



**SAILPLANES
&
GLIDERS**

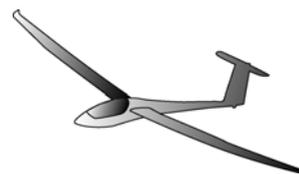
**MEDIA
BACKGROUND**

Media Guide to
Sailplanes &
Gliders by
United States Soaring
Teams

Last Update
August, 2004

Sailplanes & Gliders – Media Background

Sailplanes or gliders as they are often referred to, come in all shapes, and sizes. There are two place trainers, single place, and even three place craft. Sailplanes are made from aluminum, wood, or a special fabric stretched over steel tubing. Some sailplanes are extremely refined, designed for maximum performance and constructed from exotic composite materials while others are designed for training new pilots necessitating rugged economy.



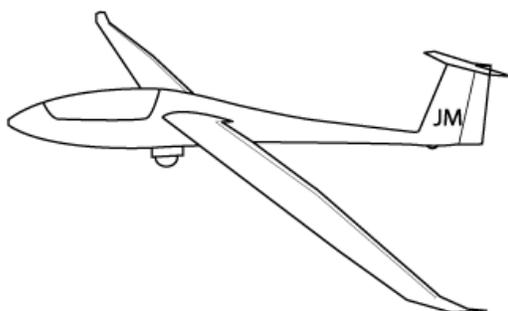
Sailplanes or gliders as they are often referred to are sleek, strong and fast.

Wingspans can vary from under 40 feet to nearly 90 feet. And the empty weight (no pilot) of sailplanes can be as little as 250 lbs, or nearly 1,500 pounds.

Competition sailplanes use carbon and fiberglass composites molded into extremely strong and accurate shapes to provide strong, lightweight structures using advanced aerodynamics to create the most refined aircraft ever created.

Sailplane pilots fit snugly in the cockpit and control the craft by moving the control stick to manipulate aircrafts control surfaces. All sailplanes are designed to be disassembled and trailered. The wings and tail are removable and slide securely into a special trailer for the trip home.

Just like cars the sky is the limit when it comes to price on sailplanes. There are used sailplanes available for \$10,000 to \$25,000 and top of the line racing types that can cost \$150,000 or more. Most competition types cost between \$50,000 and \$85,000.



A typical 15-Meter Class Competition Sailplane

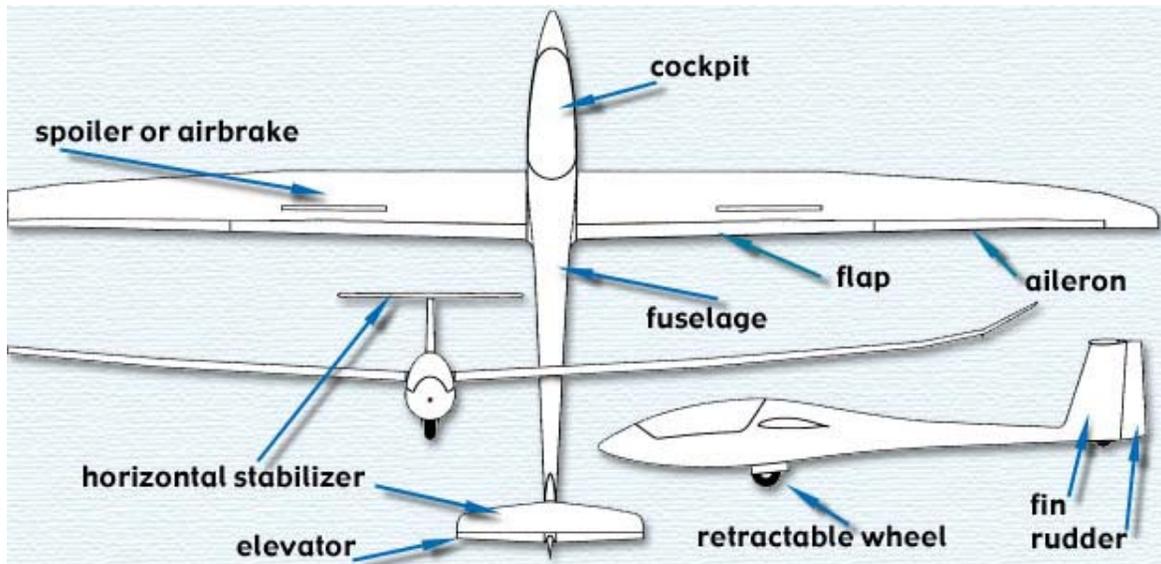
TYPICAL HIGH PERFORMANCE SAILPLANE

Sailplane:	Ventus C
Class:	15-Meter
Manufacturer:	Schempp-Hirth
Wing Span:	15m (49.2 feet)
Wing Area:	102 sq feet
Max. Weight:	1157 lbs
Empty Weight:	530 lbs
Max L/D:	43 to 1
Minimum Speed:	35 mph
Max Speed:	169 mph

Cost: \$ 50,000

Parts of Sailplanes

All the parts of a sailplane have a name. The main features are the fuselage where the pilots sits, the wings and the tail. The following illustration provides the high points.



Controls

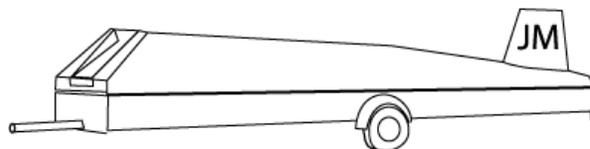
Sailplanes are controlled using a main control stick and two ruder peddles. All sailplanes use what are call aerodynamic controls meaning that the pilot controls the sailplane by moving a stick or lever in the cockpit connected to a control surface. In the illustration above the aileron, elevator and rudder are the main controls used in flight by the pilot to maneuver the sailplane. These are the very same types of controls found of a small plane or a 747.

Beyond the control stick and rudder sailplanes have several handles including the flap control, landing gear, trim and tow release.

Assemble and Disassemble

Sailplanes are designed to be assembled and dissembled easily then transported in special trailers. Assembly involved a minimum of lifting and normally takes only minutes.

When it time to fly, the sailplanes's wings are removed from its trailer and slide into the sailplanes fuselage to be pined in place. Then the tail is attached and the pre-flight checks are completed.



Sailplanes are designed to be carried by trailer and assembled at the airport.

The following sequence shows a high performance sailplane being assembled.



Wing comes out of the trailer...



and is put into position...



The other wing is put in place and pinned...



The tail goes on and you're ready!

Assembly normally takes a few minutes from start to finish and can be done with two people in most cases. The heaviest part of the sailplane that needs to be lifted during assembly are the wings which typically weigh just over 100 pounds.

Instruments

A common misconception is that sailplanes have very simple instruments. While true for basic trainers, racing gliders carry sophisticated electronics and global positioning systems.

The typical sailplane instrument panel has an airspeed, which tells pilots how fast they are going, an altimeter to show height of the sailplane and a sensitive rate of climb instrument called a variometer or vario.



Soaring pilots use specialized instruments to use lift and track their flights.

The variometer is a critical instrument that allows soaring pilots to find and then utilize rising columns of air called thermals. The invention of the variometer allowed soaring flight to become a reality.

Beyond the basic instrumentation are sophisticated flight computers that measure height, distance, performance and the movement of the air to provide pilots with the critical navigation and glide information.

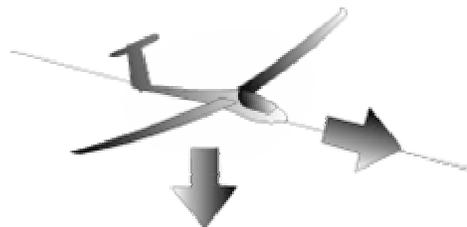
There is a small tuft of yarn attached to most sailplane canopies. This string is called a yaw string and is a very important "instrument". If the string is pointing straight back the air is flowing over the glider most efficiently and the yaw string points straight back. If the string is pointing at an angle in flight it means more drag is being developed than should be.

Sailplane Performance

Sailplanes have design criteria that at first seem to be at cross purposes. Sailplane must be able to circle slowly then go fast between sources of lift. Sailplanes must be designed to fly slowly in thermals and then at high speed between thermals. Typically sailplanes can thermal at 50-60 miles per hour and reach maximum speeds of 160 mph.

Typically competition sailplanes have excellent high speed performance

Sailplane performance is can be confusing but it's really very simple. While a sailplane is in the air it is always in a gradual decent. The more gradual the decent the higher the sailplanes performance.



Technically a sailplane's performance is measured by comparing lift and drag. A typical racing sailplane will have a maximum L/D or lift over drag ratio of around 43:1. This means the sailplane can go an astounding 43 feet forward to one foot down. If your 6 feet tall a glider of this performance can cover just over 250 feet from the top of your head. Another way to put this in prospective is that when this sailplane is one mile high it can go 43 miles before landing.

Wingspan is to sailplanes what horsepower is to an Indy car – the more the better. With Open Class sailplanes wingspans can be up to 90 feet in length allowing these marvels to travel 60 feet forward to one foot down for a glide ratio of 60:1.

Water Ballast

It seems counter intuitive to make a sailplane heavier but that is exactly what competitors do but adding as much as 55 gallons of water to their craft. The heavier glider has better high speed performance while sacrificing some of the ability to climb effectively in thermals. The beauty of water ballast is that if the weather becomes poor and rates of climb are low the extra weight can be dropped.

Training Sailplanes

Two place trainers are used to give rides and when teaching students to fly sailplanes. Both seats have full controls allowing the instructor to fly the sailplane from the front or rear seats. The instructor normally pilots the glider from the rear seat giving the passenger a better view and making communication better. Students can normally make fast progress toward solo flight under the careful guidance of an experienced flight instructor.



Two place glider preparing for launch on a ride flight. Image by Bill Hoadley

Landing

When the day's soaring is over it is time to land.

Sailplanes have a single landing gear which makes it easy to land. On two place training gliders the wheel is fixed in position often accompanied by a smaller front wheel. High performance gliders incorporate a retractable wheel for maximum performance.



Another pinpoint landing by a student in a training glider. Image by Bill Hoadley

For landing sailplanes use devices to, increase drag, and steepen the glide path. Most popular are wing top surface "spoilers", narrow blades that swing out perpendicular to the airflow, but various schemes of dive brakes, flaps, and even drag parachutes have been employed. With the continuously adjustable pull of a cockpit handle, a sailplane gliding at 60 mph and at a shallow 150 feet per minute (fpm) down (40:1) can be turned into a brick dropping at 1,500 fpm (4:1). Enough control to defeat storm currents and land exactly where desired.



Spoilers come out of the wing and create drag for landing. Image by Bill Hoadley

Sailplanes & Design Classes

Sailplane types are divided into classes based on their configuration and wingspan. There are currently Open, 15-Meter, Standard, 18-Meter, and World class sailplanes used to compete in World Gliding Championships.

Racing sailplanes are constructed from advanced composites including carbon fiber to be extremely strong and light. The empty weight of these craft is approximately 550 lbs with maximum weights reaching over 1100 lbs. Wingspan is to sailplanes what horsepower is to an Indy car – the more the better.

With Open Class sailplanes, excluding maximum weight, anything goes so wingspans can be up to 90 feet in length allowing these marvels to travel 60 feet forward to one foot down for a glide ratio of 60:1.

The 18-Meter Class is similar to the Open Class except with a wing span restriction to 18-meters or 59 feet. The 15-Meter Class restricts wingspans to 15 meters or 49.2 feet. These sailplanes use flaps and interconnecting control surfaces, water ballast, retractable landing gear and any other means to increase performance. The Standard Class is similar to the 15-Meter sailplanes except without interconnecting control surfaces or flaps.

CLASSES IN SAILPLANE COMPETITION	
• Open	No restrictions, anything goes, excluding weight.
• 18-Meter	18-Meter (59 feet) Line Open Class with wingspan length maximum
• 15-Meter	15-Meter (49 feet) Like Open with wingspan length maximum
• Standard	15-Meter (49 feet) wingspan, no flaps
• World	One design, all the same design
• Sports	Handicapped class. Many types of gliders
• Junior	Pilots under age 26
• Feminine	All female pilots

The World Class is the one design class in which all gliders are restricted to a single design. The Sports Class was developed to give older, lower performance sailplanes and fair competition using handicapping. There are several other classes including the Junior class restricted to pilots under the age of 26 and the Feminine Class.

Manufacturing & Costs

Most high performance competition sailplanes are manufactured in Europe with Germany as the main country of origin. Sailplanes are made to exacting tolerances with wing surfaces smoothed to only a few thousandths of an inch for maximum performance. Only several hundred competition gliders are manufactured each year and because of this low volume there is a good deal of expensive hand work needed to finish a sailplane. When it comes to price the sky is the limit with used sailplanes available for \$10,000 to \$25,000 and top of the line racing types costing \$150,000 or more. Most competition types cost between \$50,000 and \$85,000 when new.

Soaring Related Background Web Sites

www.ssa.org

Soaring Society of America (SSA) home page. The SSA is the national organization responsible for soaring in the United States. Lots of good information on the sport and the organization here.

www.ssa.org/UsTeam/

US Soaring Teams. Organized and funded as part of the SSA the US Soaring Teams Web site features team members, pilot's biographies and much more about the US Soaring Teams.

www.ssa.org/usteam/press

The one stop media press room on soaring brought to you by U.S. soaring teams.

<http://acro.harvard.edu./ssa/>

This site has a host of soaring related information including the turnpoint exchange, flight recordings from contests and all the details of US team selection.

http://www.soarmn.com/soaring_links/index.htm

The excellent soaring link page by Paul Remde who has collected a huge variety of soaring related links. A must visit and four stars.

<http://www.miskin.demon.co.uk/index.htm>

This site gives a very good step by step idea and many references about learning to fly sailplanes.

<http://www.webring.org/hub?ring=soaring&id=64&next5>

This is a soaring web ring that allows you to randomly browse many of the best soaring related web sites

<http://www.glidingmagazine.com>

This site is an online magazine sponsored by the Soaring Society of America.

<http://www.fai.org/>

Fédération Aéronautique Internationale (FAI), the world's air sports federation, was founded in 1905. It is a non-governmental and non-profit making international organization with the basic aim of furthering aeronautical and astronautical activities worldwide. Ever growing, FAI is now an organization of some 90 member countries.

<http://www.fai.org/Gliding/>

The International Gliding Commission (IGC) of the FAI is the Air Sports Commission which is responsible for all air sports activities involving gliders and motor gliders with the exception of glider aerobatics.

<http://www.soaringmuseum.org/>

National Soaring Museum in the USA

<http://www.soaringmuseum.org/hallfame.htm>

US Soaring Hall of Fame - Persons who achieve in a noteworthy manner in soaring or who have made significant contributions to the sport of soaring, as determined by the SSA Directors, are eligible for inclusion in this Hall of Fame.

<http://soaringmuseum.org/landmark.htm>

National Landmarks of Soaring - Sponsored by the National Soaring Museum, an affiliate of the Soaring Society of America. The purpose of the program is to identify and memorialize sites, individuals, or historic events related to the national history of motorless flight.

Other Soaring and U.S. Team Media Background Available

These resources are available for your use on the United States Soaring Team Press Room which includes press releases, media clippings, background, fact sheets, press images, web links and a championship calendar. See www.ssa.org/usteam/ust_press

United States Soaring Team Press Room

This is your one stop online media resource developed to help you craft a factual and newsworthy story on the exciting sport of soaring and United States Soaring Teams. This media resource is brought to you by the Soaring Society of America and United States Soaring Teams. Some of the resources available in the U.S. Soaring Team Press Room are:

- Soaring Society of America
- Sport of Soaring
- Sailplanes & Gliders
- Competitive Soaring
- Clipping Archive
- U.S. Soaring Teams
- History of the Sport
- Calendar of Events
- Press Releases

Sailplane & Glider Terminology

15-Meter Class	The 15-Meter Class restricts wingspans to 15 meters or 49.2 feet. These sailplanes use flaps and interconnecting control surfaces, water ballast, retractable landing gear to increase performance.
18-Meter Class	The 18-Meter Class is similar to the Open Class except with a wing span restriction to 18-meters or 59 feet.
Aileron	A hinged portion of the wing that provides a banking or rolling force.
Airspeed	The speed of the glider in relation to the air it is flying in.
Aspect Ratio	The ratio between a gliders span and the cord of the wing. Long skinny wings are said to have a high Aspect Ratio.
Bank	To tip or roll around the longitudinal axis of the glider. To bank to to turn the glider.
Class	A category of competitive glider established based on wing span performance or pilot characteristics
Drag	The force opposing the forward motion of the glider (wind resistance when you stick your hand out the car window).
Elevator	The horizontal movable surface of at the tail used to control pitch
FAA	Federal Aviation Administration is the governing body of civil aviation in the U.S.
FAI	Federation Aeronautique Internationale is the world governing body of aeronautical contests and records.
Fin	The fixed vertical tail surface, used to provide directional stability.
Flap	Hinged portion of the wing normally toward the fuselage that alters the lift and drag characteristics of the wing
Flight Computer	Sophisticated computer that takes measurements of distance and performance to show the pilot the distance and speed they can glide to reach a point.
Flight Recording	An electronic file that is a recording of the altitude and position of competitors while in flight. Normally generated by a secure recording GPS. Also called a Flight Trace.
Fuselage	The area consisting of the cockpit and tail of the sailplane
G	For gravity, the load on a glider is stated in terms of multiples of the force of gravity. Three "G" would equal three times the load than applied by gravity alone.
Glide Ratio	The ratio of forward to downward motion. Forty five feet forward to one foot down to is called a glider ratio of 45:1
Junior Class	Junior class restricted to pilots under the age of 26
Knot	A unit of speed 1.609344 times faster than miles per hour
Max L/D	The maximum performance of a sailplane normally expressed as Lift over Drag.
Nationals	An event sanctioned by the Soaring Society of America for a single class of glider. Establishes the US national champion for that class and is used to select the U.S. Soaring Team.
Open Class	With Open Class sailplanes anything goes so wingspans can be up to 90 feet in length allowing these marvels to travel 60 feet forward to one foot down for a glide ratio of 60:1.
Pitot Tube	An open-ended tube that faces toward the front of the glider that measures the impact air pressure for airspeed.
Radio	Aviation band 720 radio. Contestants use 123.3 and 123.5 for competitions.
Red Line	A warning mark on the airspeed indicator that corresponds to the maximum airspeed for the glider.
Rudder	The hinged vertical control surface used to induce or overcome yawing
Sailplane	A motor less craft that can climb using atmospheric forces alone. Referred to interchangeably as a glider.

Sink	Decending air currents
Soar	To fly without power from and engine without loss of altitude.
Span	The maximum distance between wingtips.
Spoiler	Devices that disturb the airflow across the wings and create drag. Normally used for landing.
Sports Class	The Sports Class was developed to give older, lower performance sailplanes a fair competition using handicapping.
SSA	Soaring Society of America – The national organization responsible for soaring in the United States.
Standard Class	The Standard Class are similar to the 15-Meter sailplanes except without interconnecting control surfaces or flaps.
Thermaling	Turning in tight circles to keep the sailplane inside the column of raising air.
Thermals	Raising columns of warm air that allow sailplanes to gain altitude
Variometer	Sensitive rate of climb indicator that allows competitors to climb efficiently in thermals.
Water Ballast	Water put in the wings of the sailplanes to improve high speed performance.
World Class	The World Class is the one design class in which all gliders are restricted to a single design.
Yaw String	A few inches of yarn on the front of the canopy indicating slip of skid.