

MORLEY
HELICOPTERS

JETRANGER

INSTRUCTION

MANUAL

PLEASE READ CAREFULLY

BEFORE ASSEMBLY

PACK 1

MAIN GEARBOX

STOCK CODE	Diagram Key	
MXR/CHAN	1	MXR channel (Pack 3)
OMG/MAST	2	rotor mast
OMG/CPL	3	mast coupling
OMG/C1	4	gearbox top
OMG/BB	5	8mm ballrace
OMG/CWS	6	crownwheel & shaft
OMG/ISA	7	input shaft
OMG/C2	8	gearbox bottom

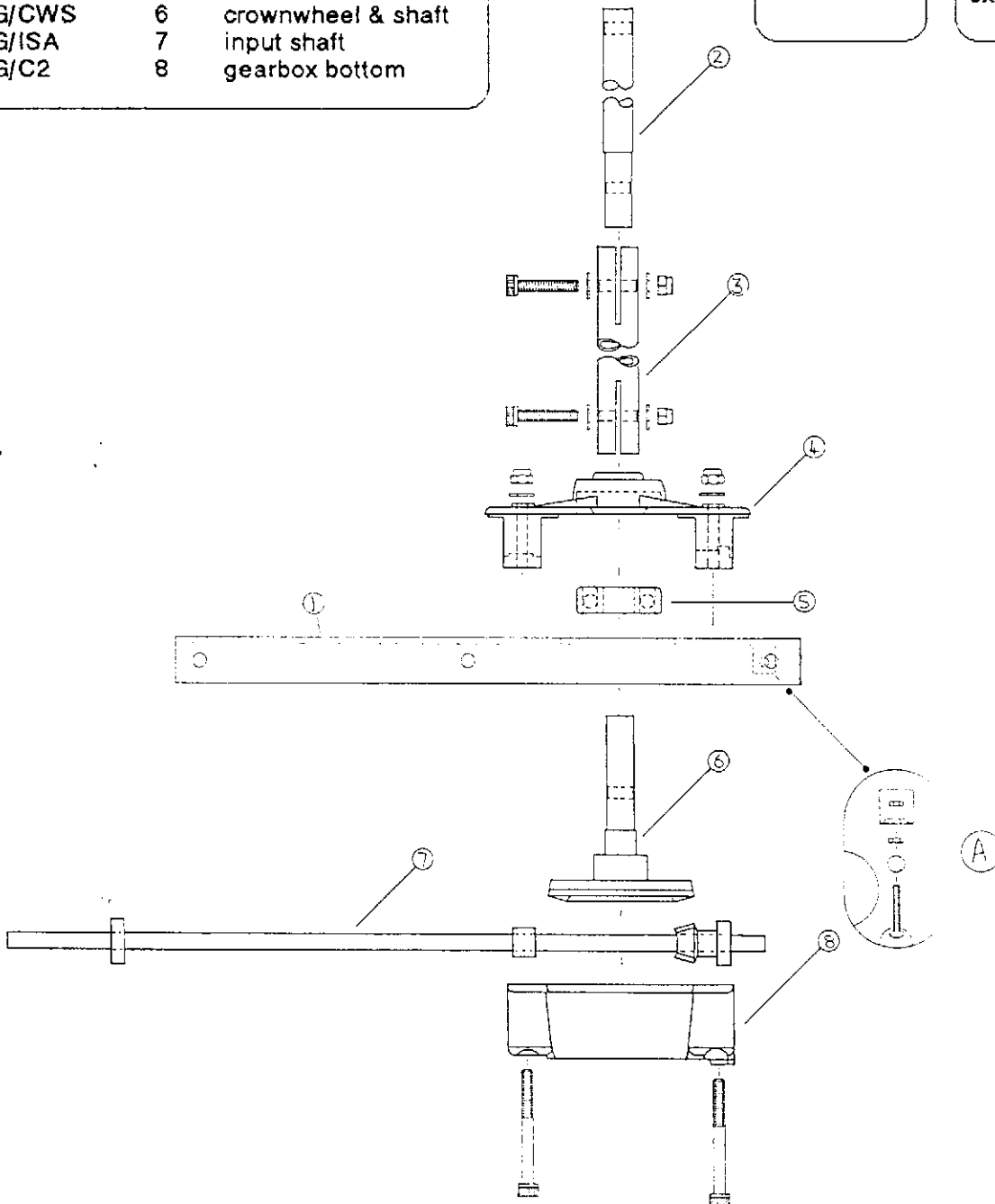
Fasteners from

Pack 11

1x brass ball
1x M2x12
2x M2 nuts

Pack 12

2x M3x16 SC
4x M3x30 SC
6x M3 NLN
8x M3 FW



Fit a brass ball to the folded tab on the MXR channel (1) (see DIAG A) using an M2x12 screw and M2 nuts. With the crownwheel shaft (6) upwards through the centre large hole of the channel (flanges downwards), slide the 8mm ballrace (5) down the shaft until seated. The gearbox top (4) also slides over the shaft, ballrace and through the chassis. Make sure the small ballrace seating in the moulding is at the rear to take the input shaft (7).

Fill the gearcase bottom (8) with the grease supplied, position and pull the bottom case into place using M3x30 socket cap screws, M3 flat washers and M3 nyloc nuts. Do not worry if the gearbox appears tight at first as it will soon bed in. Do not be tempted to slacken off the screws to obtain free rotation. Assemble the mast (2) to the gearbox using the coupling (3) and secure with M3x16 socket cap screws, M3 flat washers and M3 nyloc nuts.

PACK 2

ENGINE MOUNT

STOCK
CODE

Diagram
Key

MXR/MOUNT	1	engine mount
OMR/FLY	2	flywheel
OMR/FAN	3	fan
OMR/P16T	4	16 tooth pulley
OMR/SP	5	starter pulley
OMR/FD	6	fan duct
OMR/FDB	7	fan duct backplate
OMR/DISC	8	cork disc

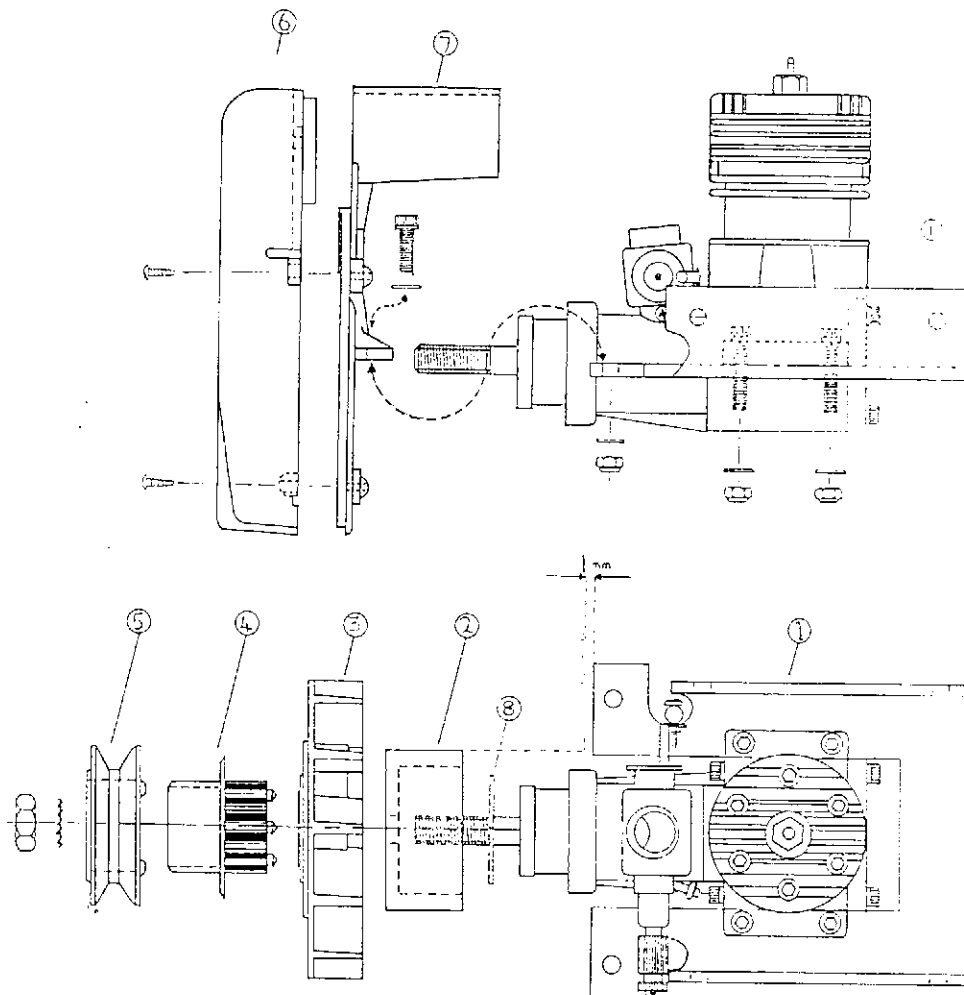
Fasteners from

Pack 11

1xM2x12
2xM2 nuts
1xbrass ball
1x1/4" SPW
3xNo2x3/8

Pack 12

4xM3x16 SC
6xM3 NLN
2xM3x10 SC
12xM3 FW



The engine mount in this kit has been pre-drilled to suit both the **Irvine** and **O.S 40 & 46** size engines. If you are using a different make of engine it will be necessary to re-drill or slot the mounting holes.

Mount the engine on the plate and secure with **M3x16** socket cap screws, **M3** flat washers and **M3** nyloc nuts. Fix the fan duct (6) to the backplate (7) with **No2x3/8"** self tappers then secure to the engine plate with **M3x10** socket caps, flat washers and nyloc nuts.

NOTE:- On some Irvine engines it will be necessary to enlarge the hole in the centre of the flywheel to **3/8"** in order to clear the boss at the base of the crankshaft. Alternatively return the flywheel to us for exchange or order Part No **OMR/FLY1**.

Fit in the following order to the engine :- cork disc (8), flywheel (2), fan (3), 16 tooth pulley (4), and secure with the **1/4"** shake proof washer and engine nut. Next glue the starter pulley (5) onto the 16 tooth pulley with cyano.

Fit a brass ball onto the throttle arm and if necessary re-position so that it can be operated from directly behind the engine (with the engine upright the arm should point straight up at half throttle)

OPTIONAL PART:- A custom made silencer designed to fit inside the fuselage is available to fit the popular Irvine and O.S. 40-46 size engines. Stock Code **ACC/SILR**.

PACK 3

CHASSIS

STOCK CODE	Diagram Key	
MXR/SIDE	1	chassis side frame
MXR/CBM	2	chassis & body mount
MXR/CR	3	mast oilite holder
MXR/CF	4	input shaft holder
OMG/OIL	5	mast oilite bearing
OCN/SLG	6	servo lead gromets
MXRUC/BRKT	-	undercarriage brackets

Fasteners from

Pack 12

6xM3x8 SC
2xM3x10 SC
8xM3 FW
8xM3 NLN

Pack 13

8xM4x10 SC
4xM4x10 BH
4xM4 FW
4xM4 NLN

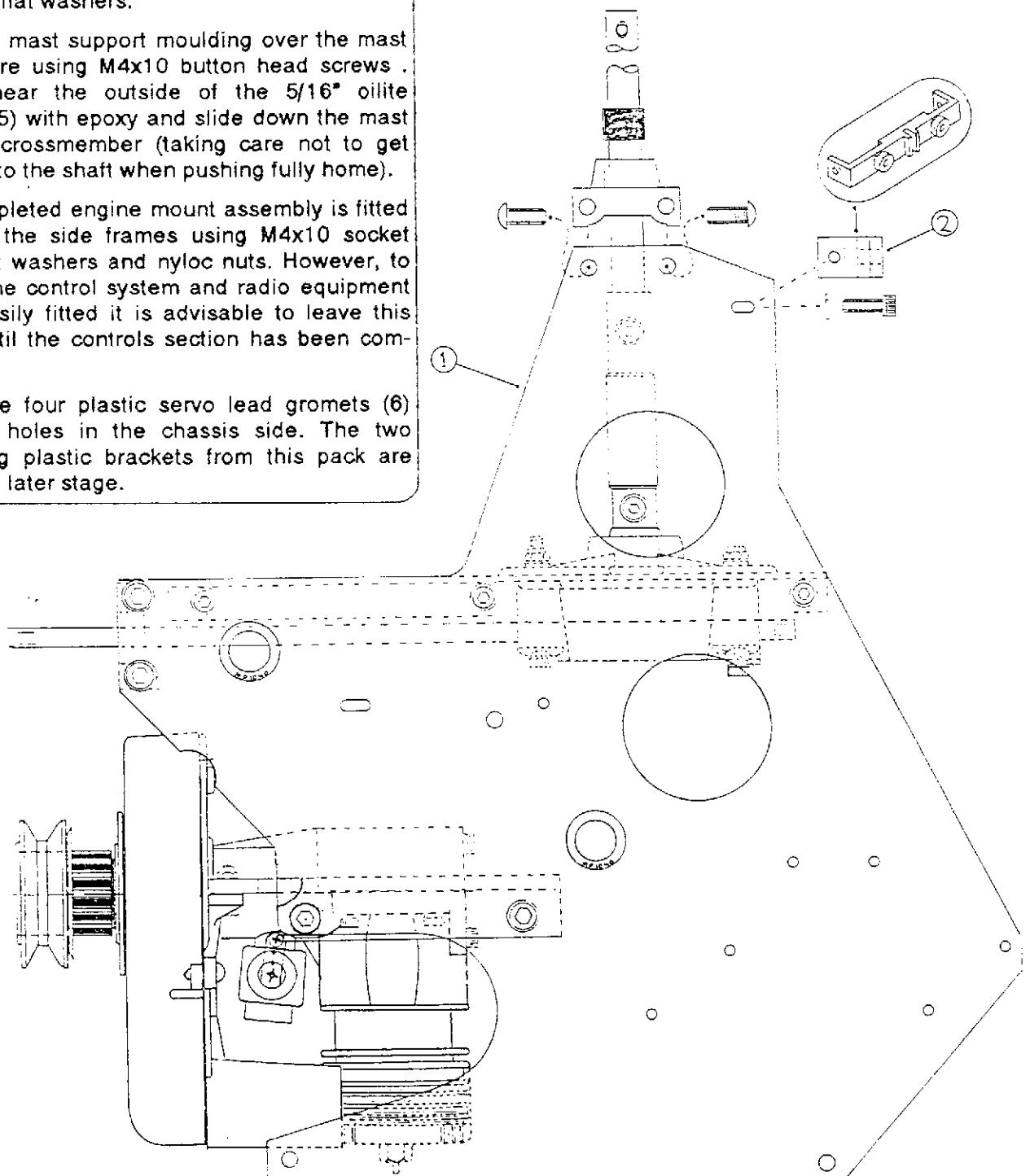
Fit the completed gearbox and mounting channel between the two black epoxy coated side frames (1) and secure using M3x8 socket cap screws, flat washers and nyloc nuts. Position the input shaft support moulding (4) over the front ballrace and secure with M4x10 socket caps and flat washers.

Slide the mast support moulding over the mast and secure using M4x10 button head screws. Next, smear the outside of the 5/16" oilite bearing (5) with epoxy and slide down the mast into the crossmember (taking care not to get epoxy onto the shaft when pushing fully home).

The completed engine mount assembly is fitted between the side frames using M4x10 socket caps, flat washers and nyloc nuts. However, to enable the control system and radio equipment to be easily fitted it is advisable to leave this stage until the controls section has been completed.

Press the four plastic servo lead gromets (6) into the holes in the chassis side. The two remaining plastic brackets from this pack are used at a later stage.

OPTIONAL PART:- A mast ballrace kit is available to replace the standard oilite bearing. Stock Code MB/KIT.



PACK 4

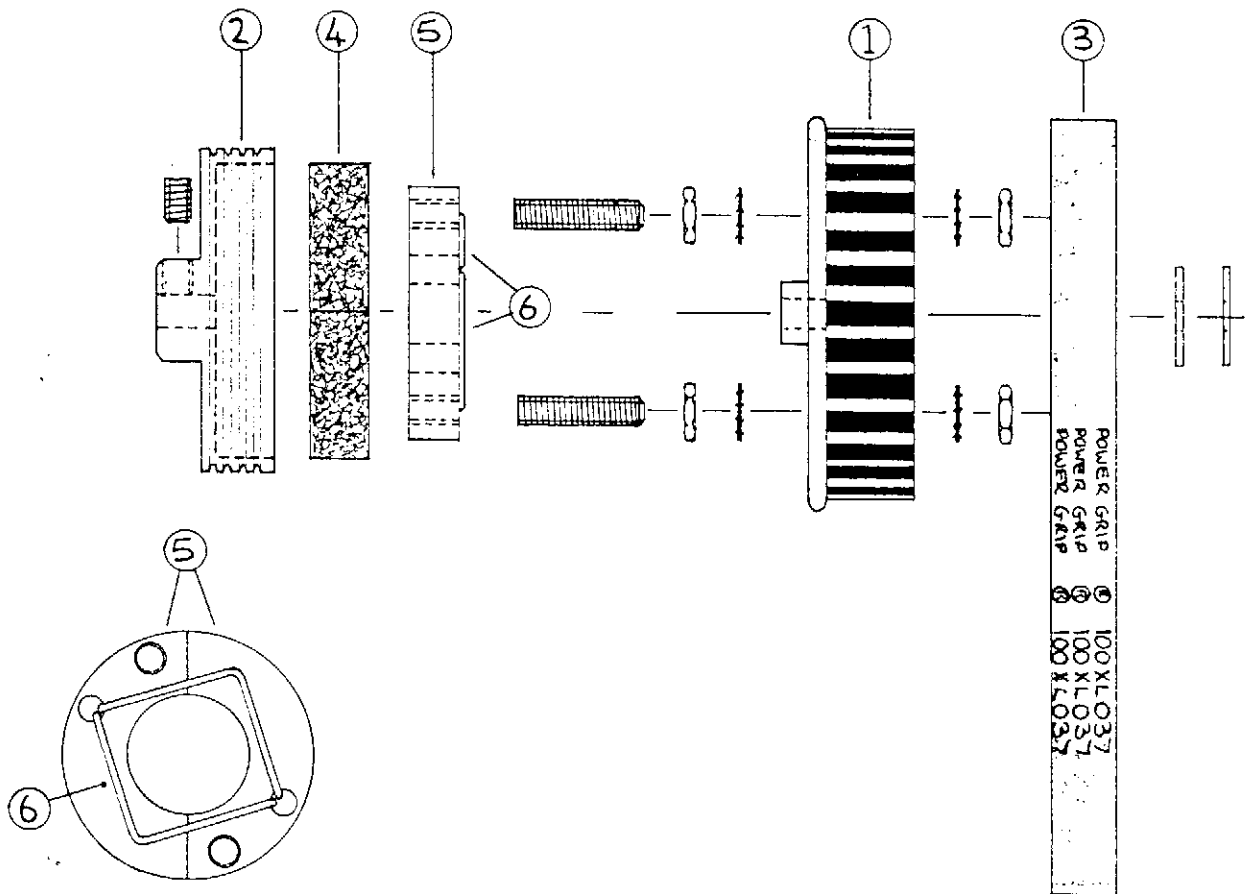
CLUTCH

STOCK CODE	Diagram Key	
OCL/LP	1	large pulley, 32T
OCL/DRUM	2	clutch drum
OCL/XL100	3	drive belt
OCL/LINER	4	cork liner
OCL/SHOES	5	clutch shoes
OCL/SPRINGS	6	clutch springs

Fasteners from

Pack 11
2x3/16 FW

Pack 13
1xM4x6 SS
2xM4x16 SS
4xM4 nuts
4xM4 SW



Carefully cut the cork lining (4) to the correct length to fit inside the clutch drum (2). Roughen the inner rim of the drum with emery paper and cover it sparingly with epoxy, then press the lining into place and leave to set.

Thread the M4x16 set screws into the clutch shoes (5) with the socket end level with the surface of the shoe. Place an M4 nut at the rear half a turn clear of the shoe, then locate the clutch springs (6) in the clutch shoes and add M4 star washers onto the studs.

Place the assembly into the large pulley (1), NB; the springs should face the plastic pulley, then secure with M4 star washers and M4 nuts.

Check that the shoes are able to swing outwards slightly (due to centrifugal force when the engine is running) while being strongly retained by the springs when stationary.

Place two 3/16 washers over the input shaft, then slide the clutch assembly onto the input shaft, followed by the alloy drum. Secure the clutch drum with an M4x6 socket set screw against the flat of the input shaft.

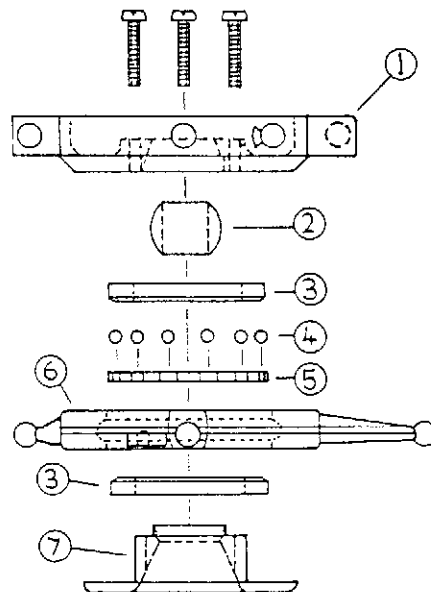
Later when the engine mount assembly is fitted the drive belt (3) must be looped over both the engine and clutch pulleys.

PACK 5

STOCK CODE	Diagram Key	
OSP/TOP	1	top moulding
OSP/BALL	2	centre ball
OSP/RING	3	alloy rings
OSP/CAGE/BRG4	4	ball bearings
"	5	bearing cage
OSP/CENTRE	6	centre plate
OSP/BOTTOM	7	bottom moulding

This unit is preassembled and should be placed over the rotor mast with the long arm facing to the rear, ready for connection to the control system.

SWASHPLATE



PACK 6

STOCK CODE	Diagram Key	
MXB/CCA	1	collective cradle arms
OCON/BELL	2	bellcranks
OCON/SH100	3	pivot shaft (100mm)
OCON/SSSM	4	single servo side mount
OCON/SMR	5	servo mounting rails
OCON/BRKT	6	right angled bracket
MXR/CSB	7	collective stabilizer bar
ACC/BJ	8	ball ends
ACC/WRAP	-	tie wraps

Fit brass balls to the bellcranks (6) as shown (DIAG A) using M2x12 screws and M2 nuts (securing with loctite). Attach a cradle arm (3) to each side frame using an M4x25 plain shank screw, M4 nuts and star washers (position the nuts to remove freeplay but allow the arms to pivot without friction). Push the 100mm pivot shaft (4) through one of the cradle arms then fit the bellcranks as shown placing M4 flat washers between each crank as shown, finally passing through the other cradle arm. Clamp the cradle arms to the shaft with M3x10 socket cap screws, M3 star washers and M3 nuts (do up lightly and adjust for friction and slop free movement then tighten fully).

Cut a 12mm length of stud from the 50mm stud (Pack 6) and fit a ball end back to back to make a link with an overall length of 43mm then fit between the collective bellcrank and the ball on the folded tab on the gearbox channel.

CONTROLS

Fasteners from

Pack 11

14xM2x12
15xM2 nuts
14xbrass ball
2xNo2x1/4"

Pack 12

6xM3x10 SC
6xM3x8 SC
2xM3 nuts
5xM3 NLN
2xM3 SW
10xM3 FW

Pack 13

2xM4x25 PS
2xM4 SW
4xM4 nuts
7xM4 FW

All servos are attached to their relative mounts via the screws provided with the radio system.

Before screwing your servos to the mounts, mark each one with its function i.e.:-

throttle (T)

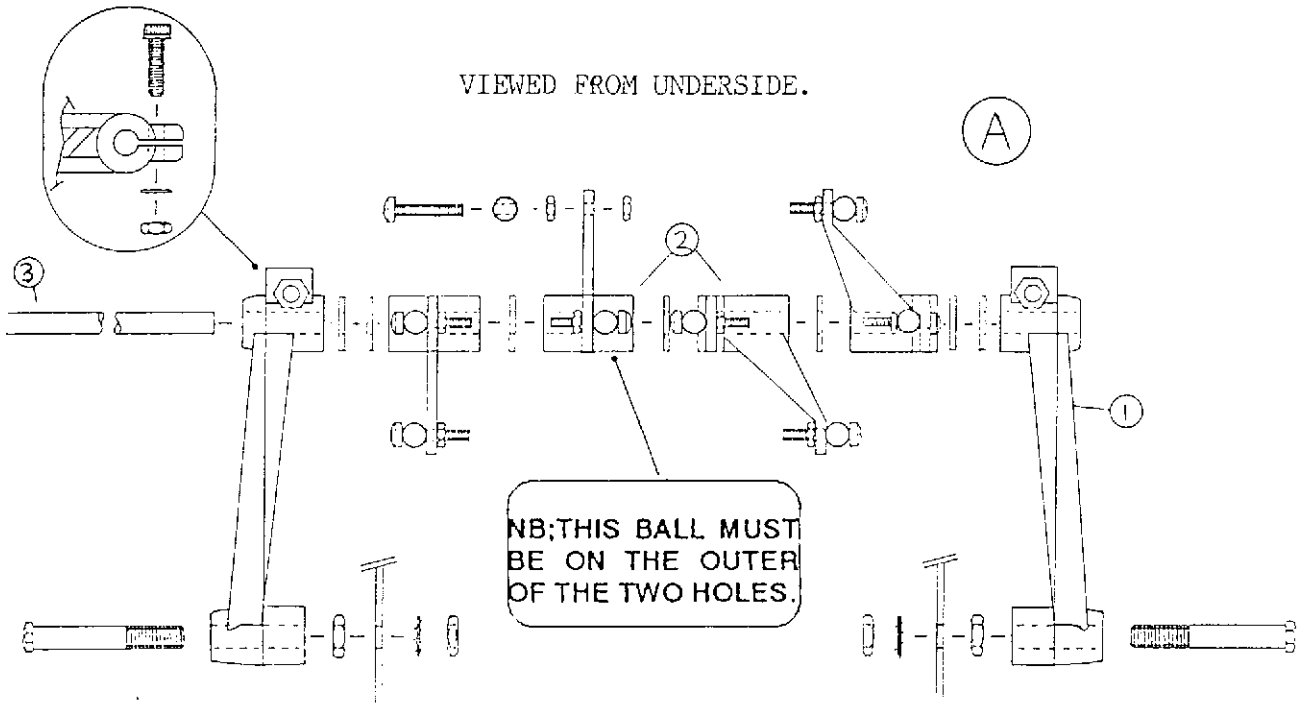
collective pitch (CP)

for/aft cyclic, left/right cyclic (FA) & (LR)

tail rotor (TR)

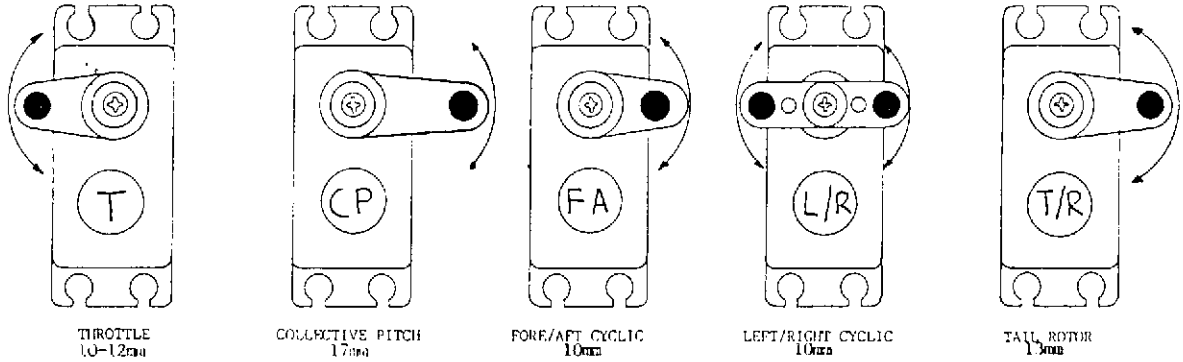
Then fit the required output arms and brass balls at the positions shown (DIAG B) using M2x12 screws and M2 nuts secured with loctite. Plug each servo into the receiver and set up with the transmitter sticks and trims in the neutral positions.

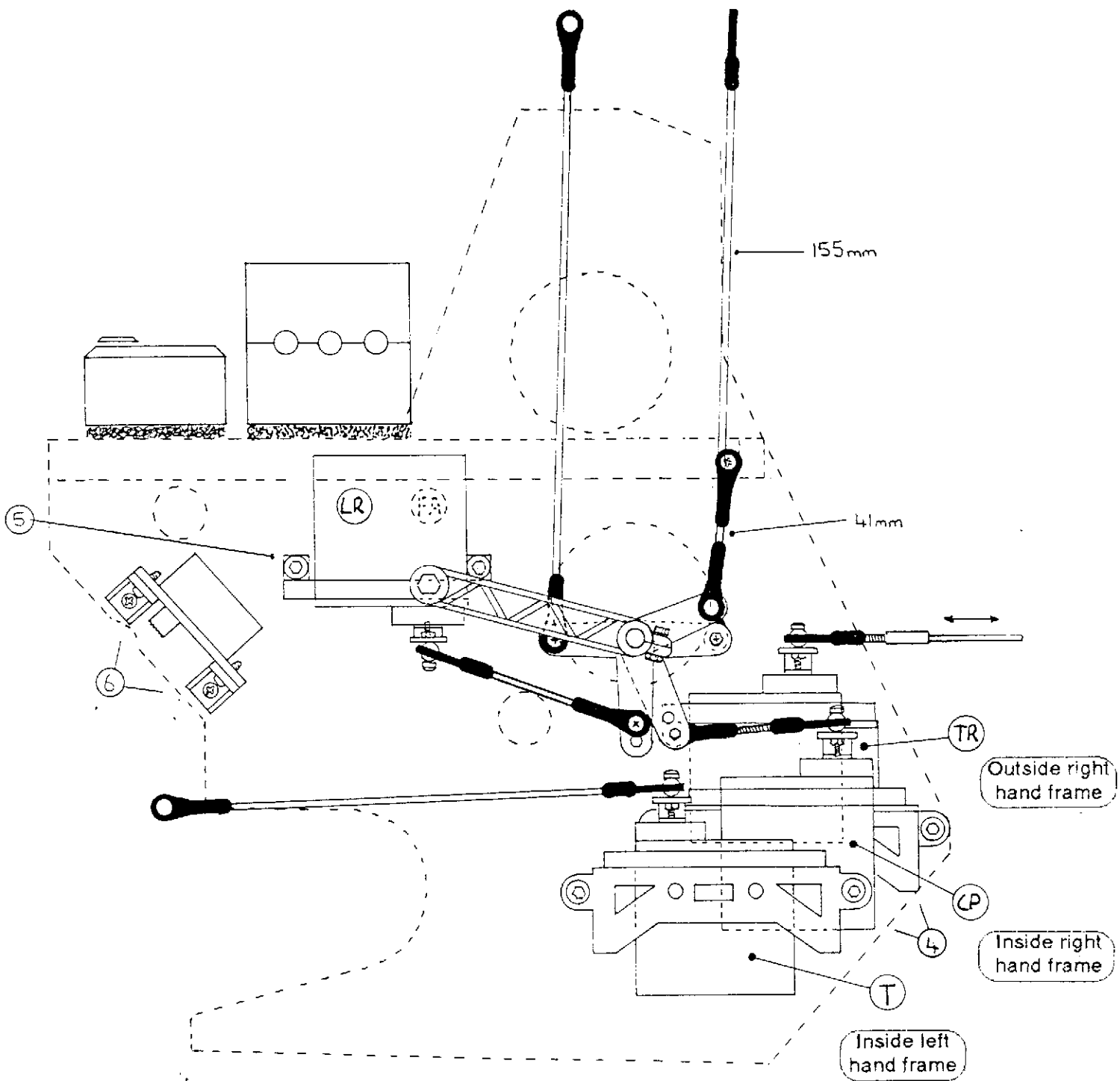
VIEWED FROM UNDERSIDE.



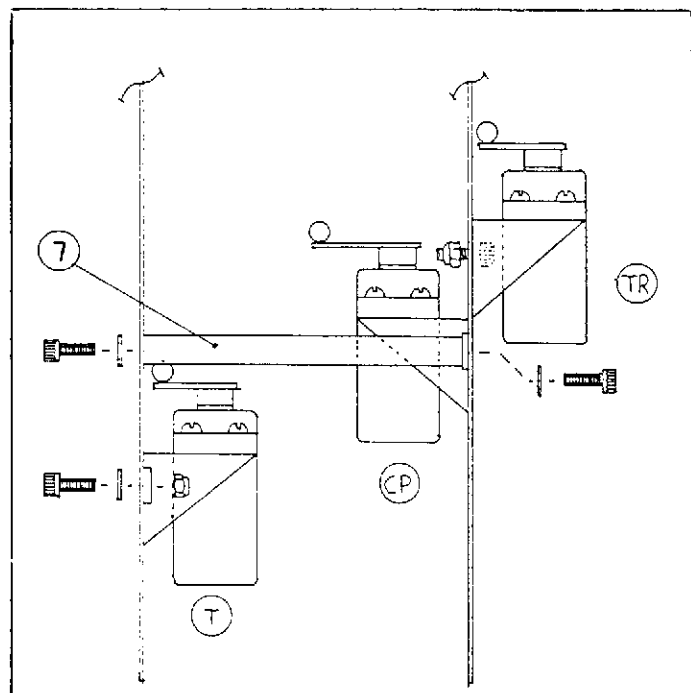
(B)

ALL DIMENSIONS ARE MEASURED FROM SERVO CENTRE TO BALL CENTRE



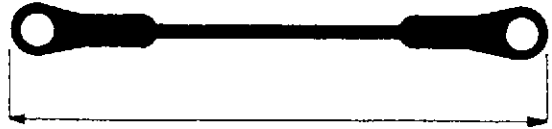


View from rear of chassis



CONTROLS

NB. This model requires 5 servos. If a heli radio is not being used it will be necessary to couple the collective servo to the throttle servo via a Y lead suited to your make of radio.



OVERALL ROD LENGTHS ARE MEASURED FROM TIP-TIP.

The servo mounts are made to accommodate most popular sizes of servos. If you have the larger type you must trim the mounts so that the servo will not touch the mount (except on its grommets). Try to leave about 1mm clearance either end to avoid transmitting any vibration to the delicate servo electronics.

Mount the cyclic servos to the servo mounting rails (5), then fix between the sideframes using M3x8 socket cap screws and washers (the servos are in an inverted position with the output discs towards the rear of the chassis). Feed the servo leads out through the holes in the sideframes.

The other three servos are all mounted into the single servo mounts (4) using diagram C for reference and fitting in place on the two sideframes using M3x8 socket cap screws, flat washers and nyloc nuts. The rearmost mounting point on the collective pitch servo (CP) also fixes the alloy stabilizer bar (7) across the rear of the chassis again using M3x8 socket caps and washers.

Mount the receiver and gyro as shown (DIAG D) using high quality double sided tape with a minimum thickness of 3mm (optional part ACC/TAPE3). Fix the on/off switch to the side frame using the right angled brackets (6) and No2x1/4 self tapping screws. Connect all plugs to sockets and secure all leads safe and tidy using the tie wraps provided.

Throttle

The throttle connection is made from a 100mm control rod with plastic ball eyes screwed onto each end to give an approximate overall length of 127mm. Ensure that full travel of the servo matches the full travel of the throttle barrel (adjust position of ball on servo arm if not achieved).

Collective Pitch

Using a 37mm control rod make up a link to a length of 52mm and connect between the collective pitch servo and the bellcrank which is anchored to the g/b channel. Adjust so that the servo arm is at 90 degrees to the side frame..

Cyclic Servos

Take three 37mm pushrods and screw on ball ends to an approx' length of 63mm, use these to link the cyclic servos to the bellcranks (adjust so that at half throttle & collective the long arms of the bellcranks are vertical).

Next take three 135mm pushrods with ball ends fitted to an overall length of 155mm, one of these should be formed (DIAG E) then fitted between the swashplate and the short arms of the bellcranks, adjust so that the swashplate sits level.

Tailrotor

The final connection of the tailrotor servo to the control wire is made by soldering a threaded end connector onto the 18 gauge wire. It will be necessary to offer the mechanics up to the fuselage to obtain the correct length and is therefore best left till a later stage.

Battery

The battery pack must be fitted into the nose of the completed model in order to obtain the correct balance. It is advisable however to temporarily connect the battery and switch harness to the receiver and operate the radio to ensure correct and free movement of the control system.

E



STOCK CODE	Diagram Key	
OTR/C1	1	main gearcase
OTR/C2	2	gearcase back
OTR/GIN	3	input gear and shaft
OTR/GOUT	4	output gear and shaft
OTR/BB1	5	3/16 ballrace
OTR/BB2	6	6mm ballrace
OTR/OIL2	7	3/16 oilite bearing
OTR/OIL2	8	6mm oilite bearing
OTR/SYMBL	9	tail rotor blades
OTR/BM	10	blade mount
OTR/HUB	11	hub and spacers
OTR/BB2	12	6mm ballrace
OTR/YOKE	13	pitch control yoke
OTR/CRANK	14	tailrotor bellcrank
OTR/CLR	15	control rod collars
OTR/WIRE	16	pitch control wire
ACC/BJ	-	ball ends

Fasteners from

Pack 11

2xM2x12
4xM2 nuts
2xNo2x3/8"
2xbrass balls

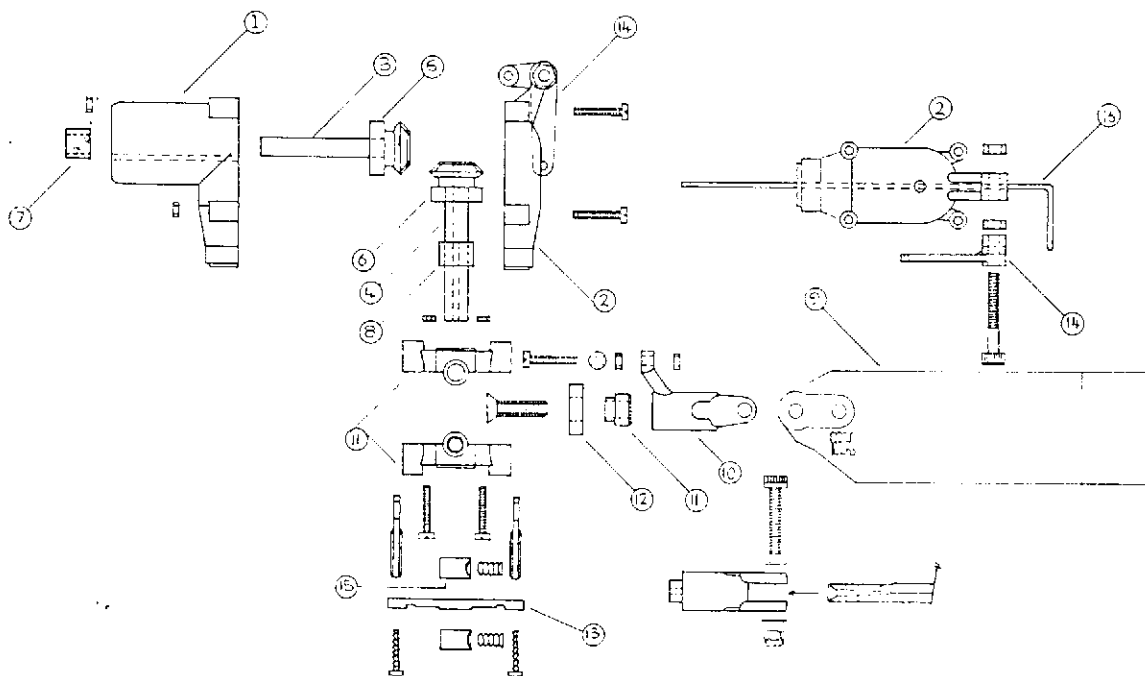
Pack 12

1xM3x20 PS
2xM3 nuts
2xM3x16 SC
4xM3 FW
2xM3 NLN

Pack 13

2xM4x6 SS

NOTE: THE GEARBOX AND HUB ARE PRE-ASSEMBLED



During assembly, check with the diagram to ensure correct positioning of the components :-

Fit a brass ball to each blade mount (10) with an M2x12 screw and an M2 nut either side of the blade mount.

Push the pitch control wire (16) through the gearbox, then mount the tailrotor bellcrank (14) - (locating the cranked end of the pitch control wire in the hole on the short arm of the bellcrank) - using the M3x20 socket cap plain shank screw and M3 nuts. Adjust the position of these nuts to get a friction and slop free movement.

Fit an ball end to each end of the pitch control yoke (13) with a No2x3/8 self tap screw.

Push one of the control rod collars (15) onto the pitch control wire followed by the yoke assembly and the remaining collar, secure the outer collar flush with the end of the pitch control wire using an M4x6 socket set screw, then move the inner collar out to sandwich the yoke assembly between both collars and secure inner collar in the same manner. The yoke (13) should not be trapped but should spin freely when the ball ends are popped over the brass balls.

The tail rotor blades (9) are fitted to the blade mounts (10) using M3x16 socket cap screws, M3 flat washers and M3 nyloc nuts. These should be tightened to give some friction so the blades do not fall under their own weight. When viewing the helicopter from the left hand side the tail rotor rotates in a clockwise direction with the control arms on the leading edge.

PACK 9

STOCK CODE	Diagram Key	
ORH/PLATE	1	alloy head plate
ORH/BBM	2	blade & bearing mounts
ORH/TP	3	top plate moulding
ORH/MT	4	mast top moulding
ORH/RUBS	5	teeter rubbers
ORH/FBZZ	6	flybar zig-zag
ORH/FBOA	7	flybar operating arms
ORH/FB	8	flyblades
ORH/FBAR	9	flybar
ORH/BUT	10	head button
ORH/OIL	11	3mm oilite bearings
ORH/LINK	12	double ended links
ORH/BB	13	6mm ballraces
OSP/MIX/DRI	14	small mixer arms
" " "	15	large mixer arms
" " "	16	mixer slider fork

ROTORHEAD

Fasteners from

Pack 11

6xM2x12
6xM2 nuts
4xbrass balls

Pack 12

6xM3x16 SC
2xM3x20 PS
2xM3x20 SC
4XM3x25 SC
4xM3x30 SC
12xM3 NLN

Pack 13

2xM4x30 SC
2xM4 NLN

Diagram A.

Before commencing assembly of the rotorhead ensure that the 'TOP' marking on the alloy headplate (1) is uppermost.

Lightly grease the bearings (13) then fit the bearing and blade mounts (2) over them, fitting the two M3x16 socket caps into the recesses. Insert two M3x25, two M3x30 socket cap screws and nyloc nuts, taking care not to overtighten them as this will cause binding on the bearings.

Clamp the incidence arm ends together with an M2x12 screw and nut as tightly as possible to prevent the M3x16 from moving. Thread on a small mixer arm (14) onto each of the protruding screws leaving them at least one full turn clear of the boss (these must be free to move).

Diagram B.

Bolt both mix/dri arms (15) to the slide fork (16) using M3x20 socket cap plain shank screws. Ensure correct orientation i.e:- fork faces up and arms pivot freely without slop.

Slip this assembly over the mast and connect the arms to the swashplate balls on the upper ring (refer to COMPLETED HEAD DIAGRAM).

Diagram C.

Sandwich the headplate between the mast top moulding (4), teeter rubbers (5) and top moulding (3), holding together with M3x16 socket cap screws and nyloc nuts. Make sure the nuts are pulled home and the rubbers are evenly and firmly clamped but not distorted.

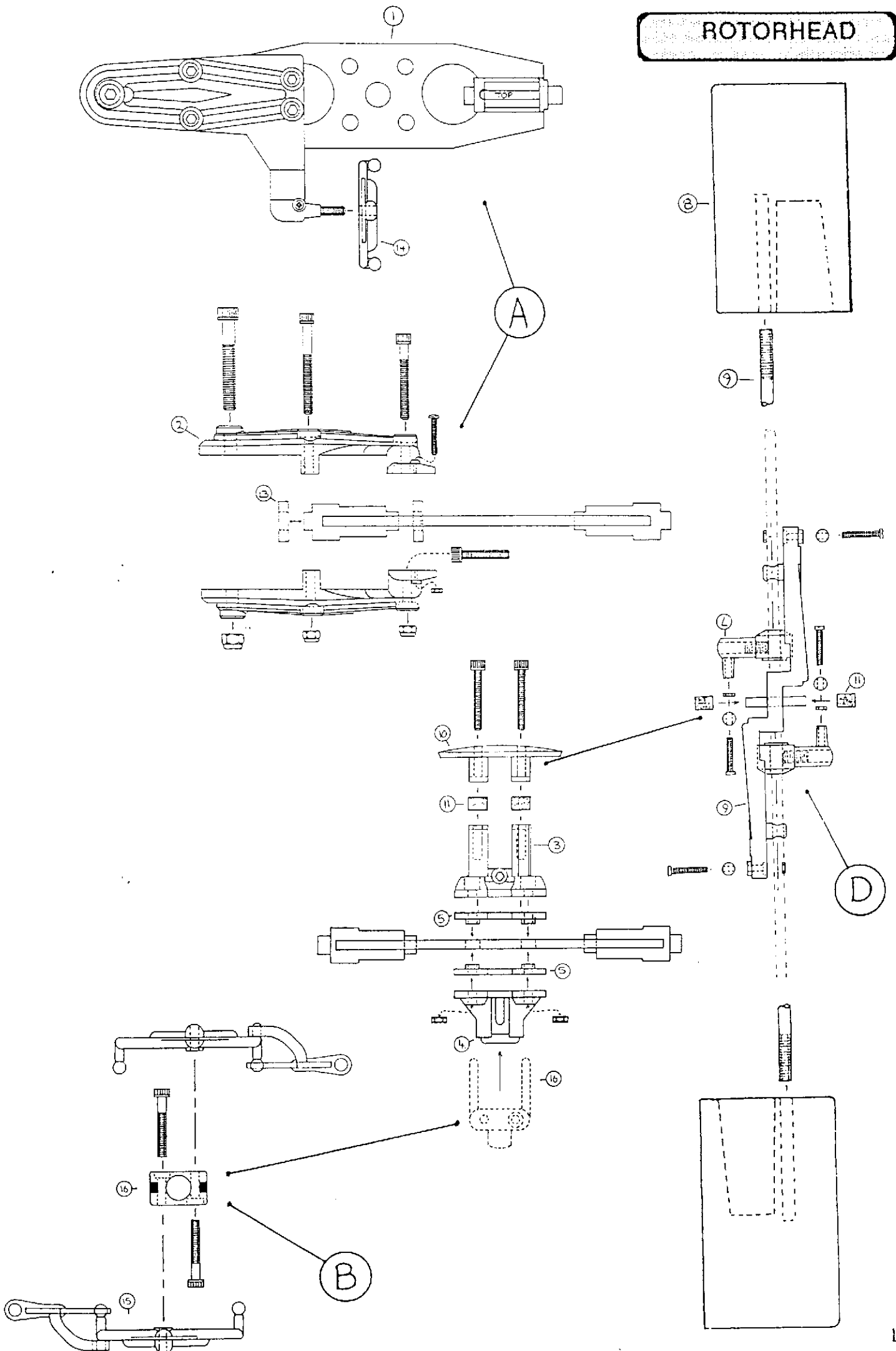
Fit the assembly on the mast and secure with a single M3x20 socket cap screw through the top moulding and the hole in the mast.

Diagram D.

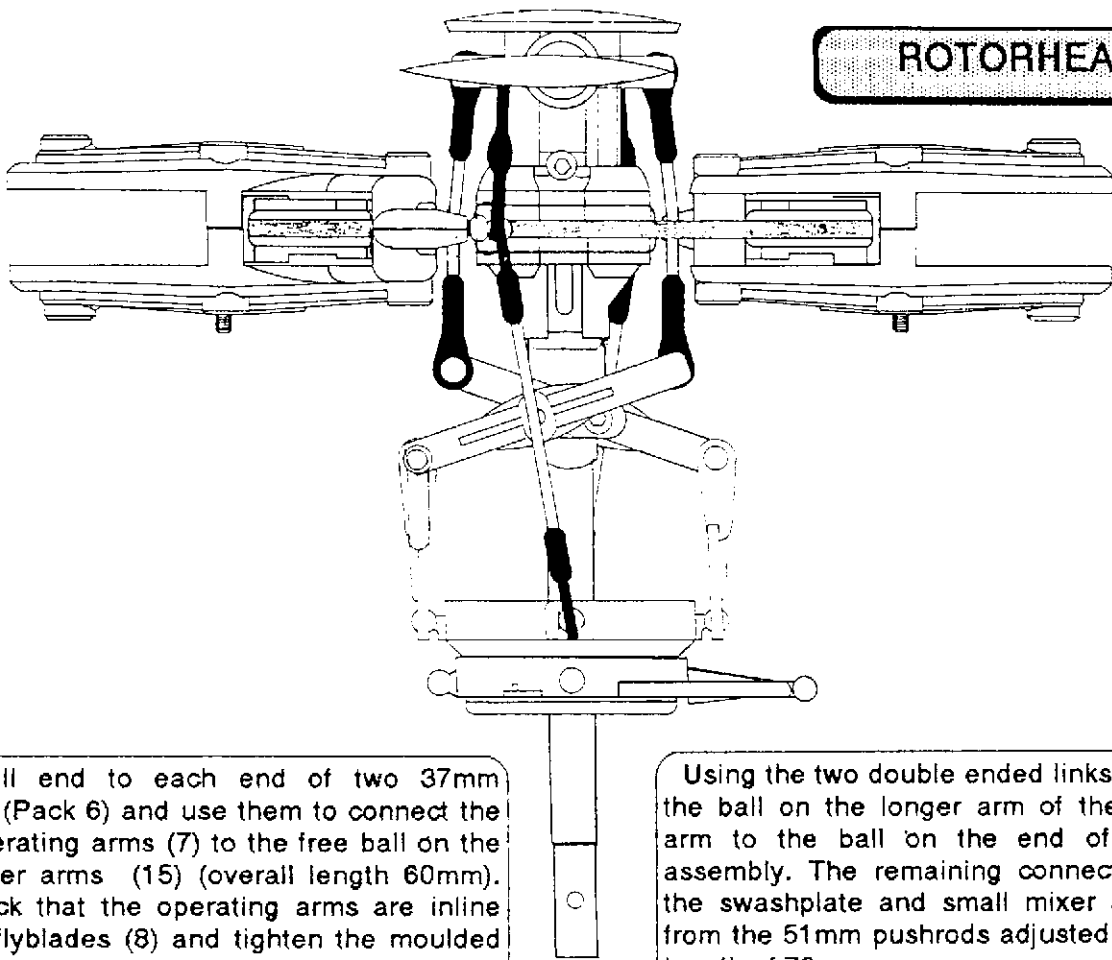
Fit a brass ball to each end of the zig-zag (6) using M2x12 screws and nuts, also to the stub on each flybar operating arm (7) (making sure the M2 nut goes under the brass ball). Pass the flybar (9) through the zig-zag threading on the flybar operating arms as shown. The flyblades (8) are fitted to the flybar by screwing them on to the threaded ends until they reach the end stops.

Slide the two oilite bearings (11) over the small central shaft moulded into the zig-zag then place on the pillars on the top moulding. Carefully position the head button (10) over the bearings and secure with two M3x20 socket caps (do not overtighten)

ROTORHEAD



ROTORHEAD



Fit a ball end to each end of two 37mm pushrods (Pack 6) and use them to connect the flybar operating arms (7) to the free ball on the large mixer arms (15) (overall length 60mm). Next check that the operating arms are inline with the flyblades (8) and tighten the moulded in grub screw (ensuring the flybar is centrally placed in the zig-zag).

Using the two double ended links (12) connect the ball on the longer arm of the short mixer arm to the ball on the end of the zig-zag assembly. The remaining connection between the swashplate and small mixer arm is made from the 51mm pushrods adjusted to an overall length of 76mm.

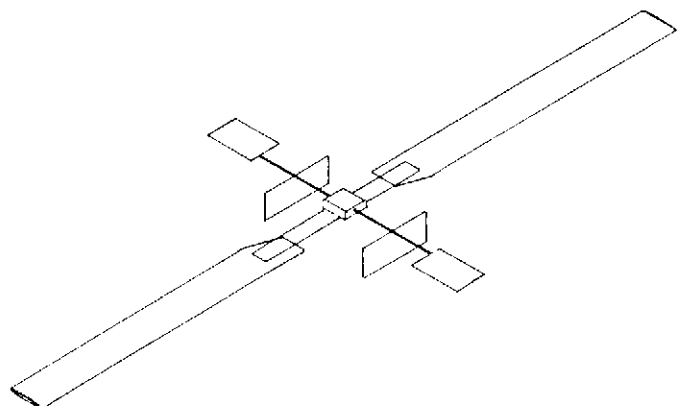
MAIN BLADES

Covering.

First lightly sand the blades with a fine grade paper to a smooth finish, then paint the root and tip sections followed by covering the long parallel section with the fablon supplied as to the direction shown below. When completed press a brass bush into each of the 6mm holes in the blade roots, these act as blade pivot bearings. Fit the blades to the head using M4x30 socket cap screws and M4 nyloc nuts (the blades must be held firmly and evenly but should not pivot under their own weight).

Balancing.

Place the completed rotor head and blade assembly across the jaws of a vice or two glass tumblers supported by the flybar as shown below. If the blades are level at rest then all is ok, however, if the one blade is higher then it must be weighted to bring it level with the other. The best way to do this is to cut a strip of vinyl tape (optional part ACC/GLOW) and place it on the blade tip and trim until balance is correct, then wrap around securely.



PACKS 8 & 10

STOCK CODE	Diagram Key	
MXR/BODY	-	ranger body moulding
MXR/COWL	-	ranger top cowling
MXR/TAIL	-	ranger tailboom
MXR/PLY	1	ranger plywood floor
MXR/BWP	2	ranger balsawood parts
MXR/VAC	3	ranger vac formed parts
MXRTB/B570	4	brass taildrive tube
MXRTB/A570	5	alloy tail control tube
MXRTB/DCS	6	drive & control supports
MXRTB/CPL	7	tail drive coupling
MXRTB/TGH	8	tail gearbox mount
MXRUC/STRT	9	undercarriage strut
MXRUC/SKDS	10	undercarriage skids
MXR/DECALS	-	ranger decal set

Before starting work on the bodyshell a few safety points should be noted;

- 1-Always wear a mask when rubbing down or cutting fibre glass (GRP).
- 2-Use eye protectors if using power tools for cutting GRP.
- 2-To avoid skin irritation use a barrier cream and wash hands thoroughly afterwards with cold water.

The quickest and easiest way of cutting GRP is to use a mini motor tool with a cutting disc or router.

The four door windows must be cut out and removed as well as the circular opening for the rotor mast and the rectangular one on the underside of the fuselage.

With the tapered end forward, position the plywood floor (1) inside the main body directly over the opening then glue in position with a two part glue (we recommend 'FUSION' from Deluxe Products). The second piece of woodwork to be glued in place is the small rectangular section of balsa (2) which must first have two M4 captive nuts pressed into place. Glue this section in behind the top bulkhead, taking care to line up the two holes in the bodyshell with those in the balsa strengthener.

A vacuum formed ABS duct (3) is provided to help keep the motor cool and direct fuel and oil out of the model. Either glue or fit with small self tap screws from the underside.

It is recommended that the body, tail and top cowl are all painted as this will provide a very much more durable finish. Before painting rub down the body using approx' 400 grade wet a dry and fill the moulded seam and any small chips with an automotive type body filler.

BODYSHELL AND FITTINGS

Fasteners from

Pack11

7xNo2x1/4"
2XNo4X1/2"
1xEnd con'

Pack12

1xM3x10 SC
1xM3 NLN

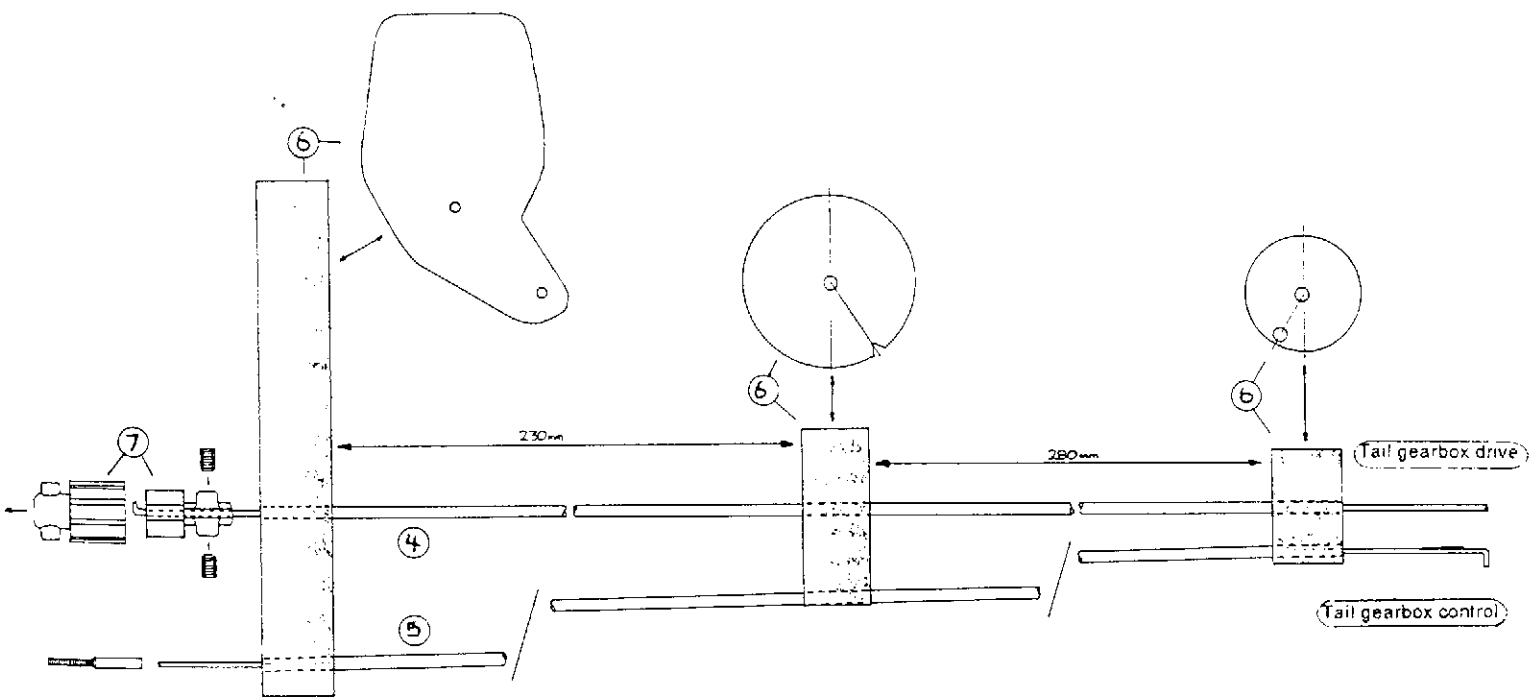
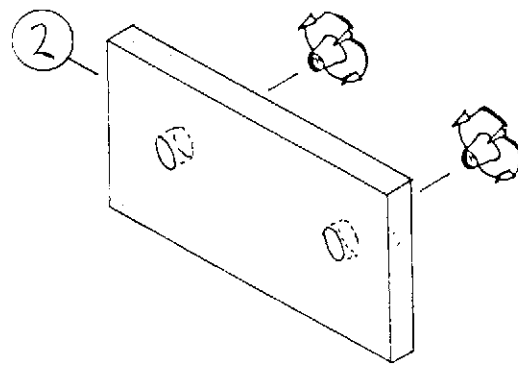
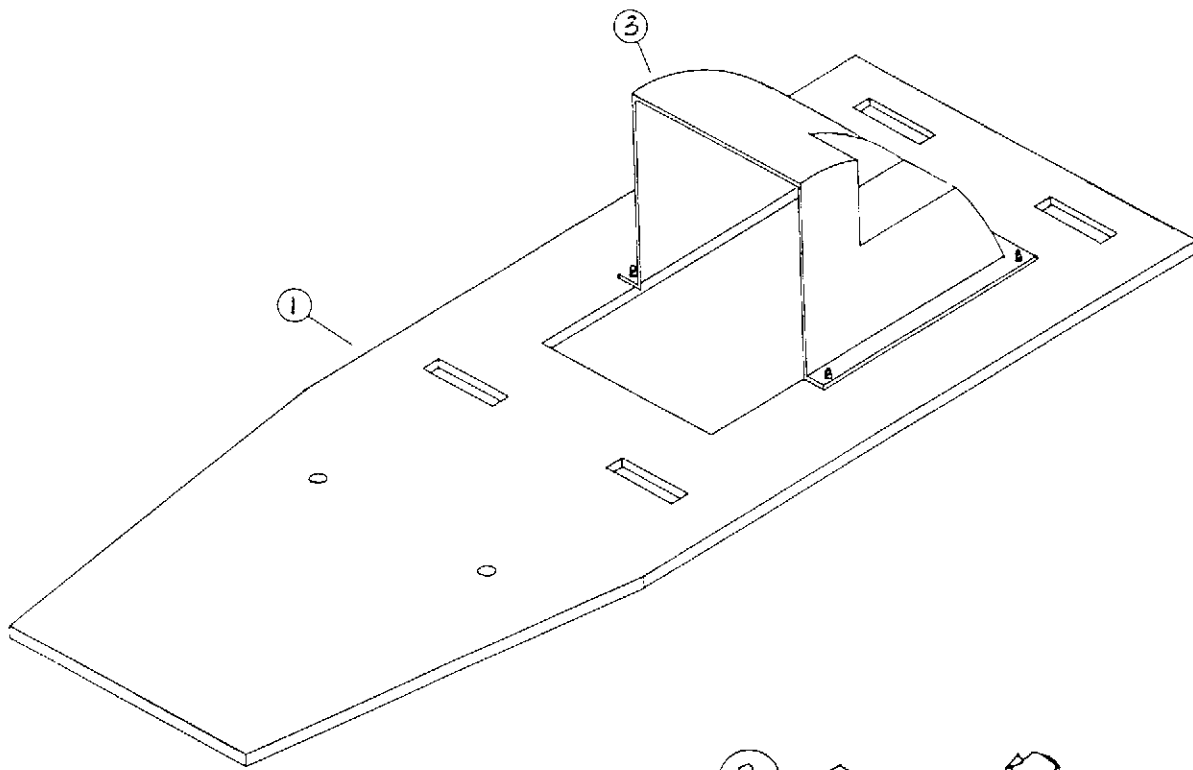
Pack13

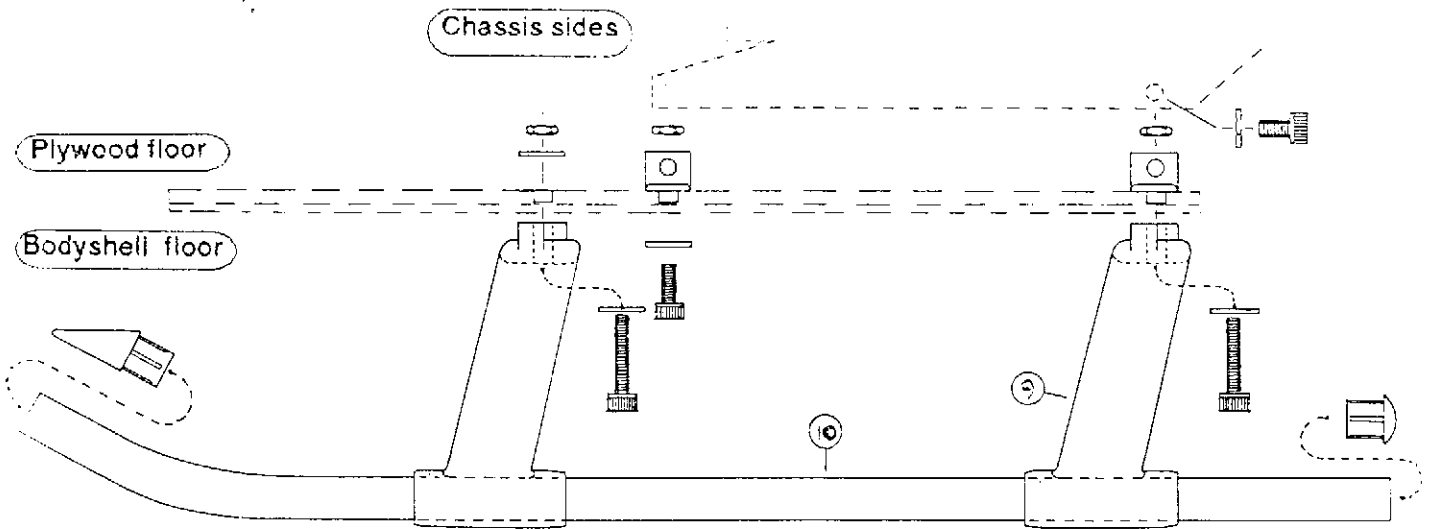
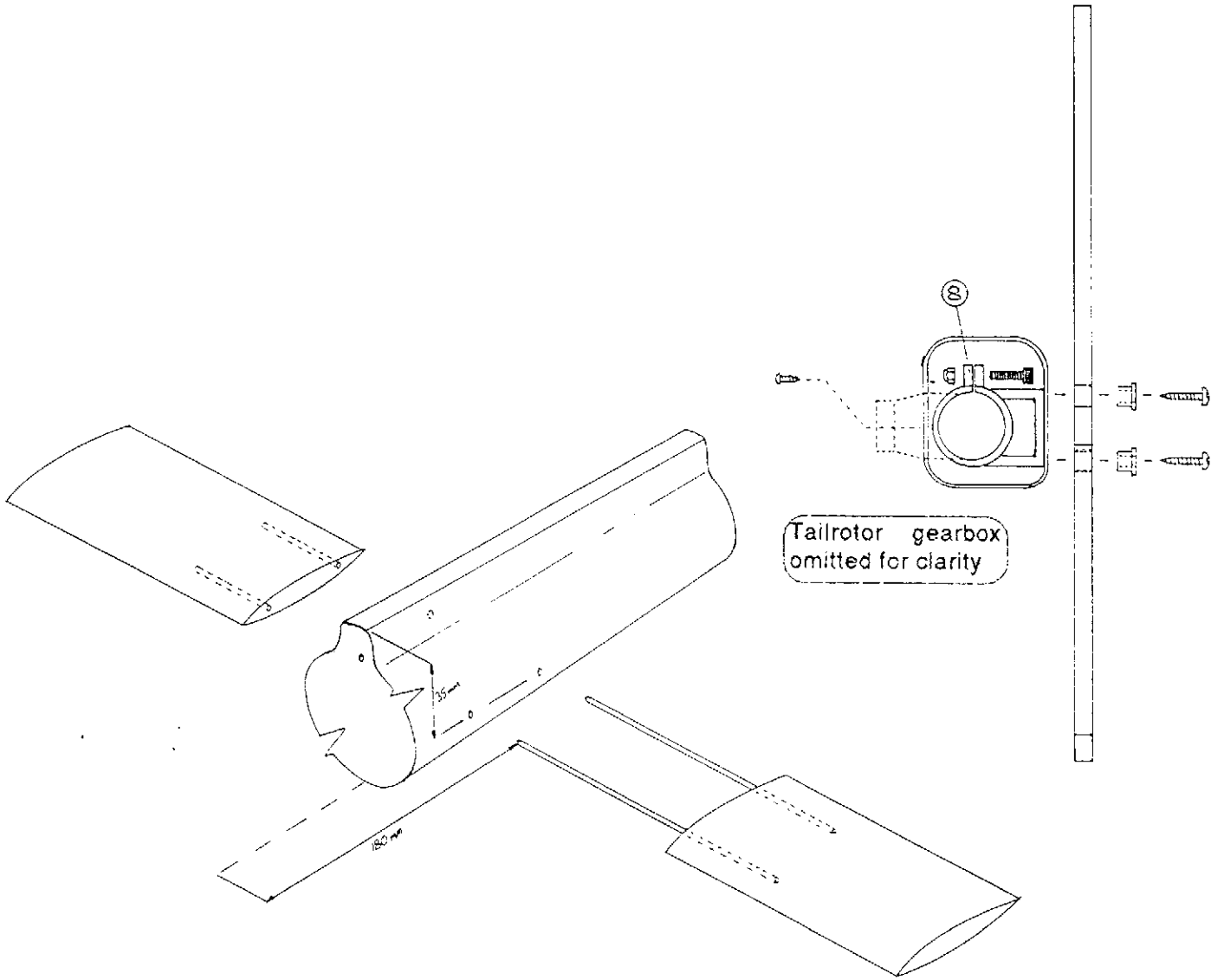
6xM4x20 SC
2xM4x10 SC
4xM4x8 SC
6xM4 N
2xM4 CN
12xM4 FW
8xM4x6 SS

Using the dimensions shown position and glue the brass drive and alloy control tubes (4 &5) into the three foam supports (6) (make sure that the control tube is offset from the centre line as indicated). When dry position this assembly into the main bodyshell with the centre foam support level with the end of the tailboom stub then glue it, and the large end support to the glass fibre. Slide the tailboom over the tubes and glue in place (it may be necessary to sand and remove some fibre glass in order to achieve a good close fit).

Cut the 16 gauge taildrive wire (the larger of the two) to a length of 745mm then slide into the brass tube and fit a male drive coupling (7) over each end of the wire. Bend over approx 3mm of wire at each end then pull back the coupling so that the bend locates into the recess, fix with two M4x6 socket set screws. The two remaining female couplings can now be fitted to the main gearbox shaft and the tail-gearbox input shaft, again using M4x6 socket sets (these couplings must be filled with grease before use). Bend 2mm over at 90' at one end of the 18 gauge control wire and slide down the alloy tube from the tailboom end.

Push the complete tailrotor gearbox fully into the holder moulding (8) ensuring it is at right angles to the vertical face and tighten with an M3x10 socket cap screw and nyloc nut. This unit needs to be fitted into the end of the tailboom so that it lines up with the two pre-drilled holes, it will be necessary to sand and remove some of the glass fibre in order to achieve a good level fit. Secure in place with two No4x1/2" self tappers and one No2x1/4" from the opposite side. Note; the two 1/2" self tappers and plastic bushes pass through the vertical balsa tailfin which should first be sanded and painted to match the body.



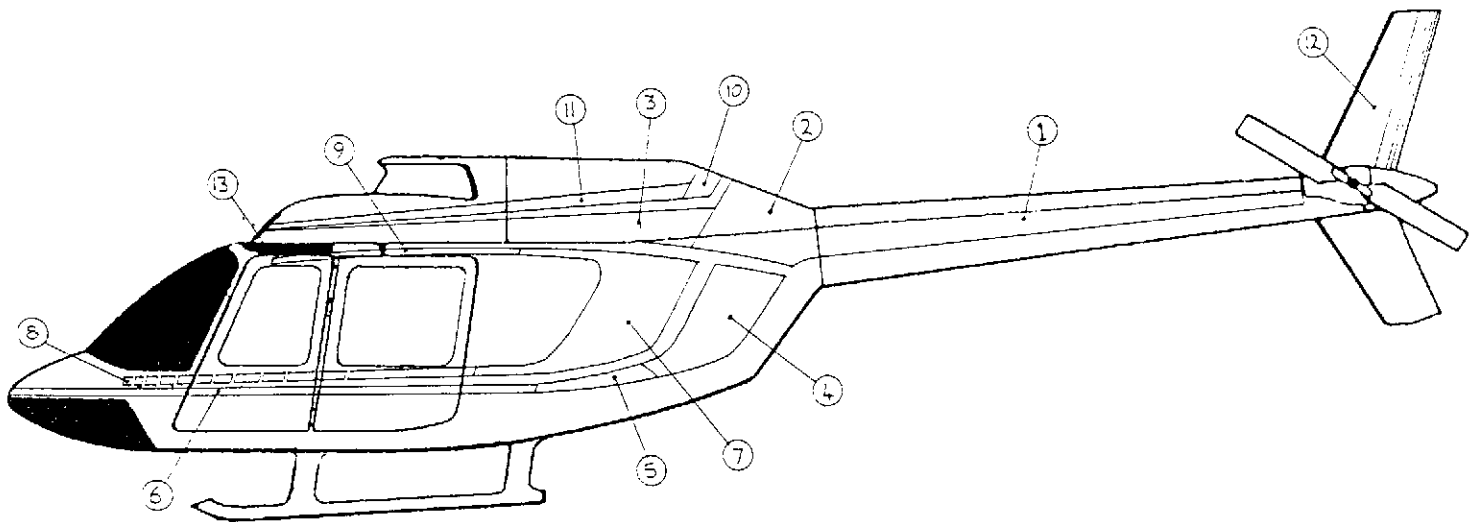
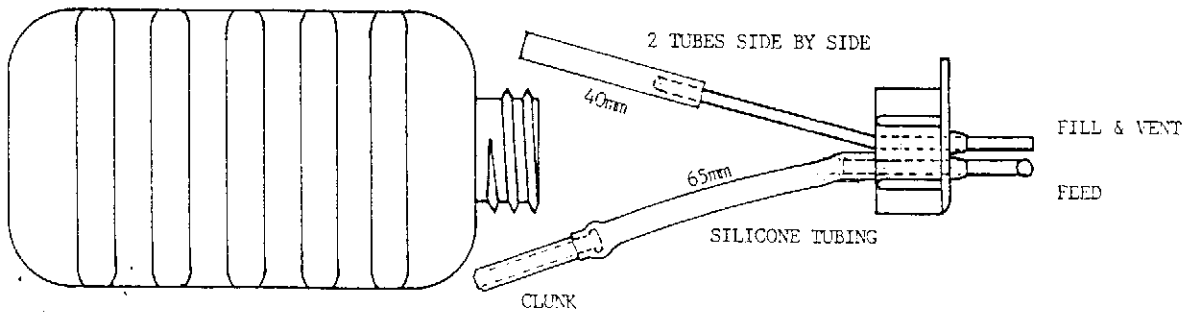


Fit the horizontal fins with two wires through the tailboom, drill 2mm holes in the positions shown. Trim the vac formed tailcone, away from the line at first, and fit to the rear of the boom, check that the tail control bellcrank is free to move before screwing in place with small self tappers. The top cowl is also fitted with small self tappers but it is advisable to glue in some scrap pieces of ABS on the inside of the fuselage so that they have something to grip into.

Assemble the fuel tank as shown and fix in place with a good quality double sided tape and if necessary, elastic bands to the front of the plywood floor section. The battery for the radio can be fitted in a similar method at the extreme front of the model.

With all the fittings complete the finished mechanics unit can be temporarily installed so that the length of the tail control wire can be adjusted and the soldered end connector fitted to reach the servo.

Assemble the undercarriage by pushing the alloy skids (10) through the two struts (9) and pressing the end caps into place. Fit the undercarriage mounting brackets onto the bottom of the chassis with M4x8 socket caps and flat washers. The final assembly can now be completed; position the mechanics over the locating holes in the plywood floor and offer up the undercarriage. Secure with four M4x20 and two M4x10 socket caps with washers and M4 nuts on the inside of the fixing brackets. A further two M4x20 screws secure the chassis to the top body bulkhead.



Fitting the decals is best done in as warm a room as possible, having warm air blowing over the model is ideal. Each decal is numbered and are best applied in numerical order. To ensure correct positioning a 'dry run' with the backing still in place is recommended, use a soft pencil to mark outlines. Peel off the backing and carefully press down making sure no air bubbles are trapped under the surface.

SETTING UP

Diagram 2

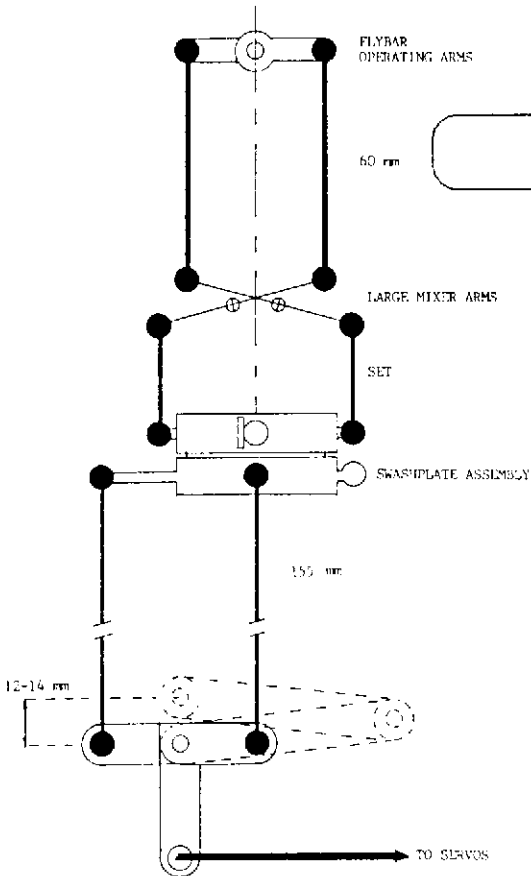
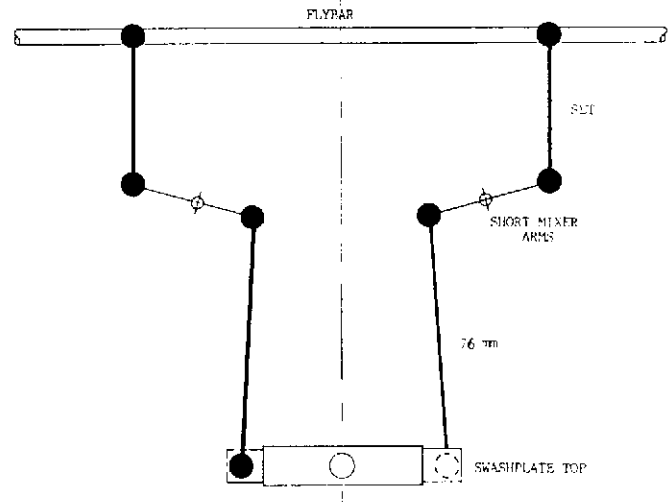


Diagram 1



Throttle

Check again that the throttle servo drives the throttle arm to its extremes without stalling and that the throttle arm rotates clockwise to close.

Collective Pitch

Select half or centre stick position and check that the servo arm is at 90 degrees. Check that the whole collective assembly moves smoothly without jumping. The swashplate should travel vertically approx' 12-14mm (measured on the mast).

Cyclic Servos

First select centre stick & trim on the collective pitch and centre trims on both cyclics, then adjust the three rods between the servos and the bellcranks until the swashplate is perfectly level. Next check the swashplate to mixer arm rods are 76mm (DIAG 1), also the rods from the long mixer arms to the flybar operating arms are 60mm (DIAG 2).

Tailrotor

When the tailrotor stick and trim are at neutral the servo arm should be at 90 degrees to the chassis.

Gyro Check

Holding the model by the rotorhead in one hand and supporting the tail with the other (one finger on the bellcrank), swing the model to the right -clockwise- the gyro should cause the servo to pull the crank forward, giving left to compensate for the right swing. Increasing collective pitch will also increase (left) tailrotor pitch to counteract the added torque.

ATS check (if available) on your transmitter.

Final Check

Left cyclic tilts the swashplate to the left

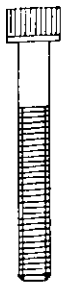
Back cyclic tilts the swashplate backwards

Pushing the throttle/collective forward raises the s/p

Left tail pulls the tailrotor crank forward to increase pitch

If this is your first helicopter, at this stage do not be tempted to fly it yourself. We strongly advise that you either return to the retailer where purchased or contact your local model flying club, who can put you in touch with a member that can help you trim the model and explain how to get you off the ground.

We wish you every success with your helicopter.



M4X30 SOCKET CAP



M4X25 PLAIN SHANK



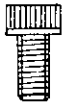
M4X20 SOCKET CAP



M4X10 SOCKET CAP



M4X10 BUTTON HEAD



M4X8 SOCKET CAP



M4X15 SOCKET SET



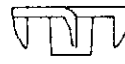
M4X6 SOCKET SET



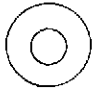
M4 NYLOC NUT



M4 PLAIN NUT



M4 CAPTIVE NUT



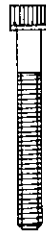
M4 FLAT WASHER



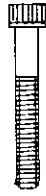
M4 STARWASHER



M3X30 SOCKET CAP



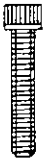
M3X25 SOCKET CAP



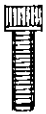
M3X20 PLAIN SHANK



M3X20 SOCKET CAP



M3X16 SOCKET CAP



M3X10 SOCKET CAP



M3X8 SOCKET CAP



M3 NYLOC NUT



M3 PLAIN NUT



M3 FLAT WASHER



M3 STAR WASHER



M2X12 PAN HEAD



M2 NUT



BRASS BALL



NO 4X1/2 SELF TAPPER



NO 2X3/8 SELF TAPPER



NO 2X1/4 SELF TAPPER



3/16 ID FLAT WASHER



1/4 ID STAR WASHER



THREADED END CONNECTOR 18

ACCESSORIES FOR MX RANGER

STOCK CODE: ACC/AUTO

This all metal unit fits in place of the standard gearbox/mast coupling and allows the main rotor to freewheel in the event of an engine failure allowing an autorotational landing to be attempted. Not recommended for the complete beginner but is an essential safety aid when progressing from the hover to circuit flying.

STOCK CODE: MB/KIT

A mast ballrace update kit to replace the original 5/16" oilite mast support bearing. The kit includes a replacement mast with fitted ballrace and a modified plastic bearing holder. Reduces friction and helps to maintain correct gearbox mesh for improved performance.

STOCK CODE: BRC/KIT

A set of four modified control bellcranks, eight high quality sealed ballraces and a steel pivot shaft. A direct replacement for the original cranks giving improved control accuracy and very low wear.

STOCK CODE: SYMBL/ADFW

Weighted main blade set consisting of a pair of pre-routed and weight matched blades, lead rods, 'Ritrama' covering and root bushes. Improves hovering and straight line stability and is a must for autorotational landings.

STOCK CODE: OTR/BR2

The tailrotor gearbox output shaft can be upgraded with this ballrace in place of the standard oilite bearing. Improves wear resistance and gives smoother running.

STOCK CODE: ACC/SILR

A custom made aluminium silencer designed to fit inside the fuselage and exhaust down through the floor. Machined from solid rather than fabricated from tubing this silencer is both quiet. Comes complete with manifold and mounting studs suitable for the Irvine and O.S. .40-.46 cu.in engines.

STOCK CODE: ACC/HSET

A universal pitch and alignment gauge that allows both main blades and flyblades (paddles) to be adjusted and set up at the same time. Makes for repeatable settings whenever you rebuild.

STOCK CODE: ACC/BAT

An 'on board' nicad battery checking device that gives an at a glance indication of battery state with red and green LED lights.

STOCK CODE: ACC/FEI

An 'on board' fuel level indicator that warns of critical fuel level with red 'LED' light. Ideal for any model where the fuel tank is not directly visible.

STOCK CODE: ACC/CAD3

A laminated high density foam main blade caddy designed to fit the Jetrangers tailboom allowing the main blades to be folded back and stored without being removed from the model. Ideal for use on any model with a large round section tailboom.

STOCK CODE: ACC/PLIERS

All metal pliers for the fitting and removal of plastic control ball links easily and without damage.

STOCK CODE: ACC/GLOW

Two sheets, one orange one green of fluorescent (day-glo) self adhesive tape. When applied to the main rotor tips it gives a visual check to ensure the blades are tracking correctly (very important to ensure vibration free running).

STOCK CODE: ACC/B5

A durable nylon reinforced V-belt for use with all electric starters. For all belt start helicopters.

STOCK CODE: ACC/TL2

Increased capacity (50%) 12 fl oz fuel tank for extended flight operation.