Classic Review: MK Champion

***Note from the Editor**: I discovered Bud's Hobby shop the spring of 1976 at the age of 12. Bud, the man, not only taught me to fly (3-channel Falcon 56 with K&B .21, Cox Sanwa radio), he taught me the meaning of great service, how to run a business and helped me be a better person. The hobby shop had something called the "kit coral" which held many dozen R/C kits. I opened, inspected, reviewed the plans of every single kit…and distinctly remember opening the box containing an odd orange colored plastic fuselage…the MK Champion.*

Fast forward to the fall of 2008…while searching "radio control airplane kits" on E-Bay, I came upon a familiar box…an MK Champion. The Champion may define "Classic Value" based on the $125 acquisition price, is appropriately powered by the $55 used Enya .60 III, was a pleasure to build and flew the 1979 FAI sequence (the CP-T "flight reference") quite well. The photo at right

shows the completed Champion with my sons Tom (4) and Chip (5). ***Rusty Dose,*** **Editor**

MK Champion

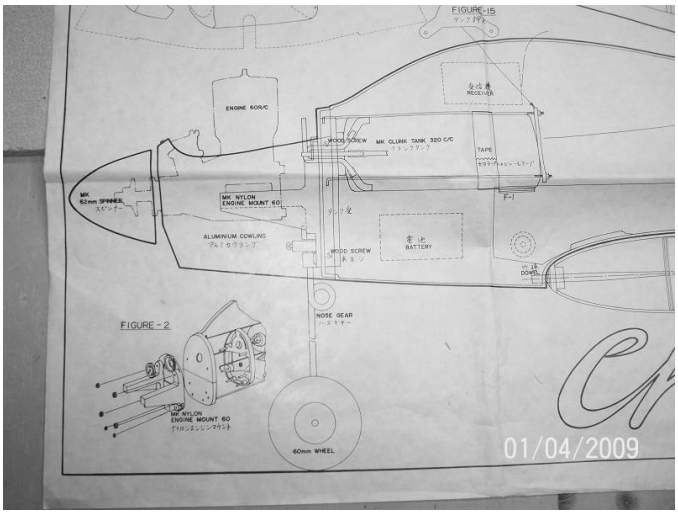
Manufacturer: MK of Japan
Designer: M. Kato 1974 (guess)
Purchased: E-Bay, NIB, $125.00
Engine: Enya .60 III, used, E-Bay $55.00
Radio: Futaba 10C w/ 606FS 2.4 receiver
Servos: All Futaba S3305 elevator, S3305 rudder, S148 throttle and S3151 ailerons.
Battery: Futaba N4RB, 4.8 volt, 1000 mah nicad
Finish: Identical to the original color scheme using orange, black and white Monokote. Graphics by BadBrad.

Specifications:

Wingspan: 61"
Wing area: 662
Length: 51"
Weight: 6 lb 1 oz dry (Rusty's model)

Overview-

The MK Champion was designed by M. Kato of Japan and based on the similarity to the M. Kato designed Blue Angel (1973 World Champion flown by Yoshioka) assume it was released in 1974. The kit is typical MK quality consisting of machine cut balsa parts, balsa sheets, generous high quality



specialty hardware (rare for the era), full size plans and (2) instruction booklets in English.

Fuselage/Stabilizer-

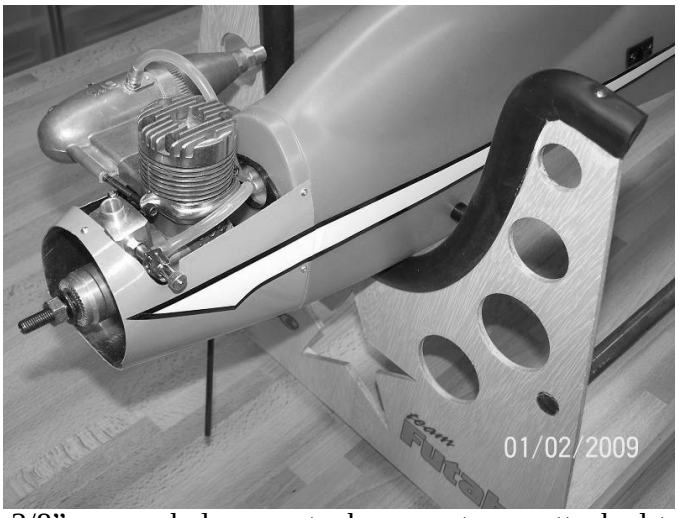
What makes the Champion unique is the molded "drink-cup" plastic fuselage available in red, yellow, blue and orange. The engine mounts to a molded reinforced nylon firewall/engine mount assembly and a plywood crutch, pre-installed by the factory, handles the servo mounting and wing mounting plate. The plans showed an IM 320 cc fuel tank (impossible to find) which was replaced with a 320cc tank available from World Models (A-6 Intruder tank) for $8.

The engine cowl is made from a die-cut aluminum sheet. The detailed instructions and plan drawings described forming the cowl by hand then attaching to the fuselage with the supplied sheet metal screws…I was most concerned about this which proved to be very simple. The aluminum was first covered with orange trim Monokote and slowly formed the bottom radius using a combination of a caulking tube, dowels and a little patience. The white swoosh with black pinstripe was applied to

the fuse at the factory and needed to be extended to the cowl using white trim Monokote and 1/8" black Carl Goldberg striping tape.

The pre-shaped balsa rudder was cut to size, sanded and covered in orange Monokote and attached using the supplied brass hinges. Slots were cut in the very tough fuselage with a lithium Dremel and cut-off wheel. The hinges were coated with 30-minute epoxy and pushed into place. I had pre-drilled a 7/8" access hole on the stabilizer mounting area to add additional epoxy on the inside of the rudder post.

The pre-cut plywood servo rails were glued into position using Zap medium CA which further strengthened the plywood structure installed by the factory. The plywood structure is held to the fuselage using a couple of black button head screws/blind nuts in the rear and the supplied hardware was used for the front. The fuel tank's stopper fit perfectly into the molded firewall and a



3/8" square balsa rear tank support was attached to the fuselage using clear silicone.

The stabilizer is built up with a combination of square balsa stock then sheeting applied to the top and bottom. I hinged the pre-shaped elevator and block sanded the assembly with an aluminum T-bar sander with 80 grit paper. Final sanding was done with 220 3M wet/dry paper using a half sheet of 8 ½" x 11" sheet, folded into thirds, using moderate pressure.

Overview-

Rusty's Rule #1- A straight and light airplane can be set-up and trimmed to be a great model. A crooked and heavy airplane should be given away!

The following method only works if one has a flat and true building surface. My “precision” work bench consists of a 36” x 80” laminated hard maple top mounted to (2) IKEA cabinet bases with (8) adjustable legs. The cabinet bases are connected with 1” x 4”s and have a few cross braces for added stability. Using a 30” level, 48” straight edge and my eye balls to the table top is checked periodically for trueness. The finish is (6) coats of clear, sanded with 180 wet/dry (dry) between coats of Minwax brand clear urethane, hand waxed using bees wax and recoated every six months or when the blobs of glue dent my latest project I am covering!

I actually glue the wing to the work bench with medium Zap CA to pieces of blue painters tape strategically applied to the work bench. The painters tape is used as a "mold release" with little balsa sticks glued to the wing and the tape on the work bench.

Wings-

Begin by drawing an accurate center-line on each rib and both sides of the leading and trailing edge stock. Each wing panel is assembled with wax paper over the plan using Zap medium CA. The full-size plan only has the left wing panel so one needs to use 3-in-1 oil to make the plan transparent or do as I do…draw a few reference lines on the back side of the plan.

The wing halves are joined with the top wing spar flat against the work surface. The spar is tack glued, the tips are floated parallel to the work surface using scrap balsa sticks glued to the painters tape with Zap green CA, then the center section. Straight trailing edges are created using square aluminum tubing then shimmed along the TE with more little balsa sticks. The wing sheeting is carefully assembled with parallel sheets to the LE and TE with a triangle sliver at the main spar...tedious, results always are good. The sheets are taped together using 1" painters tape and yellow Titebond glue, weighted overnight. Sanding consists of a long straight sanding block with NEW 80 grit paper. An angle is sanded on the leading edge of the sheeting (use an 18” sanding bar) to properly fit against the LE attached to wing.

Titebond Trim glue (does not run) is used on the ribs, spar and TE with thick CA used on the LE of sheeting aligned with a long straight edge as it is attached. Pins are added after pressing and repressing the sheeting to the very solid structure. Let dry overnight. The wing will be broken free from the little sticks, the tape removed from the work bench and the top sheeting will be applied using a similar process. The structure is very accurate.

The wing is finished by adding the leading edge, wing tips and strip ailerons. I like to add center lines on things to help me sand straight and create symmetry. Titebond and painters tape work great for the gluing and 18” and 30” aluminum sanding bars with 80 grit sand paper keep things straight.

Control system-

Today, the precision of our model is limited to the mechanical connection from the servo to the flight surface. Ideally, slop free linkages are as precise the 500th flight as the first flight. I chose to use a Dubro 4-40 ball bearing link connected to a 3/16" carbon fiber pushrod via a 4-40 titanium threaded end (both from Central Hobbies) bonded with JB Weld epoxy glue. The MK aluminum control horns were selected for the elevator (medium) and rudder (small) elevator and rudder control horns for their simplicity and elegance (Central Hobbies). The Hayes steel pinned clevis' are connected to standard 2-56 threaded rods glued with JB Weld to the pushrod.

Digital servos-

I can't say enough about the importance of high quality servos, **digital servos**!

Let's review what a digital servo is and isn't. A "digital servo" is the same as a standard servo accept for a microprocessor analyses the incoming receiver signals and controls the motor. Digital servos have the same motors, gears and cases as standard servos and they also have a Feedback Potentiometer (Pot) just like their standard counterparts. Digital servos process the incoming receiver information which controls the initial power to the servo motor, reducing the deadband, increasing the resolution, faster control response, constant torque throughout the servo travel and increased holding power when stationary.

A conventional servo at idle, no power is being applied to the servomotor. When a signal is then received for the servo to move, or pressure is applied to the output arm, the servo responds by sending power/voltage to the servo motor. This power, which is in fact the maximum voltage, is pulsed or switched On/Off at a fixed rate of 50 cycles per second, creating small "blips" of power. By increasing the length of each pulse/blip of power, a speed controller effect is created, until full power/voltage is applied to the motor accelerating the servo arm towards its new position.

The digital servo via the microprocessor is optimizing the servos performance in "real time" and does this 300 times per second rather than 50. The down side for all of this performance is power consumption. Be sure and provide not only an adequate supply but also current capabilities to feed these electronic wonders.

The Futaba 606FS 2.4 receiver was attached to the servo tray with Velcro and the Futaba 1000 mah 4.8 volt nicad was wrapped in a foam rubber cube and placed behind the tank for the initial CG location (plans!). I like the security of a heavy duty switch and it was installed directly to the fuselage side.

Final Assembly-

The stabilizer is mounted on the bottom of the plastic fuselage. The plastic fuselage is tricky because glue doesn't really stick! The stab is attached by a screw, a dowel pin on the sub-fin and the glue to keep it from sliding around? The wing is attached using (2) dowel pins in the front and (1) ¼" x 20 nylon bolt.

It is very important to take the extra time to measure, check and measure again for proper wing, fuselage, stabilizer and fin alignment. Trimming is much simpler with an inherently "true" airframe.

Finish-

I can never get excited about getting a project done until I pick out the color scheme. The Champion screamed "Do it like the box dummy!"…so I did. The finish is a combination of opaque orange, black and white Monokote with some custom graphics. I have worked with BadBrad for years and to me, he is the best. I sent Brad the box cover art, a few

dimensions and specified the colors. A few days later he sends me a proof via e-mail and then the final comes in vinyl a few days later.

Everyone has their film covering techniques…the following is what I have done for over (20) years. The finish is only as good as the work underneath. I try to create tight glue joints and take my time sanding with 80 grit paper and hand sand with 180 – 220. I vacuum the model a couple of times and wipe it off with a t-shirt a couple of times. I inspect the whole project, looking for dents (spit or water to expand the balsa) and if maybe a little more "light" spackling may be needed here and there. Vacuum and t-shirt drill again. I trace the wing/stab/fuselage profile onto white card stock from a craft store for templates. The designs are cut-out and drawn directly onto the wood with a fine line felt tip pen.

The templates are then transferred to the Monokote taking into consideration overlaps of about 1/8". I put a tube sock on my favorite Monokote iron with tie wraps and set it to the highest setting. Starting in one corner, I press the Monokote directly to the surface. My shop has about 10,000,000 candle power of florescent lighting (not really but I like a lot of light!) and by adjusting my head and the work can see any bubbles that I created.

Hey Rusty…what about bubbles and scratching and the fancy heat guns? Great questions! The scratches left by 120 – 180 sand paper are not visible through the Monokote BUT allow the air to migrate away, reducing bubbles. I only use the heat gun for open frame work structures, with a Monokote glove for ARFs (stuff that is screwed up) and wing tips.

Flying-

Picture a beautiful fall Saturday morning, at the AMA flying site…The MK Champion was fueled up with a new jug of Cool Power 15% (nothing helps create horsepower like a little nitro) and the Enya .60 III was primed and came to life almost immediately…adjust the high speed needle a little, it idles well, run it up…wow, seems to be a good little motor…shut it down. Remember, the Enya was found on E-Bay for only $55.00 and it ran perfectly.

Refuel, pre-flight the model one more time, low rates, high rates…all is a go. Start the engine, taxi to the end of the runway…deep breath (I have flown for over 35 years and STILL get nervous for a first flight!). **Advance the throttle, steer with the rudder, a little bit of elevator…it flies…no trim needed it is perfect**…Gotcha! I have always wanted to write that "a little right rudder…no trim needed". All crap, lots and lots of crap…almost every model needs SOMETHING!

Dave Guerin and I flew the model (6) times and over-all we were very impressed. We used my very well trimmed and fine flying World Models Intruder as the reference.

- The model locked "in" and tracked well in upright and inverted flight.
- The CG shown on the plans required enough down elevator (slight pressure) when inverted to be comfortable.
- Roll rate was a guess when I set-it up. It is amazing how little throw you need…about 5/16" each direction for high rate and 70% for low rate.
- Rolling maneuvers were excellent, I guessed pretty close on the differential by moving the servo arms toward the torque rods creating more up than down. Super slow rolls, full power out of a dive or a not so fast pass, all very predictable and controllable.
- Point rolls were quite good except a little hitch was present from inverted to right knife edge due to differential being a little off (more needed). Horizon to horizon!
- Rudder authority was ok, not great, but ok. The figure "M" is actually kind of difficult due to the minimal rudder power and requires one to leave about ¼ throttle at the apogee, during the rudder application and then letting off as it pivots.
- The Enya liked the APC 11 x 7" prop the best. A bunch of MK nylon, Zinger and Rev-up props were tried and just made lots of noise and produced less to lots less horse power.
- Energy management is key, smooth pulls and pushes. Appropriate for era and size of model.

Masahiro Kato-

Masahiro Kato was a top FAI pattern pilot who won

many Japanese National championships. Mr. Kato formed M. Kato Aircraft Manufacturing Co. Ltd, primarily producing high quality pattern kits made from high quality pre-cut or machined balsa or preformed parts. The company also produced a small number of scale models including a Zero, Hein, Junkers 87 which were subsequently sold to Marutaka of Osaka, Japan. Mr. Kato may have designed and drew many of the Marutaka/Royal plans.