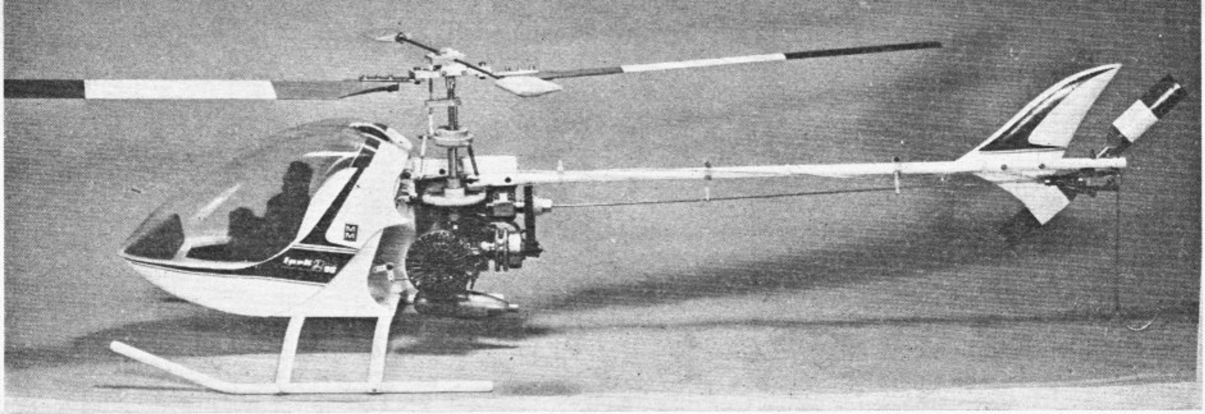


RM TEST REPORT "LARK 2-25"

latest helicopter kit for small motors, by Micro-Mold —built and flown by MAURICE TAIT

THE Mk I *Lark* was first presented four years ago as a simple and inexpensive small helicopter. Since then it has introduced thousands of modellers all over the world to the thrill and precision of radio controlled helicopter flying.

In reviewing the latest version, the Micro-Mold *Lark* 2-25, I felt the best way to be fair to the designer and the manufacturer was to build without deviating from the instructions. I found these to be very clear and easy to follow, with an explanation of helicopter flight theory followed by the building sequence laid out in logical order with excellent diagrams.

At first glance, the greatest improvement in this kit is the appearance of the model. *Lark* 2-25 has an air of 'bezazz'—as if it means business with style. A closer examination reveals it to be very practical too, as the whole cabin area can be pulled away. This reveals the four servos neatly in line in a ply tray at the top of the fuselage, with the receiver and battery safely housed below. A very simple, easily 'gettatable' layout—in fact, one of the best I have come across.

Mechanical improvements over the earlier kit include a neat universal coupling between the 16g wire tail drive shaft and the tail gearbox; tail rotor gears in an oil bath with transparent plastic cover; improved tail skid design and fitting; much-improved clutch; ball-raced swashplate; and phosphor-bronze bearings for lay drive shaft—now ready fitted in a single aluminium block instead of in separate nylon mouldings.

Some of these improvements were seen in later versions of the original kit, but it is encouraging to note that the basic *Lark* mechanics and design have withstood the test of time.

Construction

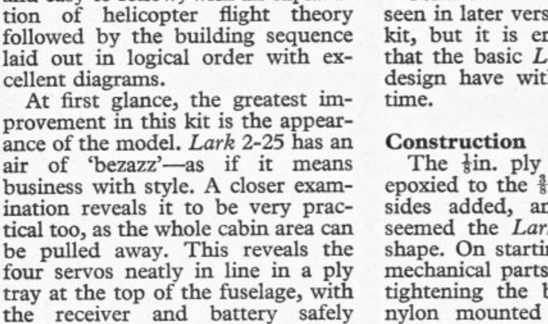
The ⅛in. ply fuselage back was epoxied to the ⅜in. ply former, the sides added, and in no time it seemed the *Lark* 2-25 was taking shape. On starting assembly of the mechanical parts I found that after tightening the bolts clamping the nylon mounted main rotor shaft bearings to the base plate, the shaft became very stiff to turn. This did not appear to be due to the holes being out of alignment but to the main plate being very slightly curved as a result of being punched out of ⅛in. dural sheet during manufacture.

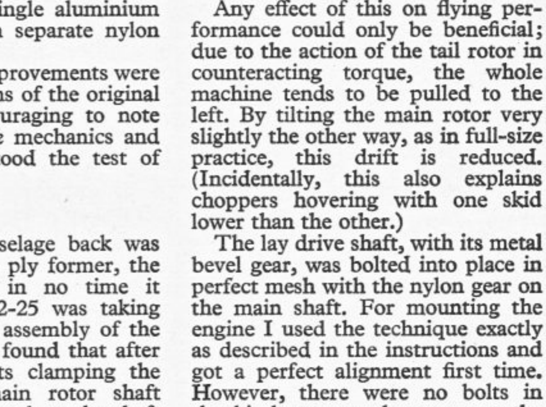
This was solved not by filing out the accurately pre-drilled holes as suggested in the instructions, but by placing a thin 6BA washer under each hole of the lower bearing block to raise it slightly from the plate.

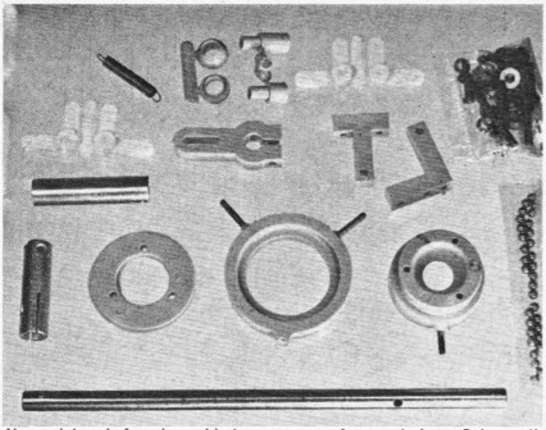
Any effect of this on flying performance could only be beneficial; due to the action of the tail rotor in counteracting torque, the whole machine tends to be pulled to the left. By tilting the main rotor very slightly the other way, as in full-size practice, this drift is reduced. (Incidentally, this also explains choppers hovering with one skid lower than the other.)

The lay drive shaft, with its metal bevel gear, was bolted into place in perfect mesh with the nylon gear on the main shaft. For mounting the engine I used the technique exactly as described in the instructions and got a perfect alignment first time. However, there were no bolts in the kit long enough to mount the engine on the aluminium pillars. This seemed silly, but true. Sub-

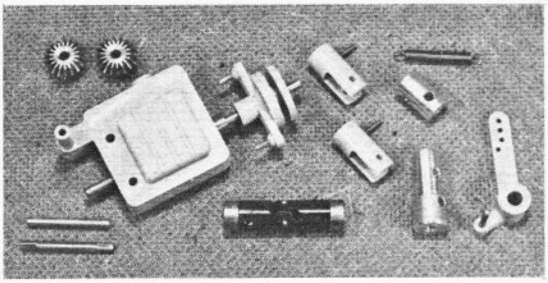
Below are the clutch components, and at right the pack containing side frame, main drive gears and belt-and-gear for tail rotor drive; also corrugated heat-sink for cylinder head.

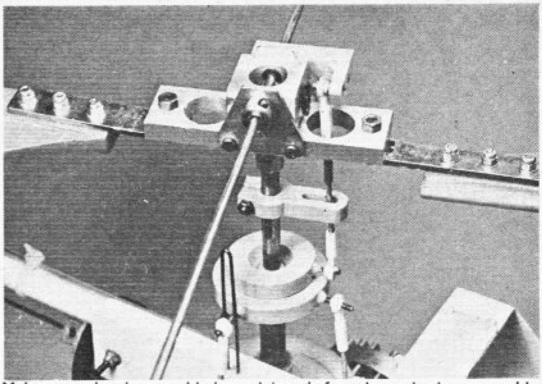




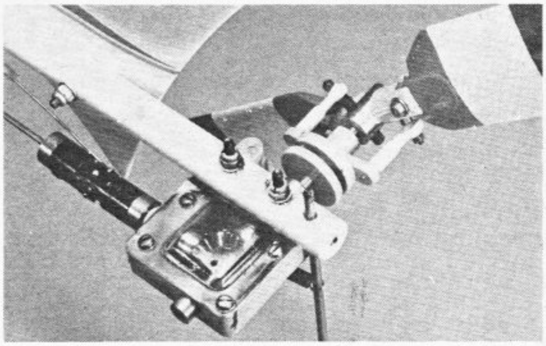


Above: drive shaft and moulded components for swashplate. *Below:* tail-rotor-gearbox and rotor-hub components—seen assembled and installed at right. (Note transparent gearbox lid for oil checks).





Main rotor head, assembled to drive shaft and swash-plate assembly. New swashplate has ball bearings (seen left) between the nylon mouldings which make for ease and smoothness of rotation.



stituting with 1 1/4in. bolts from my scrap box the engine was easily fixed in position, and gave the required 3/16in. deflection on the fan belt.

Before epoxying the Ferodo clutch lining to the clutch bell I cleaned the bell thoroughly with methylated spirit to ensure a good bond. While the epoxy was drying, the lining was forced into good contact with the inside of the bell by packing it tightly with tissue.

One minor problem when fitting the flywheel/clutch assembly onto the OS 25FSR was that the motor crankshaft was 1/32in. too long to allow the assembly to be clamped up tight. This was resolved by placing an extra 1/16in. washer behind the clutch centring washer, and recessing the 8-tooth nylon pulley to clear.

The tail rotor gearbox was easily assembled but very stiff to turn. The mesh of the brass gears was improved by reducing the thickness of the washer behind the driving gear with a small file, resulting in very free movement.

The swashplate was a pleasure to assemble. The new version has ball bearings between the nylon mouldings which greatly assist freedom of rotation. One baffling requirement was for a piece of plastic tube 13/32in. long to be placed over an 8BA bolt moulded into the side of the swashplate, followed by a nylon ball for a control link. As the bolt was only 3/8in. long, this seemed unrealistic... The tubing was reduced to 9/32in. and the ball screwed onto the end of the bolt.

Another puzzle was the brass adapters used on the tail rotor push-rod and the control link from swashplate to rotor head. They were too small in diameter for the ball link, which could be pushed over the threads and pulled off again with only finger pressure. Again, scrap box to the rescue.

While making the main rotor blades from pre-formed hardwood and sectioned balsa trailing edge, I took great care to ensure that the upper ply reinforcing piece was parallel to the straight bottom edge of the Clark-Y type section. The ply is faced on to the mild steel blade mounts, and getting the correct angle minimises further adjustments. The main blades were sanded, given two coats of sanding sealer, sanding between coats, covered in tissue doped on, two more thin coats of dope, followed by two coats of paint. When checked, one blade required a thin strip of tape added to increase weight and shift the centre of gravity to match the other blade.

An alternative to painting for those who want to get rotating in a hurry is iron-on film.

Radio installation was straightforward but it does not pay to rush it (does it ever?). Careful thought about directions of throw and pushrod placement were needed before final fitting.

There was but one fault in the installation drawings, which implied that movement one way of a bell-crank between servo and swashplate would result in forward movement of the helicopter. In fact the reverse (sic) was true.

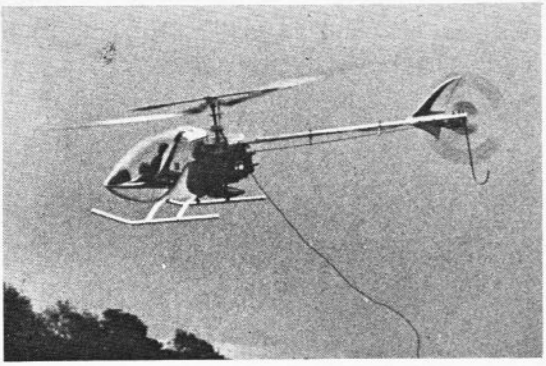
Main rotor setting up procedure was followed to the letter and found to be very simple. The main blades were set to 6 degrees incidence by bending the steel blade holders with an adjustable spanner—crude but effective.

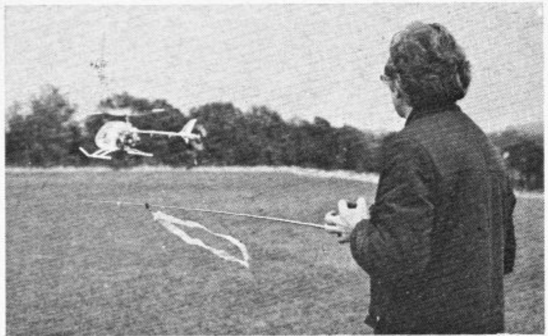
Checking the coning angle by measuring the height of each blade tip as it passed over the tail boom resulted in one blade having to be adjusted. The blade incidences were checked again to make sure they had not been affected.

The main blades on the *Lark* 2-25 are swept forward ('lead') by about five degrees to avoid possible Rock and Roll oscillations. If you have ever watched a helicopter join the old Rock'n' Roll routine you will agree it is one we modellers can do without.

The black rubber fuel tubing and plastic clunk supplied for the tank were exchanged for 3/32in. bore silicone tube and a brass clunk, as the original materials resulted in the clunk floating 1/2in. above the tank floor. The fuel filter supplied was fitted between the tank and engine.

Assembly of the canopy requires a fair bit of thought and considerable care. The instructions make it





Above: our test reporter hovers the *Lark 2-25* and, left, a typical diving turn shot.

look easy but a wrong step here could spoil the job. I found it awkward to get the pieces to fit properly, and in fact replaced the ⅛in. ply floor by one cut from balsa, because it was too narrow for a good fit.

Eventually it was all together, painted with white polyurethane as recommended, and decorated with the excellent transfers supplied in the kit. The result was a pretty model with a smart colour scheme.

On checking the balance, the c.g. was on the front of the main shaft, without need to add ballast.

Flying

When the wind had calmed down enough to fly, the OS 25FSR was fired up using a leather bootlace round the flywheel, the tickover needle adjusted, and the model carried to the take off area. The clutch bell was held still with my fingers in order to slip the toothed bell over the driving cogs, and I was pleased to find there was virtually no drag. The engine would tick over safely at low speed without engaging the clutch.

I opened the throttle slowly until the model showed signs of lifting off. A bit more throttle, a touch of tail rotor and right cyclic, and she was off the ground and two feet in the air. The first few seconds of hover showed the controls to be adequate, but the model was landed quickly because, despite all my efforts at balancing the blades and paddles, there was severe vibration of the entire machine. Adding three layers of electrical tape to one of the paddles reduced vibration to an acceptable level, but the complete cure showed up later in forward flight tests.

During a fast and steep descent on low throttle a Rock and Roll oscillation developed. It was not serious and did not affect the controllability of the helicopter, but it did give me the clue. Examination on the ground revealed that one blade had been knocked back to 1 degree lag, and the other had only 2½ degrees lead, instead of the recommended 3-6 degrees lead. Resetting the blades completely cured the vibration and the model has given up the Rock and Roll habit.

On its first day out the *Lark* was flown for five full ten-minute flights without any adjustments being needed to trims, and was found to be a delight. It demonstrated quite a high flying speed with good responses. In the hover I found the main controls to be docile yet with adequate response, once one remembered to make no sudden movements of the throttle.

The sudden change of torque resulting from too rapid a movement of the throttle stick makes the model gyrate every time. But gentle use of the controls gives a good stable hover. With practice any

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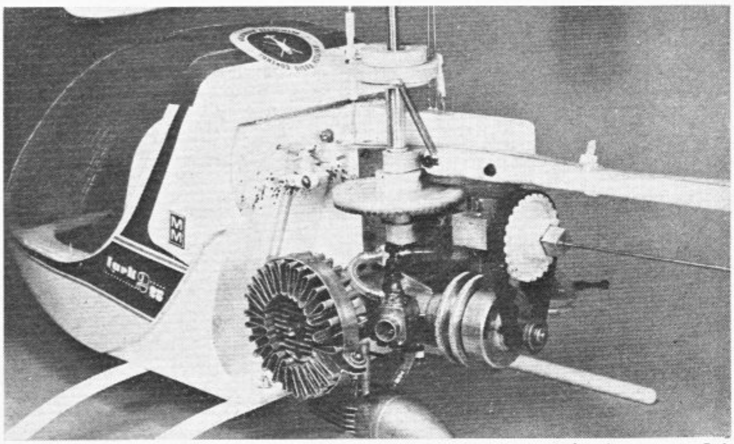
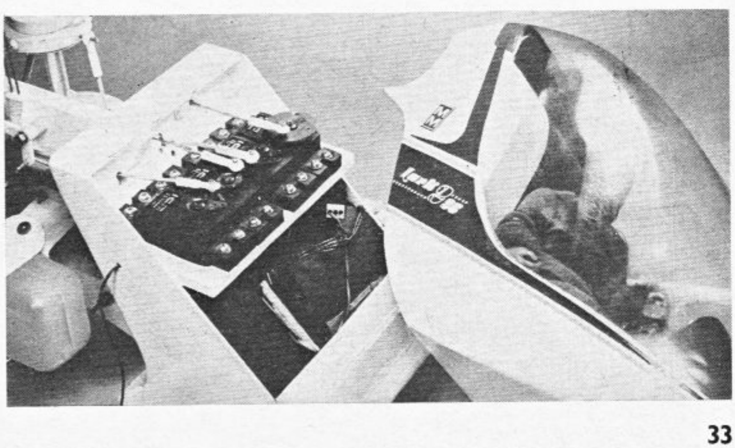


Rear view of completed model, showing "engine room." Note heat sink fitted to motor. Belt drive transmission to main and tail rotor shafts. *Below:* canopy removed to show radio installation.



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beginner should soon master the tail rotor because, when corrective control is fed in, the *Lark* 2-25 responds quickly and precisely. It will fly backwards reasonably well, although it weathercocks at the slightest excuse if moved too rapidly. In performing zooms and other mild aerobatics I found it best to remember to stay high, as the *Lark* can take its time in pulling up from a nose-down dive (but no trouble at all in a steep descent with the fuselage horizontal and throttle low).

By the second flight the *Lark* 2-25 was flying mild chandelles, 360 degrees tail rotor turns, long steep fast approaches and fly-bys.

Just before lift off on the fifth flight I noticed the tail rotor had stopped. Immediate shut down and investigation revealed the grub screw had fallen out of the brass bevel gear on the tail shaft. Rapid application of 'Torqseal' (supplied in the kit) and allen key resolved this problem, and the *Lark* was back in the air for the last flight of the day before bad light stopped play.

Summary

The *Lark* 2-25 is easy to build and easy to fly. It is an attractive, practical, and manoeuvrable little model.

I have built or test flown many models on their maiden flights and the *Lark* 2-25 bears comparison with any of them. It is only the second model I have flown which flew straight from the board with no trim adjustments at all. The only other model which matched this test cost more than three times as much, so *Lark* 2-25 represents, in my opinion, very good value for money. *Manufacturer/Distributor:* Micro-Mold, Station Road, East Preston, West Sussex.