How to Fly a Real Self-Launched Sailplane

Here's the nitty-gritty on cockpit procedure in Scheibe's SF-27M, a powered glider that *looks* like a sailplane.

By WILLIAM J. MOUTON, Jr.

I first saw the "Riverswallow" (Scheibe SF-27M) in *Sailplane & Gliding* in January, 1967, in a tremendous article by Peter Ross, who attended the Fourth German Motor Glider Rally. He wrote . . . "Highlight of the Rally was undoubtedly the powered Scheibe 'Illerschwalbe,' an auxiliary-powered version of the successful Standard Class sailplane . . . this smooth little ship took off and climbed away smartly from the 1500-foot field elevation grass strip, and will shortly be going into production." Further, he wrote, "It will be only the second single-seater with retractable engine to go into production, the first being the Scud III in 1935." The story and pictures did it; I placed my order with U.S. dealer Graham Thomson shortly thereafter.

I was already familiar with the "Zugvogel" (SF-27) derivative in an excellent write-up by George Kern in *Soaring*, May 1966, that I reread many times, memorizing every detail, and which incidentally proved to be of invaluable help in threading a cable through each of nearly 70 wing ribs per wing, in order to retract the wingtip wheels that I added later.

The English weather and ours here in New Orleans must be quite similar as regards low cloudbase, fog, humidity, etc., and for years, *Sailplane & Gliding* has had many articles on SLS (self launching sailplanes) and the usual terse replies by the pundits who feel threatened by the new breed of hummingbirds. And *Soaring* is just now experiencing this phenomenon. However, the SLS is here so please try to accept it for what it can do, and it does it just fine! You can be sure that it is better than not soaring at all.

You can tell by now that I've been conditioned by reading so many great and pure soaring tales that I'm apologetic. But one good flight, and unless you're a "bungee" man (the only purists left), I think you will begin to appreciate the fact that the winch, auto, or aero towline is nothing but, (a), a long extension of a reciprocating engine crankshaft, (b), somewhat hairy, and, (c), not very pure after all, what with being led around by the nose.

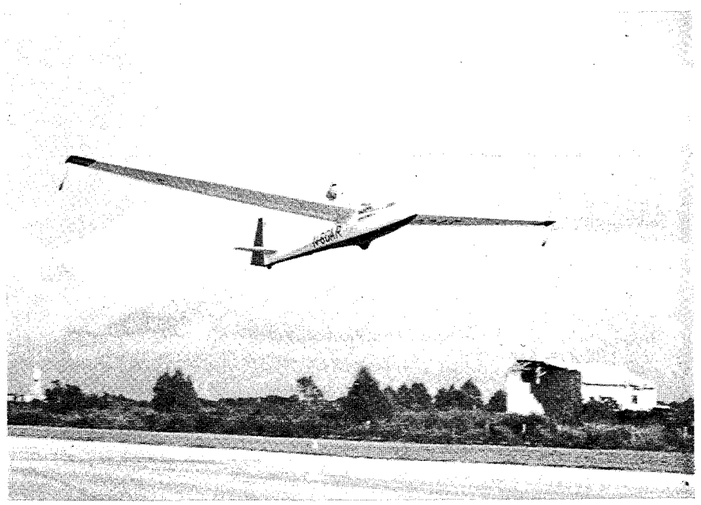
What is it like to fly? On my first flight, the tower said, "Okay— use the

View of Lake Pontchartrain from the SF-27M.

grass for takeoff and landing." After all, Lakefront Airport, a peninsula out in Lake Pontchartrain, once had a grass strip alongside the tarmac. Unfortunately, someone 'dozed the whole place from a smooth green to a sea state of about "6." So off we went, with only a wire skid at each wingtip and a totally non-steerable tailweel, with two volunteers using a blanket around the aft fuselage to line me up in the generally-agreed direction. The Luftwaffe-type seat belts were too loose, and I bounced against the canopy several times before lifting off the crest of the runway's last swell of ground—a sensation very similar to an open sea takeoff in a P5M "pure" seaplane.

Once off and up, I noticed the very good rate of climb, and even with the yaw string completely off to one side (I thought it had blown off), the '27M felt great on climbout—exactly as I have always imagined how it would feel if I could have compressed myself into the cockpit of my old Brown, Jr. powered free-flight gas-model airplane of many years ago.

The visibility was fantastic. The vario settled on a little over 400 fpm and I spent most of the time lining up the long red yaw string which traversed the beautiful full-blown canopy like an out-of-phase metronome.

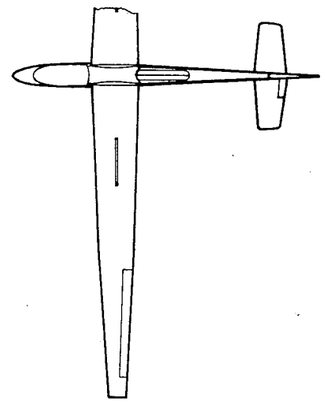


In less than five minutes I was at 2000 feet with the engine spinning along nicely, so I went right up to 3500 feet, throttled back to cool the engine for the required two minutes (it doesn't particularly like that), and hit the ignition switch. After several seconds of protest the whole affair stopped, as if the rubber band had just pooped out. Thereupon followed the greatest silence I have never heard. The transition from powered flight to free flight, even after three dozen flights is still impressive, but it requires a little practice to hold the stick steady with the left hand while turning the crank on the right three and one-half turns in order to retract the engine. It is only normal to oscillate the left hand along with the right —producing a very interesting and accelerating roller coaster ride during retraction. A little practice on the ground and lots in the air ultimately cure this, and now I can transition either way in a few seconds with ease and no apparent PIO's.

After cutting the switch, the propeller can be viewed directly by neck-swiveling, or indirectly by the convenient adjustable mirror mounted above the panel. (This same device also transmits the pilot's state of pucker without lag or compensation.) By loosening the shoulder straps, the moulded-rubber lawn-mower type pull handle can be reached and the prop can be pulled around, if necessary, until its lower leading edge is several inches from the vertical pylon. By actuating the combination propeller-brake-retraction-release-engine-lock knob on the lower left-hand side of the cockpit, a friction brake is applied to the starter flywheel. This also unlocks the pylon from the vertical engine-running position.

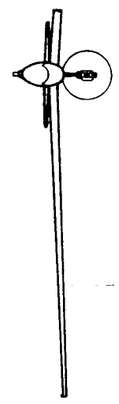
Meanwhile, back to the stick-airspeed-yaw string: We were attempting to hold 45-mph straight and mostly level. No problem here if you just don't rush it (which isn't easy for inherently nervous types). After the prop brake is applied, the starter pull can be slowly moved so as to line up the prop in the correct position as practiced on the ground.

On the first few flights I tried to line up the prop in the exact position before applying the brake; it can be done but the airflow usually tends to blow the prop off center. Scheibe chief test pilot, Christian Gad, who has been most helpful, pointed out that I could apply the brake immediately after stopping the engine, in



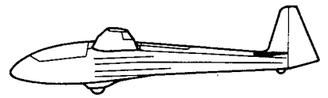
any position. Since then, no more problems except to occasionally tighten the prop as well as the wheel brake cables, an easy adjustment.

At 3500 feet the engine thunked in its pouch, the clamshell doors shut simultaneously, and the butterfly emerged from its cocoon. A whole new world opened right here at home,



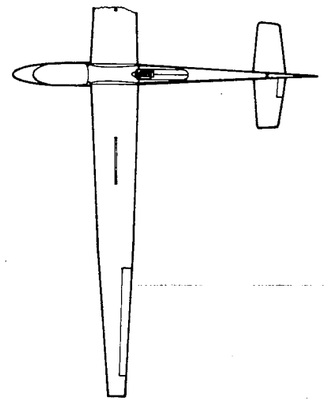
not a thousand miles away in some distant soaring paradise. With the engine in, the sailplane seemed to "swoosh" forward, and really does, due to the reduced drag. I tried a few turns and noticed again how important the rudder was—it seemed the arch-enemy of the yaw string.

Down to 3000 feet and we tried some stalls. First one happened right on schedule at 36 mph, with no warning except for the fact that the ship was extremely quiet, the airspeed indi-



cator was far off to the left from its normal vertical position at 55 mph, and the stick force was noticeable (trimmed for 50 mph). Not yet being in tune with the ship, I let it fall hard and, not having checked the engine-in lock, out popped the engine! Recovering a few feet later the engine popped back in and locked hard. Fortunately, the clamshell doors are sequenced in the retraction gearing so it wasn't serious. I checked the three and one-half turncrank on the right with the locking lever on the left and insured that the crank was physically locked. This can be checked by cranking against the lock, engine in or out.

From this point, everything was roses and several engine restarts were made by nosing over to 87 mph, ignition on, getting the prop going with a slight pull on the starter handle.

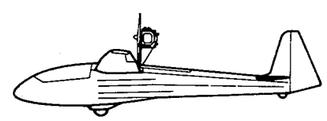


The first flight finally ended with an engine-on landing in the runway's hills and valleys. The problem was, I was bouncing up and down so hard my left hand couldn't reach to shut off the ignition switch! No more engine-on grass landings. The pneumatic main gear and Scheibe's steel truss fuselage are a wonderful combination, and after several bumpy landings on paved runways, I was happy to be informed that what I "feel" as a bumpy landing isn't too noticeable to onlookers. But landing with engine on should only be done after many hours in the ship, in my opinion.

After the first flight, I commenced converting the SLS into an STS (Self-Taxiing-Sailplane). After some ridiculous trial-and-error attempts, I opted for a steerable tailwheel and a retractable-extendable pair of wingtip wheels. Somehow these modifications were accomplished about the time the FAA 10-hour local restriction was flown off. The FAA and tower people have been with us 100 percent, and I can't thank them enough. A 2-place '27M would do wonders!

As to cruising with the engine on, the Hirth F10 engine is fitted with a climb propeller and a 1.865 reduction gear, strictly a climbing combination. On cruise it will tend to 4-cycle at 5000 rpm at 75 to 85 mph. Minor throttle adjustments help to return it to the 2-cycle operation. That high-pitched whine will really get to you with continuous running.

My first cross-country was a 120-mile trip to Lafayette. This trip is 75 percent swamp, so I did not shut



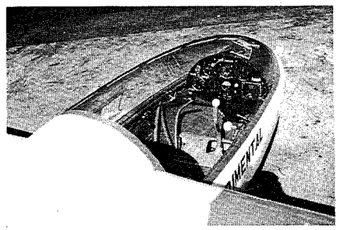
down the noise maker but turned off the radio as much as possible. It very accurately records the 4950 engine rpm, as the plug leads are not shielded. After landing successfully on a paved runway, I was convinced that the engine would run, but I was not convinced that I wanted to hear it run continuously.

So now for some specifics about the 15-meter SF-27M. It is a fixed gear and uses Wortmann airfoils (FX 61-184 at the root and FX 60-126 at the tip), which supposedly gives aerodynamic twist without the corresponding drag penalty. It has no flaps, but the Schempp-Hirth spoilers are fantastic and seal very tightly when closed. The advertised glide angle is 34 at 55 mph with a minimum sink of 138

fps at 45. What sets it apart from other wooden-winged Standard Classers is that the 2-meter sink rate was measured at 95 mph. The Standard Cirrus is only 2 mph more.

The wing is all wood, with a laminated birch spar and hand-made ribs spaced every 100 mm. (less than 4 inches) on centers. Most of the wing is covered with a Finnish birch plywood and the ailerons are of geodetic construction. The fuselage is steel tube trusswork with a nose cone of fiberglass to the C.G. The finish is superb and overall appearance is as exciting as many glass ships due to the fuselage shape and full-blown canopy. The fuselage and empennage are very clean, and substituting Open Class Cirrus wings brings the L/D up to an estimated 38.

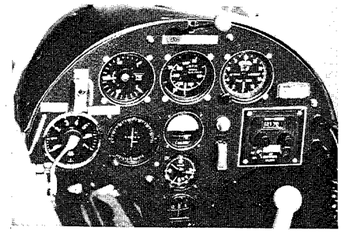
The seating is very comfortable; the leather-contoured seat and red acetate upholstery are what you would expect in a Mercedes Benz. The controls are light and very well balanced. Once the rudder is mastered, one can begin to appreciate the exceptional pitch-and-bank stability of the SF-27M, which I can only assume is expected of a 34/1 sailplane. The ship



can be set up at any airspeed directly with the trim lever control of the anti-servo tab of the all-flying elevator. In smooth air, hands-off flight can be easily accomplished by simply holding the rudder steady, and I have made many 720-degree turns with 35 degrees bank at 55 mph without any tendency for pitch or bank to increase. In addition, the ship feels very slippery and responsive in simulated instrument flight, which I was able to master in 15 minutes with an easy vertical scanning of yaw string, airspeed, and Mitchell Pictorial turn & bank. This type of airwork will also greatly improve coordination and airmanship.

The added controls for the engine do not necessarily clutter up the cockpit but could cause you to have only two varios instead of three, since the tachometer does take up panel space. The only other obvious engine controls are the engine in-out crank located on the right side of the cockpit. The combination engine-lock-prop-brake control lever is located down where your left pocket would be in a semi-reclining position. Grouped together also at the forward left side are the small choke-throttle levers, gas, and ignition switch. The ignition switch is on the panel just above the tach, but importantly, all engine-running controls are grouped together within hands reach.

To start the engine on the ground, the pylon is extended by first unlocking the lever on the left and rotating the right crank three and one-half turns forward. Gas on, switch on, choke aft (outboard lever), throttle full open (inboard lever). Clear the area (even though the prop would be very hard to walk into) and pull smoothly, using both hands on the starter handle located near the right knee just under the instrument panel. The engine will fire on the fourth or fifth pull, provided the gas has not been turned off recently. Immediately after starting, the choke is pushed halfway in and the throttle is retarded to idle position. As the engine warms up, the choke is gradually advanced forward until the engine will run with choke off. I usually do not make the full turn-up test until rolling for takeoff in order to conserve the engine. On takeoff the engine will show a steady 4850 rpm which will increase to 5300 at 55mph.



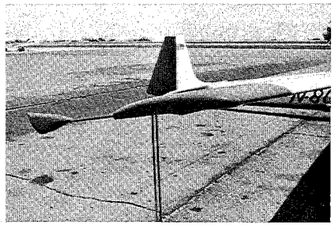
Throttle is retarded to 5000 rpm for climb which always exceeds 400 fpm. (On a hot runway you may record 700 fpm or more.) Ground roll is listed at 550 feet, but seems to be a lot less. It is very necessary to "rotate" the ship on takeoff, or you will buzz along at 55 mph a few feet above the ground with little climb and an overspeeding prop. On the rotation, the ship literally jumps up 30 to 50 feet and is quite noticeable from the ground. On first takeoffs, it is important to keep the stick fully back in order to keep from balancing on the main gear from the overhead thrust moment of the engine. Also, the ship will fly off very nicely with the tailwheel on the ground. Trying to nose over to pick up speed is very tricky in early flights or crosswinds, and usually results in PIO's about all three axes.

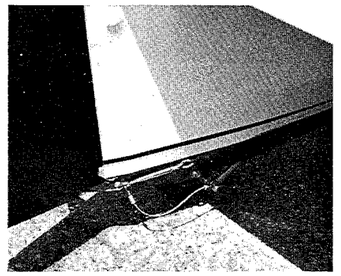
To shut down the engine, it is necessary to throttle back for two minutes at 55 mph for cooling purposes. This can be done while thermaling once you have the feel of the ship. The ignition switch is now turned off and the engine seems to run for another five seconds. Slow up to 45 and it will stop sooner. As soon as the prop has stopped, the prop brake-pylon unlock lever on the left can be moved aft, and a friction brake will make the prop harder to pull over with the starter handle. The correct prop/pylon alignment position is very easy to recognize, and as soon as you have it, concentrate on airspeed—under 50 mph, preferably 45, and rotate the crank on the right. In smooth air you will notice an immediate trim change which will require a half-inch movement forward of the trim lever. This is equivalent to a C.G. rearward movement of a little over two inches.

The "swooshing" effect upon retraction is both physical and psychological, and a difference can be observed on the compensated vario—in smooth air, of course. With engine and wingtip wheels retracted, I consistently have measured, late in the afternoon, without a "peep" out of the "piep" audio, 13 minutes or more of elapsed time in final glides from 5000 to 3000 feet at 58 indicated mph. Without a lot of fancy corrections, this tends to indicate that the published performance is approached, even with the "flamingo" legs at the wing tips.

On aerial restart, it is easier to use altitude and push over to 87 mph. (But it is prudent to learn how to do it straight and level at lower airspeed. Diving straight down on virgin swamp at 800 feet is not recommended as my faithful mirror has recorded.) First you slow to 45, switch on now, so you don't forget later. Move the prop brake forward to unlock the pylon, and crank the engine out until you can see it in the mirror, and are certain the crank detent is in its proper hole. Since the engine may still be warm, care must be exercised not to flood the engine. Use only half choke, or less, with throttle also set at the midpoint, and be ready to push the choke forward immediately if the engine tends to run sluggishly. The transition back to power-on is almost the opposite of the power-off feeling, but becomes one of great joy if you were about ready to make like a crawfish in the swamp.

Several modifications were made to the original configuration of the SF-27M, in addition to the tailwheel and tipwheel changes installed for





Modifications added by author Mouton—retractable tipwheels and steerable tailwheel.

ground maneuverability. These have to do with the engine, and basically the major change was installing a racing type of Tillotson fuel pump of more than twice the capacity of the original along with larger inside-diameter rubber hoses and fittings. The plugs I now use are Japanese along with a fuel mixture as recommended by motorbike 2-cycle experts. The engine is very reliable now and spark-plug fouling has been solved. In reference to the physical changes having to do with the wheels, they can be converted back to the original in less than one hour, but I strongly feel that motor-gliders should have inherent ground mobility.

My soaring is starting to improve now that I am no longer spending full time on maintenance and modifications. I feel that the SF-27M will be the milestone in the SLS development that the Nelson Hummingbird should have been years ago.

The lack of suitable engines has been a major snag in SLS development. At a recent EAA meeting it was requested, on a national scale, that all aircraft owners and homebuilders send in a resume of their types as there are presently several interests and interested large firms of proven production capability looking at the market, but these have previously been "turned off" by the lack of available surveys. The recent Oshkosh show and the topsy-like growth of EAA (with its many contributing SSA members), has just changed the whole editorial content of the major and minor air mags.

Interest in improving small 2-cycle engines has been rekindled with the present competitive race to built the best snowmobile engine. If I could get Carl Kiekhaefers' new 35-hp. engine on the SF-27, with belt reduction drive, I should be able to nearly double the rate of climb and reduce engine time to three minutes per flight, as the present 26-hp. Hirth 4-cylinder 2-cycle engine uses nearly 20 of the horses just to maintain zero sink. The total added weight of the Hirth, including fuel, is less than 90 pounds and is not too significant in lieu of water ballast sometimes carried in sailplanes. In England, an electric starter for the '27M is being advertised. However, I feel that a simple compression relief valve in each cylinder, similar to the old push-to-start motorbikes would allow air starts effortlessly, with only four or five pounds increase in weight.

Right now, an SF-27M can be had for the cost of one of the glass ships, and interest in this field could cause some startling changes. The answer may well lie in the homebuilt movement, as a light weight, powered, 30-foot span Bede BD-5 might well soar past a 1-26 and cost no more. Personally, I'm hoping the "BD-6" will turn out to be a 2-place slightly stretched-out version of the former, with 13-meter wings, Standard Class performance, and a $4000 price tag when homebuilt.

Meanwhile, the '27M will more than do, and is averaging three flights per week, sans crew and towplane, at a major municipal airport as its recognized "sailport." So I hope that you guys will come over to this side and appreciate the fact that this type of flying is a brand new ball game. Finally, I pray that none of the comments here will offend you solid soaring types that consistently turn an inert, inorganic, and powerless aggregation of glass, wood, or aluminum into a dynamic combination of art, skill, courage, and science that is undoubtedly the purest of true sport. Good Soaring! From N-SOAR!

Author Bill Mouton is an ex-navy flying boat pilot—who else would describe a rough runway as having a built-in ground swell (*sic*) equivalent to a sea-state of "6"? In recent years he has been leading a double life as a consulting engineer in New Orleans and a full professor in Tulane University's School of Architecture. His efforts to consumate a long-unrequited love affair with soaring may have been what led him to the SLS Scheibe sailplane, SF-27M. At any rate, he complains of having traveled extensively on this quest in past years, "but with very little luck, due to weather, distance, availability of sailplane/towplane, etc. . . ." This is an intolerable situation to all but the very purest purist, and Bill evidently succumbed with the results herein chronicled. But even though he now has his own SLS, he still has to travel, and if the article sounds a little high, he explains that's because it was all written above 30,000 feet on commercial jets—but while on business trips and speaking tours.