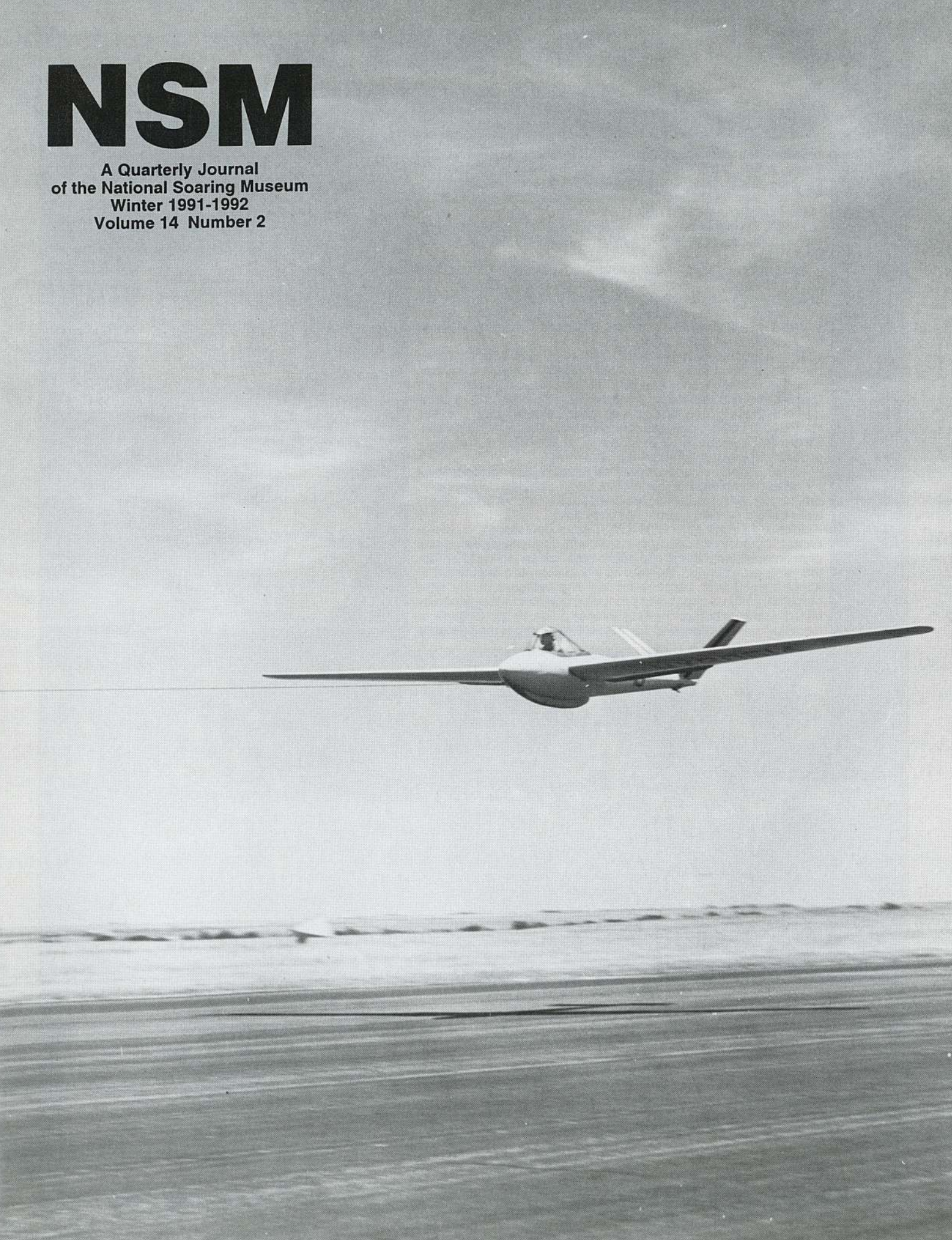
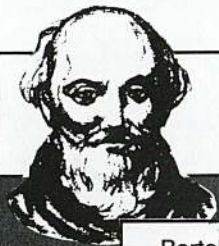


NSM

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Volume 14 Number 2





The New World's First Gliderman and Aeronaut

Bartolomeu Lourenco deGusmao, born 1685 (1) in Santos, Sao Paulo, Brazil, is generally passed unnoticed in the pantheon of early aeronauts. Yet, he may have been the western hemisphere's first gliderman and balloonist, even though he accomplished most of his experiments in Europe.

In 1709, the highly controversial and frail Jesuit priest petitioned and was granted a patent for a flying machine by John V, King of Portugal.

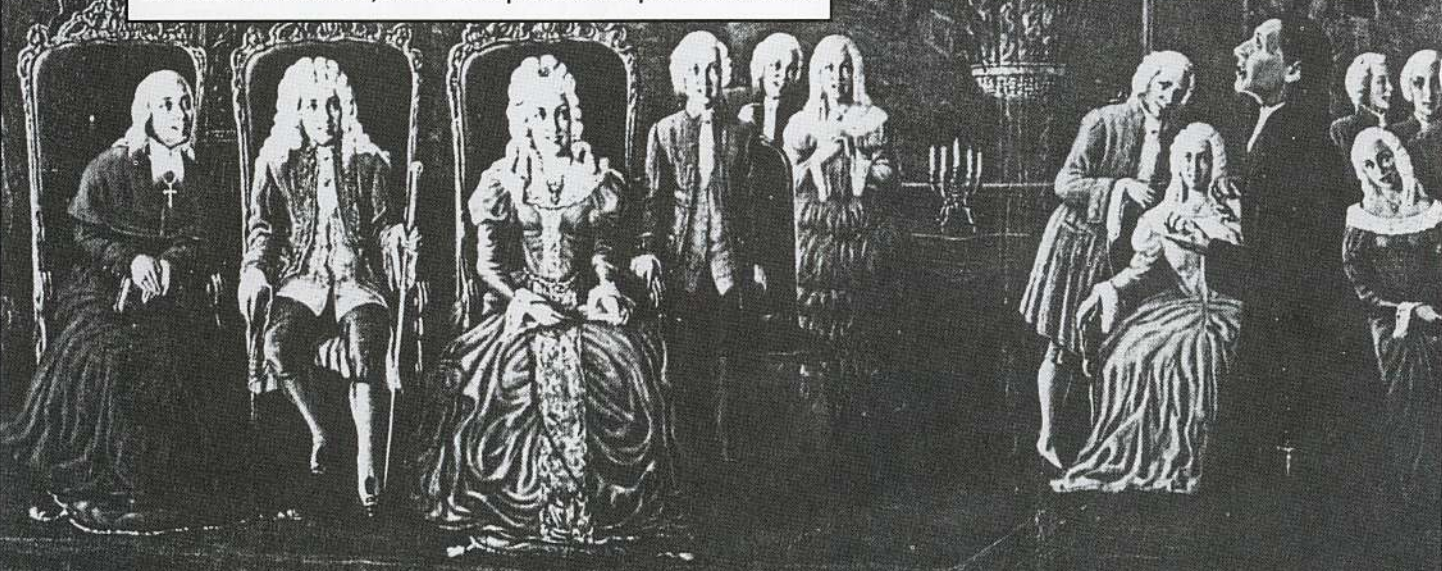
An early engraving of de Gusmao's "Passarola" (Great Bird) shows an ungainly contraption resembling a Viking longship with flapping wings, a bird tail, with lift supplied by a large horizontal sail or canopy (2). The imaginative artist's elegant draftsmanship shows it was to be drawn skyward, with its bouyancy maintained by magnets enclosed in globes (3).

The respected aero-historian Charles H. Gibbs-Smith states that this representation was treated heretofore as pure fantasy, "But the evidence now suggests that some well meaning but misguided artist drew from hearsay, an actual aircraft, a small model in the form of a bird... It was made by deGusmao and was launched at Lisbon, perhaps achieving tentative flight." (4) Gibbs-Smith did a reconstructive drawing of the "Passarola" as it probably appeared and flew in model form.

Although deGusmao was granted a patent, it is not recorded if he ever completed a full scale, man-carrying "Passarola" ornithopter. All historians agree that if such a cumbersome device were built, it certainly would not have flown.

John V of Portugal (1706-1750) gave deGusmao exclusive rights to such devices and threatened with death anyone else who experimented with them. In a public order dated March 17, 1709, the King proclaimed, "In order to encourage the supplicant to apply himself with zeal toward the improvement of the New Machine, which is capable of producing the effects mentioned by him, I grant unto him the first vacant place in my College of Barcelos or Santarem, and the first professorship of mathematics

Inset: Bartolomeu Lourenco deGusmao. Below: Fr. deGusmao demonstrates his hot air balloon to the Court of King John V of Portugal in 1709.



in my University of Coimbra, with the annual pension of 600,000 reis during his life. (5)

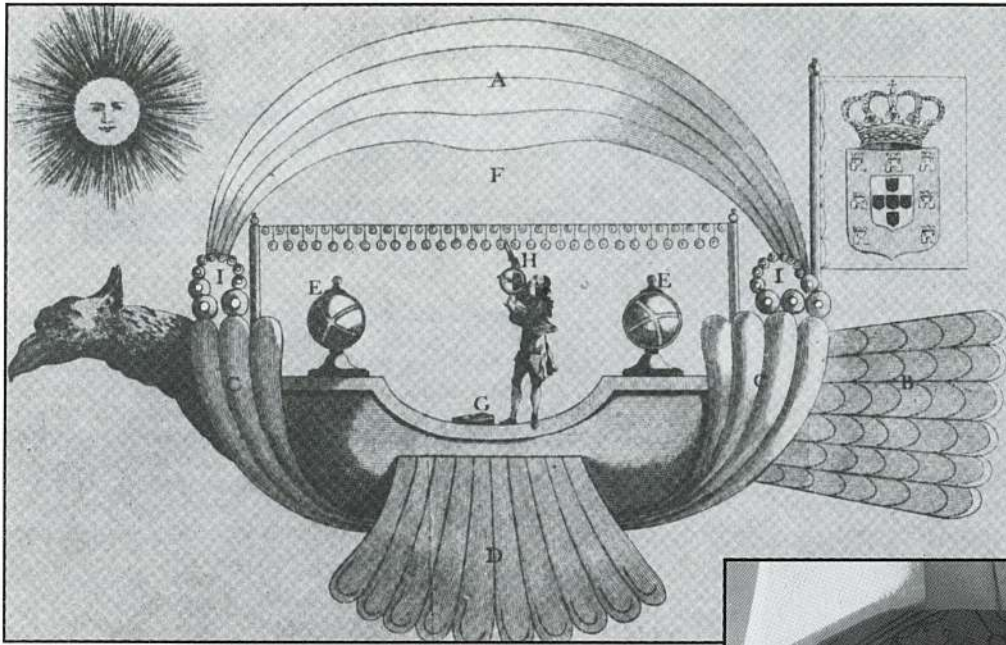
The fanciful "Passarola" drawing seen in most aviation histories is now in the collection of the Bibliotheque Nationale, Paris, France.

While deGusmao's "Passarola" experiment faded into historical speculation, his most important aeronautical contribution is well documented and occurred later in the summer of 1709 before the Portugese King, Queen Maria Anna, the Papal Nuncio, Cardinal Conti (later Pope Innocent III) and other court dignitaries.

This was a small boatlike device (a "bark" according to an old manuscript) suspended beneath a "cloth of canvas." With

"various spirits, quintessences and other ingredients, (deGusmao) put a light beneath it and let the said bark fly in the Salla das Embaixadas before His Majesty and many other persons. It rose to a small height (12 feet) against the wall and then came to earth and caught fire when the materials became jumbled together. In descending and falling downwards, it set fire to some hangings and everything against which it knocked. His Majesty was good enough not to take it ill." (6)

deGusmao had invented and demonstrated the first primitive hot air balloon. It occurred 73 years before the more generally acclaimed first lighter-than-air ascent when Joseph and Etienne Montgolfier sent a sheep, a cock and a duck aloft in their hot air balloon, September 1783. (7)



A fanciful rendering of deGusmao's Passarola (Great Bird). In 1709 a model of this design may have flown as a glider in Lisbon.

The question arises as to why deGusmao didn't pursue his experiments further, and why it took so long to realize the dream of aerostatic flight.

In his book, "Bartolomeo deGusmao E A Sua Prioridade Aerostatica," Alfonso deTaunay (8) writes that deGusmao "was the butt of a terrible series of attacks covering him with disparaging insults and ridicule. And, as he was timid, from that time on (1709), he did not recommence his experiments. He was universally called, "Padre Voador" (the Flying Priest)...Court intrigue engulfed him..." There was talk of sorcery and the use of the black arts. He had the impudence to be the friend of several Brazilian Jews exiled in Portugal. He was watched by the Inquisition and finally was sought by that tribunal.

"Panic struck him and he burned all his papers and fled to Spain at the end of September, 1724. He arrived in Toledo in a state of great poverty, became seriously ill and died on the following 19th of November in the hospital of that town." (8)

It was not until 1804 that Sir George Cayley built and flew the first true heavier-than-air machine. (9) It was a model glider consisting of a kite-shaped wing mounted on a pole with a movable cruciform tail unit, basically the same configuration as used in modern aircraft.

The Montgolfiers aside, it was another Englishman, Henry Canvendish, who in 1766 discovered "inflammable air," hydrogen, which paved the way for the development of practical lighter-than-air flight. (10) Lately the sport of hot-air ballooning has enjoyed a remarkable world-wide growth, with several significant records being attained.

Recent discoveries indicate pre-Columbian aeronautical experimentation and activity among the Aztecs of Mexico and the Nazcas, a coastal race that inhabited southern Peru from 100 B.C. to A.D. 700. More on that in a later NSM Journal.

While deGusmao is little recognized in the United States, he is an icon in Portugal and Brazil, ranking with such national heroes as Prince Henry the Navigator, explorers deGama and Diaz; aeronaut Santos-Dumont, and Cabral/Coutinho, first to fly the South Atlantic.

Sited outside the new Lisbon air terminal is a highly stylized, free standing, 12-foot representation of Fr. deGusmao holding a tablet with a drawing of his "Passarola" inscribed on it. The people of Portugal want the people of the world to know that their "Padre Voador" was one of Western man's first aeronauts...

Special thanks for their generous assistance:

Sra. Ana Martins Barata, National Library of Portugal, Campo Grande, Lisbon.

Barbara Hornick-Lockard, Dir., Arthur A. Houghton, Jr.

Library, Corning Community College, Corning, NY

Michael Huang, Steele Memorial Library, Elmira, NY



Top Right:
This stylized monument to deGusmao stands outside Lisbon's new air terminal.

Middle:
Detail of the Lisbon deGusmao monument showing the great pioneer holding a design of his Passarola.

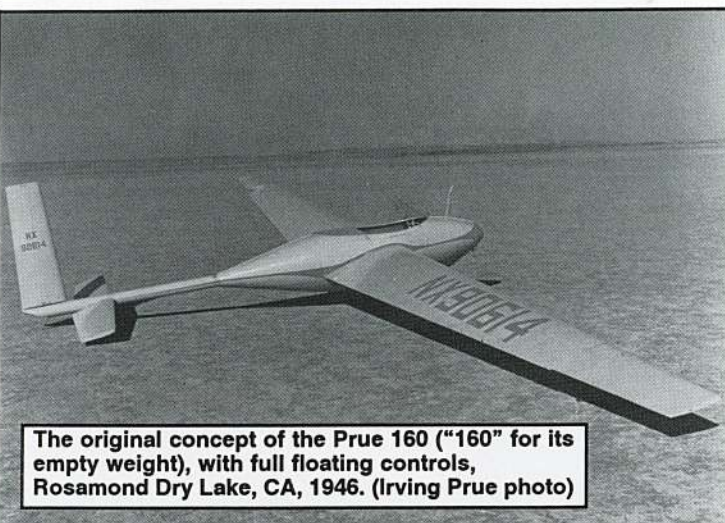
Right:
A satirical Italian cartoon of deGusmao pointing with his left hand to an inverted Passarola dumping its pilot and with his right hand to the resultant crash.



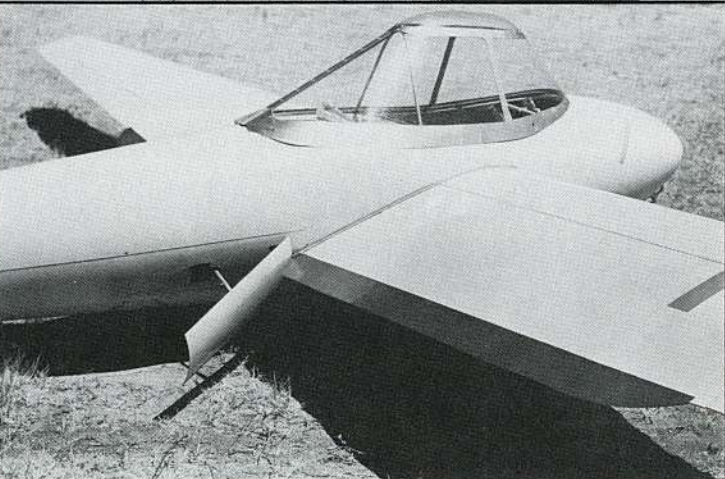
References:

1. There is some disagreement on the date of deGusmao's birth. Several sources, along with the Dictionary of Catholic Biography list 1685, while Charles Gibbs-Smith along with other noted historians give 1686 as his birth year.
2. "Flight Before Flying" by David W. Wragg - Frederick Fell, Publishers, Inc. pgs. 13 and 24.
3. "Man With Wings, A Pictorial History of Aviation" by Edward Jablonski, Doubleday & Co., p 7.
4. "Aviation, An historical survey from its origins to WWII" by Charles H. Gibbs-Smith, London - Her Majesty's Stationery Office, p. 14.
5. "The World in The Air" by Francis Trevelyan Miller - G.P. Pulmanis Sons, London, p. 111.
6. "Man With Wings" p. 8.
7. "Flight" by John Taylor - Peebles Press, p. 10.
8. "Bartolomeo deGusmao E Sua Prioridade Aerostatica" by Alfonso deTaunay, da Academia Brasileira S. Paulo - 1935 - Ecolas Profissionais Salesianas, #B.N.L. 15111 H.G., pgs. 281,2.
9. "The Lore of Flight" by John W. R. Taylor - Crescent Books, p. 39.
10. "Flight" p. 10.

On the Cover - The Prue 160 - N90614, a WWII P-38 Fighter Droppable Fuel Tank that Grew into a Sailplane



The original concept of the Prue 160 ("160" for its empty weight), with full floating controls, Rosamond Dry Lake, CA, 1946. (Irving Prue photo)



In its original configuration, the fuselage of the Prue 160 was a WW II surplus P-38 droppable fuel tank and a laminated plywood radio tower tube mast that, in 1945, pioneering constructor Irving O. Prue fashioned into a sailplane.

Prue, of Pearblossom, CA, was determined to experiment with a very small and light sailplane. The basic idea was to construct a very light ship, gaining strength through its reduced size. The goal was a 40-foot span all-metal ship weighing 160 pounds. The first design incorporated wingtip ailerons and full floating tail surfaces, which were identical assemblies, all of them hinged at .2 chord and of symmetrical airfoils. (See Photo)

The design was modified so that the P-38 tank fuselage of 1010 steel extended 6 feet from the nose to the aft torsion spar section of the wing with the three forward stiffeners removed. Maximum diameter of the tank was 28 inches. A sleek magnesium aft section replaced the original plywood radio tower mast giving a clean aerodynamic shape.

At the suggestion of Harold Huber, Walnut Creek, CA, Prue incorporated a vee tail "along the lines that Bob Stanley suggested in articles in "SOARING". (1) The designer felt that the vee had the advantages of stability, low weight and aerodynamic efficiency in a small ship. The modified 160 flew in the 1947 Nationals at Wichita Falls, TX.

In a November-December 1948 "SOARING" magazine article (2) Prue discussed the merits and minuses of a small sailplane:

Strength: A small span results in ruggedness unattainable in larger spans.

Lower Cost: Less material, small trailer to buy or build. Not so easily damaged due to its ruggedness. Smaller maintenance and repair costs due to its size.

Handling ease: Not a problem to lift assemblies.

Manueverability: Advantageous rate of roll. Rolling inertia loads are smaller.

Easier to fly: Control loads are practically non-existent, making flying less tiring over a longer period of time.

Home building: The home garage or utility room is generally enough space. Alignment problems are much simpler.

Prue also listed some of the negatives: Tip stall, uncomfortable cockpit, wingtip clearance, wing-fuselage interference, control effectiveness (the ailerons are so effective that a small degree of wheel movement causes instant reaction of the ship in a roll), directional control on the ground and performance.

Only one Prue 160 was built by Irv Prue (in 1945). It had an experimental rating and featured a vee tail, magnesium skins, ribs and spar webs. Airfoil was symmetrical with external airfoil flaps. The '47 Nationals version had fuselage dive brakes.

Prue recently commented that he thought his '160' was "alive but not flying."

Subsequent to the 1947 Nationals he sold it for \$700. The buyer, after paying \$400 on it, 3 months later returned it to the builder along with oxygen bottle, instruments and parachute that were not part of the original sale. The would-be purchaser explained that he didn't want the ship involved in his current divorce settlement.

Middle Left: Irving Prue in the cockpit of his "160" showing cockpit arrangement, high visibility canopy.
Lower Right - A close-up of V-tail design. Builder Prue adjusts canopy for pilot Harold Huber.
Lower Left: Side view of the Prue 160 with fuselage dive brakes and external airfoil flaps.

The next owner was Carl Ziler, a former Air Force test pilot at Wright Field. Ziler had the use of only one eye but nonetheless flew the diminutive '160' safely for 5 years. Ownership then passed to a San Diego pilot who flew the '160' for 10 years. Later the '160' was discovered de-rigged minus its canopy at a San Diego garage sale by a man who thought it was a helicopter. Prue was contacted and he advised that they "put it on a barge, tow it out and dump it in the ocean, where the ship's magnesium could be returned to its original state."

In 1980 Prue received a call from a Fresno, CA man who wanted advice on rebuilding the '160'. Prue implored the caller not to try and fly it. Around 1984 or '85 the designer-builder received another call, this time from San Antonio, TX. He asked Prue where the canopy was and how he could restore the ship. "Please, for goodness sake, please don't try to fly it," Prue responded. Prue said that he hasn't heard of the '160's' whereabouts or its condition since.

Irving O. Prue is a 41-year veteran of Lockheed, retiring as senior and advanced liaison engineer in 1977. He had been associated with work on Lockheed models 10, 12, 14, 16, 18, Electra, P-38, P-80, F94A, B, C, F104A, B, C-131 Hercules, Constellations, 049, 549, 649, 1049, YF12 and SR71.

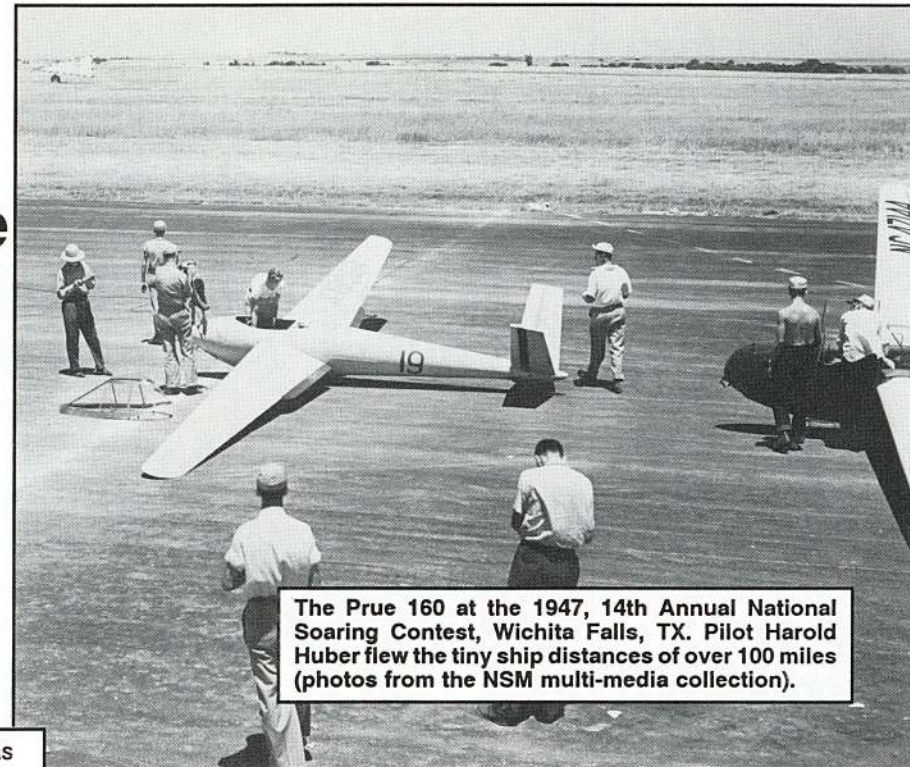
He is a 1964 U.S. Soaring Hall of Famer and will be honored with a showing of his lifetime work in the United States Sailplane Designers and Builders segment of the National Soaring Museum's 1992 Exhibit, opening in May.

Prue 160 specifications:

Span	40 Ft.
Area	80 sq. ft.
Aspect ratio	20
Airfoil	NACA 0018 to 0009
Empty Weight	160 lbs.
Payload	200 lbs.
Gross Weight	360 lbs.
Wing loading	4.5 lbs/sq. ft.
Structure	all metal

Performance

L/D Max	26 @ 52 mph
Min. sink	2.8 ft. per sec. @ 40 mph
6 ft. per sec. sink	72 mph



The Prue 160 at the 1947, 14th Annual National Soaring Contest, Wichita Falls, TX. Pilot Harold Huber flew the tiny ship distances of over 100 miles (photos from the NSM multi-media collection).

Prue's 1946 version was the first effort at a small sailplane design. It was far from what he imagined could be done to develop an all-metal, small sailplane. He felt that the kit sailplane idea could be taken a step forward by type-certifying the design and having home builders make different assemblies under simple production certificates, one person fabricating all tail surfaces, another fuselages, others wings, canopy, etc., thereby eliminating overhead costs.

From the "160", Prue went on to design and build an impressive line of original sailplane concepts.

(1) SOARING - May/June 1947, p. 4

(2) Take Another Look At the Small Sailplane, p. 8-9

CALENDAR OF EVENTS

DATE	EVENT	LOCATION
April 7	Community Aviation Dinner with Pilot-Astronaut, Maj. Eileen Collins sponsored by the NSM, The Community Soaring Committee, the Harris Hill Soaring Corp. and The Experimental Aircraft Ass'n.	NSM Community Room
April 25	Spring KITE-CITEMENT	Harris Hill
May 16	Annual Trustee Meeting United States Soaring Hall of Fame Induction and Banquet	NSM
June 3-4	NASA Aerovan	NSM
Sept. 12-13	Chemung Valley Air Show	Elmira/Corning Regional Airport
Sept. 26	Fall KITE-CITEMENT	NSM
TBA	19th Annual Ralph S. Barnaby lecture	Location to be announced
Dec. 4	Annual Community Soaring Luncheon	NSM Community Room

For further information, contact Paul Prunier, Curator of Education

You can help in preserving America's soaring heritage.

If you have historic memorabilia and excess or duplicate publications, please contact the National Soaring Museum to discuss contribution to the Museum's collections and archives.

Share your collection of Soaring artifacts and reminiscences with interested succeeding generations.

Address: Charles D. Smith, Ph. D., Executive Director
National Soaring Museum
Harris Hill, RD#3, Elmira, NY 14903

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Executive Director — Charles D. Smith Ph.D.
Editor — Bill Gallagher

The National Soaring Museum is an affiliate of The Soaring Society of America and, as such, is the official repository for all its artifacts and memorabilia.

JUST FOR THE RECORD

From time to time the NSM receives inquiries concerning national and international sailplane records, so we have included the following for your quick reference.

The listing on the following pages is a reprint of a "World and US Records" from The Soaring Society of America 1991 Membership Handbook. The SSA is the governing body of motorless flight in the United States and is headquartered in Hobbs, NM (Box E, 88241).

U.S. NATIONAL SOARING RECORDS
As of March 1, 1991

Record Category	15-METER CLASS SINGLE PLACE		STANDARD CLASS SINGLE PLACE	
	U.S. National	U.S. National	U.S. National	U.S. National
DISTANCE	1152.0 km (716.0 mi.) Wallace A. Scott 7-22-77 SGS 1-35A Odessa, TX		797.33 km (495.44 mi) Robert F. Hupe 6-8-88 LS-4a Lake Creek, CO	
GOAL	857.12 km (532.59 mi.) Kenneth Arterburn 7-30-81 AS-W 15A Refugio, TX		721.37 km (448.24 mi.) Fritz Seger 8-29-87 Astir CS/77 Crystallaire, CA	
OUT & RETURN	1298.97 km (807.14 mi.) Leonard R. McMaster 3-17-76 Std. Cirrus Lock Haven, PA		655.87 km (413.75 mi.) James M. Payne 5-29-86 LS-4a Minden, NV	
ALTITUDE GAIN	9,753.6 meters (32,100 ft.) Harold Katinazky 3-27-85 Janar Std. 2 Cal. City, CA		12,162 meters (39,900 ft.) Robert R. Harris 2-17-86 G-102 Cal. City, CA	
ABSOLUTE ALTITUDE	11,582.4 meters (38,000 ft.) Harold Katinazky 3-27-85 Janar Std. 2 Cal. City, CA		14,938 meters (49,009 ft.) Robert R. Harris 2-17-86 G-102 Cal. City, CA	
SPEED OVER 100KM TRIANGULAR COURSE	172.16 km/h (106.98 mph) Thomas Knauff 11-5-87 Discus Ridge Soaring, PA		172.16 km/h (106.98 mph) Thomas Knauff 11-5-87 Discus Ridge Soaring, PA	
SPEED OVER 300KM TRIANGULAR COURSE	148.89 km/h (92.5 mph) James J. Nance 6-22-80 LS-3 Taos, NM		130.75 km/h (81.24 mph) William G. Hill 5-28-88 Discus Rifle, CO	
SPEED OVER 500KM TRIANGULAR COURSE	139.00 km/h (86.37 mph) Thomas Knauff 5-21-89 Discus Ridge Soaring, PA		139.00 km/h (86.37 mph) Thomas Knauff 5-21-89 Discus Ridge Soaring, PA	
SPEED OVER 750KM TRIANGULAR COURSE	121.03 km/h (75.21 mph) Robert L. Semans 7-4-84 Mini-Nimbus B Minden, NV		117.99 km/h (73.32 mph) James M. Payne 5-30-86 LS-4a Minden, NV	

SPEED OVER 1000KM TRIANGULAR COURSE	123.38 km/h (76.66 mph) Tom Serkowski 8-04-90 AS-W 20 Inyokern, CA	None Established
SPEED OVER 1250KM TRIANGULAR COURSE	109.01 km/h (67.74 mph) Leonard R. McMaster John C. Seymour Karl Striedieck 5-2-86 AS-W 20B Eagle Field, PA	None Established
DISTANCE AROUND A TRIANGULAR COURSE	1362.68 km (846.73 mi.) Leonard R. McMaster John C. Seymour Karl Striedieck 5-2-86 AS-W 20B Eagle Field, PA	873.41 km (542.71 mi.) H. Ray Gimney 8-14-87 Discus B Minden, NV
OUT & RETURN 300 KM SPEED	199.47 kph (123.94 mph) William Bartell 7-19-89 Ventus B Inyokern, CA	195.53 kph (121.50 mph) Thomas Knauff 4-22-89 Discus Ridge Soaring, PA
OUT & RETURN 500 KM SPEED	159.37 km/h (99.03 mph) William Bartell 7-17-88 Ventus B Cal. City, CA	133.48 kph (82.94 mph) Hal Woodruff 8-20-88 Discus B Lone Pine, CA

WORLD AND U.S. NATIONAL SOARING RECORDS
As of March 1, 1991

Record Category	FEMININE SINGLE PLACE		FEMININE MULTI PLACE	
	World	U.S. National	World	U.S. National
DISTANCE	949.7 km (590.0 mi.) Karia Karel 1-20-80 LS-3 Great Britain	951.43 km (591.19 mi.) Joann B. Shaw 7-02-90 Nimbus 2 Hobbs, NM	864.864 km (537.399 mi.) Tamara Pavlova Filo Mechkina 6-3-67 Blanik USSR	274.10 km (170.316 mi.) Betsy W. Proudfit 7-11-52 Pratt-Read El Mirage, CA
GOAL	951.43 km (591.19 mi.) Joann B. Shaw 7-2-90 Nimbus 2 U.S.A.	951.43 km (591.19 mi.) Joann B. Shaw 7-2-90 Nimbus 2 Hobbs, NM	864.862 km (537.399 mi.) I. Gorokova K. Koulava 6-3-73 Blanik USSR	274.10 km (170.316 mi.) Betsy W. Proudfit 7-11-52 Pratt-Read El Mirage, CA
OUT AND RETURN	1127.684 km (700.74 mi.) Doris Grove 9-28-81 Nimbus 2 U.S.A.	1127.68 km (700.7 mi.) Doris Grove 9-28-81 Nimbus 2 Ridge Soaring, PA	649.63 km (403.68 mi.) Tamara Sviridove Valentina Toporova 5-24-86 Lak 12 DP Poland	None Established
GAIN OF HEIGHT	10,213 meters (33,508 ft.) Yvonne Loader 1-12-88 Nimbus 2 New Zealand	8,533 meters (27,994 ft.) Betsy W. Proudfit 4-14-55 Pratt-Read Bishop, CA	8,430 meters (27,661 ft.) Adela Dankowska Maria Matelska 10-17-67 Bocian Poland	7,481 meters (24,545 ft.) Babbs Nutt 3-5-75 SGS 2-32 Black Forest, CO

continued on pg. 7

WORLD AND U.S. NATIONAL SOARING RECORDS
As of March 1, 1991

ABSOLUTE ALTITUDE	12,637 meters (41,460 ft.) Sabrina Jackintell 2-14-79 Astir CS U.S.A.	12,637 meters (41,460 ft.) Sabrina Jackintell 2-14-79 Astir CS Black Forest, CO	10,809 meters (35,463 ft.) Babbs Nutt 3-5-75 SGS 2-32 U.S.A.	10,809.1 meters (35,463 ft.) Babbs Nutt 3-5-75 SGS 2-32 Black Forest, CO
SPEED OVER 100-KM TRIANGULAR COURSE	139.45 kph (86.59 mph) Susan Martin 1-29-79 LS-3 Australia	139.06 km/h (86.43 mph) Joann B. Shaw 7-23-83 Nimbus 2 Snyder, TX	126.286 kph (78.47 mph) Adela Dankowski Elzbieta Grzelak 8-1-78 Halny Poland	37.398 km/h (23.238 mph) Gun-Britt Ploden 5-9-76 Blanik Van Sant, PA
SPEED OVER 300-KM TRIANGULAR COURSE	138.70 kph (86.18 mph) I. Mueller 12-8-85 Ventus B West Germany	129.71 km/h (80.61 mph) Joann B. Shaw 8-15-83 Nimbus 2 Snyder, TX	123.30 kph (76.62 mph) I. Mueller C. Mueller 12-7-85 West Germany	None Established
SPEED OVER 500-KM TRIANGULAR COURSE	133.14 kph (82.72 mph) Susan Martin 1-29-79 LS-3 Australia	112.77 km/h (70.09 mph) Joann B. Shaw 7-30-83 Nimbus 2 Snyder, TX	95.72 kph (59.48 mph) Daina Vilne Valentina Toporova 5-16-86 Halny Poland	None Established
SPEED OVER 750-KM TRIANGULAR COURSE	111.52 kph (69.30 mph) Pamela Hawkins 11-17-84 Great Britain	100.55 km/h (62.48 mph) Joann B. Shaw 8-5-84 Nimbus 2 Snyder, TX	None Established	None Established
SPEED OVER 1000-KM TRIANGULAR COURSE	None Established	None Established	None Established	None Established
SPEED OVER 1250-KM TRIANGULAR COURSE	None Established	None Established	None Established	None Established
DISTANCE AROUND A TRIANGULAR COURSE	847.27 km (526.50 mi.) Joann B. Shaw 8-5-84 Nimbus 2 U.S.A.	847.27 km (526.50 mi.) Joann B. Shaw 8-5-84 Nimbus 2 Snyder, TX	None Established	None Established
Record Category	FEMININE SINGLE PLACE		FEMININE MULTI PLACE	
OUT & RETURN 300 KM SPEED	World Not Applicable	U.S. National 184.81 km/h (114.83 mph) Iris Mittendorf 11-17-90 AS-W 24 Ridge Soaring, PA	World Not Applicable	U.S. National None Established
OUT & RETURN 500 KM SPEED	Not Applicable	113.82 km/h (70.74 mph) Joann B. Shaw 8-13-83 Nimbus 2 Snyder, TX	Not Applicable	None Established
Record Category	MOTORGLIDER SINGLE PLACE		MOTORGLIDER MULTI PLACE	
GOAL	World 826.66 km (513.69 mi.) Hans P. Elkmann 5-15-89 AS-W 22M West Germany	U.S. National 788.34 km (489.85 mi.) Donald Hurd 7-10-88 DG-400M/17 Minden, NV	World 1049.43 km (651.70 mi.) Hans W. Grosse Karin Grosse 5-29-90 AS-H 25E West Germany	U.S. National 969.75 km (602.57) Jerry Wenger Donald Aitken 7-8-89 Nimbus 3DM Minden, NV

OUT AND RETURN	1084.94 km (674.18 mi.) Otto Schaeuble 1-9-88 AS-W 22BE West Germany	842.68 km (512.43 mi.) Donald Hurd 7-6-87 DG-400M/17 Minden, NV	1101.54 km (684.54 mi.) Morris Walker George Taylor 10-27-88 Twin Astir New Zealand	None Established
GAIN OF HEIGHT	9935 meters (32,595 ft.) Malcolm D. Stevenson 10-25-85 DG-400M USA	9935 meters (32,595 ft.) Malcolm D. Stevenson 10-25-85 DG-400 North Conway, NH	5650 meters (18,701 ft.) Helmut Kohler Jean-Claude Batault 4-28-86 Taifun 17-E West Germany	None Established
ABSOLUTE ALTITUDE	10,408 meters (34,149 ft.) Gunter Cichon 5-27-79 Nimbus M West Germany	10,282 meters (33,733 ft.) Malcolm D. Stevenson 10-25-85 DG-400 North Conway, NH	8000 meters (26,379 ft.) Helmut Kohler Jean-Claude Batault 4-28-86 Taifun 17-E West Germany	None Established
SPEED OVER 100-KM TRIANGULAR COURSE	191.191 kph (118.73 mph) Beat Bueznli 12-29-87 DG-400 Switzerland	157.90 km/h (98.12 mph) Donald Aitken 6-30-87 DG-400M/17 Minden, NV	150.96 kph (93.80 mph) Beat Bueznli Max Bachmann 11-26-88 AS-H 25MB Switzerland	None Established
SPEED OVER 300-KM TRIANGULAR COURSE	165.514 kph (102.85 mph) Beat Bueznli 12-22-84 DG-400 Switzerland	130.87 km/h (81.32 mph) Donald Aitken 7-1-86 DG-400M/17 Minden, NV	152.53 kph (94.78 mph) Walter Binder Karl Semne 1-2-87 AS-H 25M West Germany	None Established
SPEED OVER 500-KM TRIANGULAR COURSE	170.06 kph (105.67 mph) Beat Bueznli 1-9-88 DG-400 Switzerland	129.54 km/h (80.49 mph) Donald Aitken 6-23-86 DG-400M/17 Minden, NV	156.93 kph (97.52 mph) Otto Wegscheider W. Schoeffer 1-2-88 AS-H 25MB West Germany	None Established
SPEED OVER 750-KM TRIANGULAR COURSE	150.82 kph (93.72 mph) Beat Bueznli 12-17-87 DG-400 Switzerland	122.99 km/h (76.42 mph) Donald J. Hurd 8-14-87 DG-400/17 Minden, NV	127.57 kph (79.27 mph) Walter Binder Otto Wegscheider 12-25-87 AS-H 25MB West Germany	None Established
Record Category	MOTORGLIDER SINGLE PLACE		MOTORGLIDER MULTI PLACE	
SPEED OVER 1000-KM TRIANGULAR COURSE	World 139.97 kph (86.97 mph) Beat Bueznli 12-2-84 DG-400 Switzerland	U.S. National None Established	World 129.99 kph (80.77 mph) Erwin Mueller Karl Semne 12-27-86 AS-H 25M West Germany	U.S. National None Established
SPEED OVER 1250-KM TRIANGULAR COURSE	None Established	None Established	None Established	None Established
DISTANCE AROUND A TRIANGULAR COURSE	1089.99 km (677.32 mi.) Fritz Rueb 1-16-87 Nimbus 3MR West Germany	933.70 km (580.18 mi.) Donald J. Hurd 8-14-87 DG-400/17 Minden, NV	1095.69 km (680.86 mi.) Erwin Mueller Walter Binder 12-27-86 AS-H 25M West Germany	None Established
OUT & RETURN 300 KM SPEED	Not Applicable	131.93 km/h (85.70 mph) Donald Aitken 8-6-90 DG-400M/17 Minden, NV	Not Applicable	None Established
OUT & RETURN 500 KM SPEED	Not Applicable	136.57 km/h (84.86 mph) Donald Hurd 7-20-88 DG-400M/17 Flying M, NV	Not Applicable	None Established

continued on pg. 8

WORLD AND U.S. NATIONAL SOARING RECORDS (continued)
As of March 1, 1991

Record Category	OPEN CLASS SINGLE PLACE		OPEN CLASS MULTI PLACE	
	World	U.S. National	World	U.S. National
DISTANCE	1460.8 km (907.7 mi.) H.W. Grosse 4-25-72 AS-K 12 West Germany	1452.8 km (902.95 mi.) Michael S. Koerner 4-19-84 Kestrel 19 Cal City, CA	1091.864 km (678.05 mi.) Hans Werner Grosse Karin Grosse 1-14-90 AS-H 25 West Germany	901.92 km (560.43 mi.) Lazlo Horvath 5-10-80 Janus Estrella, AZ
GOAL	1254.26 km (779.36 mi.) David Speight S.H. Georgeson Bruce L. Drake 1-14-78 Nimbus 2 New Zealand	1083.8 km (673.6 mi.) Michael S. Koerner 4-19-84 Kestrel 19 Cal City, CA	1019.598 km (633.17 mi.) Morris W. Walker Terry Delore 1-04-90 AS-H 25 New Zealand	657.9 km (408.9 mi.) Kenneth Arterburn 8-17-78 Lark Woodboro, TX
OUT AND RETURN	1646.68 km (1023.42 mi.) Thomas L. Knauff 4-25-83 Nimbus 3 U.S.A.	1646.68 km (1023.42 mi.) Thomas L. Knauff 4-25-83 Nimbus 3 Ridge Soaring, PA	1261.36 km (783.30 mi.) Morris W. Walker Terry Delore 12-01-89 AS-H 25 New Zealand	1000.88 km (621.92 mi.) Thomas L. Knauff 9-28-81 Twin Astir Ridge Soaring, PA
GAIN OF HEIGHT	12,894 meters (42,303 ft.) Paul F. Bikle 2-25-61 SGS 1-23E U.S.A.	12,894 meters (42,303 ft.) Paul F. Bikle 2-25-61 SGS 1-23E Mojave, CA	11,680 meters (38,320 ft.) S. Jozefczak T. Tarczon 11-5-66 Bocian Poland	10,493 meters (34,426 ft.) Laurence Edgar 3-19-52 Pratt-Read Bishop, CA
ABSOLUTE ALTITUDE	14,938 meters (49,009 ft.) Robert R. Harris 2-17-86 G-102 U.S.A.	14,938 meters (49,009 ft.) Robert R. Harris 2-17-86 G-102 Cal. City, CA	13,489 meters (44,255 ft.) Laurence Edgar Harold Klieforth 3-19-52 Pratt-Read U.S.A.	13,489 meters (44,255 ft.) Laurence Edgar 3-19-52 Pratt-Read Bishop, CA
SPEED OVER 100-KM TRIANGULAR COURSE	195.30 kph (121.36 mph) Ingo Renner 12-14-82 Nimbus 3 Australia	186.9 km/h (116.1 mph) Thomas L. Knauff 5-9-83 Nimbus 3 Ridge Soaring, PA	177.26 kph (110.14 mph) Erwin Sommer Ingo Andresen 7-26-84 Janus C West Germany	138.03 km/h (85.77 mph) David K. Allen 9-20-81 Janus Black Forest, CO

SPEED OVER 1250-KM TRIANGULAR COURSE	133.24 kph (82.79 mph) H.W. Grosse 12-9-80 AS-W 17 West Germany	124.05 km/h (77.08 mph) Thomas L. Knauff 5-2-86 Nimbus 3 Ridge Soaring, PA	143.46 kph (89.15 mph) Hans Werner Grosse Hans Kohlmeier 1-10-87 AS-H 25 West Germany	None Established
DISTANCE AROUND A TRIANGULAR COURSE	1362.68 km (846.73 mi.) Thomas L. Knauff Nimbus 3 U.S.A. Leonard R. McMaster AS-W 20B Robert L. Robertson Ventus Great Britain John C. Seymour AS-W 20B U.S.A. Karl H. Striedieck AS-W 20B U.S.A. 5-2-86	1362.68 km (846.73 mi.) Thomas L. Knauff Leonard R. McMaster John C. Seymour Karl H. Striedieck 5-2-86 Nimbus 3 & AS-W 20B Ridge Soaring, PA	1379.35 km (857.13 mi.) Hans Werner Grosse Hans Kohlmeier 1-10-87 AS-W 25 West Germany	761.2 km (473.0 mi.) David K. Allen 6-22-84 Janus Taos, NM
OUT & RETURN 300 KM SPEED	Not Applicable	201.33 km/h (125.13 mph) Thomas L. Knauff 5-10-83 Nimbus 3 Ridge Soaring, PA	Not Applicable	134.39 km/h (83.53 mph) Thomas L. Knauff 12-9-83 G-103 Ridge Soaring, PA
OUT & RETURN 500 KM SPEED	Not Applicable	159.37 km/h (99.03 mph) William Bartell 7-17-88 Ventus B Cal City, CA	Not Applicable	106.29 km/h (66.95 mph) Harold Katinazsky 10-3-87 Janus Cal. City, CA

WORLD AND U.S. NATIONAL SOARING RECORDS
As of March 1, 1990

Record Category	FEMININE SINGLE PLACE, MOTORGLIDER		FEMININE MULTI PLACE, MOTORGLIDER	
	World	U.S. National	World	U.S. National
OUT AND RETURN	531.11 km (331.03 mi.) Ingrid Kohler 7-01-89 DG-400 West Germany			
GAIN OF HEIGHT	8,844 meters (29,017 ft.) Ingrid Kohler 6-03-88 DG-400 West Germany			
ABSOLUTE ALTITUDE	10,245 meters (33,614 ft.) Ingrid Kohler 6-03-88 DG-400 West Germany			
SPEED OVER 100KM TRIANGULAR COURSE	127.49 kph (79.22 mph) Ingrid Kohler 7-07-89 DG-400 West Germany			
SPEED OVER 300KM TRIANGULAR COURSE	87.53 kph (54.39 mph) Ingrid Kohler 7-07-89 DG-400 West Germany		67.82 kph (42.12 mph) Isabell Mittag 5-27-90 DG-500M West Germany	

Record Category	OPEN CLASS SINGLE PLACE		OPEN CLASS MULTI PLACE	
	World	U.S. National	World	U.S. National
SPEED OVER 300-KM TRIANGULAR COURSE	169.49 kph (105.32 mph) Jean-Paul Castel 11-15-86 AS-W 22 France	148.91 km/h (92.55 mph) William S. Ivars 7-28-84 Nimbus 2 Flying M, NV	170.90 kph (106.13 mph) Hans Werner Grosse Hans Kohlmeier 1-08-88 AS-H 25 West Germany	130.83 km/h (81.29 mph) David K. Allen 4-17-81 Janus Black Forest, CO
SPEED OVER 500-KM TRIANGULAR COURSE	170.059 kph (103.74 mph) Beat Buzuli 1-09-88 AS-W 22 Switzerland	159.79 km/h (99.29 mph) Carl Herold 7-9-88 Nimbus 3 Minden, NV	163.03 kph (101.24 mph) Hans Werner Grosse Hans Kohlmeier 1-20-88 AS-W 25 West Germany	123.29 km/h (76.61 mph) David K. Allen 4-25-81 Janus Black Forest, CO
SPEED OVER 750-KM TRIANGULAR COURSE	158.41 kph (98.42 mph) H.W. Grosse 1-8-85 AS-W 22 West Germany	134.15 km/h (83.35 mph) Carl D. Herold 5-30-86 Nimbus 3 Minden, NV	161.33 kph (100.19 mph) Hans Werner Grosse Karin Grosse 1-10-88 AS-H 25 West Germany	105.00 km/h (65.27 mph) David K. Allen 6-22-84 Janus Taos, NM
SPEED OVER 1000-KM TRIANGULAR COURSE	145.30 kph (90.32 mph) H.W. Grosse 1-3-79 AS-W 17 West Germany	123.38 km/h (76.66 mph) Tom Serkowaki 8-04-90 AS-W 20 Inyokern, CA	157.25 kph (97.65 mph) Hans Werner Grosse Karin Grosse 1-11-88 AS-H 25 West Germany	None Established