

# *Sport Aviation*

FEBRUARY 1991







## THE PAZMANY PL-9 "STORK"

Our article in the December 1990 issue on the three Jan Mueller owned Fieseler Storchs displayed at Oshkosh '90 stirred up quite a bit of interest. A lot of EAAers, it seems, would like to build an airplane with Storch-like flying characteristics. In what appears to be great timing, Ladislao Pazmany has announced his development of a 3/4 scale Storch replica, the PL-9. Swamped with mail as a result of the Storch article and a couple of Hot Line notices on his replica, Paz has written the following article to provide everyone with information on the project.

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other functions associated with a versatile utility aircraft. It was powered by a 240 hp Argus As 10C engine (eight cylinder, air cooled, inverted "V") turning a fixed pitch wooden propeller.

The construction was welded steel tube fuselage, wooden wings and tail surfaces, all fabric covered. The extremely long stroke (15.7 in.) main landing gear strut was designed to absorb energy at very high sink rates.

Fifty-three years after the flight of the prototype Storch, I am now designing a 3/4 scale replica for amateur construction. I have been interested in the Storch since my days of model aircraft designing and building in Argentina. In 1955 I designed and built a rubber band powered, balsa wood scaled model of the Storch.

For the design of the PL-9 "Stork", maximum effort has been made to re-

produce the performance of the Fi-156. The same wing airfoil with fixed leading edge slats, Fowler flaps, drooped ailerons has been used. The fuselage structure closely follows the original. Some features are different: the cockpit has been enlarged slightly from a true 3/4 scale (hard to scale down people). The Fi-156 main landing gear has coil steel spring/oleo damping shock absorbers. The PL-9 will have a very simple oleo/pneumatic shock absorber, to save the weight of the coiled steel springs. I designed similar shock absorbers for the Pazmany PL-1, PL-2 and Ryson ST-100 motorglider with very satisfactory results. The PL-9 main tires and wheels are larger than a true 3/4 scale size of the Fi-156 tires, that were rather small for rough field operations. In lieu of the 500-5 tires, which would be almost perfect 3/4 scale, the 600-6 will be used. While the wing and empennage of the Fi-156 were made out of wood, the PL-9 will have aluminum sheet metal ribs and spars, covered with fabric.

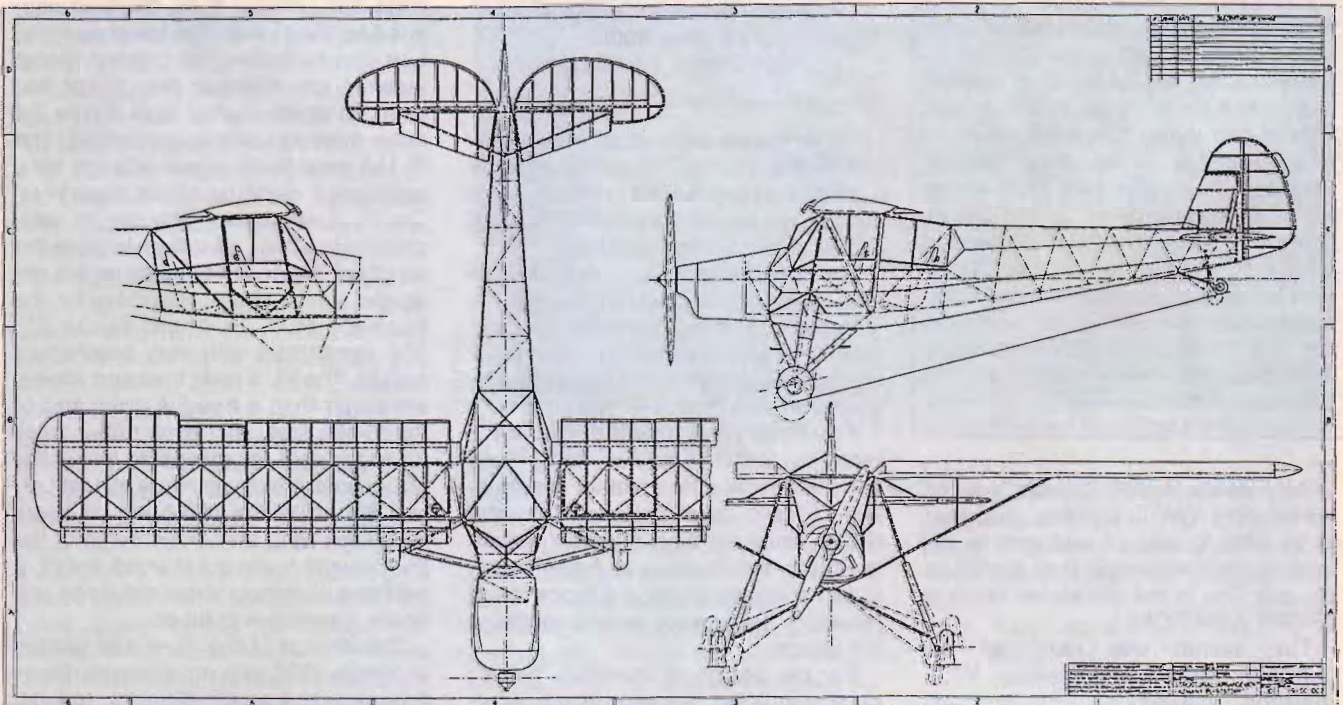
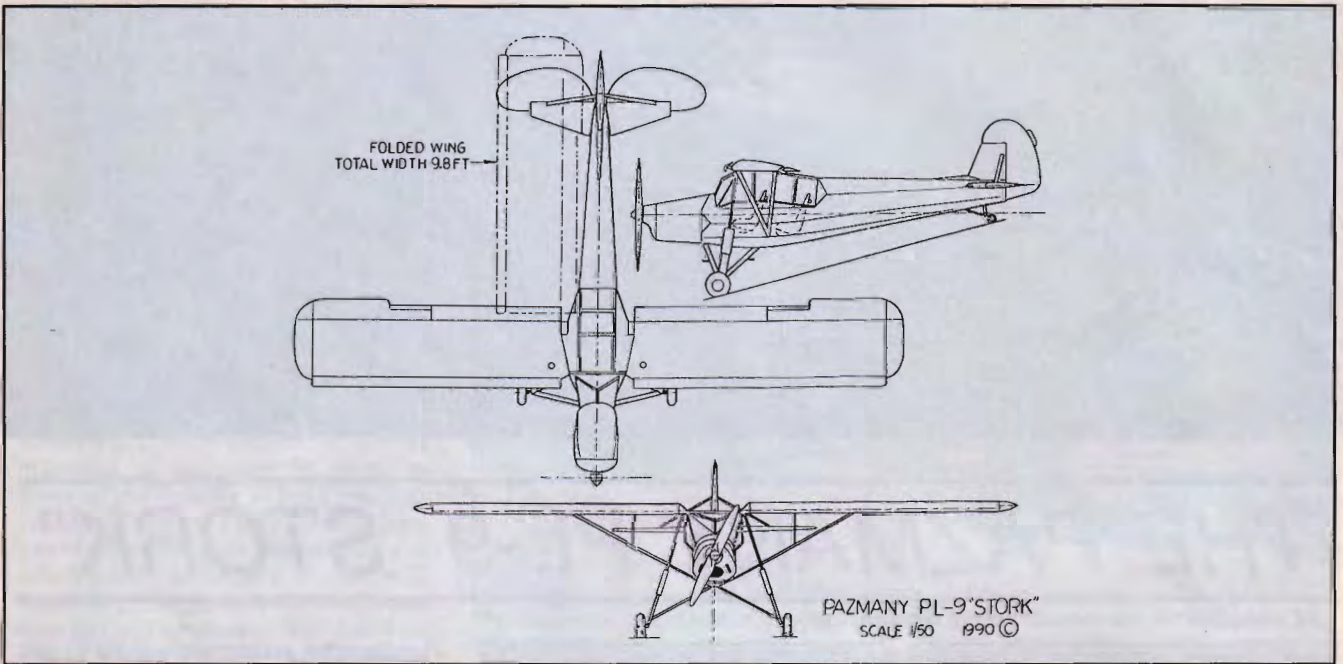
The design of the PL-9 was started in March 1990 with an extensive literature search. I acquired books, reports,

The Fieseler Fi-156 "Storch" was an outstanding WW-II airplane, designed to be able to take-off and land in extremely short distances (see the article by Jack Cox in the December issue of SPORT AVIATION).

The aircraft was used by the Luftwaffe for reconnaissance, V.I.P. transport, casualty evacuation, and



manuals, microfilm reproductions and movies. Also, I talked to former Luftwaffe pilots who had flown the Storch and I had many phone calls with Bruce Panzl, the man in charge of the restoration of the three beautiful Storches that we saw at Oshkosh. Bruce was extremely helpful sending me a full size wing airfoil drawing and some discarded portions of ribs, fittings, etc. I also had wonderful cooperation from the Smithsonian's National Air and Space Museum and the National Archives which sent me reproductions of aircraft manuals, illustrated parts catalogs and VCR tapes and testing and flight demonstration movies of the





Storch in the 1930s.

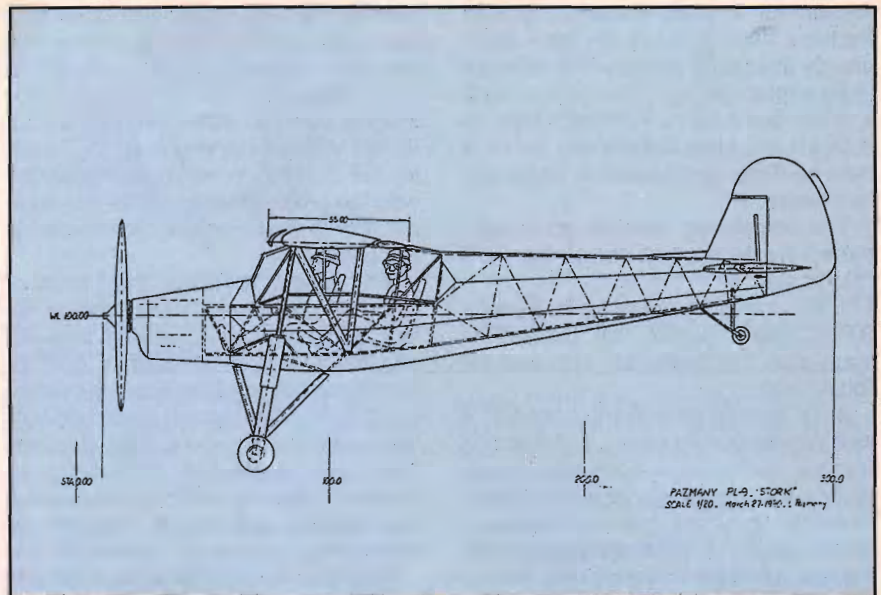
At the end of 1990, I had completed performance estimates, detailed weight and balance calculations, structural geometry and layouts. A computer analysis of loads and deformations of the fuselage structure was made, and most of the stress analysis of the wing structure has been made. The main landing gear shock absorber sizing, complete stress analysis of the main gear, detailed drawings of the vertical tail, some of the wing ribs, layouts of the seats, and detailed drawings of the main gear are now being made. At the present rate, I estimate that a complete set of plans will be available in at least another year.

As a result of two brief notes in the November and December issues of SPORT AVIATION, I received an avalanche of letters requesting more information. Upon mailing out many information sheets (free of charge), I received another avalanche of comments. A great majority of the builders indicate the desire of complete plans, so the builder is not forced to buy kits. Therefore, I decided to provide complete plans. The builder will have the option of buying available kits or can make every part. This is how I still sell the plans for the PL-2 and PL-4A.

Originally, to expedite the design, I decided to eliminate the wing folding feature, but I received so many letters requesting the folding wings that now I have decided to incorporate the system in the plans from the inception.

The "Energy Absorbing Seat" is now a requirement for all new aircraft designs being Type Certificated, according to FAR 23-562. Emergency landing dynamic conditions require some form of shock absorber built into the seat legs. Approximately 6 in. of vertical stroke and 6 in. of forward stroke are required to decelerate the occupant from a minimum speed of 31 ft./sec. in one test, and 42 ft./sec. in a second test. These may result in crash load factors up to 26 Gs. Although the PL-9 will not be Type Certificated, I am designing the seats to meet these requirements. No claim will be made that this has been achieved until complete dynamic tests of the seat and supporting structure have been made and the requirements satisfied. Since seats may move forward and down in a crash, it is impossible to anchor the shoulder harness to the fuselage structure. The shoulder harness must be attached to the seat back. According to this new requirement, the total strap load may not exceed 2,000 lbs., although analysis may result in lower loads.

The PL-9, with a main landing gear oleo-pneumatic shock absorber, will have a stroke of 12.6 in. To this we should add approximately 3 inch tire de-



COMPARATIVE TABLE

	Units	Fieseler Fi-156	Pazmany PL-9	
			with 30 Gal.	with 52 Gal.
<b>WEIGHTS</b>				
Empty	lb.	2006	1132	1132
Pilot & Observer & Misc.	lb.	416	350	350
Fuel	lb.	242	180	309
Oil	lb.	22	11	11
Maximum weight	lb.	2688	1673	1802
<b>DIMENSIONS</b>				
Wing Area	ft <sup>2</sup>	280	166	166
Span	ft	46.5	36	36
Length	ft	32.5	24.3	24.3
Width-Wing Folded	ft	15.6	9.8	9.8
<b>POWER (Max)</b>	hp	240	150	150
<b>AERODYNAMIC</b>				
Wing Loading	lb/ft <sup>2</sup>	9.60	10.07	10.85
Power Loading	lb/hp	11.34	11.15	12.01
Span Loading	lb/ft	57.8	46.5	50.0
C <sub>L</sub> max - Flap Retracted	—	2.49	2.49	2.49
C <sub>L</sub> max - Flap Extended	—	3.68	3.68	3.68
<b>PERFORMANCE</b>				
Stall Speed (Flap Extended)	mph	31.7	32.7	34.0
Stall Speed (Flap Retracted)	mph	38.5	39.8	41.2
Cruise Speed (75% power)	mph	89.6	104	103
Max Speed	mph	112.0	116	115
Rate of Climb @ 85% Power & 45 mph	fpm	1110	1400	1227
Service Ceiling	ft	15,091	15,100	15,000
Endurance @ 75% Power	hours	3	3.2	5½
Range @ 75% Power	miles	223	332	412
Take-Off Ground Roll (no wind)	ft	246	246	250
Landing Ground Roll (no wind)	ft	85	85	90
Range @ L/D <sub>max</sub> = 8.96 (V = 45 mph)			585	980

\*The Pazmany PL-9 performance is estimated. Final values will be based on the results of the flight tests of the prototype aircraft.



flection for a total stroke of 15.6 in. Perhaps I should not even think about energy absorbing seats for the most unlikely airplane to injure the occupants in a crash, but the new FAA regulation requires it and I like to think that the PL-9 may be Type Certificated in some distant future.

The compelling reasons on which I based my decision to design the PL-9 "Stork" are:

1. To provide amateur builders a STOL aircraft which will please the sport pilot, the "nostalgia" pilot and the "bush" pilot.

2. To provide an airplane based on a well proven configuration, capable of a number of functions such as: surveillance, fish spotting, highway patrol, forest fire detection, pollution detection, missionary work, glider and banner towing, and perhaps a few others.

3. The welded tube fuselage, aluminum sheet metal/fabric covered wing and empennage seem to be very popular with the amateur builders . . . with, for example, over 1,000 kits sold for the Avid Flyer and the Kitfox (each), although this method of construction represents 70 year old technology.

A converted automobile engine, with a cog-belt reduction, probably the 2.2

liter Subaru Legacy or the Honda Prelude, both approximately capable of 150 hp, will be the basic engine for the PL-9. The engine should fit in the "pear" shaped cowl, so distinctive with the inverted V-8 cylinder Argus As 10C used in the Fi-156. A specially designed wooden propeller shaped like the original Storch propeller will be included in the plans.

The builder will have the option of using any engine of his/her choice, as long as it develops 150 hp on take-off, and the weight is reasonable. This includes aircraft engines such as Lycoming O-320 (probably with an add on cog-belt reduction to drive a large diameter slow turning propeller). The engine installation drawing, other than the 2.2 liter Subaru, will not be available, at least at the beginning of the project.

Pazmany Aircraft Corporation will sell complete sets of plans for the fabrication and assembly of the PL-9. It is my estimate that the price of the plans will be around \$300. I have no estimates of how much the kits will cost until I find suppliers. Eventually, I will need fabricators of fiberglass parts, sheet metal parts, machined parts, suppliers of tack welded or completely welded fuselages, landing gears, etc. As I do with

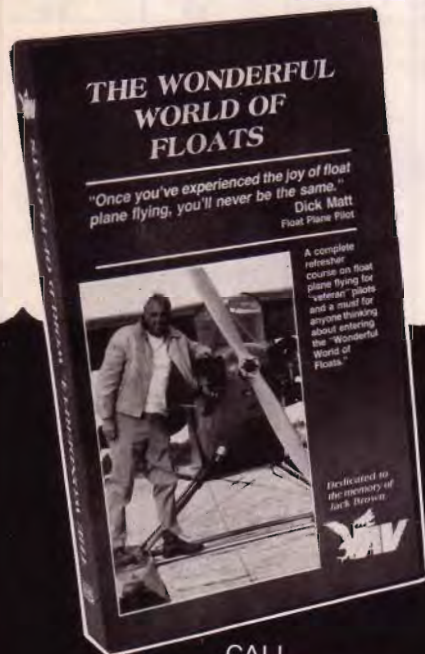
the PL-2 and PL-4A builders, I will be selling those kits through my company until I find a well established supplier who can take over this task. The builders can purchase all bulk materials such as fabric, plexiglass, paint, bolts and nuts directly from established suppliers. As with the PL-2 and PL-4A plans, I will include a detailed list of materials which can be used as a purchasing list. Several companies and individuals have already contacted me offering their automobile conversions with belt or gear reductions. The choice is still open. I would like to see these powerplant installations tested in a dynamometer, and also weights of the different components, fuel consumption and an endurance test before making a selection.

I will appreciate comments on this project. Anyone eventually interested in building a PL-9 should send me a letter. As I always did before, I personally answer all letters, although this does take time away from designing. This is very helpful, however, in defining the preferences of the builders. Also, I am compiling a list of potential builders so I can communicate with them at the time that plans are available. You can contact me using the address at the beginning of this article.

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