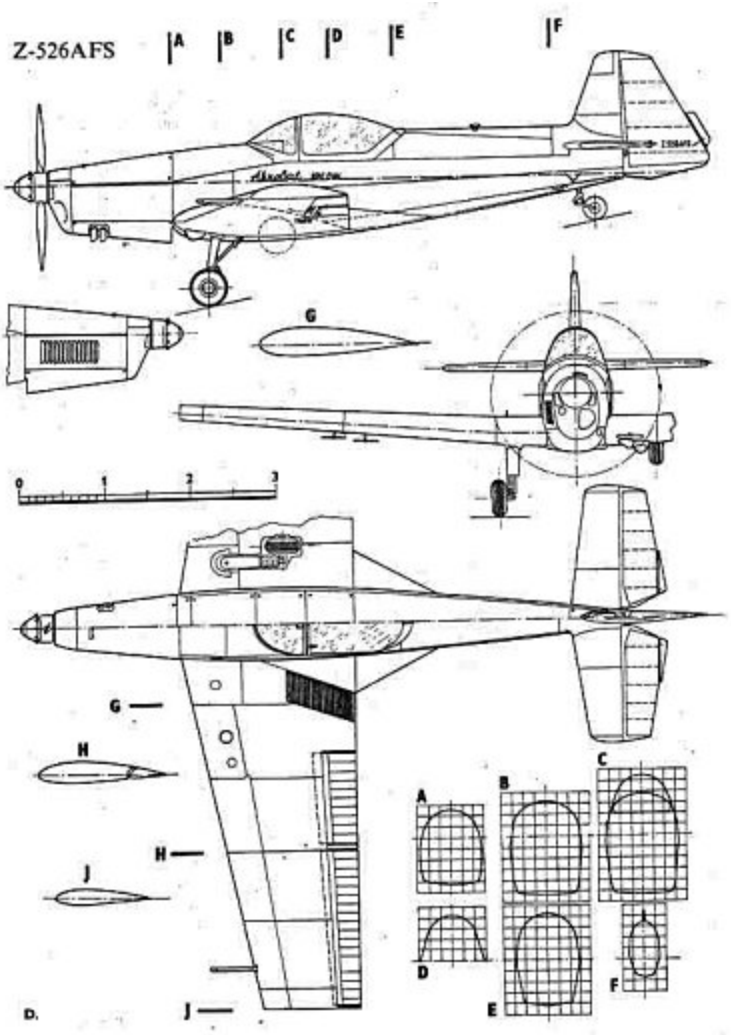
Special classic aerobatics aircraft for REFLEX XTR

Zlin Z-526 AFS

as a model true-to-reality also in its flight behavior

The Zlin Z-526 AFS was probably the last special aircraft for classic aerobatics which was derived from a standard model. Shortly afterwards the Moravan works in the Czech Republic (http://www.zlinaircraft.eu/) brought out the completely new designed Z-50 because the Z-526 AFS was no longer competitive. Quite some time ago now *Janning Quint* created a very nice model for the REFLEX flight simulator, which renders a real scale model.

From http://richard.ferriere.free.fr/3vues/3vues.html:



In the mid-1960s, the Z-526 AFS was the last in a whole series of special aerobatic aircraft the Moravan works derived from their trainer at the time. So the *Z-526 Trener* was turned into the *Z-526 AFS Akrobat Special* in several intermediate steps. The fuselage was shortened by omitting the front pilot's seat. The engine cowl was lengthened to accommodate a more powerful and thus bigger engine.

The wing was clipped to enhance the roll rate. To this end it was as well necessary to supplement the now smaller ailerons with additional inner ailerons (see picture). The split flaps used on the trainer had to be cancelled, but it's easy to do without any flaps.

Obviously, the designer of the scale model has mistaken the inner ailerons for flaps. That's why they are made flaperons on the simulator model.

The wing is still quite slender (aspect ratio 5.65) to keep the induced drag low. It's considerably tapered (taper ratio 0.54) and of course is still swept with a straight trailing edge. Cambered wing airfoils NACA 2418 (root) to NACA 4412 (tip) give much lift for tight loops, even if not inverted. The quite cambered outer wing airfoil and a decent washout (3.5 degrees) make for a stall beginning only near to (not at) the wing tips, despite the taper. Flick (snap) rolls are yet easy to do, though.

This design was classical. Due to the special suitability for aerobatics the flight behavior is not suitable for beginners. The seasoned pilot knows how much the elevator may be pulled. The model pilot has to restrict his stick movements to a certain limit. Snapping the elevator to the mechanical stop is done only for flick (snap) rolls in classic aerobatics, if at all. Even a spin is initiated smoothly, avoiding the so-called flick entry. Still it is possible to fly quite tight loops if only the elevator is *smoothly* pulled to the stop.

The aircraft has not especially big horizontal and vertical tail even if big control areas and a quite long tail moment arm. The horizontal tail area is 19% of the wing area. Maybe the Z-526AFS as a scale model is very well suited to fly true-to-reality. Just that's what I intended to check out in the simulator. In this package are 10 model versions for REFLEX differing from each other in size, weight, and drive. Of course, the basic design is the same in each version, just that of the original aircraft. That's why I wasn't tempted to set up any 3D version. The 0.7 to 0.8 thrust/weight ratio is well enough for normal, classic aerobatics.

The REFLEX-Models

The model made by *Janning Quint* looks impressively well and realistic. When taxying, a small length difference between left and right landing gear was a bit annoying, though. I just corrected that in the model file and some small surface distortions and reflections as well. Mainly, the point special functions "flap left/right" are replaced by "flaperon left/right" so the inner ailerons are working as ailerons and as flaps as well. *Janning Quint* kindly permitted to publish the modified model (mod file) together with my different parameter sets (par files).

Different drive sounds are used for the 10 versions (see below). The first and biggest version is scaled 1:2.95 and is a rendition of the real scale model made by Aeroflug and now produced by Skygate Collection. In flight it feels like a quite lightweight sports model. Originally, *Herbert Quint* had set up a somewhat smaller and lighter simulator model (1:3.40) even though he claimed it would render the Aeroflug model. Anyway, this medium version may seem to fly more like a special aerobatic model. With a different type of engine (glow instead of gas) the small version flies quite well despite its weight. It is equivalent to a real model once offered by Lenger. The 1:3.0 and the 1:3.5 versions are there only for comparison with other models in these scales.

Scale	*Wingspan*		*Weight*		
1:2.95	118 in	3.00 m	36.4 lbs	16.5 kg	Skygate Collection
1:3.00	116 in	2.95 m	34.4 lbs	15.6 kg	
			34.4 lbs	15.6 kg	3.5 degrees decalage
			20.3 lbs	9.2 kg	
1:3.40	102 in	2.60 m	28.7 lbs	13.0 kg	like Janning's version
1:3.50	100 in	2.53 m	18.5 lbs	8.4 kg	
			15.2 lbs	6.9 kg	
			13.2 lbs	6.0 kg	maybe best version
			11.0 lbs	5.0 kg	
1:4.66	75 in	1.90 m	11.0 lbs	5.0 kg	Lenger

All versions are set up and trimmed for aerobatics, including full-power flying. The big wing incidence angle, the same as on the original, makes the aircraft's nose point down in upright flight. It's pointing well up when flying inverted, what is caused also by the big angle-of-attack needed due to the cambered airfoils. Despite of this asymmetry, no propeller right and down thrust are needed. Adverse yaw is virtually canceled out by a small aileron differential. The Z-526AFS now flies remarkably balanced and straightforward, even inverted.

Rudder deflection is 22 degrees because there is a mechanical restriction. Elevator and aileron deflection are set to 25 and 20 degrees, respectively. Some expo is set in REFLEX since it's needed to get a smooth flight, at least with my transmitter. Elevator deflection may be limited by dual-rate to avoid wing stall. This way the model may be flown quite slowly and a real model might be even used as a tug.

The REFLEX Model Files

Janning Quint kindly permitted to publish the modified model (mod file) together with my parameters (par files). The installer program creates the folder (directory)

...\Flugzeug\Zlin\

and stores all model files there. If you would like to have also *Janning Quint's* original version, go to RC-Sim to download it.

I prefer a model engine's sound for the REFLEX model, even if I don't have the „correct" one. *Herbert and Janning Quint* recorded the sound of a ZG 38 and published it on RC-Sim.de. This quite sonorous sound is assigned to the big model version. The sound of a Zenoah G20ei is assigned to the middle version. The small version has the O.S. 120 AX engine sound as a perfect fit. The 1:3.0 and 1:3.5 scale versions have the four-stroke engine sounds of the O.S. FS-200S and the Saito FA 90TS, just for a change.

The drive sound files are

ZG38-1550.wav and ZG38-1550_.wav,
OS FS-200S.wav and OS FS-200S_.wav,
ZenoahG20ei.wav and ZenoahG20ei_.wav,
Saito FA 90TS.wav and Saito FA 90TS_.wav,
OS120AX.wav and OS120AX_.wav.

Now all should be available, including demo flights, and this text should be accessible in the program menu „Programs\REFLEX\models". Of course, the demo flights „Z-526AFS 3.00m" and „Z-526AFS 1.90m" (hit F9 in REFLEX) are not really artistic but show the decent flight behavior of the models. Especially the directional stability and the elegance of patterns are remarkable.

Enjoy!

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http://time.hs-augsburg.de/~erd/Modellflug/textReflex.html

More REFLEX models and the latest versions are on my page
http://time.hs-augsburg.de/~erd/Modellflug/textDownloads.shtml

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