40th-anniversary edition for REFLEX XTR

Kwik-Fli Mark III

world champion pattern model by Phil Kraft

In 1967, Phil Kraft was FAI pattern world champion flying his own design Kwik-Fli Mk III. Even though there were more elegant models, especially this one became famous, probably just for winning the world championship, and was built and enjoyed by many modelers all over the world.

Here is Phil Kraft showing the original world championship Kwik-Fli and - even more in the fore-ground - his own-design and -make radio. He pioneered proportional radio control and exploited the potential of this new technology with his own model designs. The Kwik-Fli has to be the end point of that stage in the evolution of R/C model flying when for the first time the equipment allowed full and real control of the model. It seems typical for Phil Kraft that he found the simplest and most efficient design to reach the goal.

Next to Phil Kraft may be Bill Northrop, back then M.A.N.'s R/C editor.

The Mark III was even quite elegant compared to the two earlier versions. These had a square horizontal tail with an undivided elevator. Thus, the vertical fin and rudder were quite small. Besides, the tail moment arm was quite short and the thrust line rather high. These things might be leftover from older design practice when only primitive R/C equipment was available and pattern ability was limited.

Anyway, Phil Kraft lowered the engine, elongated the tail moment arm by two inches, divided the elevator, and stretched the rudder down to the fuselage bottom. That made for some expense but it was worth it because pattern ability was noticeably enhanced. Both horizontal and vertical tail were distinctively tapered. This embellishment was at nearly no cost because the tail feathers are flat so their outline may be arbitrary.

On the other hand, the wing was built-up from ribs and spars and was most easily built square. Though sheeted foam core wings were already known in the 1960s they were still quite unusual. It would have been easy to build a tapered foam wing, but this might have been noticeably heavier than the built-up wing, especially due to the thick airfoil used for the Kwik-Fli. But maybe as well Phil Kraft simply disliked foam wings.

Obviously, he never found it worth the effort to build a tapered wing. Even though a Mark IV and V existed having one, he preferred the Mark III. Maybe he didn't need the small advantage of a tapered wing either because he was a brilliant pilot. But he used "barn-door" ailerons and not the easier-to-build strip ailerons. This may be again due to the thick airfoil because strips might be heavier, but again we don't really know.

Despite all his efficiency, Phil Kraft still cared much for good looks of his models if it was efficient and didn't affect usability. So he simply rounded the wing tips and the tail feather tips, which were nicely painted. The fuselage top was rounded but not the virtually invisible bottom. There was a nice canopy yet an ugly hatch in front of it because easy access to the tank and fuel lines was so important.

Net result was an attractive model that was able to fly the same patterns as the full-scale planes. It did it to perfection, at least in the hands of a good pilot. This required the new proportional R/C technology and some matching airframe design features. Kwik-Fli Mk III was an excellent and economical combination of all this, proven by placing first at national and international championships. It deservedly became famous, even if it's time was over very soon when technology advanced and pattern competition became more acrobatic and "ballistic".

For me, having the model in the simulator is reliving some of my youth when I just couldn't afford it. But the model is the prototype of a low-wing sport model even today – simple, easily built, good-looking, good pattern ability, honest flyer. It's just the most basic design of a pattern model. So it's a modern model as well and worth to be flown at least in the simulator.

Sources

Credits are due to all those who published something about the Kwik-Fli in the Web, may it be information, data, plans, pictures, or stories. Of course, you'll have to blame me for any errors, flaws, or misunderstandings.

The AMA biography of Phil Kraft says the Kwik-Fli Mk III article was published in 1965 by the Model Airplane News magazine. This must be a typographical error or a mistake because the article is listed in the correct chronological order and the magazine cover shown above is from February 1968. See the AMA biography.

The 1968 publication is confirmed in the Vintage R/C Society's planes list.

There is a discussion about history of "Classic Pattern" at RC Universe where especially post #20 describes the evolution of pattern designs.

The kits by Jensen, Top Flite, and Graupner are out of production for a long time, though the plans are still available from Model Airplane News magazine (under RC Store-Plans-Planes-Sport-page 3).

There's a reproduction of the original Kwik-Fli Mk III available as short or full kit by Home and Hobby Solutions, Inc. in the USA, and here's a discussion with the kit manufacturer. One of their customers has a build page.

A build thread concerning the Home and Hobby Solutions kit in the "Classic Pattern" forum at RC Universe has also general information about Kwik-Fli.

Howard Engineering produced a modified Kwik Fli III. It featured tapered foam wing, fiberglass fuselage, some other modifications, and retracts. There's a very informative build thread in the "Classic Pattern" forum at RC Universe, containing much general information about Kwik-Fli (and the MAN magazine cover shown above).

In the "Classic Pattern" forum at RC Universe was a comparison of the "Top Flite Kwik Fli vs Graupner Kwik Fli".

Recently, Graupner brought out a Kwik Fly Mk3 (as they spell it) again, but as an "enhanced" ARF. In the "Classic Pattern" forum at RC Universe are comments on it.

In the "Vintage & Antique RC" forum at RC Universe was a comparison of the "Top Flite Taurus or Graupner Kwik Fli" with a characterization of the Kwik-Fli in post #7.

People may think differently about "Uncle Willie" and his website. But undoubtedly one of his merits is to present images of original plans on his site http://myunclewilliestoo.com/, though I found the Kwik-Fli plan only in one of his eBay offerings. Anyway, it was of paramount importance for this project as it made it at all possible to render the model in REFLEX.

Take a look at Vintage R/C Society's pages about pattern sequences and maneuver discriptions to find a typical pattern program for the Kwik-Fli.

Eric D. Wildermuth from Brisbane, Australia, kindly provided scanned images of an article about Kwik-Fli Mark II in the 1965 RC MODELER magazine, of a Mark III plan in the May 1968 Aeromodeller magazine, as well as a short description of the Mark IV from another magazine. Thank you very much!

There's a nostalgia website showing several old Graupner models including the Kwik Fly Mk3. The site is in German language but anyway you will find the pictures most interesting, especially the construction pictures. There are even a three-view drawing and an exploded drawing.

The RCM magazine website still has several old articles for download. There was a series of articles on "Precision Pattern Design" where Kwik-Fli Mark II is explicitly mentioned several times. Modifications suggested there were applied to it giving the Mark III, though independent from these articles. Long winded but good read, see at bottom of feature articles page. (Click "Login", enter the user ID and password given there, and click the "Log In" button. Search for the link "Requested Articles" and there click "FEATURES".)

The Radio Control Hall of Fame has several pictures of Phil Kraft and his models, especially several photos shot in Corsica during the 1967 FAI World Championship. Well worth a look!

Contributions

These contributions were involuntarily, I simply borrowed some hard-to-get components of the REFLEX model from other authors. At least they should be given credit here:

There was an Enya .60 engine on the original Kwik-Fli Mk III, but there is no such engine model for REFLEX. Bo (Jörgen) Strömberg from Sweden made a Veco engine for his excellent Graupner Taxi for REFLEX XTR. He published it on RC-Sim (see here) in August 2005 and later granted permission to use the engine model. Thank you very much! The engine is enlarged a bit to mimic a .60 on the Kwik-Fli.

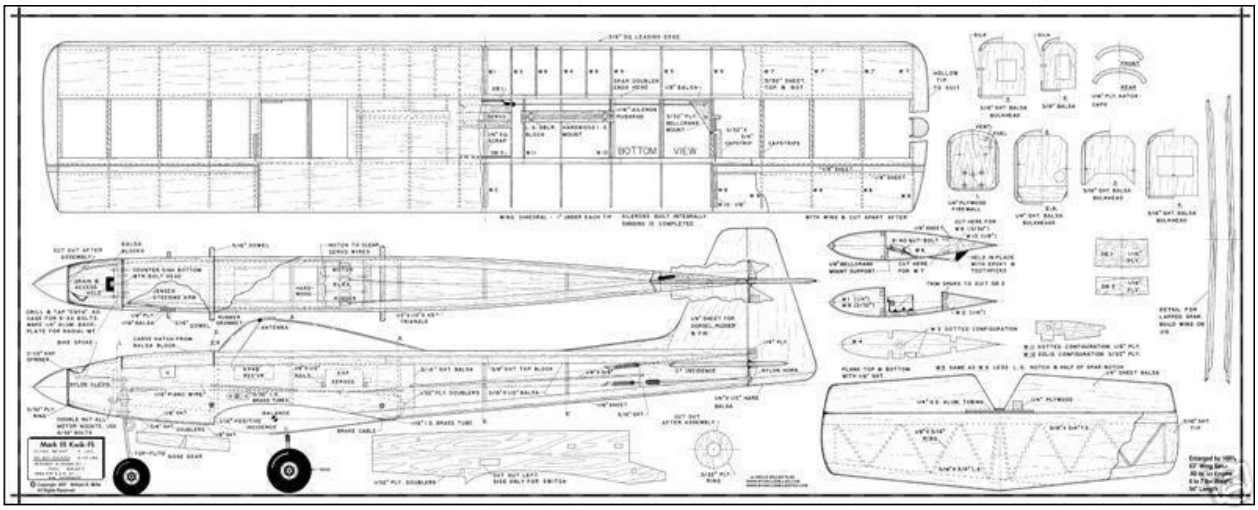
The propeller is a wooden Master Airscrew that fits the old model. Prop size in the visual model is 11" diameter and 7" pitch. The texture was borrowed from one of the many Internet shops.

The wheel textures are borrowed from REFLEX.

The engine sounds were borrowed from Thomas Hanser (see his models on http://www.rc-sim.com/) who published them with his Westerly and Extra models on RC-Sim. I don't know whether he recorded the sounds and from what models, and I think he will not mind that they're used for the Kwik-Fli. The idle sounds are the same, only the full power sounds are different, the louder one used for the original version and the quieter one for the model with a muffler.

Shape and Appearance

Since I intended to revive the original in the first place I bought the old plan from the well-known German publisher vth. Unfortunately, the plan shows mainly the Mark I and II. The Mark III version is only additionally drawn with dashed lines and the wingspan seems too big. An Internet search gave an explicit Mark III plan in an eBay offer of Uncle Willie's.

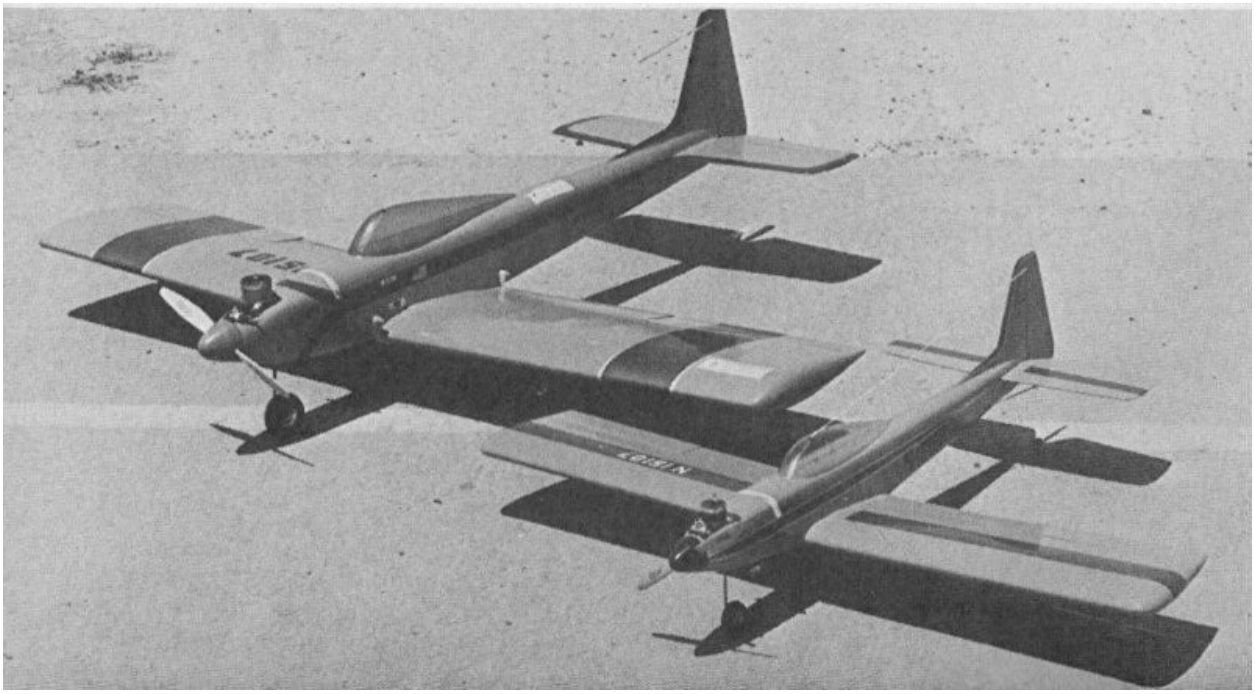


It's so small that it's just sufficient for modeling in the REFLEX model builder program RMK, but it seems trustworthy because it confirms some dimension data. For instance, if the wing chord is assumed as 11" (Phil Kraft obviously loved nice round numbers) the wingspan comes to 60" what should be correct. Anyway, the REFLEX model is now built using a plan and side view made from this plan. The correct dimensions were later taken from the plan M.A.N. 76A scanned by Eric Wildermuth from a magazine and shown three pages below.

The shape of a model in REFLEX is made of polygons. Much polygons and work were spent on the ribs-and-spar structure of the wing. Viewing from certain angles, you'll see the wing covering denting between the ribs and sheeting. You'll have to keep some viewing distance, or the wing will look a bit angular and awkward.

Adequate to this viewing distance, details were applied to the raw body of the model. These are control horns and linkages, mounting dowels and rubber bands for wing and nose hatch, the main landing gear locks, and the antenna. The landing gear is fully detailed and working like the real one.

The paint scheme was made as close as possible to the original one. The only source was the magazine cover shown above. Later someone presented two pictures from the October 1968 issue of Model Airplane News magazine on RC Universe. They show the original Mark III compared to the Flea Fli, a .20-sized version of the Kwik-Fli. Now the geometry of the paint scheme is quite clear. The FAI stickers are still on wing and fuselage.



Still there's nothing known about the model's bottom and little about the colors (see this post on RC Universe). But I think the REFLEX model's overall look is very similar to that of the original.

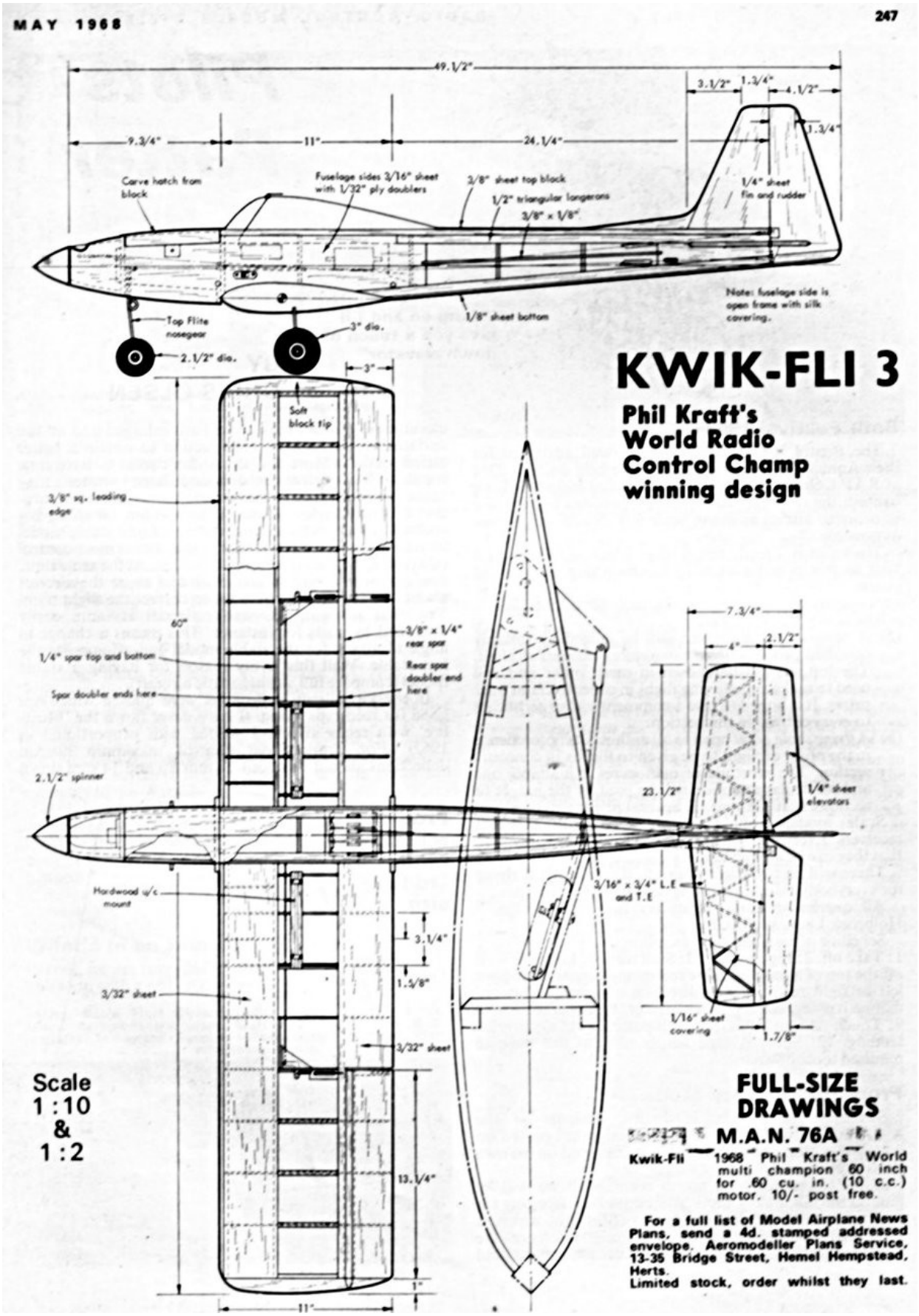
Setup

The old proportional radios were no computer radios and had neither expo nor aileron differential. Things today being a radio setting were in the old days possible only by properly arranging the control linkages of the model.

Phil Kraft produced and used servos with linear actuators (not the rotary horns of today's servos). Of course, the control horns are rotating around the control axis. Thus, linkage geometry makes for some expo effect. The rotary control deflection increases progressively faster from neutral to end than the linear servo movement. In REFLEX, this is imitated by a – guessed – expo setting.

In the wing, only one servo was used and linked to the ailerons by spanwise pushrods, 90-degrees horns and pushrods back to the control horns. These were not perpendicular to the pushrod. Instead, the linkage point on the control horn was a bit behind the aileron axis. That gave a nonlinear differential, which is approximated in REFLEX by an estimated 10% linear setting.

The control deflections are chosen differently. The article accompanying the German plan mentions a certain aileron deflection to be correct and sufficient. The deflection given in millimeters converts to about 11 degrees. Assuming 10% differential, that makes for 11 degrees up and 10 degrees down deflection. That is really sufficient for this kind of model (for three rolls in five seconds), even though it may not meet everybody's expectations.


49.1/2"
3.1/2"
1.3/4"
4.1/2"
1.3/4"
9.3/4"
11"
24.1/4"
Carve hatch from block
Fuselage sides 3/16" sheet with 1/32" ply doublers
2/8" sheet top block
1/2" triangular longerons
3/8" x 1/8"
1/4" sheet fin and rudder
Note: fuselage side is open frame with silk covering.
1/8" sheet bottom
Top Flite nosegear
3" dia.
2.1/2" dia.
3"
Soft block tip
3/8" sq. leading edge
60"
1/4" spar top and bottom
Spar doubler ends here
3/8" x 1/4" rear spar
Rear spar doubler end here
2.1/2" spinner
Hardwood u/c mount
3/32" sheet
3.1/4"
1.5/8"
3/32" sheet
13.1/4"
1"
11"
7.3/4"
4"
2.1/2"
23.1/2"
1/4" sheet elevators
3/16" x 3/4" L.E and T.E
1/16" sheet covering
1.7/8"
KWIK-FLI 3
Phil Kraft's World Radio Control Champ winning design
Scale 1:10 & 1:2
FULL-SIZE DRAWINGS
M.A.N. 76A
Kwik-Fli 1968 Phil Kraft's World multi champion 60 inch for .60 cu. in. (10 c.c.) motor. 10/- post free.
For a full list of Model Airplane News Plans, send a 4d. stamped addressed envelope. Aeromodeller Plans Service, 13-35 Bridge Street, Hemel Hempstead, Herts.
Limited stock, order whilst they last.

There were no recommendations for rudder and elevator, but rudder deflection is limited to 30 degrees by the cutout of the elevator. So I simply set both rudder and elevator deflections to this value what as well seemed to be adequate. You'll need all rudder effect you can get, and 30 degrees elevator reliably enable spins and snaps to be done. But after knowing data extracted from the Graupner plans (RC Universe post) and comparing the control horn pushrod positions in the original plan, I reduced elevator to 25 degrees.

Phil Kraft took special measures to avoid any play in the control linkages. Though I only know of special bearings for the aileron bellcranks, I set zero play for all controls. 1% play showed little but still noticeable swaying.

The model's weight is simply set to 6 lb following a recommendation in one of the web pages on the Kwik-Fli. The article accompanying the German plan even says the model should be extremely lightweight. The web page says maximum should be 6.5 lb.

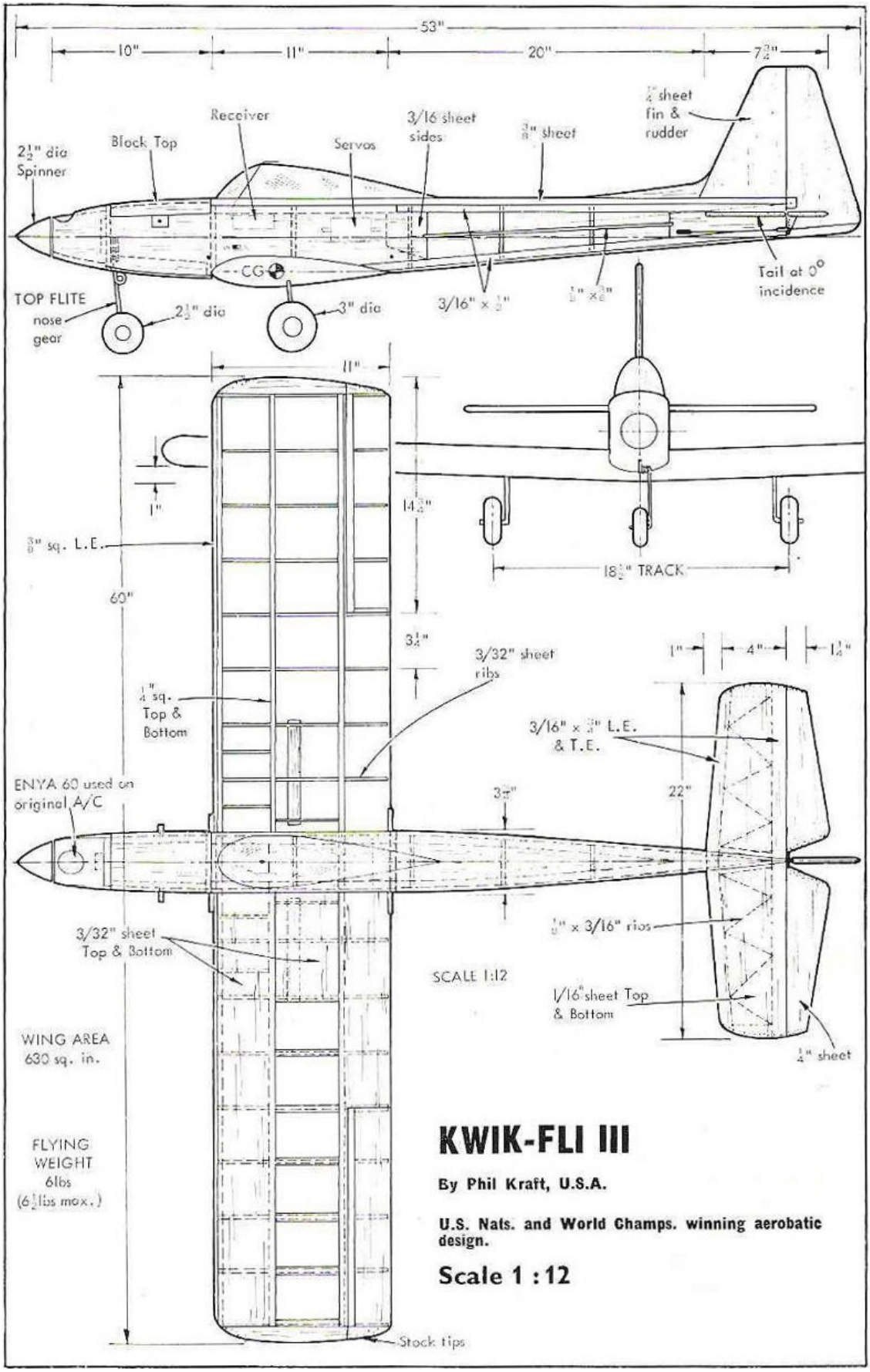
The drive settings are based on power and torque measurements published in an older German book. It seemed suitable to assume a .60 OS engine and an 11x7" propeller. Following a strong recommendation in the article accompanying the German plan, no engine down thrust and right thrust were set.

There is a recommendation for some decalage, though. The wing's leading edge should be 1.5 to 2 mm higher than the trailing edge what converts to 0.3 to 0.4 degrees positive angle-of-incidence. This compensates for a small part for the landing gear's drag and for the most part for a quite forward position of the center-of-gravity (C/G). The RC MODELER article even says 3/32" what converts to 0.5 degrees. So it was set to this value what gives neutral trim upright but requires down elevator inverted.

The C/G is set as shown in the plan, what means 4" / 102 mm behind the wing's leading edge. Blaine Beron-Rawdon's Plane Geometry spreadsheets compute 13.5% static margin what is quite big for a pattern competition model. By the way, static margin is the distance between C/G and neutral point compared to the wing chord. The model would behave nicely also with 5% or even less, but the big static margin means much stability.

To compare a less stable, crisper flight behavior, an alternative setup with 3.5% static margin and only 0.16 degrees decalage was added. It is nearly neutral both in upright flight and inverted. It might need down elevator when taxiing, but such a trim "on the main wheels" seems to be not uncommon.

We don't know which setup Phil Kraft used for the world championship. It's possible that he liked the neutral behavior and recommended the stable setup as more suitable to pilots less talented than him. But it's as well possible that he used the stable setup because it desensitized the model to servo inaccuracies (as this post on RC Universe suggests). Anyway, the stable, forward C/G setup is now the "Mark III original" version in REFLEX while the neutral setup is the "Mark III crisp" version.


53"
10"
11"
20"
7½"
Receiver
Block Top
Servos
3/16 sheet sides
⅜" sheet
¼" sheet fin & rudder
2½" dia Spinner
CG
TOP FLITE nose gear
2½" dia
3" dia
3/16" x ½"
Tail at 0° incidence
11"
1"
14¾"
⅜" sq. L.E.
60"
18½" TRACK
3¼"
3/32" sheet ribs
¼" sq. Top & Bottom
1"
4"
1¼"
3/16" x ⅜" L.E. & T.E.
ENYA 60 used on original A/C
3½"
22"
3/32" sheet Top & Bottom
⅛" x 3/16" rios
SCALE 1:12
1/16" sheet Top & Bottom
¼" sheet
WING AREA 630 sq. in.
FLYING WEIGHT 6lbs (6½lbs max.)
Stock tips
KWIK-FLI III
By Phil Kraft, U.S.A.
U.S. Nats. and World Champs. winning aerobatic design.
Scale 1 : 12

Flight Behavior

As usual, I took the geometry from the plan and put it into Blaine Beron-Rawdon's excellent Plane Geometry spreadsheets (see his website) to get most of the physical parameters. The airfoil and wing coefficients were calculated in an own spreadsheet. All calculated values and the C/G position from the plan were simply transferred to REFLEX – and the model worked right away. This is another case where no tweaking or fudging was needed.

Some plausible assumptions had to be made for the airfoil. The one shown in the plan has approximately 18% thickness but is not a NACA 0018, which has a rather blunt leading edge. The most similar airfoil for which I have German low-Re measurements is Eppler E 169. Its thickness is only 14.4% but I projected the coefficients for analogy.

Ignore the nice guy on the picture; pay attention to the wing's leading edge. It seems to be especially sharpened, most likely for better spin and flick performance. It might just be a reflex but at least it's not a standard NACA 0019 noted for its blunt leading edge. The plan above shows a noticeably sharper leading edge. Anyway, the E 169 airfoil used for the simulator model shows an adequate stall behavior.

The above-mentioned article says Phil Kraft had a second model with thinner airfoil (the Bar-Fli, see below), which he had used if there had been more wind during the world championship. Kwik-Fli Mk III is a light-wind, light-weight model that flies patterns at moderate speed. It is built to be light-weight and not to be slick and have low drag. Nevertheless, it already gives an idea of the later development to "ballistic" pattern flying.

The wing's aspect ratio is rather small (5.3), thus wing area rather big and wing loading low. This makes for good slow-flight capabilities, particularly because induced drag will be high at slow speed – no flaps needed, neither as lift enhancers nor as brakes. Induced angle-of-attack (AOA) is big, making the model quite insensitive to pitch changes.

Due to the square planform, no tip stall and no inadvertent stall at all will occur. On the other hand, the airfoil justifies a reasonable stall setting in the airfoil parameters. The model will spin using the classical competition entry into spin. It will even snap when full rudder and a bit aileron in the same direction are used, of course in addition to full elevator.

Due to the small deflections and maybe the small differential of the ailerons, there's virtually no adverse yaw. The model is smooth on aileron and doesn't yaw in rolls. Though the vertical stab is rather high above the longitudinal axis, there's surprisingly little yaw-to-roll coupling. In knife-edge flight, only a bit top aileron and up elevator are needed. There's also much directional stability and smoothness, presumably due to the long tail moment arm and the 2 degrees dihedral. It's just a joy to fly classic aerobatics with this plane.

This behavior is what I would expect of a model having Kwik-Fli's geometry. REFLEX is amazing because it credibly renders all this flight behavior. I think Kwik-Fli is just the type of model REFLEX was initially made for – more than 15 years ago. And that's why I think this rendering is quite realistic – though I don't know for sure, of course.

Tapered Wing

Californian hobby store proprietor Larry Leonard won both Formula 1 pylon racing and Aerobatics at this year's U.S. Nationals.

The model which he used in the aerobatic event was a modified version of Phil Kraft's famous Kwik-Fli, currently one of the most popular multi designs, particularly since it is available in kit form. Larry Leonard's Kwik-Fli features a tapered wing, a mod. which was in fact designed by Phil. The new wing, which has a 4:3 taper ratio, has a 20 per cent thick root section, slimming to 15 per cent at the tip, improving the aircraft's performance for 'snap' or flick manoeuvres which are a feature of the current U.S. aerobatic schedule.

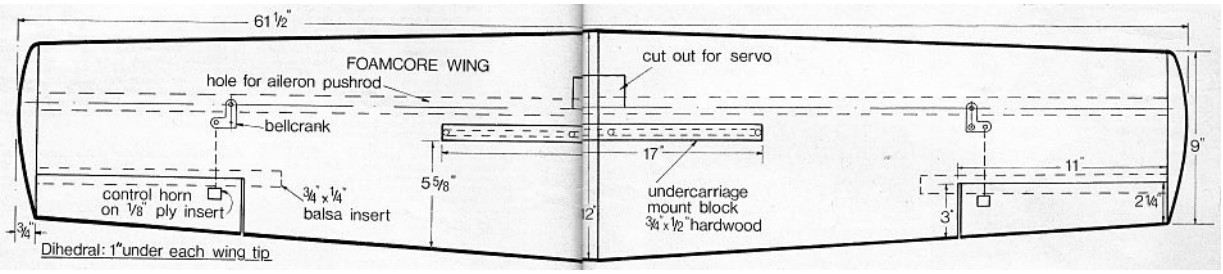
Larry's model used a foam core type wing, but for modellers who wish to duplicate the new wing using conventional construction techniques, it should not be difficult to apply the structure of the straight wing Kwik-Fli 3 on to the new layout. The only modification required to bring a Kwik-Fli 3 up to the Mark 4 standard is in fact the new wing, apart from allowing for the slightly increased wing chord at the fuselage wing seat.

Phil Kraft himself tried out tapered-wing versions of the Kwik-Fli, actually called the Mark IV. But he didn't find it worth the effort to build it and just didn't like it, so he stuck to the square-wing Mark III. But others found it easy to build a tapered wing from balsa sheeted foam cores and preferred the better snap-ability of the Mark IV. After all, more snap (flick) maneuvers were added to the competition aerobatic schedule.

The Mark IV was simply a Mark III with a different wing. On the other hand, this wing was a simple variant of the square wing. Just this modification and replacement has been duplicated in REFLEX with another paint scheme traditionally used for the Kwik-Fli (see picture above).

As usual and as for the basic design (see plan 5 pages above), Phil Kraft chose nice round numbers: 12" root chord and 9" tip chord giving a 0.75 taper ratio. The airfoil was modified as well by slimming a 20% thick root to a 15% thick tip. The 60" wingspan exclusive wingtips gave almost as much wing area as the 58x11" square wing. The ailerons got smaller, though, and require a bit more deflection.

Some dihedral is gotten by leaving 1" room under each wing tip at the 30" half-span point. This converts to 1 degree dihedral what gives 2 degrees at the wing bottom and a straight wing top. This layout was typical for most of the tapered-wing pattern designs coming later. On the other hand, the 1"-room-under-the-wingtips recommendation applied also to the Mark III and already to the Mark II. In these cases, 1" at the 29" half-span point converts to 2 degrees dihedral. There's no difference in directional stability, though, maybe because the only 1 degree dihedral of the Mark IV is complemented by 1 degree sweep of the wing (2.4 degrees at the leading edge).



The only real change in flight behavior is better flick performance, though really better only with the "crisp" balance. Whereas Mark III is hard to flick especially to the right, Mark IV flicks easily at nearly any flight speed using only elevator and rudder (the old-school method). It may even flick with elevator only, but one has to really snap it to full deflection to accomplish that. Thus the model is still not vicious and is actually the better version.

Obviously, Phil Kraft didn't think so. As reported in this post on RC Universe, he tried even two variants, this one (Mark IV) and another one with constant airfoil thickness (maybe called the Mark V). This one was the best, but both variants had less drag than the Mark III and therefore were not as constant-speed in patterns. Besides, Phil Kraft found them touchy around neutral on the ailerons. It's clear that he disliked both peculiarities because he was known for his smooth and elegant flying style.

The Mark IV REFLEX model has less roll moment-of-inertia and roll damping and more aileron effect than the Mark III model. There's little difference in flight behavior, at least in the simulator. But it is noticeable and may be enough to disappoint a choosy pilot.

Enhancement

The name Kwik-Fli doesn't mean a fast flying airplane but a model that is quickly built and thus flying soon. As a matter of fact, Kwik-Fli is a slow flying plane with it's thick airfoil, boxy shape, and low weight. The simple design actually contributes to the low weight and thus the good flight characteristics. A fixed landing gear matches this design because it weighs not much and the drag doesn't matter. Besides, it's simple and robust.

On the other hand, Phil Kraft produced retractable landing gears and even used one for the Kwik-Fli Mark III, even though it may seem inappropriate. Pattern flying developed to heavier and faster models and he had to stay competitive. In the late 1960s, more powerful .60 engines came out, which were bigger and heavier, though, and had a muffler which was required at contests. Both engine and retracts made for some weight, but that was now even welcome for the faster flying style since the models were smoother in gusty wind and did better spin and snap maneuvers.

Phil Kraft experimented with new model designs, beginning 1969 with the Slik-Fli. It featured a tall fuselage like the Bar-Fli (see below), a swept wing with straight trailing edge, and what is called snap-flap today. The next design, Dragon Fli, kept the tall fuselage but reverted to the unswept wing of Kwik-Fli Mk IV, and had retracts. Finally, the Fire-Fli reverted to a slender and now rounded fuselage and was used at the 1971 world championship.

At least till then Phil Kraft obviously flew a Kwik-Fli Mk III at contests (e.g. here, even with wing fillets), just turned into an up-to-date pattern ship in his typical, simplistic own way. The picture above (posted at RC Universe, source unknown now) shows him with a rather straight Mark III. The canopy has been omitted, maybe to avoid the "Kwik-Fli dance" (see below) and/or to lower drag. The engine is a newer one with a flow-through muffler, and there are retracts. Only the fuselage nose is obviously modified.

There has been made room for the slightly longer engine, and the nose had to be made taller to accommodate the nose landing gear. By making the bottom lower, a shorter landing gear leg could be used that fits in front of the wing when retracted. Still the nose wheel is so big that the tank had to be set higher, so the hatch runs now horizontally and not sloped like on a standard Mk III. Supposedly, the model's weight is considerably higher, so even 7 lbs are assumed for the REFLEX model. The engine is assumed to have (typically) 1.25 hp and spin a customary 11x7" propeller. That makes for decent flight speed but still gives a very good 0.87 thrust/weight ratio.

It's really a different model now, but the typical Kwik-Fli smoothness is retained. It's just considerably more powerful, flies big round patterns, and does even reverse spins as well as old-school snap rolls (flown without ailerons), even though only to the left. It seems to be a typical Kwik-Fli asset that snap rolls are "clean", meaning they are easily and cosistently stopped at the right point and end with the same attitude as they were begun with. With the higher wing loading, landings are not as easy as before but not really hard, either. The "Mark III enhanced" version is balanced neutrally

because to me a stable balance would make little sense. It would detract from the spin and snap performance of this heavier square-wing version.

To me it seems that Phil Kraft was just very fond of the Kwik-Fli wing design. In his articles about his newer designs he's lamenting about several draw-backs of tapered wings, especially swept ones, unprecise ailerons, and more. In the early 1970s, the new flying style required new designs, though. Maybe it was just his flying style which was no longer up to date.

Retractable Landing Gear

In the first place, I didn't believe that Phil Kraft used retracts on a Kwik-Fli, but I wondered what the newer, more powerful engines and retracts would make out of the Kwik-Fli design. So I just tried it in the simulator for both wing versions. That went to show that the "Mark III retracts" version is a quite different model, as is the "Mark IV retracts" version with tapered wing.

The retract mechanism makes for some weight and delicacy. The landing gear is prone to damage so the model should be flown from paved runways. The increased weight gives higher landing speed and the retracts should give higher flight speed. Unfortunately, the increase in flight speed is rather low.

It's anyway assumed that this is a 1970s version. Therefore, a quite powerful engine is spinning an 11x8" (higher-pitch) propeller. Overall weight is 6.5 lb, which is the recommended maximum. It's supposed that the 1970s R/C gear was lighter than the 1960s proportional gear, so that partly compensates the additional weight of the retractable landing gear and the muffler.

The engine is side-mounted for better looks and to have the carburetor and the tank level. It's slanted 30 degrees upward, though, to have the exhaust and the muffler beside the fuselage. Matching the sleek look of the model with side-mounted engine and retracted landing gear, a different livery was applied. It's still a paint scheme traditionally used for the Kwik-Fli, though, and I even stuck to the orange and dark blue colors. I only beveled the inner ends of the stripes on wings and horizontal tail and put a big Roman 3 or 4 on the vertical tail. All dowels and rubber bands were omitted because they were replaced by snap-on mechanisms and bolts or CamLocks in the 1970s.

The center-of-gravity was moved further backward to have only 2.0% static margin. Together with only 0.05 degrees decalage, this makes for a completely neutral longitudinal balance meaning the model will fly where you point it. The main landing gear was moved backward a bit as well, so the model will stay level on the ground but still take-off easily. That's all quite the same for the square wings and the tapered wings version.

Even though there's not really much changed in the "Mark III retracts" and "Mark IV retracts" versions compared to the "Mark III crisp", these are just considerably more powerful, sleeker, and faster airplanes. You may knock them around just for fun without risk because they are still not vicious. But you may just as well fly serious aerobatics, both upright and inverted, and even do snap rolls the old-school method only with elevator and rudder and without ailerons (though ailerons still help especially with the square wings). This version already gives an idea of the even sleeker and faster pattern ships which came after the Kwik-Fli.

Progress

The evolution of pattern model design was influenced by changing flying style and vice versa. Both were driven by progress in technology. The new proportional R/C got better and better and, above all, had less weight. The engines got more powerful at the same weight and even stayed as powerful as before when mufflers were needed and added some weight. So competition pattern style developed from constant low speed flying to constant high speed flying and the patterns became big and round.

The models had to be faster and more powerful than before, even at the cost of considerably more weight. The airframe had to be sturdier what made for some added weight, and a retractable landing gear for low drag and high speed as well contributed to the weight. The combination of high speed and high weight might explain the term "ballistic pattern", but of course it means mainly the fast and jet-like flying style.

The Kwik-Fli was not at all a ballistic pattern ship but instead a sample of the older constant low speed model. But quite small modifications would make sort of a "rocket" pattern ship of it, at least nearly. These modifications were done to the REFLEX XTR model in two steps.

The first step was to put a Graupner/O.S. 49-PI rotary engine on it, which weighs only 395 g / 13.9 oz including muffler and mount. Of course, the Mark IV with retracts was chosen for it's low drag. The engine is able to take it to high speed because it may perform up to 2 hp at up to 20000 rpm if a hot fuel is used. It's low weight and small diameter are important as well. For more information about this engine see my article on Das Ugly Stik.

Using such a rotary engine in reality might be a real pain, and it wouldn't last long operated at high power, but that's both irrelevant in the simulator. The really used conventional .61 engines with tuned pipes were powerful but also quite heavy – too heavy for the Kwik-Fli. The rotary engine is just a simple and adequate (and even realistic) solution.

The engine fits well into the fuselage's cross section. With a nicely rounded cowl the model's drag is lower than before and engine cooling should still be enough. Now also wing fairings just had to be applied because the fuselage-wing crossing is definitely a source of strong turbulence. So all major drag sources, except the thick wing, are eliminated.

The overall weight could be lower as well, but what the engine is lighter than a normal .61 is used to "beef up" the model. Otherwise, flick maneuvers at high speed would damage it. Whereas the former versions are set up for a 15 maximum-g factor, the new version needs 20 and thus has the same weight as the previous ones.

Despite the small low-pitch 9x6" propeller, the high engine rpm makes for high flight speed. Pattern flying already looks quite "ballistic" though it could still be faster. The thick wing airfoil prevents the model from being really "ballistic", but at least it makes landings still quite practicable. This version was simply called "Mark IV rotary" in REFLEX XTR.

So there's one important modification left. The model has to be equipped with a thinner wing. The planform was left unchanged but different airfoils were assumed, instead of 20% to 15% from root to tip now 15% to 10%. As an average, the 12.4% thick Eppler E 168 was used to choose realistic coef-ficients. Though this is still not really thin, it gives somewhat lower drag and a really "ballistic" model, now even called "Mark V rocket" in REFLEX XTR.

Now the model is already quite hard to land even on long runways. With the retractable landing gear, only paved runways are suitable. Though pattern competition pilots could handle that, it was still important to make landings easy. After all, take-off and landing belonged to the competition schedule.

So models were equipped with speed brakes or flaps for glide angle control to facilitate spot landings. Unfortunately, in the newer versions of REFLEX XTR the coefficients for flaps and ailerons are the same, so it's not possible to give them different characteristics. Therefore, the "rocket" Kwik-Fli has no spoilers but normal flaps, which give lower approach speed due to more lift and a steeper approach due to much drag at 45 degrees deflection.

Unfortunately, the flaps themselves and the servo and linkage make for some weight, so overall weight is now set to even 7 lb. But they are real "barn doors" and have a huge effect. You may fly small traffic patterns and steep landing approaches and touch down "on the spot". Landing is something like with the original version, but the flaps make for a lower angle-of-attack what is quite pleasant. You don't have to use the flaps, but they are there just in case you would like to use them, and I think you will like them.

This "rocket" version now really should be the final step in the modification of the Kwik-Fli. Later models had swept wings, real airfoils for the tail feathers, lower vertical tail, anhedral horizontal tail, and fuselages with large forward side area for knife-edge flying. The next milestone in the evolution probably is the Curare with which Hanno Prettner won the 1977 world championship. Both Hanno and the Curare became world-famous like Phil Kraft and the Kwik-Fli, so I should better build the Curare for REFLEX XTR. But this "rocket" Kwik-Fli version somewhat bridges the 10 years of development between both models.

By the way, I didn't invent the paint scheme, I just borrowed it. It is quite common for the Zlin Z-526 AFS, which has similar lines. It fits the Kwik-Fli with only minor adjustments and looks pretty dynamic in blue and especially in red. The registrations are those of the two Cessna C206 Turbine I was very fond of 20 years ago. They just give me a warm memory.

I called the tapered-wing variant with retracts and rotary engine the Mark IV and put a big "4" on it's nose. That's justified because Phil Kraft himself designed and named it. But naming the thin-wing variant the Mark V and putting a "5" on it's nose is completely unauthorized. What Phil Kraft would have thought?

Today

Today, a good sport model looks the same as in the 1970s, but it should have an electric drive. That saves much trouble unavoidable when using glow engines. Powerful electric drives are still a bit heavy, and they give a reasonable flight time only due to their efficiency. Outrunner electric motors are spinning large propellers at low rpm, so thrust is big but at low flight speed. However, just that matches the original Kwik-Fli design.

The model was an extreme lightweight to fly at slow speed. So some boxy shape and a tricycle landing gear didn't hurt but on the contrary contributed to the low weight. Much drag was good for constant slow flight speed, which is also why the wing airfoil was very thick (18%, or 20% to 15% tapered).

Even the tapered-wing Mark IV is not vicious, though it is not for the rank beginner. But an owner and pilot of a low-wing sport model should be able to handle it and would appreciate its flick performance, so it was made the "Mark IV electric" version in REFLEX XTR.

The customary AXI 4120/14 brushless outrunner motor with a 6000 mAh 5s2p LiPo battery spins a 12x8" APC Sport propeller, as recommended by Model Motors for aerobatic models. The overall weight of this drive should be 1250 g / 44.1 oz. This is a bit more than the weight of an old .60 drive, but instead the modern R/C components are lighter than the old ones. So the overall weight of the model is assumed to be nearly the same as that of the "Mark IV original" version.

Of course, low flight speed is still much more than parkflyer speed (in fact four times as much). But the model will gently and vividly go through any classic aerobatic maneuver. The 10 minutes flight time should be enough for a decent pattern sequence. This configuration is so good that it makes no sense to build a variant with thin wing, flaps, and retracts. Flight speed would be only less than 10% higher but weight and trouble more than that.

Again, the paint scheme is one used for the Zlin Z-526 AFS. And again, the registration is one of those two Cessna C206 Turbine (after re-registration) I flew 20 years ago. The model just needed an engine cowl, wing fairings, and a canopy rim for less drag and better looks.

Nostalgia

It must have been a lucky chance for Graupner: a model that everybody wants to have because it was world champion, that is still so well-behaved that everybody is able to handle it, and that is even easy to build. They immediately seized this opportunity and brought out their kit version as soon as to the Feb. 1968 Nuremberg toy fair (see their 75th anniversary website).

Recently, Graupner re-released the Kwik-Fli Mk III (or KWIK FLY MK3 as they spell it), but as an "enhanced" version with a modern engine, hidden in a cowl, and a tall retractable landing gear for good ground clearance and less drag and clean look in the air. The paint scheme was somewhat modernized.

I think the "old" Kwik-Fli fans won't like this new version and would prefer the old one, brought out 1968. So do I, and so I made this "nostalgia" version for REFLEX XTR (I just had to). Someone presented the photo shown below on RC Universe (Web links see above). It shows the Kwik-Fli picture page of a 1975 Graupner catalog with enough detail to copy the model.

These are the pages we looked at over and over again when we were young and couldn't afford the model and especially the proportional R/C equipment. Of course, these pages were well-thumbed and not those that showed the beginner models for 4-channel reed equipment. Now for us a dream comes true – virtually.

This is the page from an old Graupner catalog.

And here is the REFLEX model:

Tell the difference! The (old) Graupner logo behind the spinner was intentionally omitted because I couldn't find a graphics file in the Web (and was too lazy to draw it) and because I think it's ugly at least on the left fuselage side and I don't like such advertising on models either. For quite a while, I wondered what the symbol on the fin might be. Eventually, there was a picture in an eBay offer large enough to show it. Again, the Graupner logo was omitted.

The engine is not the O.S. H60F-GP "Gold Head" as well brought out 1968. Both model and engine were boosted as top-notch until 1974 when the O.S. H60F-GR "Black Head" or the even more powerful 60F-SR replaced the Gold Head. I especially bought an old O.S. 60F-SR to render it in REFLEX. It got a Graupner 11x7" Super Nylon propeller on the Kwik-Fli. Unfortunately, I have not the sound of this drive but only the one mentioned above.

The model is so dressed up that I think Graupner had designers to find an effective paint scheme. On the other hand, they took the liberty to improve the kit compared to the original. I rendered the white wheel rims (dressed up) as well as the double-sided nose landing gear (improved).

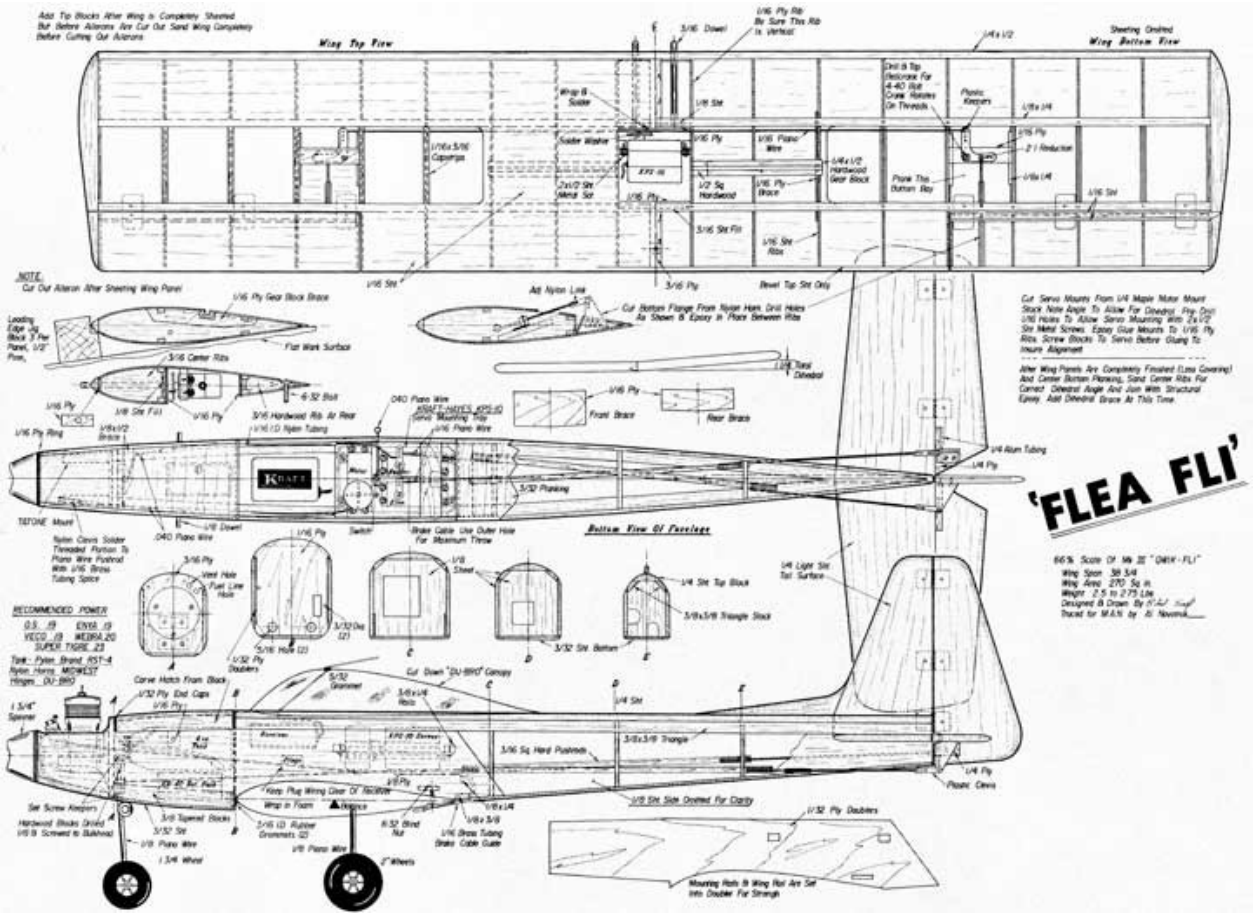
Flight behavior of this "Graupner KWIK FLY MK3" version in REFLEX XTR is simply like the somewhat heavier but more powerful "Mark III retracts" version but with fixed landing gear and re-balanced for neutral flight. The propeller is a customary 11x7" and not an 11x8".

Reduction

Phil Kraft proudly presented a scaled-down (0.66) version of the Mark III – the Flea Fli (see pictures on page 6 above). It's quite close to the original and has even the same wing loading. Engine is not a .40, though, but a .20 which is not as powerful for the Flea as the .60 for the original but still quite sufficient for the 2.5 to 2.75 lb weight.

The geometry is nearly exactly scaled down. The dowels and rubber bands for the wing were replaced by leading-edge dowels and trailing-edge bolts. The control horns for rudder and elevator are rather big to fit the still quite big servos that Phil Kraft produced in the 1960s.

The REFLEX model is painted like the model Phil Kraft shows on the pictures above. These are borrowed from a thread on RC Universe as well as the plan shown below (whole article in this build thread).



The plan suggests .19 to .23 engines, and I assumed an O.S. MAX .19 just because I still own such an old mill. With an 8x6" propeller this would give a rather small 0.55 thrust/weight ratio compared to 0.8 of Mark III. But the flight speed is only a bit lower and quite right for the Flea. It just takes some time to reach full speed and you'll need constant full power for aerobatics.

Of course, the Flea seems to fly faster and swifter due to its smaller size (39" wingspan), but you will still notice the typical smooth flight characteristics.

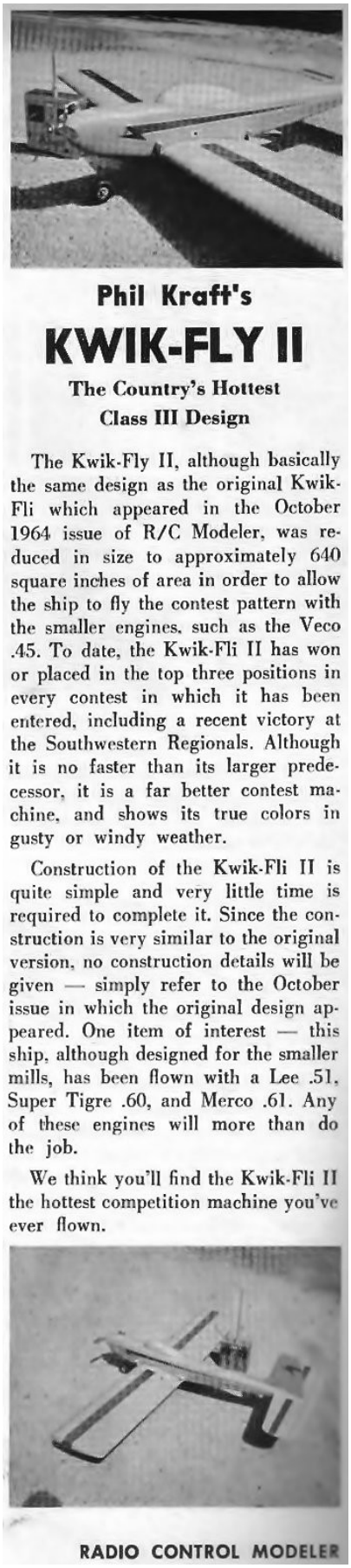
History

Of course, the predecessors of the Mark III were Mark II and Mark I, but what's the difference and what is better on Mark III? Let's work back in the line of ancestors.

There was a Mark II build article in the April 1965 issue of the RADIO CONTROL MODELER magazine, only a short while after the initial Mark I article in the October 1964 RCM issue. I've got only parts of both articles, but it seems that indeed the Mark II followed soon. Mark I was an initial design with emphasis on quick building (hence the model's name) and it was quite big (66 x 12 in wing) for use with the old .60 engines. Mark II got an embellished, tapered stabilizer while the Mark I stabilizer was square like the wing. But above all, Mark II was a slightly smaller version (60 x 11 in wing) for use with .45 engines. Mark II is said to be a better contest machine due to its smaller size and the same wing loading, but obviously not a .45 but a .60 engine soon got standard probably because stronger flies better (sort of).

To match the smaller wing, the tail moment arm was shortened by 1.5 inches though it's not told between which reference points the moment arm is measured. The horizontal stabilizer's outline is similar to that used later on the Mark III, but the elevator is still undivided and quite small. Like on the Mark I, the fuselage bottom ends in a tip just below the elevator hinge line, and the vertical fin sits a bit ahead of the stabilizer so the rudder is completely in front of the elevator hinge line and above the fuselage. The rudder pushrod has to run above the horizontal stab and maybe that's why it was the same on the Mark III in the first place and only later moved below the horizontal stab.

The wing was modified in a clever way. To reduce the span, one rib frame was left out on each wingtip so the landing gear and the inner aileron tips stayed in place. The 18%-thickness airfoil was scaled down to give one inch less chord length and a correspondingly shorter aileron chord. The reference point for scaling was at 25% chord length, so



Phil Kraft's

KWIK-FLY II

The Country's Hottest Class III Design

The Kwik-Fly II, although basically the same design as the original Kwik-Fli which appeared in the October 1964 issue of R/C Modeler, was reduced in size to approximately 640 square inches of area in order to allow the ship to fly the contest pattern with the smaller engines, such as the Veco .45. To date, the Kwik-Fli II has won or placed in the top three positions in every contest in which it has been entered, including a recent victory at the Southwestern Regionals. Although it is no faster than its larger predecessor, it is a far better contest machine, and shows its true colors in gusty or windy weather.

Construction of the Kwik-Fli II is quite simple and very little time is required to complete it. Since the construction is very similar to the original version, no construction details will be given — simply refer to the October issue in which the original design appeared. One item of interest — this ship, although designed for the smaller mills, has been flown with a Lee .51, Super Tigre .60, and Merco .61. Any of these engines will more than do the job.

We think you'll find the Kwik-Fli II the hottest competition machine you've ever flown.

RADIO CONTROL MODELER

the leading edge got 0.25” backward and the trailing edge 0.75” forward. The center-of-gravity stayed at the same percentage of the chord length at the main spar. Obviously, just shortening the tail moment arm by 1.5” and leaving the tail areas unchanged gave about the same tail effectiveness.

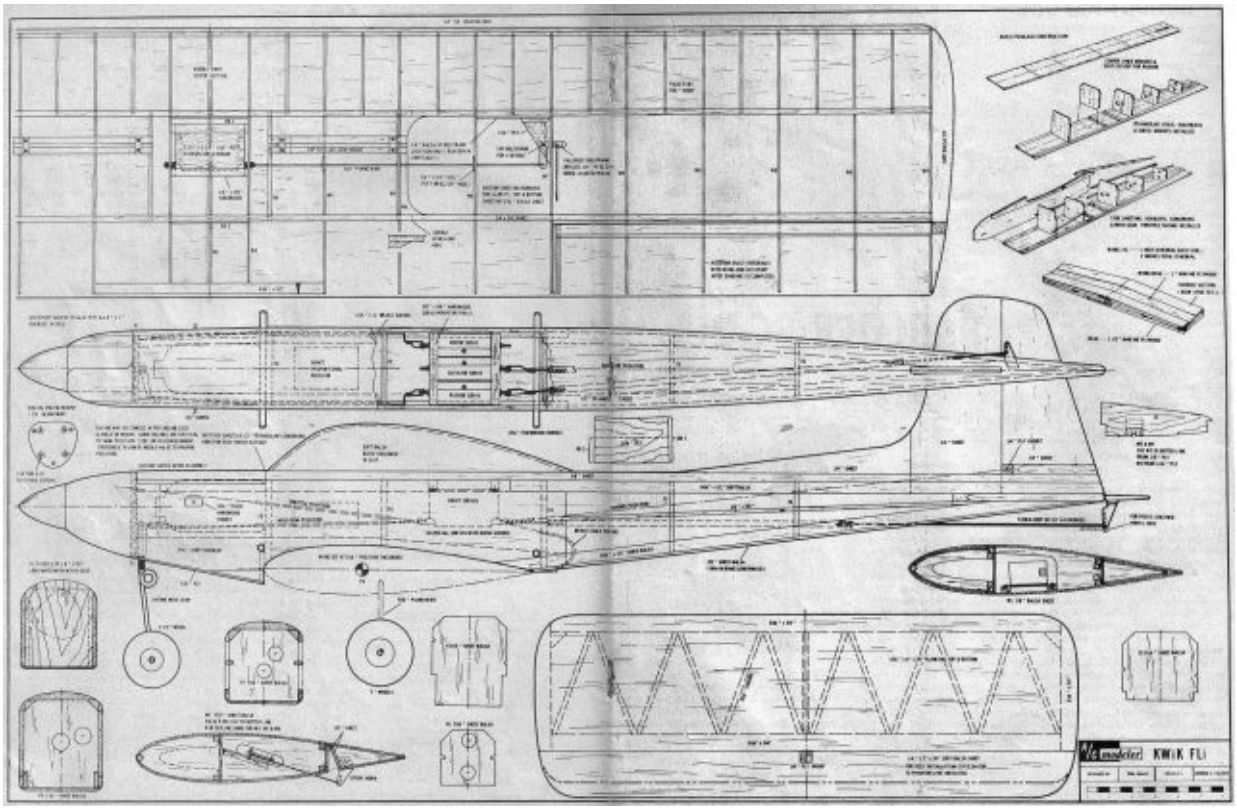
These tail modifications were undone for the Mark III. Instead, the horizontal tail was nicely tapered and the elevator enlarged. This was easy or even necessary because the elevator anyway had to be divided in two halves. The vertical tail was set back to the same moment arm as the horizontal tail, and the rudder was elongated quite a bit below the horizontal stab. Of course, the fuselage now ends in an edge and no longer in a tip. The fuselage’s rear end is no longer a triangle but now square which is supposed to make for a structural weakness. Anyway, the elevator is a more complicated build now.

Originally, the engine was high on the fuselage nose. Maybe this was old design practice to counteract nose-up tendencies in powered flight. This and any decalage are not good for a pattern airplane, though. For Mark III the engine thrust line was lowered to be near the center of drag. Whereas the engine was formerly slanted, maybe to get the exhaust opening outboard (I think the better look was only a side effect for Phil Kraft), it is now mounted upright without causing problems. The hatch behind the engine is no longer level with the fuselage top but at an angle down to the spinner. But this makes the fuselage shape only slightly more complicated.

The Mark I article says the left model on the picture is one of the first proto-types – all white with black trim. I think the paint scheme is a predecessor of the one used for the world-championship Mark III and I used the customary orange and dark blue instead of white and black. The model on the right is

not mentioned but maybe it's an even earlier prototype with a straight wing and without rounded wing and empennage tips. Anyway, it was disregarded.

The Mark II pictures above already show the paint scheme that was used later for many Mark III copies, except the lightning bolts on fuselage and vertical tail. Obviously, Phil Kraft's favorite colors were used but a clear canopy. Maybe a blue tinted canopy was made only for important models used in competition.



Comparing the Mark I and the Mark III plans it seems obvious that Mark III is essentially an enhanced Mark I. Mark II is an intermediate step or a side step with its smaller wing and tail moment arm. The rest is like Mark I, the horizontal stab modification being only an embellishment. Mark III combines the smaller Mark II wing with a larger vertical tail at a longer moment arm (and a bigger elevator). Both vertical and horizontal tail are embellished at the same time. The fuselage is modified only to fit the lower (and more forward) engine and the bigger rudder while the fuselage length is unchanged.

All Kwik-Fli versions have a low wing loading, but due to its size and the lower thrust/weight ratio Mark I flies peculiarly. It's almost like a free-flight model that learnt to fly pattern, but in no way bad and actually quite good for the time. It was one of the first pattern models with a symmetric airfoil what avoids bothersome pitching moments. Due to the rather small tail area and moment arm the model still won't stall or even spin, at least in the simulator. But in the early 1960s flying patterns at all was the main progress and in a pinch spins were achieved by special means (rudder/elevator boost).

But soon this was taken for granted and Mark II with its smaller size and the same wing loading was appreciated for better authority in gusty wind. The better thrust/weight ratio obtained by using a .60 engine was appreciated as well, especially for competition where patterns flown faster look nicer or are easier to fly, respectively. Still Mark II doesn't fly really neat patterns and won't reliably spin or snap, not even the "crisp" version.

No wonder, because according to the plan Mark I and II have 30 degrees rudder throw but on a short moment arm and only 20 degrees throw of the rather small elevator.

Mark III has the engine thrust line near the center of drag and the vertical tail's aerodynamic center is much lower than before, both making for cleaner patterns. The big fin and rudder and the bigger elevator, together with the long tail moment arm not only help in yawing maneuvers (like stall turns) but also enable spins and snaps to be reliably done.

All three Kwik-Fli versions show the typical smooth flight behavior, so it must be mainly due to the wing design. The different characteristics may be seen as the steps from the former, nearly free-flight designs for reed R/C to the fully controlled designs for proportional R/C. As I said in the second paragraph above…

Mark I and Mark II are rendered in REFLEX with their original paint scheme and in Phil Kraft's favorite orange and blue color. The flight behavior parameters are derived from the model's geometry. Like any simulator, REFLEX is a simplification of a real airplane. But the differences between the Kwik-Fli versions are so fundamental that you'll still notice the resulting differences in flight behavior even though they are rather small. It's amazing that we have the look and feel of the old models today, even if only virtually. By the way, Mark I and II are both balanced on the main spar, as given in the plan, in the "original" version and balanced neutral in the "crisp" version in REFLEX.

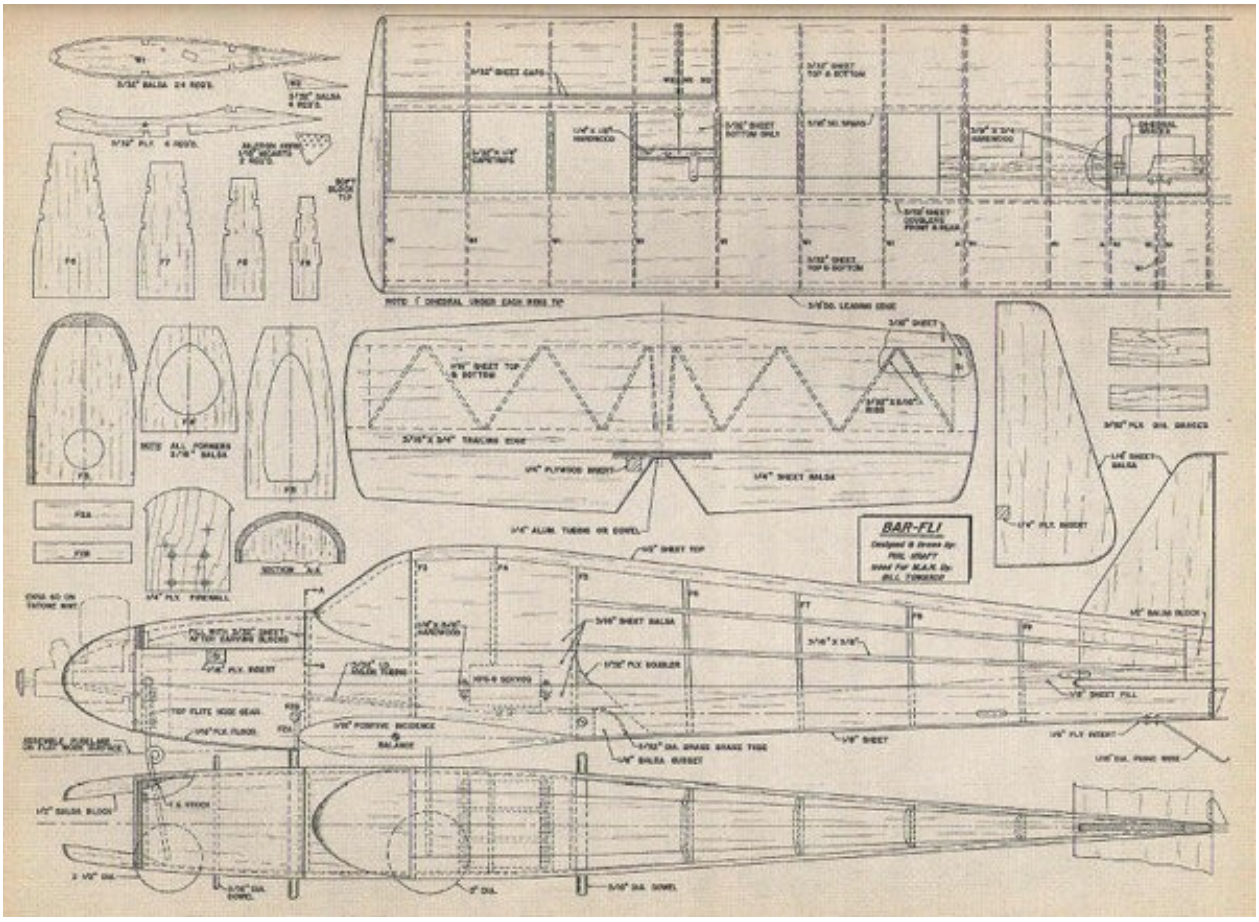
Alternate

Of course, the Bar-Fli isn't really a Kwik-Fli, but it is rather similar and it was Phil Kraft's alternate model for the 1967 world championship. It has the FAI stickers on wing and fuselage on the front page picture of the 1968 RCM&E issue. Our consideration would not be complete without comparing also this model to the Kwik-Fli Mk III, including the hands-on experience in the simulator. There is much information given by Phil Kraft himself in the Aug 1968 MAN article and the Dec 1968 RCM&E article, both with plan and available in the Classic Pattern Image Base.

Obviously, the model had been designed and built just for a change from the Kwik-Fli Mk II and just for sport flying. It was made a bit smaller (58 x 10 in wing instead of 60 x 11 in), got a thinner airfoil (15% instead of 18%) and a deep fuselage with much side area as well as a large rudder like that of the Kwik-Fli Mk III. Unexpectedly and despite being a bit small, it turned out to be a very good pattern ship, especially in high winds and turbulence. So the reason why it was chosen as the *secondary* model for the world championship was only the mild weather forecasted for Corsica. Being a bit smoother in such conditions due to slightly bigger size and thicker wing section, Kwik-Fli Mk III was preferred as the primary model. Actually, it was a tie.

There's nothing special about design and build of Bar-Fli, and all dimensions are nice round numbers. The wingspan is 58 in including the two 1 in tips, so wing area is only 560 sqin. The all-up weight should come in at 5 to 5½ lb. The .60 engine is a bit slanted, to have the exhaust outboards and for better looks, and may get a 2½ in spinner. The paint scheme is nearly the same as that of Kwik-Fli Mk II as to the outlines, except the stripes on the turtledeck and around fin and rudder. The colors are different, though, as the main color is a sober red and the stripes are black. The pinstripes are gold and the canopy is the silver base coat. The name comes from the bar-like fuselage.

As usual, the engine is mounted without any down or right thrust. The horizontal stabilizer is set to zero incidence while the wing should have 1/16 in positive incidence what computes to 0.38 degrees. Dihedral should be 1 in under each wing tip meaning 2 degrees. The balance point is drawn 3½ in from the leading edge just on the rear side of the main spar. Phil Kraft tried moving the C/G from this 35% position back to even 60% of the wing chord and found the model not very sensitive to C/G location. There are the "Bar-Fli original" and "Bar-Fli crisp" versions in REFLEX to compare.



The Bar-Fli's overall layout is very similar to that of Kwik-Fli Mk III. The deep fuselage is advantageous for certain maneuvers while the thin wing section makes for more speed in all maneuvers, particularly since Bar-Fli is lighter than Kwik-Fli Mk III but has the same wing loading and the same powerful .60 engine. It seems that Phil Kraft found it a bit too small only in terms of the visual impression of the judges in competition.

That is no wonder, however, since Bar-Fli is the faster and more powerful machine. Flying faster and bigger patterns, it has to be flown at greater distance to the judges what may have more effect than the only slightly smaller size. And the higher speed is only partially due to the thinner wing airfoil. After all the overall smaller size reduces drag, and the lower weight increases the thrust/weight ratio from 0.8 to 0.91, what is quite spectacular.

Setting the parameters for REFLEX gave some insight into the subtle differences between Bar-Fli and Kwik-Fli Mk III. The general layout is similar, and Bar-Fli has only slightly more wing aspect ratio. The ailerons are a bit shorter but that doesn't matter because they are more effective on the thinner airfoil. I chose the Eppler E 475 because it is a special 15% aerobatic airfoil with a pronounced stall behavior, giving the good snapping ability described in the articles. The good stall-turn ability is due to the huge vertical tail that is even bigger than that of Kwik-Fli Mk III and even nearer to the centerline.

The slightly superior maneuverability is achieved by the same control throws: 30 degrees rudder, 25 elevator, 11 aileron. The big engine sits on a short nose moment arm making for low pitching and yawing inertia.

For the "Bar-Fli crisp" version, the balance point was set back by 1½ in to exactly 50% and the incidence angle reduced to 0.25 degrees. The main landing gear legs have to be bent backward to keep the nose wheel on the ground. The airplane is now neutral both upright and inverted and more comfortable to fly. As Phil Kraft stated, there is a bit more elevator effect, but the most important effect seems to be much better snap/flick ability. That's the very good pattern machine described in the articles, maybe even better than Kwik-Fli Mk III except lacking a small bit in size and smoothness.

The simulator model has a Veco engine instead of the original's Enya 60 II, which was not available for modeling. The Enya is especially short so the Veco protrudes quite a bit, but that doesn't really matter.

The red color may be not the original one, but it's impossible to learn it from the magazine cover picture above. At least it's consistent with a (color corrected) photo found in the Radio Control Hall of Fame (half page down) and it's quite nice. The RCM&E article just specifies "red and black color scheme with gold trim". The cover picture is retouched and does not show the pinstripes around the fuselage lightning bolt and around the vertical tail, either. So far, I couldn't identify the oval signet on the vertical tail so I left it out.

Scenery

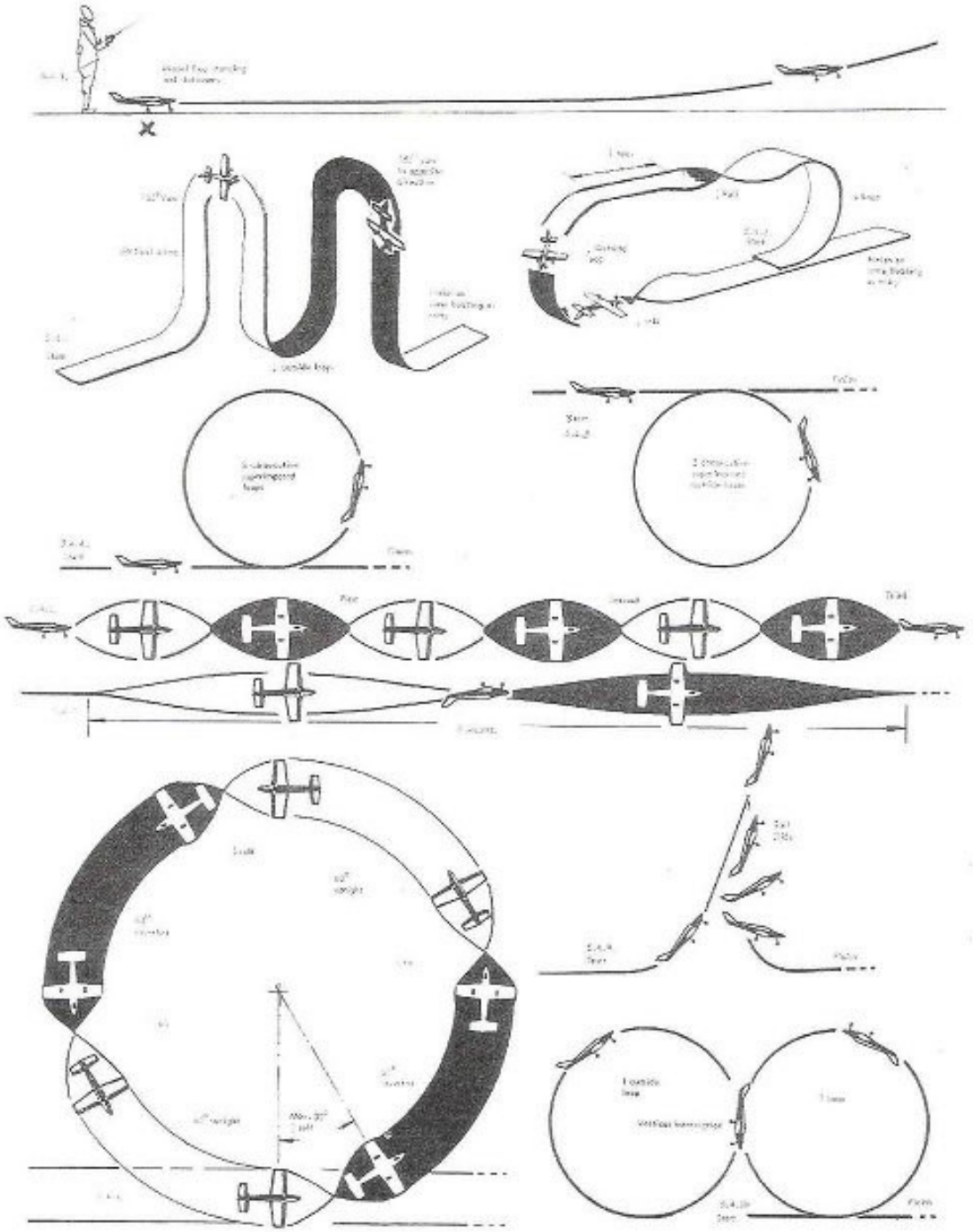
There is a scenery on RC-Sim, very well suited to this model especially with retractable landing gear. *Horst Lenkeit* perfectly rendered one of the nicest model flying sites in Austria. It's the field of the Klagenfurt model flying club in St. Johann, the field where *Hanno Prettner* once practiced. There's a long tarmac runway and much room.

The scenery is just great, but it seems the digital camera failed finding a suitable white balance. At least the colors look quite cold. You might correct that yourself. Load the file S0.jpg in a graphics program like the GIMP and select the "Color Balance" tool. For "Midtones" set +30 red and –30 blue. Re-save the file as jpg with "Quality: 85", "Optimize", "Subsampling: 1x1, 1x1, 1x1", and "DCT method: Floating-Point".

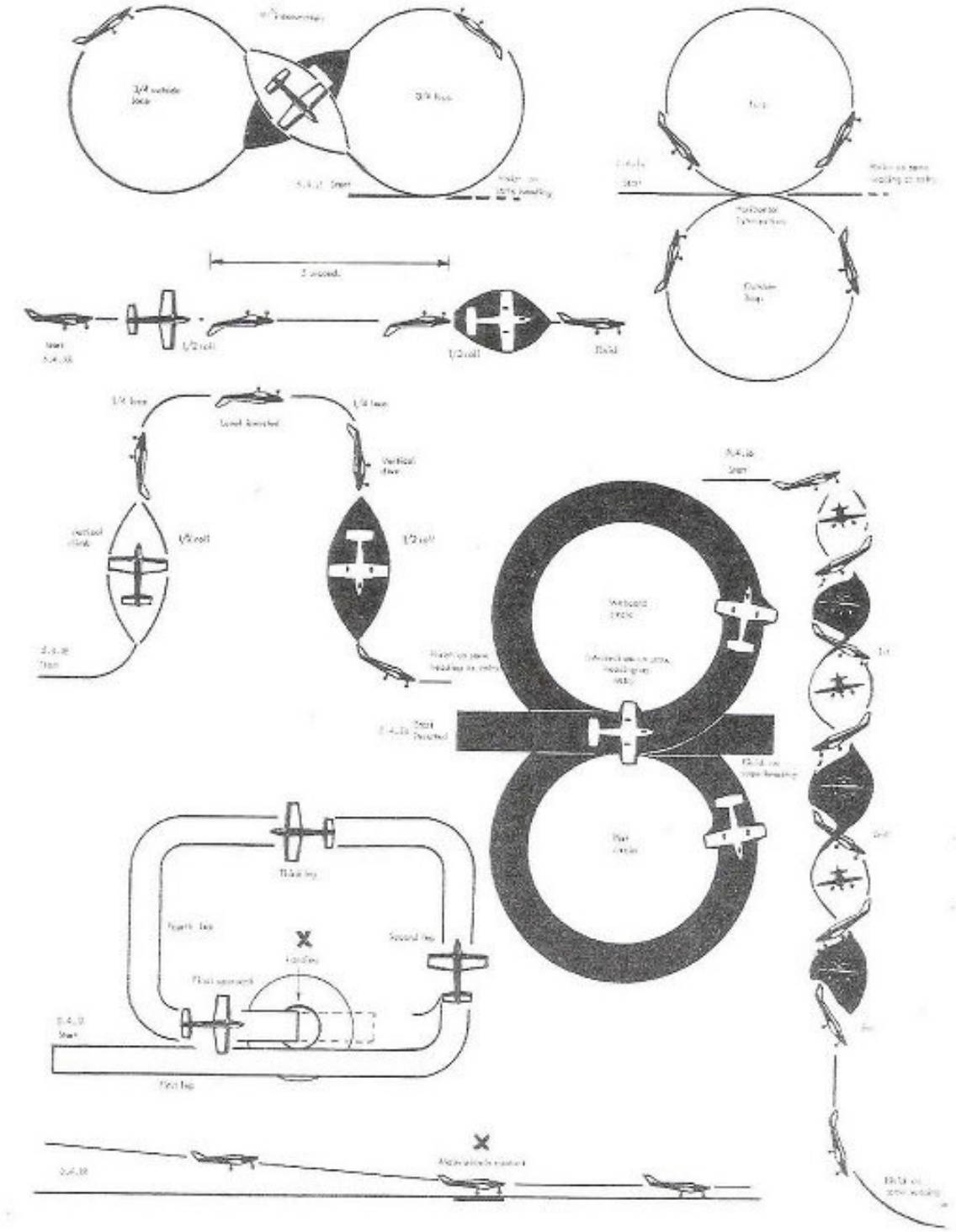
Try the different Kwik-Fli versions on the nice long tarmac runway and you will see why there were those paved runways in the old times and why the models even had wheel brakes. There's no problem at all to land the slow-flying Kwik-Fli on this runway, but even this lightweight model needs some roll distance to full stop. And the heavy "ballistic" ships with their high landing speed might even use up the whole (148 m / 485 ft) runway.

Patterns

If you would like to know more about the old maneuver schedules, look at the comprehensive Competitors Guide of the Senior Pattern Association. Of course, Kwik-Fli is SPA-legal and might do even the expert sequence quite well. Information on the old rules is rare, but recently someone posted even the original 1967 FAI world championship schedule at RC Universe:



1967 FAI world championship maneuver schedule part 2:



Dance

Each old-timer I talk to about the Kwik-Fli immediately says: "Oh, the Kwik-Fli dance!" Obviously, the model was known or even notorious for a certain tail wiggle. The experts vastly disagree on both the diagnosis and the cure.

Some say it's yaw wiggle because the large canopy blankets the vertical tail. Some say the yaw wiggle is caused by turbulence from the fuselage-wing crossing and maybe the dowels and rubber bands. Some others say just for that it's a pitch wiggle. Some say nicely shaped wing fillets would cure it, and others recommend using a smaller canopy. Both recommend real or at least diamond-shaped airfoils for the tail feathers instead of the flat ones.

The well-known Dick Hanson is sure that the dance was simply caused by the canopy and its location (post at RC Universe), what sounds very reasonable.

Be it as it may, neither the tail wiggle nor the possible cures could be rendered in REFLEX. We simply have to expect the REFLEX model being somewhat more pleasant than the real one.

Conclusion

While the REFLEX model cannot be *completely* realistic at all, it yet shows the essence of the real model's flight behavior, which is best described as "smooth". So just enjoy the look and feel of this great classic!

But if you're one of those veterans having own experience with the original Kwik-Fli Mk III, I'd really appreciate any corrections or suggestions from you.

And still I would be very glad if one of the expert flyers, regardless of old or young, would fly and record the 1967 world championship schedule in the simulator (REFLEX XTR²) so we could have the "old" spectator's experience we missed in our youth.

Enjoy!

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

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