



TWIN-engine cabin  
airplane developed  
and designed by  
John D. Akerman, 1928

COURTESY OF UNIVERSITY OF MINNESOTA

# MINNESOTA

## *in the WORLD of AVIATION*

TO MARK the fiftieth anniversary of the Wright brothers' first flight and the beginning of air transportation, the Minnesota Historical Society devoted its one-hundred-and-fourth annual meeting, held in St. Paul on April 1, 1953, to a program centering about the history of Minnesota aviation.

The event took the form of a panel discussion following a luncheon at the St. Paul Hotel. Participating were three leaders of aeronautic activity in the state, each of whom contributed a chapter to the little-known story of Minnesota aviation. In slightly condensed form, their addresses appear herewith.

Before introducing the speakers, the society's president, Mr. Clarence R. Chaney of Minneapolis, provided a background for their remarks by recalling the pioneer flight "on the wind-swept sand dunes of Kitty Hawk," where on December 17, 1903, Or-

ville Wright took a machine into the air for twelve seconds and covered a hundred and twenty feet. This, Mr. Chaney pointed out, was the "first flight in the history of the world in which a machine carrying a man raised itself by its own power into the air," went "forward without a reduction of speed," and "landed at a point as high as that from which it started." Although in this and other flights on the same day, Orville and Wilbur Wright covered only short distances, the speaker reminded his hearers that these pioneer flyers "spanned the infinite space between hope and achievement."

Mr. Chaney then introduced the first speaker on the panel, Mr. Schroeder, state commissioner of aeronautics, who has served in this position for ten years and has been flying since 1938. His remarks on Minnesota's general aviation history follow.

# Fifty Years of Flight

LESLIE L. SCHROEDER

FROM TIME immemorial, man has aspired to ride rather than walk, to have his burdens carried for him rather than to carry them, to be able to move past the limits of his immediate horizon, to see what is beyond, and to broaden his sphere of influence and activity. The extent to which the individual man has been able to gratify the desire to ride—to travel—has been a mark of his standing in his own community among his fellow men. The extent to which communities, cities, states, and nations have been able to gratify their needs for improved forms of transportation and communication has been a mark of their standing culturally, socially, and economically. Transportation is the lifeblood of civilization.

The building of means of transportation and communication was among the first activities of the pioneers who settled in the Minnesota country. Their initial problem was one of overcoming physical handicaps. Available at first were natural watercourses and trails made by the redmen and wild beasts; soon the settlers hewed others from the wilderness by their own labor. Then as towns and cities developed, the building

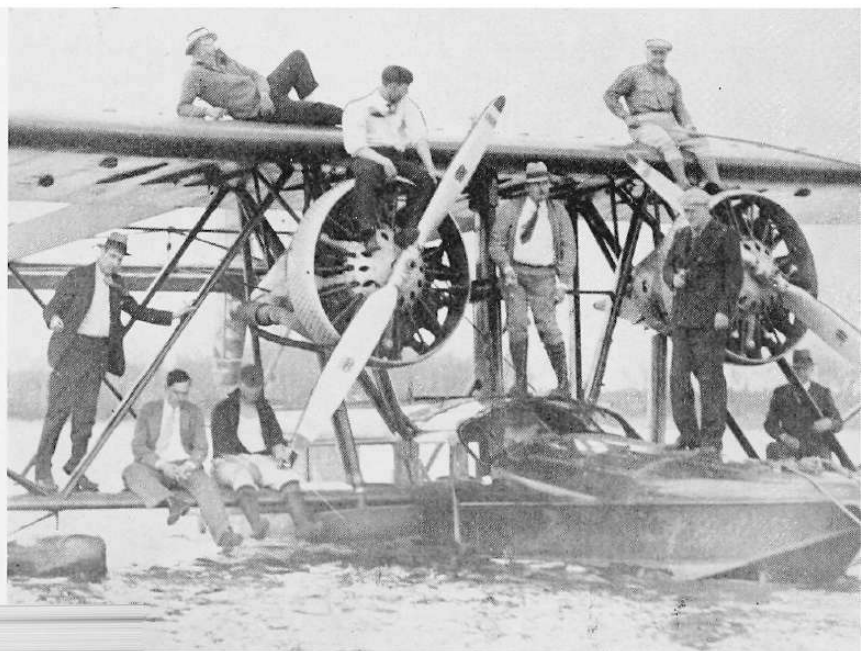
of cartways, roads, and ultimately highways became a community and a governmental problem.

We know that those who labored to supply the means of transportation on the frontier looked to the sky and wished that they might move through the air over swamps and streams and plains and forests. In 1859, a year after Minnesota was admitted to the Union, four men traveled in a balloon from St. Louis to the state of New York, and in the same year mail was carried between two towns in Indiana. It was not until fifty-four years later that the Wright brothers made their first successful flight. Now we are celebrating the fiftieth anniversary of that event.

The development of aviation in our own state, as well as in the nation, falls into well-defined eras of progress. The period before World War I may be described as the construction phase. One could not buy a flying machine. If he wished to have one, he had to build it. In Minnesota, a number of people of skill and patience endeavored to build flying machines and some few were successful in developing aircraft capable of short sustained flights. This was the beginning of the manufacturing phase. While there still are no companies in the state actually building aircraft, many are building component parts and accessories.

Following World War I came the exhibition era. By that time, most people had learned that man could fly, but few had

THESE fishermen  
went to Mille Lacs in  
an amphibian plane  
in 1933



Summer 1953

actually seen an airplane in flight. Aircraft made appearances at state and county fairs, and as people became accustomed to seeing machines in flight, the spirit of competition drew airmen to other spectacular efforts. Aerobatics consisting of wing-walking and the like on aircraft in flight, then involving the aircraft itself, and eventually calling for formations of aircraft developed successively. Many of you here today have seen the famous Blue Angel team. The climax in a progression of exhibits or air shows probably was attained a few years ago when five helicopters waltzed with elephantine grace to the tune of the "Beautiful Blue Danube" before the grandstand at a national air show.

Economic considerations unquestionably stimulated the next phase of aviation's development, since there were not enough state and county fairs to sustain the aircraft or the pilot. Beginning in the early 1920s, aircraft of World War I vintage moved out over the countryside seeking likely looking communities and meadows in which to conduct passenger hopping operations. These were the barnstorming days, during which airmen developed real skill and ingenuity in the art of keeping an aircraft aloft with the fewest possible parts and tools. They also learned how to make a living through the medium of barter, exchanging rides for leases of farmers' fields, for gasoline, food, lodging, and parts to keep their craft in repair. The farmers who leased their fields and provided meals and equipment in return for rides were the first flying farmers. The people who rode as passengers from the farmers' fields and meadows were the first paying passengers in aircraft. For the first time aircraft were being used as vehicles of transportation for hire.

Ultimately, many barnstormers became weary of gypsy life and, finding what appeared to be lucrative locations near communities, settled down in near-by pastures or meadows to operate from what were known as permanent or semipermanent bases. Thus originated the term "fixed-base

operators" of aircraft—a term which has survived until recent years.

The combined skill of keeping an airplane flying and providing for economic needs was learned the hard way by the men who established the first commercial air lines. They have continued to be the grass-roots source of many of the skills that sustain aviation today, both civil and military. The meadows from which they operated became the first private landing fields. Today most of them have been replaced by publicly owned, improved airports or air terminals. The sheds which passed for hangars have been supplanted by improved shops, and the gasoline drums have been replaced by modern gassing facilities and the adequate underground storage needed by transient aircraft. From these fields still come most of the young men and women who acquire the basic flight skills and go on to become pilots of military aircraft, airline pilots, flight instructors, and maintenance men, as well as scientists and research men in the field of aeronautics.

Minnesota has made its own special contribution to the skill and art of the science of flight. It was Charles Lindbergh from Little Falls who in 1926 electrified the world with a nonstop flight to Paris in a little single-engine airplane. There have been many others, less well known, who have made great contributions. At least two Minnesotans have been winners of the Wright brothers trophy.

Since occasional spectacular achievements in aviation completely overshadow the plodding nature of its total growth, it becomes most difficult to evaluate progress. With the bombing of Pearl Harbor, however, it became necessary for security reasons to locate and pin down all civil aircraft and to guard every public airport. At that time, the state department of aeronautics received a list of six hundred aircraft supposedly existing in Minnesota, and the Minnesota National Guard was ordered to establish security control at every airport. Of these aircraft, ultimately only about

three hundred were located. The National Guard found to its embarrassment that in some cases it was guarding empty pastures from which the airplanes had long since departed. During the summer of 1942, Minnesota was asked to provide as many aircraft as possible capable of flying patrol along the Atlantic coast, which was threatened by submarines. These aircraft had to be equipped with instruments for overwater flight and radios, and they had to be capable of carrying an observer in addition to a pilot and a small hundred-pound bomb. In the entire state, only two such aircraft were found.

Today the name of the owner and the location of every civil aircraft in the state is on record with the department of aeronautics. Slightly over eighteen hundred aircraft are operating regularly from about three hundred airports and landing fields, all of which are registered with the department, which has detailed information about the limitations and capabilities of every airport facility. If necessary, within twenty-four hours, Minnesota could provide at least three hundred and fifty aircraft meeting the requirements specified in 1942, and within sixty days the state could furnish about a hundred and fifty additional aircraft.

From airports, large and small, throughout the state, aircraft daily depart and return, engaging upon all kinds of missions. Within the space of an hour in this metropolitan area, aircraft may leave for Tokyo, for a ranch in one of the Western states, for some of the smaller cities within the state's boundaries, or for a local flight. At the same time, aircraft of all types arrive from all parts of the world, from other states, and from other parts of this state. They are operated as common carriers, by corporations for business purposes, by businessmen, and others. More than ten thousand professional and nonprofessional pilots fly with reasonable regularity over the state. Aircraft other than those operated by scheduled airlines or by the military authorities

in Minnesota fly more than twenty million miles annually.

In 2003 a group similar to that meeting here today doubtless will assemble under the sponsorship of the Minnesota Historical Society to celebrate the centennial of man's flight. We may be sure that such a group will regard the aircraft of our day as relatively primitive. The greatest progress still lies ahead in man's conquest of the airspace to meet his requirements for improved transportation and communication.

*FOR THE second address on the program, Mr. Chaney called upon General Harris, president of Northwest Airlines. In addition to a distinguished military career, he has been connected with various air lines in an executive capacity since 1926. Thus he has firsthand knowledge of the development of commercial aviation in Minnesota and the nation at large.*

## Commercial Aviation

HAROLD R. HARRIS

THE "AIR AGE" born at Kitty Hawk a half century ago is still trying out its wings. Yet it has grown into a pretty robust fledgling. Experimental aviation, with its jets, rockets, and supersonic speeds, is today being pressed with a fervor matching that of the Wright brothers. Military aviation, which is being used in actual combat in some areas, probably offers the free world its best promise of peace and survival. Commercial aviation is expanding over the four corners of the earth.

During the past year, regularly scheduled domestic air lines in the United States hauled more than twenty-six million passengers over twelve billion passenger miles. In addition, the American flag carriers



COURTESY OF ST. PAUL DISPATCH-PIONEER PRESS

*LOADING a mail plane at the St. Paul airport, 1926*

which operate internationally flew two-and-a-half million passengers some three billion passenger miles. Besides passengers, the planes of the scheduled air lines carried some two hundred and thirty-eight million ton miles of cargo on the domestic routes and seventy-eight million on the international. Operating revenues passed the \$1,200,000,000 mark for United States scheduled carriers.

Minnesota has contributed substantially to this development. Here we have in operation the oldest and the second oldest air lines of the nation. These pioneer companies have retained their original identities; they are not merely carriers whose lineage runs back to predecessor companies with which they have had rather tenuous ties. Western Air Lines started operations in the Far West on April 27, 1926, and Northwest Airlines began here in Minnesota on October 1, 1926. They lead the parade.

Another air line which has contributed much to the growth of commercial aviation in Minnesota and the adjoining area is North Central, formerly Wisconsin Central Airlines. This company began operations on February 24, 1948, at Madison, serving Chicago and eighteen cities in Wis-

consin and Minnesota. Now North Central serves sixteen cities in Wisconsin, thirteen in Minnesota, seven along the upper peninsula of Michigan, as well as Chicago, Fargo, and Grand Forks — a total of thirty-nine cities. Nearly three hundred of its employees live in the Twin Cities, where the line now has its base of operations.

Other air lines serving Minnesota are Western, which has routes extending to the Pacific coast; Braniff, with which Mid-Continent was merged, running south as far as Buenos Aires; and Capital, which serves a group of Eastern and Southern cities. Western started its service into the Twin Cities on April 1, 1947, and Capital on December 1, of the same year. Hanford Airlines, which preceded Mid-Continent, started operations here in 1932; Mid-Continent in 1938; and Braniff on August 16, 1952. Wisconsin Central made its appearance on the local scene on February 27, 1948. These air lines put Minnesota on a route map which covers much of the United States and extends beyond the borders to South America, Alaska, the Orient, and Hawaii.

Northwest Airlines, one of the nation's four transcontinental carriers and the only



one to cross the northern tier of states from coast to coast, has always had its headquarters in Minnesota. At present more than three thousand Minnesotans are on its sixteen-million dollar local payroll. Its system overhaul base is in St. Paul, its maintenance base in suburban Minneapolis, and its headquarters in the Midway district.

This Minnesota air line started operations out of the Twin Cities in 1926 with a route to La Crosse, Milwaukee, and Chicago. With a twenty-thousand-mile network of lines extending across the United States from New York and Washington, to Seattle-Tacoma and Portland, along the great circle route through Alaska to the Orient, and overseas to Hawaii, it has become one of the world's major air lines. Its world-flung operations are being directed from Minnesota.

At the beginning, Minnesotans ironically were reluctant to engage in this enterprise.

They held off, despite the persuasive powers of Colonel L. H. Brittin, then executive vice-president of the St. Paul Association. A man of vision, he wanted to organize an air line to take over a mail contract which Charles ("Pop") Dickinson, a venturesome old-timer, was about to discontinue. When local people made no haste to invest in his plan, Colonel Brittin turned to the Ford Motor Company, which with his help had obtained power concessions for its assembly plant on the Mississippi River near Fort Snelling.

A long-distance telephone call to William Mayo, chief engineer for Ford at Detroit, brought an encouraging invitation. "Come here and tell your story," Mayo said. "I'll have thirty Detroit millionaires sitting around a table at the Detroit Athletic Club to listen to it." Colonel Brittin presented such a good case for his project and the potentials of commercial aviation that the Detroit group signed up.

COURTESY OF ST. PAUL DISPATCH-PIONEER PRESS

*"SPEED" Holman  
Northwest Airways  
pilot, 1929*



Northwest Airways — as it was then called — was organized as a Michigan corporation. It was capitalized at three hundred thousand dollars, and there were twenty-nine original stockholders. That was on September 1, 1926. It was pretty much a Detroit outfit, with Harold Emmons of that city as the first president, and his fellow townsmen holding most of the offices.

The new company promptly made two moves. First, it bid \$2.75 a pound to fly the mail between the Twin Cities and Chicago. It got the contract. Second, it ordered three airplanes. Its first pilots were Charles ("Speed") Holman of St. Paul, a fabulous figure of the day; David L. Behncke, later the controversial head of the Air Line Pilots Association; and Chester Jacobson.

The air line has been in business ever since. Some other air lines that reached the top have expanded by mergers or similar devices. This company has grown from within. It always has been Northwest — without a hyphen. Although it got its start with the backing of Detroit capital, it was not long before St. Paul and Minneapolis businessmen began to take an interest. At the beginning, their investments were prompted more by a sense of civic responsibility than by a thought of profit. They agreed with Colonel Brittin that the Twin Cities should have a spot on the aerial map which was being drawn by a new and dynamic industry — commercial aviation. They backed their civic pride with their dollars. On April 26, 1927, the first evidence of a new investment balance appeared when three directors from St. Paul — J. M. Hannaford, Jr., C. E. Johnson, and Roger B. Shepard — were added to the board, with Johnson as treasurer. Then, on August 26, 1929, the Minnesota interests took over. Richard Lilly, a St. Paul banker, was named president, and A. R. Rogers, a Minneapolis lumberman, became chairman of the board.

Investment banking houses of St. Paul, Minneapolis, and Milwaukee offered a hundred thousand shares of Northwest Airlines stock in the open market. Would the public

invest in this new industry, this new company? It would. It did. The bond issue was sold. The base of aviation stock ownership was greatly broadened. Investors scattered throughout the nation now hold more than 1,200,000 shares of common and preferred stock in Northwest Airlines. What started as a sort of Minnesota stepchild has become a national and international institution.

Northwest Airlines observed its silver anniversary two years ago. But it is not living in the past. It is looking ahead to greater things for the future. It is buying new airplanes. It has applied for new routes in southeast Asia which would add some thirteen thousand miles to its route structure. It has also applied to the Civil Aeronautics Board for routes to strengthen its domestic structure. It expects to keep up with every forward development of the Air Age. Northwest Airlines has been and is a Minnesota product. It hopes to continue that identity.

*IN introducing the third speaker, Professor Upson of the department of aeronautical engineering in the University of Minnesota, Mr. Chaney called special attention to his widely known work in aircraft construction and with lighter-than-air craft. Professor Upson here reviews Minnesota's spectacular contributions to aeronautical science, both through its university and its commercial organizations.*

## Aeronautical Science

RALPH H. UPSON

THEORY without experiment is barren, and experiment without theory is blind, but together they can work miracles — the miracle of human flight itself, of speed exceeding that of sound, of reaching alti-

tudes above almost all the atmosphere, of flying distances comparable to the size of the earth. It was the realization of what co-ordinated research can accomplish that caused Professor John D. Akerman of the University of Minnesota department of aeronautical engineering to take over the Gopher Ordnance Works, now the university's Rosemount Research Center, in 1947.

There, in one building, you can see a wind tunnel in which a model aircraft or missile can be tested at any desired air speed up to and beyond that of sound, to nearly a thousand miles per hour, as well as two other tunnels that take the speed on up to about five times that of sound, all in continuous flow for as long as required. In another building are two intermittent type tunnels that will be capable of speeds up to more than eight times that of sound. Outside are large open jet tunnels in which full-size missiles or power plants can be tested.

For observation of the air flow and the forces it creates, special photographic, mechanical, and electronic equipment, largely developed in adjoining laboratories and shops, is available. Still another building houses the offices in which the theoretical work is done; there the tests are planned and the results co-ordinated and interpreted.

Thanks to this university research center and others like it, there has recently been a veritable explosion of aeronautical progress, marking an advance as great in a few brief years as in all preceding centuries. Whereas fifteen years ago sustained flight approaching the speed of sound—that is, sonic speed—was generally thought impossible, this barrier has now been passed, and we are entering into a new “supersonic” regime ruled by new laws and new techniques.

It may well be asked: “What is the sound barrier that constitutes such an important obstacle, such a dividing line between the old and the new?” It is far more than a merely convenient reference point,



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#### INFLATING an early plastic balloon, 1936

like zero on a thermometer. The speed at which sound is transmitted through the air is that at which the slightest pressure disturbance travels and makes itself felt. But what if the source of disturbance is traveling at an even greater speed? Instead of sending out continuous pressure signals in the direction it is moving, it pushes out concentrated waves of thunderclap intensity.

To use another example: How does the air in front of an ordinary airplane wing get out of its way to flow smoothly around it? The same pressures, not necessarily audible but still there, force the air to deflect. If you sound your automobile horn to warn



a pedestrian ahead, the warning is effective as long as the sound message travels faster than you do. If, however, you are traveling faster than sound, the pedestrian will be run over before he hears anything. Thus it is no wonder that as supersonic speed is reached, a new type of flow appears, with air-shattering shock waves, and with generally far greater demands on thrust and power.

Among the major recent projects at Rosemount has been a study of surface shock waves and of methods by which their pernicious build-up of pressure can be relieved—for example by sucking part of the displaced air into slots in the surface of a missile or other moving object. As might be expected, much of the work done in the supersonic field is on missiles, and it remains highly classified. In a general way, however, it may be said that the big problem is to get the desired performance without excessive loss of power in shock waves and other forms of energy dissipation. In addition to the university, the recently organized FluiDyne Engineering Corporation of Minneapolis, which has available excellent supersonic test facilities, is working in this field.

Another basic problem faced by the aeronautical engineer is that of minimizing and dealing with the very high temperatures developed by air reaction at high speed. A familiar illustration is the heating of meteorites as they enter the atmosphere. Such problems are being particularly studied by Research, Incorporated, recently organized in Minneapolis. Still another group, Research Associates of St. Paul, specializes in electronic devices. These in turn are vital components of control and instrumentation, the field in which the Minneapolis-Honeywell Regulator Company is the national leader.

One of the surest ways of minimizing the terrific penalty imposed by air forces at high speed is by simply flying where there isn't much air—in other words, at high altitude. Minnesota agencies have done pio-

neer work in the exploration of the upper air. In this field, the most effective method of doing the research job has been by free balloons. Through their use, isolated studies can be made of the air constituents and physical properties, of solar radiation, of cosmic rays, and of horizontal and vertical currents—nearly all the items that affect aircraft performance and organic survival.

ALTHOUGH the first balloon flights in Minnesota were made nearly a hundred years ago, their scientific use is much more recent. Sparked by the ideas and initial stratosphere observations of Dr. Jean F. Piccard, the first practical balloon of plastic material was made at the University of Minnesota and launched from the stadium in 1936. General Mills of Minneapolis since has gone into the manufacture and further development of these balloons on a large scale. Important additional theoretical and experimental research has been contributed by members of the university physics staff and other departments, and practical construction has been furthered by another industrial group, Winzen Research, Incorporated, of St. Paul. In fact this particular field of aeronautical development has become, by virtue of intensive application, almost a Twin City monopoly. It is a common performance for the gigantic unmanned balloons manufactured and released in this area to rise to heights of more than twenty miles. The small “pillow balloons” recently used to carry messages behind the Iron Curtain were made of the same material as that used for the local giants.

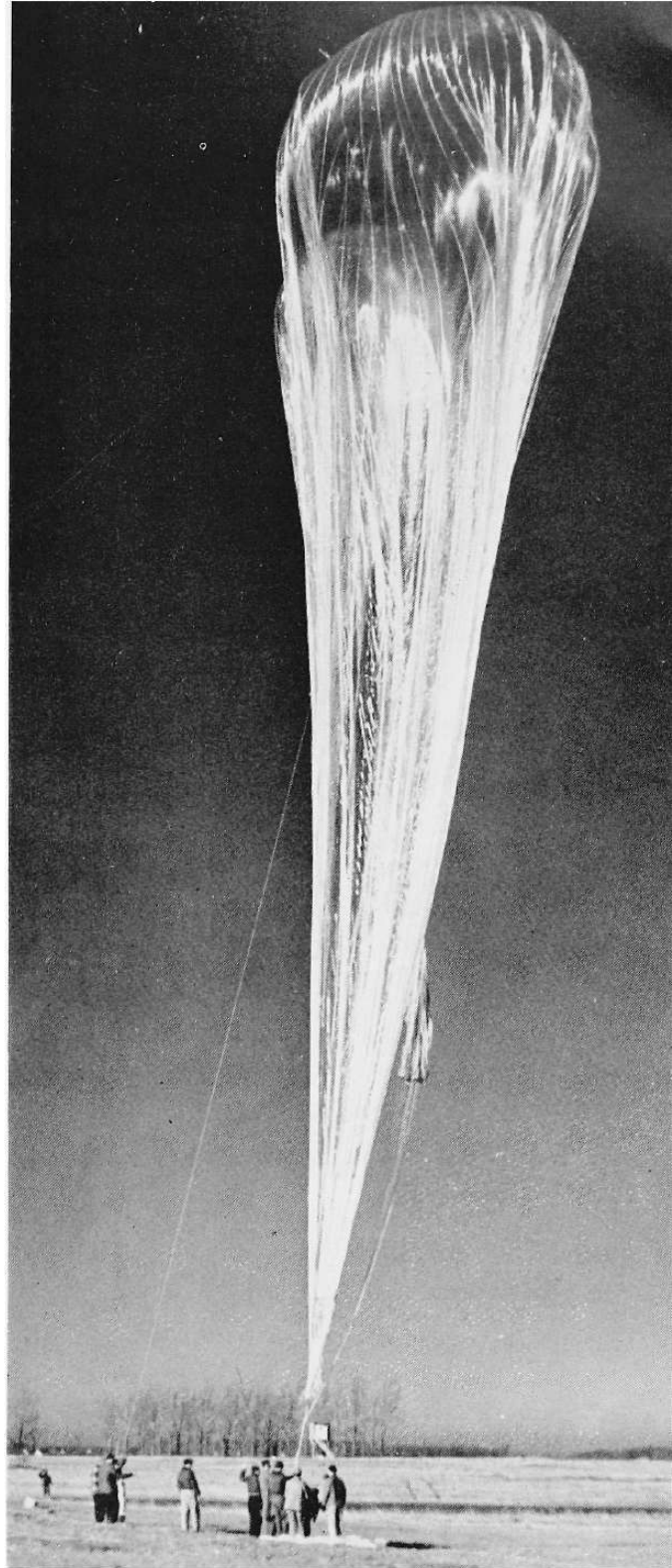
How best to remove ice and snow from parked aircraft is the subject of a study, of particular interest to the Air Force, now in progress at the University of Minnesota. It takes advantage of the state's winter weather. Clothing and oxygen equipment have been specialties of the Strato Equipment Company of Minneapolis. Other recent Minnesota contributions to the aeronautical sciences have been in the structural field. They relate to such questions as how

to get more strength with less weight and how to deal with atmospheric gusts.

The G-suit, one of the outstanding developments of World War II, was largely a product of medical and mechanical research conducted by the personnel of the Mayo Clinic at Rochester. This is a pressurized suit that resists the tendency of a fighter pilot's blood to be forced into his lower extremities in a tight maneuver. The story goes that the Germans first tried to develop such a suit, but failed and gave up the effort as impractical. Gradually they became aware that American jet pilots were running rings around them, not because of higher speed but because they could make turns and pull-outs that would result in complete unconsciousness for the Germans who tried them. Still obsessed with the idea that a G-Suit was impractical, the Germans thought we had discovered some wonder drug that we fed our pilots.

For a considerable time, no American fighter was brought down intact in German-held territory. When this finally happened, the strange-looking suit was discovered. It was sent to Goering. He could make nothing of it; neither could Hitler. By mere chance, it was seen by a man who had worked on the earlier German project. "Gott in Himmel," he shouted, "They have a G-suit that works!" It was immediately copied and put into production. Soon the Germans had enough such suits for every pilot in the *Luftwaffe*. But by that time American air superiority was so complete and German transportation was so disorganized that the suits could not be distributed and delivered to the airports. The German suits were still in the stockpiles as the war drew rapidly to a close.

WHAT of the future? Dr. Hugh L. Dryden, director of the National Advisory Committee for Aeronautics, recently stated conservatively that speeds of aircraft would probably be increased as much in the next five years as in all aviation history up to World War II. A combat aircraft that will



COURTESY OF GENERAL MILLS, INC.

LAUNCHING a modern giant plastic balloon

travel at twice the speed of sound is already being designed, and there is no end in sight. Predictions are easy. It is still easier to cite an old one that is well on the way to fulfillment. In a paper published fifteen years ago, I predicted that it should be possible to support a properly designed balloon in air only one one-thousandth of normal air density. This is the density of air about thirty miles above the earth, and we are now nearing that goal.

Anything much higher would have to be reached by rockets or "space ships,"

which, if not air supported, can hardly be classed as aircraft. But even rockets destined for outer space must start through the air and ordinarily return through it. Thus aeronautical science remains of vital importance in their operation. By keeping our sights on these and allied requirements, and by continuing co-ordination of theory and experiment — with a liberal dash of resourceful imagination — we can ensure for aeronautical science in Minnesota and in the nation as a whole a future of high promise.



## THE PIONEER

MILDRED B. LEE

*We turned the plodding oxen from the trail,  
And all at once it seemed to me  
Our creaking wagons were tall ships asail  
Upon a boundless emerald sea,  
Where grassy waves, cloud shadowed, ran to meet  
And swirl and break about the oxen's feet.*

*This is our land, we said; remote, unchanged  
In swell and slope since time began.  
Here buffalo and antelope once ranged,  
But on its virgin soil no man  
Has set his mark. So we believed, until  
Our mother found beyond that rounded hill,  
Untended and alone,  
A tame rose blooming by a flat white stone.*

MRS. LEE frequently contributes verse to *The Moccasin*, the quarterly of the League of Minnesota Poets. A resident of Granite Falls, she is a former president of the Yellow Medicine County Historical Society.



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