A FLIGHT TEST EVALUATION OF THE SCHEMP-HIRTH JANUS
By Richard H. Johnson, Published in Soaring Magazine, March 1979

Janus is listed in the dictionary as an ancient Italian divinity, god of beginnings, having two faces, looking east and west. Therefore, the name is truly appropriate for the beautiful Schempp-Hirth high-performance, two-seated, fiberglass sailplane. Its creator is the brilliant designer Klaus Holighaus, who is well known for his excellent Cirrus, Standard Cirrus, Nimbus II, and Mini-Nimbus high-performance, single-seated, glass-reinforced plastic (GRP) sailplanes.

When David Jones of Aspen, Colorado, telephoned and offered to bring his fine Janus to Texas for testing, we enthusiastically encouraged him to come at the earliest opportunity — which he did during early December.

The Janus is a moderately large sailplane, and appears to be developed from the mid-winged Standard Cirrus and Nimbus II sailplanes. It uses the Nimbus flapped wing, but with somewhat less span (18.2 meters versus 20.3 meters) and a wider wing chord. Its wing area measured 177.4 ft.², which was close to the 178.6-ft.² value shown in the brochure. The cockpit seating is tandem with both seats located ahead of the wing spars. A slight sweep forward of the wings permits this excellent seating arrangement, and this design innovation is also used with several other modern tandem-seat sailplane designs.

The current Janus horizontal tail is an all-moving type that appears to be identical to those of the Std. Cirrus and Nimbus II, but scaled up somewhat to provide approximately 25% more area. I had never been very happy with all-moving tails, principally because of the relatively unsatisfactory longitudinal dynamics of the poorly-balanced Nimbus II and Mini-Nimbus sailplanes, reported in Reference A. Would the new larger all-moving tail be worse? I was due for a pleasant surprise there because Klaus had apparently rebalanced the tail almost perfectly, and I was unable to detect any unstable dynamics when I later tested it during 110-kt high-speed test dives.

The landing wheel does not retract and has a moderately large 14-inch tread diameter by 5-inch width Tost wheel and drum brake system that works modestly well. A smaller 9.5-inch diameter auxiliary wheel is mounted slightly forward of halfway between the main wheel and the fuselage nose allowing the Janus to roll in either a nose-down or nose-up attitude during takeoff and landings. This is an excellent feature and allows full wheel braking without fear of damaging the forward fuselage bottom surface.

The cockpits are relatively large, being similar in length but slightly wider (27” max) to those of the Standard Cirrus and Nimbus II. The controls are well-positioned and practically identical to those of the Nimbus II, except that there is no landing-gear retracting handle, and the tail drag-chute control handle is located on the right side of the cockpit floor near where the gear handle would have been. The tail drag parachute system appears to be identical to the Nimbus II, reported in Reference B.
Standard fairly effective Schempp-Hirth type airbrakes are provided on the top wing surfaces, making the need for the tail parachute system somewhat improbable in ordinary landing situations. A separate instrument panel is provided in each cockpit and a beautiful single-piece side-hinged canopy covers the cockpits in royal style. The factory documents showed an empty weight of 810 pounds unequipped; our empty test weight with instruments, radio, battery, and oxygen was about 860 pounds. The 18.2-meter wing is divided into two panels at the fuselage, with the left panel weighing 241 pounds and the right about 234 pounds. Three moderately stout people and one wingtip support stand make assembly and disassembly fairly easy.

How would the Janus performance compare to those of its higher aspect ratioed wings and retracted gear Std. Cirrus and Nimbus brothers? First an airspeed system calibration was made, comparing the Janus airspeed system readings to those of our flight-test master instrument connected to the trailing-bomb static source.

The Janus is provided with a good fuselage-nose pitot and two separate static sources. One set of statics is on the forward cockpit sides; the flight handbook said these must be used for the sailplane’s airspeed indicator. A second set of statics is provided on the aft fuselage sides, about halfway between the wing and tail. Since we had the luxury of having a second cockpit plus an observer to record extra data, we decided to connect the rear cockpit airspeed indicator to the aft fuselage statics and calibrate both systems simultaneously.

The measured airspeed system errors for both systems are shown in Figure 1. Note that the cockpit-sides system gives readings that are 5% higher than true, but that changes in flap settings have little effect upon the airspeed system calibration. On the other hand, the aft-fuselage-sides system gives airspeed indications that range from zero to 4.7% lower than true, and the error magnitude varies considerably with flap setting. It appears that neither of the Janus’s static systems would provide a very satisfactory static source for use with sensitive variometers, but the aft ones are probably better than the forward set.

Next, high tows were made to measure the Janus’s sink rates at various airspeeds. I always found volunteers eager to ride in the aft seat, and this greatly lessened my data-writing task, and kept test gross weights close to a constant 1250 pounds. Figure 2 shows the sink rate data measured with +6° flap. Only one flight was made with this flap setting, but the air was unusually smooth and remarkably little data scatter existed. A L/D_max of about 36.3 at 54 kts was measured. Not bad for a thermaling flap setting!

Figure 3 shows the data measured with the flaps set to 0°. Here data were taken on five separate days, and significant data scatter occurred during several of the flights. Small and gentle flatland wind shear waves caused the bulk of the data scatter; so care was taken to average the test data as much as possible by flying in both up and down wave regions. No measured test data points were omitted from this plot, so the average indicated sink rates measured should be close to those measured in really smooth air. My best-faired line through these data indicates a remarkably good 40.9 L/D_max at 53-kts calibrated airspeed. This L/D_max value is almost ex-
Exactly at the midpoint between the 35.9 measured with the Std. Cirrus B (Reference C) and the 47.2 measured with the unmodified Nimbus II (Reference B). The data taken during Flight 1 appears to have been the most representative of the 0° polar at the low and mid-speed regions.

Figure 4 shows similar sink rate data taken with the flaps set to -4° with data again taken on five separate days; Figure 5 shows the -7° flap setting data taken on four different days—more data scatter than I like, but still the faired curves are probably relatively accurate, nevertheless.

The polars from each of the preceding four plots are shown in Figure 6. From this plot one can determine optimum flap settings for various airspeeds of interest. Below 60 kts the 0° flap setting provides least sink rate, and above 60 kts the -7° flap setting appears best, except possibly in the 84 to 92-kt region where -4° flap setting may be slightly better. Unfortunately, the test-data quality taken with the zero and negative flap setting was not sufficient for very exact determination of optimum values.

The last test measured the Janus’s sink rates with the leading edges roughened by our “standard” 20 tape “bugs” per meter of span, designed to simulate roughening effects of insects impacted during summer thermaling. Figure 7 shows these test data. The L/D measured was about 34.1 with bugs, which is a 17-percent decrease from the 40.9 measured with clean wings. At 80 kts the Janus’s sink rate is increased by about 29 percent by the bugs, and this is significantly less than the 38-percent value measured during the Nimbus II close to 18 months old when we made our measurements, yet they showed remarkably good surface smoothness. The top surfaces produced waffe-gage readings averaging only about .0045 inches peak-to-peak, and the bottom surfaces averaged about two-thirds of that value. The wing maximum thickness-to-chord measurements figured .175 at the wing roots, .156 at the wing flap tips, and .159 at the aileron tips—a moderately thick, but a well-made and good-performing wing.

The Janus flight-handling characteristics are quite good, and it is apparent that Klaus put considerable effort and thought into this design. The roll rates were fine for this class of sailplane. +45° to -45° rolls were timed at 4.8 seconds when flying at 50 kts calibrated airspeed with +6° thermaling flaps. The aft fuselage is longer than that of the Nimbus and the tail surfaces are almost identical in design but larger in size. Because of my Nimbus training, I kept applying too much rudder when rolling into turns, trying to counter a large adverse yaw that was not there. The well-balanced, all-moving horizontal tail provided good longitudinal stability at all speeds and was a great improvement over the smaller poorly balanced Nimbus and Std. Cirrus tails. It did, however, cause

Motor Janus. Tandem wheels facilitate taxiing the Janus M, winner in the two-place category of last summer’s European Motorglider Championships. Except for take-offs, Walter Binder, the first pilot, only used his Hirth 0-289 engine for one 18-minute period during the two-week meet. This was to avoid an outlanding which is prohibited by the rules of the Championships.
the longitudinal control to be fairly sensitive to control stick position. I understand that a new model of the Janus will offer a fixed horizontal stabilizer similar to that of the excellent newer Nimbus II B's, and this should provide even better stability and handling characteristics.

Thermaling tests were performed in weak Texas December conditions, and with two aboard. I thought the climb characteristics were quite satisfactory considering our wing loading was slightly over 7 lb./ft². However, we were no match for a much lighter carbon spar PIK-20D-78, which obviously had a lower sink rate and a tighter turn radius.

Tests of the tail parachute resulted in little praise for that system in my opinion. One deployment was made at 55 kts during a high approach to a landing. Though the chute apparently deployed properly, I had difficulty determining if it had done so because its drag deceleration force was relatively small compared to the inertia of the 1250-pound loaded sailplane. I can easily understand why an inadvertent deployment might not be readily apparent to the pilot. The ribbon type of parachute used provides a very low opening shock and the deceleration is too low to be obvious, unless flying fast.

A second deployment was made at 80 kts indicated airspeed while flying directly over the airfield at 1500 feet altitude. Here the opening and drag forces were fairly obvious. I then attempted to jettison the tail parachute, but just as with the Nimbus system, the jettison mechanism locks up under high force loads. Jettison attempts were continued while gradually decreasing airspeed and finally succeeded when the calibrated airspeed reached 50 kts. This is about 10 knots below normal towing speed, and an accidental deployment during takeoff or tow could easily cause a critical situation for everyone! For safety reasons I would prefer to have larger wing airbrakes and delete the expensive and potentially hazardous tail chute system.

In overall appraisal the Janus deserves a high score. For those who enjoy sharing their flying joys with others, this sailplane is tops. They will find that it is difficult to keep friends and relatives out of that roomy and comfortable rear seat! Its high-performance capabilities make record and cross-country flying truly feasible. No doubt more records will continue to fall to this fine machine in the future.

Thanks to David Jones for bringing his beautiful sailplane to Texas for testing, and to the Dallas Gliding Association for providing the towing funds. The data reduction is now programmed into a Texas Instruments Model 59 pocket calculator; so Bob Gibbon's much appreciated past efforts are now automated.

REFERENCES