

Graupner Bell 212s of the Graupner demonstration team flown by Manfred Kufner and Herr Palmann in action at the Domenico Agusta R/C Helicopter International event during the summer.

By Jack Barnard

Building the

GRAUPNER BELL 212 'TWIN JET'

I AM afraid I was a little optimistic in expecting to have this model completely assembled by this month's issue of the mag. The kit builds fairly easily, but I found that the main hold up was the fact that one has to use a slow setting epoxy to ensure maximum strength when gluing the ply sections to the fuselage, and as absolute accuracy is necessary I thought it advisable to place the fuselage to one side while glued sections were drying for fear of inadvertently misplacing same. In fact, I had so much time to spare while waiting for glues to dry I used it up in building and flying a conventional model!

The need for complete accuracy is, of course, obvious, and the instructions have to be followed to the letter. It is necessary to have the large plan unrolled and the written instructions plus the exploded diagrams always immediately to hand during the building for purposes

of cross reference. There are also quite a few measurements which have to be transferred from the plan to the fuselage. One, in fact, needs quite a large working area, I won't tell you where I built mine, but we did get used to having our meals in the kitchen after a while!

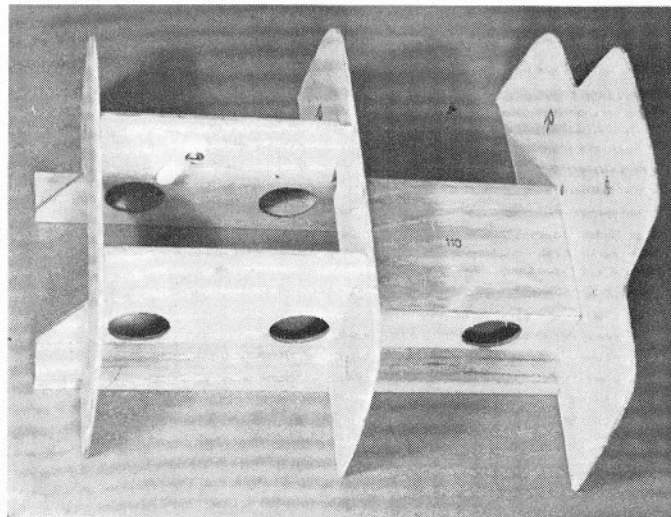
The first step in the building sequence is the making of the sub-assembly, a ply frame which is the foundation of all the interior woodwork. This is built for accuracy around a large balsa block which is supplied ready cut accurately to shape, and when the glue holding the sub-assembly together is quite dry the balsa block is removed. The sub-assembly must be constructed on a true flat surface, and all angles must be double checked with a set-square before the assembly is carefully placed to one side, preferably overnight, for the glue to set really hard. Speaking of set-



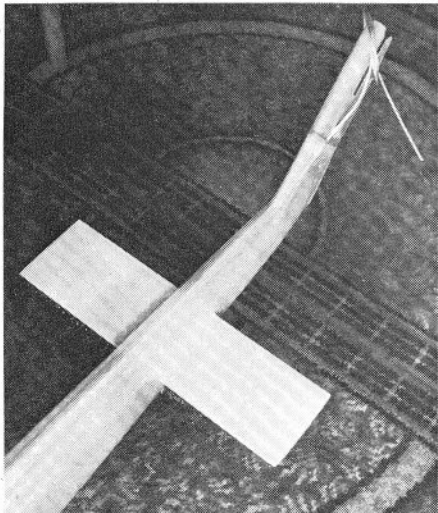
squares, a small square for use inside the fuselage is a must, as there are so many right angle joins which have to be true right angles if we want that vertical drive to emerge from the correct hole at the top of the fuselage!

The sub-assembly is now ready, or nearly so, for a letter 'M' in the margin of the instruction sheet calls our attention to a mechanical part which has to be fitted. This is a bellcrank which is part of the throttle control linkage, and a number by the side of the letter M tells us in which particular plastic bag the crank and its associated parts can be found. The sub-assembly is now given a couple of coats of fuel proofer in the places which cannot be reached after it is fitted in the fuselage. The large holes in the sides of the assembly are to allow positioning of the blind nuts for the power pack holding down bolts, and are, in fact, covered over when the nuts have been fixed.

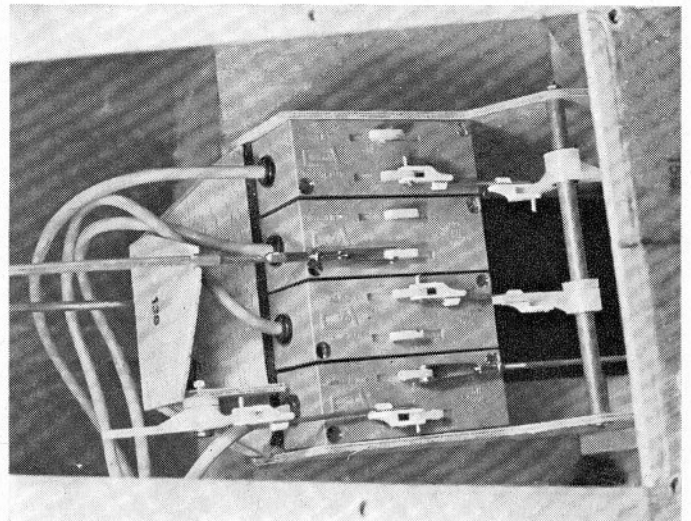
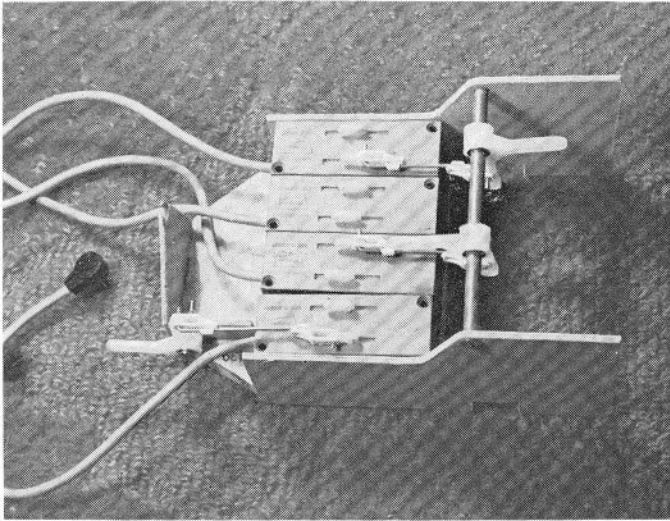
Getting the sub-assembly into the fuselage to its correct position is not without problems, and I doubt if many of us would remain cool in the process if it were not for the diagrammatic instructions and photos showing us how. I advise a few practice runs, as we have to get it in without touching the sides when the edges are covered with epoxy



Left: the main drive mount built from die-cut and pre-formed ply and hardwood pieces, ready for installation in fuselage.



Right: rear end of fuselage tail boom showing the auxiliary stabiliser which is supplied ready-shaped to fit into the boom.



on the final insertion, it can be done, even though you may be prepared to bet against it at the first try. With it sitting nicely in the correct position we put the fuselage aside for the epoxy to dry, at least ten hours in normal room temperature. There is really nothing we can do until the glue is dry, except perhaps to make a special field box for the model, a plan for a box tailored for the model is shown in the instructions.

When the epoxy glue used to hold the sub-assembly is quite hard we can carry on fixing the remaining formers and undercarriage assembly supports, there is plenty of room to get both hands inside the fuselage. When the woodwork at the base is completed we can see that we have a very strong assembly to support the mechanics of the model and to take those heavy landings, and while on the subject of heavy landings we can carry on nicely to the description of the undercarriage assembly. The very strong, ready-shaped, ply undercarriage legs are cut to the exact size required and have only to be shaped at the bottoms to the contour of the alloy tubes. Alloy clips have to be made up from materials supplied (I will stop that 'materials supplied' comment right there, as everything

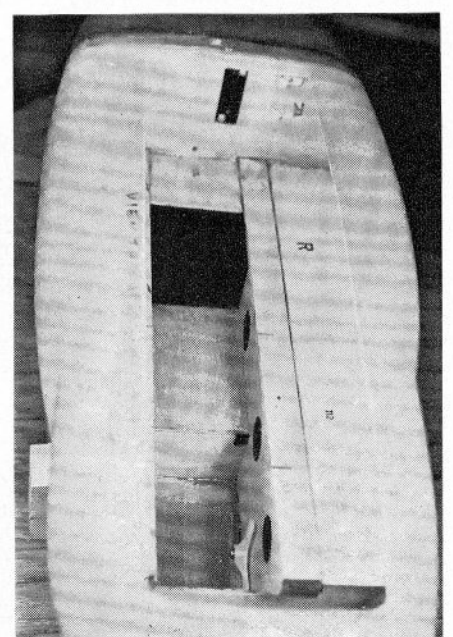
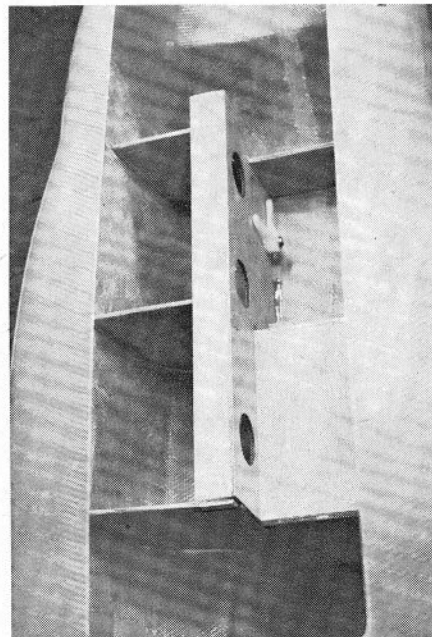
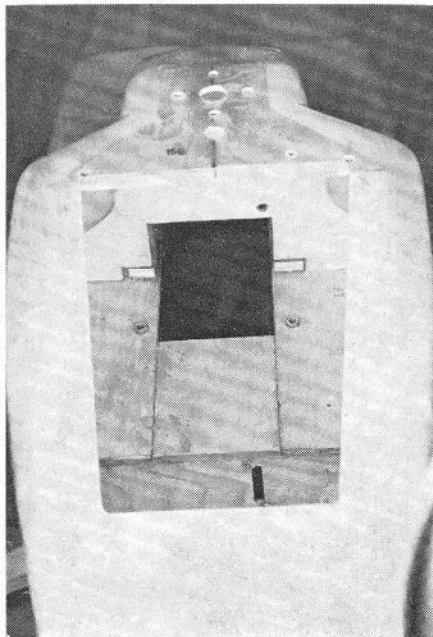
for the building is supplied) and these hold the tubes firmly to the legs by means of bolts, all parts of the undercarriage assembly are bolted together, and it can be taken to pieces in minutes. The ply undercarriage legs fit into nylon mouldings, and the nylon mouldings bolt to shock absorbers which are screwed into the wooden base of the fuselage assembly. The nylon mouldings referred to are fitted with 'strop holding positions', I assume these are for tethering strops which are used when learning to fly the model. The undercarriage is not yet complete in that the steps on the top of the alloy tubes are not yet fitted, nor are the oval shaped plates which cover the front of the tubes. I had better mention here, I think, that there are a lot of trim pieces yet to be fitted to the model, but I am leaving all trims and other unnecessary bits and pieces until I have completed the final assembly of the mechanics.

I think we have completed the main assembly at the base of the fuselage so let's turn it over and start at the top with the top hatch cover. This is a plastic moulding which is held in place by six bolts which pass through it and

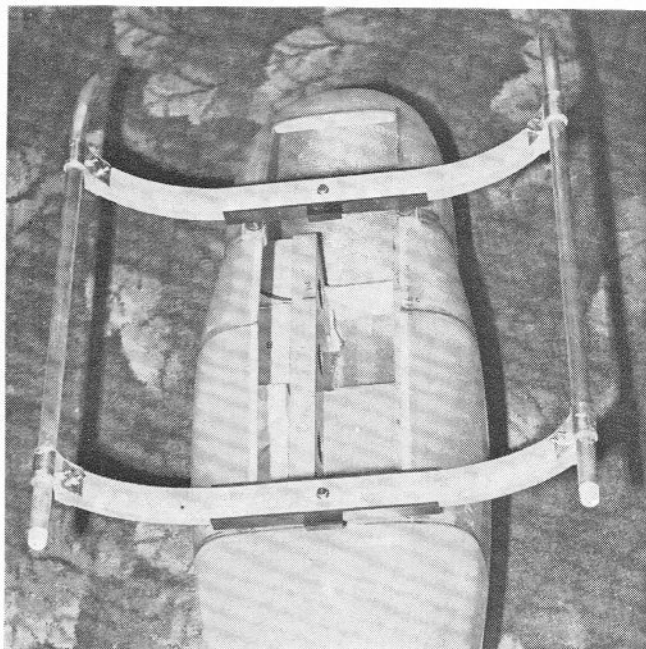
screw into blind nuts epoxied into a hardwood frame which is itself epoxied to the underside of the hatch opening. In front of the hatch is a part which has to be positioned with extreme accuracy, the ply support for the upper bearing of the vertical drive, this ply former also has holes through which pass the control rods from the servos to the pitch control unit at the main rotor head.

The servo tray is a very well designed piece of equipment, it has to be made up, of course, and, in fact, took me one whole evening to make, dodging from plans to instructions and back to tray. The tray also holds, as well as the four servos used, three nylon cranks to transfer the horizontal servo drive to vertical movement, the two front cranks transfer servo movement up to the head, and the rear crank takes the movement down

Fuselage construction. At far left, the view of the internal woodwork in main fuselage compartment seen looking forward through the top hatch. Below, centre, shows the basic frame in place; and below, the remaining wood parts built up around. Right: the undercarriage shock-absorbing mounts.



Left: two views showing the four servos — at far left on mounting tray and linked to intermediate linkage bellcranks; while at left, the tray is installed in fuselage. Only four servos required. Plastic servo keepers supplied are example of completeness of kit.



Right: fuselage underside showing undercarriage installed. Wider training undercarriage is also available.

to the base of the vertical drive for the collective pitch control. When completed the servo tray, complete with servos, is glued into position, the servos can, of course, be removed later, but are left in position when fixing the tray in order that, by lining up the pushrods, the tray can be accurately positioned. The remainder of the radio gear is fitted at a later stage on either side of the servo tray. In case it cannot be clearly seen in the photographs, the servo tray, and the remainder of the radio gear sit on a floor formed by the extension of the power-pack bearers into the rear compartment.

The servo tray also forms the forward support for the outer tube of the bowden cable control to the rear rotor. I have, in fact, fitted this cable and the generous excess of inner cable may be seen in the photographs coiled up at the rear rotor position. It may also be possible to see in the photographs the lower tube which carries the motor drive to the rear rotor,

this drive is via a thin solid wire rod turning in a fairly thick walled brass tube.

The smaller stabiliser is in one piece, it has to be sanded to aerofoil section, and, no, it is not upside down, they are fitted that way! The fuselage has to be cut away to insert the stabiliser, and I am glad to say that these positions were clearly marked, as measuring would be a little tricky. I think I will leave the extreme rear until next month after I have fitted the mechanics, as the rotor has to be accurately positioned before the woodwork can be fixed. The stabiliser is not yet fixed in position, it is a tight sliding fit and need not be glued until after the fuselage has been painted, so out it comes and its absence may be noted in the photographs next month.

In this review I should point out that I am in no position to make comparisons with other helicopter kits, as this is the first I have made, and the Editor will, no doubt, comment that I am not asked to make comparisons but merely comment on my reactions to the kit! Well, I have no adverse comments to make really. A minor comment would be that I would have liked the instructions on the large plan to be written in English, I am sure this would have saved a lot of time in searching through the typewritten sheets for correct interpretations. I would also have liked the alloy clips, which hold the undercarriage tubes to the legs, to have been prebent in Graupners workshops. Apart from these minor details I have nothing but praise so far for the accuracy of cutting of parts and ease of fitting, plus the very complete kitting.

I have had a quick check on the accuracy of the building so far by placing the power-pack and vertical drive in position, things seem to be O.K., no side stresses and parts emerging from the right holes!

All the woodwork at the base of the fuselage has been given two coats of fuel proof varnish, and so we are now ready for the final fitting of the mechanics.

