Robbe 'Squirrel' kit review

Written for 'RCM&E'.

Let's put the record straight immediately by pointing out that the name given on the kit box and above is not totally correct. The Robbe kit does, in fact, represent the twin-engined version of the "Squirrel" (or "A-Star" in the US) generally known as the "Twin-Squirrel" (or "Twin-Star"). Indeed, the decal sheet supplied contains a logo with the title "AS355F Squirrel 2". Just to make things even more complicated there are several minor variations in the windows between the two types and the panel lines on the kit fuselage are as per the Squirrel and are quite wrong for the Twin-Squirrel! If you wish to produce an accurate scale model, it would pay to check carefully against photos of your intended prototype and be prepared to make changes.

I have yet to see a Twin-Squirrel which is fitted with a nose lamp as depicted in the kit but I believe this is an optional extra and may well be fitted to some examples. There should be two large air intakes in front of the engines but these are normally covered by mesh guards and the kit "cheats" by moulding the fuselage to include these guards. Note, however, that the box top illustration depicts a model with these intakes moulded in!

One is tempted, in passing, to wonder whether the crafts distinct resemblance to a tadpole has anything to do with its Gallic progenitors! They, incidentally, would prefer us to refer to it as the Aerospatiale "Ecureuil".

While the kit is produced by Robbe, the mechanical package is as designed by Ewald Heim for his well-known "Star-Ranger". It is difficult to say whether the components are all produced by Robbe themselves or purchased from Heim, but it is safe to assume that all major items are interchangeable.

The kit

If you possess an average sized car you will probably have to unload the contents of the enormous box into your car and leave the box itself in the shop! One reason for the box being so large is to accommodate the one-piece fuselage shell moulded in Robbe’s "Plura" plastic. This has a smooth off-white finish which could give a good foundation for painting. The word "could" is used since it is somewhat marred by a very prominent joint line where the left and right hand halves meet. Unfortunately, this has deep furrows on either side which require filling. After some thought it was decided that this was best left as it was in order to avoid complications. This is the only real criticism of the whole kit so don't be discouraged yet.

Vertical and horizontal tail surfaces are supplied as two half mouldings which have to be joined together. These, the hatches and the seat/instrument panel moulding are in a slightly different plastic having a glossy white finish. Having seen several kits and been involved in building a couple, there seems to be some considerable variation in the thickness of these mouldings. The review kit had tail surfaces which were thin enough to be distinctly flimsy and the hatches required building up round the edges to make them flush with the fuselage skin. By contrast, the seats and instrument panel were so heavy that they have been left out and will, eventually, be replaced by balsa copies.

Stiffening of the basic fuselage is provided by ply bulkheads, side rails and cabin floor. These are supplied in two large sheets with what is just about the best example of die-cutting you will find anywhere. What is more - they all fit! Clever design allows all of the wood parts to be assembled inside the fuselage and pushed into place where they all lock and wait for adhesive to be applied.

The windows (10 in all) are of dark tinted plastic, while the undercarriage has aluminium skids and piano wire cross rails.

If you have built several pod and boom models, the mechanical package will strike you as highly ingenious. Most of the principal items are glass-filled nylon mouldings with the main assembly being attached to the motor via two cast aluminium blocks which have to be drilled and tapped to suit the motor. A large aluminium heatsink is attached to the head of the motor and incorporates two of the four mounting points for attaching to the fuselage. The other two mountings are an integral part of the nylon side frames. Thus the motor is used as a stressed item and is the major part of the mechanical chassis.

A metal clutch with nylon bell is bolted directly onto the motor shaft together with a plastic cooling fan/starter cone. A pinion on the clutch drives a plastic gear which in turn drives a metal (!) pinion which runs inside a nylon epicyclic gear which then drives the main shaft via an integral autorotation clutch. The first stage shaft, driven from the clutch, incorporates a bevel gear to drive the shaft to the tail rotor. This assembly includes the swashplate and Bell/Hiller mixing unit, also mainly composed of plastic mouldings. The complete unit drops in through the top of the fuselage and can be removed by undoing four nuts, disconnecting four pushrods and removing the exhaust manifold.

If you have absorbed all of the above, you may well consider that we are discussing a possible candidate for the title of the biggest plastic kit in the world! Rest assured that the main rotor blades and tail rotor blades are actually made of wood. A thoughtful inclusion is a thin strip of hardwood along the trailing edge of the main blades which are otherwise of the usual balsa/hardwood composite construction. Heat shrink tubing is supplied for covering the main blades which, while excellent for the job, is of a translucent yellow colour - hardly appropriate for a scale model!

Ancillary items required for completion

One point which must be seriously considered by any potential purchaser of the kit is the matter of additional items required to complete it. The heatsink head already mentioned is not included and is essential in order to complete construction of the fuselage. It's inclusion is not possible since the exact size is dependant upon the motor to be fitted. Robbe's own head is being imported into this country but does seem to be rather difficult to obtain. A Heim unit was used in the review model.

Another feature of the design is a totally enclosed tuned exhaust system. Here the Robbe unit is not being imported by the distributors so a Heim unit must be used.

Collective pitch control is effected by means of a moving swashplate and requires some form of mixing between collective and lateral cyclic pitch (pitch/aileron) inputs. Robbe produce a special radio to do this and also make an on-board mixer for use with other radios. Unfortunately, neither of these items is generally available in this country, although H.J.Nicholls Ltd is able to obtain the mixer.

Helicopter radios which incorporate cyclic/collective pitch mixing (CCPM) are not suitable since these are usually designed to mix three channels (lateral cyclic, fore/aft cyclic and collective), whereas the Heim system only mixes two as previously described. Some German radios other than the Robbe do incorporate a suitable mixing system - one being the Multiplex "Royal mc".

If a suitable radio is not available, however, the prospective constructor is left with two main alternatives :-
a) Use a readily available electronic mixer. The World Electronics "Christy mixer" has already been successfully used by several builders. I decided to use a Century Systems unit for the review model, however, because it has the advantage of a user-adjustable mix ratio, together with servo neutral adjustments. The Christy unit is factory adjustable only.
b) Adapt the Heim mechanical mixer as used in the "Star-Ranger". This unit will only fit in the designed servo space in front of the mechanics if the throttle and elevator servos are moved to the rear (see photo).

Finally, it would be inadvisable, though certainly possible, to fly this type of helicopter without some form of tail rotor gyro. There is ample room available to accommodate just about any gyro on the market.

Assembly

Mention has already been made of the ease of assembly of the basic fuselage unit. All of the formers, etc. were secured in place using our old friend "Stabilit Express". The hatch opening in the fuselage top is already cut to the approximate shape of the hatches. This is quite roughly done and the review kit needed some building up in places to make the hatches a good fit. A plastic tray fits inside this opening, stiffening it and forming a foundation for the servo mounting. With servo's and linkages installed and operating, this was found to be flexing so an additional ply plate was added between the rear edge of the servo mount and the bottom of the bulkhead cut-out which accommodates the heat-sink. This performs the additional function of forcing the cooling air between the cooling fins rather than round them.

One part of the models assembly which requires extra care is in the installation of the tail drive - a problem common to most helicopters. Detailed instructions for fitting this are given and the position of the outer tube is already marked on the tailboom formers. Unfortunately, if you go ahead on this basis you will end up with it in the wrong place - as I did. This is just one of the reasons why it is necessary to acquire the heatsink head for the motor before proceeding with the construction.

The tail drive shaft is a piece of 2mm diameter piano wire running in a plastic tube which is, in turn, housed in a very substantial aluminium tube which is attached to the two rear formers. Each end of the shaft is fitted with a "quick-connect" coupling, the nature of which makes the actual length of the shaft very critical. This criticality can be eliminated by using a Heim coupling at one end of the shaft. However, by so doing you will lose the advantage of a positive drive since the Heim unit transmits the drive via a grubscrew.

Having broken the formers away from the fuselage and separated them from the aluminium tube, I devised the following procedure to take care of both of the above problems :-

1) Make the holes for the tail drive in the two tailboom formers considerably larger than required for the outer drive tube.
2) Install the formers in the tailboom. They are not symmetrical so check carefully before gluing. Do not fit the tail gearbox former at this stage.
3) Make up the shaft, couplings and outer tubing to the length given on the plan.
4) Install the mechanical assembly/motor unit in the fuselage.
5) Fit the tail rotor gearbox to its former and make any adjustments or cut-outs required to install this in the rear of the fuselage.
6) Push tail drive into fuselage from the rear.
7) Attach the tail gearbox/former assembly to rear drive coupling and push the whole unit forward until front coupling engages with the tail drive on the main mechanics.
8) Position tail gearbox former so that it is square to the tail drive and the couplings are fully engaged without putting the tail drive under compression.
9) Glue former in position. It can be tacked in place with cyano at this stage and secured properly after later removing the gearbox.
10) Finally, attach outer tube of the tail rotor shaft to the two formers in the position now taken up. I used silicon rubber for this.
11) See later.

You now have the whole assembly correctly aligned and matched to the length of the shaft - much simpler than trying to make the shaft the right length to fit between the two gearboxes!

The main and tail rotor blades are beautifully made and preformed and only require the root reinforcements to be added for completion. I did not use the heat shrink film previously mentioned but covered the blades with white Fas-cal which I prefer for visibility purposes.

Installation

The tail rotor servo is located behind the mechanics in a position which allows a dead straight linkage to the tail pitch change bellcrank. A piece of 16 gauge wire is supplied for this linkage which makes it very positive.

All four remaining servos are mounted in the roof of the cabin immediately in front of the mechanical package. Here again all linkages are very direct. Included in the throttle linkage is a bell crank which is designed to introduce a considerable amount of differential into the throttle linkage. Just why this should be necessary is not too clear, since the same effect could be obtained by offsetting the servo arm or the throttle arm. The intention is to open the throttle very rapidly before the pitch begins to increase and give a form of idle-up effect.

In view of the amount of throttle travel adjustment which is incorporated into the average helicopter radio, it would seem to be easier to use this to set the throttle response rather than fiddling endlessly with the mechanical system just described.

A hatch is incorporated into the cabin floor to allow the remaining radio equipment to be hidden away. In the review model the gyro (Quest) was mounted immediately below this hatch with the electronic mixer on its right and the receiver to its left.

The plan shows the battery installed on the cabin floor inside the instrument console and two hooks are supplied to allow rubber bands to be used to secure it. This would have brought the C of G too far forward so the battery was wrapped in foam and installed under the floor, just in front of the gyro.

A panel was made up for the switch, charge/DSC socket and glow connector and made to fit inside the left hand rear side window. Holes were cut in the window to allow access. Several holes were also cut into the right hand window to allow a supply of cooling air to the exhaust manifold.

The tank is mounted in a cut-out in the front bulkhead and is easily visible through the windscreen. It is well below the motors intake which makes it advisable to use some form of pressure fuel supply. A pressure nipple was added to the tuned pipe and connected to the tank vent. Filling is carried out via a separate pipe which is taken to the outside of the lower fuselage and fitted with a blanking plug.

Weight

Although the weight limit for helicopters is 6Kg to FAI rules; in this country we need an exemption certificate for any model weighing more than 5Kg (about 11lb 3/4oz). So, sure enough, the model weighed 11lb 3oz! It would have been a simple matter to loose 21/4oz. if only I had known!

If you intend to use the model for serious aerobatic competition - for which it should be suitable - how do you go about paring the weight down? Well, I did use 3 whole large size boxes of Stabilit Express which, in retrospect, does seem rather a lot! It is not at all necessary to put continuous fillets of glue around both sides of the formers, as I did. In fact, a bead of glue every inch or so would probably be perfectly satisfactory.

It seems that there is some considerable variation in fuselage thickness as already noted and it would be worth examining several kits to find a light one. There is little point in using thinner plywood or cutting lightening holes in all the plywood parts, but the complete cabin floor could be omitted without weakening the structure to any degree

Very little can be done to lighten the mechanical parts and the use of weighted main blades would tend to nullify the effects of any but a very drastic weight paring exercise.

Flying

As the motor (OS 61 FSR) was brand new and unrun, I adopted my usual policy of removing the complete rotor head so that the motor could be set up without having to worry about hanging onto the blades or whether the motor would idle slowly enough for the clutch to disengage. This was just as well since considerable adjustment of the carburettor was required to prevent the motor from running much too rich. Perhaps I am just unlucky, but all my OS motors seem to have their idle mixtures set much too rich as they come out of the box. This is particularly true of motors fitted with the 7H and 7M type carburettors which have three independent adjustments for idle, mid range and full power settings.

It seems to be generally considered that these devices do not take well to being run on any kind of pressure system. Personally, I too dislike any kind of pressure feed and normally avoid it like the plague, but the Squirrel tank is mounted some three inches below the motors intake and if you intend to perform any kind of aerobatics this will almost certainly give problems.

Obviously, the use of pressure will make the motor run richer for a given needle setting, but the eventual settings found for the 7M carburettor on pressure in the Squirrel turned out to be almost identical to those needed for the 7H unit installed in my Helimax running on suction. In case you are having similar problems I suggest that you try setting the mid-range needle at around three-quarters of a turn open instead of the two turns suggested in the instructions.

While all this was going on, I was becoming rather concerned about the amount of noise coming from the models gear train and the general reluctance of the whole assembly to turn until the motor was opened up to nearly half power. When the rotor head was replaced and an attempt made to fly the model it became very clear that all was far from well. Apart from the noise, the models performance was far from what was expected with barely enough power to hover.

Stripping the mechanics down revealed nothing obviously amiss and the advice of experienced Heim owners was to run a few tanks through it and allow time for it to loosen up. Loosen up it did, but quieten down no! At this point I noticed a bronze 'gunge' coming from the general region of the tail gearbox!

Examination revealed that the bevel gear on the input shaft had eaten most of the way through the brass spacer which served to position the gear on the output shaft. The design of the gearbox makes no allowance for any means of preventing inward movement of the input shaft apart from the gear touching the spacer. Without recourse to a machine shop, the easiest solution is to slightly shorten the brass spacer so that the output gear is moved into closer mesh and thus prevents the input gear from approaching the spacer. If you followed my earlier instructions about installation of the tail drive to the letter, you should now pack the tail gearbox back about 1mm or so to avoid any possibility of forcing the input shaft too far into the box!

Incidentally, having discovered the cause of the problem, at least one person whose advice I had unsuccessfully sought earlier said, “Ah yes”! I had that problem too!

I now have a very lively helicopter which I am rapidly coming to like very much. There is still a lot of adjustment and experimentation needed to get the best from it, which task is still awaiting the advent of some reasonable weather! The results will, of course, be reported in the "Hovering About" column.

The next development is to be the installation of a set of Multiplex "Royale mc" R/C equipment, which will allow the onboard mixer to be dispensed with and give precise tailoring of the moving swashplate system. This will eliminate the for/aft trim fluctuation with collective pitch changes which is a feature of the Heim mechanics used.

Conclusions

An attractive model with potentially high performance that could form the basis of a scale model. Alternatively it could be a competitive aerobatic performer with the help of a weight reducing exercise. Potential purchasers would do well, however, to acquaint themselves with full details of other items which are required for completion.