

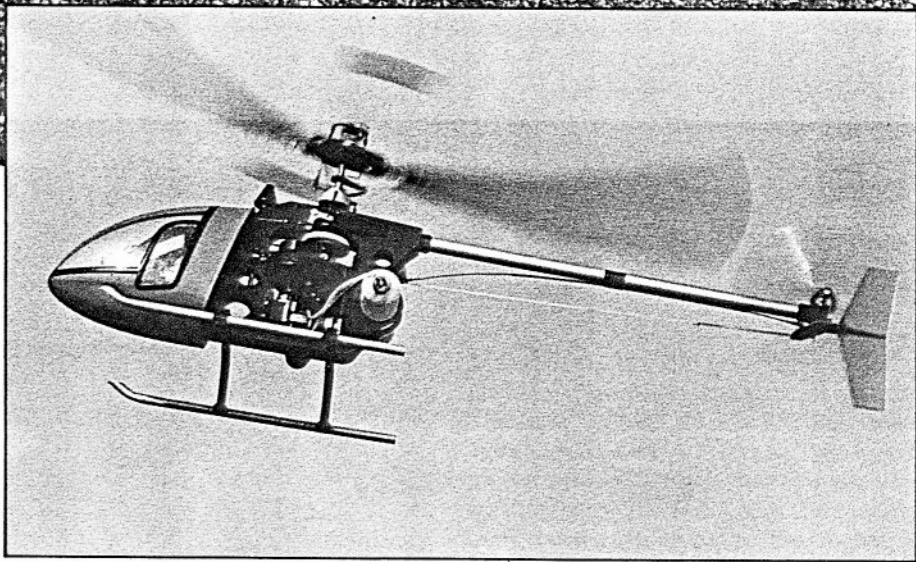
American R/C Helicopters
SUPER MANTIS

Super Mantis has strong points needed for beginners to discover helicopters at an affordable price.

by NICK ZIROLI JR.

COST HAS ALWAYS been a major setback in purchasing an R/C helicopter. People don't like spending a lot of money on a helicopter—only to later discover it's impossible to fly. A good choice for the modeler on a low budget is the Super Mantis by American R/C Helicopters*. The Mantis is a .40-size helicopter reasonably priced at \$199 with fixed pitch and \$249 with collective pitch. The collective head kit can be added later if desired.

THE KIT. I found the Mantis to be a very nice looking kit. The instructions are complete and easy to understand. Along with written instructions are over seventy photographs of different stages of construction. All the hardware is in American sizes, including socket head, pan head, and self-tapping screws.



The majority of the Super Mantis is molded in black plastic—the only helicopter with this feature. The plastic helps absorb engine vibration, eliminating radio problems common on metal models. Paint can even be applied to the plastic if you want.

CONSTRUCTION. I began the Mantis by bolting the side frames together. If your side frames ever break in a crash, they will be replaced *free of charge!* (If you're unsure of the strength of the plastic, don't worry, only four sets have ever been replaced.) Even the skid struts are plastic,

made so the aluminum skids snap into place and are held with four self-tapping screws.

Originally, I chose an O.S. .40FSR engine for my Super Mantis. As I neared completion I changed to the O.S. .45 from World Engines*. Drilling is required to fit the engine of your choice. Care should be taken here to insure a proper fit. I've always had good luck with O.S. engines in the past, they've been very reliable and extremely easy to start.

Prior to installing the engine, the fan and clutch should be well-secured to the

engine shaft with Loctite. If the fan comes loose later, you'll have a lot of work to re-tighten it. The instructions specify placing a strip of paper between the main gears for the correct amount of play. I found this works well. Be sure to tighten all screws securely.

The cooling shroud is a quality piece of plastic. It's molded, smoke-colored, and very rigid. Care must be taken while trimming for your engine. A sloppy fit results in overheating.

The plans call for a Sullivan 6-ounce round fuel tank purchased separately. Using the larger engine, I squeezed an 8-ounce tank in its place. I felt a 6-ounce tank on a .45, or even a .40, is insufficient. The Super Mantis is not equipped with an auto-rotation system. This makes running out of fuel a real tragedy.

The tail rotor on the Mantis is belt-driven. This is fine for a beginner—when the tail rotor hits the ground, the belt slips rather than breaking any shafts or gears. I

The Super Mantis is stable yet responsive in control.

prefer the positive drive of a shaft. No matter how tight a belt is, there may still be some slipping in flight. American R/C is working on a shaft drive for the Mantis. The conversion kit should be available soon for about \$60.

Following the instructions carefully, I put the rotor head together easily. I chose the collective pitch version with tail rotor mixing. I feel a helicopter with collective pitch is much easier to fly—especially in gusty winds. The head can be adjusted for fast or slow control response. This is done by moving rubber pins inward for more response, or out for less. I found moving the pins all the way in works best for me. A beginner may first want to set his Mantis slow until he gets the feel of it. Control can be increased later for higher performance.

The rotor blades are all hardwood covered in black plastic. I first coated the mounting area with Zap CA for extra strength. Fiberglassing is not required. The rotor head could then be balanced with the flybar and the rotor blades installed.

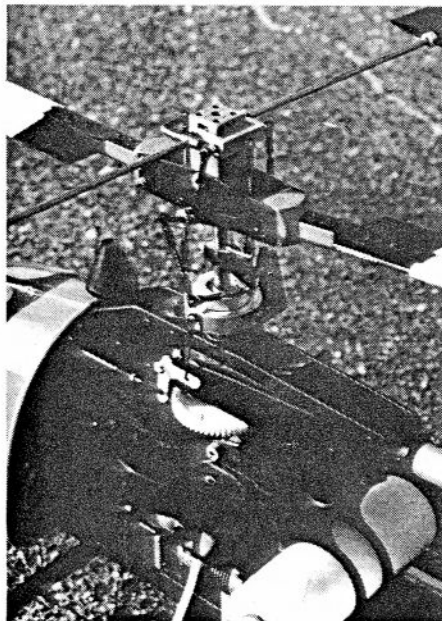
The collective pitch control rod should be installed through the center of the $\frac{5}{16}$ -inch main shaft and exit through a slot below the head. This is different from other helicopters where the rod runs along a slot in the shaft.



The Super Mantis proved to be very stable but with responsive controls.



Nick Zirolli Jr. and American R/C Helicopters Super Mantis. Kraft radio and the O.S. .45 from World Engines were the radio and engine selection.



Rotor head system on the Super Mantis, see text for full details.

I would have liked to have seen the collective rod pre-bent—or at least have a pattern provided. The bends must be correct to get the proper movement.

The head assembly now slides on the main shaft. The hole in the head had to be cleared out to fit correctly—not too much however, as it should be a tight fit. All the control rods can be connected from the head to the previously installed swash plate.

The Mantis comes with a belt starting system. I feel belts are obsolete—they slip when oily and also break.

American R/C did people like myself a favor by introducing a cone start system. The unit, priced at \$54.95, has been working very well. A belt runs from a gear on the cooling fan to a one-way gear on the starting shaft. This keeps the starting shaft from turning while the engine is running. Also, there is no vibration caused by alignment problems. A standard starter can be fit to the cone without special extensions or adapters.

I installed the unit in about two hours. Some cutting and drilling is required, but full-size patterns help make proper installation very easy.

All plywood parts must be cut from patterns on the plans. You should decide on your radio choke first and cut the servo trays before construction. Once assembled, the wood was coated with K&B* surfacing resin, then paint.

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The tail fin was done in the same manner. I don't like seeing a single screw holding the fin, especially when the bellcrank for the tail rotor control is also mounted to the plywood.

I chose a Kraft* Signature series for my Mantis. KPS 15s were used on all controls except throttle, collective pitch, and tail rotor mixing which operate off one 15H servo. I had no trouble fitting the large servos in the cabin.

Pushrods, pre-cut to length, all worked well with the exception of the tail rotor. The rod from the mixing lever to the tail rotor was not supported properly at the mixing arm. I used a homemade bracket to give the necessary support for smooth operation.

The plastic canopy can be cut out at this time. Care must be taken in this step. I had trouble distinguishing the trim lines and could have easily done it incorrectly.

I painted each half with Testors plastic paint first. Orange was my choice for good visibility—a bright color is always best on a helicopter.

Pacer* Plasti-Zap CA++ worked well joining the two halves. A wood ring is glued to the inside of the canopy which has two blind nuts, then 4-40 screws are used to hold the canopy securely.

Before flying your Mantis, take time to go over the controls and make sure they are operating correctly. It's important for safety that the engine quit at low throttle and low trim. Swash-plate movement should be about 1/4-inch either way. The pitch in the main rotor blades should be set so liftoff occurs at half throttle. The instructions are very clear on what final adjustments should be done.

FLYING. My first attempts at flight were not what I expected, with instability and lack of cyclic control. In other words—it wouldn't fly. After breaking a set of

rotor blades, I took the head apart.

The majority of the problem was tight controls. The ball links used in the kit are tight and must be stretched. This can be done by bending the link back and forth on the ball. It's imperative you do this, or your Mantis will not perform properly. The flybar should move easily, but should not be sloppy. The swash plate should not hang up, it must return to center when the stick is in neutral.

My next test flights were 100% better. Only minor trimming—mostly to the tail rotor mixing lever—was needed before my Super Mantis was flying the way I expected. The tail doesn't swing too much on power changes once it's set correctly. I was also impressed with the plastic struts. They did their job well—absorbing a few hard landings during test flights.

Once the bugs were ironed out, I found the Super Mantis to be very stable yet responsive in control. A beginner would have no problem learning to fly it. American R/C Helicopters have a complete parts service and are easy to deal with.

Super Mantis has the strong points needed to give a beginner the chance to discover R/C helicopters—at an affordable price.

**The following are the addresses of the companies mentioned in the above article:*

American R/C Helicopters, 635-11 North Twin Oaks Valley Road, San Marcos, CA 92069.

World Engines, 8960 Rossash Avenue, Cincinnati, OH 45236.

K&B Manufacturing, 12152 Woodruff Avenue, Downey, CA 90241.

Kraft Systems, 450 West California Avenue, P.O. Box 1268, Vista, CA 92083.

Pacer Technology and Resources, 1600 Dell Avenue, Campbell, CA 95008. ■