, please let me know and I shall investigate further.

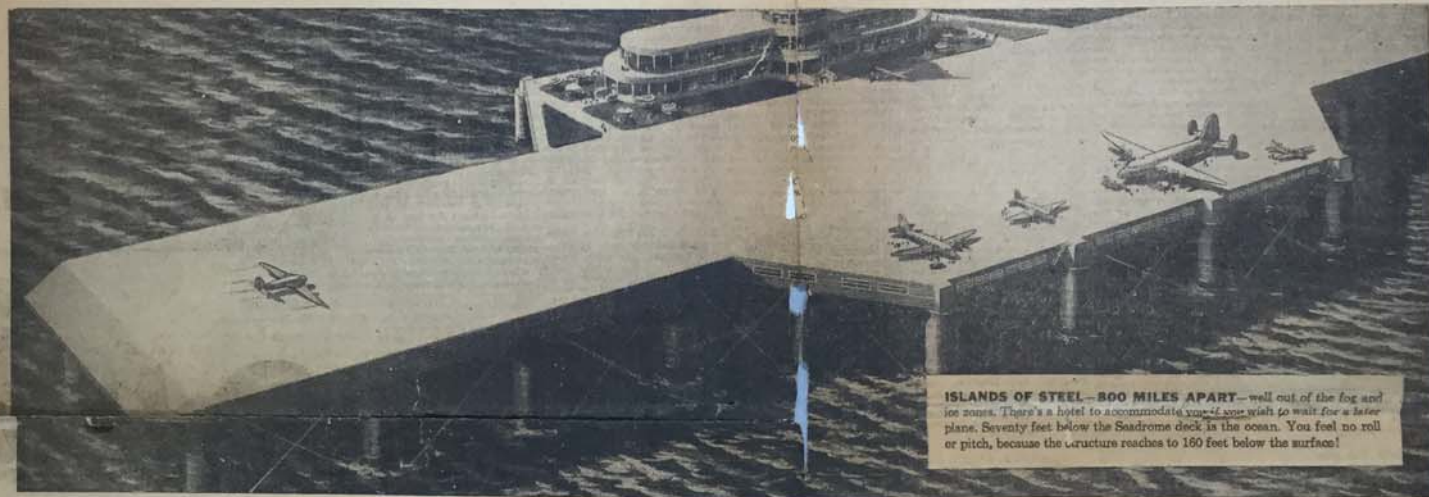
Thank you again for your cooperation.

Very sincerely yours,

(Helen Ward)  
Assistant to Mr. Wheeler

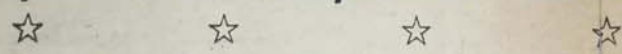
w

# Pennsylvania - Central Airlines projects SEADROME ROUTE TO EUROPE



ISLANDS OF STEEL—800 MILES APART—well out of the fog and ice zones. There's a hotel to accommodate you if you wish to wait for a later plane. Seventy feet below the Seadrome deck is the ocean. You feel no roll or pitch, because the structure reaches to 160 feet below the surface!

**New Air Bases for America!** *The practical answer to transatlantic flying... stepping stones of steel to be built with private capital. Open to all Companies... all Nations.*



PCA files application with Civil Aeronautics Board

Here's one "post-war plan" that's right down to earth—and as practical as a piece of steel! Here's one dream that's ready and workable right now! And it may be the biggest bit of aviation news since the Wright Brothers' flight in 1903.

Think what this new Seadrome route means!

To America it means new island bases in the Atlantic... a strengthening of Uncle Sam's commercial arm... another step toward keeping America in the forefront of world affairs.

**Floating Airfields**

These new "American Air Bases" are Seadromes, invented by Edward R. Armstrong, world-famed construction engineer. Floating steel islands, spaced at 800-mile intervals, they will stand 70 feet above the waves. Their draft of 160 feet will keep them as steady as the mainland itself.

Are they practical? America's outstanding engineers say "yes." Aviation experts concur. And the American Bureau of Shipping rates the Sea-



THE SEADROME ROUTE connecting East Coast cities with Great Britain... as proposed by Pennsylvania-Central Airlines, one of America's pioneer airlines—now in its 17th year of operation.

drome structure \*A-1, the highest rating possible.

**Seadrome Makes Ocean Flying Routine**  
The Seadrome project is revolutionary—making possible transoceanic flights with as much safety and dependability as any routine trip between New York and Chicago.

The short 800-mile "hops" between Seadromes means vastly increased weight-carrying capacity... providing for the first time transoceanic travel at a moderate cost. Today's airplanes can easily fly this Route of Tomorrow. Tomorrow's airplanes will have even greater efficiency because of it.

The war has stimulated a courageous line of thinking. The Seadrome project is a product of such thinking. It is proof that America can fight and win a war—and at the same time produce ideas that guarantee continued progress and prosperity.

The  
**ARMSTRONG SEADROME**  
☆☆☆  
Designed by  
**Edward R. Armstrong**  
*world-famed construction engineer*

SPONSORED AND  
TO BE CONSTRUCTED BY

**SUN SHIPBUILDING & DRY DOCK CO.**

AND OTHER GREAT  
AMERICAN INDUSTRIES

# Herald Tribune

## WEEKLY BOOK REVIEW

SECTION VIII

SUNDAY, MAY 16, 1943

28 PAGES

### The Wrights Knew What They Were Doing Their First Planes Were the Product of Study and Sheer Genius

#### THE WRIGHT BROTHERS.

By Fred C. Kelly. . . . 340  
pp. . . . New York: Har-  
court, Brace and Company.  
. . . \$3.50.

Reviewed by  
WOLFGANG LANGEWIESCHE  
Author of "I'll Take the High Road"

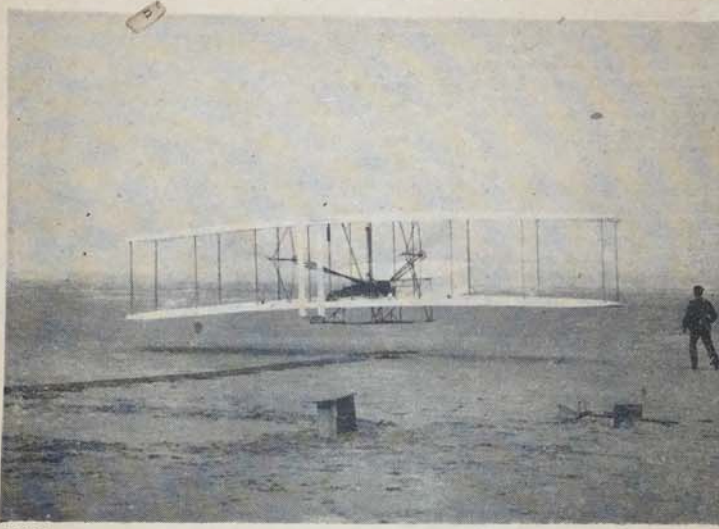
THIS is the kind of book one disregards at first entirely as a book, as a piece of research and writing, because one wants to get at the stuff that's in it: the first exact account ever published of how the most fateful invention of our time was made. One would go after that even if one had to translate it from the Greek.

We have forgotten just how spectacular the Wrights' feat was; or, perhaps, we have never appreciated it. The problem of mechanical flight had baffled the genius of Leonardo. Hiram Maxim, the inventor of the machine gun, who was a genius and a millionaire as well, had spent hundreds of thousands of dollars trying to solve it and had given up in disgust. It was then just

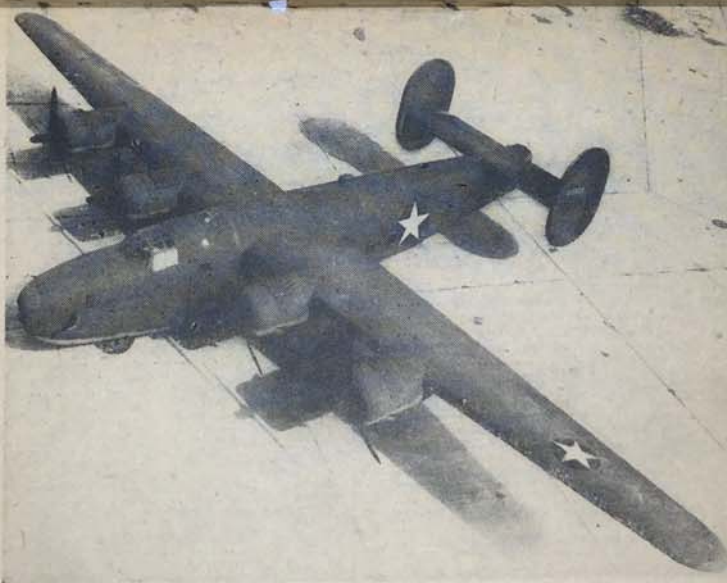
when, who had used up a large grant of money from the United States Congress building a flying machine that wouldn't fly. And then, two men with no college education solved the problem in a few short years, with a total outlay which the author estimates at less than \$2,000, including their own working time and including even their train fares to Kitty-

hawk!

The history of the human mind in action records few instances where creation was so brilliant, so seemingly almost without effort, so sure. We used to think of the Wright brothers as a pair of country boys tinkering away in a bicycle shop. We used to think that maybe they did hit upon the solution a little earlier than other experimenters at that time, but that the solution was bound to come because the time was ripe—because lightweight gasoline motors were available, and all that sort of thing. But the Wrights solved almost their entire problem, including the tricky problem of stability and control and piloting technique, on kites and gliders—i. e., without any engine. And there was nothing to their glider or to its flying—there is, indeed, nothing even to a modern high performance sail plane which can fly all day—that Leonardo da Vinci, aided by an Italian cabinetmaker could not have designed, built and flown. As for the lightweight source of power, this book quotes Orville Wright as pointing out that they had actually a large margin and that light enough power plants had



1903—The only picture made of man's first flight in a power-driven, heavier-than-air machine, Kitty Hawk, December 17, 1903. The plane, piloted by Orville Wright, has just taken off from the monorail. Wilbur Wright running at the side, had held the wing to balance the machine until it left the rail.  
An illustration from "The Wright Brothers"



1943—C-87 Liberator, Express. A super-transport, with a speed in excess of 200 miles per hour and a range of more than 3,000 miles, which can carry the greatest human or cargo load of any land plane now in mass production.

then been available for fifty years! As for tinkering and fumbling, there just doesn't seem to have been any. The usual zig-zag of trial and error seems in this case almost a straight line. There were one or two useless moves; but never

a false one. Long before it ever flew, the Wrights seem to have grasped the nature of the airplane much more clearly than many a proud pilot and aviation expert does today. They knew exactly what would happen. For example, take the ex-

ceedingly intricate problem of propulsion. They calculated on paper (they had to develop their own propeller theory first in order to enable themselves to calculate) that they would get sustained flight if they could turn their propellers at 305 revolutions per minute. Later, actual measurements showed that 302 r. p. m. were enough: an accuracy of 99 per cent! Or take that famous picture of their first powered flight: everybody has seen it, but now it turns out that it was Orville Wright himself, the pilot on that flight, who had placed the camera in position beforehand and had focused it beforehand on the spot where he was going to be in the air! Also, before that first flight, the brothers had already set up scientific flight-test equipment—cameras, stop watches and anemometers, etc., to measure all sorts of values which even today interest only the test pilot and the designer. That's how clearly they knew what they were about.

Genius without any of the usual trimmings; there are few things in the most modern airplane that the Wrights did not have on their third machine, if not actually on their first. Their machine is still our solution today. If you would stretch a point, you could even find in this book an account of the first use of "lastics for air-planes! As you read this account, the beginnings of modern aeronautics come clicking along, two to a page. The Wrights rode their first airplane "belly-buster" fashion to reduce the wind resistance of the pilot's body. That's the beginning of streamlining, and fighters as well as sailplanes with the pilot lying prone are again being advocated by engineers now! One of the Wrights' completely new ideas was wing warping for lateral control: by twisting their wings out of shape and setting one wing tip to higher angle of incidence than the other, they could bank and unbank at will. The system is far from ideal, but to this day no substitute has been found. The Wrights tried first on their glider, but with amazing perceptiveness (most of their flights lasted only seconds) they discovered that it did not work well. The unequal lifts of the two wing tips were accompanied by an equality of drag which slewed their ship around sidewise and threw it out of control. As if they had looked it up in a textbook on airplane design, they thereupon decided that the vertical rudder was needed to counteract those disturbances; that is even today the purpose of the rudder. If you could make today's flying cadets understand this one thing, it would save much heartbreak, many "washouts" from flight training, many accidents. Next, Wilbur proposed  
(Continued on page two)

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Charge to the account of \_\_\_\_\_ \$

CLASS OF SERVICE DESIRED	
DOMESTIC	CABLE
TELEGRAM	ORDINARY
DAY LETTER	URGENT RATE
SERIAL	DEFERRED
OVERNIGHT TELEGRAM	NIGHT LETTER <input checked="" type="checkbox"/>
SPECIAL SERVICE	SHIP RADIOGRAM

Patrons should check class of service desired; otherwise the message will be transmitted as a telegram or ordinary cablegram.

# WESTERN UNION

1206

A. N. WILLIAMS  
PRESIDENT

NEWCOMB CARLTON  
CHAIRMAN OF THE BOARD

J. C. WILLEVER  
FIRST VICE-PRESIDENT

CHECK
ACCOUNTING INFORMATION
TIME FILED

Send the following telegram, subject to the terms on back hereof, which are hereby agreed to

**WANT A REPLY?**  
"Answer by WESTERN UNION"  
or similar phrases may be  
included without charge.

JUNE 19, 1943

LT. COL. FRED MAST  
EXECUTIVE OFFICE  
ARMY MAP SERVICE  
6301 MAC ARTHUR BLVD.  
WASHINGTON, D. C.

HELMUTH BAY SUGGESTS WE CONTACT YOU FOR SAMPLE MAP USED IN ARMY  
AIR OPERATIONS FOR INCLUSION IN OUR EXHIBITION OPENING JULY 1  
ENTITLED AIRWAYS TO PEACE.

MONROE WHEELER

*Airways to Peace*

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DOMESTIC	CABLE
TELEGRAM	ORDINARY
DAY LETTER	URGENT RATE
SERIAL	DEFERRED
OVERNIGHT TELEGRAM	NIGHT LETTER <input checked="" type="checkbox"/>
SPECIAL SERVICE	SHIP RADIOGRAM

Patrons should check class of service desired; otherwise the message will be transmitted as a telegram or ordinary cablegram.

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"Answer by WESTERN UNION"  
or similar phrases may be  
included without charge.

JUNE 19, 1943

ADMIRAL L. COLBERT  
DIRECTOR U. S. COAST AND GEODETIC SURVEY  
WASHINGTON, D. C.

CAN YOU SEND US ANY AREA OF SECTION AIRWAY MAP N.E.1 FOR INCLUSION  
IN MAJOR EDUCATIONAL EXHIBITION ENTITLED AIRWAYS TO PEACE?

MONROE WHEELER  
DIRECTOR OF EXHIBITIONS  
MUSEUM OF MODERN ART

RE: AIRWAYS TO PEACE

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NEW YORK HERALD TRIBUNE, SATURDAY, MAY 29, 1943

### Blow and Counter-Blow in the Air Battle of the Pacific



The Army released yesterday this picture of the Japanese phosphate works on Nauru Island burning after a raid by American bombers



After the Nauru attack the Japanese staged a retaliatory raid on Funafuti, island in the Ellice group from which the American planes came. Here a B-24 Liberator, one of two hit, goes up in flames

United States Army Air Forces

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**Mop-Up on Attu  
Pressed, More  
Posts Fall**

**143 Soldiers Added  
To List of Prisoners**

From the Herald Tribune Bureau  
WASHINGTON, May 28.—The

**Japanese Diet Convoked**

Special Session, Beginning June  
15, to Vote on Funds for War  
The Japanese Diet (Parliament)

has been summoned to an extraordi-  
nary three-day session beginning  
June 15, a Tokio broadcast re-  
corded by The Associated Press  
announced yesterday.  
The Office of War Information

said a Tokio broadcast recorded by  
the Federal Communications Com-  
mission reported the special ses-  
sion had been called to consider  
a supplementary budget and  
"other war-time measures."

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*Strachan  
MONTAGE  
AIRWAYS  
A to P*

THE MUSEUM OF MODERN ART  
11 WEST 53 STREET  
NEW YORK CITY

*III*

TO Mr. Charles Rain  
c/o George Platt Lynes  
640 Madison Avenue, N.Y.

Date September 10, 1943  
PLEASE PUT ORDER NUMBER ON INVOICE

Nº 22348

INVOICE BEARING ORDER NUMBER SHOULD BE MAILED DIRECTLY TO CONTROLLER'S OFFICE.

	Unit Price	Total
<p>Montage for Airways to Peace Exhibition</p> <p>Ordered by..... Authorized by..... <i>MB</i></p> <p>Airways to Peace For.....</p>		

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Steichen  
INDEX  
AIRWAYS  
A to P  
re-keyboarded

September 30, 1943

July 12, 1943

Mr. Paul J. Hayes  
Commander Edward Steichen  
Room 4821  
Bureau of Aeronautics  
Navy Department  
Washington, D.C.

Dear Commander Steichen

I enclose herewith a photograph of you taken at the opening of AIRWAYS TO PEACE. The exhibition is proving very successful, and we hope shortly to be able to replace the very poor blow-ups of the splendid pictures you gave us with better ones. We are finding it exceedingly difficult to get good workmanship from any of the New York photo enlargers.

With renewed thanks for your generous collaboration, I am

Sincerely yours,

(Helen Ward)  
Assistant to Mr. Wheeler

MW:CH

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19

Thomas  
A to P<sub>r</sub>  
 re Wright model

September 30, 1943

Mr. Paul J. Thomas  
 Veterans Administration  
 Pittsburgh, Pennsylvania

Dear Mr. Thomas:

Mr. Wheeler has asked me to thank you for your suggestion in regard to the Wright plane model in the AIRWAYS TO PEACE exhibition. We have since had it turned so that the front of the plane is toward the label and hope that this will make the whole thing clearer.

Thank you again for your interest.

Very sincerely yours,

(Helen Ward)  
 Assistant to Mr. Wheeler

THE MUSEUM OF MODERN ART

*date 1/20/43*  
*Mr. Wheeler*  
*from: Paul J. Thomas*  
*Wright model*  
*On the back end of the*  
*model the card, it says*  
*not connected with the*  
*front of the plane - it is*  
*the front of the*

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Thompson Products

Thompson Products, Inc.

AIRWAYS



June 9 1943

Write card to take Maub to Chicago &

THE MUSEUM OF MODERN ART

Date 9/20/43

To: Mr. Wheeler

Re: Exhibit of first Wright plane model in glass case on 2nd floor

From: Paul J. Thomas, Veterans Administration, Pittsburgh, Pa.

As the back end of the plane is toward one when he reads the card, it might easily be mistaken for the front by one not acquainted with this plane.

Would it not be well to designate which is the front of the plane as it is so different in appearance from the present day plane.

Advertising Manager

MW:lfc Fred Witt/dw

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Thompson Products  
AIRWAYS

Thompson Products, Inc.



GENERAL OFFICES  
CLEVELAND, OHIO

June 9  
1943

June 17, 1943.

Mr. Monroe Wheeler  
Director of Exhibitions

Dear Mr. Witt: of Modern Art  
11 West 53 Street

You are more than kind to have sent us the twelve illustrations from your 1941 aviation calendar. Thank you very much indeed.

The exhibition, for which we needed this material, is entitled Airways to Peace. It will open July 11 and continue through October 17. I am sure that it will interest you deeply, and I hope that if you are in New York you will let me know so that I can show you the exhibition personally.

While the original oil paintings are not  
With many thanks for your courtesy, I am sending you under separate cover a set of the lithographed art panels which I hope will serve your purpose in lieu of the originals. The approximate size of the lithographic reproductions is 15 x 16 1/2 inches.

Sincerely yours,

THOMPSON PRODUCTS, INC.

Mr. Fred Witt, Advertising Manager,  
Thompson Products, Inc.  
Cleveland, Ohio.

*Fred Witt*  
Advertising Manager

MW:lf FredWitt/dw

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## Thompson Products, Inc.

M F R S . O F A U T O M O T I V E



A N D A I R C R A F T P A R T S



GENERAL OFFICES  
CLEVELAND, OHIO

June 9  
1943

Mr. Monroe Wheeler  
Director of Exhibitions  
Museum of Modern Art  
11 West 53 Street  
New York, New York

Dear Mr. Wheeler:

Thank you for your letter of June 3 expressing an interest in the 12 illustrations which appeared in our 1941 "Dawn of Wings" aviation calendar.

While the original oil paintings are not available for your purpose, we are sending you under separate cover a set of the lithographed art panels which might serve your purpose in lieu of the originals. The approximate size of the lithographic reproductions is 15 x 16½ inches.

Sincerely yours,

THOMPSON PRODUCTS, INC.

*Fred Witt*  
Advertising Manager

FredWitt/dw

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*Thompson Products  
AIRWAYS-*

June 3, 1943

Advertising Department  
Thompson Products, Inc.  
2209 Ashland Road  
Cleveland, Ohio

Gentlemen:

We are informed that you recently issued a calendar depicting early models of aircraft. If the pictures are authentic, the original drawings from which they were made might be extremely valuable to us for inclusion in an exhibition of air-age geography, entitled AIRWAYS TO PEACE, which will open here June 29. The Office of War Information is collaborating with us in the preparation of the material, as are also the Army and Navy air forces.

We should greatly appreciate your sending us a copy of the calendar, and if the originals are available we should like to know their dimensions.

Very sincerely yours,

MW:CH



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IN REPLY ADDRESS THE DIRECTOR  
U. S. COAST AND GEODETIC SURVEY  
AND NOT THE SIGNER OF THIS LETTER  
AND REFER TO NO. 884-DGM

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY  
WASHINGTON 25

June 23, 1943.

Mr. Monroe Wheeler, Director,  
Exhibition Museum of Modern Arts,  
11 West 53rd St.,  
New York, N. Y.

Dear Mr. Wheeler:

As requested in your telegram of June 19, 1943,  
a copy of the Austin Sectional Aeronautical Chart,  
stamped "obsolete for use in aviation", is being for-  
warded to you under separate cover for purposes of exhi-  
bition.

Very truly yours,

*L. O. Colbert.*

Director.

US DEPT OF COM. <sup>18</sup>  
AIRWAYS  
III



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US WAR DEPT Mast (War Department)

WAR DEPARTMENT  
ARMY MAP SERVICE  
CORPS OF ENGINEERS U. S. ARMY W/3d

Army Map Service  
AIRWAYS

6 July, 1943.

III

Mr. Monroe Wheeler,  
Director of Exhibition,  
11 W. 53rd St.,  
New York, New York.

July 8, 1943.

Dear Mr. Wheeler:

Dear Colonel Mast:

Immediately upon receipt of your telegram of recent date this office advised the Chief of the Aeronautical Chart Service of the U. S. Army Map Service. I acknowledge with many thanks your kind letter of July 6 regarding our request for a sample aeronautical chart for possible inclusion in our Airways to Peace exhibition which opened last week and will continue until the end of October. It was the opinion of that office that no restricted or confidential information and inasmuch as no dummy charts are available it was the opinion of that office that no material should be provided for a dummy chart if you can provide it, but we would prefer this not to be larger than thirty inches square because our space in the exhibition is at present somewhat limited. I enclose herewith a release about the exhibition which will give you an idea of its contents.

With many thanks for your generous collaboration, I am  
Sincerely yours,

Very sincerely yours,  
*Frederick W. Mast*  
Frederick W. Mast,  
Lt. Col., Corps of Engineers,  
Executive Officer.

Lt. Colonel Frederick W. Mast  
Corps of Engineers, Executive Officer  
Army Map Service  
6101 MacArthur Bldg.  
Washington, D. C.

MW:lf  
Enclosure

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ADDRESS REPLY TO:  
COMMANDING OFFICER  
ARMY MAP SERVICE  
6101 MACARTHUR BLVD  
WASHINGTON, D. C.

REFER TO FILE NO

WAR DEPARTMENT  
ARMY MAP SERVICE  
CORPS OF ENGINEERS, U. S. ARMY

M/jd

6 July, 1943.



Mr. Monroe Wheeler,  
Director of Exhibition,  
11 W. 53rd St.,  
New York, New York.

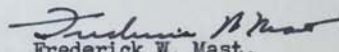
Dear Mr. Wheeler:

Immediately upon receipt of your telegram of recent date this office contacted the Chief of the Aeronautical Chart Service of the U. S. Army Air Forces relative to the inclusion of sample aeronautical charts in your exhibit entitled "Airways to Peace".

In view of the fact that all aeronautical charts bear either restricted or confidential classification and inasmuch as no dummy charts are available it was the opinion of that office that no material could be furnished for exhibit.

Mr. Helmuth Bay advises me that this exhibit may be of more or less permanent character. If such is the case, I would appreciate your advising me further and I will request permission of the Aeronautical Chart Service to construct a dummy chart which could then be included in the exhibit.

Sincerely yours,

  
Frederick W. Mast,  
Lt. Col., Corps of Engineers,  
Executive Officer.

*Arrive*



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WAR DEPARTMENT  
BUREAU OF PUBLIC RELATIONS  
WASHINGTON

US - WAR DEPT  
AIRWAYS  
II

June 19, 1943.

Mr. Monroe Wheeler,  
Museum of Modern Art,  
11 West 53 Street,  
New York City.

A memorandum has come to me to supply you with a list of manufacturers of our current combat planes. The list follows below, but it might be well if you check first of all with Bronzart Metals Co., 220 5th Avenue, New York City who manufactured metals for the Army Air Forces training schools.

X

*models*

MU 5-0950

Boeing Airplane Company,  
Seattle, Washington. (B-17) ✓

Consolidated Aircraft Corporation,  
San Diego, Calif. (B-24) ✓

12-14 in my plan

North American Aviation,  
Englewood, Calif. (B-25 & P-51) ✓

Glenn L. Martin,  
Baltimore, Md., (B-26) ✓

Douglas Aircraft Co. Inc.,  
Santa Monica, Calif. (A-20) ✓

✓ Lockheed Aircraft Corporation,  
Burbank, Calif. (P-38) ✓

Bell Aircraft Corporation,  
Buffalo, N. Y. (P-39) ✓

Curtiss Airplane Division,  
Buffalo, N. Y. (P-40) ✓

Republic Aviation Corporation,  
Farmingdale, L. I., N. Y. (P-47) ✓

MA 2-7810  
Joseph X.  
Mr. Allegro  
129 Grand Avenue  
Brooklyn

Yours truly,  
*N. F. Silsbee*  
NATHANIEL F. SILSBEE,  
Lt. Col., Air Corps,  
Research Officer, AAF Group.



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Aviation Mag  
Fidelity  
~~AIRWAYS~~  
AIRWAYS

June 24, 1943

July 15, 1943

Miss Overgard  
Aviation Magazine  
McGraw-Hill Publishing Company  
330 West 42 Street  
New York, New York

Dear Miss Overgard:

Will you be kind enough to deliver to the bearer the photographs of the Northrop All-wing Airplane, one of which we should like to use in our forthcoming AIRWAYS TO PEACE exhibition. Under separate cover we are returning the thirteen of these fourteen photographs, retaining only one of our current exhibition, AIRWAYS TO PEACE.

With many thanks for your kind collaboration, I am sending a confirming order to cover this photograph in the amount of \$5. If you have not **Very sincerely yours,** you please bill the Museum for this photograph?

With many thanks for your cooperation, I am

Sincerely yours,

MW:CH

(Mrs. G. S. Hartman)  
Assistant to Mr. Wheeler

400:17  
8/1/43

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Fairchild Aerial Surveys  
AIRWAYS

III

Mr. Heller  
Museum of Modern Art

May 27, 1943

July 15, 1943

Dear Sirs:

The Museum of Modern Art is doing a show on  
Aerography and would like very much to display a  
model showing how a condenser projection unrolls  
from the Fairchild Aerial Surveys, Inc. the cone  
projection. 21-21 Forty-first Avenue I and they will  
Long Island City, New York October at which  
time they can be returned to you.

Gentlemen:

Will you please advise us that they are available  
for the Museum of Modern Art. Please call on Mr. Heller  
at 11 East 57th Street.

Enclosed is a list of photographs which you very  
kindly allowed Mr. Wheeler to see in connection  
with the preparation of our current exhibition, AIR-  
WAYS TO PEACE. Under separate cover we are return-  
ing thirteen of these fourteen photographs, retain-  
ing O-2757 for use in the exhibition. I am issuing  
a confirming order to cover this photograph in the  
amount of \$5. If you have not already done so, will  
you please bill the Museum for this photograph?

Mr. Benjamin Webster,  
Principal With many thanks for your cooperation, I am  
35 Army Air Forces,  
Pennington Bldg.,  
Arlington, Va.

Sincerely yours,

(Mrs. C. S. Hartman)  
Assistant to Mr. Wheeler

GCH:cv  
Enclosure

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*Army Air Forces*

COPY: Mr. Keller  
Museum of Modern Art

May 27, 1943

Dear Bent

The Museum of Modern Art is doing a show on cartography and would like very much to display a Geddes model showing how a mercator projection unwraps from the globe and also the model showing the conic projection. The show opens about July 1 and they will want the models until the beginning of October at which time they can be returned to you.

Will you please advise me that they are available for the Museum and when you can ship them up to Mr. Keller at 11 West 53rd St.

Best regards,

Worthen Paxton

Mr. Benjamin Webster,  
Principal Cartographic Planning Consultant,  
HQ Army Air Forces,  
Pentagon Bldg.,  
Arlington, Va.