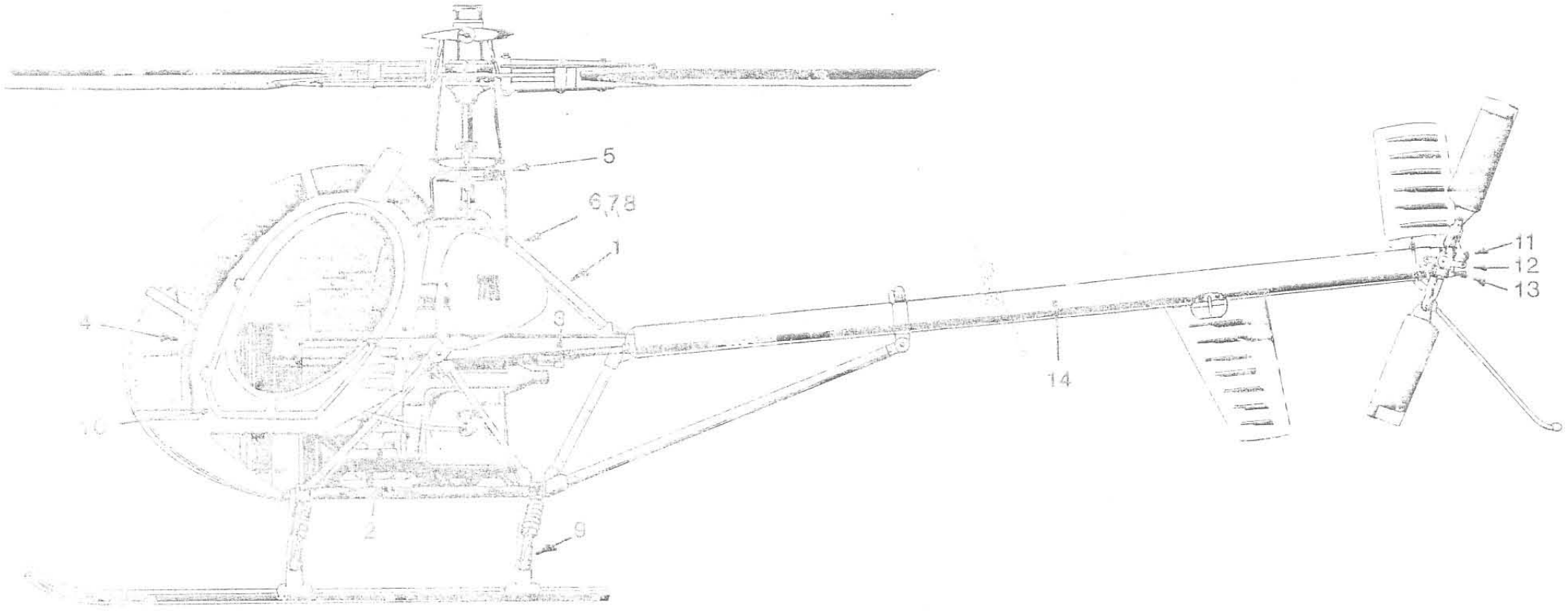


INSTRUCTIONS

MORLEY HELICOPTERS

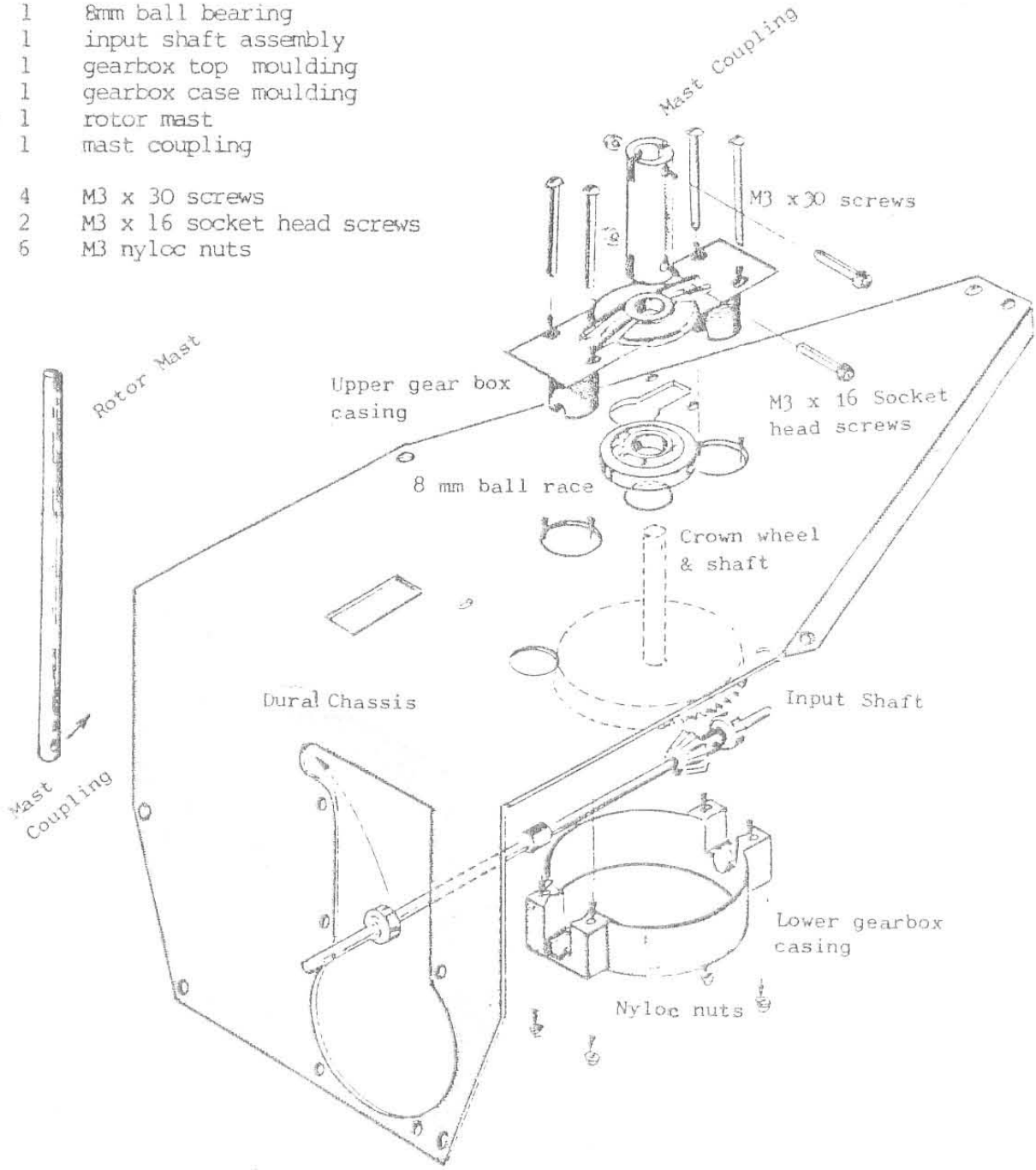
HUGHES 300

Diagram 1. Pack

MAIN GEARBOX

1 crownwheel and shaft
1 8mm ball bearing
1 input shaft assembly
1 gearbox top moulding
1 gearbox case moulding
1 rotor mast
1 mast coupling

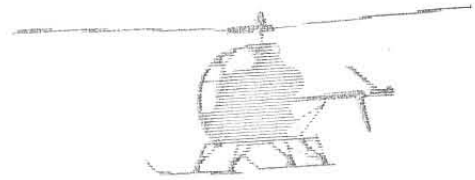
4 M3 x 30 screws
2 M3 x 16 socket head screws
6 M3 nyloc nuts



With crownwheel shaft upwards through centre of the three adjacent holes in chassis, slide the 8mm ball bearing down the shaft until it is touching the gear. The gearbox top moulding is also slid down the shaft, over the ballrace, and through the chassis. Make sure the (larger) hole in the moulding for the input ballrace is at the rear. Cover the crownwheel with light grease.

Place the input shaft assembly into position and pull the lower gearbox case into position with four M3 x 30 screws and nyloc nuts. Tighten but ensure that rotation is reasonably free. It will loosen under load. There is a hole immediately above the pinion gear in the well of the top moulding for subsequent lubrication with gear oil.

Assemble the mast to the gearbox using the coupling with M3 screws and nyloc nuts.



MORLEY MK 3. SPECIFICATION

Near 1/7 scale Hughes 300 model helicopter.

Rotor diameter	45in. . 1143mm
Main rotor rpm	approx 1100.
Main rotor	Morley 'AT' collective head
Engine	.35 - .40 cu.in. 5.75 - 6.5 cc
Radio	any four channel proportional radio system is suitable - main rotor cyclic (2) main rotor collective/throttle tail rotor collective (full collective pitch is standard for all Morley helicopters.)
Fuel capacity	8fl oz (250cc) in tank supplied
Flying weight	6.5 lbs (3kg) approx

Dear Customer

Thank you for choosing 'Morley'. I hope you enjoy making a successful model.

A helicopter is a most fascinating machine, and exciting to fly, but it does need care and persistence to become successful and enjoy the performance that the model will be capable of.

The Morley Mark 3 is a 1/7 scale model of the Hughes 300 and is designed to be easy to build and fly, and simple and cheap to repair. It has an excellent flight performance, being stable yet responsive, and is suitable for beginners who need a strong, steady model, and experts who want to be able to tune a model for extra performance.

The design is unique and even to those who are thoroughly skilled in the intricacies of a model helicopter I would respectfully suggest following the assembly instructions, especially on the subject of the plastic chassis members and tail boom. It is best to complete the assembly in numerical order.

Sincerely,

Jim Morley

Diagram 2 pack ENGINE MOUNT

2 engine mount mouldings
1 fan
1 flywheel
1 drive pulley, 14T
1 starter pulley

4 M3 x 20 socket cap screws
4 M3 x nyloc nuts

Temporarily fit flywheel on engine crankshaft making sure flywheel inner face is properly onto the prop driver. Follow by fan, drive pulley and nut, but note that these are not fitted finally until the engine unit is within the chassis. Place engine between the moulded nylon mounts and line up the rear face of the flywheel near the top front of the mounts. Check that width between the mounts is the same as the spacing on chassis cross member mouldings.

Drill mounts for 3mm engine fitting screws so that spacing is correct - cutting away one vertical stiffener in the mount if necessary. Adjust the position of the throttle lever and fit a ball end from the controls pack at this stage so it can be operated from above.

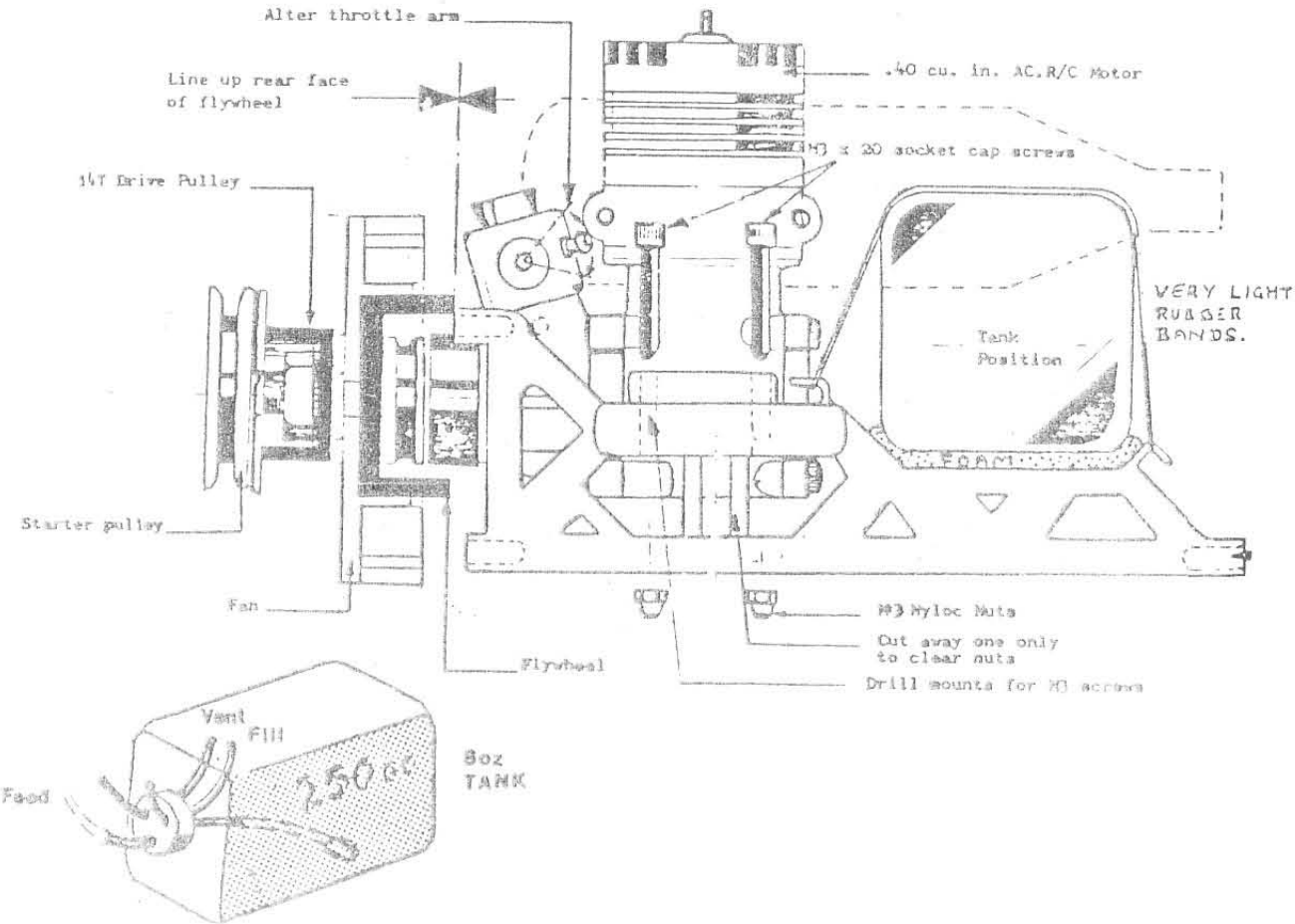
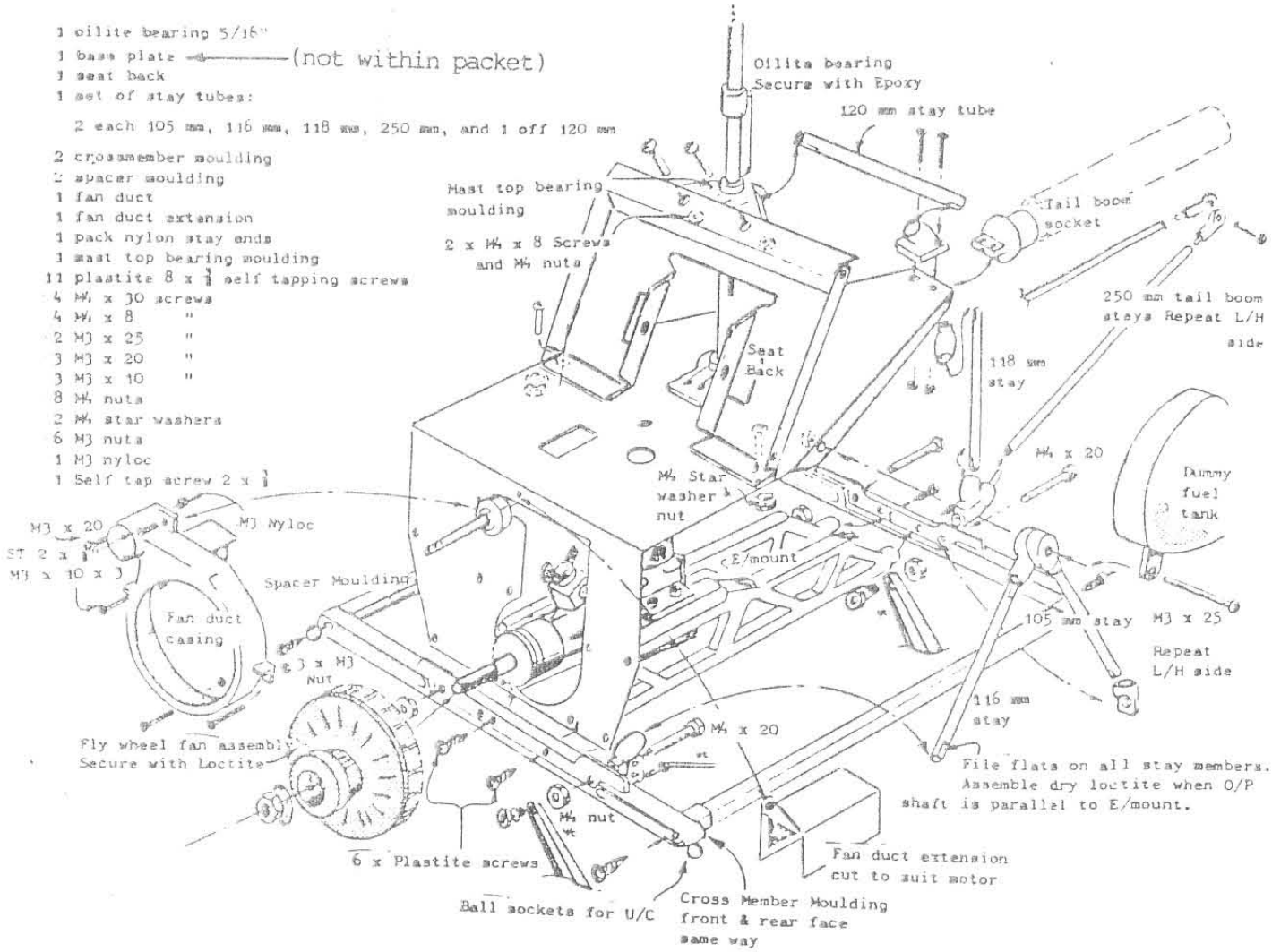


Diagram 3 pack

H300 CHASSIS

1 oilite bearing 5/16"
1 base plate ————(not within packet)
1 seat back
1 set of stay tubes:
2 each 105 mm, 116 mm, 118 mm, 250 mm, and 1 off 120 mm
2 crossmember moulding
2 spacer moulding
1 fan duct
1 fan duct extension
1 pack nylon stay ends
1 mast top bearing moulding
11 plastite 8 x ½ self tapping screws
4 M4 x 30 screws
4 M4 x 8 "
2 M3 x 25 "
3 M3 x 20 "
3 M3 x 10 "
8 M4 nuts
2 M4 star washers
6 M3 nuts
1 M3 nyloc
1 Self tap screw 2 x ½



Place front moulded chassis cross-member in position at bottom of chassis. The engine unit can now be fitted to the chassis base plate and crossmember. Follow with outer cross spacers and rear cross member, using self-tap plastite screws. Elongate access hole to glow plug if necessary.

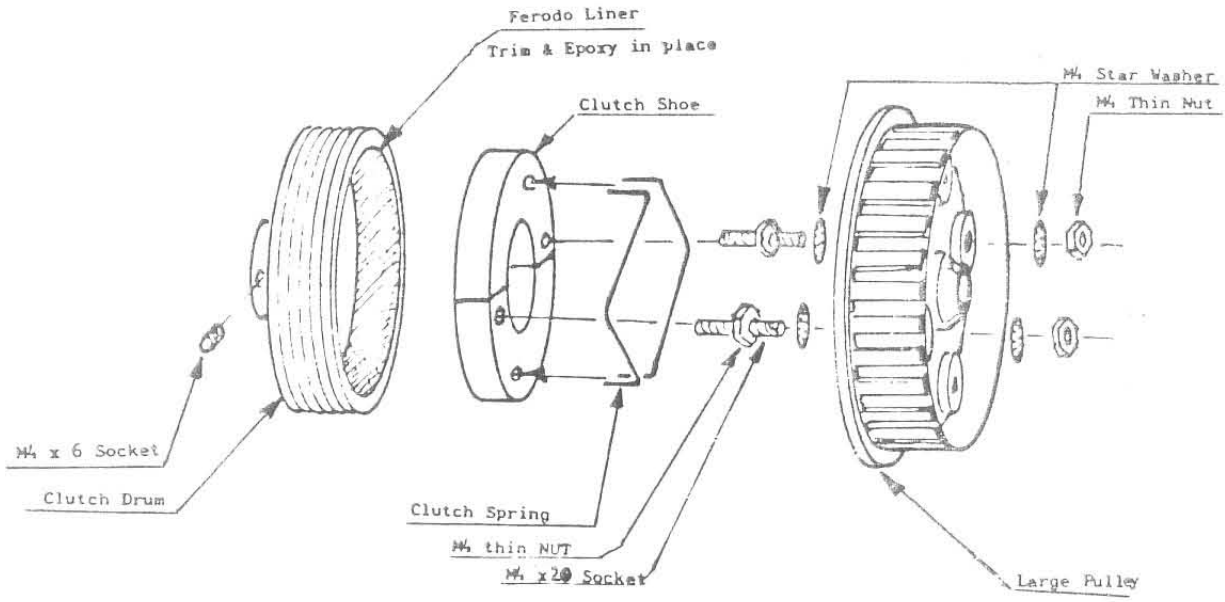
Fix the engine prop-driver, flywheel and fan using locking compound or paint between the surfaces. Fit 'V' section starter pulley over drive pulley using slow epoxy or super glue. An engine backfire on starting will undo this assembly unless it is properly tightened and locked.

Fit fan duct using 3mm nyloc nut on top screw. Drill chassis and fit moulded duct extension, which may be cut away if necessary to clear the cylinder head. Next fit the aluminium seat back pressing using M4 x 8 screws with star washers under the chassis, followed by the triangular moulded housing for the rotor mast top bearing.

Borrow the boom end from the tail boom pack and fit all stay end mouldings as shown. Assemble the stays starting with the two at the front. Fit by filing a small flat on the stay tube and making sure it will go fully into place. Then either use a contact adhesive such as Evo-Stik or a super glue run into the flat. Do not try to put super glue onto parts and then insert as it will certainly lock in the wrong place. If using Evo-Stik allow several days for the glue to set properly. Roughen the bore of the top bearing moulding, slide the 5/16 oilite bearing down the mainmast and into position, and epoxy it into place - it fits loosely to allow self-alignment with the main mast before fixing.

Diagram 4 pack CLUTCH UNIT

1	large pulley
1	clutch drum
1	100 XL 037 drive belt
1	Ferodo liner
2	clutch shoe
2	clutch shoe spring
1	M4 x 6 socket set screw
2	M4 x 20 socket set screw
4	M4 thin nut
4	M4 star washer
1	Set screw key



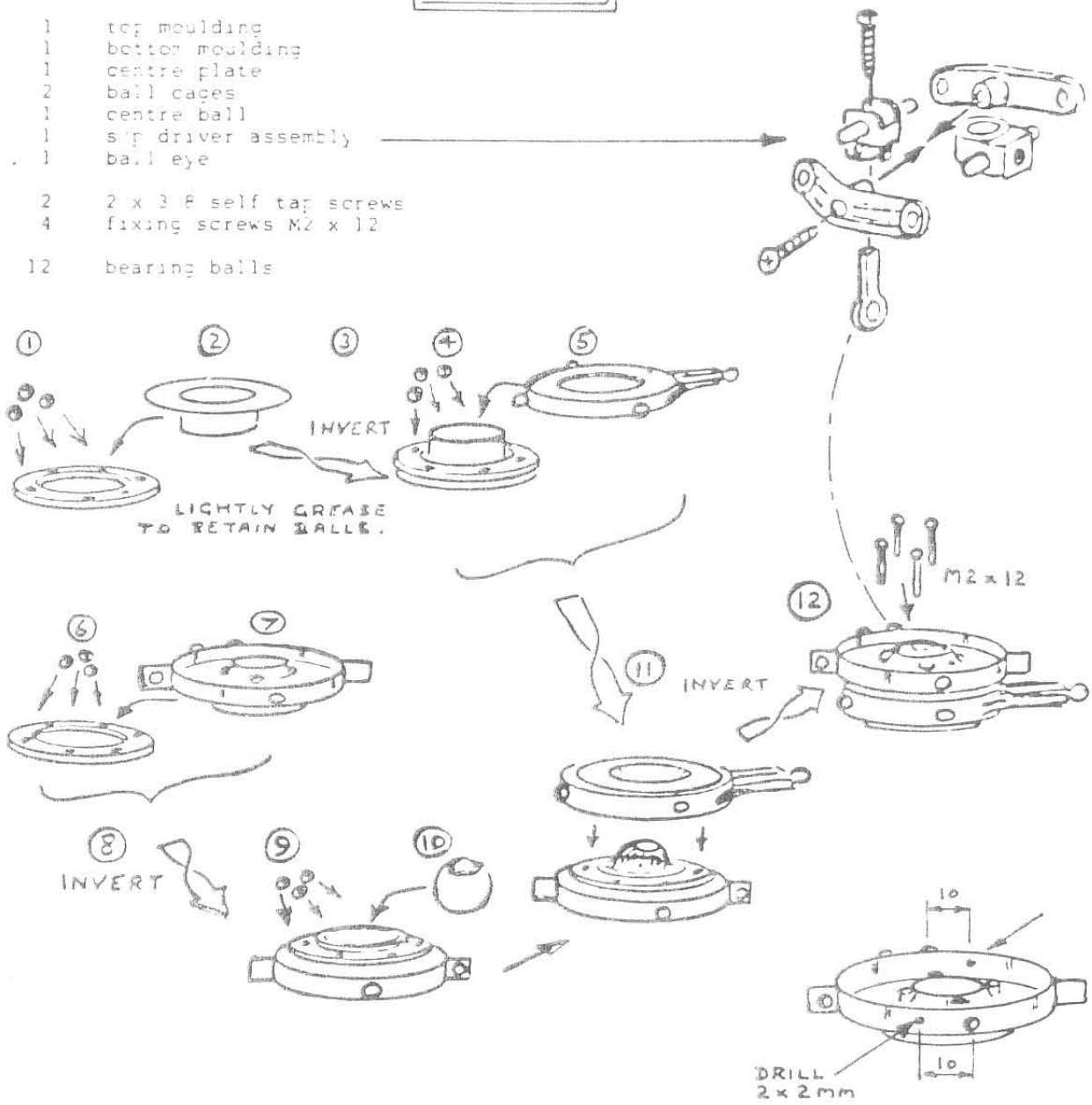
Carefully cut the Ferodo clutch lining to the correct length to fit inside the clutch drum. Roughen the drum with emery paper or a file and cover it and the lining sparingly with epoxy adhesive, then press the lining tightly into place. Hold in position until set.

Thread the M4 screws into the clutch shoes and an M4 thin nut one turn clear of the shoe. Locate clutch springs in clutch shoes and add star washers onto screws. Place the assembly into the large pulley as shown in diagram and secure with star washers and thin nuts. Adhesive tape across the shoes is a help while doing this. Check that the shoes are free to swing outwards slightly.

Fit drive belt round engine pulley and slide large pulley onto gearbox input shaft, followed by clutch drum. Align large and small pulleys, and tighten clutch drum grubscrew into flat on input shaft, after applying paint or thread locking compound to the screw only.

SWASHPLATE

1	top moulding
1	bottom moulding
1	centre plate
2	ball cages
1	centre ball
1	s/p driver assembly
1	ball eye
2	2 x 3.8 self tap screws
4	fixing screws M2 x 12
12	bearing balls



Drill two 2mm holes in the side of the top cup moulding in the position shown in sketch, ready for screws and balls from the controls pack.

Place three balls in one of the ball cages, and place the bottom moulding over it to keep the balls in position. Invert, and place the remaining three balls in the cage. Place the centre plate over the assembly, and repeat for the second cage and balls.

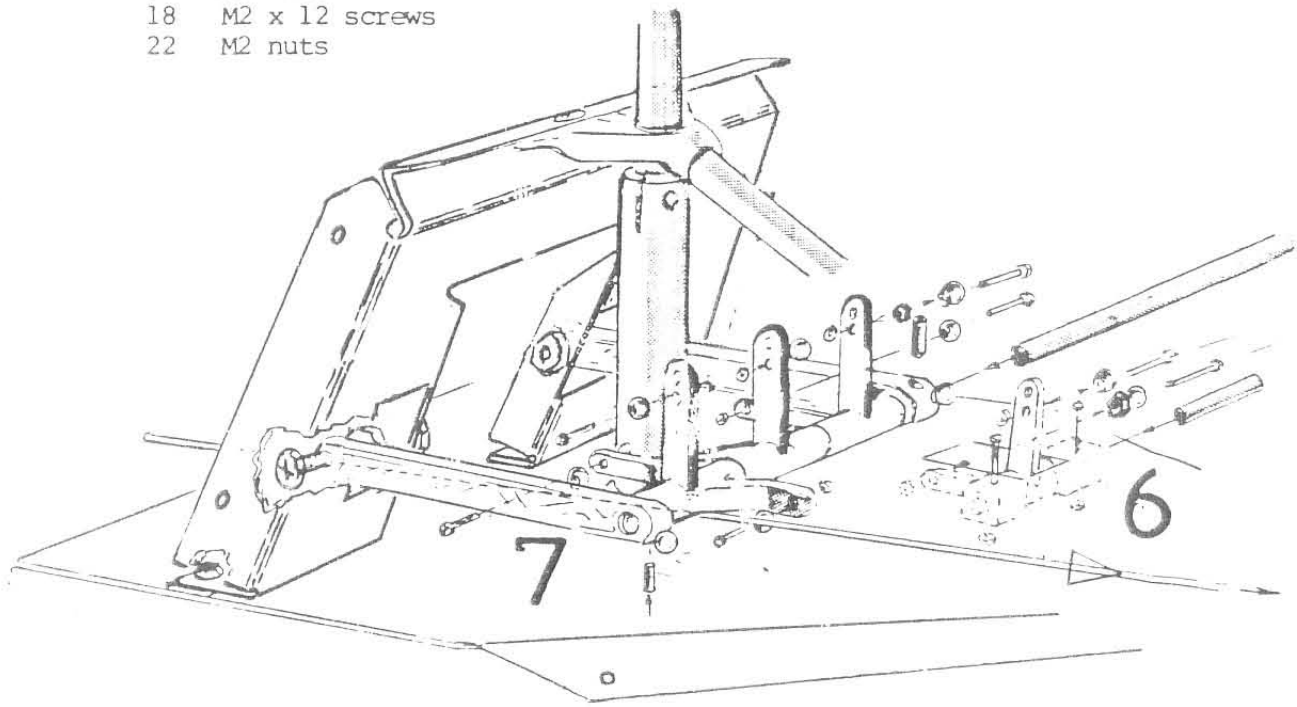
Sandwich the centre ball between the swashplate top and bottom mouldings and secure with the four screws. Place on rotor mast with long arm to the rear.

Assemble swashplate driver and fit a ball eye to small pivot.

Swashplate rocking movement must be free and the assembly should slide easily up and down the main rotor mast. Slide the swashplate driver over the mast before fitting rotor head but leave locking to mast until later when the correct position has been found.

Diagram 6, 7, 8. pack H300 CONTROLS

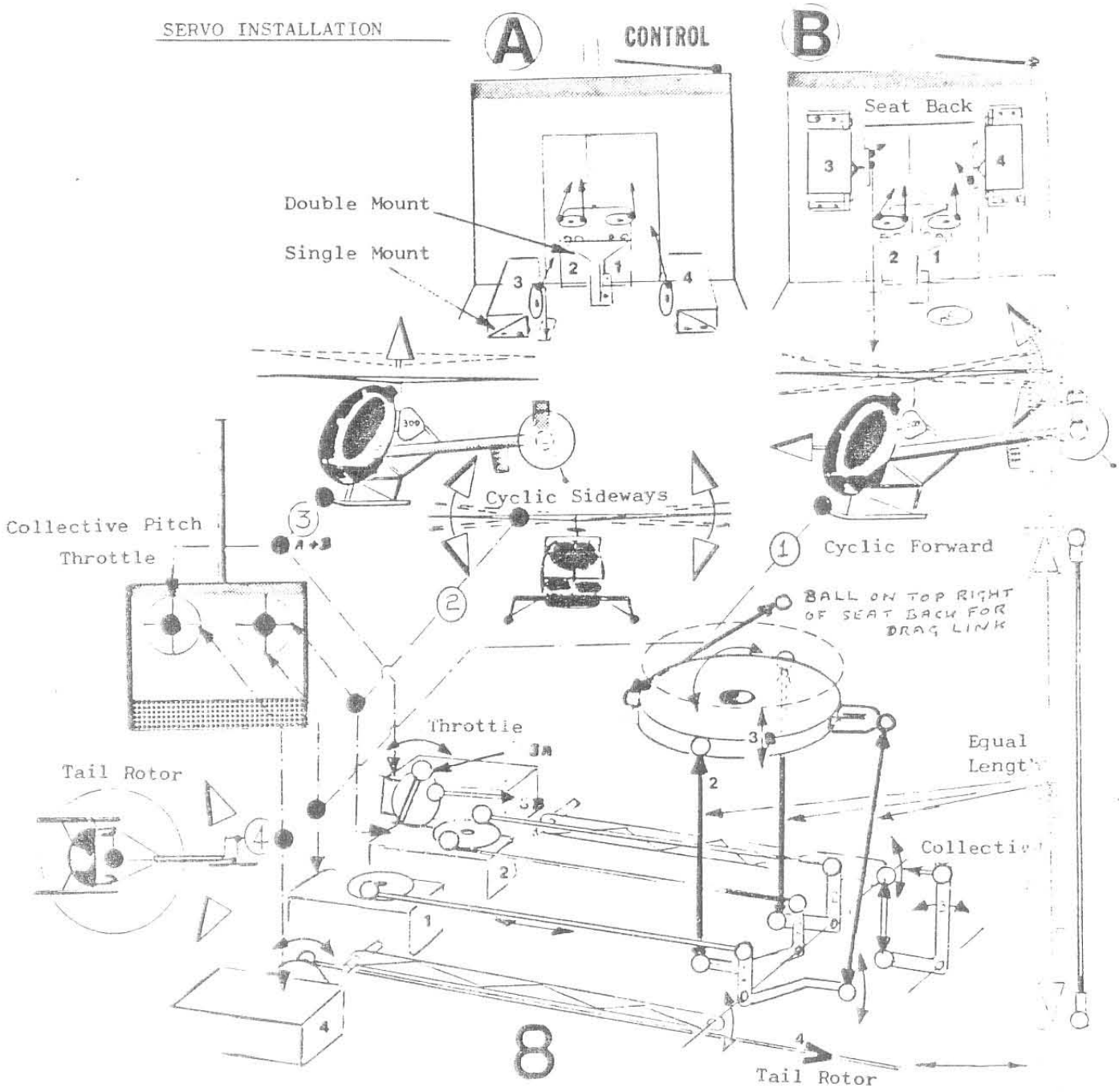
2	cradle arms
2	pairs bellcranks
1	pair bellcrank mount blocks
1	twin servo mounting bracket
2	servo mounting bracket pairs
18	ball end ball
3	tree 6 ball eye
10	connecting rod 65mm
1	connecting rod 130mm
1	threaded stud 50mm
1	bellcrank shaft 75mm
1	bellcrank shaft 30mm
2	M4 x 16 screws
4	M4 thin nuts
2	M4 star washers
6	M3 x 8 screws
2	M3 x 16 screws
8	M3 nuts
18	M2 x 12 screws
22	M2 nuts



Fit one of the straight bellcranks on the short (75mm) shaft between the mounting blocks, with ball ends fitted to outside. Use an M2 screw and a nut on each side of the crank moulding on the bottom one. The assembly is fitted through the chassis hole on the right, with the blocks position under the chassis and held by two M3 x 16 screws. This operates collective pitch control as in sketch 6.

Place the remaining three bellcranks on the 75mm shaft as in sketches 7 & 8 followed by the cradle arms. The top ball on the straight crank should have an extra nut so as to clear the adjacent one. Fit the cradle arms to seat back using an M4 x 16 screw and a nut on each side of the metal.

SERVO INSTALLATION



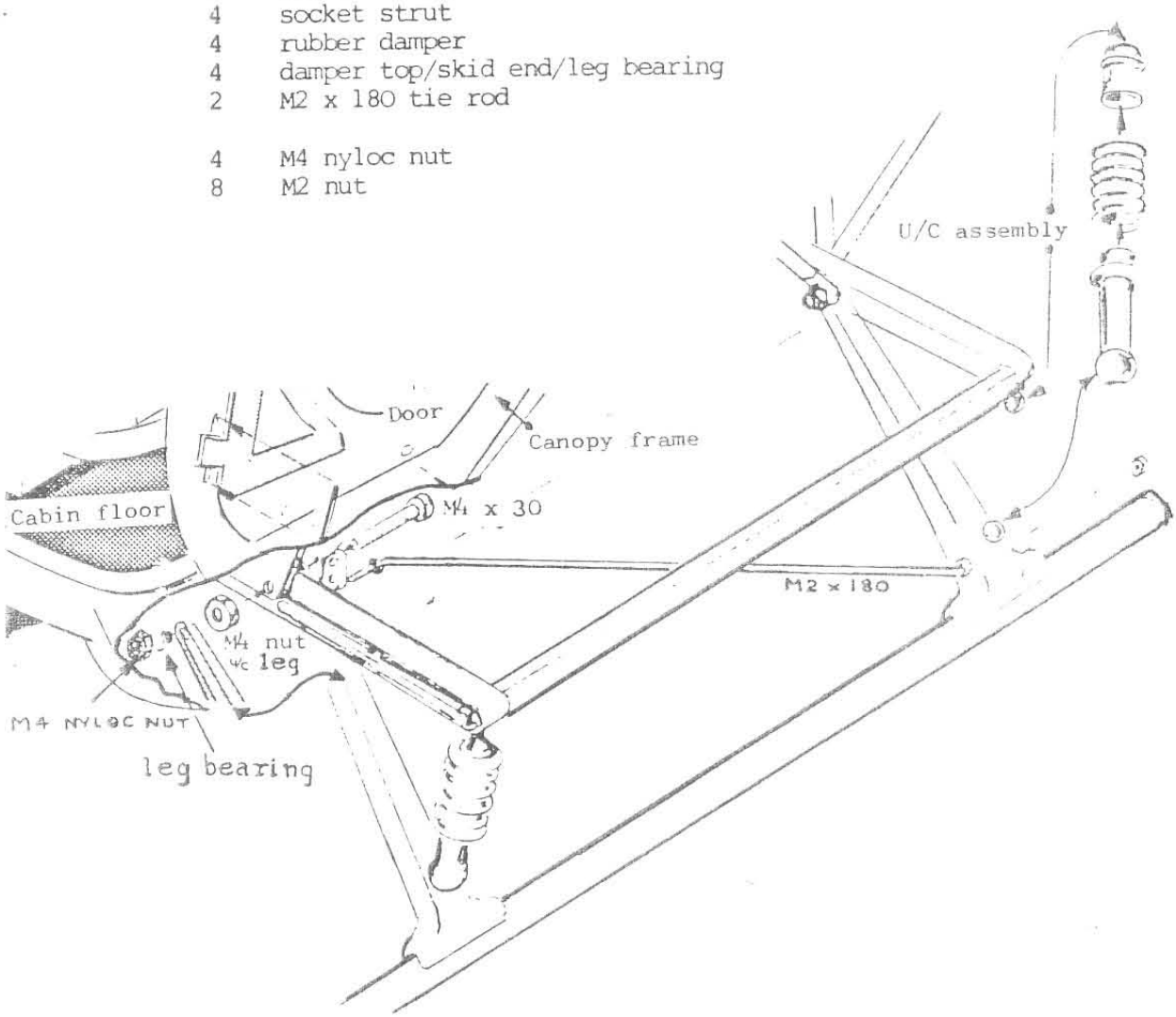
Fit two servos to the twin mounting bracket and fix in position. Note that for controls to be free of interaction the servo-to-bellcrank link should be the same length as the cradle arm, but for access it is easier to have the link longer - any interaction is slight.

Fit a ball eye to each end of the control connecting rods. Align the throttle/collective servo at chosen location as in diagrams A or B, complete the linkage and fit the servo.

Finally fit the drag link to prevent the lower swashplate from rotating as seen in sketch 8, connecting to a ball end on the seat back.

Diagram 9 pack H300 UNDERCARRIAGE

2	skids
4	leg moulding
4	socket strut
4	rubber damper
4	damper top/skid end/leg bearing
2	M2 x 180 tie rod
4	M4 nyloc nut
8	M2 nut



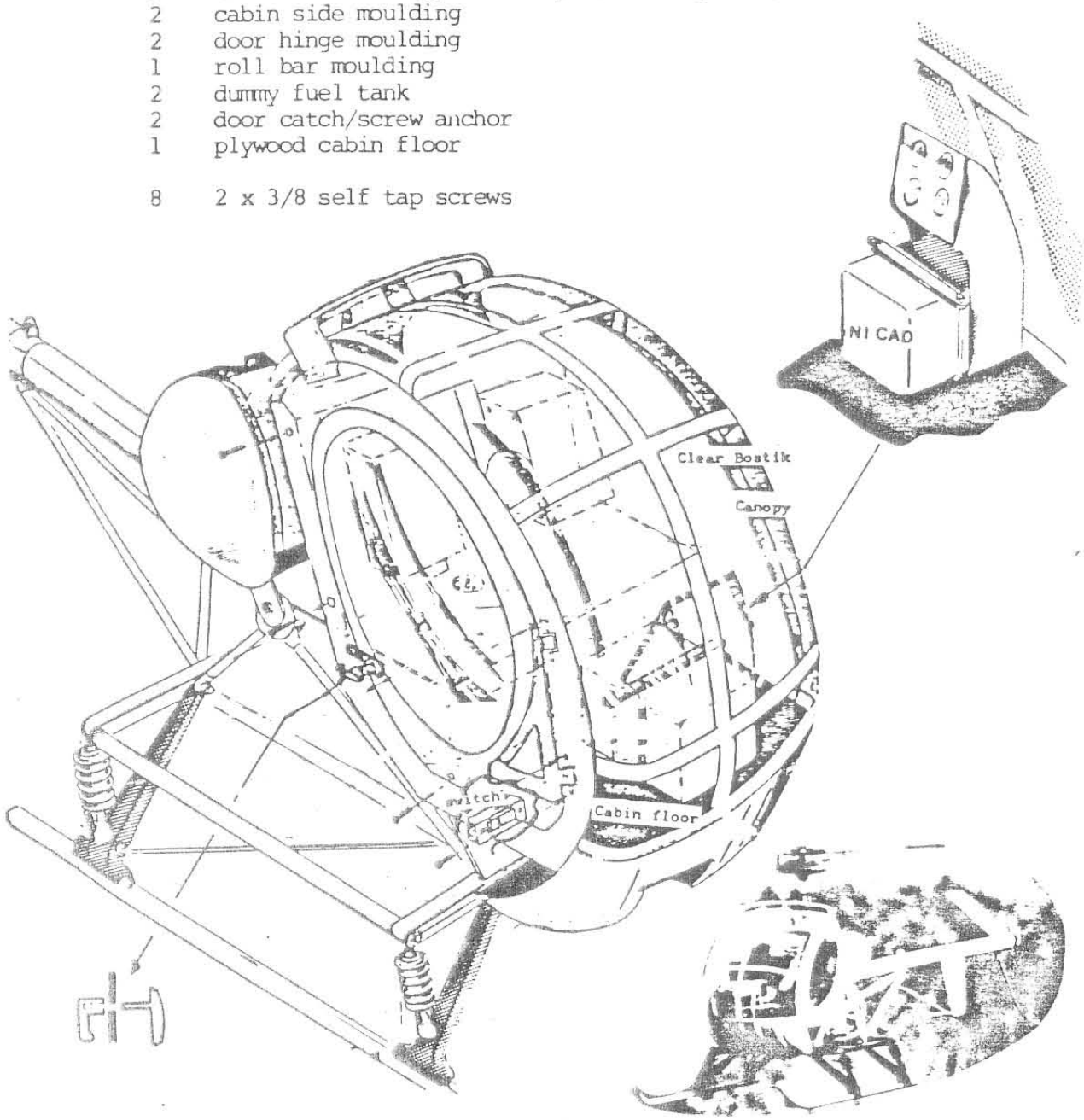
By putting the socket mouldings in very hot water for one minute they can be softened enough to be popped onto the appropriate ball quite easily. Similarly the skid legs fit over the skids. Drill a 2mm hole in the base of each rear leg moulding for the tie rods.

Glue nylon pads on the ends of the skids. Assemble legs onto the chassis forward of the cross members, using bushes over the M4 bolts and secure with nyloc nuts.

The front upper end of each tie rod goes through the small bracket at the rear of the foremost nylon stay end moulding. Bend the 180mm rods clear of the threads as this would weaken them. Fit with an M2 nut on each side.

Diagram 10 pack H300 CABIN

1	sheet clear canopy mouldings (not in packet)
2	cabin side moulding
2	door hinge moulding
1	roll bar moulding
2	dummy fuel tank
2	door catch/screw anchor
1	plywood cabin floor
8	2 x 3/8 self tap screws



Paint floor, and strap radio nicad pack, with switch, to centre. Disguise with control console pieces from canopy moulding. Using the airframe as a jig, fix the cabin sides to the seat back with the self tap screws into the moulded screw anchors. Carefully drill the cabin floor for the two small self tap screws on each side, glue and screw floor in place. Cut out the canopy bottom moulding and fix to cabin floor with clear impact adhesive. Note that the portion near the engine pulley is cut away to allow use of the starting belt.

Cut out the canopy bowl and fix to the inside surface of the cabin sides. When assembled fit the roll bar in place using clear impact adhesive on both parts.

Paint the inside of the bottom fairing. Make door hinge pins from short pieces of wire and epoxy into position. Cut out the doors using door frame as a guide, fit handle mouldings, paint, then glue to hinges. Stick plastic strip from canopy mouldings sheet around edges of dummy fuel tanks, and paint.

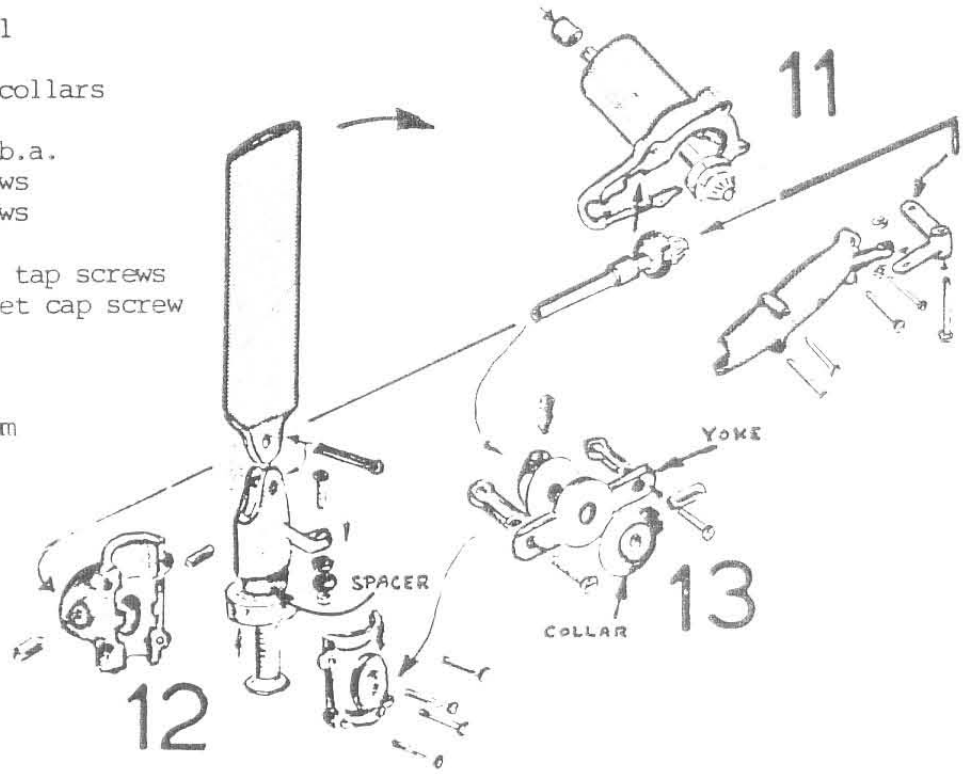
Diagram 11, 12, 13, pack

TAIL ROTOR

1 gearcase moulding
1 gearcase back moulding
1 input mitre gear and shaft (each with ballrace
1 ouput mitre gear and shaft and oilite bush)
2 blade
2 blade mount
2 1/2 hub and spacer moulding
1 control yoke
2 ball end ball
2 eye end
2 control rod collars

2 csk screws 2b.a.
4 M2 x 16 screws
6 M2 x 12 screws
12 M2 nuts
2 2 x 3/8 self tap screws
1 M3 x 20 socket cap screw
2 M3 nuts

2 split pins
2 ballrace 6 mm



Gearbox.

Remove the oilite bush and push the input shaft (i.e. the smaller of the two shafts) into the case as in the diagram. Place the output shaft in position in the case. Fill case with light grease and attach back moulding using M2 x 16 screws and nuts. Push the second oilite bush along the input shaft into the gearcase. Check for free rotation.

Tail Rotor.

Place the ballraces on the countersunk screws followed by the moulded spacers and, with paint or locking compound, screw tightly into blade holders. Fit ball ends to the pitch control arms of the blade holders using M2 x 12 screws and a nut on each side of the arm. Slot the blades into the holders. Refer to the diagram for correct installation. Spread the split pins fully after inserting through the blade root and holder.

Clamp the ballraces between the moulded hub halves and draw halves together using M2 x 12 screws and nuts. File small flats on the output shaft of the gearbox to seat the set screws, and fit tail rotor hub to output shaft. Note that the outer surface of the hub should be flush with the end of the shaft. Cut the pitch control rod from 16 g. wire and bend as shown. The wire passes through the centre of the shaft and moves the pitch control yoke which is positioned between two collars.

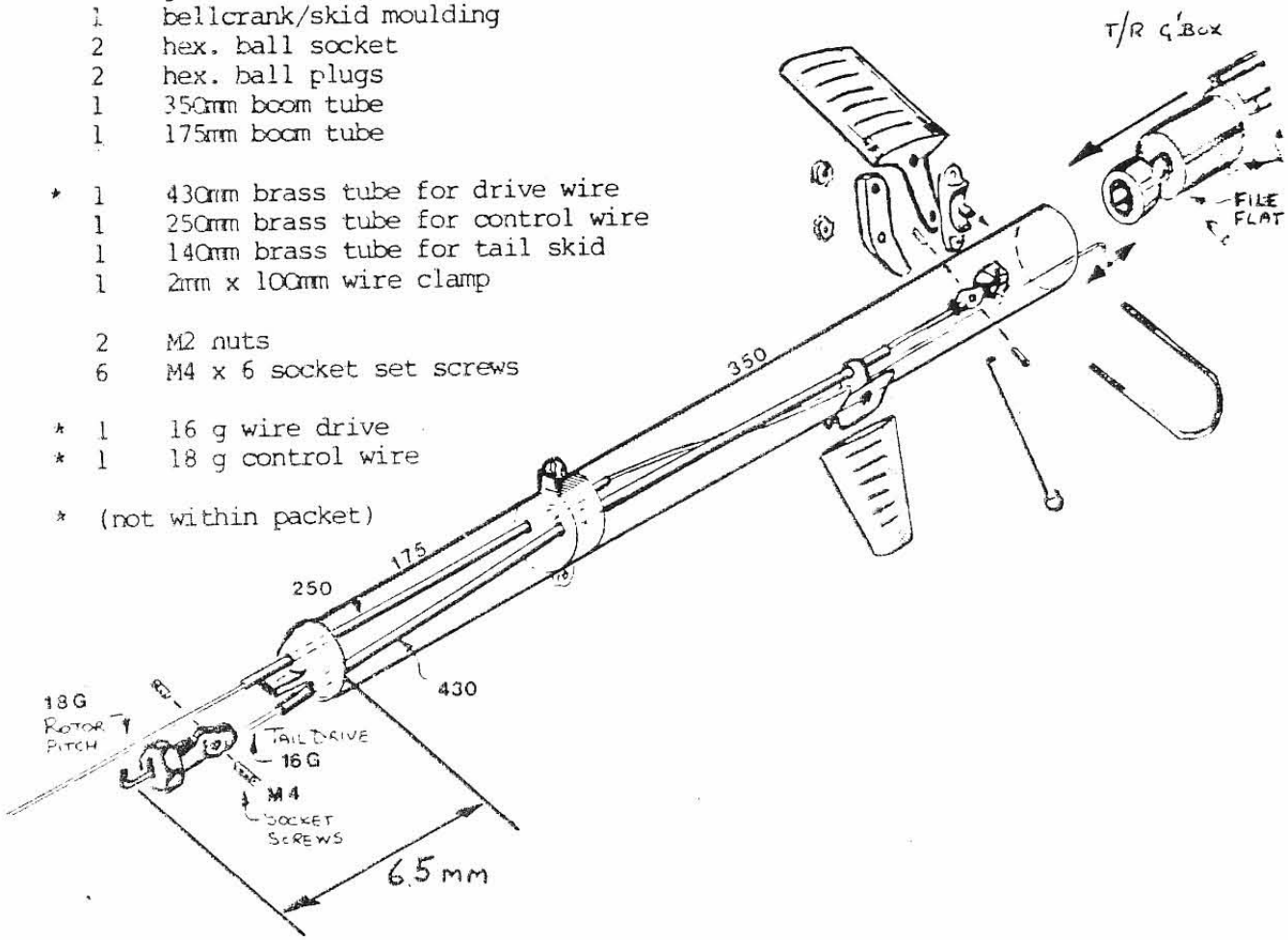
Each ball eye is fitted to the yoke with a self tap screw. The bellcrank pivots on a 3mm bolt on the arm from the gearcase back, again with a nut both sides of the arm.

Morley Mk 3

Diagram 14 pack H 300 TAIL BOOM

	1	end moulding
	1	joint moulding
	1	dagger fin
	1	dagger fin bracket
	1	tail plane
	1	gearcase lock saddle
	1	bellcrank/skid moulding
	2	hex. ball socket
	2	hex. ball plugs
	1	350mm boom tube
	1	175mm boom tube
*	1	430mm brass tube for drive wire
	1	250mm brass tube for control wire
	1	140mm brass tube for tail skid
	1	2mm x 100mm wire clamp
	2	M2 nuts
	6	M4 x 6 socket set screws
*	1	16 g wire drive
*	1	18 g control wire

* (not within packet)



It is most important to follow the correct sequence of assembly. First put the drive wire with long brass tube and the control wire with middle length tube into the end moulding which is mounted on the chassis. Then feed the 175mm boom tube over it and add the joint moulding. The drive wire goes through the left side of the joint moulding. Use EvoStik or super glue to fix. Make sure joint moulding is vertical.

Fix the dagger fin into its bracket and into the hole in the 350mm boom tube. Feed the tube over the wires and onto the joint moulding with the drive tube going through the top of the fin bracket and the control wire going through the small hole at the base. Make sure dagger fin is vertical and fix the boom tube in place.

When dry remove boom assembly from the chassis and slide hex. ball coupling over drive wire at rear, bend the end over at 90 degrees, pull the ball of the hex. coupling back over the bend and tighten the set screws. Put the socket onto the tail gearbox input shaft and assemble as shown in sketch 13. Push the drive wire from the front to engage the coupling, then complete the second hex. ball drive as shown in sketch 14. Lubricate the couplings with a small dab of grease. Fit hex socket onto main gearbox shaft using grubscrews, and re-attach tail boom.

1 top plate moulding
1 head plate
1 mast top moulding
2 bearing mount pairs
1 set of 4 finger plates
2 teeter rubber
2 drag damper rubber
2 blade mount
2 incidence arm
1 flybar cradle (zig zag)
2 cradle extension
1 cradle carrier
2 cradle carrier spacer
2 flybar operating arm
2 flyblade
2 mixer long rocker
2 mixer short rocker
1 mixer slider
8 M2 x 12 screw
8 M2 nut
4 M3 x 16 cap head screw
2 M3 x 20 cap head screw (plain shank)
4 M3 x 20 cap head screw
4 M3 x 20 pan head screw
2 M3 x 30 cap head screw
4 M3 x 30 pan head screw
8 M3 star washer
16 M3 nut
2 M4 x 10 socket set screw
2 M4 x 25 cap head screw
2 M4 nyloc nut
6 ball end ball
2 square brass collar
2 3mm oilite bearing
1 50mm threaded stud
4 37mm control rod

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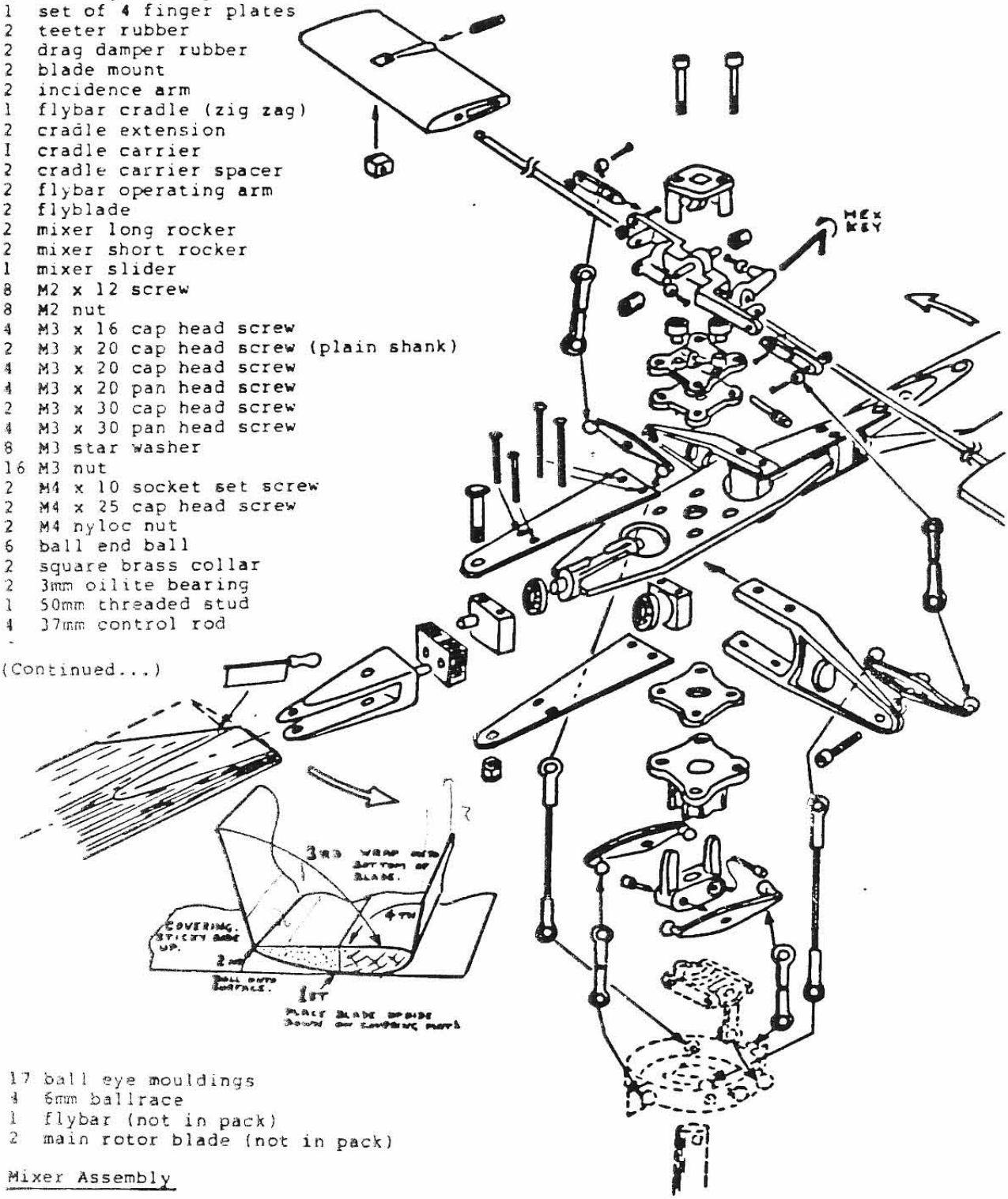


17 ball eye mouldings
4 6mm ballrace
1 flybar (not in pack)
2 main rotor blade (not in pack)

Mixer Assembly

Cut the 50mm threaded stud into four equal lengths and fit a moulded ball eye to each end of each stud.

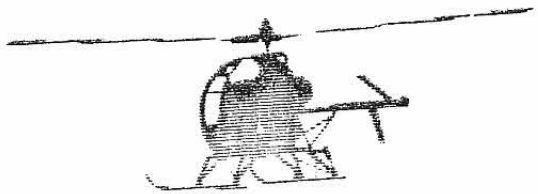
Pass an M3 x 20 cap head screw with a smooth shank through the holes in each side of the mixer slider as in the sketch. The smooth shank acts as a pivot. Thread the screws into the long rocker arms, allowing it to cut its own thread in the plastic. The arms must be allowed to move freely but without slop.

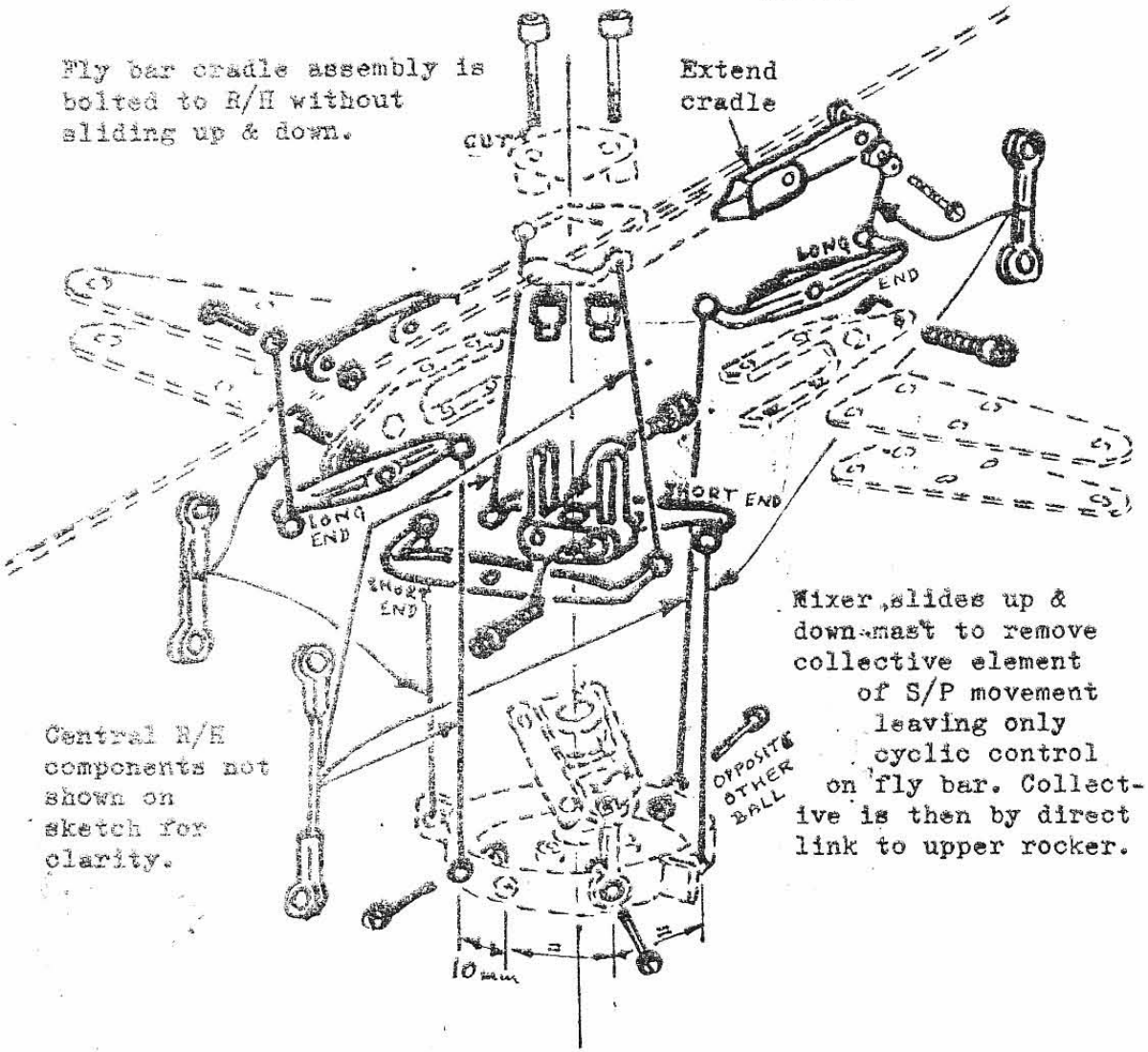
Slide the mixer slider onto the rotor mast with the fork fitting upwards to go into the grooves in the side of the mast top moulding. Connect the outer arms of the long rockers to the swashplate using the two of the short links.

(Continued..)

MORLEY HELICOPTERS

ROTOR HEAD MIXER KIT.





Contents

2	Long rocker	2 X 6	Ball eyes
2	Short rocker	3	Ball
1	Mixer slide	3 M2 X 12	Screw
2	Carrier extension	3 M2	Nuts
2	Spacer	2 M3 X 16	Cap screw
1 X 38	All thread	2 M3 X 20	Cap screw
4 X 38	Control rod	2 M3	Nuts

Remove R/H from model.

1 Drill 3 X 2 mm holes in cup side of S/P top for ball ends position as shown.

2 Assemble mixer, the shorter end of the long rockers to the outside, the long end sliding past the recessed screw head holding the other one. Slide onto mast.

3 Remove ball end from R/H incidence finger and drill out to 3 mm. Insert the M3 X 16 screw inwards and lock with nut. The short, or upper, rocker pivots on the thread of this screw.

4 Re-fit R/H to mast top.

5 Remove ball end from end of fly bar carrier and replace with extension moulding, refit ball end onto extension.

6 Bolt fly bar/cradle/slider assembly rigidly to mast top plate moulding with spaces under using M3 screw.

7 Use a short piece of the all thread rod to join ball eyes back to back. 4 off where shown.

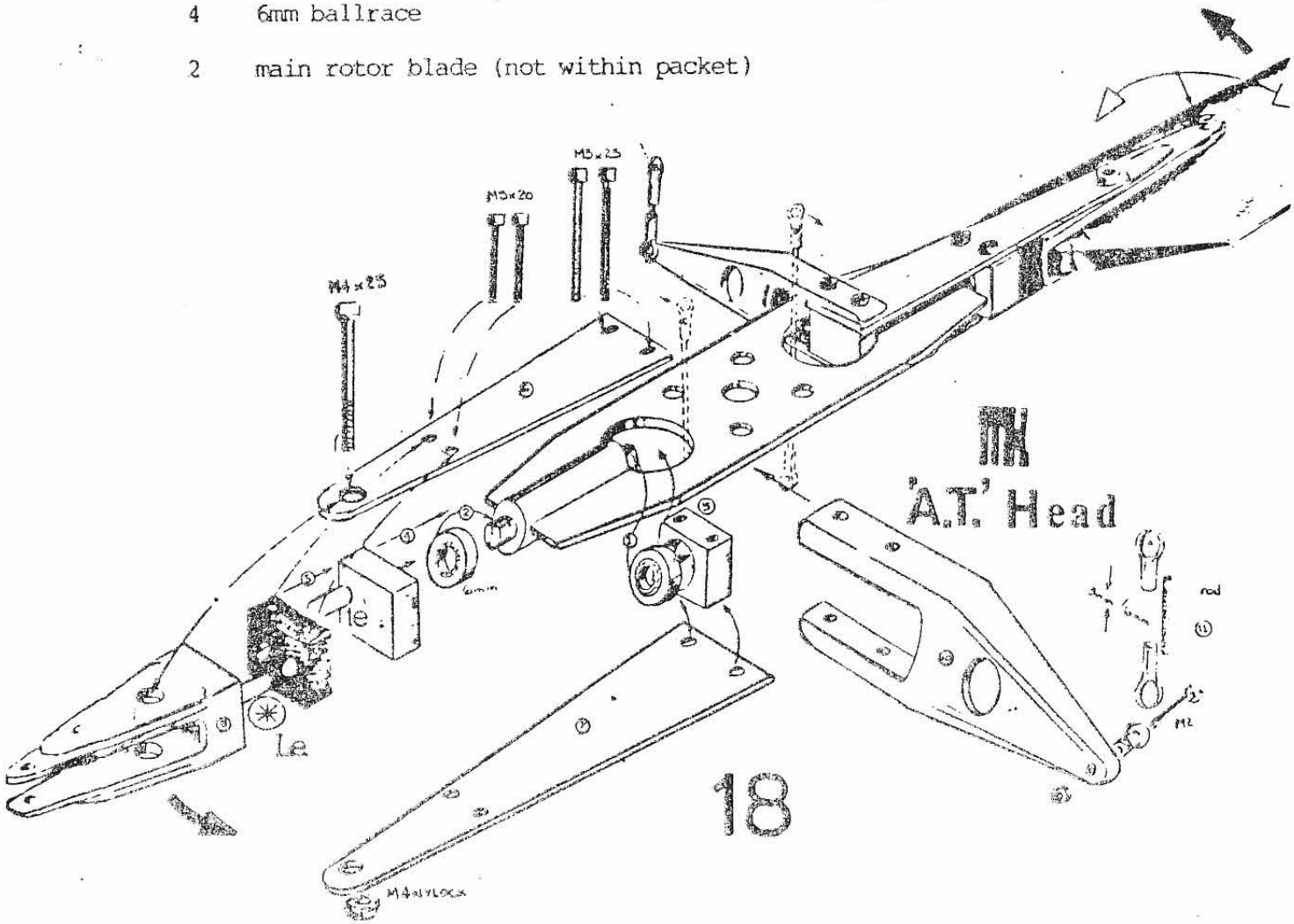
8 Use 38 mm rods to make links to complete assembly. 4 off where shown.

9 S/P driver is reset on mast at a height where forks on mixer assembly will not quite drop out of mast top moulding. Note that collective is reduced by introduction of mixer so S/P vertical movement may need to be increased.

Diagram 18, 19

ROTOR HEAD

2	M3 x 40 cap head screw
4	M3 x 25 screw
4	M3 x 20 "
4	M3 x 20 cap head screw
2	M3 x 16 "
2	M2 x 16 screw
2	M4 x 25 cap head screw
2	M2 nut
14	M3 nut
2	M4 nyloc nut
2	M4 x 12 socket set screw
8	3mm star washer
2	collective slide tube sleeves
2	brass collar
2	3mm oilite bearing
4	6mm ballrace
2	main rotor blade (not within packet)
1	head plate
1	set 4 fingers
1	top plate moulding
1	mast top
2	teeter rubbers
2	drag damper rubbers
2	blade mounts
2	pair bearing mounts
1	collective cradle
1	cradle carrier
1	slider top
2	incidence arm
2	fly bar operating arm
2	fly blade
1	flybar (not within packet)
1	pack 6 ball ends



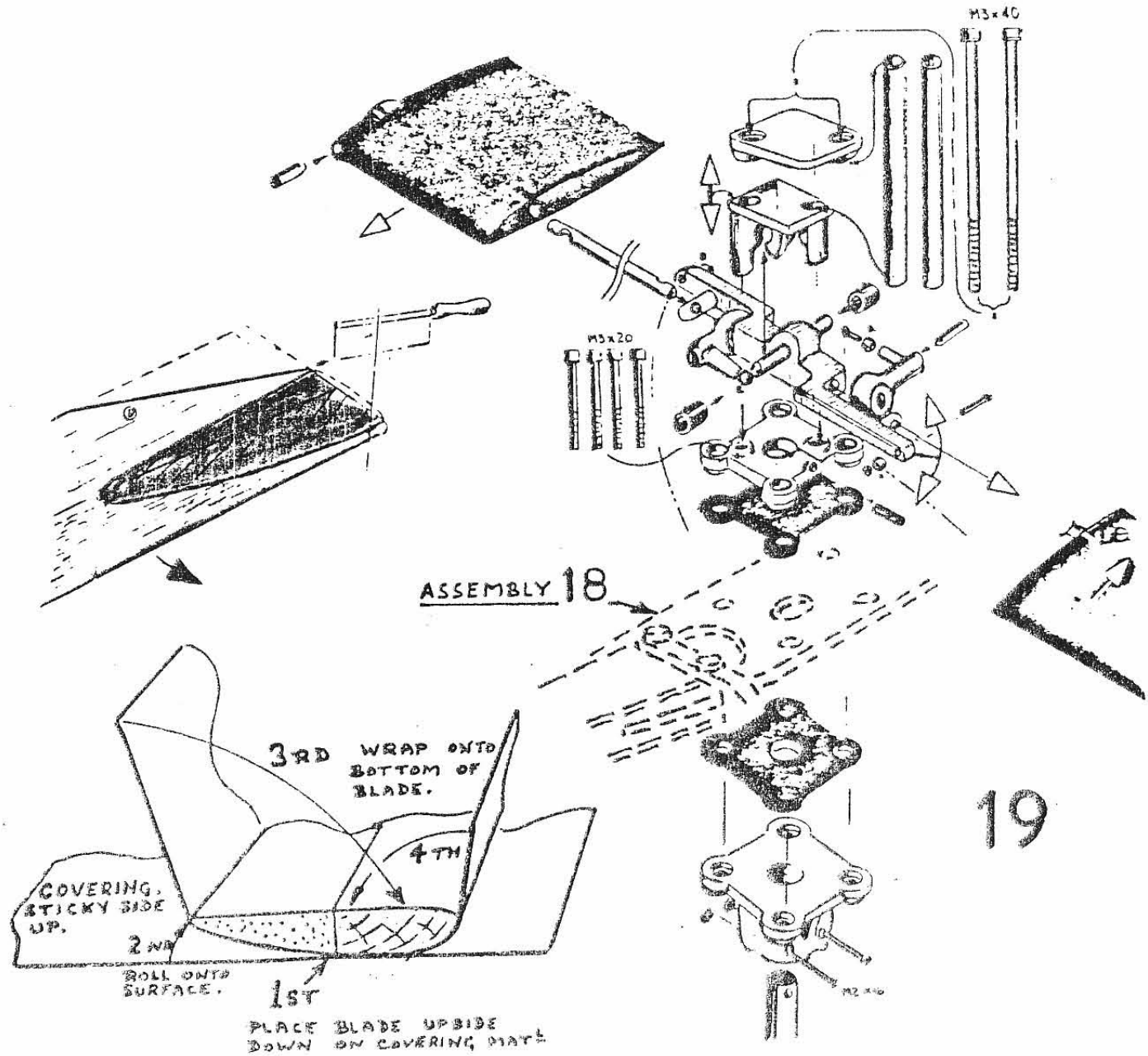
Push the ballbearings onto the stub axles moulded into the alloy plate. Assemble two steel fingers onto the outer (rectangular) bearing block with stud to trailing edge using M3 x 20 screws. Push onto the outer bearing with inner block in position. Push the formed incidence arm over the fingers and secure with M3 x 25 screws and nuts through the inner bearing block.

(cont.)

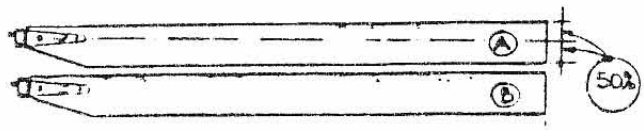
ROTOR HEAD (cont.)

Push mast top onto mast. Remove rotor head fixing screw from inside the top plate moulding. Sandwich the headplate between the two teeter rubbers and between the mast top and top plate moulding. Use M3 x 20 cap head screws. Make sure the nuts are pulled home but the teeter rubbers should be only lightly clamped. Replace screw in top plate moulding, through mast, and fasten M2 x 16 screws and nuts in mast top clamp.

Snap the fly bar 'zig-zag' cradle into the carrier and then push in the oilite bearings. Pass the fly bar through the cradle with the operating arms in place. The unit slides up and down the tubular sleeves on long 3mm screws with slider top as spacer. The fly blades fit onto fly bar with collar set screws tightened into deep grooves at outside end of flybar.



Cut away the balsa at the blade root to taper the blade, and if necessary flatten the top of the blade where it fits into the moulded holder. Sand the blades lightly to smooth the surface then cover with the self-adhesive vinyl supplied. The overlapping edges should be under the blade trailing edge 'downwind' - (see diagram).



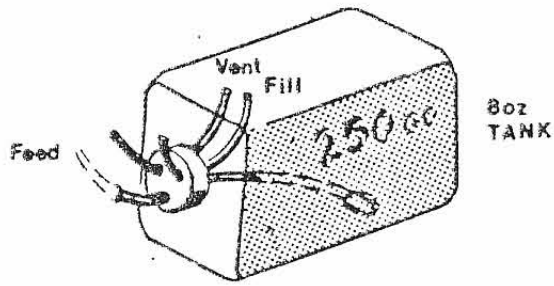
The rotor blades must be in static and dynamic balance. To achieve this is simply a case of making sure they have the same weight, and that the centre of gravity of each blade is at the same point.

If the blades are of equal weight but differing C. of G., add covering material or electrical tape to move the balance point of one blade out towards the tip, and a similar amount of material to the other blade to bring the balance point towards the centre. Try and get the balance equal to within 1-2mm.

If the blades are of unequal weight and balance point, add covering material to the lighter blade in such a position that it will also move the balance point to match the other blade.

Insert the blades in the blade holders and position so that a line from the two holes in the holders would extend to a point 50% back from the leading edge at the blade tip. This gives the correct amount of blade lead. Drill and fit the M3 x 16 bolt and nut, then drill for larger 4mm retaining bolt and fit. Place the rubber drag dampers in position and push the complete blade assembly in place between the rotor head fingers using M4 screw and nyloc nut to secure.

Paint or tape one rotor tip red and the other white. Check that each tip in turn is the same height above the boom. This is static tracking.



FINALS

Assemble the fuel tank as in the diagram and fasten on the seating behind the engine with light rubber bands. These must not be tight or engine vibration will cause foaming of the fuel.

Secure the radio receiver on the vertical surface of the chassis, on the opposite side to the fan duct, with a strap or servo mounting tape. Lead the aerial out to the rear but so it hangs clear of the tail rotor.

The hole above the engine is intended for glow plug access only. Use a long glow clip from below or a remote plug and cable during engine starting.

Have you got lubricant in the gearboxes? Occasionally lubricate the main gearbox with oil through the hole in well at rear of gear case.

Assemble the fuel tank as in the diagram [illegible] on the [illegible] behind the engine with light rubber bands. These must not be tight or engine vibration will cause foaming of the fuel.
Secure the radio receiver on the vertical surface of the chassis, on the opposite side to the [illegible], with a strip of servo-mounting tape. Lead the aerial out to the rear but [illegible] clear of the tail rotor.
The hole above the engine is intended for glow plug access only. Use a long glow clip from below or a remote plug and cable during engine starting.
[illegible] lubricant in the gearbox? Occasionally lubricate the main [illegible] oil through the hole in well at rear of gear case.

Main Rotor

[illegible] can vary widely according to many factors including model weight, engine power, air temperature, humidity, height above sea level, [illegible] [illegible] condition, [illegible] condition, etc. However, [illegible] the bottom surface of the main blades [illegible] degrees [illegible] engine throttle closed [illegible] of the swashplate on [illegible] should be [illegible] while throttle moves to [illegible].

[illegible] in the direction of tilt of the [illegible] which is controlled by the tilt of the swashplate. Tilting the swashplate down at the front will result in the rotor disc also tilting down at the front, and the model [illegible] its [illegible] forward [illegible]. The same goes for [illegible] left and right, [illegible] any other angle, the rotor follows the tilt of the swashplate and the model moves in that same direction.

An angular movement of the swashplate of about 15 degrees in each direction [illegible] is sufficient for ample control without over-sensitivity.

Tail Rotor

With the tail rotor control a suitable setting is for the flat surface of the blades to be at right angles to the pitch control [illegible]. [illegible] zero degrees when the transmitter control stick is [illegible] fully to the [illegible] (with [illegible] neutral). It is most important that the tail control [illegible] freely, [illegible] particular watch for binding at any point as this [illegible] seriously affect stability and control.

[illegible]

[illegible] got lubricant in the gearbox? Occasionally lubricate the main gearbox [illegible] through the hole in well at rear of gear case.

The carburettor should be set rich enough to keep the engine cool, yet lean enough to provide ample power. With the rotor collective pitch set as specified above, the engine should be set to a [illegible] two stroke mixture.

The rotor head should be held while starting the engine with the throttle [illegible] [illegible] centrifugal clutch will not drag at a correct idle speed. Open the throttle [illegible] forward left hand stick if you have installed according to the drawings. Some people prefer to fly other modes. This will speed up the [illegible] and apply collective pitch. Rotor speed is important on any model helicopter and too great a deviation can cause aggravating problems.

[illegible] the rotor should be spinning fast and [illegible] correctly [illegible] enable you to see this. If incorrect [illegible] the [illegible] of the lower blade by adjusting the length of the link [illegible] the [illegible] arm and the flybar cradle. If in order, advance the throttle [illegible] to the point where the model is [illegible]. [illegible] the [illegible] tilt the rotor.

[illegible] shake on the model, stop the rotor and add an extra band of [illegible] to one blade [illegible] wide for minor shake. [illegible] try [illegible] it on the other blade. The fly blades may also need [illegible].

When tracking and [illegible] sorted out the throttle [illegible] may be advanced [illegible]. [illegible] oscillations of the whole model are caused by [illegible] rotor speed. The answer is to reduce collective pitch [illegible] the [illegible] cradle and the rotor [illegible]. [illegible] collective pitch will [illegible] [illegible] in [illegible] [illegible] may [illegible].

If the engine screams and the model shows a reluctance to lift off then more pitch is required relative to throttle. If it lifts off but is very twitchy and sensitive on the controls again increase pitch to slow the rotor. Lift off is best at about 2/3 to 3/4 of full throttle stick movement. Main rotor should be turning at approx 1200 rpm, equivalent to 4900 at the tail rotor.

Oscillations can also occur with any two bladed rotor head if the teeter is reduced by excessive tightening. Try to adjust so the rotor head plate is held firmly but not solidly between the rubbers.

Similarly with the tail rotor. If the model tends to revolve at the point of lift off increase or decrease the tail pitch setting by moving the collars on either side of the yoke.

The model is now ready to fly.

FLYING

There are a great many technicalities concerned with the flight of a helicopter, only the essential reactions will be described here.

Start by standing about three paces to the rear and three paces to the side of your model which is pointing into wind and on level ground. This is the best position for observing the attitude of the model and to be able to control the hover.

Increasing throttle/collective to the point of lift off will indicate that the model wants to go in one direction or another. Ignore this but apply a control (the cyclic control is as if you had hold of the model by the rotor top) to correct the movement. You can trim out the tail at this stage. Repeat until you are confident that your reactions will give a control in the right direction. Many beginners are confused by the apparent tendency of helicopters to leap off in random directions when they are about to leave the ground. Correct control inputs to counteract this have to be learned.

A touch more collective and the model will clear the ground. If at this stage it persistently goes in one direction the trim may be adjusted, either on the transmitter or by adjusting the length of the control rods to the swashplate. Repeat until confident.

When the model is one metre clear of the ground (out of ground effect) control will be easier but a miscontrol will be more disastrous. If flying from rough grass then Morley floats can be an advantage, other training aids are more trouble than they are worth but the Morley string method may help.

A light extension to the tail boom is fitted to make an attachment for a 3 metre length of cord clear of the tail rotor. An active and understanding anchor man holds the other end with the model pointing downwind. The model has forward trim set and the pilot stands to the left of the anchor man, who raises and lowers the string with the model. In this way the pilot learns the response of the model two controls at a time instead of having all four to worry about. This method has been tried, it works, and is recommended.

When you find that height control (do not let the model go above head height) and lateral control are an automatic reaction, then the forward trim is removed and the fore and aft cyclic becomes operational. As the string goes slack so the tail rotor control is needed. Persist until you find it easy. Try to get used to settling the model down - landing - rather than slamming the throttle shut when in the right place else you may chop the tail boom.

Now you can hover! Which you need to do to land. Follow this with slow flights forward, backwards and sideways until you can place the model at any point you want, and can keep it there.

The next stage is a circuit, which is easy, but coming out of forward flight back to the hover is not always so. On a calm day a slow and careful circuit is just a hovering circle. Note that the controls are used to change the attitude of the model to position it as required, and not 'held' in any particular way. Note also that in forward flight a lot less power is required - this is caused by the addition of translational lift due to the extra air going through the rotor, and is what can give rise to trouble in stopping.

To slow down, gently reduce collective and adjust cyclic to keep the model level. As the model slows the power will need to be increased to stop it sinking. When the model is stationary slightly reduce power to stop a vertical climbout. You can then settle it down.

Happy landings