

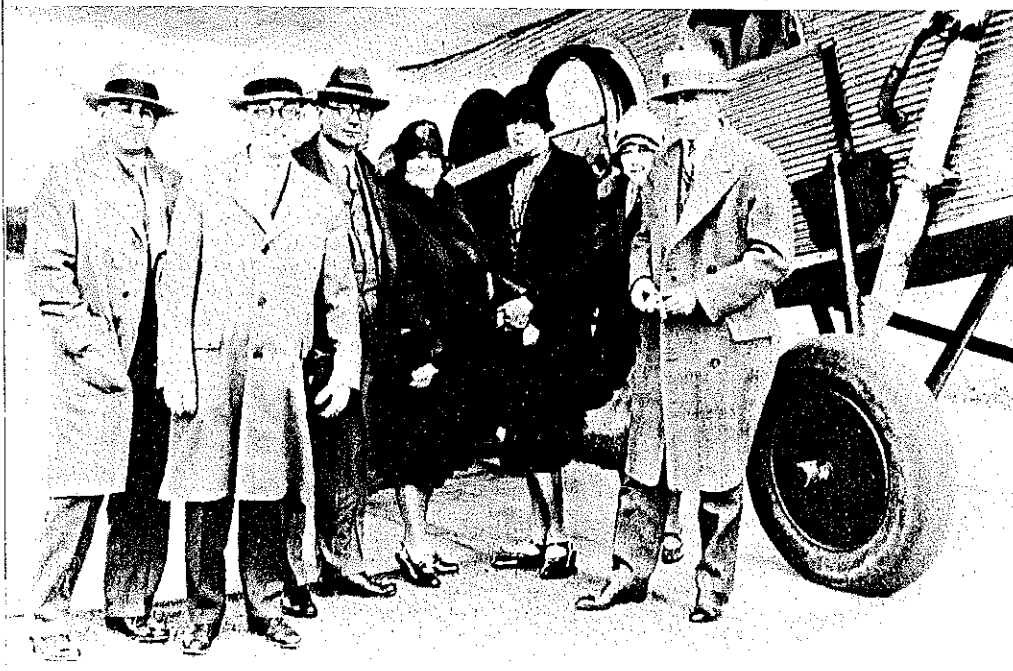
The move from wood and fabric to metal in the construction of airplanes marked a turning point in the history of full-size aviation. It took the courage of one of the world's most famous entrepreneurs and the brilliance of a young engineer to pull it off. This FF Rubber Scale model celebrates their achievements.

■ Karl Spielmaker



Miss Grand Rapids

Miss Grand Rapids touching down at the renovated Grand Rapids Airport. The sod runways were treated with chloride to hold down the dust raised by the brakeless, tail-dragging, metal-skinned 2-ATs. Stout and the Fords helped usher in a new era for the weary traveler.

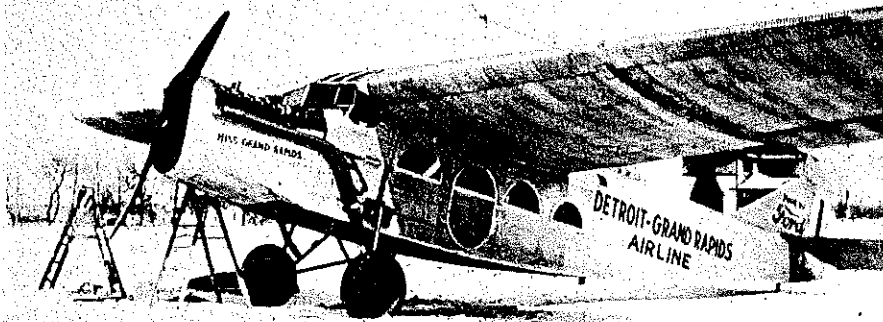


Well-dressed air travelers in 1926. All are wearing full-length coats, although the 2-ATs boasted of a heated cabin with "room comfort" that required no special winter clothing.

SIXTY YEARS AGO on July 31, 1926, a boxy, all-metal aircraft lumbered into the

DETROIT-GRAND RAPIDS AIRLINE						
ARRIVES	DUE	CITY	DUE	ARRIVES		
<i>In Comp.</i>	4:40	FORD AIRPORT	11:10	11:05		
	4:58	S. LYONS	10:51			
	5:10	HOWELL	10:39			
	5:34	LANSING	10:13			
	5:49	PORTLAND	9:58			
<i>On Time</i>	6:15	G.R. AIRPORT	9:30	<i>On Time</i>		
WEATHER REPORT						
FLIGHT	WEATHER	VISIBILITY	SKY	WIND	TEMP.	
WEST	<i>Fair</i>	<i>5 mi.</i>	<i>Clouds N.E. 15-</i>		<i>70</i>	
EAST	<i>Fair</i>	<i>4-6 mi.</i>	<i>Clear</i>	<i>E. 10 mi</i>	<i>65</i>	
REMARKS						
WESTBOUND.			EASTBOUND.			

The blackboard on the outside of the terminal wall provided more flight information than today's airport video screens . . . a benefit made possible with a one-plane airline.



Above: Freshly lettered with her new name, Miss Grand Rapids is readied for the first flight from Grand Rapids to Detroit, July 31, 1926. Left: Don Heagle at age 18 (in 1926) was the country's youngest holder of an A&E license; he poses in front of his charge.



sky in Grand Rapids, MI bound for Detroit. The flight marked the opening of passenger flying service from Grand Rapids to Detroit and the first regularly-scheduled airline service in the United States.*

Christened Miss Grand Rapids, the

*While it is true that the first airline passenger service operated in the Tampa-St. Petersburg area of Florida, this was only a "now and then" operation, with flights scheduled only when passengers or freight were ready to fly. United Airlines acknowledges that it traces its roots back to the Stout Air Service in Michigan, the granddaddy of all the airlines now consolidated under the United name. In 1960 United named its first Detroit to Los Angeles jet airliner "Mainliner William B. Stout."

plane was an eight-passenger corrugated metal monoplane with a span of 50 feet. It was the forerunner of the fabled Ford Trimotor which is also known as the Tin Goose.

The man behind the plane and the flight was a slight skinny fellow with thick glasses and a Groucho Marx moustache—the one and only William B. Stout, an air pioneer who deserves to be better remembered. Some regarded Bill as an impractical dreamer, but it was his innovative genius that brought about the all-metal eight passenger airplane that made history in 1926.

Bill designed his first airplane, a thick-winged, cantilever monoplane named Batwing, just after World War I. Powered by a 150-hp Hispano Suiza, the Batwing performed impressively enough for the Navy to engage Stout to design a twin-engined torpedo plane. In his new design he incorporated all-metal construction. Although this was not the first all-metal aircraft built in the U.S., it was a first for Bill, who quickly became an early advocate of all-metal construction and pioneered many of the metal forming techniques used in the budding industry.

During the evaluation, one of the Navy's test pilots cracked up the new torpedo plane. The plane itself was a total wreck, and the Navy decided to reject the design. Stout lost over \$100,000 on the project. It was "The bluest day of my career," he would later write. The truth is that it was the luckiest day of his life. That misfortune led



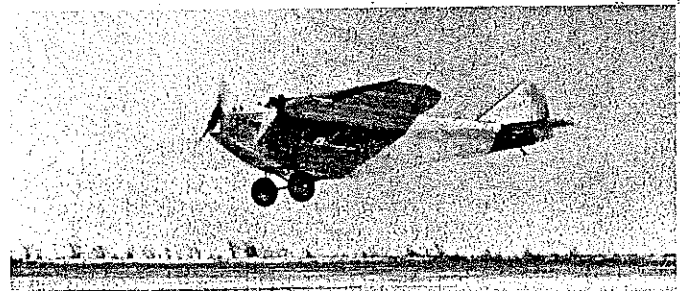
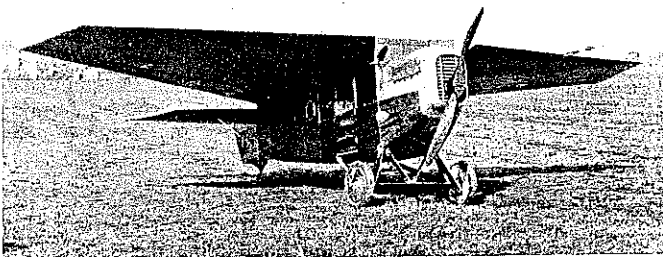
Henry Ford (Left) and Bill Stout. This is a rare photo taken of the two men during the early design and development stages of the single-engined Stout "Air Transports." Picture from the Collections of Henry Ford Museum and Greenfield Village.

him to write a now-famous letter to a hundred or more prominent businessmen.

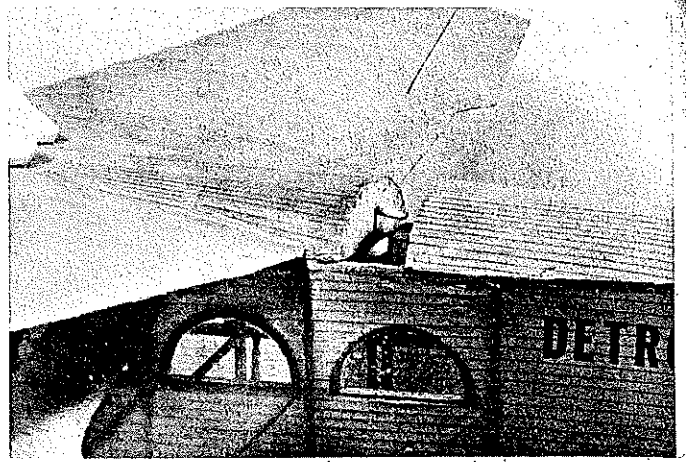
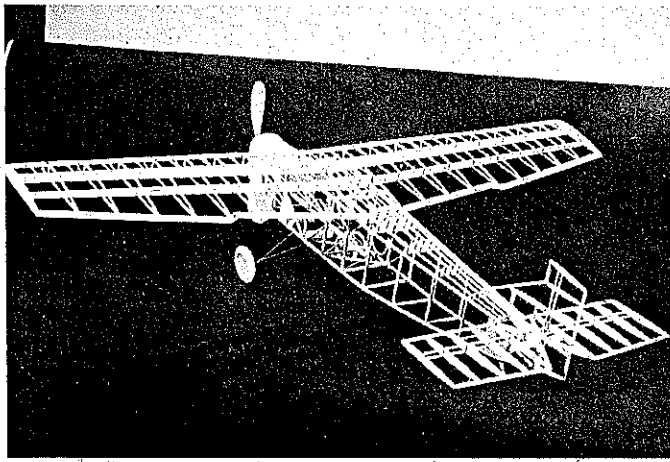
In 1923 Edsel Ford was president of the vast Ford Motor Co. empire when he received a letter asking for financial help in the development of a radically-new transport aircraft. The request was simply worded: "I should like a thousand dollars, and I can only promise you one thing . . . you'll never see the money again." It was signed William B. Stout.

Edsel could have easily thrown Stout's letter into the wastebasket along with similar requests he received from crackpots who wanted money for crazy ideas . . . but he didn't. Instead he answered the letter, enclosing not only his check for \$1,000 but also one for the same amount from Henry Ford. It was the beginning of the Ford Motor Company's interest in aviation.

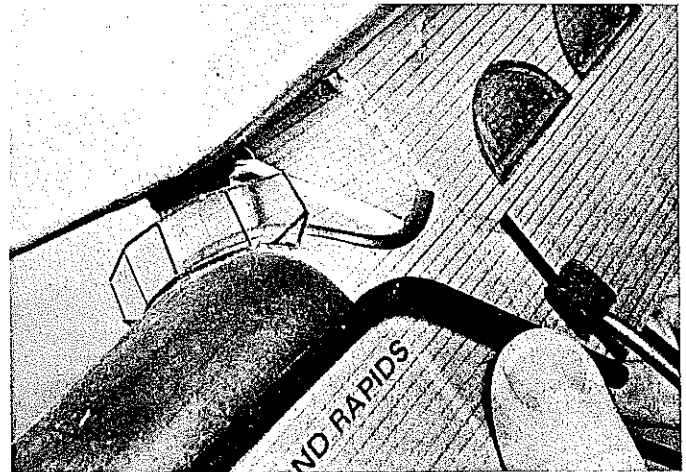
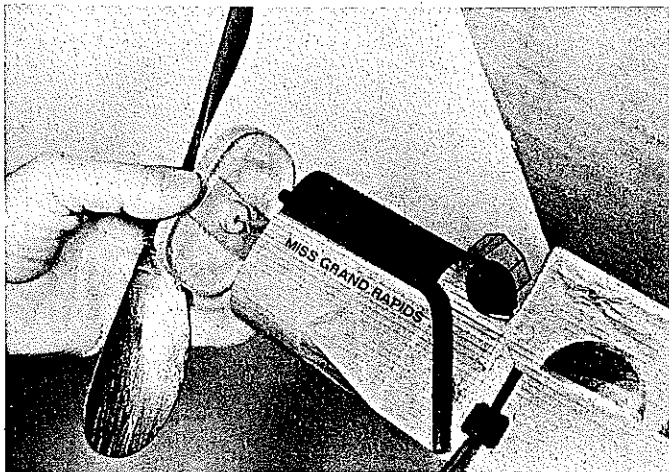
The money-raising scheme reads like a scenario from a made-for-television movie. Stout raised a total of \$125,000 from a list



Left: Stout's first attempt at a transport plane was the Aerial Sedan. Right: The second version of the Aerial Sedan became this Air Sedan of all-metal construction. Flight testing was done at the Selfridge Army Air Corps base. These two photos also courtesy of the Ford Museum.



Left: A clean, straightforward design with box fuselage and square wing and tail tips makes this model an easy but interesting construction project. Right: The wing and fuselage junction. Note the T.E. locating pin, semicircular window frames, and the ruled "corrugations."



Left: The radiator frame provides an effective means of locking the nose plug in place. It also hides any necessary side-thrust shims. Right: The leading edge of the wing is held in place with a hook and rubberband. Note the windshield detailing, cockpit coaming, and exhausts.

of investors that included most of the big names in industry during the early 1920s: the Fisher brothers, Walter P. Chrysler, C.F. Kettering, W.S. Knudson, H. Pitcairn,

Alex Dow, Harvey Firestone, Gar Wood, P.K. Wrigley, C.F. Mott, and many others. Heading the list, of course, were the names Stout used as a lever in gaining this wide-

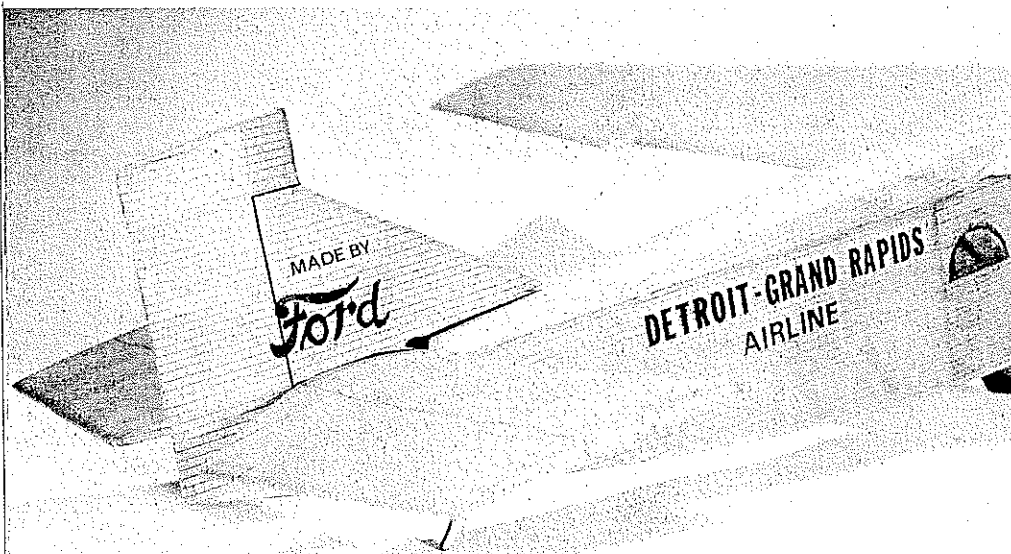
spread interest and support, Edsel and Henry Ford.

The first project of the freshly-financed Stout Metal Aircraft Co. was a four-place monoplane of composite construction. The Air Sedan, as Bill called it, was meant to be powered by the 150-hp Hispano Suiza, but the Hisso engines were in short supply, and Stout was forced to turn to the 95-hp OX-5 instead.

The original Air Sedan was grossly underpowered, and nothing much ever came of it. However, Stout began a second version, this time employing substantially all-metal construction. Powered by the 150-hp Hisso, this second plane performed quite well in tests at Selfridge Field. Witnessing some of the tests, Henry and Edsel Ford were impressed enough to invest more money in Stout's struggling company, which was once again running dangerously low on funds.

The next aircraft in the development series was a larger plane designed around the big 400-hp Liberty engine. At a time when most airplanes were still built chiefly of wood, wire, and fabric, the all-metal Air Pullman was one of the most rugged airplanes of its day.

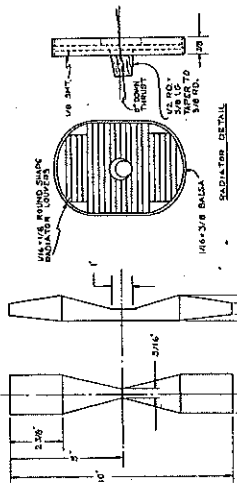
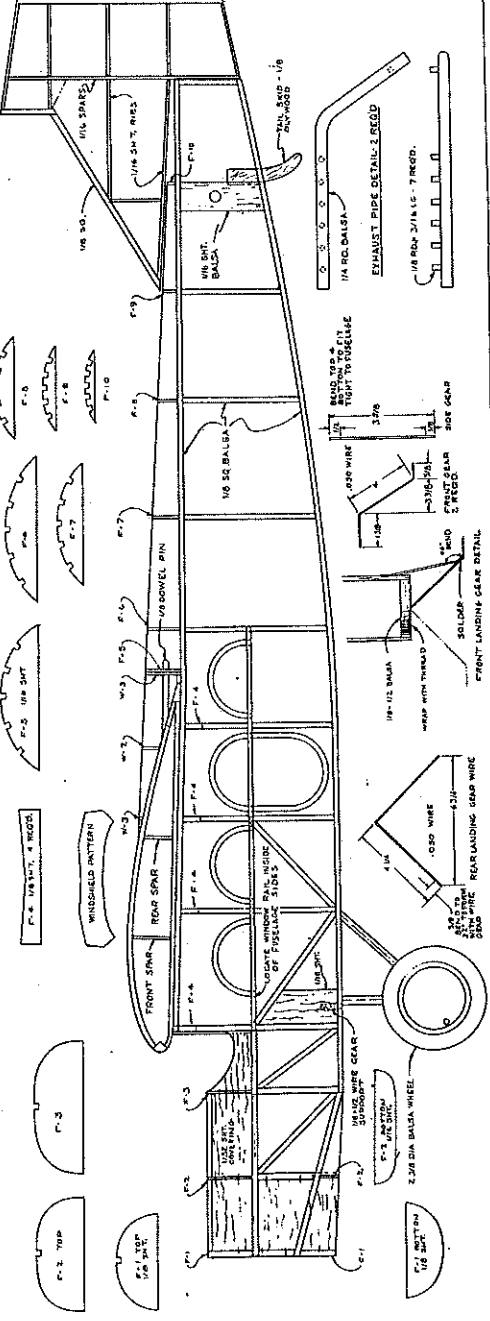
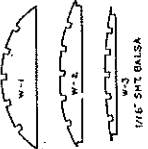
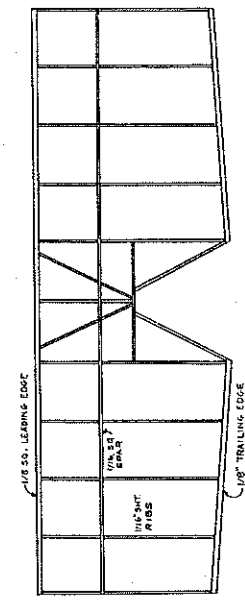
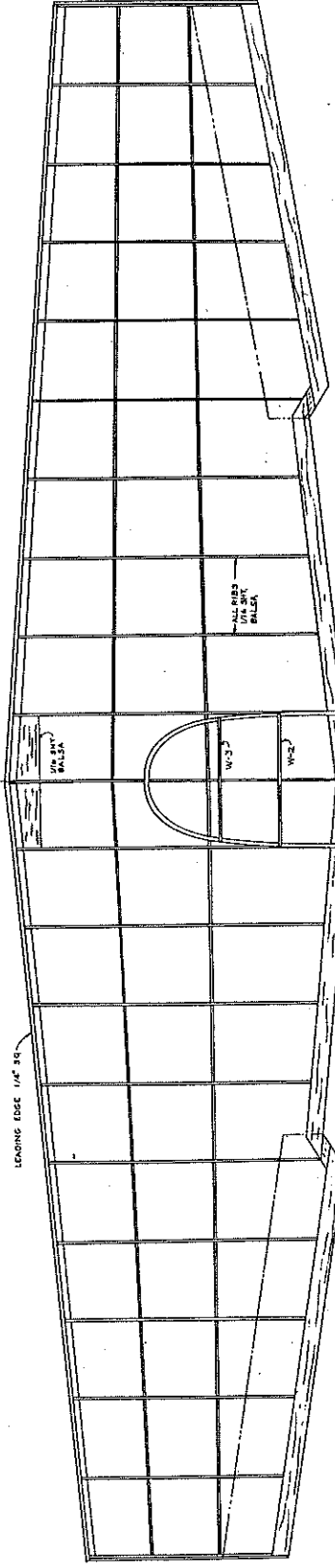
Lacking brakes and a tail wheel, and with corrugated dural skin and an ability to carry



Prop up only the front edge of the flat-bottomed stab when building it. "Ford" lettering was done by hand; all other letters are the office supply rub-on variety. See text for sizes.

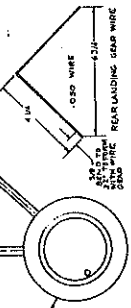
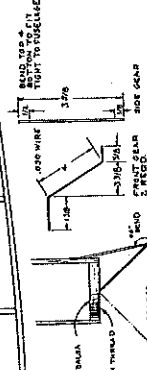
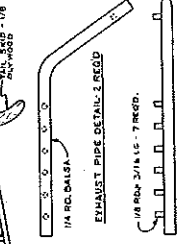
MISS GRAD RADIOS
STOUT 2-A7 AIR TRANSPORT
WING SPAN 37' 0" (SEE LIST MODEL)
RUBBER BANDS (SEE LIST MODEL)
ST. LOUIS SPIELHAKER

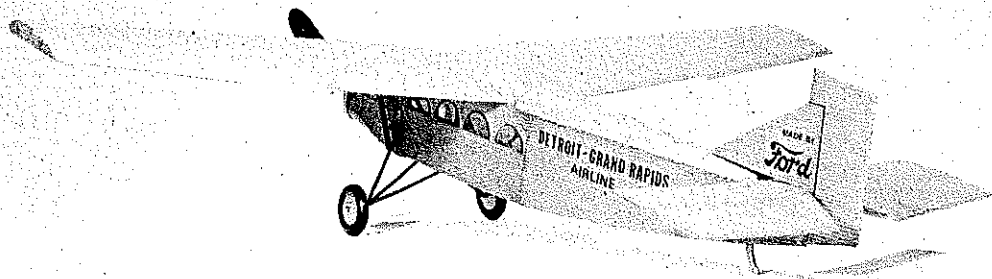
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0 1 2 3 4 5 6



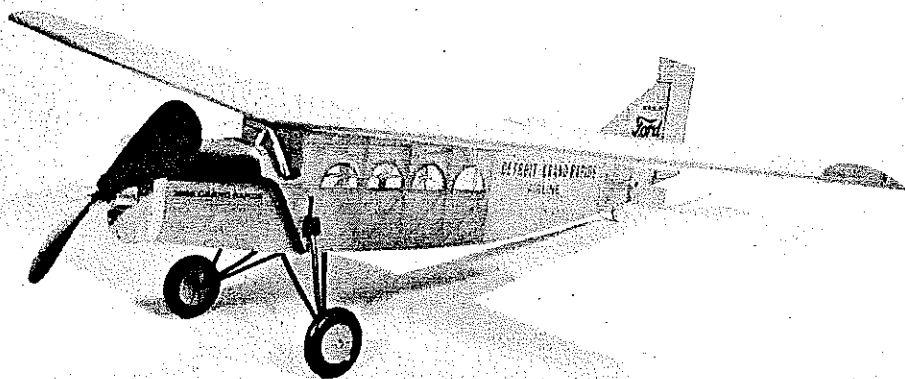
REGULATIONS
WING SPAN 37' 0"
LENGTH 48' 0"
WING AREA 1000 sq ft
WING LOADING 30 lb/sq ft
MAX SPEED 110 mph
MAX ALT 10000 ft
LANDING SPEED 50 mph
CROSSWIND 10 mph
PASSENGERS OR CARGO 8

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The finished Miss Grand Rapids showing the clean lines and good proportions that make it a fine Flying Scale model. Only minimum trimming is required to obtain good performance.



From the front, the model 2-AT looks like many of the gas models of the early Thirties that the original full-size plane may have inspired. Text and plans have the details for the propeller.

only eight passengers, the Air Pullman was, by today's standards, crude. But Henry Ford was well pleased with it and once again came up with additional capital. He eventually bought out all the Stout Co. stockholders, each of whom received a

\$1,500 payoff on a \$1,000 investment.

Keenly anticipating future developments, Ford expanded the manufacturing facilities and ordered five more models of the Air Pullman. With the incorporation of engineering changes, the plane became known

as the Air Transport. (The 2-AT, as featured in the construction part of this article, was the second design of the series). Ford paid \$22,500 for the first of these planes and \$22,000 each for the other four.

Ford's next move was to form the Stout Air Service with Bill Stout as general manager. Soon, mail and air freight were being flown for the Ford Motor Company. In its first year of operation, Stout Air Service set an enviable record. Over 1,000 flights were made, covering a distance equal to 10 trips around the world at speeds close to 100 mph, without a single personal injury or significant mechanical trouble.

The stage was set for regular passenger service. Stout initially selected Detroit and Lansing as the terminal cities, but Lansing hesitated to improve its airfield to accommodate "large" aircraft, and Stout turned to Grand Rapids. This city responded wholeheartedly, improving its airport facilities, extending the runway, and updating the terminal building.

In the early summer of 1926 a 2-AT flew into Grand Rapids where it was lettered "DETROIT-GRAND RAPIDS AIRLINE" and the name "MISS GRAND RAPIDS" was applied to the engine cowl. Meanwhile, Stout persuaded the Book Cadillac Hotel in Detroit to sell tickets (so this hotel can rightfully claim to be the first airline ticket office in the nation).

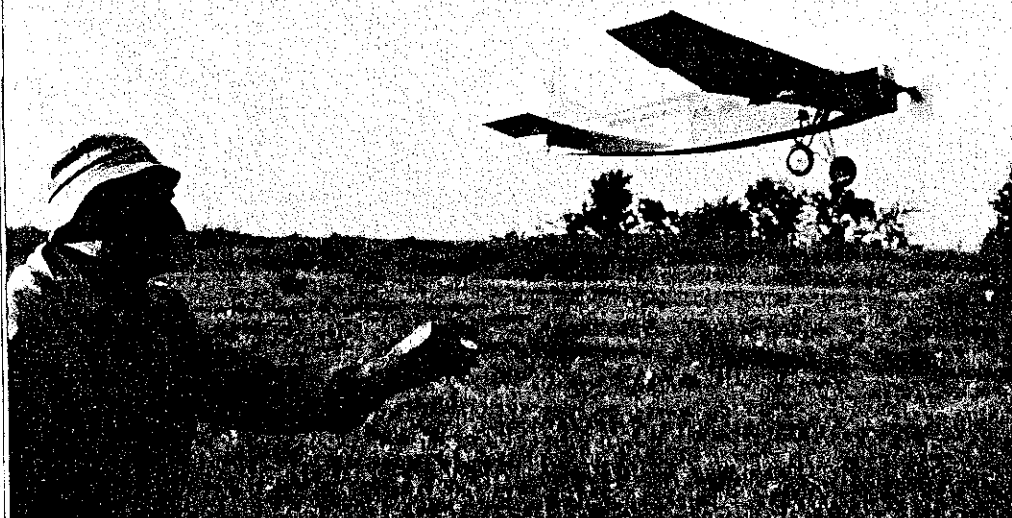
The big day arrived for the formal dedication at the Grand Rapids Airport. On July 31, 1926 at 3:15 p.m., under a clear sky, Miss Grand Rapids trundled to the end of the runway and turned into the wind. The big Liberty roared, and the plane lifted off for Detroit carrying Bill Stout, the mayor of Grand Rapids, and other dignitaries. A crowd of thousands was on hand to witness and cheer the history-making flight of the first regularly-scheduled passenger airline.

By the end of the first year's operation, the Detroit-Grand Rapids Airline had missed only a few flights because of bad winter weather. During that year 5,782 passengers flew without serious mishap or injury. But Ford's airline had done more than perform a vitally important transportation function. It had proved the value of a scheduled air operation, and it had finally affirmatively answered the often-asked question: Could a passenger airline fly safely and be self-supporting?

It had also set high standards of personnel and service. Pilots wore a snappy blue and gold uniform because, as Ford stated, "It gave dignity to their profession." Cabins were luxuriously furnished with reclining and swivel chairs, and each seat was provided with a small desk for writing cards and letters. Cabins were also heated, so there was no need for heavy clothing when flying during the winter months. Finally, uniformed hostesses went along on each flight to make the passengers comfortable, explain the functions of the airplane, and point out scenic spots of interest along the route.

As best as can be told, a total of probably

Continued on page 176



Without the scale objects in the picture, it could be the real thing 60 years ago. Miss Grand Rapids makes a steady climb away from the author's hand, turning left as it gains altitude.

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97321. He also publishes a directory of the Northwest Area Free Flighters which you can get for 30 cents and a couple of stamps.

I have received many letters about the small electric motors for Peanut and small Scale models, and things are definitely happening in this area. Dick Baxter has written MRC and procured a couple of their geared motors for about \$15 each, but he says you need to circle what you want on their parts sheet. He is using a small electronic cutoff which gives runs of 15-20 seconds but which can be preset with different resistors.

Many of the guys are taking apart the "nine-volt" (really 7.2 volt) rechargeable transistor radio batteries (the common rectangular ones) for the six Ni-Cd 80 mAh cells inside.

Ferrell Papp, 300 W. Lincoln No. 82, Orange, CA 92665 has put together a geared motor and battery rig with a charger using flashlight batteries which he sells for a bit more than the VL unit but which is the lightest available. His 005 rig turns a 5½-in. prop at 2,500 rpm, and I have seen it fly his Comet-kit Porterfield for a minute indoors.

Peanuts And Pistachios is a limited-printing booklet from the Hangar of Bill Hannan. For \$3.95 plus a dollar postage he will even autograph it. Heck, the Bristol Brownie and Farman long-nose Moustique drawings alone are worth that!

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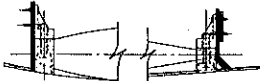


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Send to Hannan Graphics, P.O. Box "A," Escondido, CA 92025. He also has a few of the autogyro packets left, and believe me, gang, you shouldn't try to build a model autogyro without one!

An index to Model Builder plans prepared by Mark Fineman includes all plans published in that magazine since 1971. The price is \$3.75 per copy with a dollar postage to 73 Charlton Hill, Hamden, CT 06518. It's well-done and definitely a must for those of us who spend hours thumbing through mags looking for a plan or drawing.

Well, gang, keep the CyA out of the reach of children, wear your safety glasses, and give the kid down the block a model kit for his birthday.

Bill Warner, 423-C San Vicente Blvd., Santa Monica, CA 90402.

Miss G.R./Speilmaker

Continued from page 78

15 2-ATs were built. Most of their flights were made before the end of 1927.

While researching the story of the 2-AT, I met Don Heagle who, in 1926 at the tender age of 18, was the youngest aircraft

and engine mechanic in the nation. As an employee of the Detroit-Grand Rapids Airline, Don made many regular flights on the 2-ATs. I would like to thank him for his stories of those early days which gave much color and life to an almost forgotten, slab-sided sheet metal airplane.

Model Construction. Begin by building the two fuselage side frames out of ¼-in.-sq. hard balsa. Note that window rails mount on the inside of the fuselage and are added only after the sides are removed from the plan.

The ¼-in.-sq. semicircular window frames are laminated from two strips of ¼ x ¼-in. balsa. Soak the strips thoroughly in water, and pin or tape them around a form or tube of the correct diameter. When dry, cement the two strips together, trim to size, and add the bottom frame. Cement the finished windows to the rails so their edges are flush with the outside of the fuselage.

Join the fuselage sides using the plan view to make sure the sides are properly aligned and the cross members are square. Take special care to maintain fuselage alignment until the assembly is thoroughly dry. Add the nose formers F-1 through F-3, and sheet the front end with ¼ balsa. The rear fuselage formers and decking are added later along with the wing fairing.

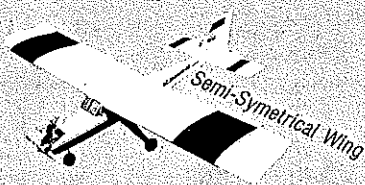
Tail surfaces. Build the rudder using ¼ x ¼-in. ribs and ¼-in.-sq. leading and trailing edges. Elevate the leading and trailing edges ¼ in., and pin them to the plan. Cement the ribs in place, and let dry; carefully sand the entire assembly to a smooth symmetrical shape before adding the ¼-sq. spar to each side. Round both the leading and trailing edges.

Build the stabilizer in the same manner but with ¼-in.-sq. leading and trailing edges and ¼ x ¼-in. ribs. Since the airfoil is flat-bottomed, only the leading edge should be elevated ¼ in. when pinning to the plan. Locate the bottom ¼-sq. spar, and cement the ribs in place. When dry, carefully sand the upper airfoil contour as shown, and add the top spar.

Wing. Shape an aluminum or brass template for cutting the upper and lower rib

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sections as shown in the side view. Cut the ribs and spars from $\frac{1}{16}$ sheet—medium for the ribs and hard for the spars.

Begin each half of the wing assembly by pinning down the $\frac{3}{16}$ x $\frac{3}{8}$ -in. trailing edge pieces. Cement the bottom ribs in place, trimming each from the rear to the correct length. Next locate the spars and cement them and the $\frac{1}{4}$ -in.-sq. leading edge in place. Then add the top ribs, trimming them to length (from the rear). Before joining the

wing halves, block up each tip $1\frac{1}{2}$ in., and bevel the spars to butt closely. Do not add the center rib yet.

Cut a form from cardboard or $\frac{1}{8}$ -in. balsa to the shape of the wing-fuselage junction as shown in the top view. Laminate two strips of $\frac{1}{16}$ x $\frac{1}{8}$ -in. balsa around this form, and cement as with the window frames.

Cut out and cement formers F-5 through F-10 into place, and temporarily attach the wing to the fuselage. Extend the top center stringer to align formers W-1 through W-3 with the laminated wing-fuselage frame. Cement these in place, and add the center rib.

Add the remaining stringers, and sand smooth before carefully cutting apart between formers W-3 and F-5.

Form the landing gear as shown from .050 music wire. Wrap the joints with fine wire before soldering. Cement in place, wrapping the attachment points with thread. Slice lengths of black rubber tubing, and slide them over the gear legs. Wrap a piece of $\frac{1}{8}$ x $\frac{1}{2}$ x $\frac{3}{4}$ -in. balsa with heavy butcher's string to simulate the rubber shock cord block. Cement the block to the top of the free-moving shock strut located on the side of the fuselage.

Covering and final assembly. Carefully sand all framework to a smooth surface. Be sure not to leave cement or rough spots along the longerons or wing leading and trailing edges.

To simulate corrugated aluminum, I covered Miss Grand Rapids with gray tissue inked with black lines spaced $\frac{1}{8}$ in. apart. The task of drawing lines, lines, and more lines is tedious, but the overall finished effect is well worth the extra effort.

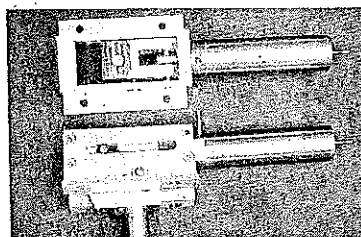
I suggest you tape the paper down, and with a water-soluble-type marking pen draw the lines across the covering before it is applied to the model. Depending upon the surface to the covered, some of the lines will be drawn parallel to the grain of the paper

and some perpendicular to it.

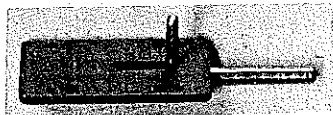
Cover all surfaces with the paper dry, and shrink the covering by brushing on a coat of rubbing alcohol. Three or four coats of 50/50 clear dope/thinner should work well.

Build the radiator/nose block as shown to fit over the front of the fuselage. It can be shimmed inside for either right or left side thrust. Paint it a dull aluminum color.

Continued on page 178



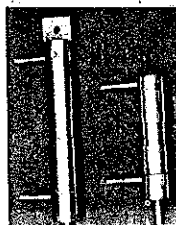
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Shape the two exhaust stacks from soft balsa. Paint them black, and mount them on the cowl just above the top longeron. Edge the cockpit with a piece of split rubber tubing, and cement the windshield in place.

Bend and attach the wing hold-down hooks. One is cemented to the bottom of the wing leading edge at the center rib. The other two attach at the upper longerons at the rear of the cockpit. The rear of the wing is anchored by a 1/8-in. dowel which is cemented to former W-3 and plugged into a hole in former F-5.

If you plan to add lettering to your model, press-on type as found in art or office supply stores is by far the simplest to use. The words "DETROIT-GRAND RAPIDS" are 1/2 in. high; "AIRLINE" is 3/8 in.,

and "MISS GRAND RAPIDS" is 1/2 in. You'll have to hand-letter the Ford logo. Apply the letters to a tissue panel which has been cut slightly oversize and taped to a smooth flat surface. Protect the finished lettering with a very light spray coating of dope before applying it to the model.

Dimensions of the propeller blank are shown on the plans. Carve the prop from hard balsa, and fit the freewheeling device of your choice.

Flying. Make up a motor of three loops of

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1/4-in. rubber about 28 in. long, and hand-wind it into the fuselage. Make sure there are no warps in the flying surfaces. Balance the model at the rear spar, and add clay in the nose as necessary. Hand glide in a field of tall grass, and trim for straight flight.

With about 100 turns in the rubber motor, hand launch and try for a long, smooth power-assisted glide to the left. Don't add any more turns until you have made several tests to check that the rubber is bunching up in the same spot. Slowly increase the number of winds, and make changes in the side thrust to control the power turn.

If you feel the need to adjust the turn in the glide, move the rudder ever so slightly. Large changes in the rudder offset may