FAIRCHILD



P H O T O A L B U M

To Gears at Fairchild

IT WAS A CLASSIC CASE OF THE CHICKEN AND THE EGG. In 1919, Sherman Fairchild had invented a fast, efficient between-the-lens shutter and timing mechanism for handling roll film, making accurate aerial photography possible for the first time. Since aircraft of the day weren't sophisticated enough to use the full capabilities of his new aerial camera, Fairchild designed his own airplane. Just eight years later, the Fairchild Aerial Camera Company and Fairchild Aviation became The Fairchild Aviation Corporation. The year was 1927. This year, that company, which was later renamed Fairchild Camera and Instrument Corporation, celebrates its fiftieth birthday.

In this anniversary photo album, we're recalling some of the highlights of our company's evolution from the barnstorming days of aviation to the forefront of the second industrial revolution. Join us!

COMPANY HISTORY

Fairchild Camera and Instrument Corporation's history represents more than a half century of technical and business innovation.

In both size and product mix, Fairchild has dramatically changed from its origins as a supplier of aerial cameras and aviation equipment. Fairchild has grown from



Sherman Fairchild's between-thelens shutter made aerial photography practical for the first time, but he couldn't interest anyone in manufacturing it. So in 1919, he opened his own camera manufacturing operation in the loft of a garment factory on New York's East Side.



The winged horse dominated Fairchild's first logo.

the manufacturer of a single product—an aerial camera—to a multi-division corporation. Although some of the company's product lines still retain strong links with the past, approximately 70 percent of the corporation's sales today is derived from semiconductor components.



Not exactly as easy to handle as today's pocket camera, the early aerial camera worked because it combined a long enough focal length with Fairchild's new shutter, capable of a shutter speed of 1/1000 of a second.



Where It All Began . . .

Fairchild's flagship product, the aerial camera, has made quiet, but nonetheless spectacular progress since its inaugural flight in the twenties. Ninety percent of all aerial cameras used by the Allies in World War II were of Fairchild design or manufacture. When the United States set out to explore the moon in the early 1970's, the Fairchild aerial camera was there to record it.

Still the leaders in the military reconnaissance market, most Fairchild cameras of today photograph from horizon to horizon at high aircraft speeds. They produce high quality imagery from a range of a few hundred feet to several miles.

Early aerial cameras operated on basically the same principle as does your family camera—they recorded a small scene with fixed optics. Major advances have occurred since that time in film, lenses and equipment designs.



Sherman Fairchild, right, readies one of his first cameras for a flight.



This jovial flight crew had more cabin room and a smoother ride in Fairchild planes than in earlier aircraft. Airplane stability also eliminated most of the picture distortions caused by rocky rides in less sophisticated aircraft.

A significant innovation in camera design occurred in the early 1960's with the introduction of the panoramic camera principle in which a rotating optical prism was mounted in front of the lens and the film moved in synchronization with the image during picture taking. This made it possible to obtain 180 degree—horizon-to-horizon photography at the rate of six photographs per second.

The camera is compact and lightweight and its inherent features permit much better performance and coverage than the previous frame cameras. This type of camera was developed just before the Cuban missile crisis, and provided the military services with valuable information during that period.

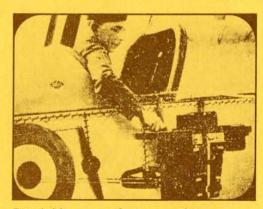
Al Arena, Manager of Photo Systems for the Imaging Systems Division in Syosset, has been a part of the development of aerial camera technology at Fairchild. One of the company's longestservice employees, Al joined the company forty years ago when the primary business was manufacturing cameras. Though Fairchild grew into a multi-division com-



Rented planes such as this were used for early aerial survey flights. Because aircraft of the day couldn't take full advantage of his camera's capabilities, Sherman Fairchild began designing his own in 1924.

pany with a wide variety of products, Al elected to stay with camera development, which he now heads.

"With the panoramic camera," Al points out, "we get excellent photography with tremendous coverage at high speed. Reconnaissance photos are able to cover a large area with a lot less film and in a lot less time than with framing cameras. In a military situation, where photographing the target on the first pass is critical, the advantage of the panoramic photograph is obvious."



Fairchild cameras first saw military duty in World War I. The camera was mounted on the outside of the fuselage so it could be operated by the pilot.

TO Gears at Tairchild

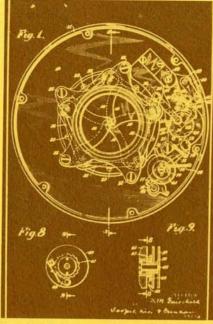


A millionaire in his early twenties because of his father's early ownership of the fledgling IBM, Sherman Fairchild turned several of his inventions into successful business ventures of his own.

One basic characteristic instilled by the company's founder, the late Sherman Mills Fairchild, remains: Fairchild Camera has traditionally and consistently been at the forefront of technically-oriented endeavors.

Sherman Fairchild's first independent corporate undertaking—from which Fairchild Camera and Instrument Corporation evolved—occurred in 1920 with the incorporation in New York of Fairchild Aerial Camera Corporation.

The company's original business primarily involved developments based on Sherman Fairchild inventions. Foremost among these were the between-the-lens camera shutter, which made aerial photography practicable; the closed-cabin airplane; the folding-wing airplane; and hydraulically operated aircraft brakes and landing gear.



Fairchild's first major success was the between-the-lens shutter, which could take a picture in ½1000 of a second. It was the first shutter to operate fast enough to take good aerial photographs without destroying the camera. The patent Fairchild received on this invention was the first of more than 30 patents he received during his life.

The various businesses which were the outgrowth of Fairchild Aerial Camera Corporation were incorporated in November of 1927 as Fairchild Aviation Corporation.

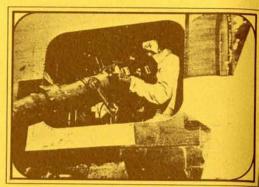
As the business continued to grow, Sherman Fairchild in 1936 spun off the aircraft and engine manufacturing operations into a separate company, now known as Fairchild Industries (previously Fairchild-Hiller Corp.).

The aerial camera and other electronics-oriented segments of the business continued as a separate entity, and in 1944 were renamed Fairchild Camera and Instrument Corporation.

Although based in New York at the time, what is probably Fair-child Camera's most historic business development occurred in California in 1957 when the company sponsored a group of young scientists involved in solid-state electronics. This group became the nucleus of Fairchild Semiconductor.



Where It All Began . .

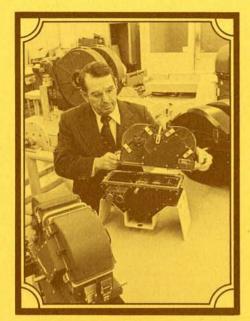


Fairchild Camera and Instrument Corporation designed or manufactured ninety percent of all the aerial cameras used by the Allies during the second world war.

Unlike the hand-held model Sherman Fairchild first exhibited, modern-day aerial panoramic cameras can weigh as much as several hundred pounds depending on the focal length and film capacity. Lens focal lengths have typically been relatively short, averaging three to nine inches for low altitude missions and 24 inches to 48 inches for high altitude missions. Currently, however, the emphasis is on developing even longer focal length cameras which will enable the user to photograph fine detail at long "stand-off" distances from the aircraft.

"We're developing what we call Long Range Aerial Photography (LORAP), which will include a lens with a focal length of up to 72 inches," Al says. "The challenge in aerial photography is to design equipment that can accurately photograph the earth at the highest possible altitude."

Imaging Systems still manufactures the original framing-type camera for some applications, and it was this camera that went to the moon. Three Lunar Mappers, as the cameras were called, made various Apollo program flights.



More compact and lightweight than its forerunner, today's aerial camera can capture horizon-to-horizon shots at six photographs per second. Al Arena, Manager of Photo Systems for Imaging Systems Division, has been developing aerial camera technology for nearly all of his forty years at Fairchild.

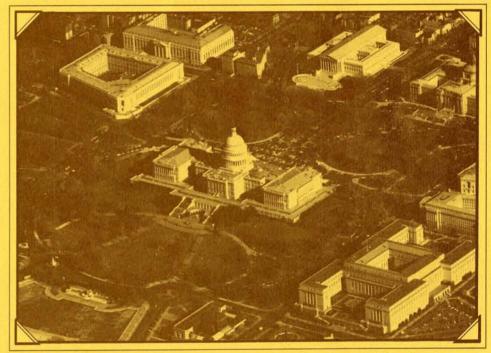
"NASA needed a metric camera system that could photograph the moon from space and also take a position reference with the stars," Al says. "So we developed essentially two cameras in one, which simultaneously photographed the moon and surrounding star field, enabling NASA to precisely locate moon features in the photographs through time measurements and star positions. We sent three cameras up, and they all were successful."

Breaking new ground is never without its snags, of course, and one of Al's recollections of Sherman Fairchild involved an unsuccessful attempt to ignore one of these snags.

"He was a very bright guy," Al recalls, "and it was tough to get imperfections past him. Once we were giving him a review of our products, and I had included a photo taken by one of the first panoramic cameras. There were some markings in the photo because the film hadn't been properly synchronized with the optics, but it was the only example of the camera's photography on hand, so I showed it anyway. I



This 1921 picture of the New Jersey shore was the first aerial photograph ever sold by the Fairchild Aerial Camera Corporation. The camera's altitude (about 1,000 feet) and grainy photo appearance are in sharp contrast to the 1975 photo shown below.



Capitol Hill and the surrounding Federal buildings are sharply defined in this 1975 aerial photo, even though the picture was shot from an altitude of 10,000 feet and a slant range of $4\frac{1}{4}$ miles.

tried to play it down, but he took one look at it and told me what the problem was. He was very capable that way."

Irving Doyle, recently-retired Federal Systems Group Technical Director, echoes Al's recollections. Irving, who was with Fairchild 41 years and holds numerous patents for his work in aerial photography, recalls that he and Sherman Fairchild "were both impatient when the technology of the day didn't provide the instrumentation necessary to carry out our ideas. What started as gadgets sometimes resulted in technological breakthroughs."



Fairchild Semiconductor, like its parent corporation, also was founded on the basis of a technological breakthrough. In 1957, a group of scientists and engineers developed a method of massproducing silicon transistors using a double diffusion technique and a chemical etching system called the "mesa" process. Enormous business potential existed, but financial backing was needed. Fairchild Camera and Instrument was willing to invest, and Fairchild Semiconductor was born.

The new company, profitable in only six months, has continued since its inception to be a leader in technology. In fact, Fairchild Semiconductor, now the Components and LSI Groups, has been the spawning ground for much of today's semiconductor industry.

In 1959, Fairchild announced the development of the Planar* process, in which all diffusions are made under layers of pure silicon dioxide, ensuring that critical semiconductor junctions are never exposed to surface contamination. As a result, all semiconductor electrical characteristics that are sensitive to surface conditions are stabilized and improved.

Fairchild's Planar process paved the way for such technological advances as the integrated circuit. Today, almost all semiconductor devices are manufactured by the Planar process under licensing agreements with Fairchild.

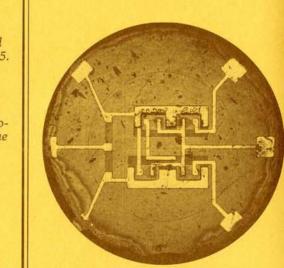
Fairchild holds numerous patents in every field of semiconductor technology, and has never lost the leadership established by the development of the Planar process. Among other significant developments, Fairchild was the first to develop the use of diffusion techniques for isolating integrated circuit components on a circuit chip. The company also holds the basic patents on the metal-oxide-semiconductor (MOS) process for making transistors and integrated circuits, and developed

Since its entry into the semiconductor industry Fairchild has been an undisputed technological leader. The very origin of the semiconductor operation was based on a technical development—the mesa process for mass-producing silicon transistors. Soon after entering the infant semiconductor industry Fairchild scientists invented and perfected the Planar process—still the basic process used for making the majority of semiconductor devices.

Over the years Fairchild has contributed many technical breakthroughs, and this leadership continues today. Just recently Fairchild introduced a combination of its Isoplanar processing techniques with integrated injection logic that is already being used in the world's fastest high-density memory—a 4,096-bit bipolar memory based on this process, called I³L™



An Electronic Revolution . . .



This resistor-transistor logic (RTL) product, introduced in 1961, was the semiconductor industry's first integrated circuit available as a monolithic chip.



This digital watch advertisement was one of the first to introduce Fairchild consumer products in 1975. The Consumer Products Group brought out men's and ladies' LED watches that year, and has since added LCD watches, a programmable television game and digital clocks.

*Planar is a patented process of Fairchild Camera and Instrument Corporation.

In the consumer market, Fairchild quickly established itself as one of the world's leading suppliers of solid-state watches, and is now supplementing that effort with the introduction of the world's first programmable home video game.

The internal structure of a digital watch is a good example of the power of solid-state technology to simplify and increase the reliability of a countless range of products that previously were based on mechanical components or combinations of electrical and mechanical parts. After 2½ centuries of development and refinement, the mechanical watch today

the electronic model.

It is this type of simplification of design, with the related increase in reliability and decrease in cost, that enabled the semiconductor industry to grow from infancy to a multibillion dollar worldwide industry in less than two decades.

remains a complex assembly of

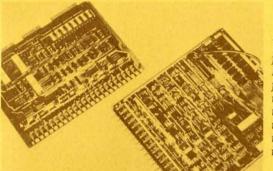
numerous finely machined parts

compared with the simplicity of

For the last year or so, much of the development effort in the industry has centered on a "mysterious" group of products known collectively as the microprocessor. Essentially, all a microprocessor really amounts to is a small but powerful computer system built into one or more tiny "chips" of silicon. Yet, for the first time, these highly complex integrated circuits offer users a solution to a wide range of equipment requirements, using solid state devices that are extremely low in cost.

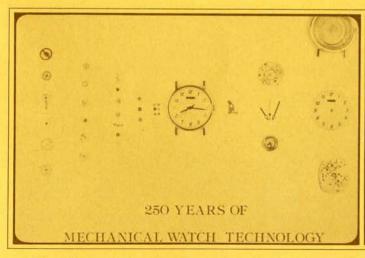
They are inexpensive because they can be built in very high volume to meet a wide range of needs simply by changing the programming information stored in other memory circuits associated with the microprocessor or "microcomputer" chips.

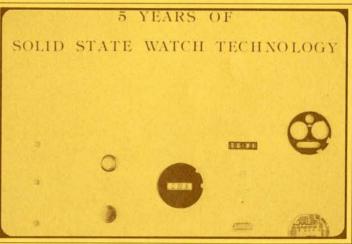
Fairchild has established a strong position in this new field with its F8™microprocessor design, which offers a very low cost



The IBM 701, below, was the world's first commercially available computer. Introduced in the mid-1950's, it sold for \$1 million. Fairchild's F8 microprocessor, shown at left in a two-board configuration, has the same information handling capabilities as the entire 701 system. The F8 was introduced in 1975.







Though conventional mechanical watches have been around for hundreds of years, they still contain the numerous complicated parts shown at the left. The digital watch components at the right show the capability of solid state technology to simplify products previously based on electrical or mechanical parts.



the silicon gate technique for making MOS devices smaller, faster and more economical. Today, the company ranks as the third largest U.S. supplier of semiconductor devices.

In 1975, Fairchild entered the consumer electronics field with the formation of the Consumer Products Group and the subsequent introduction of a full line of electronic digital watches. By 1976, Fairchild had become one of the largest digital watch companies in the world, and had expanded the consumer line to include digital clocks and the first programmable electronic television game.

As the pervasiveness of electronics, particularly semiconductor technologies, has increased during recent years, Fairchild Camera has steadily adjusted its operations to serve growing computer, industrial and consumer markets.

The company has manufacturing facilities in five states and nine foreign nations, plus a worldwide sales and distribution network. Fairchild manufacturing and sales activities are divided among seven domestic and foreign groups and divisions.



In 1968, Fairchild's corporate headquarters was moved to Mountain View, California from Syosset, New York.

answer to many designers of industrial, commercial and consumer systems. In fact, the F8 microprocessor is the heart of Fairchild's own video game system.

The cost of the microprocessor is so low that it can even be used in home appliances such as washing machines and ovens. The illustration of a typical washing machine control panel may be familiar to any "do-it-yourself" repairman who has encountered trouble with such a system. Yet all of these complex mechanical timers and relays, with their associated knobs and switches,



An Electronic Revolution . . .

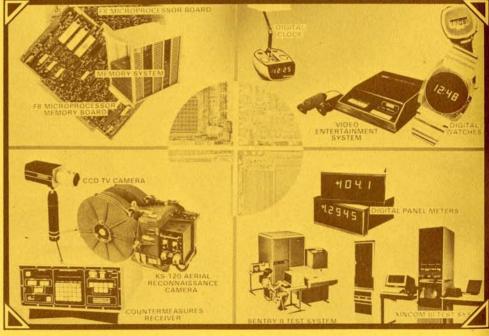
can now be replaced by one F8 circuit and a few other semi-conductor components. And, since all of these parts are solid-state devices, there is nothing to wear out, clog up or get out of adjustment.

Perhaps the most dramatic example of the impact of semiconductor technology on our society is the illustration of the IBM 701, the world's first commercially available computer.

This machine, introduced in the mid 1950's, just about the time Fairchild was entering the semiconductor business, sold then for \$1 million. Yet it represents about the same information handling capabilities as today's F8 in the board configuration shown. This F8 system sells for about \$300. The other principal difference is that the F8 can execute a computer instruction in about ½10 the time it took the IBM 701.



The complicated workings of a conventional washing machine control panel can now be replaced by a Fairchild F8 microprocessor and a few related parts.



This "family portrait" of products based on innovative Fairchild technologies includes, bottom left, products from the Federal Systems Group, top left and bottom right, from the Instrumentation & Systems Group, and top right, the Consumer Products Group. Products manufactured by the Components Group are used in all the systems and end products shown.



AN EARLY FAIRCHILD AIRPLANE IN GOOD COMPANY....

Editor's Note:

If you're a sucker for American history like I am, Washington, D.C. can give you a real high. Imagine the likes of the genuine Declaration of Independence (a little the worse for wear) or the original Star-Spangled Banner, within walking distance of each other. So, as we set out for the Smithsonian Institution's new Air and Space Museum one day, I was making secret plans to dash through the place (just a bunch of old airplanes, said I-you've seen one...), leave my companions and head for the National Archives or the National Gallery of Art.

They both had to wait until

another day.

The National Air and Space Museum is magnificent. The air and space craft visible through five-story tinted windows draw you in from Independence Avenue on the Federal Mall like a magnet. Inside, there are two display levels

A visitor to the Air and Space Museum buildings captures the imposing exterior on film. The museum dominates a section of the Federal Mall leading to the Capitol.

stuffed full of artifacts commemorating the history of flight.

Aircraft dominate the skylighted ceilings of three floor-toroof exhibit halls. In the corner of one of them hangs a small airplane that made the first international airmail flight in 1927. That plane was built by Sherman Fairchild.

Walter Boyne, Curator of Aeronautics, was the man in charge of "choreographing" the hanging of all the aircraft on display at the museum. He's also an early airplane buff and an authority on early Fairchild aircraft. Recently, he shared the story of the museum and the Fairchild FC-2 with me.

Although Fairchild Camera and Instrument and Fairchild Industries, which makes aircraft, have long been separate companies, it was an honor to see something developed by the founder of our company displayed in such prestigious surroundings. And right next door to the Spirit of St. Louis.

Three million people came through the door of the National Air and Space Museum in Washington, D.C., in the first three weeks of its operation last summer. Over Labor Day weekend alone, attendance topped one million. On a heavy day, the crowd has matched attendance at the Super Bowl.

Officials at the Smithsonian Institution's newest attraction have been pleasantly surprised by all this, considering their original projections of seven million visitors per year. But the main attractions are guaranteed to bring at least a patriotic twinge to every visiting American.



Crowds have been pouring through the doors of the National Air and Space Museum at record rates since the July, 1976 Bicentennial opening. The idea for the museum was first conceived in 1946, when Congress passed a law establishing a place to "memorialize the national development of aviation."



Progress in passenger, mail and cargo aircraft is evident in the Gallery of Air Transportation. As the first closed-cabin airplane, the Fairchild, upper right, was the forerunner of larger aircraft to come, including the Eastern Airlines DC-3 shown center. The DC-3 is the largest airplane suspended in the museum.



The Components Group, with plants in Mountain View, San Jose, San Rafael and Healdsburg, California, South Portland, Maine and Hong Kong, Korea, Singapore and Indonesia, manufactures semiconductor devices for the computer, industrial, automotive and consumer markets.

The LSI Group supplies memory and logic circuits and charge-coupled device products to computer, consumer and broadcasting markets. LSI operates plants in Mountain View and Palo Alto, California and Wappinger Falls, New York.

Consumer products and related components are made by the Consumer Products Group, with plants in Palo Alto and Santa Clara, California, Frankfurt, Germany and Sydney, Australia.

Government products and industrial systems are produced in two facilities headquartered in New York. The Federal Systems Group, Syosset, New York, produces space and defense systems and products for the federal government.

The Industrial Products Division, with manufacturing facilities in Commack, New York and a subsidiary in Traverse City, Michigan, produces audio-visual and aviation products for commercial, industrial, educational and government customers.



Plants in San Jose and Chatsworth, California, manufacture the products of the Instrumentation and Systems Group. This group markets semiconductor test systems and microprocessors to component and original equipment manufacturers.

Fairchild's International Division directs marketing and sales of company products throughout Central and South America, Europe, and the Pacific region.

In October, 1972, the company joined with TDK Electronics, Ltd. of Japan to form a joint venture company, designated TDK-Fairchild Corporation, which markets semiconductor products in that country.

In 1975, Fairchild and Applied Materials, Inc., Santa Clara, California, formed Great Western Silicon Corporation. The joint venture will supply semiconductor grade polysilicon from a plant in Chandler, Arizona.

Fairchild Camera is committed to remaining a company of innovation, but a corporation in which new business directions are pursued only if they are complementary to the company's longrange goals.



The Stars and Stripes, probably the most famous FC-2, was selected by Commander Robert Byrd to make the first flight into Antarctica in January, 1929. This plane is currently in storage at the Smithsonian.

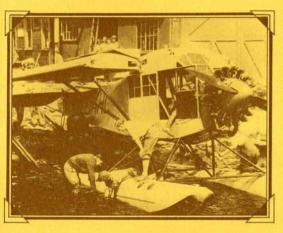


Spanning the brief but phenomenal history of flight in America, the main "Milestones of Flight" gallery exhibits the Wright Flyer, the Spirit of St. Louis (personally donated by Charles Lindbergh), and the first Gemini capsule to orbit the earth. Down the hall towards the U.S. Capitol stand the Skylab Orbital Workshop and the back-up units of the Apollo Lunar Module and Orbiter. Smaller areas surrounding the three main halls are devoted to everything from balloon flight to Apollo spaceshots.

The impact of the museum comes not only from its displays, but also from its architecture. Illuminated primarily with natural light, the three main display halls are as high as the building (nearly 90 feet) and covered with a roof resembling small glass bubbles, designed to make the aircraft suspended beneath them appear to move.

Cobwebbing the ceiling are slim steel pipes and cables strong enough to support twice the weight they hold, but structured so they fit unobtrusively into the building's design.





The FC series had a great impact on transportation in the Canadian bush country, because of its good performance on floats and skis. Many areas previously inaccessible by air were opened up by the Fairchild planes.

Hanging just above the museum's largest airplane, a DC-3, in the skylit Air Transportation Gallery is the Fairchild FC-2, one of the first airplanes built by Sherman Fairchild. The FC-1, built in 1926, and the FC-2, built the next year, were developed to be efficient aerial camera planes, cruising long distances at high altitudes.

The FC-1 made history—it was the first aircraft with a closed cabin, folding wings and flaps for greater stability. More innovations came with the FC-2, which was the first plane equipped with hydraulic landing gear and brakes.

The basic design of the Fairchild plane was so good that it soon was being used to carry passengers and speed mail delivery. The FC-2 on display made the first scheduled passenger flight in South America in 1927. That same year,

it carried the first international airmail from Key West, Florida to Havana, Cuba.

"Because the Fairchild plane has great technological and historic significance in aviation's development, it was a foregone conclusion that it would be part of the new museum," says Walter Boyne, Curator of Aeronautics. "By developing a closed-cabin, fabric-covered steel plane, Sherman Fairchild took the first step forward from the fabric-covered open cockpit biplane we associate with the Wright Brothers.

"It's not generally known, but Fairchild went from zero production to being the second largest commercial aircraft producer in the world in about nine months with his new aircraft, because it offered things other contemporary airplanes didn't. It could seat five people including the pilot, had

To prevent damage to their many irreplaceable aviation artifacts, the staff of the Air and Space Museum choreographed and rehearsed each aircraft hanging twice before the actual hoisting was done. Left, the crew readies the Fairchild for suspension. The FC-2 carries the name Panagra, which was part of Pan American World Airways in the twenties. Charles Lindbergh once flew a Fairchild plane around the country and an FC-2 accompanied Lindbergh and the Spirit of St. Louis on a nationwide tour after his transatlantic flight.

folding wings, and was basically a strong, safe airplane."

The Smithsonian's FC-2 carries the name "Panagra," which was an early offshoot of Pan American World Airways and later became the parent company of Braniff Airlines. It was donated to the museum by Braniff, and Walt recalls "was just tucked inside a jumbo jet and flown up here."

Later notable FC-2 models included the one chosen by the Department of Commerce to accompany "Lone Eagle" Charles Lindbergh on his triumphant cross-country tour following his 1927 transatlantic flight.

But perhaps the most famous is the FC-2 called "Stars and Stripes," which made the first flight into Antarctica in January, 1929, with the Robert Byrd expedition. That airplane is now in storage at the Air and Space Museum's Silver Hill, Maryland restoration facility.

Though he never met Sherman Fairchild, Walt has formed an image of the man through his Smithsonian work and independent research for an Aviation Quarterly series on early Fairchild aircraft.

"It seems to me he was a classic American entrepreneur. He wasn't afraid to put up money for a venture he believed in—and he believed in the future of aviation. He also had the ability to pick out good people—people who could do the job well—then let them do it. Fairchild fostered the careers of some of the great minds of early aviation. I would have been honored to have known him."

MILESTONES IN



HISTORY

1920

Fairchild Aerial Camera Corporation is formed in the state of New York. 1927

Fairchild Aviation Corporation (later renamed Fairchild Camera and Instrument Corporation) incorporated in Delaware. 1936

Aircraft and engine manufacturing operations spun-off into a separate company, now known as Fairchild Industries (formerly Fairchild-Hiller). 1944

Fairchild Aviation Corporation adopted the present name of Fairchild Camera and Instrument Corporation.

1957

The corporation sponsored the formation of Fairchild Semiconductor Corporation at Palo Alto, California, for the development and production of silicon diffused transistors and other semiconductor devices. It became a wholly-owned subsidiary in 1959, and in 1961 became the Semiconductor Division.

1960

Planar process for semiconductor device manufacturing introduced.

1961

Fairchild introduces the world's first monolithic integrated circuit.

1968

Corporate headquarters is moved from Syosset, N.Y. to Mountain View, California. Federal Systems Group and Industrial Products Division remain in New York.

1971

Death of Sherman Mills Fairchild, founder of the company. 1971

Isoplanar process for semiconductor manufacturing introduced. 1975

Fairchild announces entry into the consumer products field with a line of men's and ladies' digital watches. Consumer Products Group formed.

F8 microprocessor announced.

1976

Introduction of the Video Entertainment System, a programmable television game, Fairchild's first consumer end product based on its F8 microprocessor.

