

A FLIGHT TEST EVALUATION OF THE J-4 JAVELIN SAILPLANE

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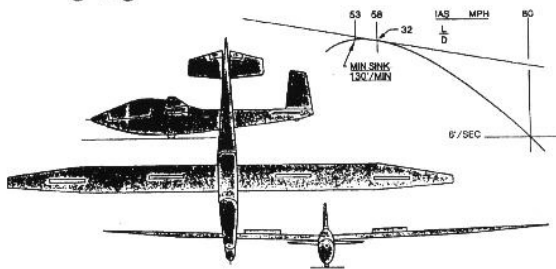
The J4 Javelin is an American single seated, all metal, medium performance sailplane that was fully F.A.A. type certified and factory produced during the mid 1970's by the Peterson Sailplane Corporation in California.

Max Peterson was its principal designer, and his goal was to produce a safe and low cost sailplane that could be available to a large number of pilots for recreational flying. Unfortunately, the higher performance fiberglass sailplanes from Europe apparently proved to be too much sales competition for Max's project, and only about 8 were produced before the production was terminated.

Max Peterson was thorough in his engineering and development of the Javelin, and he obviously expended a great deal of effort to achieve its F.A.A. certification. His account of that activity is recorded in Reference A, which chronicles his extensive development program that started in the late 1960's.

Although it is now 13 years after the Javelin's production, we considered it worthwhile to document its performance and somewhat unique flight characteristics because it was a good American sailplane development project, of which we see few in recent years. The opportunity for D.G.A. to do so did not occur until late in 1989 when Bob Hofer of Fort Smith, Arkansas, recently became N5TF's new owner and kindly offered it for our evaluation. Figure 1 is a 3-view of the Javelin along with its factory measured or estimated polar and its brochure technical data and features listing.

The J-4 Javelin



J-4 Features

- 1-Large one piece canopy for maximum visibility.
- 2-Molded contour seat with comfortable armrests.
- 3-Rotary lap belt buckle with inertia reel shoulder harness.
- 4-Hydraulic disc brake.
- 5-Polyurethane paint.
- 6-Spare parts catalogued and available.
- 7-Complete set of instruments including Ball electric variometer.
- 8-Easy assembly-less than 15 minutes from trailer to tow rope.
- 9-For added safety-instant weight and balance checking.
- 10-Fully ATC'ed.

The Javelin is a uniquely different sailplane—comfortable, quiet, mild mannered—an honest airplane, that has a proven control system which eliminates adverse yaw and gives coordinated turns with little use of the rudder. Now you can sit back in

the contoured arm rest seat and relax and enjoy soaring flights as never before. An effective rudder system allows you to slip and maneuver and put the J-4 just where you want it. Approved for auto/winch towing, it will give you a variety of launching techniques to extend your abilities. The Javelin is extremely easy to assemble and disassemble and makes using it more versatile. Controls are always hooked up and don't need adjustments. Nose, tail and wing fairing remove for quick access to all the moving parts and reduces annual inspection time.

Technical Data

Gross weight-804 pounds.
Max. cockpit wt.-230 lbs.
Nose ballast weights to aid pilots down to 123 lbs.
Wing Panel weight-135 lbs. each.
Wing area-126 sq. ft.
A/R-19.2
Fuselage width-26".

The J-4 sailplane appears to be well and stronger constructed with adequately thick wing skins and stiff spars to avoid the "oil can" skin buckling that many all-metal sailplanes exhibit. Also, all of the rivet heads ahead of the wing spars are flush, thereby likely permitting significant amounts of laminar flow along its low drag airfoil. The unique feature of the J-4 is that its wings do not use conventional ailerons, but only top surface forward hinged spoiler plates located about three quarters of the wing panel span from the fuselage.

Our flight-testing indicated its roll rate to be comparatively slow with about 7 to 8 seconds required to roll from +45 degrees to -45 degrees bank angles at 48 kts CAS. The good feature was that this spoiler type of aileron created almost no adverse yaw at all. That took some time to get comfortable with because practically all-modern sailplanes require large pro-turn rudder deflections to overcome the adverse yaw created by conventional aileron deflection.

The other unconventional J-4 feature is its all moving vertical fin that provides a more powerful rudder control than most of us are used to. Over controlling with rudder on my first aero tow flight was the first thing that I needed to correct. After getting used to only using gentle and small rudder movements, the tow went well.

Three high tows were made to measure the J4's sink rate versus airspeed, and those data are shown in Figure 2. An L/D max of about 32 is shown at 48 kts CAS, and that is exactly equal to that shown in the Figure 1 factory polar.

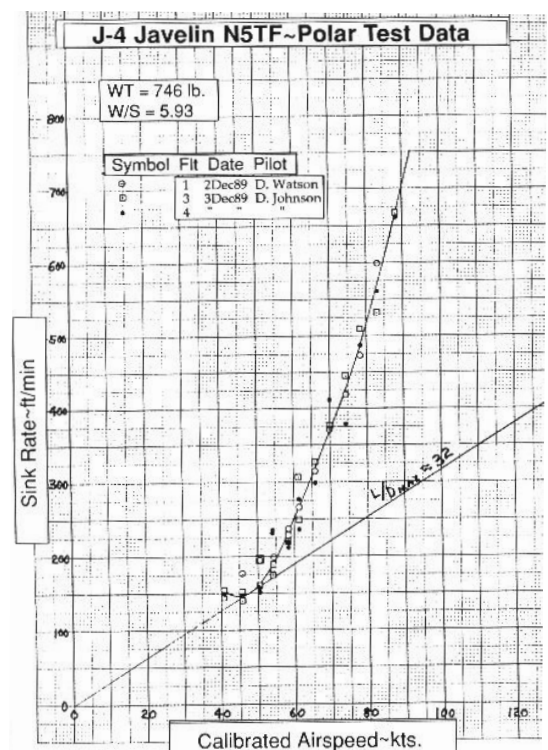


FIGURE 2

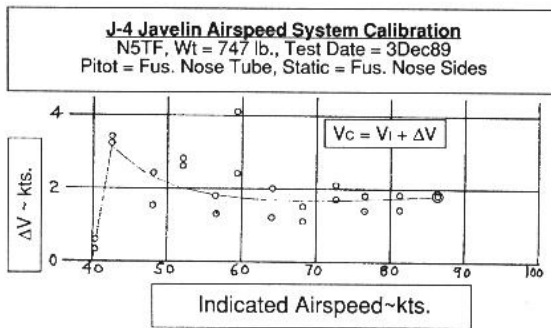


FIGURE 3.

It is equipped with the same type hydraulic disc brake used on many of the newer sailplanes, including the big Nimbus III.

The J-4 nose is equipped with a skid, and the main landing wheel is located only slightly ahead of the sailplane's flight c.g. The flight handbook recommended checking c.g. before takeoff by observing that the nose skid would remain down on the runway when placed there (aft c. g. limit check). A nose ballast weight was provided for installation in the event the c. g. was too far aft. An excellent safety feature indeed!

Each wing tip of our test Javelin was equipped with a sprung Schweizer type training wheel. More performance could have been measured had those been removed during our flight-testing. However, I did roll those tip wheels on the runway inadvertently during 2 of my early takeoffs. A fairly strong quartering cross-wind was partly to blame but my failure to keep the nose low during the early part of the takeoff roll was the main problem. The ailerons appeared to be adequate during both takeoffs and landing as long as the nose skid is kept on or near the ground.

The Javelin's good performance no doubt came from its well made and relatively high 20.1 aspect ratio 15 meter span wing, and relatively low drag NASA 64 (3)-618 laminar airfoil that was used for its airfoil section. The wing thickness-to-chord ratio was measured at .1837 over the rectangular portion of the wing, then thinned somewhat through the tapered tip portions. The basic wing chord measured 33.4 in. (.848 M) and a simple 6 inch O.D. chemically milled tubular aluminum spar is used over the inner portions of the wing.

Level flight stall speed was measured at about 39 kts CAS, and the stall characteristics appeared to be relatively gentle. After one gets accustomed to the Javelin's unique spoiler aileron's lack of adverse yaw and its relatively powerful rudder control, the J-4 Javelin can be quite comfortable to fly. However, it takes several flights to get accustomed to; so do not expect early flights to feel very natural. Consider it to be a transitional learning experience, as it was for Darrel Watson and me.

Thanks go to Bob Hofer for loaning us his J-4 for testing and to D.G.A. which provided the high tows. Also to Max Peterson for his unique design talents and fine creation.

REFERENCES

- Peterson, Max, "The Javelin". *Soaring*, June 1973.
- Cruce, Marion, Letter to Editor, *Soaring*, August 1973.
- S.S.A. IN ACTION, Bulletin, *Soaring*, March 1976.
- SAILPLANE DIRECTORY, *Soaring*, November 1983.

I had lightly sanded the wing leading edge surfaces before our testing, but the sailplane had little sealing around its canopy or elsewhere. Above about 80 kts CAS, both of the spring closed spoiler ailerons were noted to suck open about 1 inch. If stronger closing springs were installed, the J-4 high-speed sink rates could likely be reduced over that shown in the Figure 2 polar.

One additional high tow was made to perform the J4 airspeed calibration, and those data are shown in Figure 3. Only about 2 kts of airspeed system error was measured, which is quite good. The main landing wheel is a large 5 X 5 inch size.