



(Joseph Juptner)

Solar MS-1

By HANK ARNOLD and LARRY PETERSON

Solar is a name famous today for aircraft engine manifolds, afterburners, gas turbines and other high temperature machinery. Seldom is it remembered that the company actually began as a manufacturer of complete aircraft, and so the Solar MS-1 has vanished into obscurity.

The story of the MS-1 and the early efforts which led to this San Diego firm's rise from bare solvency to a 50 million dollar a year business is the story of Solar's founder and long-time president, Edmund T. Price.

Price arrived in San Diego in August 1928 and became interested in the small Prudden-San Diego Airplane Company. Their first airplane, the three-engined XM-1, had been built the year before in the same empty fish cannery building near Lindbergh Field in which the Spirit of St. Louis had been made. (1)

The firm's managing director was George H. Prudden, formerly chief engineer of the Stout Metal Airplane Company, originator of the Ford Tri-motor. After Price talked with Prudden on Labor Day, Price agreed to go to work without salary, with the promise of a directorship if he would invest his own money in company stock.

Next day he went out to the field to see the Prudden-designed XM-1. "She was a creature of sharp angles," he recalls, "that took off at 80, cruised at 80 and landed at 80--and literally took my breath away when I made my first flight!"

Certainly there was a strong resemblance between Prudden's all-metal tri-motor and the famous Ford machine. Three Ryan-Siemens engines of only 125 hp powered the eight-place aircraft which had been advertised as economical, (\$25,000 Flyway) and safe. "All-metal construction practically eliminates upkeep, repairs and fire hazard," said a piece in Western Flying, May 1928, page 33.

This first aircraft was licensed as X-3321, according to the tail markings, but registration in the govern-

ment records has not been confirmed. Neither has any record been found of the history of X-3321 subsequent to its flight tests in the fall of 1927, although an effort was made to sell it to a movie company for "crash scenes."

A second transport was constructed under the leadership of chief engineer William L. Lewis, formerly of Lewis and Vought (1919-23) and of Boeing (1923-27), who had joined Prudden in October 1927. This aircraft originally appeared in June 1928 with three Siemens-Halske S.H.12, 125 hp engines. Licensed as 5728, it differed from X-3321 primarily in having the two outboard engines slung low, beneath the wing struts "to avoid having any propeller blanket the tail." Slightly larger than its predecessor, it had a wing span of 57' and a 7'6" chord, and was 36' long and 9'7" high. Dual controls had been added for the two pilots, and blue plush cushions were provided for the six passengers. (2)

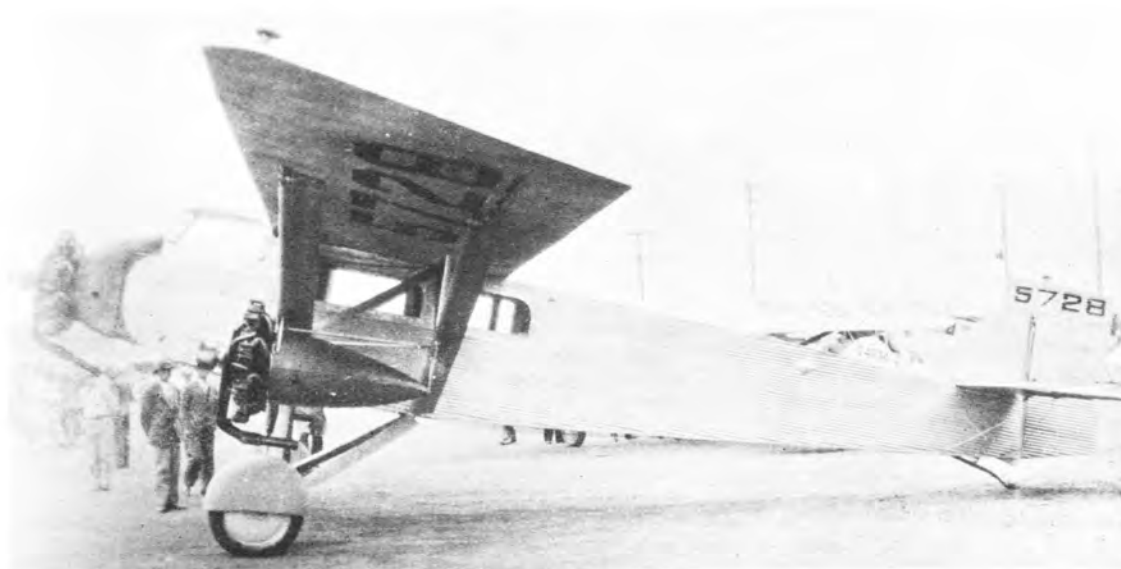
JANE'S ALL THE WORLD'S AIRCRAFT of 1928 shows the Prudden TM-1 tri-motor in a head-on view and credits it with speeds of 110 mph maximum, 95 mph cruising and 52 mph landing.

Number 5728 was soon converted to a single engine aircraft by removing the outboard engines and replacing the nose engine with a Pratt & Whitney Wasp. In this form it was designated the SE-1 but was too overweight for certification.

The SE-1 finally earned a \$1,000 down payment from a purchaser, the Mexican Army, but when the pilots arrived in Arizona to pick it up they refused to fly it because of its large size. It was finally moved to a Los Angeles airport where it lay unclaimed for months, eventually being auctioned off to recover part of the rental due and scrapped.

Meanwhile, Price had become managing director of the company, still at no salary. This was on October 10, 1928, less than a month after his arrival in San Diego. He found himself running a company that was \$300,000 in

*Prudden XM-1 with three Ryan-Siemens engines as seen in 1927 on a field near San Diego.
(Peter M. Bowers)*



The Prudden TM-1 appeared in 1928 and was a modified version of the earlier XM-1 transport. (Peter M. Bowers)

*Modified to single engine configuration with Pratt & Whitney Wasp, the TM-1 became the SE-1.
(Peter M. Bowers)*



debt and with two unsatisfactory aircraft. Hopefully, he had engineer Lewis start from scratch on a new single-engine transport design. Shortly after this, Prudden left the company and joined the Atlanta Aircraft Corporation in Georgia, which produced the Prudden-Whitehead tri-motor, low wing transport in 1930. (3) Prudden later joined Lockheed Aircraft Corporation.

The San Diego firm had now become the Solar Aircraft Company, re-named from Prudden-San Diego Airplane Company in April 1929. The name was suggested by Eric de Wolfe, a director of the company, who pointed out it would be useful for deriving future airplane names such as "Mars" and "Jupiter" if Solar stretched its wings. It has proven useful as Solar uses these names today for their line of gas-turbine engines.

By May 1929, work began on the Solar MS-1. This third design was an eight place all metal transport, but this time Lewis planned a sesquiplane layout, with a stub lower wing for lift and bracing. The engine appears to have been a used Pratt & Whitney Wasp C of 420 hp. Pratt & Whitney Aircraft has no record of a sale to Solar. (4)

The MS-1's design was checked by Professor Reed of Stanford, and work continued until the plane was ready for the first test hop.

"From Mr. Price's diary: Jan 21, 1930: Plane moved onto Lindbergh Field. Much Excitement: Taxied to the hangar and found brakes needed strengthening. Delay. Doug Kelley (now a vice-president of PSA Airlines of San Diego) taxied for a few minutes, took off, sailed around for half an hour and made a most beautiful landing. Great relief--the ship a success." (5)

As he climbed out of the cabin after the first test flight, Doug Kelley said, "That's a real ship. One of the finest closed planes I have ever flown. It's stable in the air and easily controlled in all maneuvers."

The test flight also disclosed easy handling at high altitude, a low, safe landing speed and economy of operation. Refinements included chairs that were well upholstered and adjustable so "passengers may ride in greater comfort than (in) Pullman railroad cars." (6)

After flying the MS-1 with Kelley a few days later, Colonel Charles A. Lindbergh praised its performance highly. Although the plane seemed to be a good airplane for its day, it was born in the middle of the depression, and the Solar Company was still having a very hard time trying to get more working capital.

How desperate the state of Solar was in those days is shown by an entry in the diary of Edmund Price, who became president of the firm in January of 1930. On March 25, 1930 he wrote:

"Hellish day. Marston distrubed as to whether I should try to borrow money from family. Downtown to bank to see Belcher. Told him situation and that I couldn't put in any more money without cooperation from others. Asked him to give us a thought as to ways out. I feel groggy and stale. Paid off the men with a personal check for \$340, and ate at the Diner. Don't see how I can go on." (7)

Barely solvent, with no customers for the MS-1, Solar company employment dropped to six men. Only the faith or stubbornness of the still unsalaried president kept it going.

Doug Kelley flew the MS-1 on a three-day tour of California air fields, testing its cross-country performance. On February 27 he returned, but no customer was in sight. To pay its way, the plane was leased from time to time for various jobs, such as hauling seafood from Baja California. Designer Bill Lewis resigned in June, and the future of the MS-1 remained doubtful. As things turned out, Solar's future was not in the aircraft's design but in its engine exhaust ring. When the original bent-tubing manifold failed because of high back pressure, a new one of mild steel had been stamped out on a drop hammer by plant manager Fred Rohr (later founder of Rohr Corp.).

Further work on manifolds led to successful stainless steel types sold to the Navy, and it was this business that saved the firm and started its successful march toward becoming the leading supplier of exhaust manifolds.

In August 1931 another effort was made to promote sales for the MS-1. Price decided to fly his family back to New Bedford, Massachusetts as a publicity stunt, and the "Flying Nursery" received nation-wide publicity, landing at 50 airports in 25 states, en route. Piloted by Bill Seaton of South Dakota the plane carried Mr. Price, Mrs. Price and their three small children. A picture showed the children, Charles 7, Joan 3 and Mitzi 9, playing parcheesi in the "specially fitted" cabin. A picture from Charles Scheetz, Antique Airplane Ass'n member #3, of Solon, Iowa, shows the plane at Des Moines, Iowa, on September 12, 1931. Charles said, "Nice ship, had a very roomy cabin." Mr. Scheetz was the only A.A.H.S. Member to respond to the request in the JOURNAL for information on the Solar MS-1 project.

The picture from Mr. Scheetz shows the MS-1 with the familiar Solar "flying sun" insignia and the name "Solar All-Metal, San Diego" on the side of the fuselage.

On the way back across the country Mr. Price stopped at St. Paul, Minnesota, headquarters of Northwest Air Lines, and talked to the purchasing agent. He said the MS-1 was just the airplane they wanted, and that he would take 10 at the agreed-upon price of \$28,000 each. The agent said that Col Brittain, President of the airline, was out of town, but if he, the purchasing agent, recommended the airplane the sale was made. As Mr. Price was again running out of money he decided to return to San Diego. After four days he called to see if Col Brittain had signed the order. The girl on the phone said that the purchasing agent had been stricken with a heart attack the evening before, and he was dead! Mr. Price did not have enough money to go back and see the Colonel, so he continued on to San Diego with his family. They covered approximately 6,500 miles on their trip, and their return flight to the Pacific coast took 30 hours flying time. They flew about four to seven hours daily, landing every two hours so the children could rest.

The MS-1 did not receive an Approved Type Certificate but was under a group 2 classification. According to Engineering Memo No. 2-252, dated September 15, 1930 from Department of Commerce, Aeronautics Branch the MS-1, 8 PCLB (8-place closed land biplane) was powered by a Wasp 420 hp engine. It further read:

No. of Passengers	6
No. of Crew	2
Fuel Capacity	110 Gallons
Oil Capacity	8 Gallons
Span Overall	56 ft 6 in
Length Overall	36 ft 0 in
Empty Weight	2665 pounds
Useful Load	1955 pounds
Payload	1020 pounds
Gross Weight	5650 pounds

"This memo supersedes # 2-252, dated August 8th, to cover change in designation, fuel capacity and remarks. Remarks: Airplane bearing Serial No. 101 is eligible, provided the baggage compartment is sealed and the following placard is displayed:

1. This aircraft has been approved as airworthy by the Department of Commerce at a gross weight not to exceed 5650 lbs.
2. The empty weight with standard equipment is 3665 lbs.
3. Standard.
4. In computing gross weight, allowance should be made for 68 gallons of fuel, when less is carried.
5. At no time, may more than 8 people be carried (including crew).

Signed, Richard C. Gazley
Chief, Engineering Section"

The wing construction of the Solar MS-1 was conven-



Solar MS-1 being weighed in San Diego street. (Bowers)



MS-1 parked on Lindbergh Field in San Diego. (Bowers)



Outside the Solar plant on Juniper Street, 1930. (Author)



MS-1 with "flying sun" insignia under cockpit. (Bowers)



In flight over Southern California. (Tom Anderton/Solar)



Refueling at Des Moines on cross country trip. (Sheetz)



Solar MS-1 in its final configuration, spring 1931, with legend of its Tabasco, Mexico owner on fuselage. (Bud Bodie)

tional except for the elimination of drag bracing, the drag load being carried by the corrugated metal covering. The upper wing spanned 56 ft, 6 in and had a chord of 8 ft, 4 in, the lower wing spanned 18 ft and had a chord of 5 ft, 10 in, and the gap was 60 inches.

Performance figures were: high speed, 125 mph; cruising speed, 112 mph; landing speed, 50 mph; rate of climb, 800 feet per minute; climb in 10 minutes, to 6,500 feet; service ceiling, 17,000 feet; and range, 500 miles. (8)

From the figures, it would seem the MS-1 was overweight, and it appeared impractical to try and get an A.T.C. and sell an aircraft that could not carry any baggage. So it was that Solar finally made the decision to sell the MS-1 and go out of the airplane manufacturing business for good.

The Solar MS-1 was finally sold to the Compania Aeronautical Del Sur in April 1931 for \$10,000. It was to be used to haul coffee beans from the interior of the state of Tabasco (located on the Gulf of Campeche, a portion of the Gulf of Mexico, some 500 miles south-east of Mexico City) to the coast of Mexico.

A picture of the MS-1 from Bud Bodie shows it still with its U. S. registration NC-258V on the rudder but with the narrow, high pressure tires having been replaced with air wheels and a ring cowl added to the engine. Lettering on the right side of the fuselage is: "Contratistas Transportes Aeros De La Casa Piza, Mexico D.F. Y Tabasco." Translated, this reads: "The House of Piza, Aerial Contractors, Mexico City and Tabasco."

On February 23, 1932 the Solar was licensed in Mexico as X-BAFK, Solar Sesquiplane, c/n ES-1-1-1, and registered to G. D. Woodside, Villahermosa, Tabasco, Mexico.

On March 2, 1932 a letter from Mr. Price to the San Diego Union newspaper reported:

"We are now several hundred miles south of Mexico

City, at Salina Cruz. Our party consists of Jimmy Angel (of Angel Falls fame) pilot, myself, and four other persons. On leaving Mexico City, we also had a young bull calf as a passenger, the calf being a prize animal, a gift from a person in Tabasco. This country has an excellent market for airplanes, as distances are great and the roads are poor. The plane was passed for inspection by the Aeronautica Civil, and licensed X-BAFK. The inspector gave us the compliment that it was without question the finest airplane that had ever flown into Mexico City. The plane does her stuff well at this high altitude, Mexico City airport being 7200 feet above sea level. On the way down to Salina Cruz we passed over where George Flaherty had to land his Ford Tri-motor on the beach, during a terrific wind storm. The landing was safe, but the waves tore a hole in the side of the fuselage and damaged the tail surface. We shall try to help get it out, so it may be used to haul coffee also."

Apparently the MS-1 did its job well for several months, hauling coffee beans to the coast from Tabasco. Then one day it was forced down in the jungle with engine trouble. During a takeoff attempt from a hurriedly cleared runway, the landing gear hit a log, a wing crumpled and the plane died. In 1936 the airline also died, and the \$9,000 balance due on the MS-1 was written off as a bad debt.

Before the MS-1 itself is written off completely, an employee of the present Solar Company says there is a strong rumor that no more than three years ago Solar received a letter from Mexico asking if it would be possible to obtain a wing section for the MS-1. He is still tracking down this letter and hopes to find it some day. So, who knows, perhaps old airplanes really never die--like Jimmie Angel's Flamingo at Angel Falls.

FOOTNOTES: (1) "1927-1941, The Years of Faith", Solar Blast, Vol 13, November 1952, pages 2-15. This company publication presents a history of Solar, upon which the authors have leaned heavily for MS-1 background.

(2) Western Flying, July 1928, page 31.

(3) Aviation, August 1930.

(4) Letter from Harvey Lippincott to Larry Peterson, dated November 12, 1965.

(5) Solar Blast, Vol 13, November 1952, page 6.

(6) San Diego Union newspaper, February 16, 1930.

(7) Solar Blast, Vol 13, November 1952, page 2.

(8) Aero Digest, April 1931, page 27.

ACKNOWLEDGMENTS: In all ways this article is the result of a joint effort by A.A.H.S. Members of the San Diego chapter. My thanks to Larry Peterson for all his help in researching, letter writing and micro-film reading; Ron Bulinski for all his hours of labor on the drawing; Ray Wagner for his editorial assistance and help in revising the Prudden story; Joe Barry for research; Bill Larkins for research; and Pete Bowers, Bud Bodie, Joe Juptner, Charles Scheetz, Steve Hudek, Bob Meyers and Title Insurance and Trust Company for pictures. And thanks to my wife, Millie Arnold, for typing the text.

ABOUT THE AUTHOR: Hank Arnold, 521 G Avenue, National City, Calif. 92050, first became interested in this subject when he took a Brownie shot of the MS-1, beginning his interest in aviation photography. This interest was boosted along by Bill Larkins and Pete Bowers and, in the course of time, the JOURNAL. Two years ago Hank became interested in the idea of a "project" for groups such as the San Diego Chapter and instituted the Solar MS-1 study as such a project. He has brought forth a great idea for Members in many parts of the U. S. who can thus get together and share their aviation interest.

Larry Peterson, 7366 Viar Ave, San Diego, California 92120, is a fellow employee with Hank at Convair. He's been a key part of this project from the start and has a broad interest in all phases of aviation history.



Sesquiplane and tail configuration of the MS-1, (Solar)

