MFA COLLECTIVE 500

Norman Streeter builds the M.F.A. Sport 500 Collective Version

Earning your living with the same company as the editor of your favourite Helicopter Magazine can have its advantages. Knowing he was "overworked", my offer to do this review for him seemed to reassure him that he would hold on to his head of hair longer than he might have anticipated.

The concept of buying a fixed pitch machine with the option of a collective update as finances allowed is all too rare these days. MFA have managed all combinations, a fixed pitch machine, a collective update and a complete collective version of their Sport 500. No doubt a conscious effort by MFA to tailor their machines to suit people's financial resources.

Back in the August/September 1988 MHW Clive Thompson did a review of the fixed pitch version. I shall channel my ramblings into the actual building and flying.

Kit Contents

From the onset the kit has been designed with the newcomer in mind, the familiar kitting in plastic bags with appropriate titles to suit each bag made identification easy. I did like the way all the nuts, screws etc. were separated into individual bags, i.e. all 3mm nuts and bolts together rather in the relevant fitted bag. Woodwork is 4mm Ply and well marked out, even down to which way the curve should travel for each function, plus a pitch gauge. The canopy is in two halves with a good lip for joining.

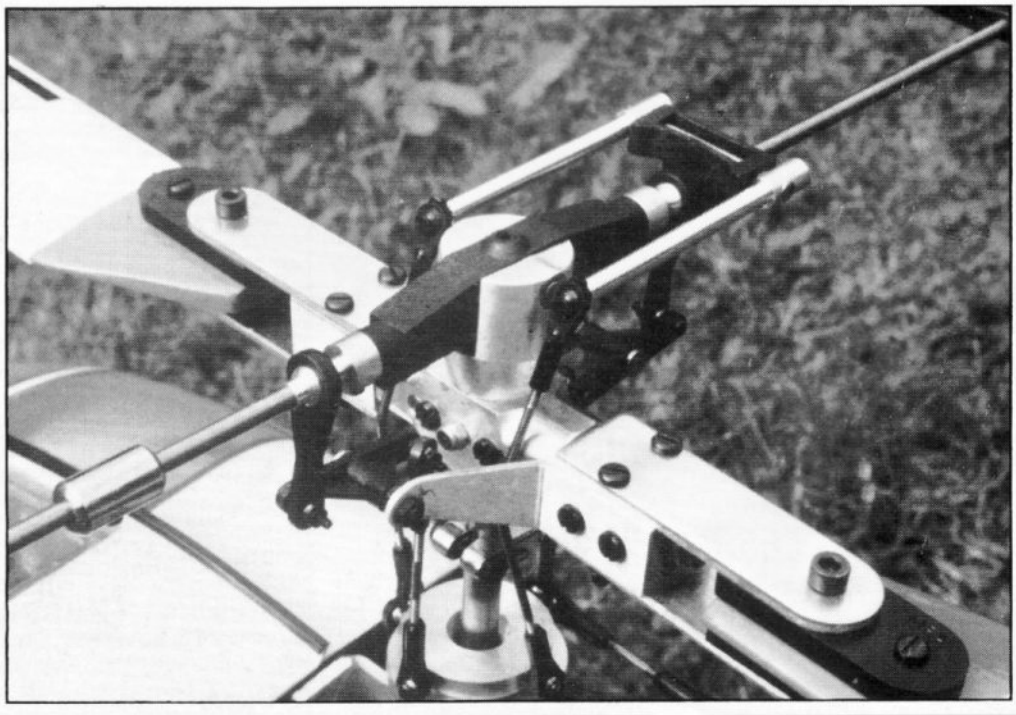
The instructions take full marks, they are well written with clear photographs to match. The second paragraph on Page 1 suggestions that if you abide by the instructions then building and flying should be successful. Let's get on and see if they are right!

Construction

Having attached the four u/c legs to the single main frame the clutch assembly followed with no problems, although I did have to grind the spring protrusions down as suggested.

Fitting the flywheel to the engine is where I had to diverge. My available engine was a Super Tigre 45. The instructions inform you than an Irvine requires a 9.5mm hole but not that a S.T. needs a 7mm hole — you get ¼ inch. If you do not want to return your flywheel or ream it out then choose your engine to suit. Whilst on the flywheel I was later to find out that it is vital to ensure a minimum run out on the flywheel to avoid vibration and the possibility of the engine plate cracking, take care at this stage, it is worth it. Mounting the engine to the plate and subsequently to the frame went without mishap. The cooling duct took a bit of time to get right but this was mainly due to the size of the S.T. Carb.

The horizontal small bevel geared shaft assembly, including the previously mounted



Head mixer assembly with fly bar balancer.

Note large tank for endless flying.

clutch and tooth pulley is fitted next via two ballraced blocks to the chassis, hooking the toothed driven belt over the two pulley's and setting them up at right angles to each other, to allow 6–10mm belt movement.

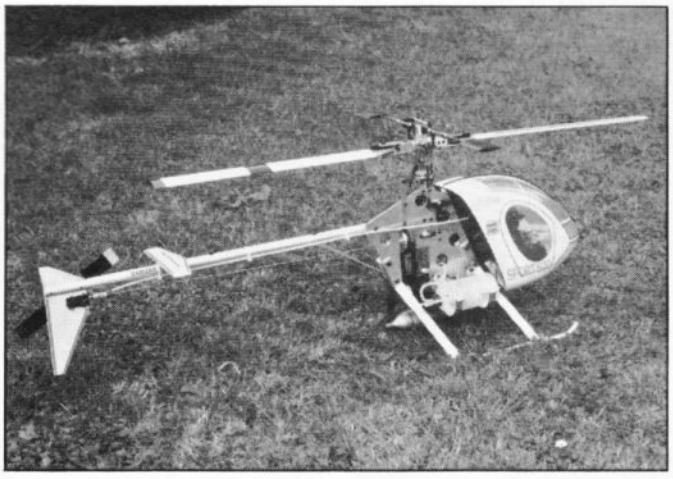
The mast and large bevel gear was next, the top bearing block is mounted first, in this case an oilite bearing then the lower ballrace block, at this stage do not tighten the blocks, the mast is taken down through the top oilite and then aligned by pulling the mast in the appropriate direction to drop into the bottom bearing. Mine was remedied by turning the oilite block around 180° which gave me a beautifully smooth running mast. I was fortunate to have the autorotation kit which no doubt helped because the large bevel gear in my kit was a very sloppy fit on the mast, both these items are discarded if the auto facility is used.

The fuel tank clips and tank followed including foam seating tape to help prevent the fuel tank from frothing up.

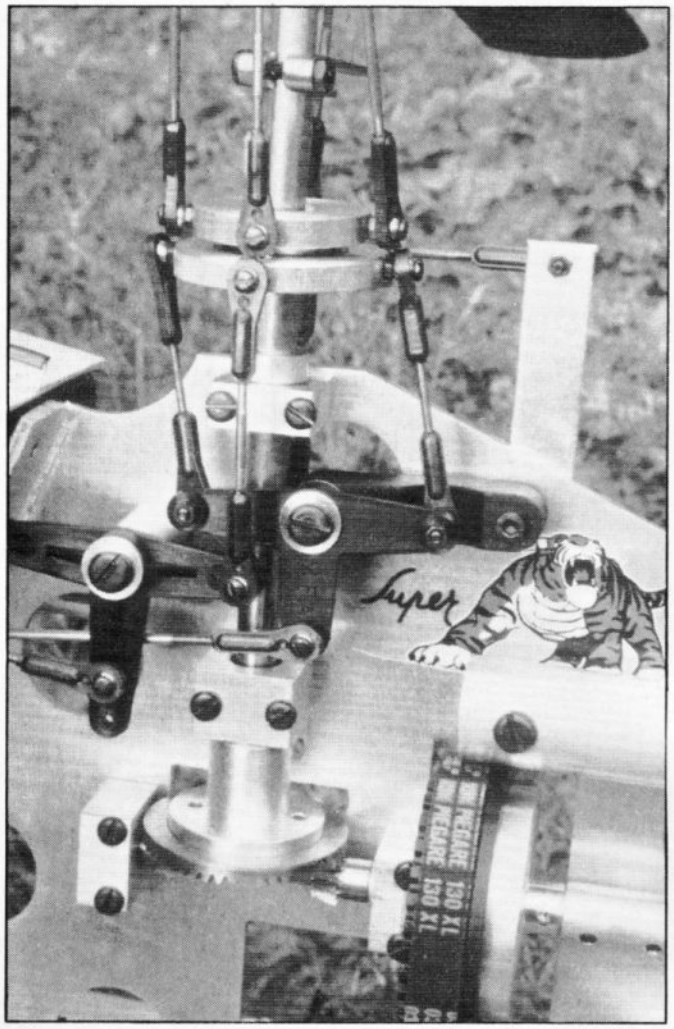
Tail boom was next, my only comment here is to ensure that the slot at rear is nearer to STBD side, saves you putting it on upside down. My boom support was missing but soon rectified by MFA by return of post. T/R drive supports are loosely fitted along with the tail drive rod and couplings. Do put flats on tail drive, I also put them on the gearbox outputs as well to be sure. Tail rotor gearbox went together without a hitch consisting of one oilite and one ballrace per shaft, held together by two GRP housings. This is mounted to the tail fin and subsequently fed into the tail boom slot and held with two bolts. From here everything was aligned and bolted up for a smooth run. Tail rotor hub and blade holders all went together without difficulty. The T/R blades were of a different length by some 2mm which was soon put right.

Head Assembly

The metal swashplate pivots on an 'o' ring and is an all moving device and is all very similar to the Heim/Vario technique of mixing. The bell cranks did give cause for concern especially the fore/aft crank touching the bottom-most bearing. Instructions said use inner hole — mine did not have one, a chat to Chris Baker at MFA explained that a batch had escaped without the inner hole facility. If you are unlucky, drill a 2mm hole 8mm up from existing hole and you will be okay.



The head is an all aluminium affair apart from the fly bar holder and head mixer which are a GRP material. Damping is such that it is of a flapping nature. Assembly starts with the head mixer fly-bar and paddles. Next we assemble the teeter rubbers onto the blade pivot pins, each one retained by a retaining pin through the blade joiner and



Pitch up/cyclic fore/aft and roll bell cranks.

Don't forget to lubricate gear box.

"Piglet" one of J.D.'s ground crew checks paddle alignment before first flight.

locked by M3x5 screws. The blade holders follow, mine went on easily despite the instructions telling me I may have to debur the pin ends. The rotor head is epoxied into the blade joiner, in retrospect I should not have done this as the fly bar pivot pin goes through the rotor head via two bushes which were out of alignment. I had to drift the brushes out and re-fit to get a free pivot for the fly bar and that would have been easier if I had not done the epoxying. The blade holders pitch arms etc. all went together easily.

Main blades weighed in at 51.5 gms each exactly. As a personal preference I weighed mine at 72 grms with a milled slot and nickel brass powder epoxy mix, they come ready drilled apart from a 3mm hole to secure the blade holders on final alignment. No work was required to balance statically as both C of G came out perfectly.

Woodwork etc.

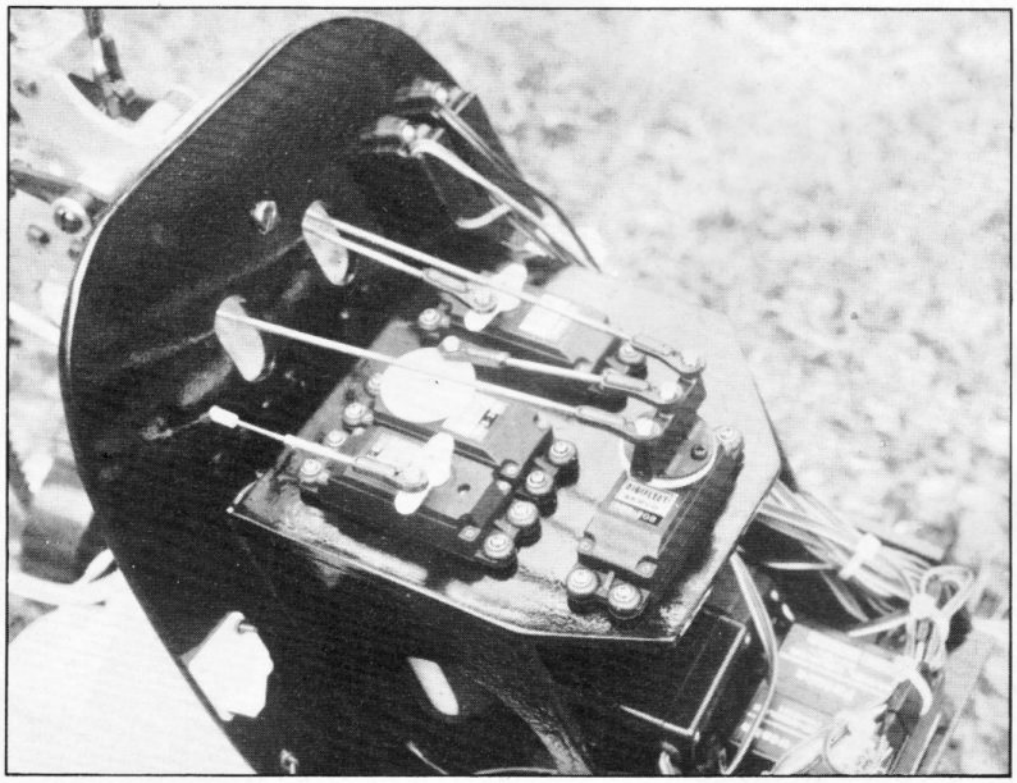
The woodwork was cut out to suit servos switches etc, all the necessary cut outs are marked including output. After relevant fuel proofing and painting everything was fitted to chassis and servos fitted. The linkages were then made up to exact lengths given, no difficulties here.

Canopy was straightforward with a good lip to join the two halves and trim down afterwards. Security is by two 6mm nylon bolts into nylon retaining brackets mounted on the servo chassis. I was to subsequently fit two screws via the bottom of the canopy into a wooden crosspiece at the base of F1 to stop the canopy rocking back and forth.

Setting Up

There was ample room for the radio set including Gyro and 1000m/a battery. As I mentioned earlier all the linkage dimensions are given with the throttle one being the only one you may disagree with depending on your positioning etc. A mixing unit is mounted to the cyclic roll servo and linkages connected. You might like to raise the collective servo a bit to cut down the push rod angle. Initial settings are easy with all servos at neutral and ball cranks horizontal. Tail rotor control is via a PTFE tube and 18 SWG wire via cable ties, I would have preferred stand offs here for a

Plenty of room for radio installation.



straighter run. The pitch gauge is used to give you −1° to +8° on the main blades.

Flying

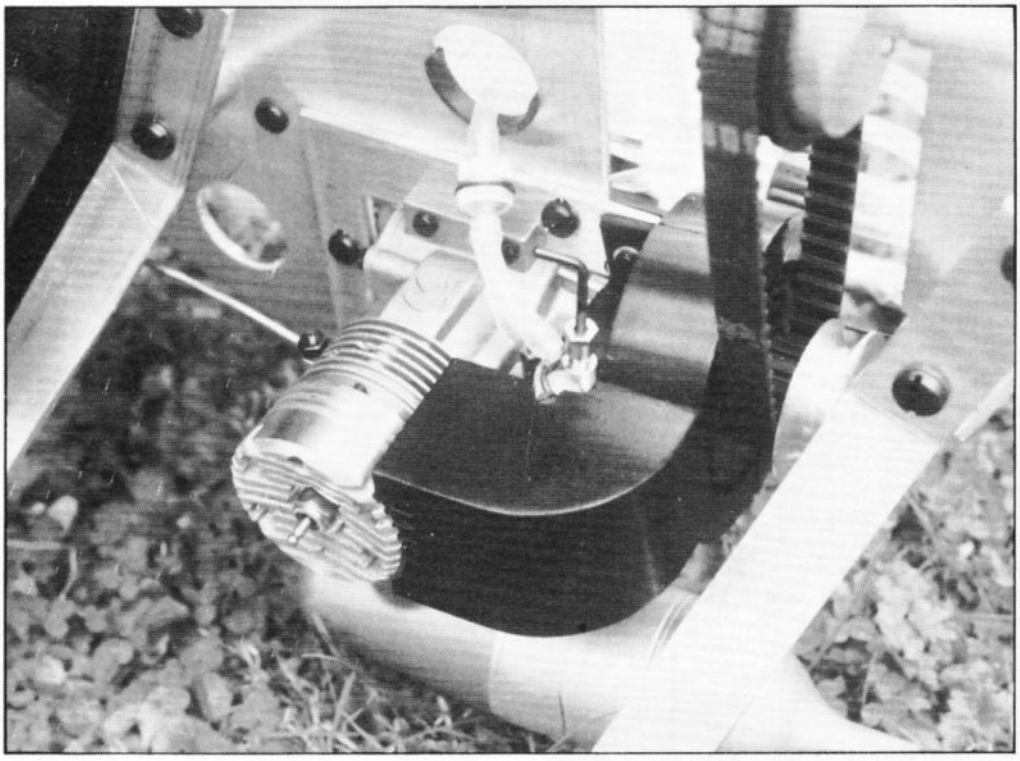
All ready to go, yes but not the weather, three terrible weekends led to desperation as far as getting this review in on time so flying was limited to a couple of sessions. Two problems arose, vibration and nodding. The vibration was a 6 thou. run out on a flywheel, careful attention is required here as the cracked engine plate soon proved. I got it down to ½ thou. run out and with a new engine plate things were a lot better after a bit of tape on the fly bar paddle.

The nodding took a bit longer to find, I had the head speed but was the lead/lag on the blades OK? The dampers seemed soft enough but I decided to coat them in Vaseline. I also made another set of blades up and drilled the blade pivot hole 2mm closer to the leading edge — (sorry Chris these were a set of Morley blades I had at hand). All the work paid off as everything was perfect at the next flying session. Naturally I put the original blades back on and decided they were in fact better than the ones I had just made up, no doubt because they were heavier. It did mean though that the Vaseline on the dampers cured the nodding.

With the initial problems out of the way the 500 flew very well with all the controls set up as per instructions. The ST 45 was more than adequate and with a few collective adjustments we were soon realising that this model had a lot of potential. Tail rotor at this point would seem to lack a bit of turning power but apart from this I am looking forward to further flights.

Ed's Comment

A dabble on the sticks soon confirmed that the Collective 500 exhibits that combination of stability and response that is essential for rapid progress by the newcomer and enjoyment for the more experienced. Tail power is adequate in the hover but shows up as a bit short of life in the circuit. I am not sure at this stage if this is simply evidence of a need for more tail power — you could fit larger blades — or is a result of the unconventional tail rotation. More flying will tell.



Engine plate would benefit from two more screws at corners, to make it more rigid.

In sport form the ST 45 is really too much and the pitch range suffers — you get rpm decay in a descent. However, this will come in handy with the body — of which more anon.

Conclusion

If built as per instructions i.e. take your time, you should have no problems. Do ensure a minimum run out on the flywheel, it will pay off later. To find fault with the kit I would comment on the poor drilling of the mast, perhaps I was unlucky, but a lot of slop existed in the crown wheel and head when fitted, which would not be acceptable as far as flying was concerned, my cure was Stabilite Express in the holes to take out the slack, seems to have worked.

To maintain this model is a dream, everything is accessible, a major plus in my book especially for the beginner. Well you have the fixed pitch, then the collective version, how about a smart Hughes 500 body to wrap around it, that's next.□