Right: what sport R/C is all about. Nene Valley R/C club members enjoy a weekend flying session. Model in foreground is popular Saturn Models' Sandpiper.

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Sport & Single

More 'Lark' Hints

Last month we considered some constructional points concerning the Micro-Mold 'Lark' helicopter and this month we continue with some suggestions on rotor blades and flying. I am again indebted to Geoff Thompson for his assistance in compiling these notes.

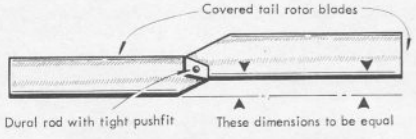
Tail Rotor Blades

Many modellers have made the mistake of making a 'left hand' and 'right hand' tail rotor blade instead of two identical blades; others have fitted them incorrectly to the tail rotor head. A little forethought and care should avoid this kind of mistake.

Balancing

The tail rotor blades should be finally balanced after they have been covered or painted and this is achieved by adding coloured trim tape to the light blade – see Fig. 1. Balance the blades, by the rod, on parallel knife edge bars, adjusting accordingly.

Fig. 1



Main Rotor Blades

Experiments with tapered main rotor blades suggest that this shape of blade may have advantages over the constant chord design. From observation, it would certainly appear that this is the case. I am prepared, however, to leave it to the scientists and aerodynamists to argue over the pros and cons. For 'Lark' flyers wishing to experiment, here are details of tapered rotor blades which we have tried and have found successful.

The leading edge material is Ramin, shaped to the same section and length as the original blades, although the contour of the leading edge does not seem to be too critical. Glue on the ¼ in. Med/Hard balsa trailing edge as shown in Fig. 2, cut and sand the trailing edge

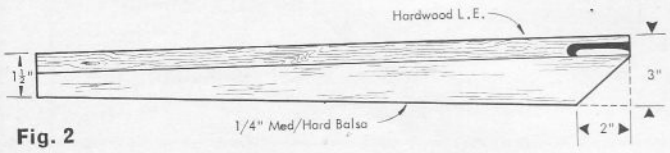


Fig. 2

to shape and note that the leading edge section does not vary throughout the length of the blade, i.e. the thickness ratio increases towards the tip. Ply strengtheners are added as before.

An alternative to painting blades or covering with Kwikcote or Solarfilm is to cover them with 'Fablon' or 'Contact' self adhesive plastic film. Better still is the P.V.C. self adhesive material used for self adhesive letters and numbers. This material has a very adhesive backing and is extremely tough. It is suggested that the blades are clear doped and sanded first and the root area painted before covering is commenced. Covering may be undertaken in two pieces, although it is possible to cover each blade from one piece of material. See Fig. 3.

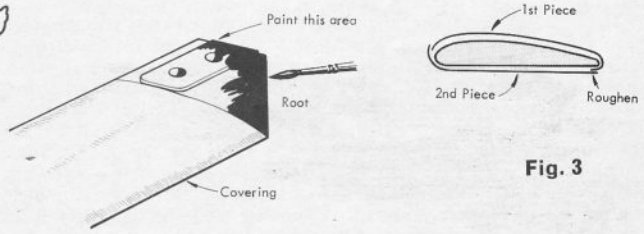


Fig. 3

Sets of tapered rotor blades with covering material are available – see Classified Adverts.

Page 35 (instruction book). The surface of the rotor shaft should be roughened with a file at the position of the swash plate driver. Roughen the surface with a file to achieve a better key for the driver to clamp to. It is imperative that the driver does not move in flight.

Page 37. Paddle blade alignment. Should you find difficulties in lining up the moulded line on the paddle with the edges of the rotor head, a scribe block method may be used. Use only two top grub screws for adjustment and 'torqueseal' before adjustment is commenced. The underside grub screws are tightened after truing of the paddles.

Rotor Head Balancing

It is vital that the main rotor assembly, including paddle blades, is square and well balanced. Misalignment will make flying extremely difficult or even impossible. Alignment of the main rotor assembly will be easier if a board (thick white card will do) with centrelines marked on at right angles to each other. See Fig. 4. The board needs

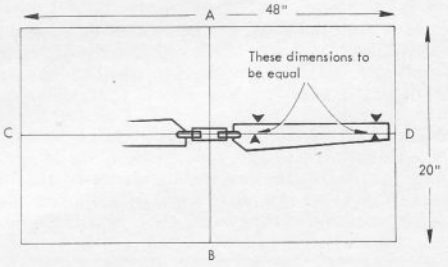


Fig. 4

to be about 20 in. × 48 in. (14 in. × 43 in. min.) and the centre lines must be accurately drawn. Before the rotor assembly is balanced, it should first be fitted on the model and the coning angle adjusted relative to the tail boom. Remove the assembly and invert on the building board. Measure from the leading edge of the rotor to the centre of the attachment bolts at the root. Measure an equal distance at the blade tips and mark positions on the underside of the blade tips. Align the fly bar over line A-B with the rotor head over the centre crossing. Adjust the blades until the marks on the blade tips coincide with line C-D.

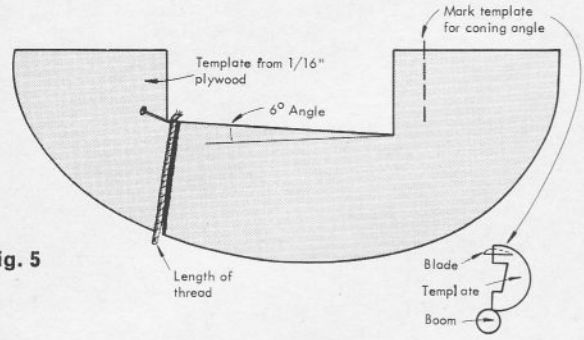
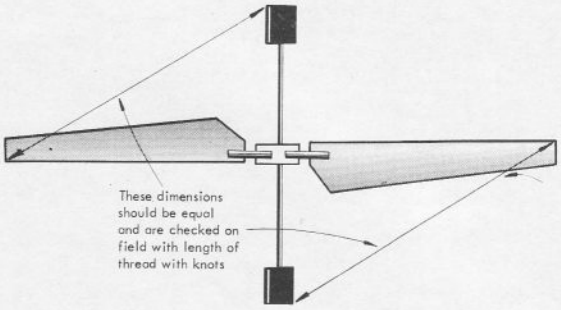


Fig. 5



Balancing the blades is most easily carried out on parallel bars, measuring the vertical distances from the tips. Coarse balancing is carried out with small countersunk wood screws or self tapping screws (drill the hardwood L.E. first and counter sink). Secondary balancing can be achieved with household pins pushed into the rotor tips (balsa part) and final balance is then obtained by using self adhesive trim tape on the blade tips. Contrasting colours of tapes should be used on each blade.

Re-check the total balance of the head assembly by supporting at the pivot head over a flat surface. Rap or vibrate the table supporting the pivot head – the assembly should remain exactly horizontal. Should the assembly appear to be out of balance around the blade axis (i.e. one paddle is apparently heavier), move forward fractionally the rotor blade in front of the heavier paddle – in direction of operation rotation. Never move blades rearwards – this will probably cause oscillations.

With the rotor head assembly connected, but with the transmission belt to the engine removed, the rotor blades should rotate through at least four complete revolutions when swung from a static position. Failure to rotate as freely as this indicates stiff bearings and transmission. Do not, incidentally, use the drawing in the instruction book (Fig. 6 Page 38) for measuring the 6° angle and add to it a mark taken from one edge of the template as a guide for the coning angle distance between the rear boom and rotor tip. Also, it is worthwhile tying a piece of strong linen thread to the template to assist in field measurement of blade alignment – checking that the distances from blade tip to paddle tip are equal. See Fig. 5.

Engine

The engine has a pretty hard time of it in a helicopter. It spends much of the time running nearly flat out, often with a minimum of cooling. The O.S.25 fitted in the production prototype 'Lark' is still performing well after ten months of operation and many hours of flying. The external appearance admittedly represents a piece of charcoal more than an engine but, internally, it is in excellent condition. This is a tribute to modern engines, castor based fuels (no break down at high temperatures) and to Geoff for taking the trouble to run the engine in well before using it in a helicopter. Various engines require vastly differing running in periods, particularly small lapped piston engines, and it is strongly recommended that a new engine is subjected to a period of operation in a conventional fixed wing model before fitting to the 'Lark'. Always double filter your fuel and set the engine *slightly* rich for flights – the one dread of helicopter flying is an engine failure at height.

Starting methods vary. Geoff normally uses the starter to prime the engine until it is 'popping', and then resorts to a leather thong to pull start it as with a model boat. In the case of an easy starting 'free' engine, it is possible to start by 'flicking' the fly-wheel between the thumb and forefinger. Always remove the toothed belt for starting.

Before first flights are attempted, check that the blade tips are rotating in the same plane while a helper holds the model down. This is where the different coloured blade tips assist in determining the 'low' blade. Adjustment to the 'low' blade is made *not* by altering the coning angle, but by increasing the incidence of the blade. Twist the blade holder to increase the pitch angle of the lower blade and try again. Make adjustments until the blades are rotating true.

Flying

As with any model, never consider flying until you are *certain* that *everything* is working as it should be. Get someone to double check that the controls are all working in the correct sense. Again, as with any model, it is preferable to get an experienced (on helicopters) pilot to trim the model out for you. Once the model is trimmed out, you are very much on your own. A buddy box system does not seem to be of great value for helicopter training as so much initial flying is carried out near the ground and there would be insufficient time for the 'teacher' to take over and correct mistakes.

Quite full movements of all controls may be required and you must be prepared for *quick* counter corrections. This is particularly so when hovering near the ground due to ground effects. A steady light wind condition is preferable to a flat calm as the wind assists in keeping the 'Lark' weathercocking into wind. In calm conditions, the problems of keeping into wind, particularly near the ground, are much greater. Helicopters, as with fixed wing models, should always be taken off and landed directly into wind. Take care in placing the model on a piece of flat ground, as smooth as possible, with a decent flat run in front of you. Short smooth grass, combined with floats fitted to the 'Lark', is undoubtedly the ideal condition for learning to fly the model.

Although it is of course, imperative to learn to operate all four functions of the helicopter simultaneously, the first control to be mastered is the tail rotor. Trim out any natural swing. The tail rotor control is adjusted by increasing or decreasing the pitch of the tail rotor via the clevis linkage. Learn to keep the model straight by watching the *nose* of the model and not the tail. When the tail rotor corrections become *automatic*, forward movement may be attempted keeping the 'Lark' just 'swimming' on its floats or skids. The next step is to take off the model and walk with it in a constant forward track into wind. Keep the nose tilted slightly downward for these 'hops' and never try to lift off the model unless it is level and pointing into wind. When this phase of flying is mastered, the time has arrived for a circuit. Take off and climb steadily ahead, not too far away, or too high and commence a left hand circuit. The left turn may require a little 'up' – on the main rotor, and a little 'left' on the tail rotor. (Right hand turns normally only require 'right' main rotor and 'up'). Coming round to the landing approach, reduce the throttle gradually and aim to keep the 'Lark' coming forward and steadily downward into wind. Be prepared to open up the throttle to reduce the rate of sink near the ground but avoid trying to put the model into a hover position too high above the landing spot. Patience is one of the biggest assets with helicopter flying as it takes considerable practice to fly in the manner of the experts.

A few final thoughts

Do not fly in poor light conditions, i.e. near dusk. With all helicopters it can be difficult to tell the altitude in various positions and it is even more difficult in poor light. Do use the 'Lark' floats if possible, 'bounceability' and 'skimmability' are better with floats.

Sometimes a 'Lark' seems reluctant to leave the ground even though the engine appears to be running well and the rotor pitch is correct. In such a situation, check the rubber toothed belt for possible wear. With the wrong tension it is possible for the belt to slip and cause the teeth to wear.

If the 'torque seal' is to hold metal parts securely, it is necessary to clean the metal parts thoroughly with a degreasing agent. To release 'torque sealed' parts, heat them with a flame and apply cellulose thinners.

After a considerable amount of flying you may find that some wear occurs in the fixing holes on the root of the main rotor blades. This can be remedied by making a longer steel blade holder (steel as used for ornamental scroll work suits fine) with a three bolt fixing. See Fig. 6.

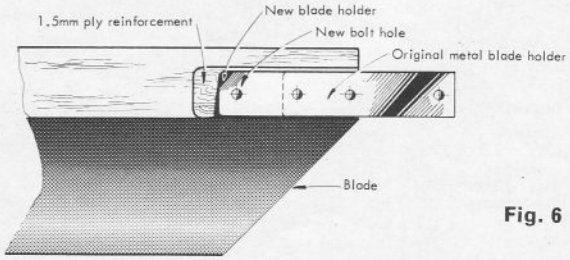


Fig. 6