

# A secondhand Cyclone saga



**John Watkinson finds that inherent durability and good availability of spares makes Kalt's Cyclone a feasible second-hand purchase.**

IT is hard to say just why I wanted my own helicopter. Perhaps it was watching 'Whirlybirds' as a kid; perhaps I can be pretentious and say I was looking for an outlet for my creativity.

Probably fifteen years ago news filtered through the magazines that model helicopters were starting to happen. One of the biggest impacts on me was that the mechanisms employed were exactly like the real thing. So these were not model helicopters at all, they were real ones, albeit rather small. As I had spent some time reading about the real thing, it struck me that most of this would apply to the smaller members of the species.

And so it came to pass that I started taking notice of model helicopters with a view to really doing it. I decided fairly quickly that I wanted a decent sized model, so it would not be pushed around by gusts so badly, and it had to have collective pitch, because there are too many drawbacks to fixed pitch, difficult to hover, no possibility for autorotation etc.

As I understood the interaction of throttle and tail rotor pitch on fullsize helis, I also decided that the only way I was likely to succeed was with five servos and a transmitter which would allow throttle/tail mixing.

This narrowed down the choice, and at the time, the Cyclone was one of a number of possibilities. The reasons for considering the Cyclone were that it is popular, so spares should not be a problem, and

although the standard canopy looks a bit Noddy there are scale bodies available so it can look the business when you have managed to stop the ground coming up so fast.

There is a nicely detailed Agusta body, which looks good but for the fact that it should have wheels and not standard Cyclone skids. The fact that Jim Morley got it right makes it more obvious! The other body I am aware of is the Airwolf, which is just asking for a set of retracts and a strobe light.

At this point fate took over, and I saw a secondhand Cyclone airframe in a local model shop. I decided at once to have a good look at it, as even if I decided not to buy that particular one, I would at least know what the design had to offer.

And so down it came from the hook on the ceiling, and as it came closer, my immediate reaction was how big it was. And so it was set down on a counter, and I was left to my own devices whilst other customers were served.

That was good because you don't want to be under any pressure when you buy secondhand, it is necessary to be more careful. You have to take a reasonable view, which is that you pay less for anything secondhand, but you must also expect less, in that there will be wear and tear, possibly damage.

Everyone must make their own value judgements as to just what constitutes a fair price considering the work needed to get the model into shape, and no two people will be the same.

I was immediately struck by how well engineered the Cyclone is considering it is not especially expensive. I was impressed by the nicely made

servo mountings, much better than the bits of plywood which some models manage with. The moulded main side frames are a work of art! The fuel tank is properly integrated, instead of looking like an afterthought, and yet it is still possible to see the fuel level from behind the model.

The tank is also of a good size. The moulded switch/charger socket plate is a nice touch. The landing gear seemed unbelievably tough. I spent nearly an hour looking at this Cyclone before I decided to buy it. I spotted the following before parting with the hard earned.

(a) The model had obviously been crashed fairly heavily, since there were a lot of brand new parts fitted. These included a new canopy, new main drive gear, new rotor blades, new flybar. The model also had an autorotate clutch, which added to the value. The original instruction manual was with the model. In general, if there is no manual, tread very carefully.

(b) The motor mounting block bolt holes in the side frames were distended and generally abused, as if the motor had persistently been vibrating loose.

(c) The collective pitch slider on the mainshaft was siezed solid. Tail rotor pitch control was stiff.

(d) There was a lot of wear in the bushes where the flybar passes through the seesaw and in the pivot pins in the collec-

tive slider.

(e) The tail rotor belt guide pulleys were shot, and emitted ominous groans when the rotors were turned.

(f) The radius support for the swashplate had been broken at some time, and patched up with a self tapping screw.

(g) Some of the servo mounting screws had been sheared by impact, leaving the stumps in the mounting frames.

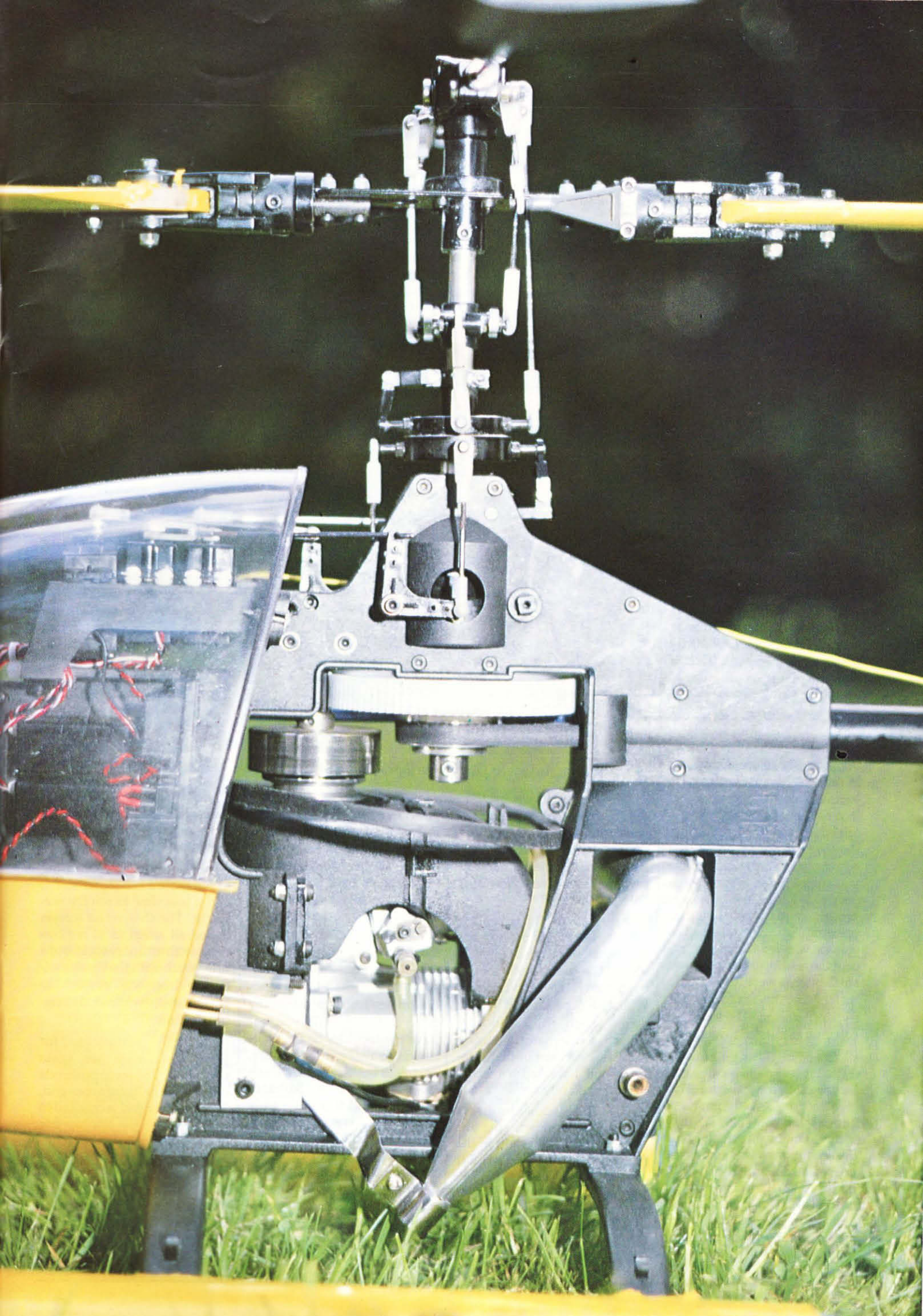
Since there had been a crash, I had to be sure that there was no remaining damage which would be expensive to repair. Fortunately the mainshaft was not bent, and I couldn't find anything else wrong.

Although this sounds like a grim picture, none of these defects would cost a lot to repair, and the significant number of new parts was another positive feature. I was being asked a hundred pounds less than a new Cyclone with autorotate clutch, and having made my value judgement, I walked out poorer in fiscal terms, but immensely richer in the knowledge that I now had a challenge to see through.

Having got this beast safely home, the manual became compulsory bedtime reading. The Kalt manual is really very good at explaining how it all fits together, and the exploded diagrams are very clear. I have heard some stories about instruction manuals which need clairvoyant powers to be understood, so this was a nice bonus.

*Continued over*

All R/C heli pilots have been there before. Which is the best model to splash out hard-earned cash on in those costly learning days?



The next step was to take the thing completely to pieces and check everything. It cannot be sufficiently emphasised that with choppers, perfect is just about adequate. The tips of the rotors are doing about two hundred and fifty miles an hour, and if something fails and it comes for you, you will come out with chips. This last sentence is a good one to use if you have spectators who are too close for comfort. In any case a complete stripdown is virtually essential in order to work on the collective mechanism.

And so my Cyclone became a pile of pieces, and each one was accepted and cleaned, or rejected. The fuel tank seemed to be rather sticky on the outside, and this was traced to a crack near the neck.

A shopping list was drawn up, and taken to a well known Kalt dealer not a million miles from Slough. Most of the parts I needed were in stock, belt rollers, radius support, various HT screws, fuel tank, balls and links and twenty servo screws. I also made off with an OS 61 heli motor with rear exhaust. Although the Cyclone will fly with a smaller motor, I felt that the extra power would come in useful for lifting a scale body at a later date, plus the big motor would not be working so hard, and should last longer.

I proposed to use mineral oil in the fuel, because castor oil is so revolting. The bad news was that new bushes cannot be obtained to fix the flybar slop, they are pressed in, and a new seesaw has to be bought unless you are prepared to some engineering. I took the latter approach, and soon obtained some miniature ballraces. The seesaw was reamed out to accept the bearing outer race, and small bushes were turned up to match the inner race to the flybar diameter. The standard collars are still used to retain the flybar.

The biggest pain was the collective pitch mechanism. This is a famous Cyclone problem, and mine was as bad as they come. The block which holds the scissor arms was so tight, it needed a rubber mallet to drift it off the mainshaft! This needed a lot of care to avoid damage to the pushrod which passes up the grooved main-

shaft. It did not take long to figure out what was wrong. The moulded slider is an irregular shape, because it has a pair of lugs in which the scissors pivot. Plastic has a high coefficient of expansion, which means that it shrinks a lot after it is moulded.

The presence of the lugs increases the thickness of the plastic locally, and it shrinks more in that area, distorting the whole moulding, so that the centre hole is no longer circular or parallel sided. It is not possible to put a reamer down the hole, as this would destroy the peg which engages the slot in the mainshaft, so the answer is to use a miniature file of suitable radius, and make the hole cylindrical, checking it on the

shaft has a slight residual roughness after manufacture, and I took this off with metal polish. This is fine as my chopper lives in the house.

If yours is relegated to the shed or garage, it might be better to leave the shaft alone so the standard finish protects it from rust. The scissor bearing holes in the block were worn on my example, and I decided to put two more ballraces in. The original pivot pins were used as mounting bolts for the races, and the scissor arms were reamed to accept the outer races. As the bearings were slightly thinner than the arms, it was possible to peen over the arms so there is no way the bearing could come out. A drop of CA ensured that there would

went in the side frames, and a new radius support followed. With the mainshaft in and the side frames together, it is possible to check the collective mechanism for freedom of movement and backlash.

At this point I discovered that it is possible to remove and refit the engine without separating the side frames. Even the 61 will go in and out if the carburettor is taken off first.

The worn motor mounting holes were taken care of by a pair of dural plates which were placed under the bolt heads such that the side frames are clamped between the plates and the motor block. The area of contact is now huge, and the motor has stayed exactly where I put it, which is to say that it is

perfectly aligned with the clutch bell as per Kalt's instructions.

Everything else went together much as normal, with loctite/lock-washers/nyloc nuts exactly as specified.

The stiffness in the tail rotor pitch control turned out to be no more than a slight misalignment where the tail PC lever

passes through the PB bracket. Opening out the hole with a file fixed that one permanently.

The pile of pieces was starting to resemble a helicopter again, and it was time to put the servos in. The sheared off screws defied all attempts to remove them with ordinary tools, but a brief touch with the tip of a soldering iron was enough to loosen them without damaging the hole.

The Kalt instructions for servo installation are again very good. The servo pushrods only have a balljoint at one end, and the other end is cranked to pass through the appropriate lever. This can be the source of a lot of play, but the cost of eliminating the play is minimal. The cranked ends of the rods were cut off and the rods were then threaded with a die to accept balljoints which



*Cyclone snuggled up to Gerry Llewellyn's Baron 50. Note the secret weapon transmitter*

shaft frequently. Since the expansion rates of the block and shaft are different, it is possible for the block to seize if the temperature falls and shrinks it onto the shaft.

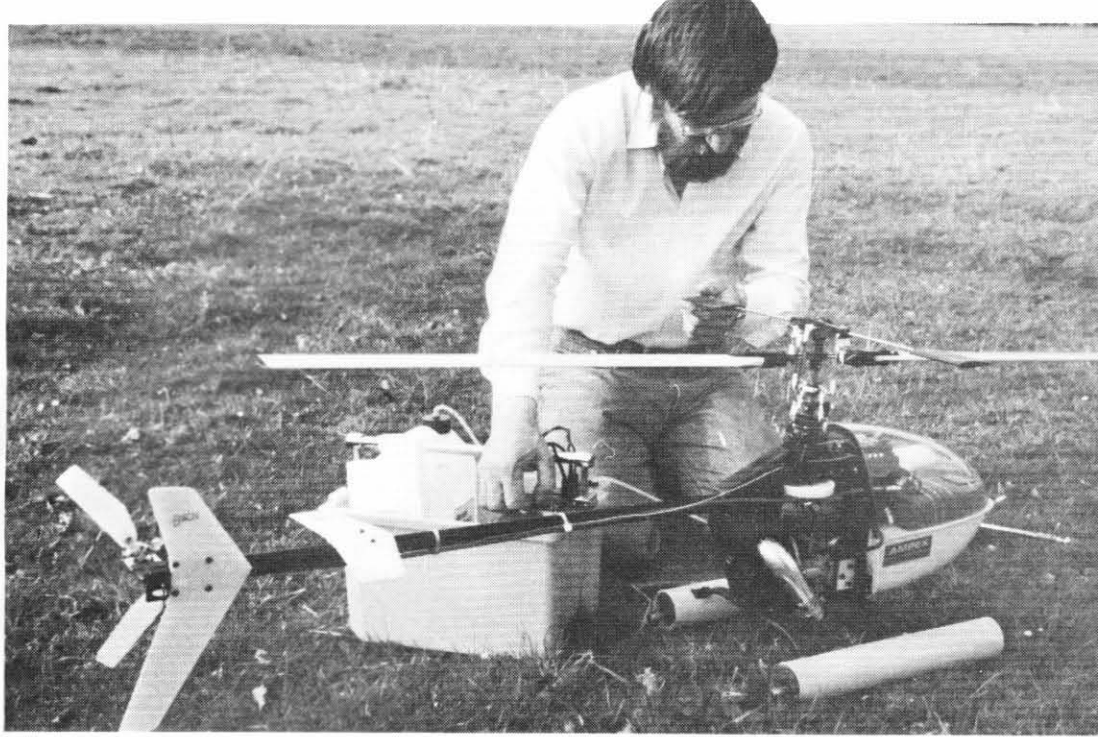
There is a rather large cooling fan fitted on top of the average helicopter, which also provides lift, so the mechanism should be able to work when very cold. Whilst an expert might be able to get down with a sticking collective mechanism, using throttle, I was not in that category, and I wanted a mechanism I could rely on.

When the block slides freely after a little work with the file, put it and the mainshaft in the fridge for a while, and see if it remains free. Another endearing feature of plastics is that they absorb liquids and swell. Oiling a sticking plastic slider will make it worse. The main-

shaft frequently. The last step in fixing the collective mechanism was to remove some slop in the slide ring fork by bushing the pins on the slide ring with brass tube and opening the fork out to fit the tube with a miniature file.

There is no doubt that the wear in the fork was due to the servo having had to exert an enormous force to move the pitch slider. Should you not have the facilities or the inclination to make these repairs, you must buy new parts. There is a metal slider with ballraces available, and this is the only part I would consider buying. There is a fully ballraced seesaw available which is expensive, but the saving made by buying secondhand should allow one these little luxuries.

It was now possible to start assembly. New belt rollers



*The author pumps endless quantities of money into the Cyclone fuel tank*

bolted to the control levers.

A good way of finding slop is to twist the main blades to and fro on their pitch control axis whilst watching and listening to the whole linkage system from the pitch arms back to the servos. This can be repeated with the flybar blades.

Make both tests with the main blades turned fore and aft, and then repeat with the blades at right angles. If there is any looseness, you will hear, see or feel it. On my Cyclone this test shows up a couple of balls which were loose where they were screwed into the swashplate. I removed all of the balls and refitted them with loctite. With the servos in, it became clear that there was going to be a centre of gravity problem even with a 1200mAh battery up front.

Strangely the manual does not acknowledge the existence of a centre of gravity. Mine was going to be on the mainshaft with an empty tank or else. The special gyro housing in the rear of the Cyclone was not to be used. The relatively heavy gyro ended up in the nose, which is a much better place anyway. A Modtec tuned pipe intended for an X-cell was next obtained, and to my amazement it was possible to fit this through the gyro hole with zero clearance. The standard Modtec manifold needed the pipe cut from the flange and re-fitted at a more

suitable angle.

My local specialist welding shop did a beautiful job, and I then gas flowed the manifold flange to make a smooth transition from the exhaust port shape to the pipe bore. At this point I discovered that the OS exhaust uses 3.5mm bolts which are about as common as rocking horse droppings. I suppose they have good reason to use that size, but considering the cost of the motor one might expect them to be supplied with it.

Some automotive gasket materials and exhaust sealant made a nice gas tight seal to the silencer. The outlet end of the silencer was supported with the stainless strip supplied.

One end was rolled into the shape of a P and clamped around the tailpipe with an M2 nut and bolt. The other end was cranked to allow it to be fixed under one of the motor block mounting screws. The ground lead for the remote glow connector was fitted under the same bolt head.

The rotor blades which came with the model were composite hardwood/balsa wood types, which were rather carelessly covered in fablon. This was carefully removed, and sanding sealer was used to harden the surface and give a smooth finish (after sanding, of course). The blades were then dynamically balanced according to

Dave Day's book, using solarfilm. Once balanced, the blades were covered with yellow solarfilm to match the pod. This takes a little longer than Fablon, but gives a much better appearance.

The yellow rotor disc really stands out in flight, helping to assess the orientation of the model. The last touches my model needed were to cut the frayed strands from the tail rotor drive belt, and to grease the thrust washers in the tail PC mechanism. This is important, as the tail rotor does 7000 rpm, and the plastic PC plate will melt if it isn't lubricated.

As this was my first heli, it needed some form of training undercarriage to allow me to touch down whilst still moving along, sideways if necessary. The solution I adopted is a pair of cardboard postal tubes about two and a half inches in diameter were obtained, and these were covered in solarfilm to stop them getting wet and oily. The skids were removed from the model, leaving just the legs.

The ends of the legs pass through holes cut in the side of the tubes, and then the skids are slid back into place. The tubes are now flopping around loose on the skids, until pieces of dense foam with central holes are then pushed on. It has not turned out to be necessary to tighten the grub screws in the legs.

These modified skids have been a great success. The foam can absorb lateral and vertical shocks, and the large diameter tubes allow sideways landings on grass without tipping over. I was particularly pleased that they don't look too bad. Most training undercarriages look absolutely diabolical, and there must be a temptation to remove them prematurely. There is a resemblance to floats with this approach, and I shall be happy to leave them on for as long as necessary. There is a small bonus that the model is raised slightly, and this keeps the tail rotor out of the weeds.

The majority of the Cyclone is plastic, and the tail rotor is driven by a belt. This has an unusual benefit. The receiver aerial can be run along the tailboom held by the same tiewraps which hold the tail rotor pushrod. With this approach the aerial is actually further away from metal parts than it is when mounted on the landing gear. It also looks a lot better. The only precaution necessary is to route the aerial out of the canopy high enough so that the main drive gear can't eat it.

Having learned to hover on this Cyclone without any tuition in less than two weeks, I would have to say that everything Kalt claim is in order. There have been the inevitable bumps and scrapes, and I am pleased to report that the Cyclone bounces back.

Amazingly little maintenance is required between sessions. With proper use of loctite and a little care over balancing to reduce vibration, nothing has worked loose to date. The cooling arrangements are perfectly adequate, and the motor does not overheat.

I have found that a second-hand model can be made as good as new with a little care. There is, of course, more to building a heli than just screwing the parts together. It has to be set up properly or you don't stand a chance. That sounds like a trailer for another article.