MFA SPORT 500

'Collective'

INSTRUCTIONS

MODEL FLIGHT
ACCESSORIES

ERRATA: Due to a photographic error, the fly blades illustrated on the completed model are shown facing the wrong direction. The shorter side should obviously be facing the direction of travel.

On Ply Sheet 3, the 'FAST' arrow should be pointing in the opposite direction i.e. FAST is towards the rear of the helicopter and slow would be towards the front.

MFA 'SPORT 500' COLLECTIVE PITCH HELICOPTER

This helicopter has been developed from the well established MFA teeter rotor head (fixed pitch) Sport 500 model but has the addition of a collective pitch rotor and control system. Collective pitch means both rotor blades increase and decrease their pitch together (as well as individually for directional control). This gives quick response to climb and descent commands, which allows a more aerobatic performance, a faster landing approach and descent and extreme rough weather flying capability. With the MFA auto-rotation unit (available separately, MFA pt.no.768) added, the model has auto-rotation capability allowing it to be landed safely if the engine should stop while flying, with a little practice!

As with the existing Sport 500, it offers unrivaled value for money, spares availability and technical back-up (we manufacture the model, it is not imported). The main components of the helicopter are made from aluminium and steel, although more expensive to produce than plastic, the result is our helicopters being extremely durable, already proven by the existing model. You gain by more air time as the odd misshap does not automatically mean a grounded model with broken parts. An important point to mention here is that sufficient information is in these instructions to enable the model to be successfully built, 'set up' and flown. Expert help is not necessarily required and setting the model up for flight is not a 'mystic science' and is quite straightforward, just follow the instructions! For this reason, these instructions may seem longer than normal (not because the model is complicated to build!) but, was done so that you can avoid problems, IF YOU ABIDE BY THEM!

IMPORTANT:

Don't rush the assembly (it is already straightforward and enjoyable!) to try and get the model into the air quickly. Remember, any helicopter is potentially dangerous due to the rotating rotor blades so, work precisely which will save time in the long run and the reward will be a fine flying model! Note, if you have any difficulty assembling a part or, a part for example is not free to rotate, carefully check the reason, it will probably be due to machining burr or nylon moulding 'flash', in which case simply remove the burr with a fine file or the flash with a sharp knife.

ADDITIONAL ITEMS REQUIRED:

RADIO: Any modern 4-6 channel. Note: If you have a 4 channel radio, purchase a fifth servo and connect it together with the existing throttle servo via a 'Y' lead (available from your dealer). This gives one servo for throttle and one for collective pitch both operated together via the throttle stick. If you are purchasing a radio, one for helicopters will already have this facility.

GYRO: For damping tail swing. A gyro is strongly recommended, it makes flying much easier and smoother. See your radio supplier for this.

ENGINE: Most .40-.46 cu.in. two-stroke (for best performance we recommend a .45 or .46), see ENGINE INFORMATION below. Special helicopter engines with heat sink heads are not necessary unless operating in hot climates.

FUEL FILTER: An in-line (engine to tank) filter is essential (MFA pt.no.769).

ADHESIVE: MFA 'Yellow Cyano-glu' (pt.no.666) or equivalent wood type 'Super Glue'. Use for ALL gluing on the model including the body.

SCREW & NUT LOCKING LIQUID ('Loktite'): MFA pt.no.697 or equivalent.

FUEL PROOFER: Small tin of fuel proofer for the ply (F.1), inner portion of the rotor blades and transfers. Alternatively 'egg shell' (semi matt) black paint can be used for the ply and inner portion of the rotor blades.

TRIM TAPE: 2 different colours (MFA pt.no.96 or 207) for the rotor tips etc. Also 1.5mm MFA 'Snake Tape' (pt.no.216) for the door and window outlines.

SERVO MOUNTING TAPE: MFA pt.no.37 for ver and g old down.

PAINT: For body and tail parts as desire epoxy or enamel recommended). A primer, table for styrene plastic, is recommended b re the top coat.

TOOLS: 1.5mm, 2mm, 3mm and 4mm twist drills will be required and a fret saw/jig saw for the ply parts, plus a few tools e.g. modelling knife, soldering iron, scissors, screwdriver, small adjustable spanner, a socket spanner for the engines prop nut, a metric ruler, sandpaper.

ENGINE STARTING EQUIPMENT: Electric starter (MFA pt.no.761), 'V' belt for starter (MFA pt.no.739), 12v battery (MFA pt.no.183), 'Power Panel' (MFA pt.no.518 or 668), glow plug connector, fuel.

ENGINE INFORMATION:

The MFA Blue Bird .46 AAC engine has been well tested in the Sport 500 Collective. This quality engine is not only powerful, particularly smooth running, has good heat dissipation, it's also lower priced than most! Most other makes of.40 -.46 two-stroke engine can be used provided the one chosen has a twin ball race crankshaft and modern Schneurle porting. Some engines may not quite fit the Engine Plate (H.18) due to variations in crankcase width, in this case simply file or sandpaper the inside edges of the Engine Plate to obtain a snug fit. NOTE, IMPORTANT: The Irvine 40 or 46 requires a flywheel with a 9.5mm hole. This is available on an exchange basis. Send the existing flywheel back to MFA with £1 specifying part number HI.43. Also the fan should be drilled to 9.5mm for these engines.

SCREW IDENTIFICATION:

When identifying a screw, the size refers to the length of the thread (including the unthreaded portion on some special screws) EXCLUDING the head, i.e. an M3 x 25 is 3mm diameter by 25mm THREAD length.

ASSEMBLY:

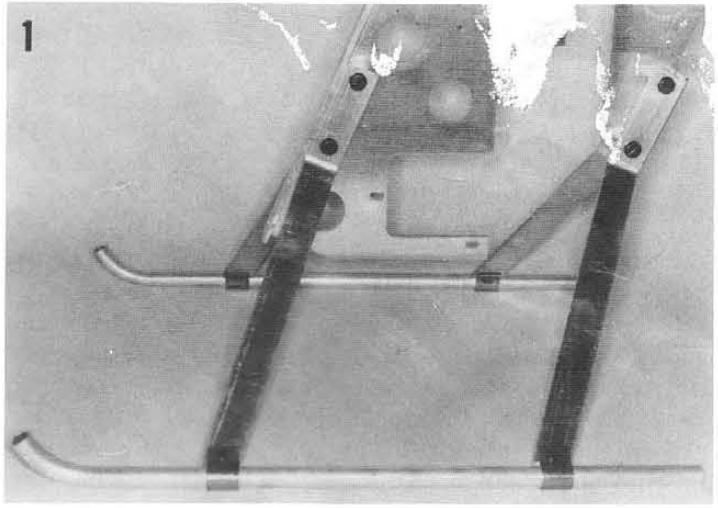
1. USE THE 'LOKTITE' ON ALL SCREWS AND NUTS, except the nylon insert ('nyloc') nuts and the engine's prop nut. Assemble the basic chassis by bolting the 4 U/C legs (H.44) to the main chassis plate (H.20) with 4 M5 x 35 screws and nuts, sandwiching the 4 U/C leg spacers (H.19) between the left legs and the chassis, Figs.1 & 2. Attach the skids (H.98) to the legs with the 4 leg/skid joiners (H.40) using M3 x 8 screws and nuts, Fig.1. Note the holes in the 4 joiners are slightly off centre, fit so the holes are forwards, Fig.1.

2. Fit the clutch springs (H.85) to the shoes (H.42) and insert the M3 x 12 screws included with them (the heads of the screws go into the recesses and the springs are on the opposite side to the recesses) then the nuts, Fig.3. Put an M3 washer on each screw and insert the shoes/springs into the large toothed pulley (H.21) from the flanged side of the pulley. Now place an M3 washer on each screw and tighten down an M3 nut on each. Set the inner nuts so the shoes are just free to pivot on the screws, Fig.4. If excess spring protrudes through the holes, grind/file them flush with the shoes.

3. Insert the clutch lining (H.86) temporarily into the clutch drum (H.10) and mark the appropriate length but, mark an overlap of about 1/2mm, this will ensure that when the lining is cut and glued in, the butt join will make the lining press tight against the inside of the drum. Cut and glue in. Slip the M5 washer on to the main gear shaft (H.11), Fig.4, then one of the main gearshaft bearing blocks (H.6), note which way round it goes, Fig.5. Slide on the clutch drum and retain with the split pin (H.87).

4. Fit the flywheel (H.43) on to your engine, then the fan (H.24), the small toothed pulley (H.22), the V belt pulley (H.41) and the star washer (H.88), VERY FIRMLY tighten down the engine's prop nut. Drill (3mm) the engine plate (H.18) to suit your engine so that there is a gap of 3mm between the back face of the flywheel and the edge of the engine plate, Fig.6. Fit the engine with 4 M3 x 12 screws & nuts. Now offer up the fan duct (H.23) and trim it as necessary to clear your engines needle valve and throttle arm, Fig.7. Some engines require the fan duct to be trimmed slightly at the top to clear the cylinder head, as Fig.8. Attach the two duct halves to the plate with 2 M3 x 12 screws & nuts, Fig 8.

5. Slip the toothed drive belt (H.100) over the large toothed pulley and attach the gear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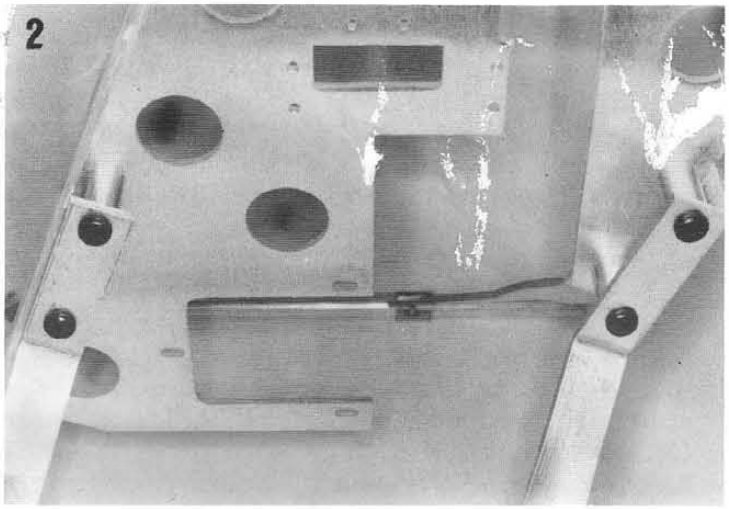
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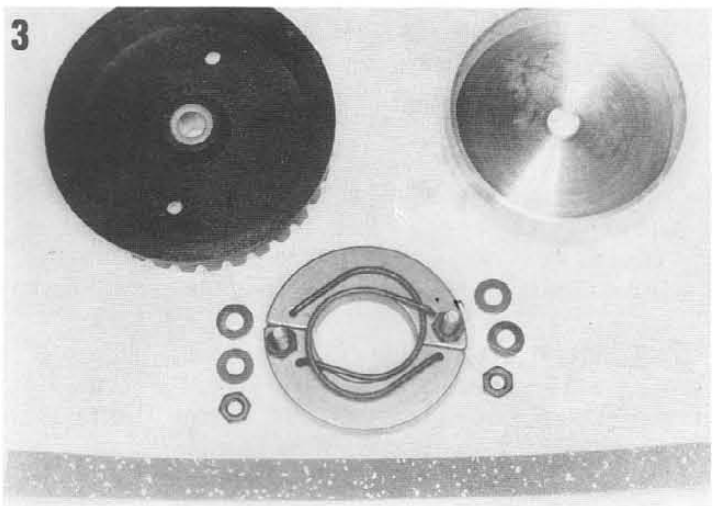
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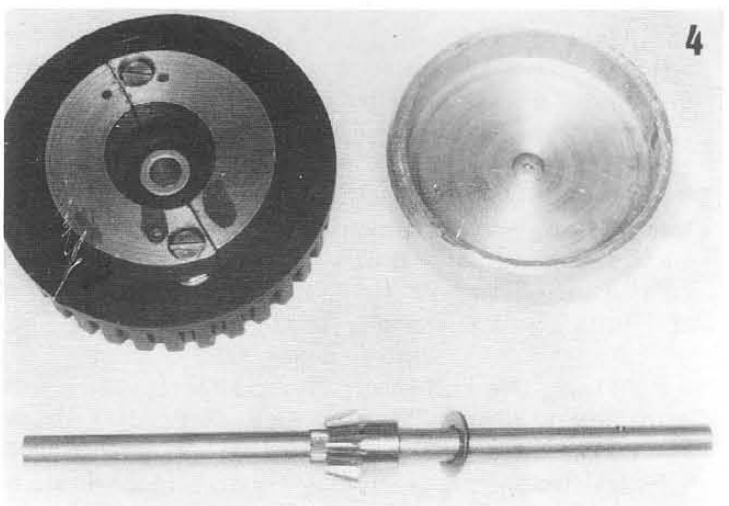
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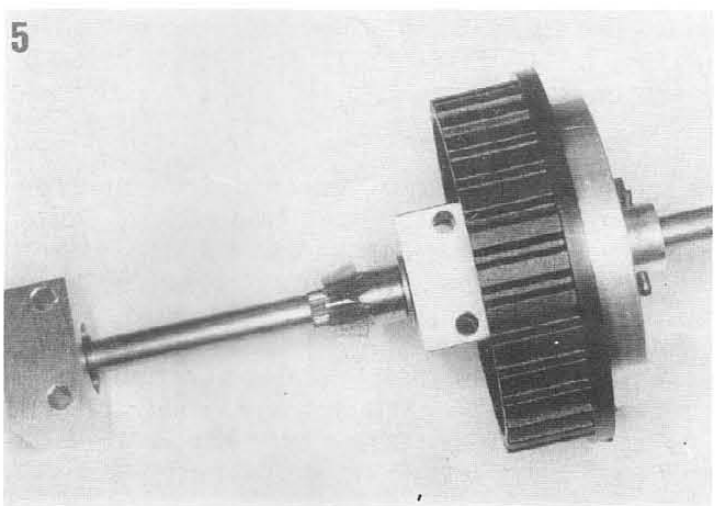
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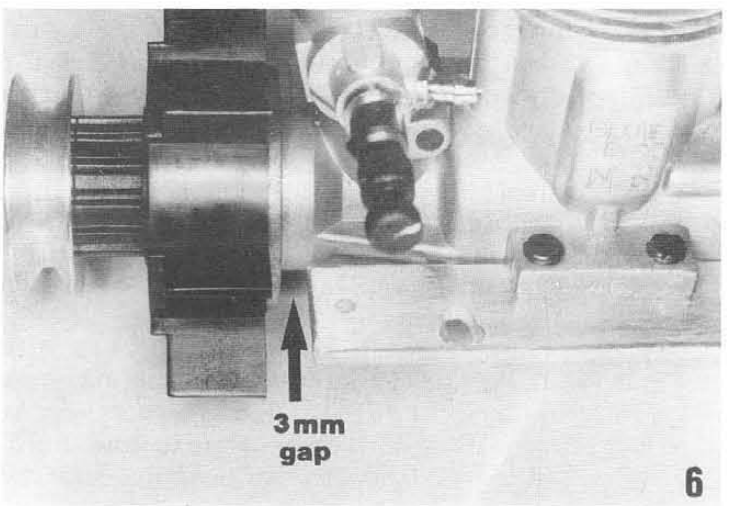

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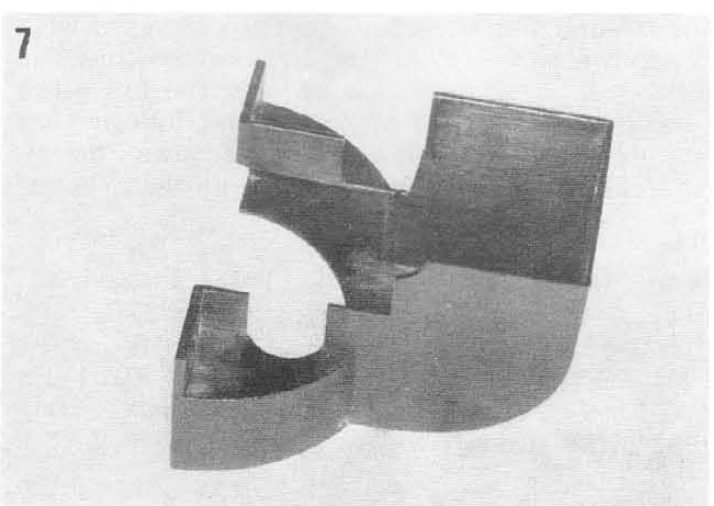
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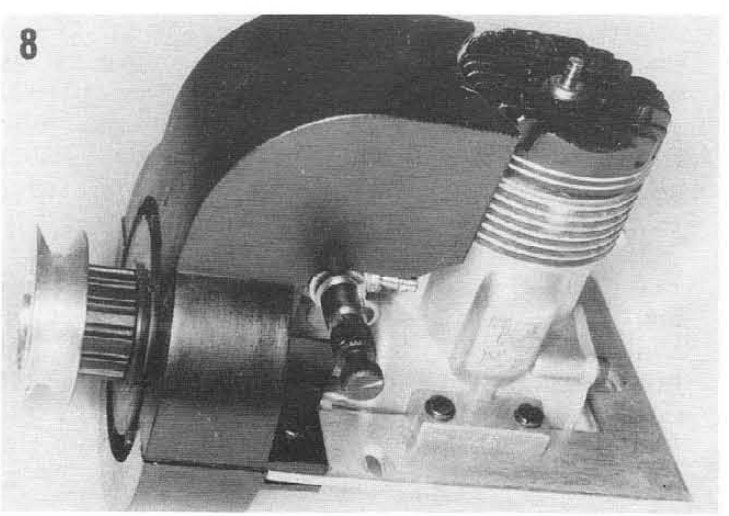
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shaft/bearing blocks assembly the chassis with 4 M3 x 25 screws & nuts. Attach the engine assembly to the chassis with 1 . 1 x 25 screw & nut (uppermost of the three) and 2 M4 x 12 screws and nuts (all heads on engine plate side), hooking the belt over the small pulley. Before fully tightening, check the belt is as near right angles to the gearshaft and engine shaft as you can tell, Fig.9. Check the belt tension, this is not too critical but, if a pressure of about .5Kg (1lb) is applied to the middle of one side, the belt should move in 6 -,10mm.

6. Attach the upper mast bearing block (H.5) to the top of the chassis with 2 M3 x 25 screws & nuts (don't fully tighten yet). Attach the lower mast bearing block (H.4), with the ball race downwards, to the chassis (don't tighten yet) with 2 M3 x 25 screws, nuts and M3 washers behind the nuts. Slide the mast (H.33) down from the top and check the mast slots straight into the lower mast bearing block, if it is slightly to one side, pull the mast gently in the appropriate direction to re-align the upper mast bearing block. Attach the large bevel gear (H.72) to the mast with an M3 x 16 SOCKET HEAD screw & nut, Fig.10. Tighten the upper mast bearing block. Tighten the lower mast bearing block so the gears mesh smoothly with minimum play, also put nut locking liquid between the lower mast bearing block and the chassis.

7. Attach a tank clip (CO.32) to the end of the M4 x 25 screw with two M4 nuts (end nut level with the end of the screw). Fit the other tank clip using another M4 x 25 screw and 3 M4 nuts (end nut about 3mm in from the end of the screw) through the chassis hole provided. Apply the foam seating tape (36) to the clips for the tank, Fig.11.

8. Assemble the fuel tank (68) as Fig.12. Fit the tank to the clips, Fig.13 using two rubber bands, check the tank dosn't touch the fan duct or undercarriage leg. Join the lower tank vent to the engine with fuel tubing (108), use the in-line filter. Fit one short piece of tubing to one of the other two vents (keep plugged with 3mm dowel or similar at all times except when filling the tank) and the other to the silencer connector.

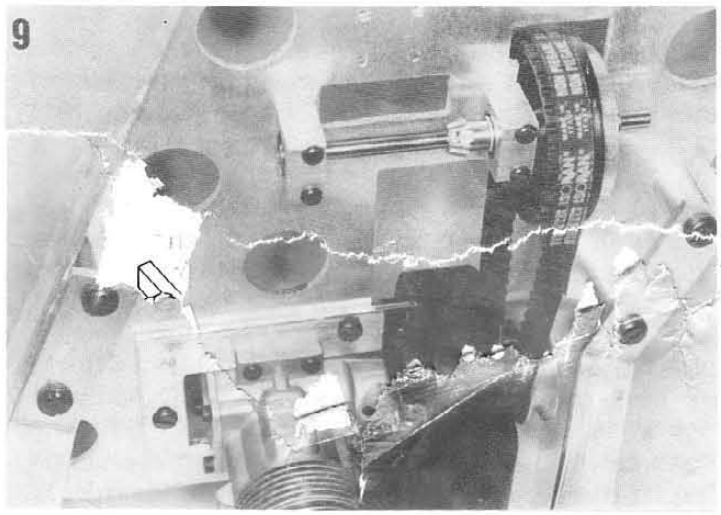
9. Attach the tail boom (H.45) to the chassis with an M4 x 25 screw & nut (rear hole) and an M4 x 30 screw & nut (front hole), attaching the anti-rotation link bracket (CO.28) under the front M4 nut. Fit a brass ball to the top with an M2 x 12 screw and 2 nuts. Attach the lower end of the tail boom support (H.49) to the chassis with an M4 x 12 screw & nut. Attach the top end with a tail drive support (H.46) and 2 M4 nuts, Fig.14. Fit the other tail drive support, Fig 15. Don't tighten these yet until the tail gearbox is fitted. Attach a tail drive coupling (H.34) to the main gear shaft, using two M3 x 3 grub screws. File a flat (about 10mm long and not more than 1/4 depth) on each end of the tail drive rod (H.75), DON'T FORGET TO DO THIS! Thread it through the two drive supports and attach to the coupling with two M3 x 4 grub screws making sure one of the screws sits on the flat.

10. Trim off any moulding 'flash' from the inner faces of the two tail rotor gearbox halves (H.25). Slide a 5mm ball race (H.79) down each tail gearbox shaft (H.9) then a 5mm Oilite bearing (H.82) and fit to one gearbox half, Fig.16. Grease the gears and and fit the other half, retaining with 9 M2 x 20 screws & nuts, nuts on the gearbox side with the bracket.

11. Assemble the tail rotor hub (H.13) with the tail rotor blade holders (H.29) as shown in Fig.17. Use M3 x 12 screws and the M3 stepped washers (H.101) to retain the 3mm ball races (H.81), note STEPPED SIDE of the washer AGAINST the ball race. Attach a brass ball to each arm with an M2 x 12 screw & nuts and hold the two pairs of halves together with 4 M2 x 12 screws & nuts. Attach to the gearbox shaft with an M4 x 4 grub screw, tighten securely.

12. Bend 8mm of the tail pitch change rod (H.77) to 90 degrees and insert in the gearbox shaft. Fit the tail rotor pitch crank (H.26), with brass ball fitted, to the gearbox bracket with an M3 x 16 screw and 2 nuts as shown in Fig.19 (tighten the nuts on the bracket so that the crank is free but with no up and down play). Attach 2 M2 x 12 screws & nuts to the tail pitch yoke (H.27) followed by two ball clevis. Slip a 16 swg collet (H.47) on to the rod followed by the pitch yoke and the other 16 swg collet. Retain the collets with M3 x 3 grub screws and set so that when the pitch change crank is straight, the two blade holders are at an angle of about 15 degrees, Figs.18 & 19.

13. Drill the six holes (3mm) in the fin (F.6) and cut it out, sand smooth. Paint as desired. Fit the tail gearbox to it with 4 M3 x 8 screws & nuts. Attach to the boom with 2 M3 x 25 screws & nuts, Fig.20. Similarly smooth and paint (white) the tail rotor blades (H.31) and fit to the holders (curved side of blades outwards) with 2 M3 x 12 screws & nyloc nuts but, TIGHTEN ONLY ENOUGH TO PREVENT ANY PLAY, THE BLADES SHOULD PIVOT QUITE FREELY. Drill (3mm) the tailplane (H.7), sandpaper and paint as desired then attach to the boom with 2 M3 x 25 screws & nuts.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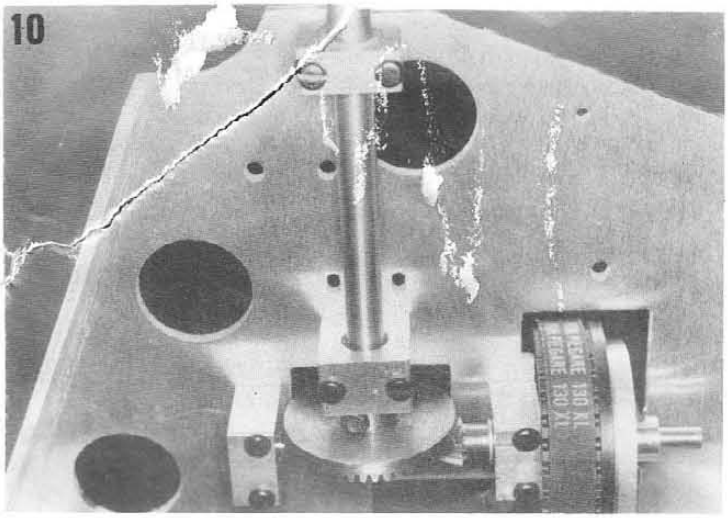
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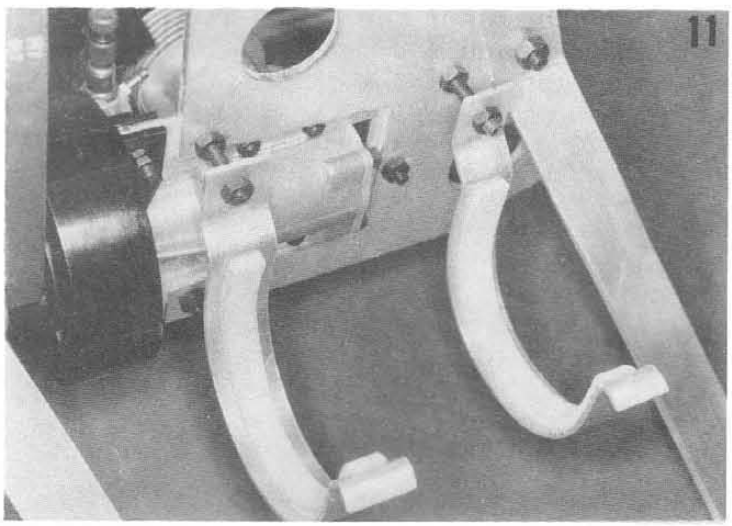
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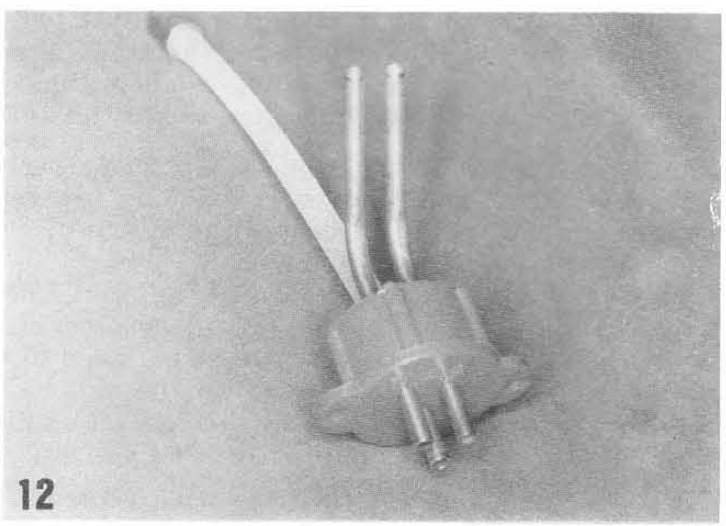
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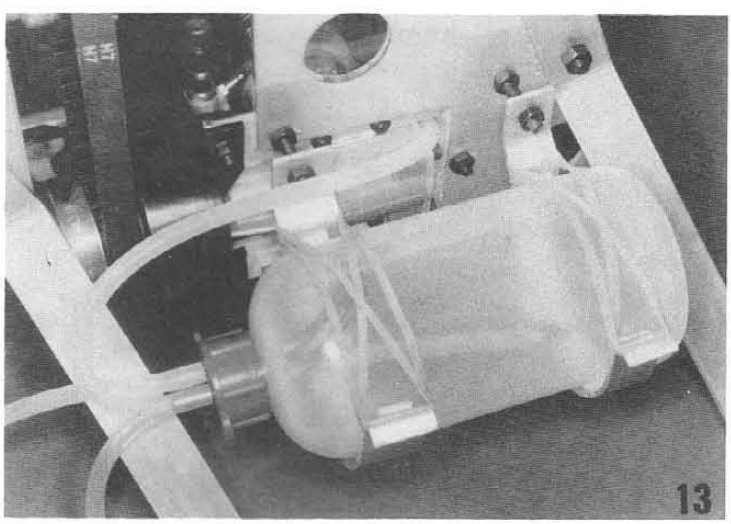
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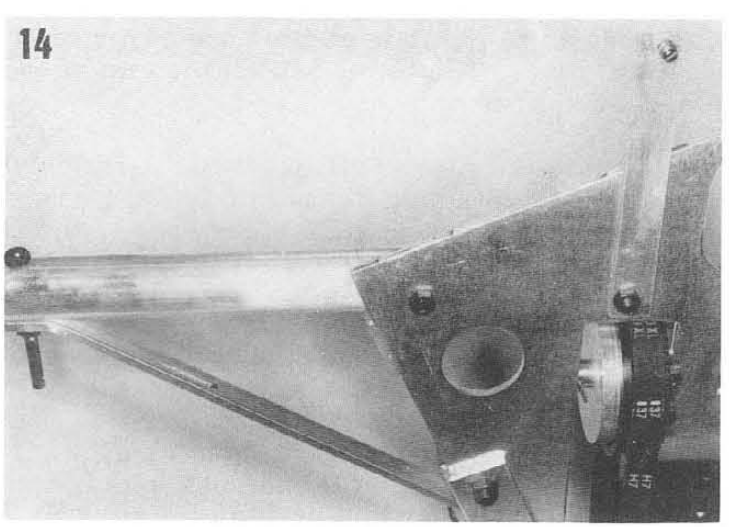
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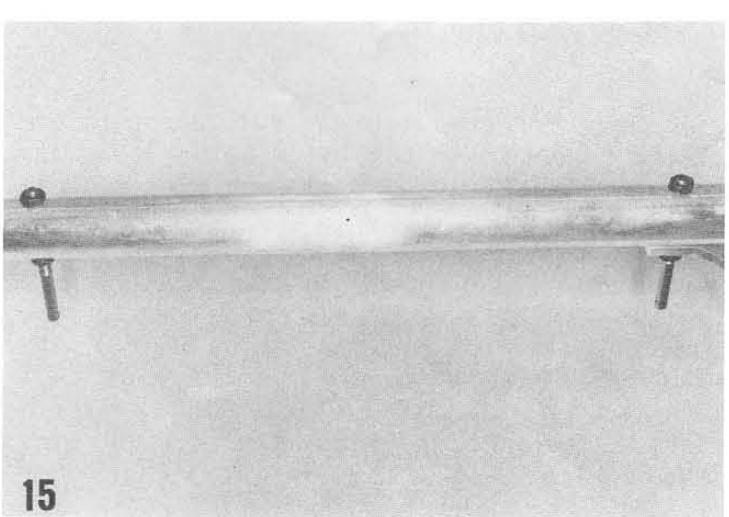
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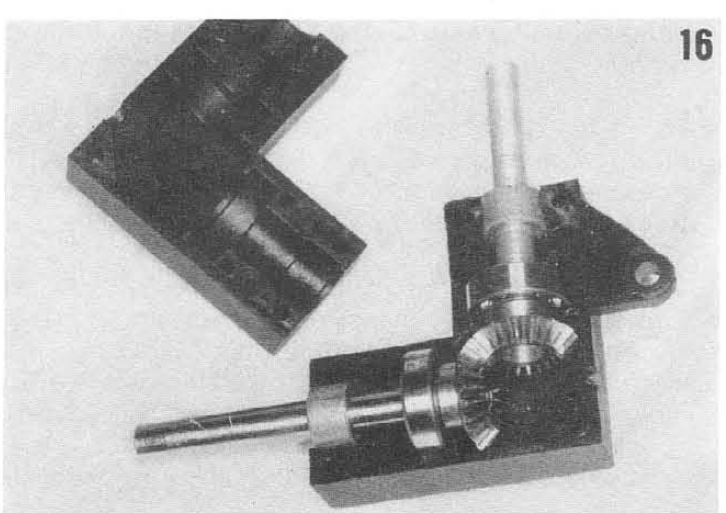
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4. Slide the other tail drive coupling (H.34) on to the drive rod at the rear and attach to the tail gearbox using two M3 x 3 grub screws on the gearbox shaft and two M3 x 4 grub screws on to the drive rod (make sure one of the screws sits on the flat), Fig.20. Adjust and then tighten the two M4 nuts on each drive support (H.46) so that the tail drive rod a straight line.

15. Insert the 'O' ring (H.83) into the centre of brass balls with 9 M2 x 12 screws & 8 nuts. Note the ut), arrowed Fig.21.

16. Make up the two 'T' bellcranks (CO.37) as Fig 22 u in alls, 8 nuts (using the INNER hole in the middle arm). Use the bellcra. k bear (CO.38) and fit one to the bellcrank mount (CO.16) with an 4 x 16 screw, no one! Use the bellcrank spacer (CO.17) on the other. Fit them both to the front bea e in the chassis with an M4 x 25 screw, Fig.24 (these are the left, right cyclic as well col ive bellcranks). Make up the third 'T' bellcrank and bearing and attach to the 'for aft yclic crank mount' (CO.22) with an M4 x 25 screw and nut, Fig 23. Attach the other end of the 'for/aft cyclic crank mount' to the chassis with an M3 x 20 socket head screw and an M3 nut either side of the chassis, setting the inner nut to allow the for/aft cyclic crank mount to pivot without lateral play. This screw also holds the top of the anti-rotation link bracket (CO.28).

17. Assemble all the links as Fig.25 to the lengths shown (measure from the centre of each clevis hole) from the appropriate length threaded rods. Note that some have their clevises at right angles to each other and the top one (throttle) has the white clevis on one end.

18. Slide the swash plate down the mast (larger side down) and connect to the two left/right cyclic/collective bellcranks with two 53mm links, Fig.26 & 27. Note: the link on the right side of the chassis (viewed from the rear) goes to the INNER of the DOUBLE ball on the swash plate. Now connect the outer of the double ball to the top of the anti-rotation link bracket with the 48mm link, Fig.27. Connect the for/aft cyclic crank (on its mount) to the remaining two balls on the lower swash plate with two 45mm links. This completes the swash plate input controls until the servos are fitted.

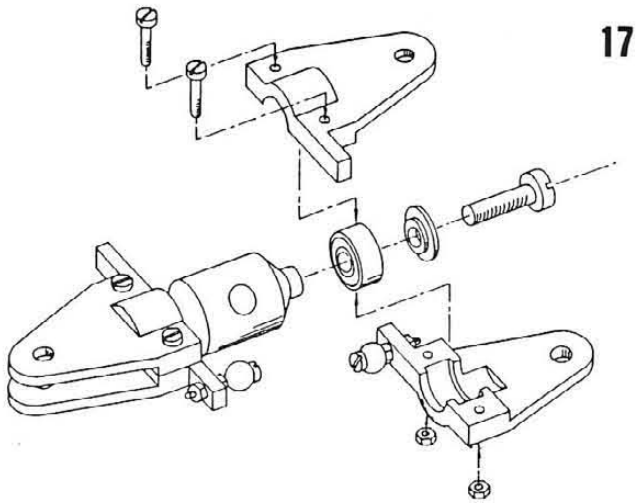
19. Assemble the head mixer as Fig.28. Use M4 x 6 grub screws to hold the head mixer arms (CO.6) on to the flats of the head mixer pin (CO.7). Set so that the unit pivots freely without lateral play. The brass ball on the end of each arm is retained with a COUNTERSINK HEAD M2 x 12 screw (no nut).

20. Slide the fly bar (H.37) into the fly bar holder (CO.4), then a fly bar ball joint (CO.9) on each side, retaining them with M4 x 4 grub screws. Set them so that the fly bar is central (measure from the centre to each end), the fly bar is free to revolve with no end play, Fig 29. Clip a fly bar link (CO.15) on to each fly bar ball joint. Slide the head mixer on one side and the fly bar balance weight (CO.31 with an M4 x 4 grub screw) down the other. Screw on the two fly blades (H.32) until resistance is felt (indicating the bottom of the threads) and set them level with each other (the short side of the fly blades face forward when the rotor is rotated in a clockwise direction).

21. Now tighten the head mixer using 2 M4 x 6 grub screws, so that it is level with the fly blades and against the fly bar ball joint. Now balance the fly bar by inserting a convenient rod through the fly bar holder and resting it on the open jaws of a vice or other suitable rest. Note that the arms of the mixer are resting on the rod, don't allow them to hang down or incorrect balance will result, Fig.30. Set the balance weight so that the fly bar balances level and tighten it.

22. Fig.31 shows the rotor hub parts. Start by pushing a Teeter Rubber (CO.20) on to the stepped section of each Blade Pivot Pin (CO.12) and insert in to the Blade Joiner (CO.2), smear some grease round the outer edge of the rubbers if difficult. Retain each with a Blade Retaining Pin (CO.12) and then the 4 M3 x 5 screws, Fig.32.

23. Slide on the two Blade Holders (CO.3), either way round, if difficulty is found here, check and file off if necessary any burr on the ends. Retain with M4 x 12 screws not forgetting the Blade Holder Retaining Washers (CO.13). Fit the two pairs of Blade Holder Plates (CO.21) with 4 M3 x 25 screws & nuts, then the two Pitch Arms (CO.14) retained with 4 M3 x 5 screws. Fit four brass balls with 4 M2 x 12 screws & 8 nuts to the two nylon Blade Cranks (CO.30). Attach these to the Pitch Arms with the M3 x 19 (no slots in their heads) Blade Crank Pivot Pins (CO.30) and 4 M3 nuts, Fig 33. We recommend the Rotor Head (CO.1) is glued (epoxy or



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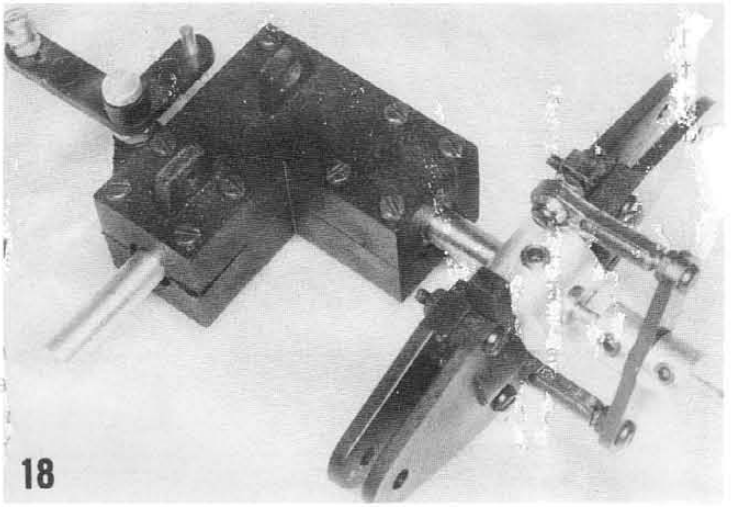

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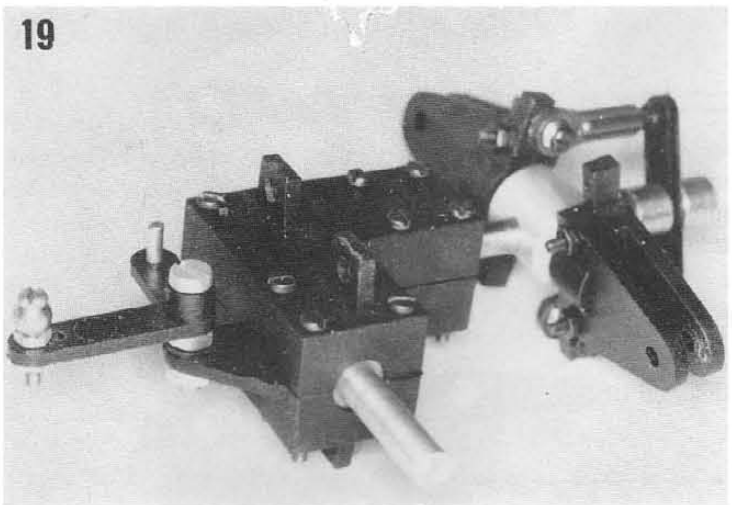

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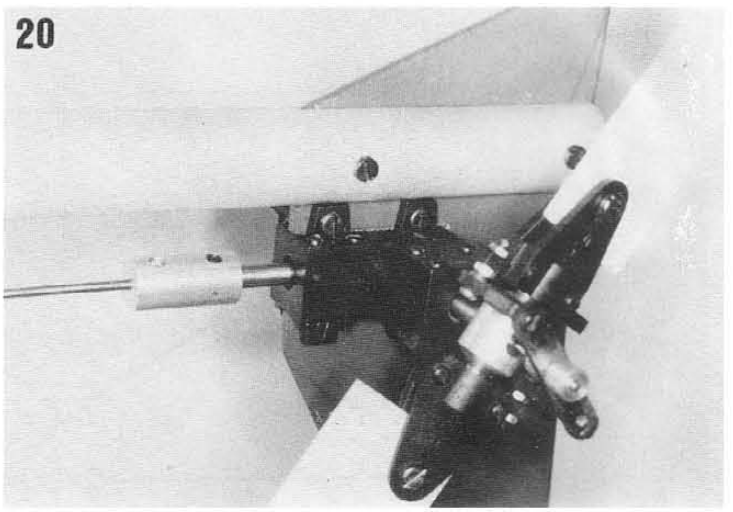

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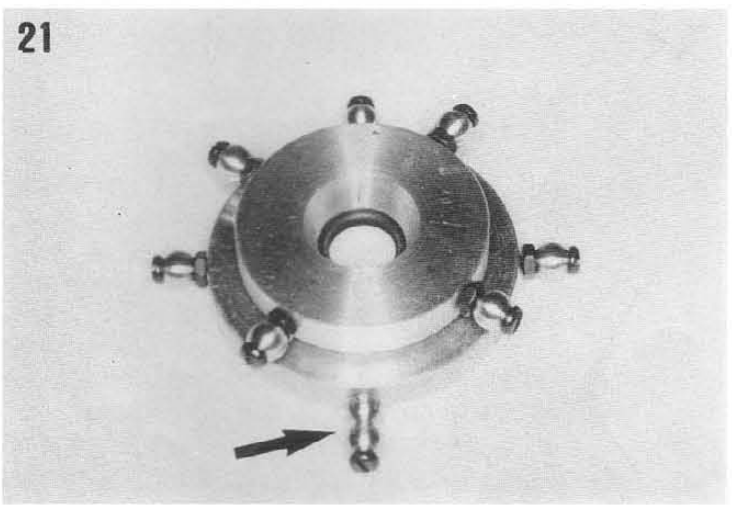

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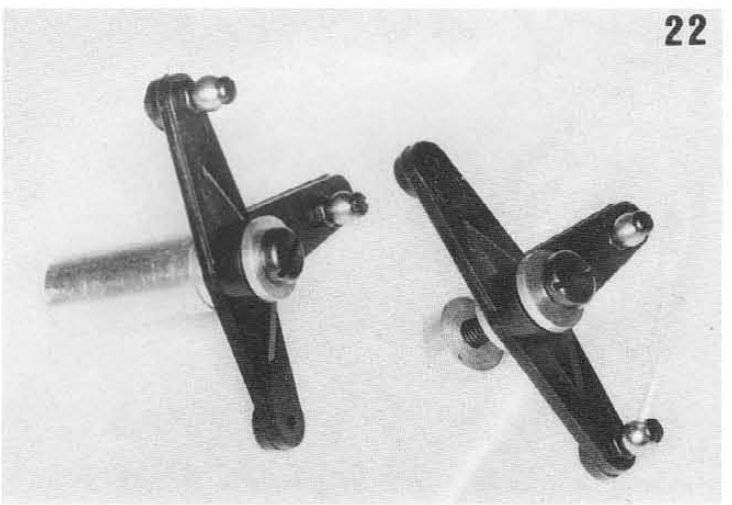

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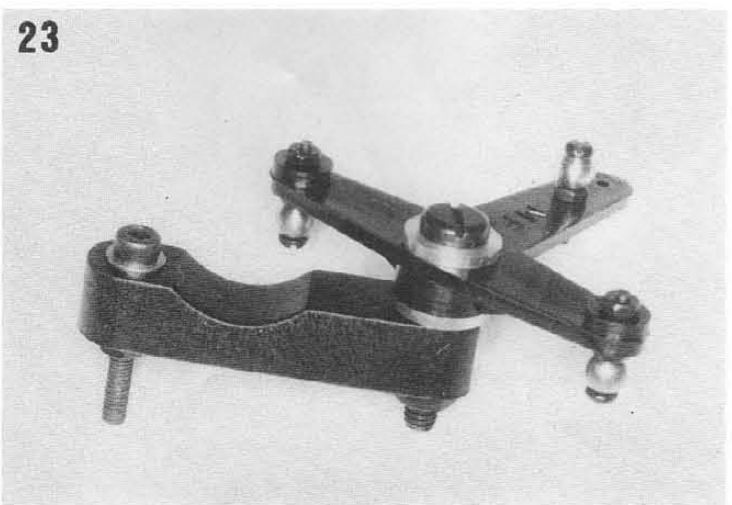

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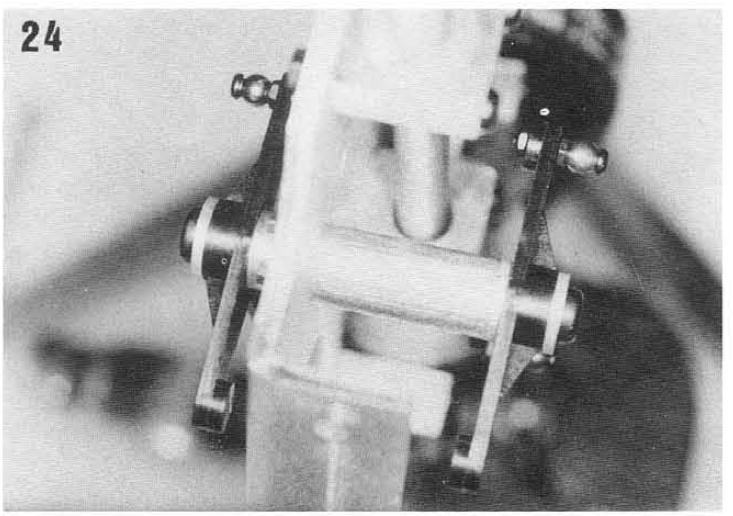

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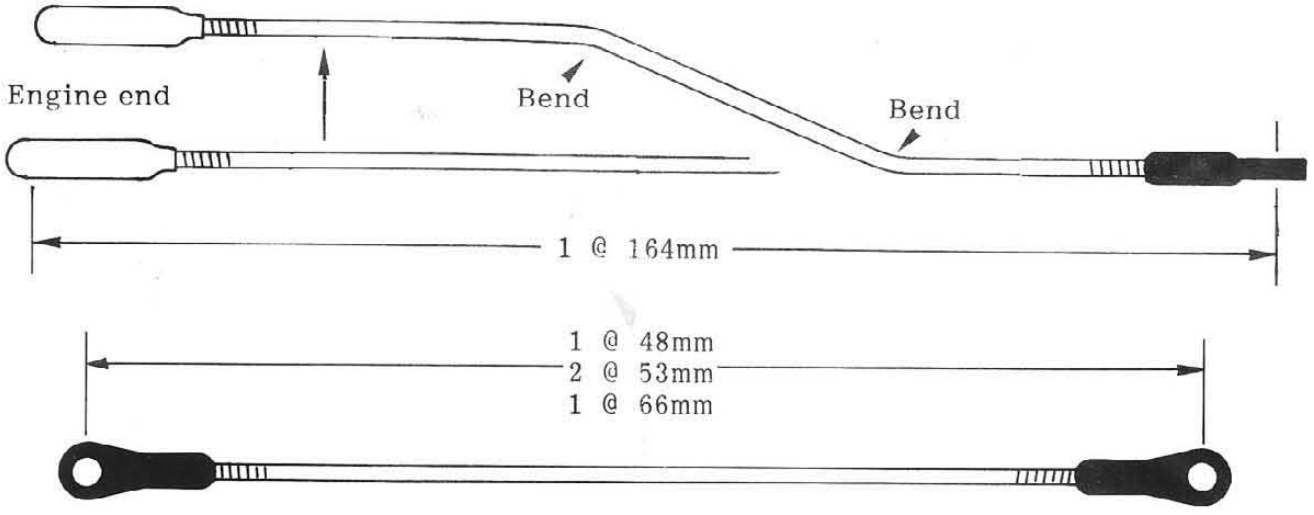
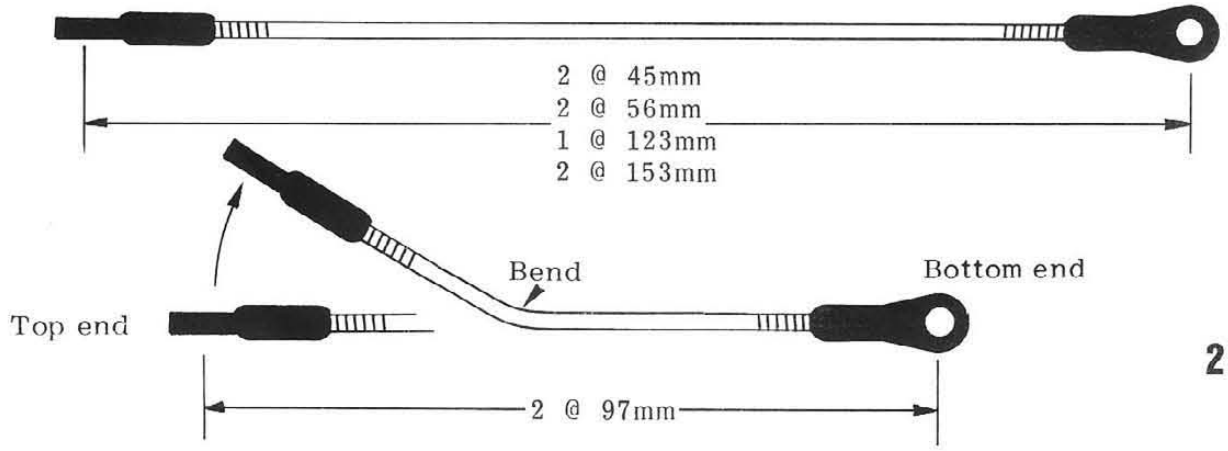


LINKAGE DIMENSIONS



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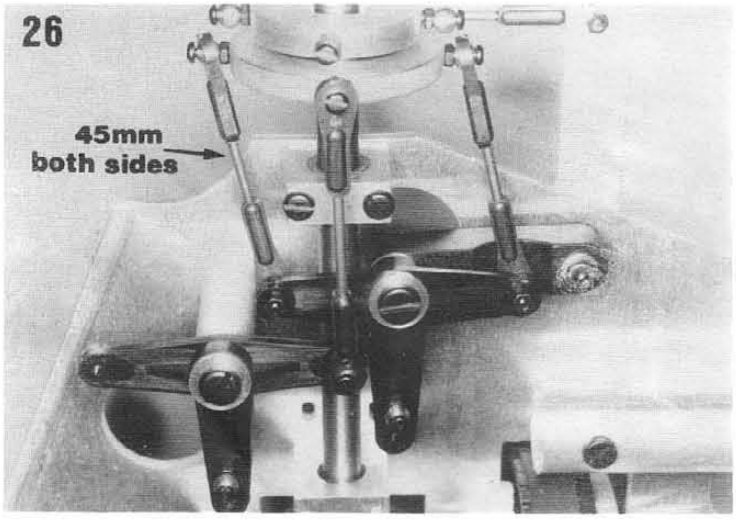

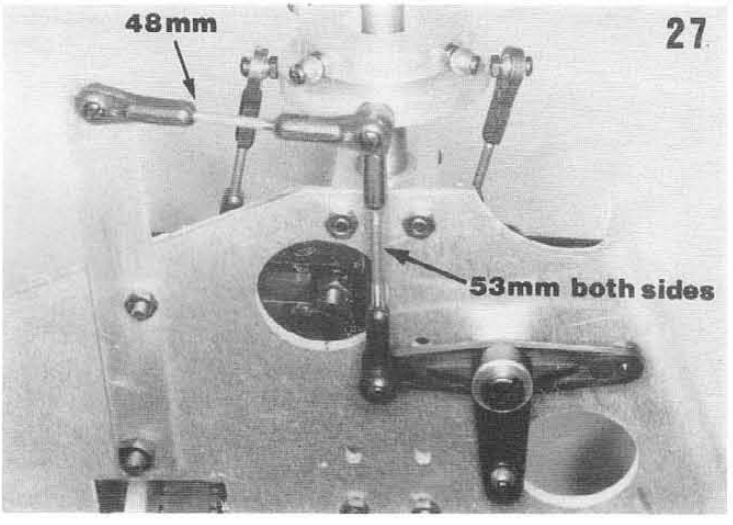

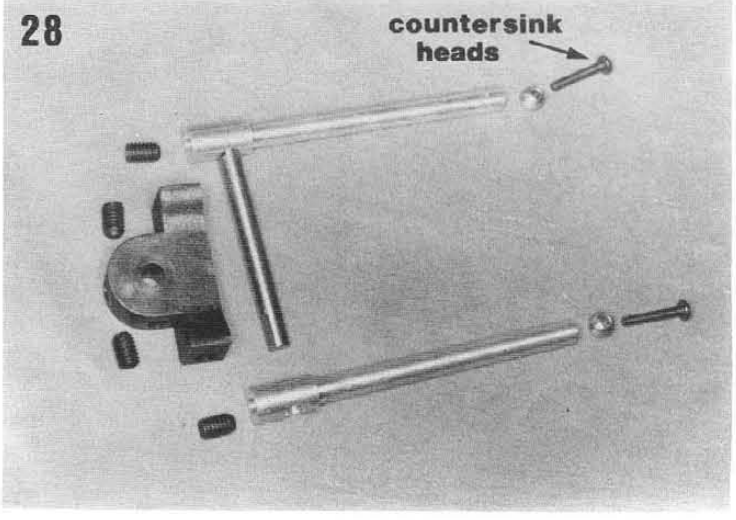

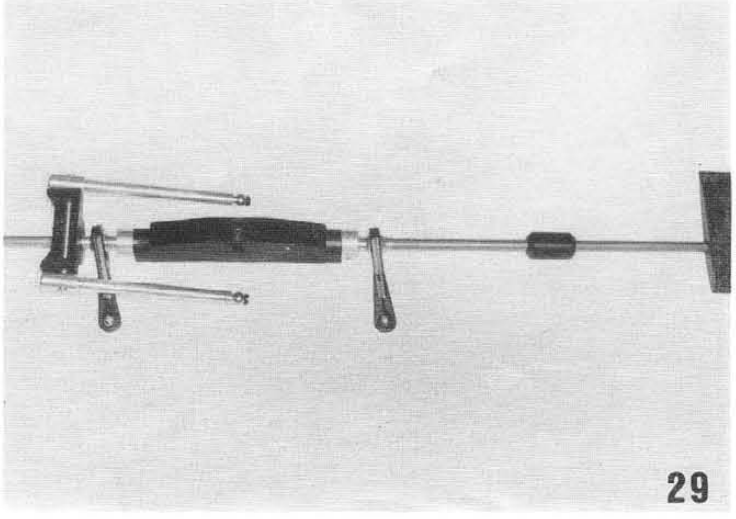

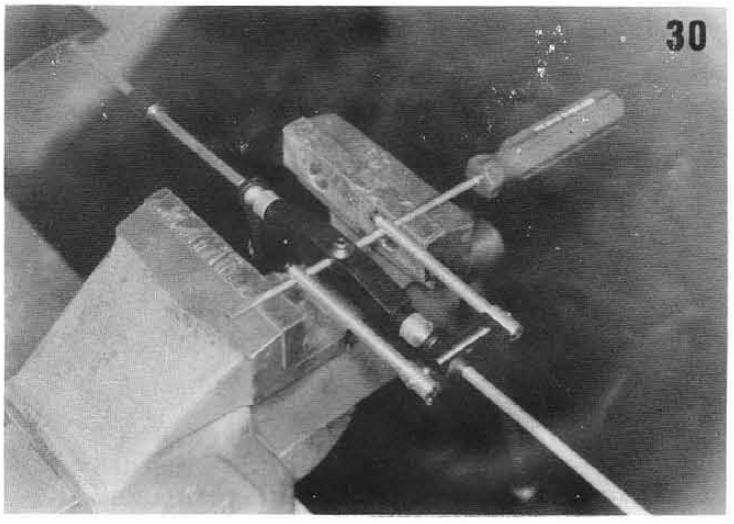
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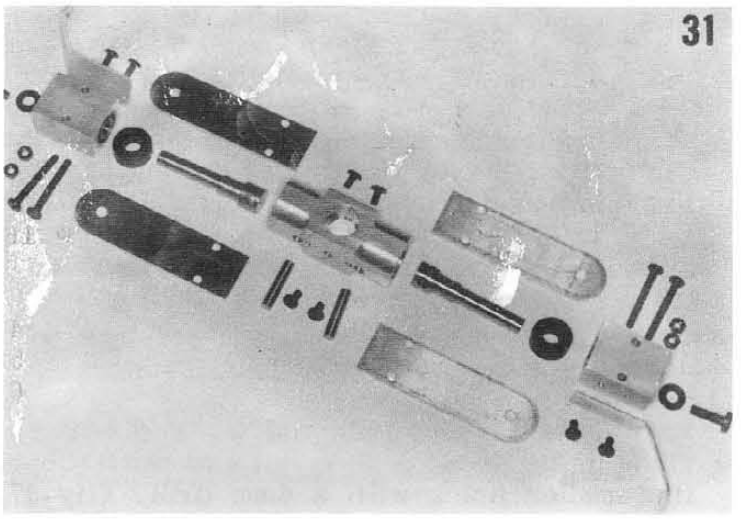
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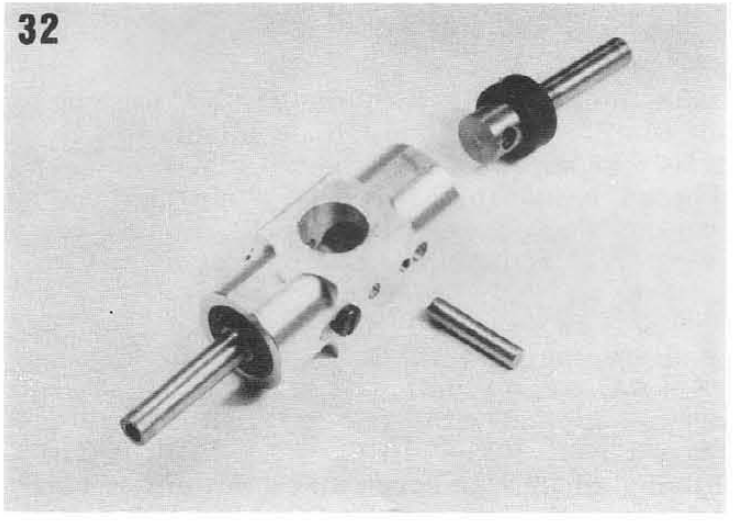
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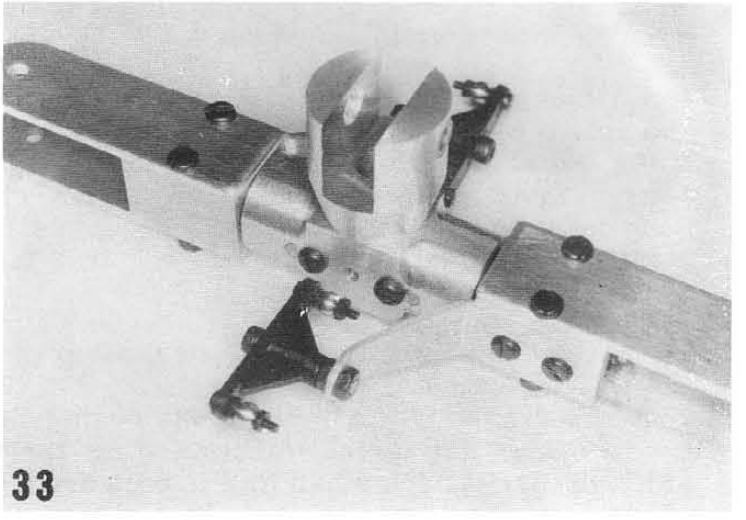
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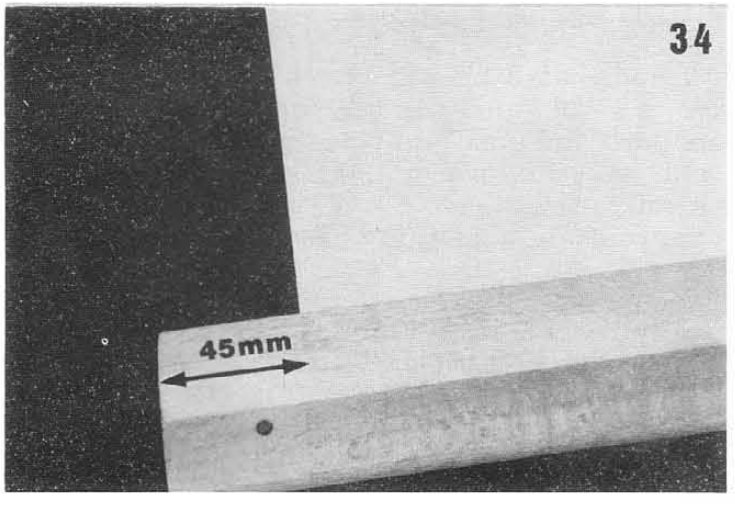
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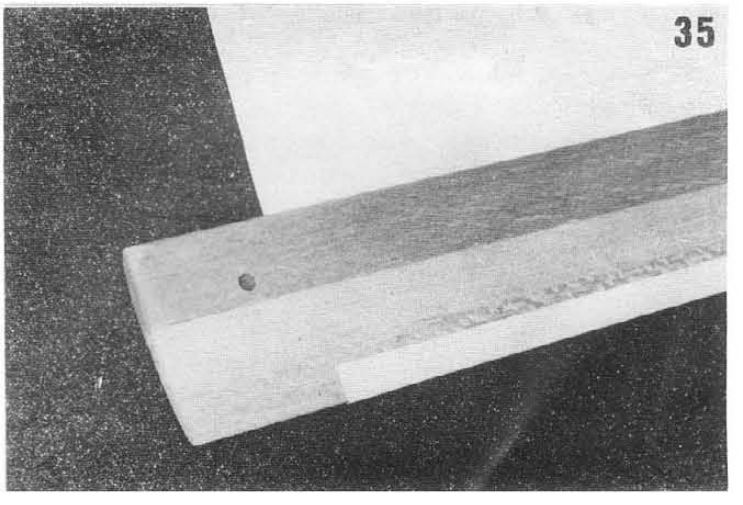
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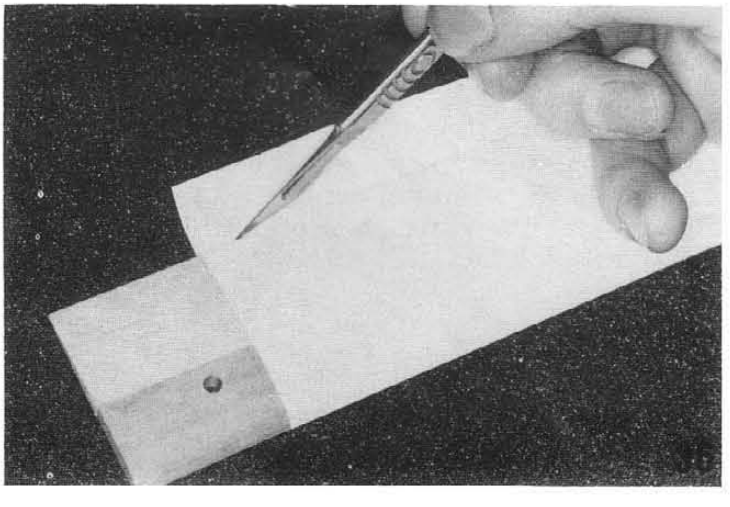
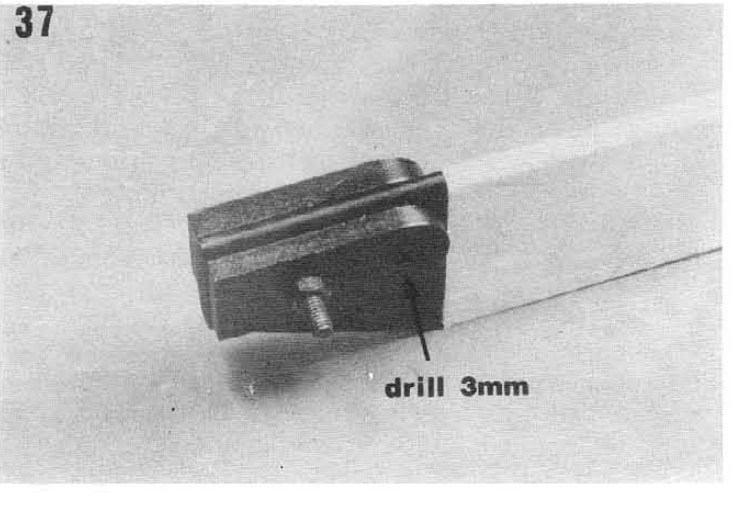



37
drill 3mm

Cyano-glu) into the Blade Joiner (CO.2) to minimise play, when doing this, check the slot in the Rotor Head is 90 degrees to the Blade Joiner, Fig 33.

24. Next is the rotor blades (H.48). Cut the covering material in half lengthwise and remove the backing. On a flat surface, starting on the trailing edge bottom, press the blade down on to about 8mm of covering, Fig.34. The length of uncovered blade at the root should be 45mm. Now rotate the blade round pressing the covering down at the same time, Fig.35, ending again at the trailing edge, trimming off the excess with a sharp knife, Fig.36. Do this in a warm place so the covering is pliable. If the covering does not stick down in places, simply warm it, pressing down at the same time. Repeat with the other blade. Fuel proof or paint black the uncovered root sections.

25. Temporarily attach the top and bottom Blade Reinforcing Pieces (CO.23) to each rotor blade using an M4 x 20 screw and nut. Check they are perfectly straight, then drill through the smaller holes with a 3mm drill, (fig.37). Remove the 4mm screws and re-attach the reinforcing pieces with M3 x 20 screws and nyloc nuts through the just drilled holes. Note the blade can be trimmed as Fig.37 to allow the blades to be folded back for transport (MFA supply a rotor support for this purpose).

26. Attach the fly bar assembly to the rotor head with the Fly Bar Pivot Pin (CO.8, 25mm long) and retain with an M4 x 4 grub screw in the top of the Fly Bar Holder. Hook up the Fly Bar Links, Figs. 38 & 39. Attach the rotor blades with M4 x 25 screws and nyloc nuts (tighten only enough to take up any play, the blades should move reasonably freely in their holders). Balance the rotor assembly by resting the fly bar on two convenient supports (engine box illustrated in Fig.40), wrap some coloured tape (96 or 207) round the lighter blade until they are level.

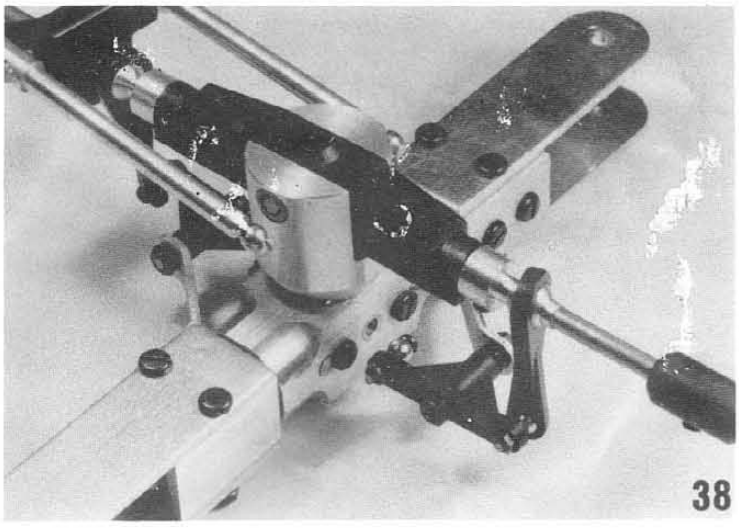
27. Attach the Mixer (CO.27) to the top of your aileron servo with the 2 small self tapping screws, Fig.41. Cut out and drill F.1, F.2, F.3, F.4 & F.8 and glue together, Fig.42. Attach your 4 servos as Fig.43 and Fig.44 (using the screws supplied with your radio, first drilling 1.5mm holes) noting the information on the ply mount F.8, NOTE WHICH WAY ROUND THE SERVOS GO. Attach a ball link to each arm/wheel using an M2 x 12 screw and a nut either side of the arm/wheel, use the hole that gives nearest 12mm radius except the COLLECTIVE servo which should be near 10mm radius. Attach the THROTTLE servo underneath, Fig.47.

28. Wrap some soft foam round your nicad battery and install behind the throttle servo and against F.1. Install (use MFA Servo Mounting Tape, a small square in each corner) the gyro, then the receiver and switch, Fig.43. Connect up the 4 links as Figs.44, 45 & 46, note that these may need adjusting slightly due to different makes of servo but, simply check the bellcranks are level when the servos are neutral. Ideally, the Mixer (CO.27) should angle back slightly. Connect up the throttle servo using the appropriate hole in the arm/wheel that gives full open and tick-over on the engine's throttle.

29. Connect up the tail rotor pitch control using the PTFE tube (H.102), the 18swg wire (H.103) with a soldered Threaded Connector (704) on each end. Glue in to F.1 (arrowed in Fig.44) and attach to the tail boom with 3 equally spaced cable ties (H.90), the rear one (arrowed in Fig.48) is just behind the tailplane. Glue each of these joints to prevent slippage. Screw a ball clevis on each end and set so the tail pitch crank (H.26) is straight.

30. Trim round the edge of the body moulding H.97, with scissors, to leave a flange of about 4mm, Fig.49. Cut across the middle, on the marked line, to separate the two halves using a fine toothed 'razor saw' or similar, NOT scissors. Drill the two 6mm holes for the body retaining screws in the marked positions. We advise before gluing that the two halves are clipped together (croc clips or clothes pegs) to obtain exact alignment as Fig.50, then glue a short length at a time, removing the clips and replacing as you go. Cut to size (not critical) and glue in the two white plastic reinforcing pieces, Fig.50. Sandpaper round the flange (don't scratch the windows!) and the rear edge to even them up. Mask off the windows using PVC tape or trim tape and paint the body as desired. The windows look attractive if finished off with MFA White Snake Tape (pt.no.216) and the door outlines with Black Snake Tape, Fig.51.

31. Slide the Swash Plate Driver (H.36) with its M3 x 16 screw & nut down the mast. Attach the rotor assembly to the mast with the M3 x 22 Mast Retaining Bolt (CO.29). Connect up the two 97mm links, then the two 56mm links. Note the Swash Plate Driver hooks in to one of the 56mm links and is 90 degrees to the rotor. For the correct height of the swash plate driver,



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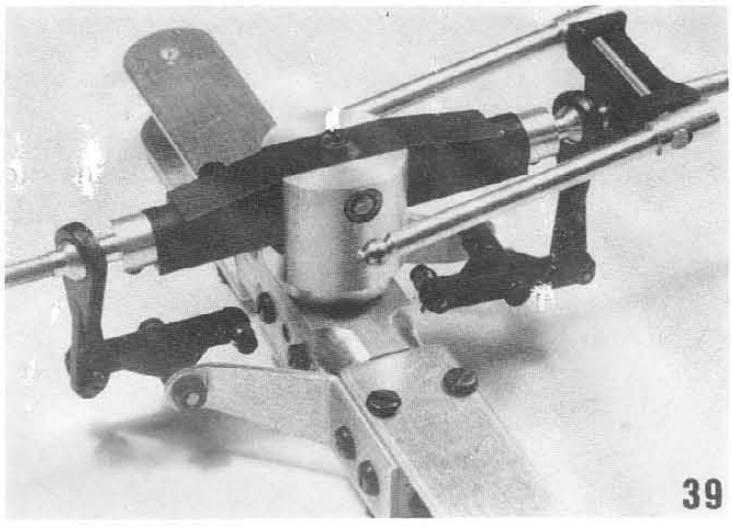

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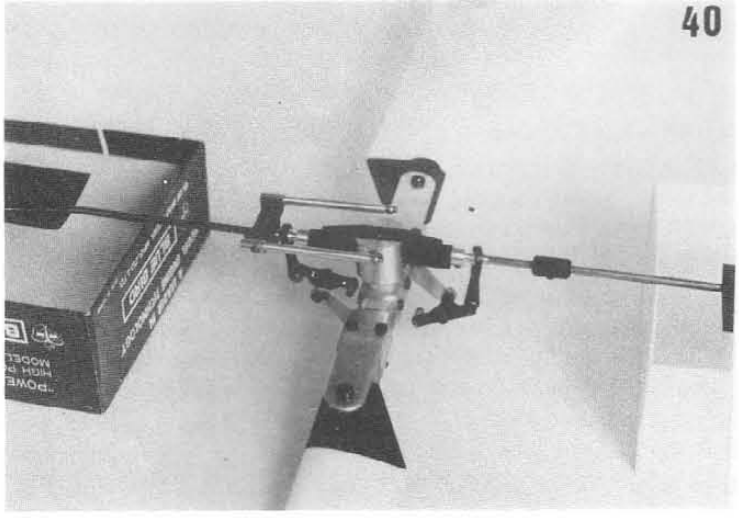

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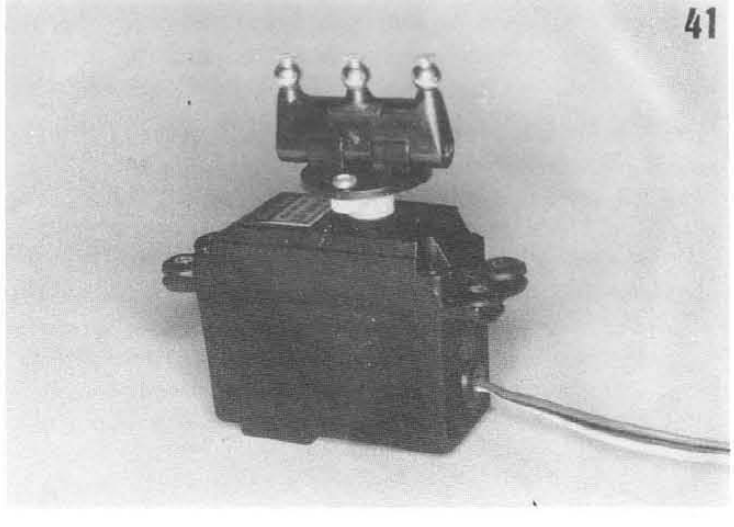

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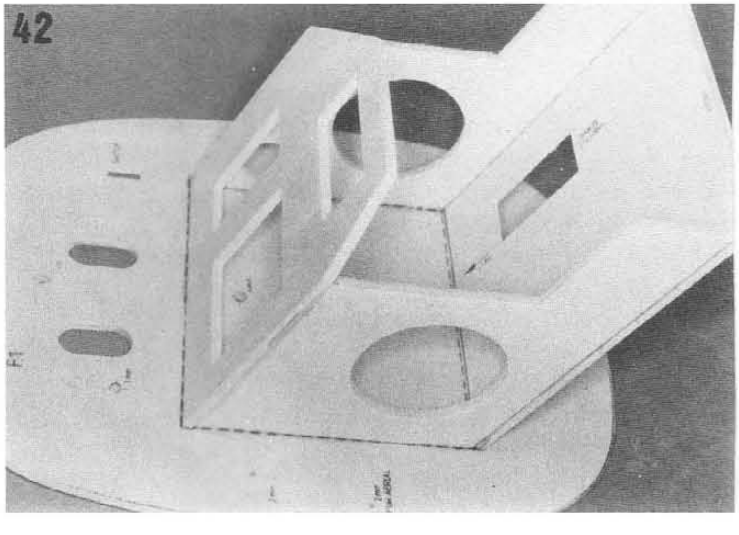

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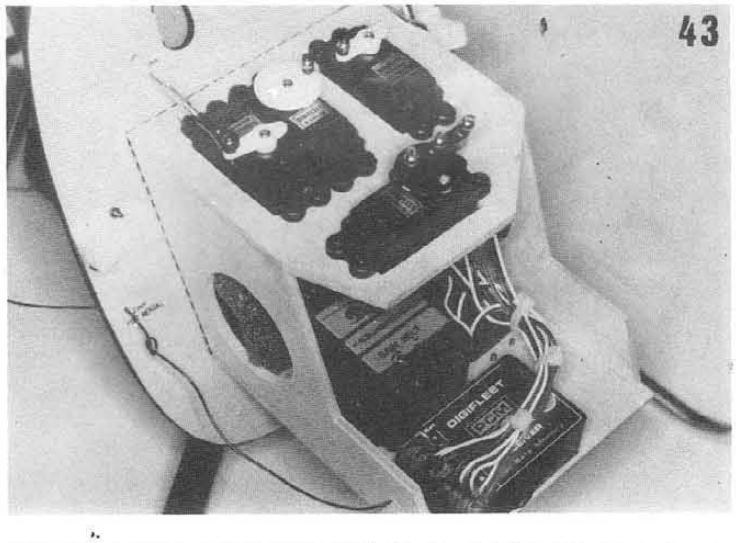

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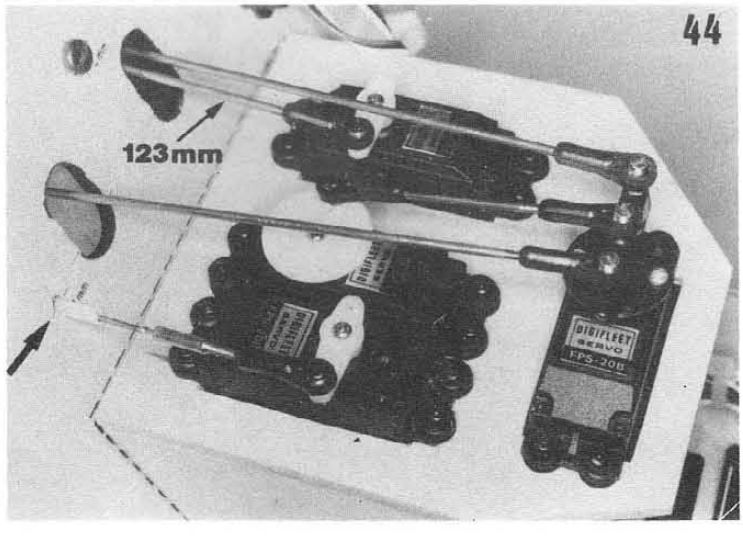

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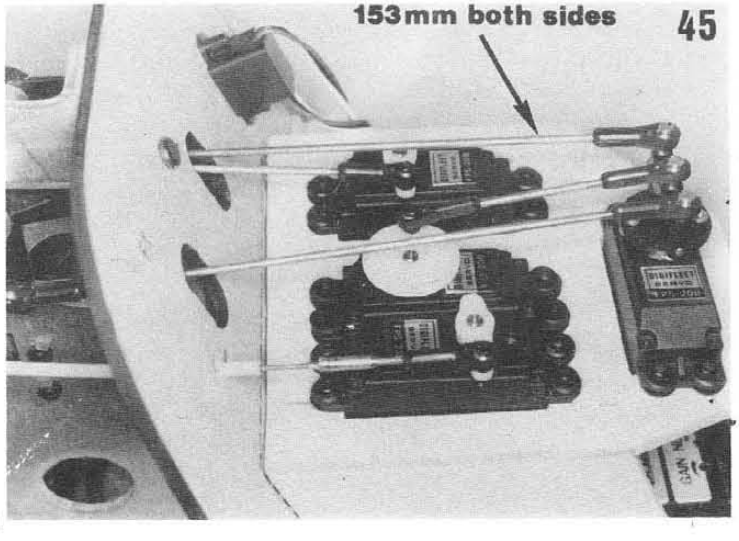
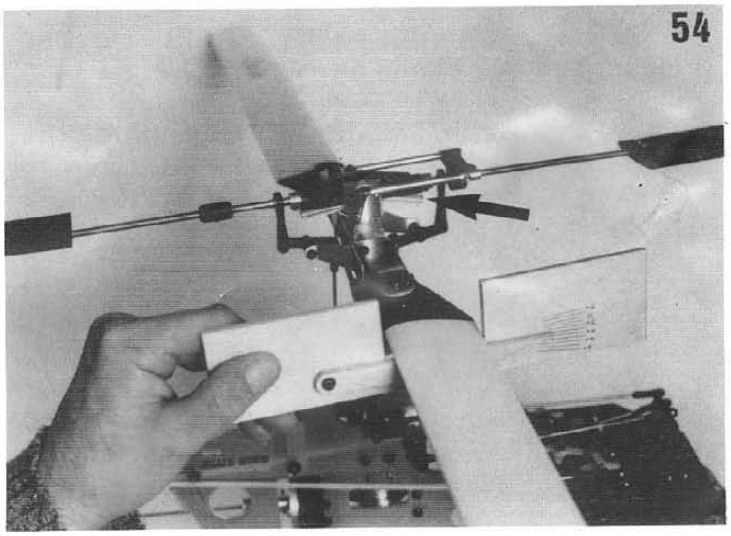
123mm



153mm both sides

45



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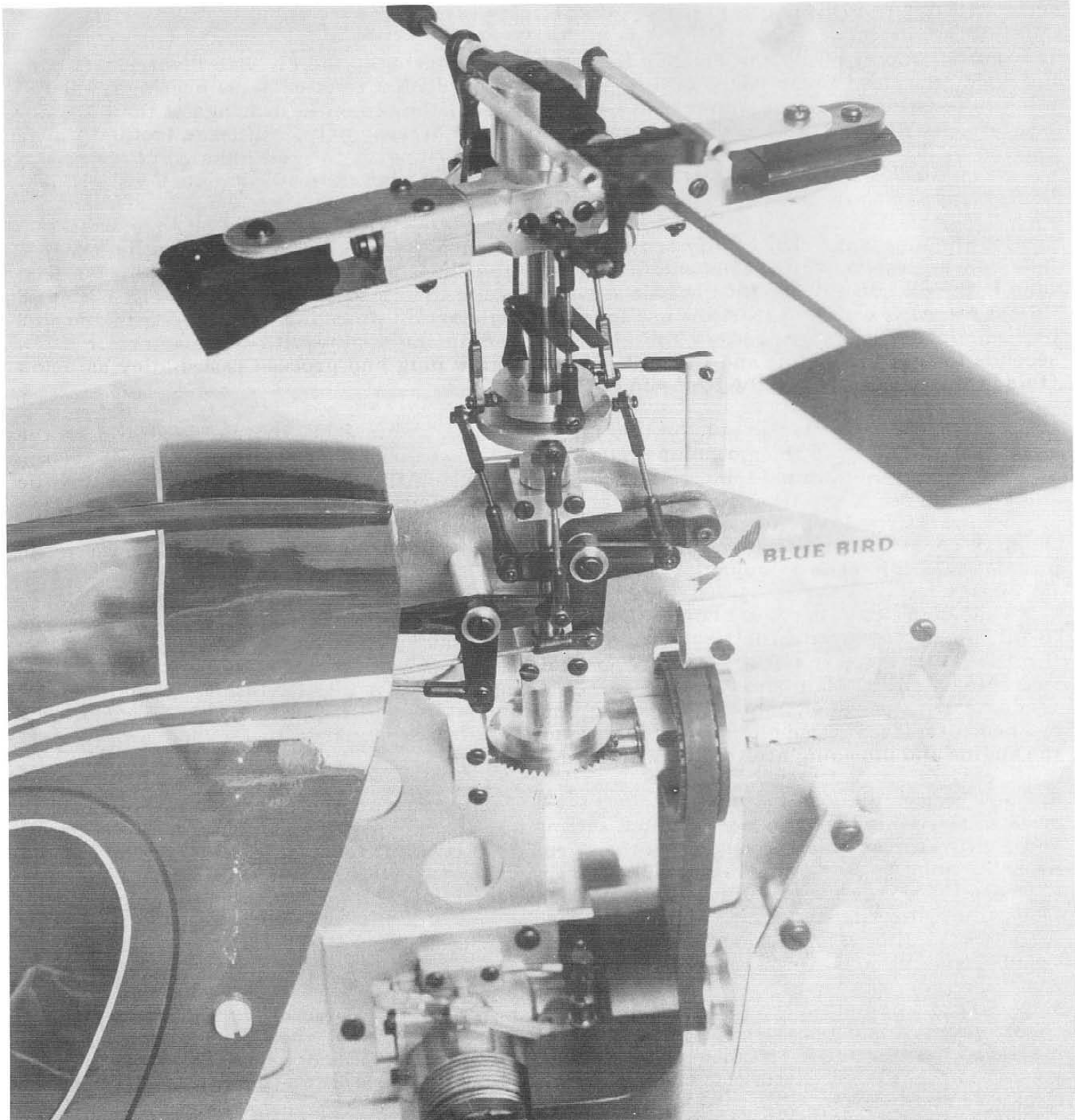


vertical ascent and vice-versa. Don't worry if you don't have this facility on your radio, it is not essential and the gyro copes pretty well on its own!

FLYING:

1. If you already have experience with the teeter rotor Sport 500 or other helicopter, go ahead and enjoy your model! You will notice the quick response to vertical climb and descent commands (see 2 below) but, do not get too ambitious too early! You should also notice the very steady hover which allows good controlled landings because the model can be flown with precision close to the ground.

2. COLLECTIVE PITCH SETTING: After initial hovering checks, try climbing at full throttle to check the full collective pitch setting. The model should climb quite rapidly without the engine labouring too much, if it does labour, reduce the overall pitch (via the 66mm servo link) by 1/2 degree and try again. However, if your engine is not too powerful, you may have to live with slight labouring at full pitch. If the model is sluggish to lift, with a high revving engine, increase the pitch by 1/2 degree. YOUR ENGINE MUST BE RUNNING PROPERLY as a sick, too lean, too rich or too tight engine will require excessive pitch for take off causing too low r.p.m. on the main and tail rotors causing poor control of both! A sure sign of too low r.p.m. is slight for and aft oscillation in hover.
IF YOU DO NOT HAVE ANY HELICOPTER EXPERIENCE, PLEASE CAREFULLY READ THE REST OF THESE FLYING INSTRUCTIONS.

3. Pick a flying field away from trees and buildings and preferably no wind (gyro fitted) or just a gentle breeze blowing (when no gyro fitted) for initial flying. Turn on the radio and gyro, start the engine and always face the model into the wind. Stand about 3 or 4 metres to the rear of the model and about 2 or 3 metres to the left. Gently open the throttle until the model lifts off, it will probably stop at about 1/2 metre altitude as it comes out of ground effect (if you have opened the throttle gently!) but, reduce the throttle gently if it climbs any higher than this. Keep these first attempts brief (to maintain concentration) and just try to keep the model roughly over one spot or slowly moving forward (walk with it). Every time you become disorientated, close the throttle (gently and gradually!), have a breather and try again!

4. You should begin to get the idea of the controls at this stage, the for & aft and left & right cyclic control ('aileron' & 'elevator', right hand stick) and vertical climb and descent (throttle/collective, left hand stick) will be quite positive and logical. The tail pitch ('rudder', left hand stick) control is the most difficult as the tail is not naturally stable (as on any helicopter) so, this will seem very sensitive unless a gyro is fitted. Keep practising and do not allow the model to gain a lot of height or fly away from you at this stage. Hovering is the most difficult flying to do with any helicopter but is also the most rewarding. Forward flight seems easy compared to hovering but, DO NOT ATTEMPT FORWARD FLIGHT UNTIL YOU CAN HOVER REASONABLY WELL or you will find it difficult to land the model safely.

5. As confidence is gained, keep in the hover but climb the model to a height of about 4-6 metres for a while before bringing it down, this is good practice for maintaining orientation while looking more underneath the model. Now try and land the model over a specific mark on the ground, when you can do this you will have mastered basic hovering flight! NOTE: KEEP CHECKING THE FUEL LEVEL, stop when it is less than 1/4 full.

6. The next stage is brief forward flight. Take off and hover at about 2 or 3 metres, move the forward cyclic stick gently forward, the model will tilt forward and start to fly forwards, it will also start to climb (as happens when a helicopter comes out of hover) so, reduce throttle slightly and almost immediately halt the forward flight by bringing the cyclic stick back to neutral and then briefly into slight back stick (don't hold back stick or the model will try and reverse). Increase power as the model goes back into the hover and fly it back down to the ground. Repeat this a few times. Then try 'figure of eights', take off into a hover, fly the model to the right and then to the left while keeping the nose facing into the wind. This way you will alternately looking at the right and left sides of the model, which is good practice and preparation for flying a circuit.

7. The next stage is a circuit. Take off as before and as before gently go into forward flight (always into wind) and allow the model to climb a little higher this time until it is about 30-50 metres away from you and reduce throttle slightly and turn left by applying slight left on both sticks and then left again. When it has flown back down wind and is back level with you, turn it back round into wind so that in fact you have flown the model in a complete circle round you,

ending up slightly down wind and probably fairly high but still looking at the left side, push in a little forward cyclic to maintain forward flight into the wind. Halt the forward flight as before, go back into hover and slowly descend to a landing. Practice this initially when only a slight wind is blowing (or none at all). Note the method of landing at this stage i.e. hovering and then slowly descending to the ground, is the easiest way. The more scale type of landing i.e. flying forwards while descending, then halting the forward flight and descent with back cyclic and collective just before touch down, requires practice so, perfect the easier method first!

8. Flying in a wind: The model will fly in quite a high wind with no problems. You will find it requires less throttle/collective than normal both for take off and hovering so be prepared for this. IMPORTANT: When taking off in a wind, always make sure the tail lifts first before the nose because if the nose should lift first, the wind will get under the rotor and cause the model to be blown backwards. Set the for/aft cyclic trim further forward as necessary.

9. From here on, it is practice makes perfect! Do keep everything gentle until the full extent of the controls and the 'feel' of a helicopter become second nature. Large amounts of control input too early in practice could end up with the model getting away from you and out of control.

SAFETY:

PLEASE READ AND ABIDE BY THIS! It will save you frustration/time/expense and possibly endangering yourself/spectators/property!

1. Has the model been built and set up according to the instructions? If in doubt, re-read the appropriate instruction or seek expert advice.
2. Has the 'Loktite' been used on ALL screws and nuts (except the nyloc nuts and engine shaft nut)? Don't forget to re-apply it if you have dissassembled any part.
3. Regularly check important screws and nuts for tightness and the fuel lines for kinks, splits etc. Keep your fuel clean.
4. Fly in an open area away from people and houses and DO NOT GET OVER CONFIDENT DURING INITIAL FLYING, progress slowly!
5. Make sure your radio is operating perfectly before take off and the batteries are fully charged before each flying session.
6. ALWAYS HOVER BRIEFLY after take off on the first flight of the day (and ideally every flight), as a final check on everything before going into forward flight.
7. Keep checking the fuel level, it is very visible!
8. Don't fly with a damaged rotor, dents and nicks in the balsa trailing edge as the result of a 'tip-over' are O.K. but NOT any splits or cracks in the hardwood leading edge. IF IN DOUBT, DON'T!
9. Don't get too close to the model when hovering, we know it's fascinating but, rotor blades are dangerous!
10. When flying, if anything appears abnormal i.e. change of engine note, change in handling characteristics, a vibration noise etc., LAND AND CHECK!
11. Always clean the model thoroughly with a spray model cleaner after flying, a build up of oil and dirt is bad modelling practice.
12. Have third party insurance cover for model flying. This is available from the B.M.F.A. or the ASP magazine group and is very cheap.

Above all, we at MFA hope you enjoy your helicopter!

OPTIONAL EXTRAS:

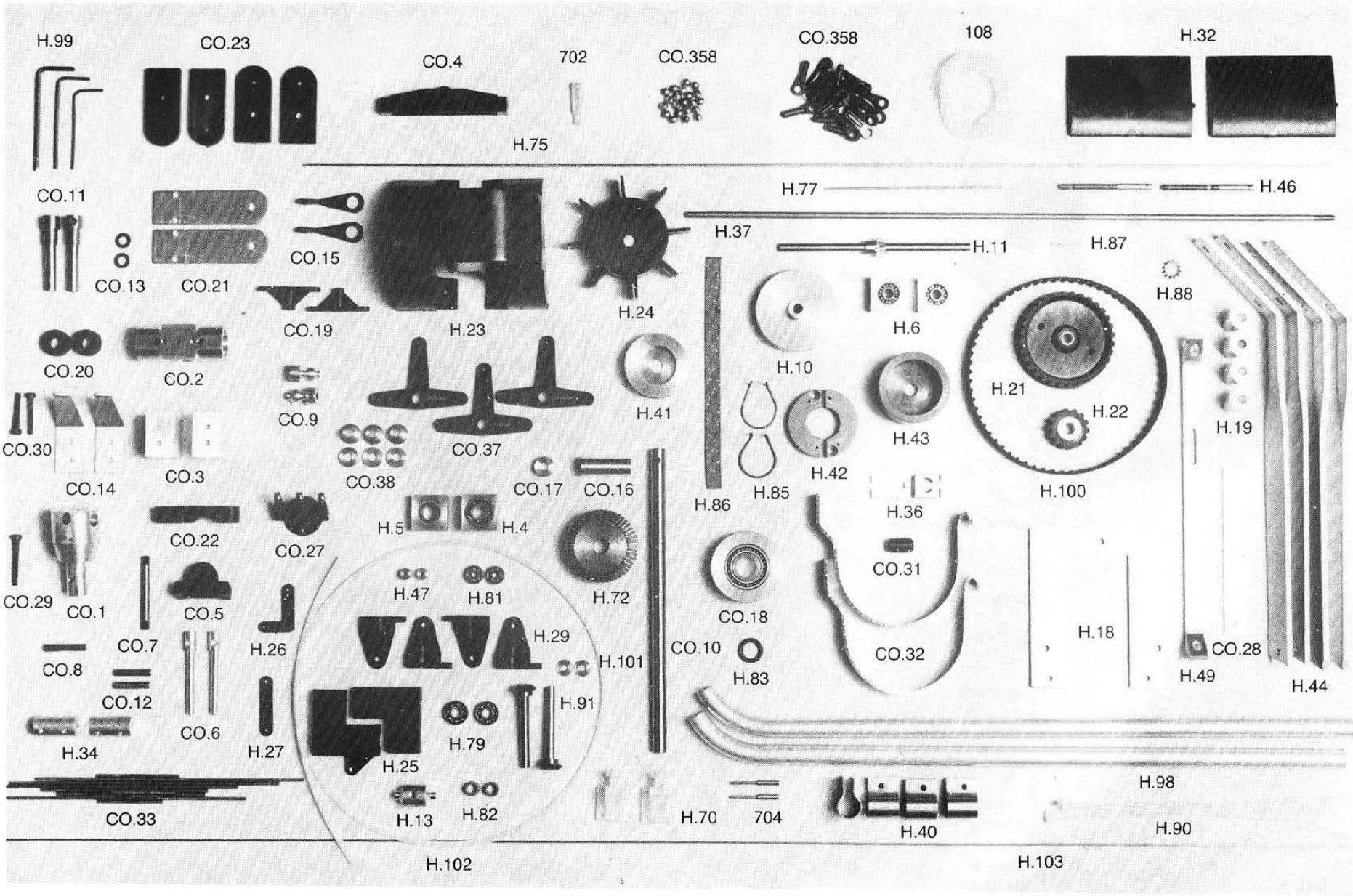
Autorotation kit: Part no.769.

Hughes 500E scale body conversion kit: Part no.737.

Extended U/C legs (by 30mm) for rough terrain use and/or greater silencer to ground clearance: Part no.H.53.

Rotor blades support (when transporting the model): Part no.770.

Camera cradle. To take a simple electric wind 35mm compact camera for aerial photography: Part no.772.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