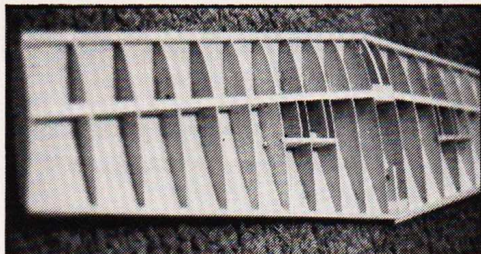


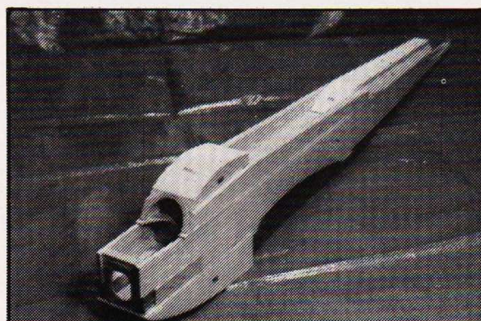
Overall view of kit parts; excellent materials and prefabrication evident.



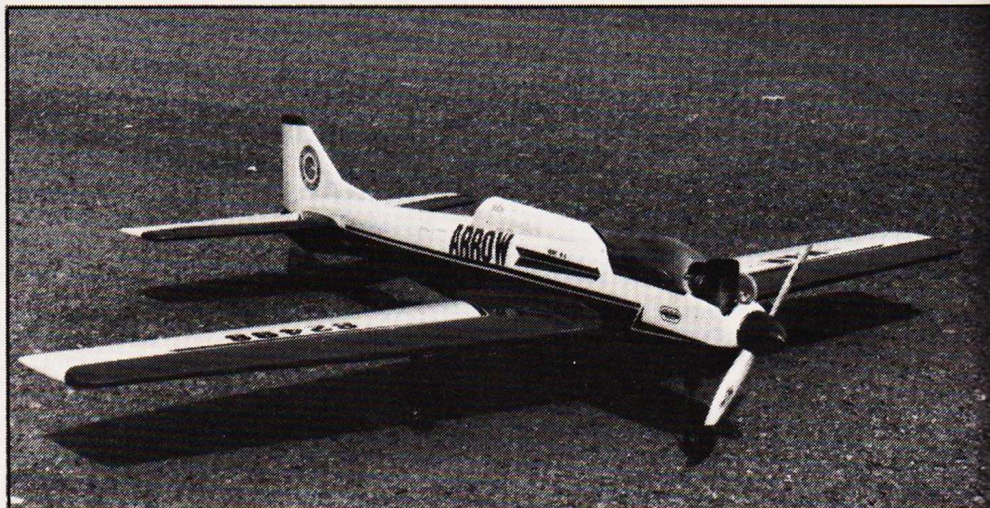
Basic wing structure is built of light spars and ribs; balsa skin gives strength.



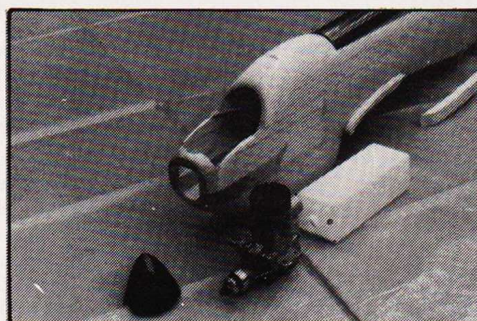
Fuselage is basically a box with block balsa added for shaping.



All the blocks are in place and the shaping fun is about to start.



On the tarmac and ready to fly; Arrow exhibits the classic lines of a competent pattern airplane. Finish is a combination of MonoKote and K&B Superpoxy paint.



Nose shapes nicely to spinner, and fuel tank supplied nestles nicely in its space.



Super Tigre X 60 proved to be good power choice for this project; note pipe setup.

The World Championship airplane and Super Tigre's X-60 R/C combine with Ace's new Silver Seven to create all the "pattern potential" anyone could want.

Field & Bench  
**REVIEW**

# MK Arrow

## MK Arrow

by Mike Lee

• Not so long ago, in a country far away known as South Africa, Wolfgang Matt brought an old term back to world prominence in a new form. His "Arrow," a new world-class pattern airplane, helped Wolfgang win the World Championships in 1979. Actually, the "Arrow" is not all that new, having placed second to Hanno Prettnner's famed "Curare" at the 1977 Tournament of Champions. The modeling world went "Curare" happy and this tended to obscure the obvious potential that Matt's airplane had. This was all changed with the *M.A.N.* presentation of "Arrow" in the June 1980 issue and a kitting of the bird, the subject of this Field & Bench.

For those who are curious about the actual ship Matt flew in South Africa, his entry was equipped with a piped Webra Speed, retracts, flaps, spoilers and a variable-pitch propeller. Because there was not sufficient time to work with the variable-pitch prop, it was used very little in the competition but has since proven its worth to the World Champ. Basically the Arrow is a direct descendent of Matt's popular Atlas with clean-up efforts directed toward hiding the pipe and other minor changes.

This review looks at a version of the Arrow manufactured by MK Models of Japan; a version endorsed by Wolfgang Matt. Indy R/C is the distributor of MK kits in the U.S. and Bev Goad of that company was kind enough to allow me a kit to work with. Bev also sent along some MK retracts and an OS Cougar retract servo.

**THE AIRCRAFT.** The kit can best be described in one word—**INCREDIBLE!** MK really went "first cabin" with this one. Die-cutting, what little there is, is sharp and clean. Ninety percent of the kit is machine cut with an accuracy that is nothing short of fantastic. A complete hardware package is included which contains the tank, spinner and some well-thought-out aileron hardware, along with the usual collection of nuts, bolts and other goodies. Let's get to building.

The most discouraging thing with kits made abroad is that the instructions are in

almost every language but English. This kit was no exception, but the parts are numbered and identified in English and there are small exploded views of the various subassemblies to help out. Actually, the plans are so well done that anyone with any past building experience will have no trouble and most who build Arrow will have the background to handle construction.

The fuselage is basically a box with a lot of block balsa to shape the basic structure out and give those unusual Arrow lines. After the sides are pieced together, the separately assembled nose section is fitted to the fuselage. Unless you do some pretty serious surgery, you will be using the built-in wooden motor mounts. I recommend you do; they are solid and many experienced fliers prefer the vibration absorption a wooden mount gives over the more common radially mounted metal mount. The engine compartment has the recommended right thrust and down thrust built in, giving you one less thing to worry about. After the engine compartment is attached, the tail is pulled together and everything else just falls together after that. By using a ruler, you can accurately place anything required on the plane (drilled holes for wing bolt anchors, for example) by simply transferring a measurement from plans to actual work.

The stabilizer and fin are built-up sections and are simple and a lot of fun. It takes no more than a 1/2 hour to do the stab with the help of some Super Jet or Hot Stuff. The fin takes about five minutes. You should sand the fin so that it tapers from a thick base to a thin top. The rudder is also tapered, but don't taper it below the stab centerline. Both stab and fin are tapered from the leading edge of the item to the trailing edge à la airfoil style.

The wing is probably the hardest item to construct; but only because it's so big. As does the fuselage, the wing goes together quite rapidly. Make sure you identify the various pieces, because each and every part will fit exactly in its proper position only—if it doesn't fit, you have the wrong piece! After assembling the ribs on the main spars, and the glue is dry, you must decide what kind of retracts you wish to use. The kit has blocks custom-made for MK type "S" retracts and I highly recommend them. They are very sturdily made

and they operate smoothly with positive locking. The MK units are those that I installed in this project. The linkage to the retracts is not all that critical; relatively easy to set up. If you do choose to use another type of retract be careful, as there is limited room in the fuselage nose. After the leading edge and trailing edge pieces are installed, the entire wing is sheeted with balsa supplied for that purpose. Be sure you follow the grain direction shown on the plans to gain maximum strength. Most of the wing's strength depends on its stressed construction. Add the wing tip blocks and cut away any excess balsa throughout.

The aileron/flap torque rod is an integrated unit (as its name implies). It is very simple in design and is merely a tube with the aileron rod running through it. The flaps are glued directly to the tube, and the tube rotates freely and separately from the ailerons. I interconnected the two flap tubes to operate them from a single servo.



Mike Lee peers at test pilot, Leo Prescott, for a sign that Arrow is in "go" condition.

The kit also includes all the wood and hardware for the optional spoilers; however, I did not install them on this model. Finish the wing by installing the bottom belly pan and lining the wheel wells with the super flexible balsa supplied in the kit.

I saved the neatest goodie for last because I know you'll be just as pleasantly surprised about this as I was. Most people would have you believe that the pipe tunnel on the fuselage top is balsa or scrap metal. Not so. The tunnel is made of rolled

belief. The tunnel must be cut down to fit as closely as possible the particular engine/pipe combination you plan to use.

Speaking of pipes, the powerplant we used in the Arrow is a Super Tigre X-60 with rear exhaust and mated to a stock ST pipe. I'll get into the engine a bit more in a minute, but for now, the pipe. You must choose your engine well ahead of time because the pipe installation depends greatly on the engine used. If you are thinking of a side-exhaust engine on this project, forget it. Although the plans show a side-exhaust engine, you'll have an impossible task trying to find an adapter as shown. It's rear-exhaust or "nuthin'!"

The Tigre exhaust port actually sits about 3/8" below the tunnel floor and thus requires some minor surgery. I cut the floor away with my trusty Dremel sanding drum, and webbed in the cavity with glass cloth and resin in the pipe's general shape where it intersects the floor. There is about 5/8" leeway between the floor and the fuel tank's top, so you should encounter no problems with most rear-exhaust motors.

The fuselage was first sanded down to contour and then two coats of polyester resin were applied. This in turn was sanded smooth and followed by Krylon primer. After light sanding and filling of some minor ruts and canyons, the final coats of K&B Superpoxy paint were sprayed. The wing was finished with Super MonoKote after a generous amount of Balsarite was applied. Lettering was done with some of the supplied decals and Coverite Graphics. Striping is standard plastic colored tape cut to size.

**THE ENGINE.** The Super Tigre X-60 is an impressive-looking engine. It has a massive case to house its ABC/ringed piston and liner, with a head finished in blue anodizing to set it off. X-60 is Super Tigre's latest in its long line of 60-size engines. As with the rest of the "X" series, Schnuerle porting mixes with high-speed ABC design for very high power output. The engine handles easily with fine idling through its Mag series carb. This is a very easy to use and dependable carb, and its two-needle design makes setting both high and low ends of the power range a snap.

## F&B: ARROW

steel with the nicest chrome (that's right—chrome) finish I've ever seen. It's an absolute sin to paint the thing; I sinned, since, in my usual "clutzy" style, I stored the tunnel in a drawer with 60-grit sandpaper and scratched it up beyond

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Engine is available as both a rear- and a side-exhaust; for reasons mentioned, I selected the rear version. Pipe is a stock item; massive in appearance and effective in operation. It merely pushes on the rear end of the engine's exhaust port and is held in place by friction of a rubber O-ring and a small wire clip that acts as a cotter pin. Adjustments are obtained by slipping the pipe's chamber into or out of the pipe adapter section; adjustments are held by whatever rear pipe bracing you use. This pipe does an effective job of silencing the engine while providing a copious amount of power boost. I don't have much in the line of testing equipment, so I can't give you a "Peter Chinn" rundown, but I will give you the readings I obtained with my Royal Tach.

The manufacturer claims a top end speed of somewhere around 13,800 without a pipe on his prototype engines. Our engine, running on DynaKnight Super Sport fuel, put in a reading of 14,200 with the pipe while spinning an 11x7 Zinger prop. Not bad for an engine with less than a gallon or so of fuel run through it. By the way, as the kit box shows for the model, you will need a length of rubber tube to route the exhaust clear of the tunnel. Otherwise, the oily exhaust will curl back into the tunnel during the flight and you'll end up with a mess.

**FLYING.** Maiden flights get my nerves or glands operating on strange wavelengths, so I enlisted the help of Masters pilot Leo Prescott for the Arrow's first flight. Our Ace Silver Seven radio (see my accompanying Bench report) checked out flawlessly, and after minor engine adjustment, Leo taxied the ship out to the line. The X-60 surged, brought the Arrow to flying speed, and was off to a steady climb. A bit of aileron trim was needed, after which the Arrow was put through her paces. Leo started with simple maneuvers and worked up to 8 point rolls and outside loops. He said that she felt "real nice," and by this time I really wanted to get my hands on the transmitter. After the camera work was out of the way, my turn came. Arrow is a real smoothie, loops with grace and point-rolls with little rudder input needed. The ship leaves plenty of margin for slow reactions; it goes where you point it. The flaps are most effective and require a marked degree of extra control inputs when deployed. This aircraft is probably the nicest plane I've had the pleasure of flying. And the X-60 engine only added to the pleasure by producing good power, reliability and response.

In summary, the Arrow is a ship that could be the "everyman" pattern airplane. It can be built by anyone with at least some experience in building and is one that can be flown by any pilot past the "nervous novice" stage. In short, it is simple to build and fly; that flying simplicity will upgrade the average flier's skills and compliment the expert's. If you are in the market for a pattern ship that will make you look good, then you should seriously consider the Ar-

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