# National Soaring Museum
# Historical Journal

Winter 2021

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# Stan Corcoran and the First Training Glider Contract


Military gliders came into use during World War II as a means to leapfrog natural and man-made barriers and deliver combat troops and equipment deep into enemy territory. Troops that deployed in gliders tended to reach the ground in a more concentrated group than airborne troops that parachuted from transport aircraft. Soldiers scattered across a wide area could not concentrate their firepower and were difficult or impossible to communicate with, and these limitations greatly reduced their combat effectiveness. Gliders could also carry light artillery or small vehicles directly into a landing zone to support paratroops or glider-borne infantry. The primary U. S. Army combat glider was the Waco CG-4A. This glider could be difficult to handle with heavy loads and a skilled pilot was required to fly it. Until late in the war, it was only produced in limited numbers and none were available for training. To train army cadets to handle the big Waco, the army urgently needed a training glider that was easy to build and handled well in the air. The first aircraft selected for this role was a glider designed by Stan Corcoran, the TG-1A (Training Glider model 1A).

U.S. Army planners realized the potential of a glider-borne assault force after German commandos, aboard DFS 230 gliders, landed atop and captured the Belgian fort of Eben Emael in May 1940. The American army began to develop programs to design and build assault gliders, and train crews to fly them. But American industry was under tremendous pressure to expand production, and create and field new weapons. The national military leadership was forced to assign priorities and they ranked gliders well behind fighters and bombers. Henry H. "Hap" Arnold, commanding general of the Army Air Forces (AAF), declared that glider contracts could be awarded only to civilian manufacturing firms not already committed to military aircraft production. The AAF contacted eleven companies and invited them to submit glider designs for 2, 8, and 15-man gliders in March 1941, but only four returned bids: Bowlus Sailplanes, Inc, St. Louis Aircraft Corporation, Waco Aircraft Company, and the Frankfort Sailplane Company. (editor's note: In a separate arrangement, Schweizer Aircraft was supplying TG-2 training gliders to the USAAF by the summer of 1941.)

Before submitting his bid, Stan Corcoran had produced gliders for the civilian market at his Frankfort Sailplane Company factory. He was well known among competition glider pilots, and in the late 1930s, he had started small-scale construction of his Cinema I single-place glider in Frankfort, Michigan. Civilian interest in gliding was growing at a steady pace and Corcoran's company soon relocated to larger facilities in Joilet, Illinois. When the request for military gliders came out, Corcoran responded with a two-place training glider design, essentially a Cinema I with provision for another pilot. Corcoran also attempted to win contracts for production of the 8- and 15-man cargo gliders. However, during tests, Corcoran's prototype, 8-seat cargo glider, the XCG-1, suffered structural failure at only 63% of its design load strength, and Corcoran was advised to stick to designing light training gliders.

On May 26, 1941, the Frankfort Sailplane Company received a $5,784 contract from the AAF for three prototypes of a two-place glider designated XTG-1. This was the first contract issued for a U. S. training glider. The new design, soon to be called the Cinema II or Corcoran Model B, consisted of an additional tandem seat in a stretched cockpit. Other changes included a fixed horizontal stabilizer and elevator in place of the all-moving stabilator on the Cinema I. Stall speed was only 59 km/h (36 mph) and the never- exceed speed was calculated at 130 km/h (80 mph).

Corcoran used welded steel tubing to form the TG-1A fuselage. Wood construction was used for the wings and tail assembly and he installed spoilers on the upper wing surface. The pilot could increase the glider's rate-of-descent by approximately .8 m/s, or 150 fpm, using the spoilers. The tandem cockpit consisted of two canvas seats equipped with dual flight controls and instrumentation, and covered by a multi-pane, plexiglass canopy. A hinged section of the canopy gave access to the front seat, a small, quick-release door on the right side of the fuselage allowed access to the rear seat. Instrumentation consisted of an airspeed indicator, altimeter, rate-of-climb indicator, turn and bank indicator, and compass, duplicated for both front and rear seats. A single radio was included in the front-seat position.

Landing gear consisted of a single wheel and tire (fitted with a brake) installed on the bottom of the fuselage, directly below the strut fittings and a wooden skid with rubber shock absorbers was placed directly in front of the wheel. A small tail skid protected the fragile rudder and vertical stabilizer during ground handling.

In May 1942, the Frankfort Sailplane Company received a contract to build 40 TG-1As. Production began immediately and the order was completed by November 1942. Each glider cost $2,775 to build but Corcoran's factory lacked the resources to quickly produce large numbers of gliders. The Schweizer Aircraft Corporation easily built many more TG-2 gliders, a design somewhat similar to the TG-1A. By war's end, nearly 1,100 dedicated military training gliders were completed.

The expense and casualties involved in the U. S. combat glider program during World War II raised questions about its ultimate value. Operations in Europe achieved mixed results and heavy casualties. However, in Burma, combat gliders proved very useful in placing troops and equipment behind Japanese lines. After the war, the glider force was abandoned and eventually replaced by the more versatile and cost-effective helicopter. All training gliders, such as the TG-1A, were declared surplus and offered for sale to the public. Sport gliding resurged when these inexpensive gliders flooded the market, but this also forced most glider manufacturers, including Corcoran, into serious financial difficulty.

More than thirty years after combat glider pilots trained in it, Stan Corcoran donated a TG-1A to Lewis University in Illinois. An aircraft structures class at the University fully restored the aircraft and test flew it as a class project. Lewis University donated it to the Smithsonian Institution in 1983. The glider is painted in the blue and yellow colors specified for training aircraft during World War II.

https://airandspace.si.edu/collection-objects/frankfort-tg-1a-cinema/nasm_A19830113000


*Frankfort TG-1A on display in the Boeing Aviation Hangar at the Steven F. Udvar-Hazy Center in Chantilly, VA.*

# Bill Holbrook

*from Wings over Cumberland by Bob Poling and Bill Armstrong*

The arrival of William C. 'Bill' Holbrook as chief pilot of the Kelly-Springfield Flight Operations was fortunate for the Cumberland area. Holbrook became known as 'Mr. Aviation' in the 1950's, 60's, and 70's at the Cumberland Municipal Airport much as Ronald B. 'Torque' Landis had been in the 1920's, 30's and 40's at Mexico Farms Airport. Growing up in Akron, Ohio, where his dad worked for the Goodyear Tire Company, Bill was privileged to watch the giant dirigible airships (zeppelins) being built for the U.S. Navy. He was as fascinated by these giants of the sky, as he was by the International Balloon Races his dad took him to see. The family also attended the Cleveland Air Races; a huge annual event of the 1930's which was held over the Labor Day week-end. After graduating from high school, Holbrook was employed by Goodyear as a draftsman before entering the U.S. Army Air Force.

Bill learned to fly in the Army Air Force Aviation Cadet Program, beginning with the open-cockpit Boeing PT-17 Cadet during primary training, the Vultee Valiant BT-13 in basic, and the Cessna Bobcat AT-17 in twin engine advanced. He graduated in Flying Class 43-H at Marfa, Texas. While flying the Cessna Bobcat, he had the first of his four career engine failures, landing successfully with the power of the remaining engine. His initial assignment following cadet training was to the Naval Air Station, Pensacola, Florida for training in the Consolidated PBY Catalina OA-10 flying boat under a special project. At the time of its first flight in 1934 the PBY was the largest flying boat assigned to the Navy. It had two Pratt and Whitney 1830 hp engines, five machine guns, a crew of nine or ten men, a gross weight of 35,420 pounds, with a listed but doubtful top speed of 179 mph. In 1939 a retractable landing gear was added by the Consolidated Aircraft Company making it an amphibious airplane. After learning to fly the Catalina flying boat Holbrook received his Gold Navy Wings on January 11, 1944. However, due to inter-service rivalry by the Navy towards the Army Air Force, it was required to gain a direct order from Washington to get a Marine Colonel to present the Army Air Force Flying Officers with the Gold Wings worn by Navy pilots. It was a unique distinction, for Holbrook and others of his class, in being permitted to wear both the silver wings of the Air Force and the gold wings of the Navy on their Army Air Force uniforms.

Holbrook was one of the original pilots of the Second Emergency Rescue Squadron formed at Gulfport Army Air Base in Mississippi as the Army Air Force was forming its own air sea rescue units for duty in the Pacific Theater of War. He and his crew ferried an assigned Catalina to Hamilton Field, California. After six weeks work to modify the aircraft they proceeded to Hawaii, Canton Island, Tarawa, Guadalcanal, and finally Townsville, Australia, where the ship was painted a dull blue. From there they proceeded to the Island of Biak off the northeast coast of New Guinea, which became their combat base. Here activity became intense as they participated in search missions lasting twelve to eighteen hours as they performed their duty assignment of rescuing downed Air Force fighter and bomber crews. The PBY 5A's rugged dependability saved lives time after time where open sea landings were hazardous due to the swells of the ocean. Even a normal landing seemed like a crash with much sea water flowing over the hull and flight deck. The hulls sustained damage in open sea rescue, popping rivets, often bending stringers, or buckling the heavy bottom skins, once even opening a basket ball size hole in the hull and twisting the large tail on the fuselage of the Catalina. Fortunately, a crew member, noticing the hole, alerted Bill to abandon the landing attempt and continue on with a full power climb out and make a safe landing back at their base. Holbrook's squadron lost all of the original planes during their first year, four on the ground during air raids and the others during sea water operations while rescuing over seven hundred men.

*PBY Catalina from the National Naval Aviation Museum at Pensacola - similar to the one Bill flew. →*

First Lieutenant Bill Holbrook was discharged from the Air Force in November 1945. His combat flying experiences earned him the Air Medal and seven oak leaf clusters. Bill was then hired by the Goodyear Tire and Rubber Company as a co-pilot in their flight department. In 1951 he came to Cumberland.

Holbrook was a dynamic person with a congenial and persuasive personality who accomplished much for the Kelly-Springfield Flight Department and the Cumberland aviation community. He constantly worked diligently and with rare vision to improve the airport and its instrument landing capabilities. Bill was one of those rare corporate pilots who flew professionally during the week and when off duty on week-ends came to the airport to fly small private planes or sailplanes. Holbrook rebuilt several aircraft and gliders and built his own sailplane, a Schreder HP-14. He was generous with his time and was known to use his own aircraft to teach many to fly. Bill was a gifted instructor and was especially helpful to young teenagers. For many years the Kelly Hangar was the hang out for local pilots. Bill Holbrook was a truly professional pilot, one who is worthy of emulation.

Dr. Edward F. "Ed" Byars, of the West Virginia University faculty, was a member of the Cumberland Soaring Group who based his sailplane at Cumberland. He and Bill Holbrook became close friends and realized the need for the dissemination of formal soaring information. They jointly formed '*Soaring Symposia*', an organization dedicated to the furtherance of knowledge and the art of soaring. They presented their first symposium in February,1969.

*Original soaring club members, about 1960. L-R: John Wagoner, Bud Young, Randy Hostetler, Jim Abe, Bob Poling, Bill Holbrook, Dick Alstot, Earl Wilson, Sr., and Dick Roberts*

Fortunately, Gene Moore, a local soaring pilot, had become nationally known for his pioneering work in the development of soaring instruments, principally a sensitive rate of climb variometer. Gene Moore's presentations at the symposia were well received by soaring pilots. Ed Byars held discussions on aircraft structures and performance, while Bill Holbrook gave presentations on soaring techniques. The Symposia were held annually for several years. Their recorded proceedings were published and prized by soaring pilots. The Soaring Symposia eventually became the basis for the Soaring Society of America's present mid-winter annual meetings. Soaring Symposia also conducted a tour to the soaring sites and sailplane factories in Germany, Austria, and Switzerland. Bill and Ed also wrote a best selling soaring pilot's text book, *Soaring Cross Country.*

*2009 L-R: Bob Poling, Bill Holbrook, Ed Byars, Lanier Frantz*

On May 5, 1973, Bill Holbrook set a world soaring record "out and return" flight of 783 miles (1,260 kilometers) on the Knobley Mountain range, just west of the Cumberland Airport, and on adjoining mountains stretching from Lock Haven, PA to Hansonville, VA. The Hansonville point was just ten miles from the Tennessee line. This was a dangerous flight in that Bill had to fly his Libelle sailplane at the red line speed of 120 mph through severe turbulence 50 to 200 feet above the mountain ridges while navigating where the ridge lift existed. The gusts stressed the Libelle close to its design limits and Bill knew that he could be on the ground in a matter of less than a minute if he did not remain in the updraft portion of the wind over the ridge. It was necessary to maintain a rapid pace near the red line speed in order to complete the required task during daylight hours. Surface winds blew so hard on that day from the northwest at the Cumberland Municipal Airport that members of the Cumberland Soaring Group had to nail the Quonset Hangar doors shut to keep them secure. Holbrook was only the tenth person in the world to fly a sailplane over 1,000 kilometers. It was an outstanding achievement.

Bill participated in two coast to coast Smirnoff Soaring Derby contests. The contest consisted of a daily assigned cross country soaring route of several hundred miles, beginning in California and after several soaring days ending at Dulles Airport, Washington, DC. Many of the flights were in poor flying conditions, the opposite of Holbrook's world record flight. Several of the flights were over stark and lonely areas with smooth glides of twenty to thirty miles across forbidding desert canyons and wilderness areas. Here an off-field landing and a retrieve by his auto-trailer crew would have been a lesson in survival.

Bill won the first event in 1974, competing against national and world caliber soaring pilots while flying his Kelly-Springfield sponsored Libelle sailplane, the 'Spirit of Cumberland'. The Cumberland Dapper Dan Club honored him with its top award for this achievement which was highly commendable and reflected favorably on and gave noteworthy attention to the city of Cumberland.

The following year Holbrook placed high in the derby while flying a lower-performing Schweizer-factory-sponsored 1-35 sailplane.

*Bill Holbrook's Libelle sailplane on the taxiway →*

In the early periods of the K-S operations, occasionally the Lockheed Lodestar would be out of commission, but transportation requirements would still be needed. George Newman served as President of the firm during that time and did not hesitate to have Bill Holbrook use his own Piper Super Cub as a means of returning him to Cumberland from National Airport in Washington. Holbrook was well known to the air traffic controllers who accommodated him even though hindered by the Cub's crude communication radio. It was an unusual but pleasant sight to observe a smiling Mr. Newman climb out of Bill Holbrook's Piper Cub dressed in an expensive three piece suit, white shirt and tie, and with black and white shoes. Newman was enthralled with small aircraft flying and greatly enjoyed glider flights with Holbrook in the Cumberland Soaring Group's aircraft. With this cordial relationship, Kelly Springfield, under President Newman's guidance, provided appropriate trophies for the Mid-Atlantic Soaring Meets hosted by the local Soaring Group.

Bill lived in Tucson, Arizona, in retirement and passed away at the ripe old age of 98 on June 8, 2020.


From left to right: Stan Leasure, Bill Holbrook proudly wearing his 1974 Smirnoff Derby medal, and David Poling. Stan and David have been long-standing members and tow pilots for the CSG.

# Aluminum Disc Recordings of the 1920s and 1930s

Our recent discovery of 1933 aluminum voice recordings by Warren Eaton, sent us off to research audio recording in the 20s and 30s. As expected, there is a lot to learn about this process. And the web has a lot to offer in this area. The following information was found in compact form on Wikipedia, but there are several other websites that delve into the subject: obsoletemedia.org; theaudioarchive.com, and more.


*Warrem Eaton voice recording 1933*

In the field of audio recording, an aluminum disc is a phonograph record made of bare aluminum, a medium introduced in the late 1920s for making one-off recordings. Although sometimes used for making amateur studio or home recordings or in coin-operated "record-your-voice" booths at fairs and arcades, during the first half of the 1930s bare aluminum discs were primarily used to record radio broadcasts for the private transcription disc archives of performers or sponsors.

In the recording process, a sufficiently amplified audio signal was sent to a heavily weighted electromagnetic recording head with a blunt diamond stylus that indented, rather than cut or engraved, a sound-modulated groove into the surface of the metal. Normally, a completely blank disc was used and the recording head was slowly carried toward its center by a dedicated feed mechanism. Some low-end recording units economized by eliminating the feed mechanism, relying instead on the use of discs already cut with a narrow blank groove that guided the stylus, which simply impressed its vibrations into the upper region of the existing groove. This cost-cutting approach produced recordings with a very limited dynamic range and generally inferior sound. In either case, because of the grain structure of the metal and its resistance to the side-to-side motions of the recording stylus, significant surface noise was inherent and the high-frequency signal content was heavily attenuated.

The recording had to be played back with a fiber needle such as cut and pointed bamboo or a plant thorn, as an ordinary steel needle in a typical heavy pickup would severely damage the soft aluminum surface. Even when playing a bare aluminium disc with a modern lightweight magnetic cartridge, a hard stylus that does not correctly fit the contour of the groove will score its surface and tend to skip and repeat, damaging the disc as well as degrading the quality of the recovered audio. Because the blunt recording stylus typically bore down on the aluminum at a substantial angle, it produced a disproportionately shallow groove, so that optimum playback with modern equipment requires a custom stylus with an unusually large tip radius.

*Wooden needles*



*Needle Sharpener*

In 1934, the Pyral Company in France and the Presto Recording Corporation in the United States independently created the so-called acetate disc by coating a layer of nitrocellulose lacquer onto the aluminum, which now served only as a rigid support. Engraving the groove into an easily cut and grainless lacquer, rather than indenting it into bare metal, made it possible to produce a broadcast-quality recording that preserved high-frequency detail and was nearly noiseless when new. As a result, professional recording services soon abandoned the use of bare aluminum blanks, although some amateur and novelty use persisted into the 1940s. From an archival perspective, the changeover traded long-term stability for superior sound quality. A bare aluminum disc can remain unchanged indefinitely if carefully stored, while the coating on a lacquer disc is subject to chemical deterioration, tending to shrink and become brittle due to the loss of unstable plasticizers, which can cause the lacquer to develop cracks, split off from the aluminum base disc, and in severe cases disintegrate into an unsalvageable rubble of tiny flakes.

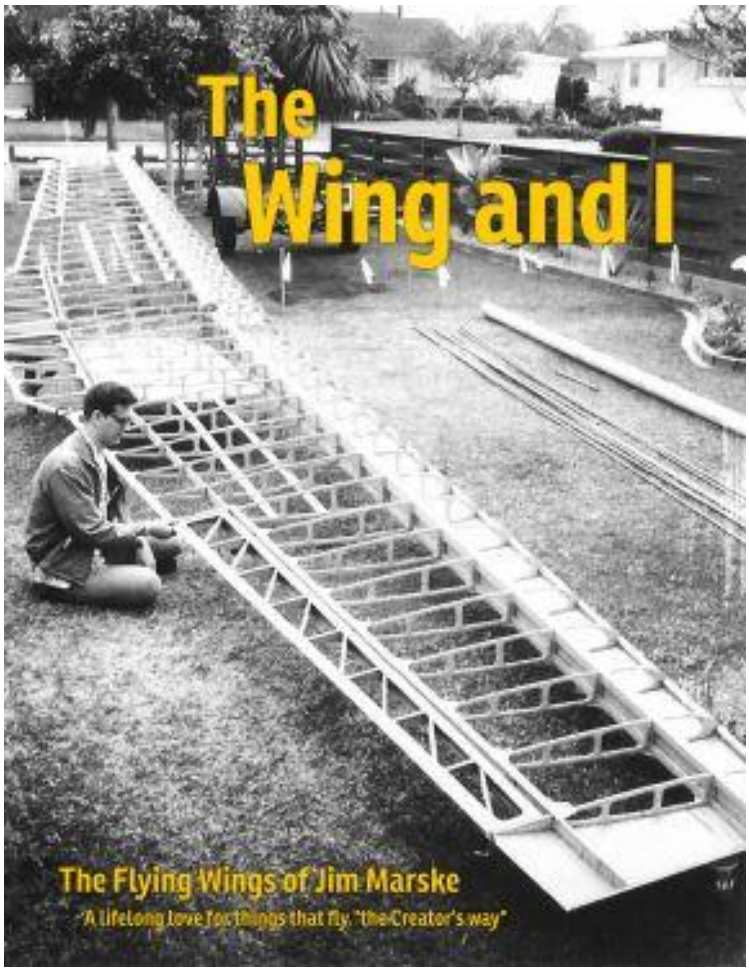
Most recordings on bare aluminum are believed to have perished in the scrap metal drives held during World War II. Aluminum was declared to be a critical war material and civilians in the US were urged to do their patriotic duty by finding and turning in anything made of it. The collected "scrap" was melted and recycled.

A selection of recently found EKCO aluminium discs containing home recordings of BBC radio broadcasts from 1932 to 1937 which escaped the above fate may be seen and heard at http://www.greenbank-records.com

https://en.wikipedia.org/wiki/Aluminum_disc


*Record jacket from Warren Eaton's recording*

# Jim Marske and the Flying Wing




Thanks to Bob Randall's recent donation to the museum of Jim Marske's book, *The Wing and I*, it seemed like a good moment in time to share some of the story of Jim's enthusiastic pursuit of excellence in design, building and flying.

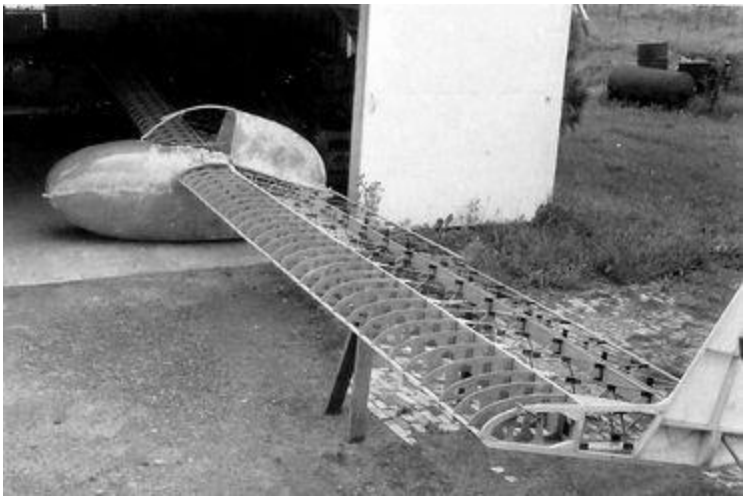
Jim's book was written to record the development and progress of the flying wing design with a swept-forward planform. At first glance, its unusual appearance tells one it cannot fly. Even if it did fly, it should tumble and be highly unstable, yet it contradicts all logic. Paul Schweizer once said, "I've seen it fly, but still can't believe it!" Those who have flown a Marske Wing speak highly of its performance and flight characteristics.

*The Wing and I* is available from Marske Aircraft https://marskeaircraft.com for $69.99 plus $10 shipping and handling.

Jim Marske has been in aviation all his life. From the age of 5, he was passionate about building and flying. In his early years he built a variety of different model airplanes, from simple rubber-powered designs to more advanced gasoline powered models. As a teenager, he progressed from model-building to restoring full-scale aircraft while developing a particularly strong interest in soaring - especially Flying Wings.

After building many model gliders as a teenager, Jim designed and constructed his first, man-carrying flying wing glider at age 21, mainly to prove to himself that the flying wing was as good, or not as good, as his models had proven. Lessons learned from his first "Plank" type glider led to the development of his *Pioneer* Series with a "Reverse Delta" type planform. Like the models, his full-sized wings demonstrated impressive pitch stability and were highly spin resistant. As a bonus, the wings had surprisingly low drag, resulting in excellent overall performance, challenging conventional tailed aircraft. All through this experimentation, Jim fought and conquered his primary nemesis, which was 'adverse aileron yaw', or simply put, not enough rudder power.

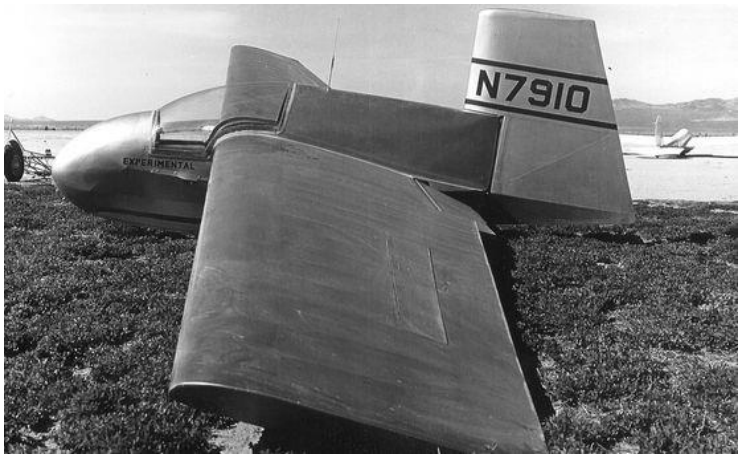
At the young age of 19, Jim built the *XM-1*, his first flying wing design inspired by the works of Charles Fauvel and Al Backstrom. After building several scale models he found the models of the un-swept, tailless wing concept to be superior in performance and stability compared to conventional designs.

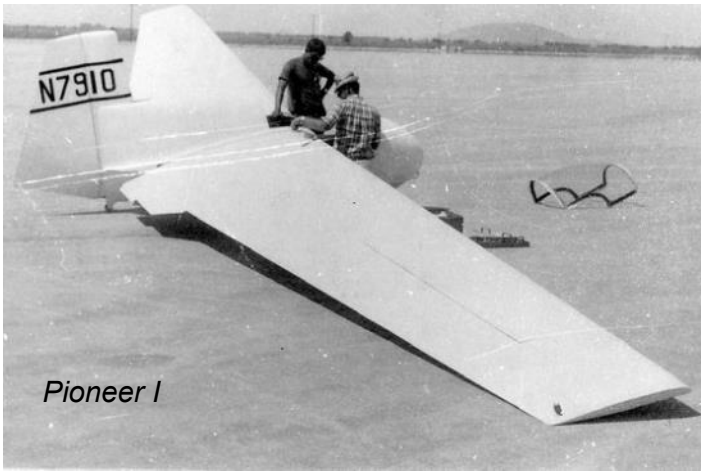


*XM-1 in its original configuration with wing tip rudders*

The *XM-1*, as its name implies, was designed and constructed as a research and development sailplane. Knowledge of aerodynamics came primarily from Jim's modeling experience. Structural knowledge initially came from a few aircraft textbooks before university aeronautical studies came a few years later and filled in many gaps.

Learnings from the *XM-1* would lead to a series of novel sailplane experiments. A fitting name was required to suit this series and eventually the name "Pioneer" was chosen. Thoughts of adapting a tapered wing planform had come into focus. There were many advantages to a tapered wing, both aerodynamic and structural. The *Pioneer I* became a flying laboratory for many further experiments.



*Pioneer I*

The aircraft was constructed with a wood and doped fabric wing, with the fuselage made from steel tube and fiberglass. The design features a fixed monowheel landing gear, flaps for glide-path control and spoilers for roll control instead of the more usual ailerons.

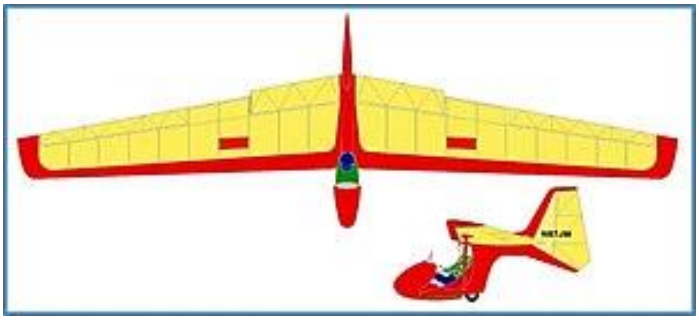
With the success of the *Pioneer I*, Jim built the *Pioneer II* with the intent to address the needs of the amateur glider builder. The wing, which has separate ailerons and flaps, had the span reduced to 13m. so it could be built in a standard 20 ft. garage. Upper and lower surface airbrakes are used for glidepath control. Because a tailless sailplane has a narrow center of gravity range, an adjustable seat was positioned above the fixed landing wheel, which itself is on the center of gravity. The pilot simply moves the seat until his/her own weight balances the ship on the wheel. The II-D model is similar, but with a swept back vertical tail and modified wing leading edge. Starting in 1972 the *Pioneer II* was made available as plans or as a kit. The kit included a pre-made fiberglass fuselage shell. Reported building times range from 600 to 2000 hours. At least one *Pioneer II* was modified with a 45.93 ft (14.0 m) wingspan.

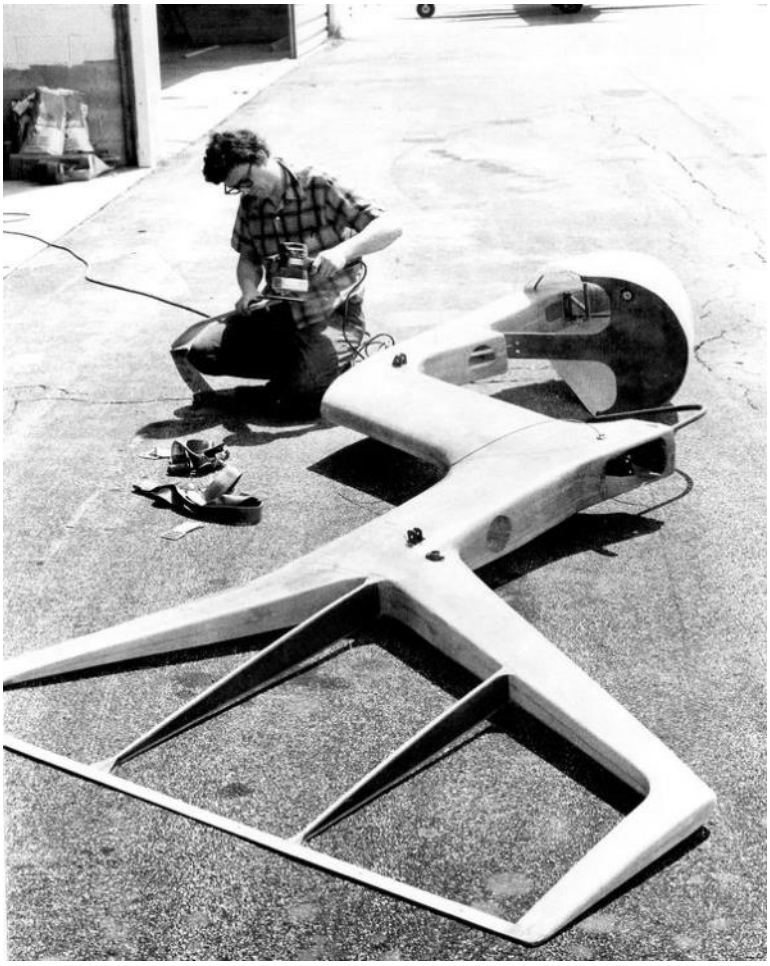
The *Pioneer II* had a more simplified structure than the *Pioneer I* and had increased performance. To date, approximately 35 *Pioneer II*s have been built and many are still flying 50 years later. Numerous design changes have been made over the years, but the *Pioneer II-D* model has been by far the most successful. Several early models are being displayed in various aircraft museums.


*Pioneer II-D*

MARSKE
FLYING WINGS

After the *Pioneer II*, one of Jim's personal goals was to re-live the experiences of the early days of gliding, when flying was done in open, slow-flying Primary Gliders. The concept of the *Monarch* ultralight was initiated and developed into a viable, lightweight glider with real soaring performance - staying aloft for hours in weak thermals where all standard-type gliders were not able to soar.





The Monarch first flew in 1974 and was designed to be both a powered self-launching sailplane and a pure glider, depending on whether an engine was fitted. The glider version is suitable for car-tow or winch-launching.

The aircraft is built from fiberglass and epoxy laminates. The wing uses a D-cell leading edge. The optional engine can be mounted to the upright behind the pilot in pusher configuration, with the fuel tanks located in the leading edge D-cell. The original powerplant produced 12 hp (9 kW), but engines up to 24 hp (18 kW) can be fitted. When the lower-powered engine is installed the wing is relocated forward to maintain center of gravity. With the larger engine the wing is moved aft. The standard control stick is mounted from above, simplifying control runs to the high wing. The aircraft was proof tested to 9 g.

The Monarch has had several modifications designed for it, including mounting a conventional floor-mounted control stick. Other modifications include larger ailerons and rudder to improve the low-speed handling characteristics.

Many years had passed since the *Pioneer II* had made its first flight. There was an extended time period where progress of the Pioneer lineage had nearly stopped. It was time for a new *Pioneer* sailplane. It was to have a lower drag airfoil, Schempp-Hirth plug-type spoilers, all composite construction, automatic control hookups and a modern, attractive cockpit with adjustable rudder pedals.

The completed, tailless, *Pioneer III* aircraft is 100 lb. lighter than the wood wing of the *Pioneer II*. The *Pioneer III* enjoys a 20% reduction in wing drag over the *Pioneer II* resulting in an excellent sailplane that can perform exceptionally well under weak lift conditions. On its first attempt to soar under marginal thermal conditions, the *Pioneer III* made a 5-hour flight. On its second flight, it easily flew a 60 mile, out and return trip, being careful to stay within the parameters of the FAA flight test area.

***Jim Marske in the Pioneer III***

Again, a promising new low-drag wing profile had hatched on Jim's computer, tempting the design of a new wing and the basis for a competitive racing glider. To improve the high-speed end of the flight polar requires a higher wing loading. To increase the wing loading and keep the empty weight reasonably low, a higher aspect ratio is required. Also, a hard wing to maintain surface perfection and its extended laminar flow is necessary.
A retractable landing gear, and the addition of water ballast tanks, improves its high-speed cruise performance. Test flights thus far have been very successful.

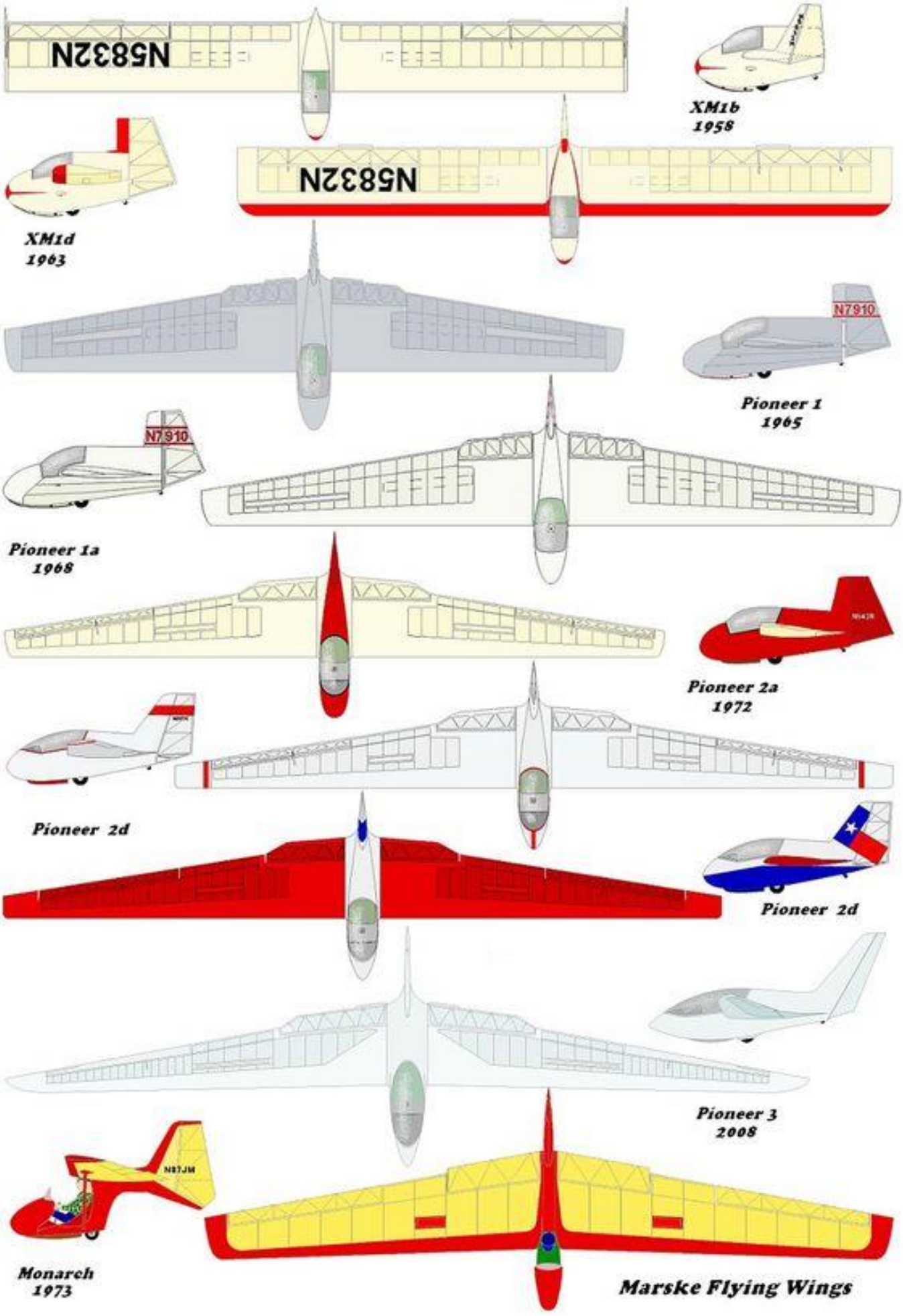
Jim has made several YouTube videos about his adventures in soaring. Copy and paste this link into your browser to view one of his videos: *https://www.youtube.com/watch?v=oalFPM10HOY*

The NSM is pleased to have on exhibit Jim Marske's *Genesis I* in the Blossom Gallery, donated by Jim in 1998.

References: *MarskeAircraft.com*
*SailplaneDirectory.com*
*Wikipedia.com*


***Pioneer III***


***Pioneer IV***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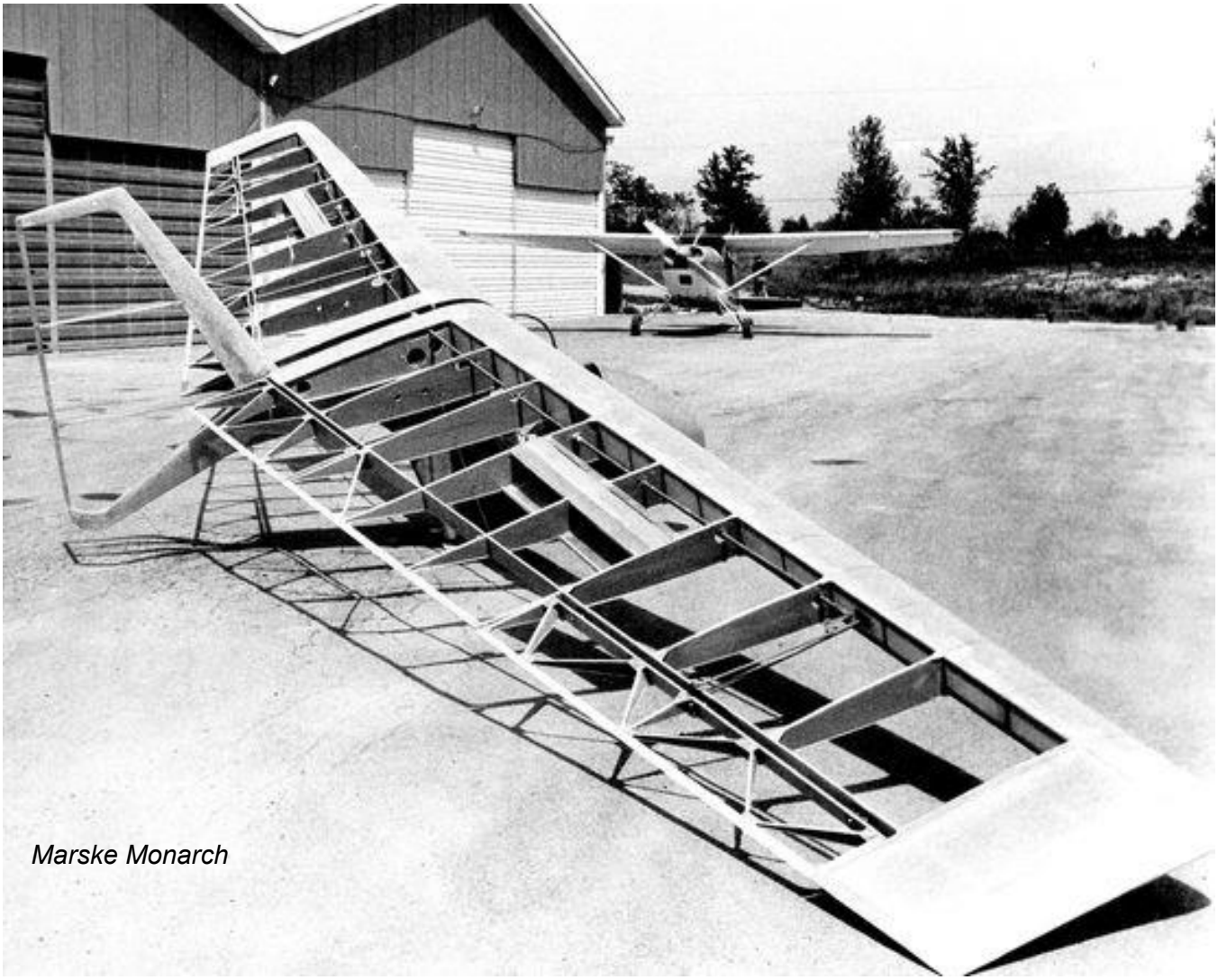
Marske Flying Wings



*Marske Monarch*

**IBSN #0892-0516**

The **NSM Historical Journal** is a publication of the National Soaring Museum

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website: www.soaringmuseum.org

Anyone is invited to contribute article material and photographs with identification about historical soaring activities, renovation of old sailplanes, soaring pioneers, unusual uses of sailplanes, etc.

Manuscripts are subject to whatever revisions, additions or deletions are necessary to make the material conform to the space limitations and standards of the NSM. Material that is to be returned must be accompanied by a self-addressed, stamped envelope. No compensation other than credit will be given. Materials sent by e-mail should go to: info@soaringmuseum.org.  If we receive an overabundance of articles for the upcoming edition, your material will be saved for a future edition.