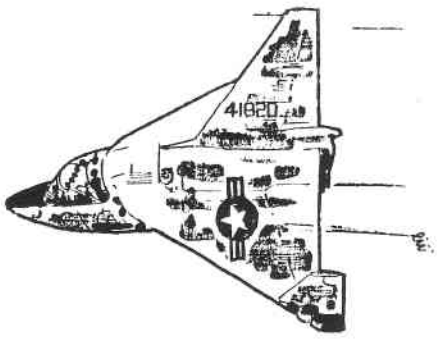
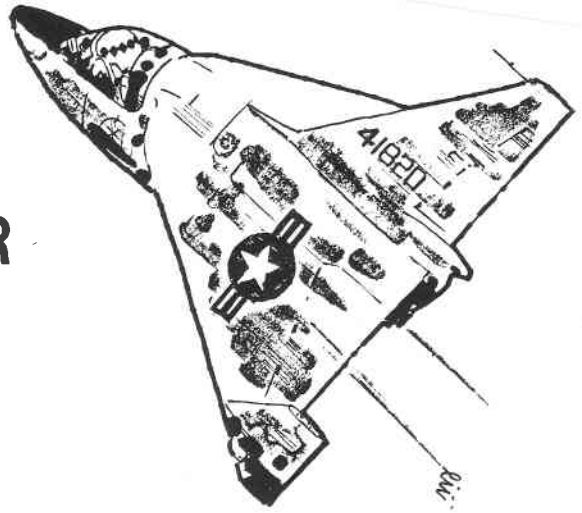
No 18, December 1987



TWITT
NEWSLETTER



F. Marc de Piolenc, Editor and Publisher

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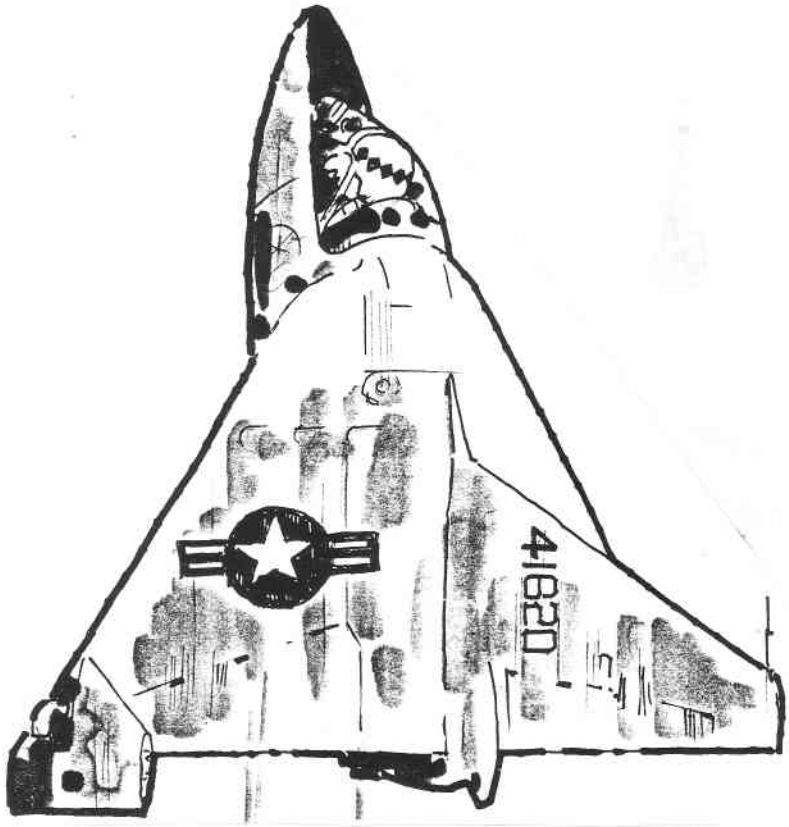

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¶Next Meeting: 16 January 1988,¶
¶1330 hours, hangar A-4, Gilles-¶
¶pie Field, El Cajon, California¶

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Telephone: (619) 224-1497 before 10 AM or after 10 PM

MINUTES OF TWITT MEETING, 21 NOVEMBER 1987

Bob Fronius opened the meeting by introducing the many gliders in various stages of restoration housed in his hangar. One in particular, the Screaming Wiener, got special attention because this month's featured speaker, Paul MacCready, took 2nd in the National Soaring Championships and also set a world goal and return record with it. He also made the following announcement:

* There will be no December TWITT meeting. Next meeting date will be 16 January 1988

Bob then introduced Tasso Proppe, who reminisced on his experiences with early sailplanes in Germany, in particular the Horten IV flying wing. Tasso recalled that the IV's balance was so critical that the ship had to be rebalanced if the pilot changed his boots.

June Wiberg rose to introduce Paul MacCready. She declined to repeat the curriculum vitae published in our previous Newsletter, but underscored the honor that Dr. MacCready was doing TWITT by taking a day to speak to us; it seems he had spent only three hours in his office in the past two months.

Paul MacCready then took the floor with a simple explanation of the late start of his presentation; it seems that the information that his office gave him was "1:30 at Gillespie Field." He reviewed his movements over the preceding several weeks: a vacation trip in East Africa, including a walk up Mt. Kilimanjaro, followed by the Solar Challenge Race across Australia. His company, Aerovironment, has undertaken projects for giant sponsors like DuPont, Johnson's Wax, the National Air and Space Museum (Smithsonian Institution), and General Motors. For these giants, the desired product is publicity, and the engineering, which is the Aerovironment team's primary interest, is simply the vehicle. Dr. MacCready's involvement in aerodynamics, advanced structures and so on began in his teens with his interest in model aircraft. After earning his Ph.D. in Aeronautics, he became involved in weather modification and weather research, for which, as an avid sailplane pilot, he was well prepared. After all, only sailplane pilots had ever willingly entered a convective system, other pilots avoiding them like the plague. For some years thereafter he was only marginally connected with aviation, concerning himself mostly with meteorology. His interest in Henry Kramer's prize was stimulated by a $ 100,000 debt incurred by guaranteeing a bank loan for a relative who later defaulted. At that time, 50,000 pounds sterling equalled $ 100,000, and this seemed an intruguing way to liquidate the debt. Dr. MacCready's original approach to man-powered aircraft design started with a fairly satis-factory...hang-glider design, which needed about 1.25 horsepower to maintain level flight, about five times what a human can produce steadily. By scaling all linear dimensions by a factor of three and keeping the weight the same, the horsepower required

should be reduced below that available. Paul MacCready and his colleagues took full advantage of the fact that the aircraft would operate at very low speed and altitude to shave factors of safety to the bone. By making the structure easy to repair, they guaranteed themselves the lowest possible amount of downtime. The result was an ugly monster that flew and flew and flew. His was a complete departure from the approach used by competing groups, who built equally fragile, but far more sophisticated and expensive ships which were far too ungainly to fly the Kramer figure-eight course. The development of the Gossamer Condor proceeded rapidly. One phenomenon noted by the team was the considerable effect of the entrained air on the apparent mass of the huge, light machine. The phenomenon was known in theory, but no aircraft had ever had it influence its stability and controllability. MacCready and company were breaking new ground. One year (mostly of weekend and evening work) after the original idea, the prize was in the bag. The ship is now on permanent display at the National Air and Space Museum, a circumstance which Paul MacCready describes as "a great honor and a wonderful tax deduction." Kramer's new challenge--crossing the English Channel--did not stand for the full eighteen years of the original challenge. What was needed was a somewhat larger, stiffer, cleaner airplane--the Gossamer Albatross. They also acquired a very large and accomodating sponsor, the DuPont company whose carbon-fiber materials they used. The machine and its tired pilot Brian Allen barely made the wet sand strip of the French coast after a three-hour flight, but they did make it. The machine illustrated its designers' approach to the problem: build it just good enough to do the job. There was no more prize money to be won in the field of low speed and low power aeronautics, but they now had sponsors. The next project was a solar-powered airplane intended to attract attention to the potential of solar cells. Development of the Solar Challenger, intended to fly from Paris to England, was preceded by extensive work on a test bed airplane in the US. On 18 May 1980, an airplane climbed out for the first time on solar power alone. The Solar Challenger was intended to fly very much like "real" airplanes--too high for the flimsy structures of the gossamer series. Its structural integrity was validated by careful static testing to load factors of 6 g limit, 9 g ultimate. Best rate-of-climb speed was twenty mph! Performance improved with altitude and altitudes of 14,000 feet were achieved, considerably below its theoretical best height of 30,000. The Solar Challenger's successful flight took place in 1981. Kramer came out with some smaller prizes for speed, not enough to be incentives by themselves, but just enough to encourage two projects: a sailplane and a long-duration drone for which Aerovironment later won a Government contract. Their new cantilever machine, the Bionic Bat, won some of the Kramer speed prizes. MacCready's next challenge was the flying pteradactyl, developed for the Smithsonian film "On the Wing," about the development of natural and artificial flight. The full-size pteradactyl, with its 36-foot wingspan, was about the size of the Li'l Dogie glider (unconfirmed reports of live 50-foot specimens sighted in Texas appeared in the National Enquirer). Dr.

MacCready's original goal of a life-size model could not be achieved within the budget allowed, but an 18-foot model was built and successfully flown under its own power. The process of building a stable, controllable beast involved engineers talking to paleontologists, with fruitful results for both disciplines. Flights began with a winch tow to 500 feet and lasted about three minutes each. Dr. MacCready displayed an artist's conception of the motor-glider which is the ultimate goal of the Bionic Bat work. It happens that the drone wing is the same size as the motor-glider wing (50 feet), offering the hope that the same molds could be used for both. A ten-hp engine would get it up there, and 3/4 hp should sustain it. He took time off from aeronautics to praise the efforts of James (The Amazing) Randi, a professional illusionist who has made a career out of exposing fraudulent claims of occult phenomena. One of Randi's contributions to vaccinating mankind against "magic" flim-flam is sponsoring Magic Clubs in high schools; these allow students to learn how easily people can be deceived. Dr. MacCready also touched on human-powered ground vehicle progress, including a two-person vehicle that can cruise forty miles at fifty mph. Dr. Alec Brooks of Aerovironment, project manager on the Pteradactyl, has designed a human-powered hydrofoil that can travel 15% faster than anyone has ever traveled in a rowboat. There's still a lot of room for invention in the water vehicles. The car that won the 2000 mile race across Australia was intended to garner publicity for GM as a high tech company, and for the highway, which had just been paved. Aerovironment was involved with aerodynamic design in connection with the America's Cup challenge; he is now working with an Australian syndicate in connection with the next race. Concerning the product liability crisis that has killed light aircraft manufacture, Dr. MacCready suggested a special attorneys' convention on the Queen Mary, followed by a surreptitious launch and scuttling...

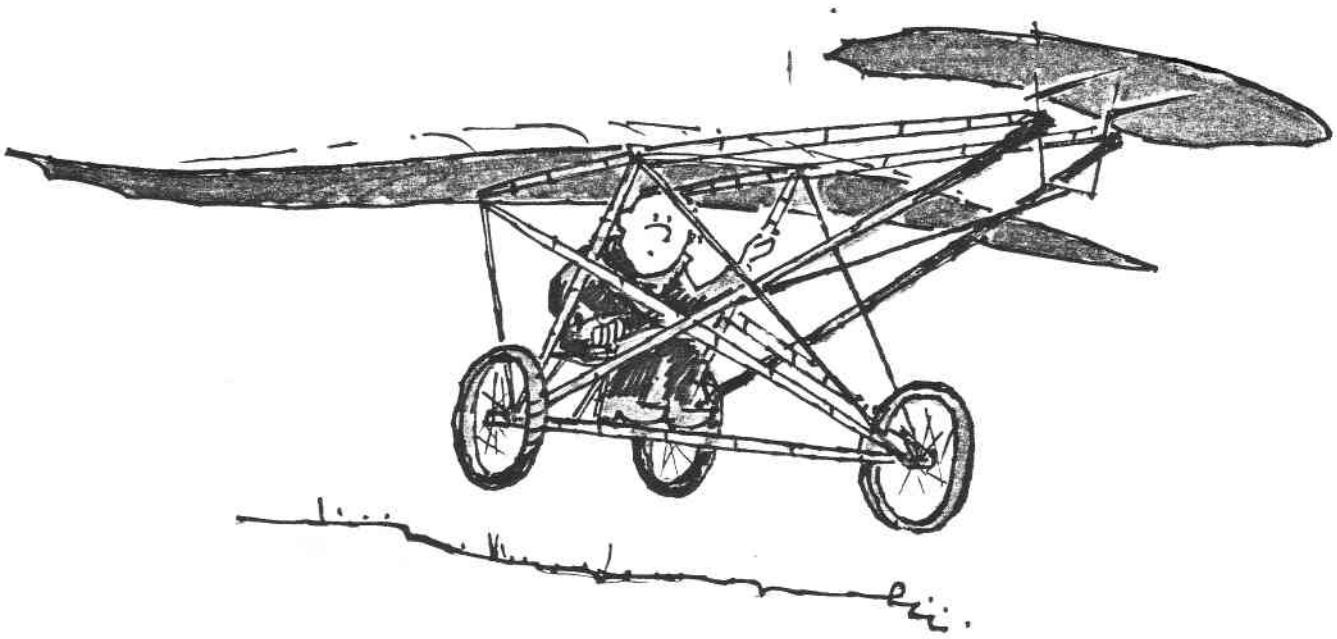
Curator, Ed Leiser, from the San Diego Aerospace Museum used his talent to draw the covers for the TWITT NEWSLETTER. The limited numbers suitable for framing will be included in this 18th issue of TWITT.

The cover depicts the Ryan X-13, Vertical Takeoff and Landing (VTOL), research aircraft. The first complete transition flight was April 11, 1957. The pilot, Peter F. Girard, has attended TWITT meetings.

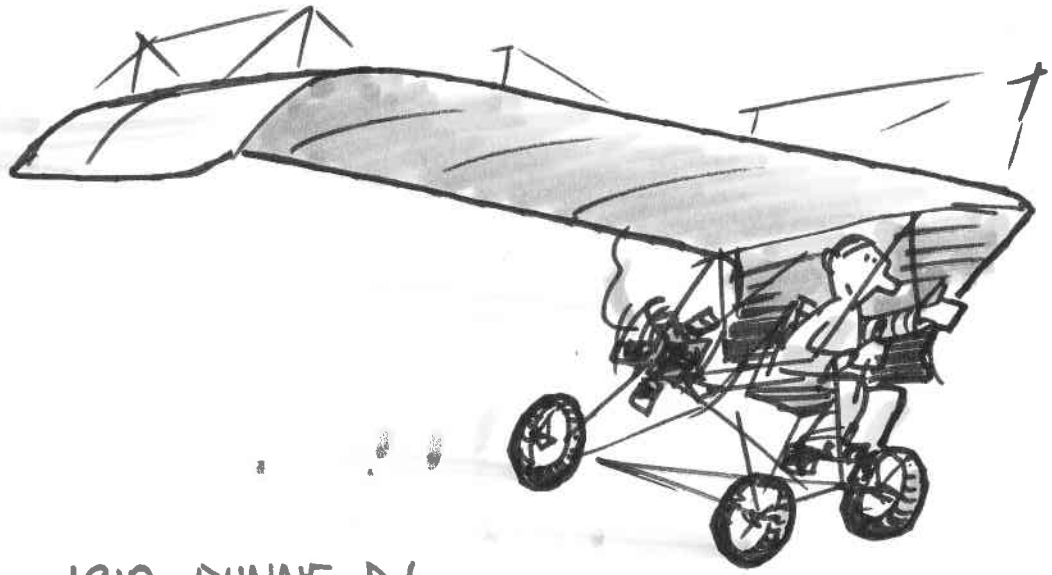
Inspiration for these drawings came from the book "WINGED WONDERS" by E.T. Wooldridge. Copies may be obtained from W.C. Hannan Graphics, P.O. Box A, Escondido, CA 92025.


ED LEISER 1987

1883 MONTGOMERY



1909 HANDLEY PAGE



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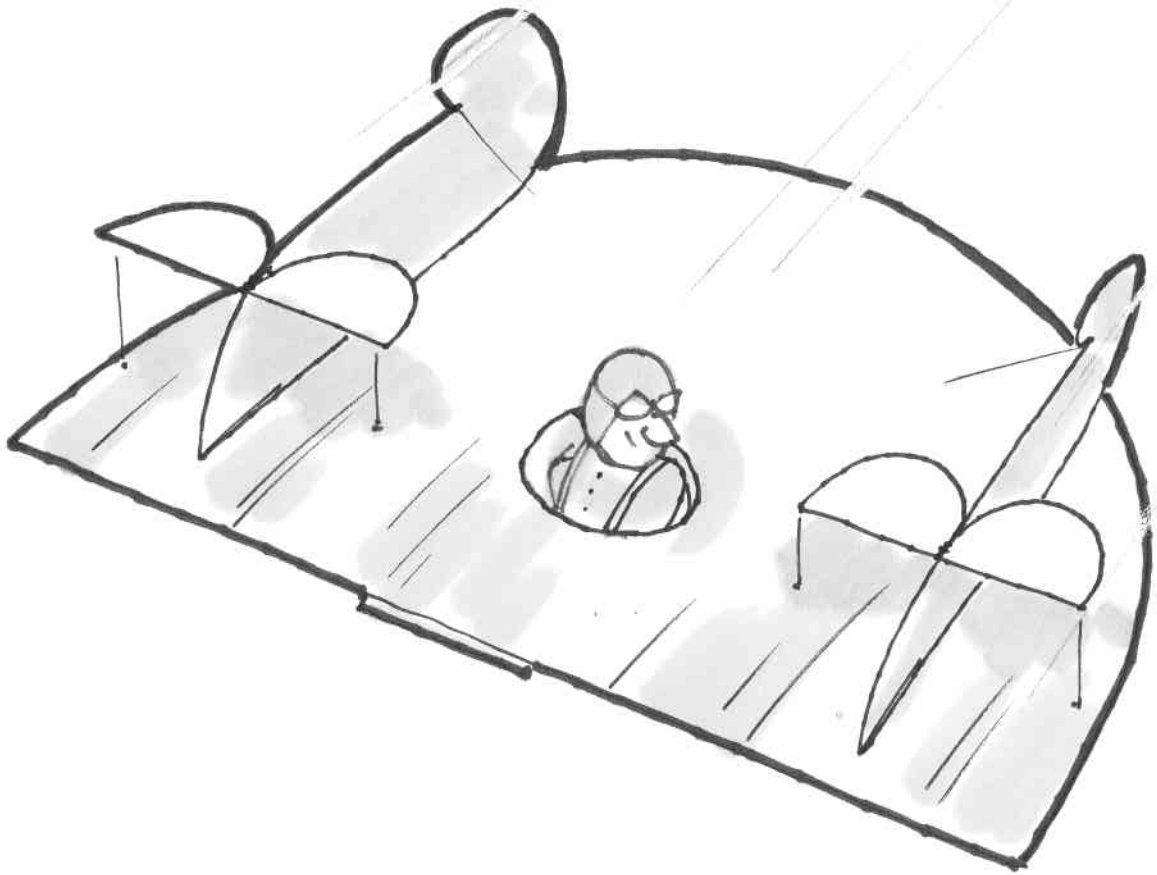
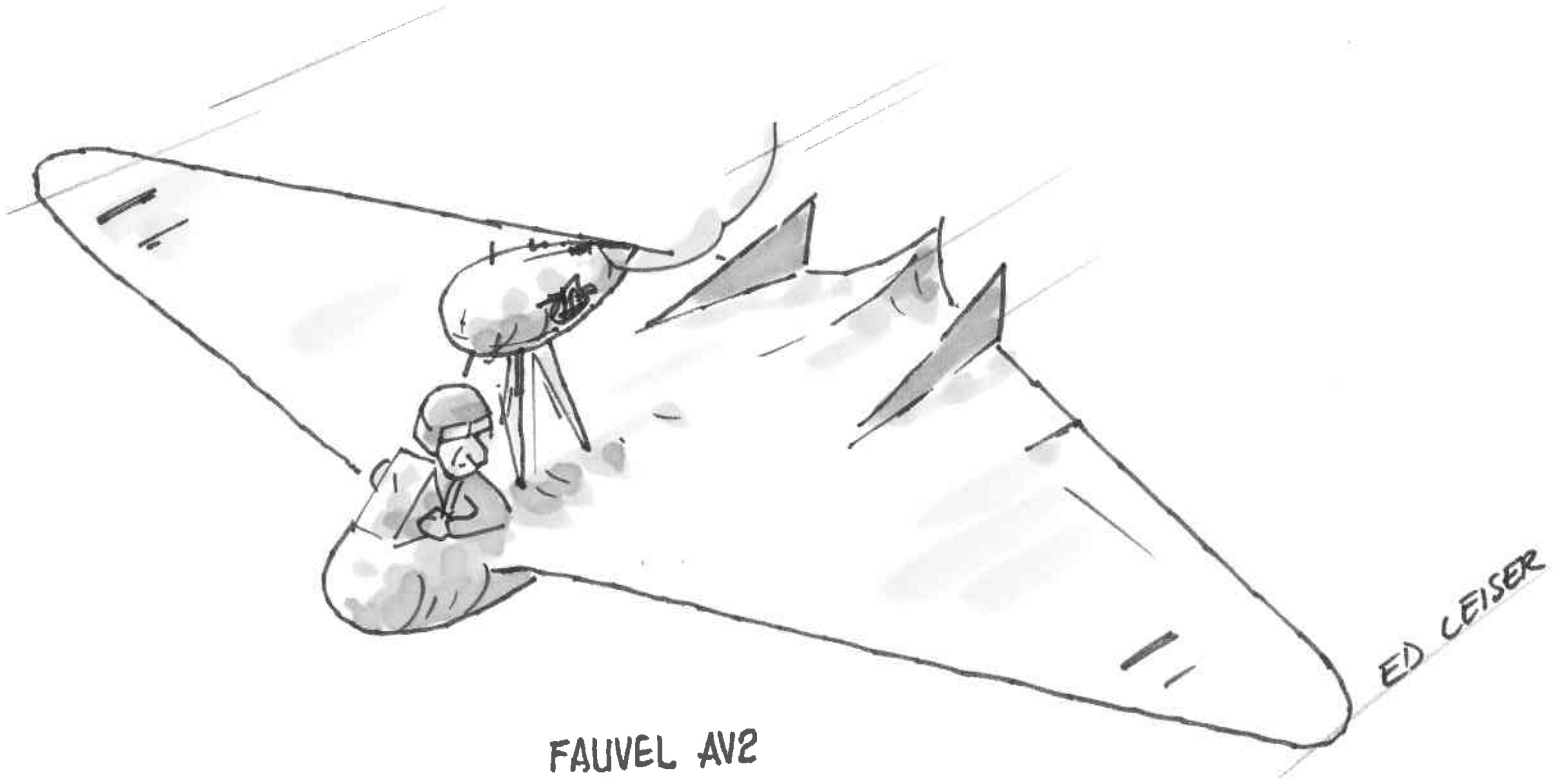
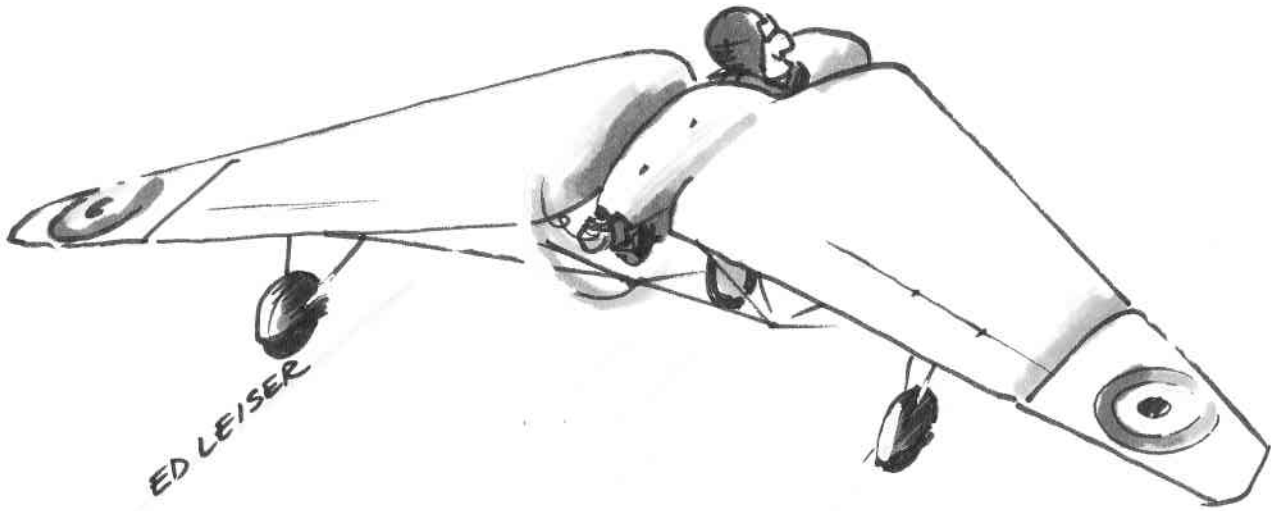


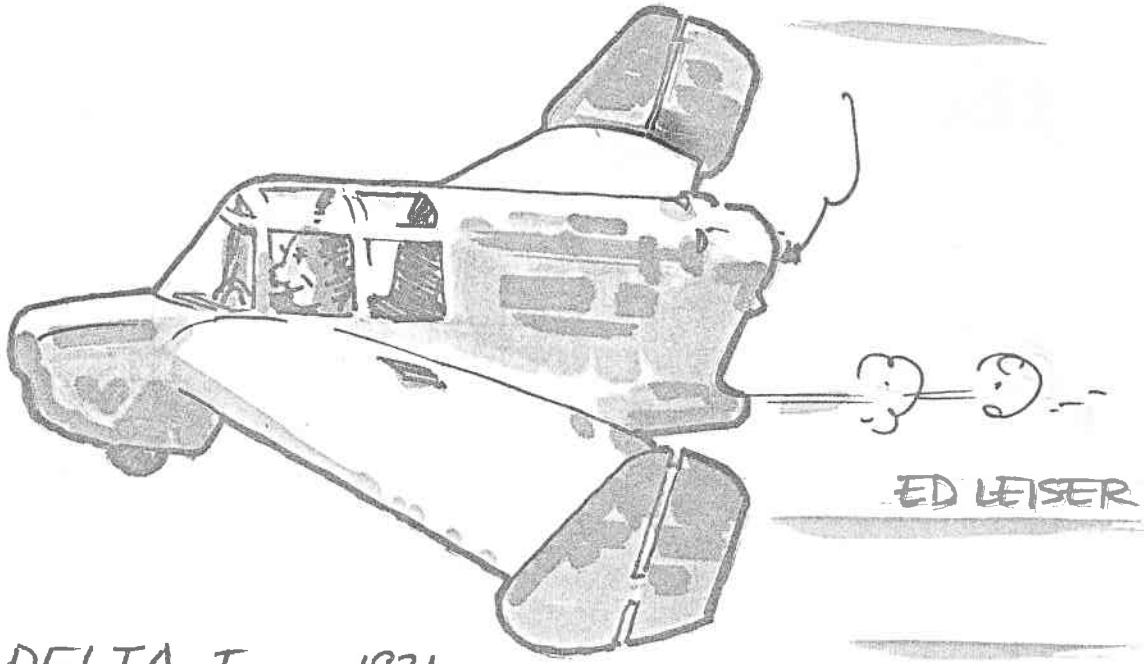
SNYDER DIRIGIPLANE



FAUVEL AV2

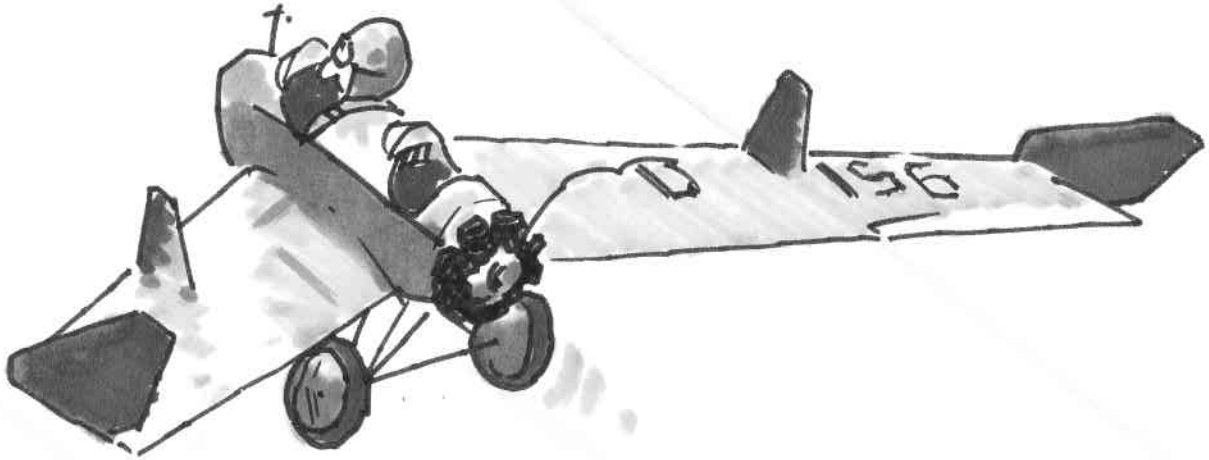


1928 WESTLAND-HILL PTERODACTYL MK. IA



DELTA I - 1931

1930 PRIMARY



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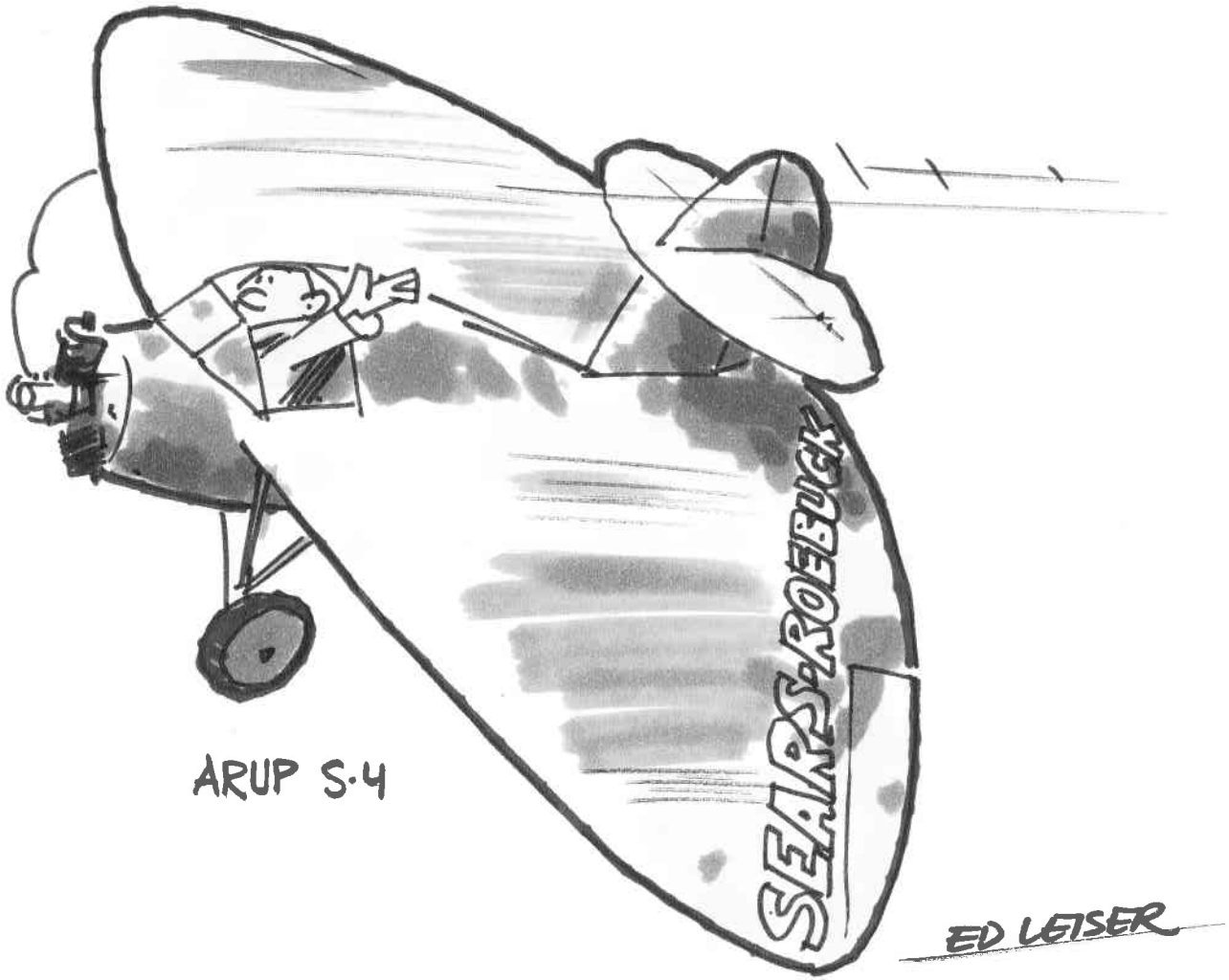
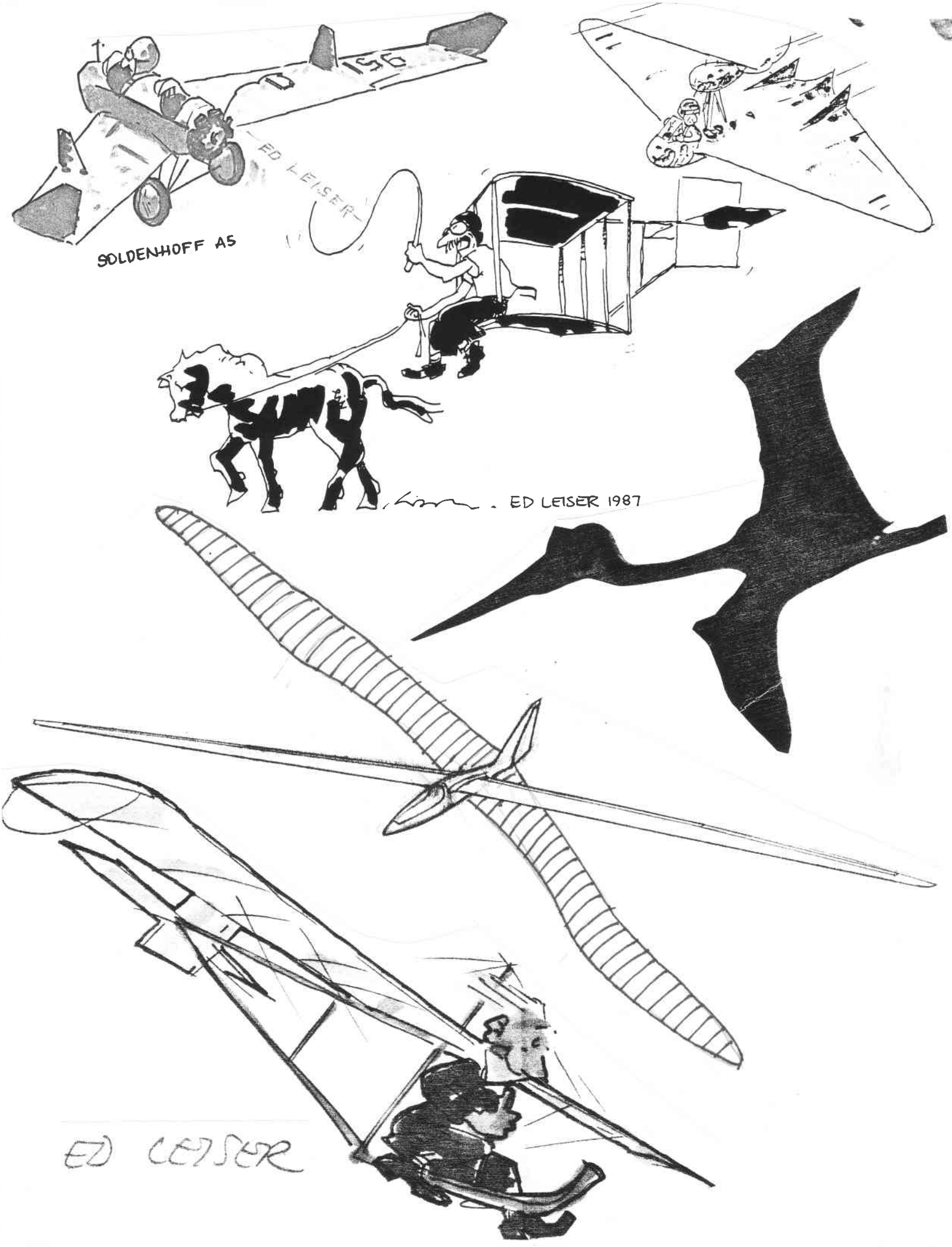

SEARS-ROEBUCK
ARUP S·4
ED LEISER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