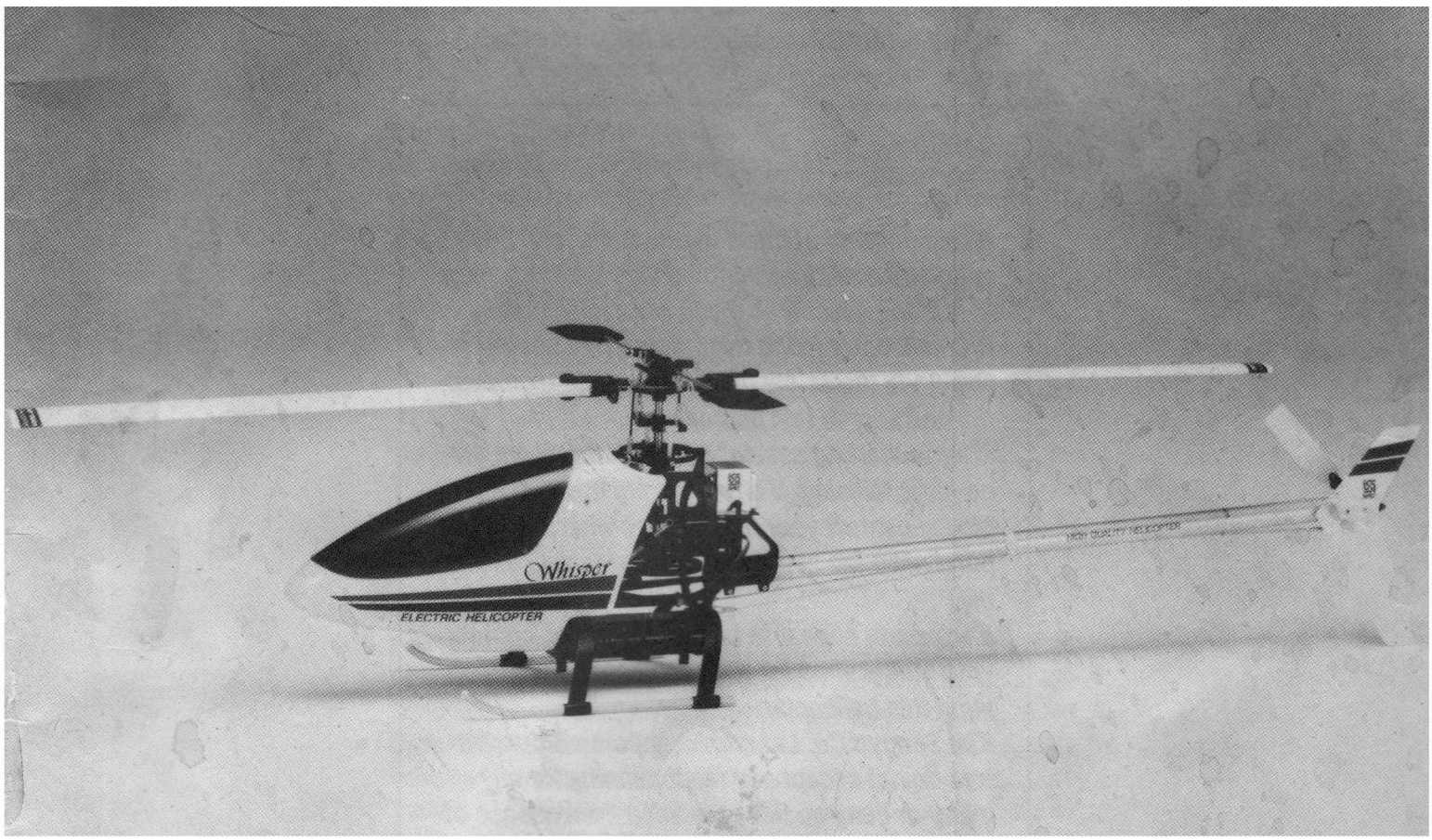
KALT ELECTRIC HELICOPTER

BARON Whisper

Instruction Manual



Become thoroughly familiar with the contents of this manual prior to beginning construction

KALT

BARON Whisper

INSTRUCTION MANUAL

INTRODUCTION

Thank you for purchasing a Kalt electric powered WHISPER.

The Whisper is designed and manufactured to the highest quality specification and standards.

Featuring an entirely new structural design philosophy; the Whisper leads the way in electric helicopter technology. It incorporates strong, yet light modern materials which allow long flight times and unsurpassed performance.

Please take your time and enjoy assembling this helicopter, because a well-built helicopter is the first step to safe and enjoyable helicopter flying.

Spare parts may be obtained through your model shop.

Please read all of these instructions -and any supplementary instructions- very carefully prior to starting assembly. If you are a newcomer to R/C helicopter flying then please pay special attention to the safety guide-lines and recommendations later in this manual.

Prior to starting assembly, check that there are no parts missing. If any parts are missing then please contact your model shop where you purchased the helicopter before starting assembly.

If any parts appear to be defective then contact your model shop for replacements before operating this helicopter.

Kalt Sangyo Co. Ltd and its appointed distributors do not accept any responsibility for any injury or damage that may arise from misuse of this model or any component part of this model; neither do they accept any responsibility for any damage or injury arising as a consequence of non-observance of the instructions and guide-lines laid out in this manual.

Kalt Sangyo Co. Ltd reserve the right to modify at any time any part or parts of this helicopter and any part of this manual without prior notification.

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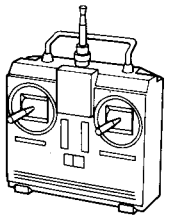
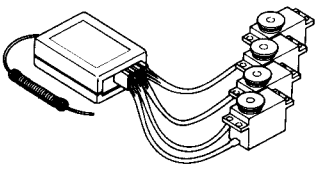
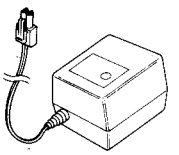
Items Required to Complete this Helicopter (Not Supplied in the Kit)



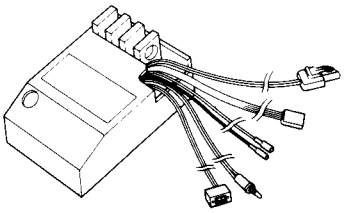
5 Channel Helicopter R/C



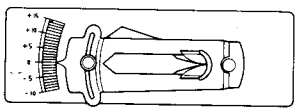
Four Mini or Micro Servos



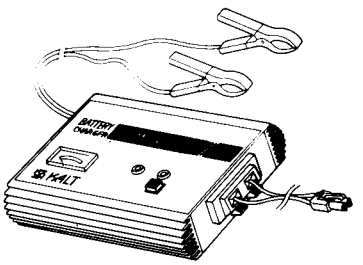
Trickle Charger for Nicad Pack



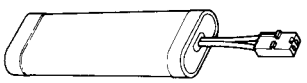
Electronic Speed Controller



Pitch Guage

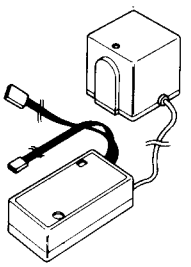


12 Volt Rapid Charger



9.6 Volt 1100 mAh Nicad Pack

9.6 Volt 1700 mAh Nicad Pack
w/3m Silicon Wire



Small or Medium Size Tail
Rotor Gyroscope

Tools Required to Complete this Helicopter (Not Supplied in the Kit)

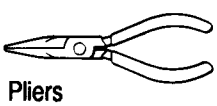
Cyanoacrylate Adhesive

Kalt Tite Threadlock

Grease

Phillips Screwdriver

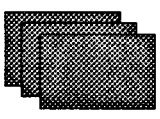
Modelling Knife or Scalpel



Pliers

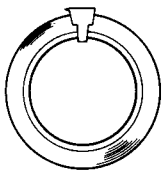
4mm Nut Driver

Awl



Sand Paper

Vinyl Tape



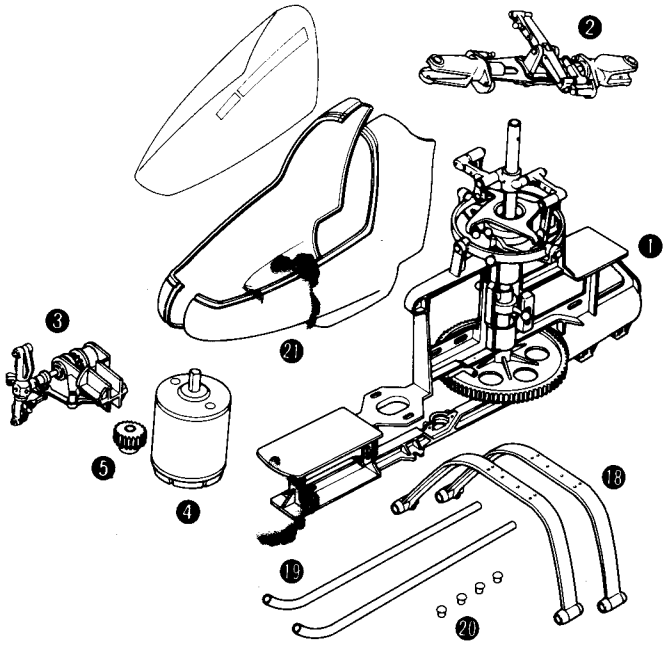
Scotch Tape

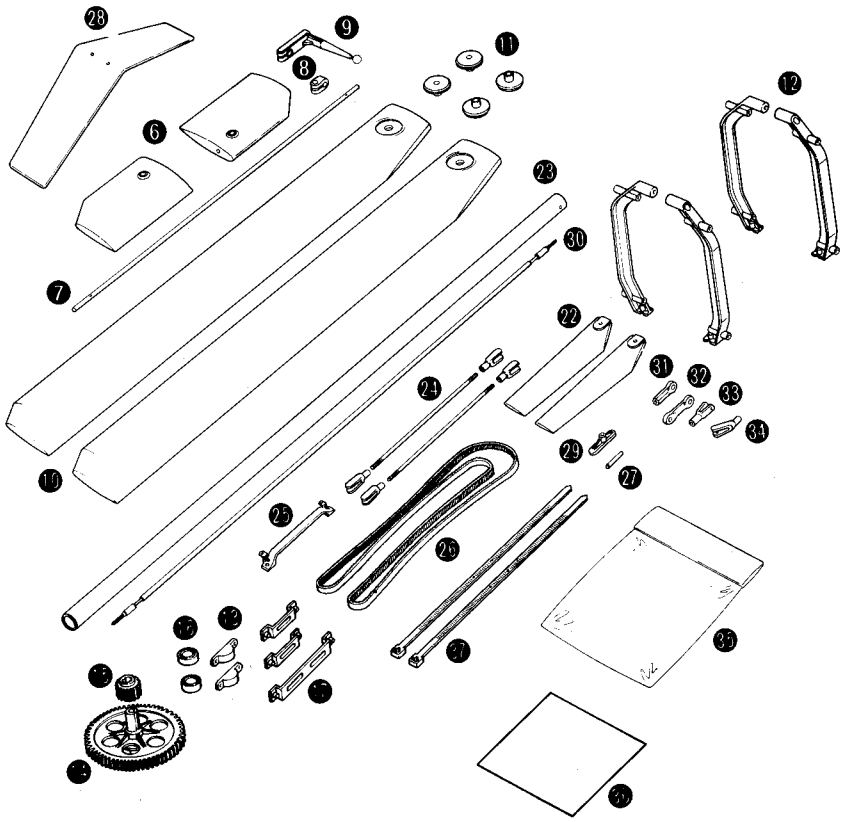
Semi-Kit Parts List

1. ..... Frame Assembly
2. ..... Rotor Head
3. ..... Tail Unit
4. ..... Motor
5. ..... Pinion Gear
6. ..... Paddle Set
7. ..... Stabiliser Bar
8. ..... Stabiliser Stopper
9. ..... Stabiliser Control Arm
10. ..... Main Rotor Blades
11. ..... Main Blade Spacers
12. ..... Frame Side Arms
13. ..... Bearing Shields
14. ..... EH2D Drive Gear
15. ..... EH2P Pinion Gear
16. ..... L1170ZZ Ball Bearings
17. ..... Servo Brackets A & B
18. ..... Undercarriage Braces
19. ..... Undercarriage skids
20. ..... Skid Caps
21. ..... Body Set
22. ..... Tail Blades
23. ..... Tail Boom
24. ..... Tail Boom Supports
25. ..... Boom Support Clamp
26. ..... Tail Drive Belt
27. ..... Tail Gear Cross Member
28. ..... Vertical Fin
29. ..... Fin Mounting Bracket
30. ..... Rudder Rod
31. ..... Universal Link
32. ..... Universal Link W
33. ..... Quick Link
34. ..... Quick Link L
35. ..... Bolt and Screw Pack
36. ..... Whisper Decal
37. ..... Battery Straps

Parts not included with the kit

9.6 Volt Nicad
9.6 Volt Nicad Slow Charger
Electronic Speed Controller





Screw List (Semi-Kit)

Type		Quantity
M2x6	⊕ Bolt	1
M2x8	⊕ Bolt	2
M2x10	⊕ Bolt	16
M2x12	⊕ Bolt	4
M3x6	Cap Bolt	2
M3x18	Cap Bolt	2
M2x8	Cap Bolt	4
M2x12	Cap Bolt	2
M2x15	Cap Bolt	1
M2x3	Tap Tite Screw	3
M2x4	Tap Tite Screw	4
M2x5	Tap Tite Screw	10
M2x6	Tap Tite Screw	10
M2x10	Tap Tite Screw	4
M2x12	Tap Tite Screw	1
M3x3	Set Bolt	1
M3	Nyloc Nut	2
M2	Nyloc Nut	10
M2	Nut	20
M3	Plate Washer	2
M2	Plate Washer	12
50mm	Pushrod	1
25mm	Pushrod	4
45mm	Pushrod	1
42mm	Pushrod	1
23mm	Pushrod	1
20mm	Pushrod	1

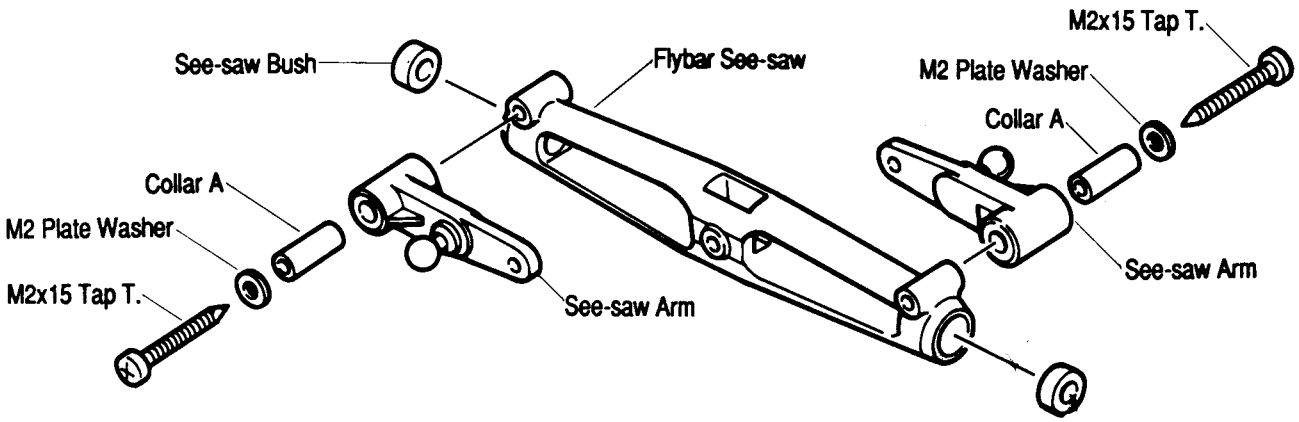
Screw List (Kit)

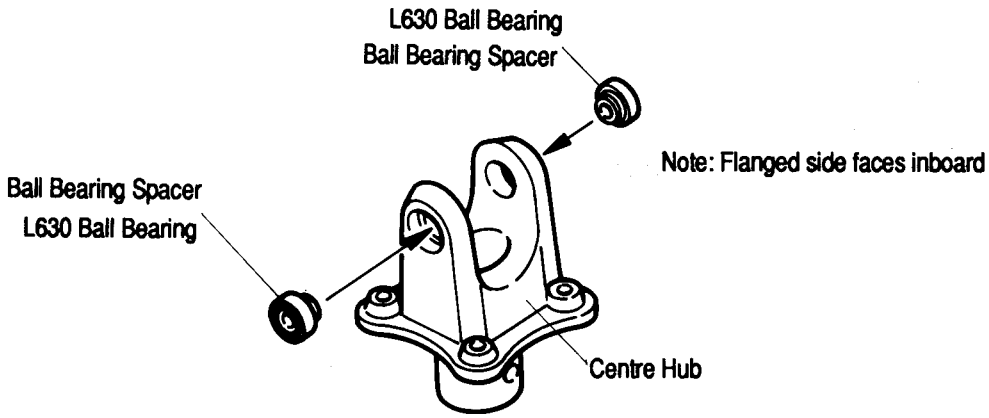
Rotor Head Assembly		Quantity
M3x22	Cap Bolt	2
M2x6	Tap Tite Screw	6
M2x8	Tap Tite Screw	4
M2x15	Tap Tite Screw	2
M2	Plate Washer	2
3x4.5x0.5	Plate Washer	2
Frame Assembly		
M2x8	Cap Bolt	1
M2x15	Cap Bolt	1
M2x8	Tap Tite Screw	6
M2x15	Tap Tite Screw	4
M2	Nyloc Nut	2
M2	Plate Washer	4
Tail Section		
M2x8	Cap Bolt	2
M2x 5	Tap Tite Screw	2
M2x6	Tap Tite Screw	1
M3x3	Set Bolt	2
M3x4	Set Bolt	1
M2	Plate Washer	1

Symbols Used in This Manual

▲ Triangular-bulleted lists, like this one, provide important information which must be followed, but not procedural steps.

▲ Numbered shadow-bulleted lists (❑ 3., ❑ 4.) specify a step in a construction procedure involving a number of sequential steps.





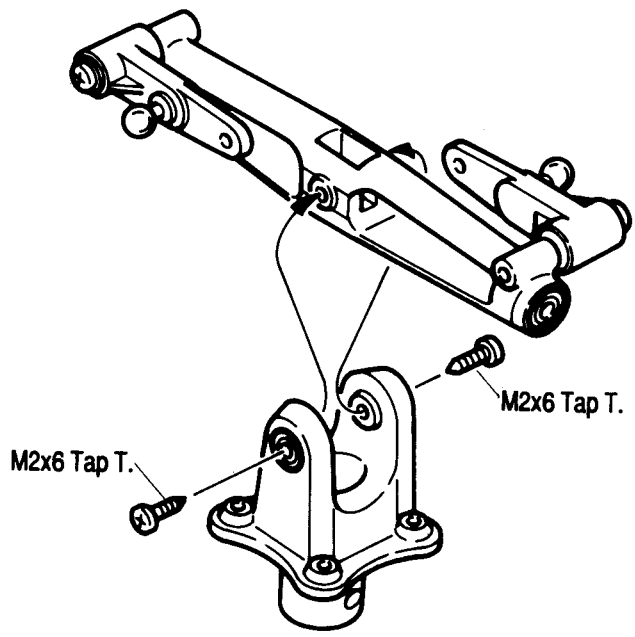
1-1.1 Main Rotor Head Assembly

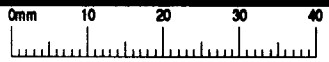
- ❑ 1. Press two see-saw bushes into the flybar see-saw assembly as per the diagram, and secure with a small drop of cyanoacrylate ensuring that the flanged edge of the bush faces outwards.
- ❑ 2. Screw a see-saw mixing arm onto the flybar see-saw as per the diagram. Apply a thin film of grease to the outside of collar A. Repeat for the other mixing arm.
- ❑ 3. Insert a ball bearing spacer into a flanged L630 open see-saw pivot ball bearing. Repeat for the other spacer and ball bearing.

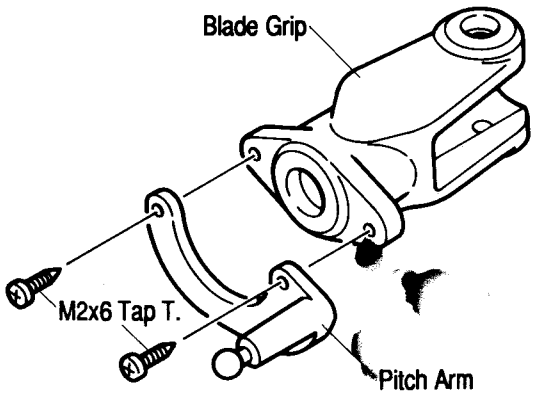
▲ Spacers are a tight fit and must be pushed in squarely to avoid damaging the bearings.

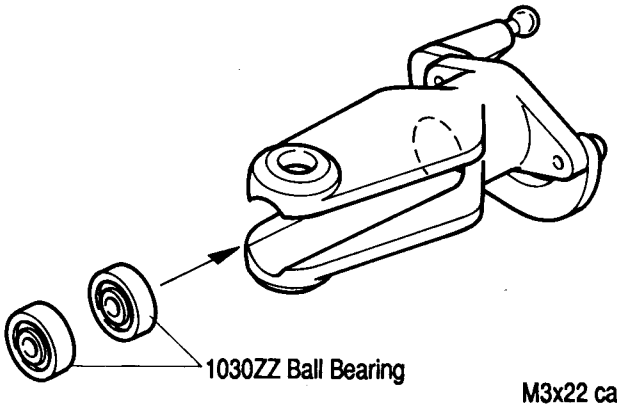
- ❑ 4. Push the bearings into the centre hub ensuring that the flanged edge of the spacer faces inboard.
- ❑ 5. Secure the see-saw assembly to the centre hub with 2 M2x6 tap tite screws.

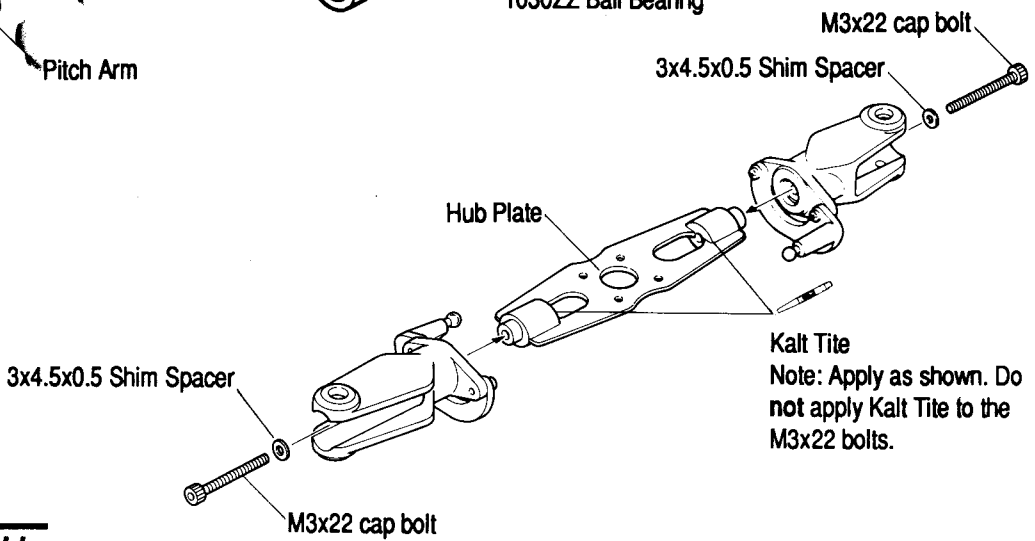
▲ Because the M2x6 tap tite screws must be *self-tapped* into the spacers, you may find it easier to first assemble a bearing onto an M2x6 tap tite screw, and then screw this into a see-saw bearing











1-1.2 Main Rotor Head Assembly

- ❑ 1. Assemble a pitch arm onto a blade grip as per the diagram with 2 M2x6 tap tite screws.

- ▲ Please note that the blade grip is *not* symmetrical, and that the underneath surface is moulded to accept an M3 lock nut.

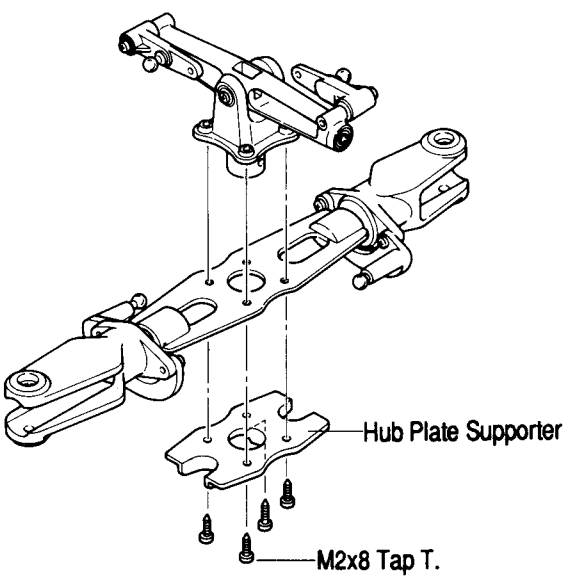
- ❑ 2. Push 2 1030ZZ ball bearings into the blade grip as per the diagram.
- ❑ 3. Repeat steps 1 and 2 for the other blade grip and pitch arm.
- ❑ 4. Apply a small drop of Kalt Tite with the end of a scalpel blade to the threads on the *inboard* side of the hub plate.
- ❑ 5. Repeat step 4 for the thread on the other side of the hub plate.
- ❑ 6. Assemble a blade grip onto the hub plate using an M3x22 cap bolt and M3 shim spacer.
- ❑ 7. Repeat step 6 for the other blade grip.

- ▲ Do not be tempted to apply Kalt Tite to the M3x22 cap bolt. Kalt Tite may migrate into the blade grip ball bearings which will make them unusable.

- ▲ **Do not overtighten the M3x22 cap bolts, otherwise the hub plate may be damaged !**

- ▲ Please note that there should be a small amount of end-float on the blade grip assemblies.

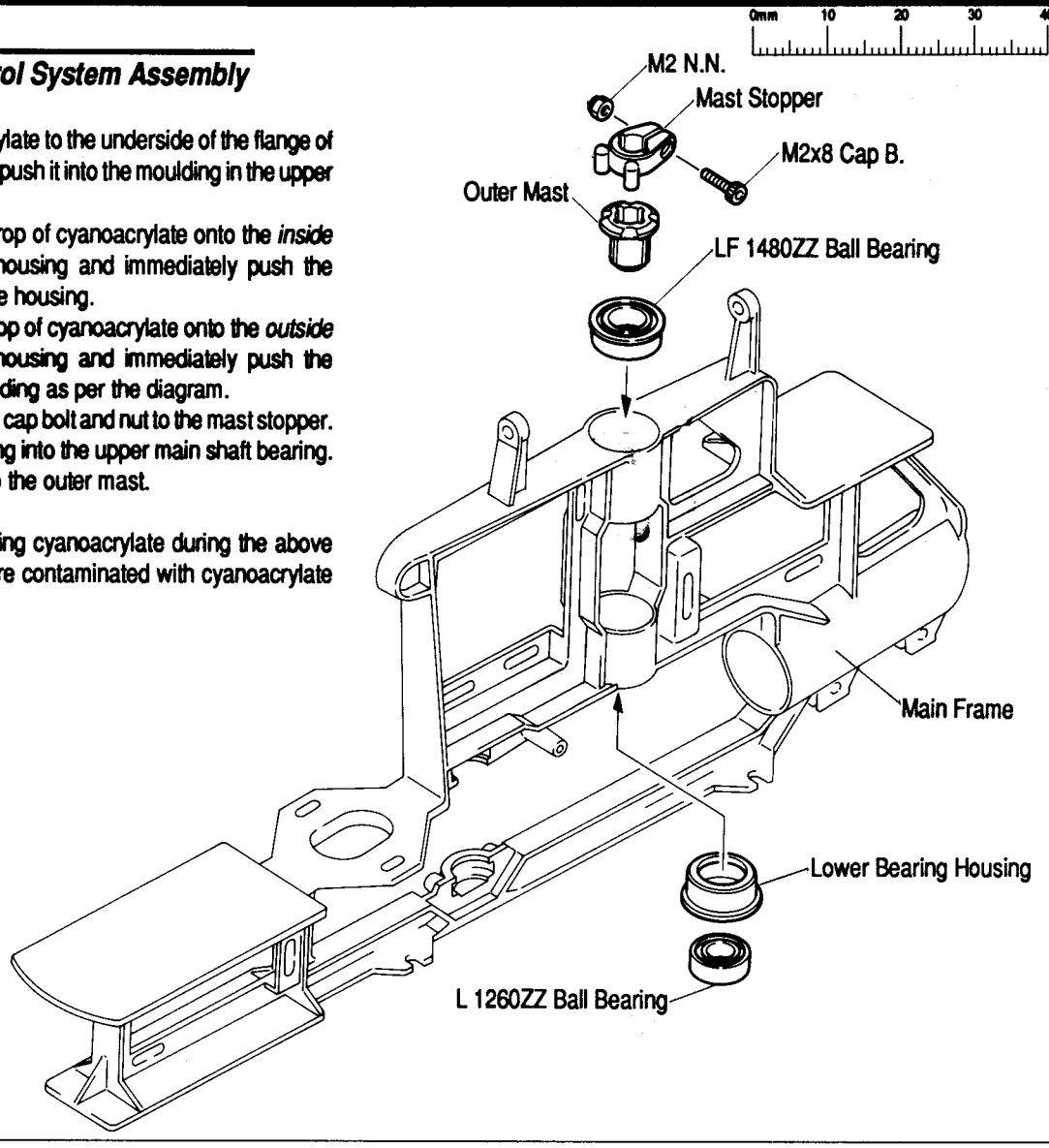
- ❑ 8. Assemble hub plate supporter onto the hub plate and centre hub assembly using 4 M2x8 tap tite screws; paying careful attention to the relationship between the three sub-assemblies.



1-2.1 Main Frame and Control System Assembly

- ❑ 1. Apply a thin film of cyanoacrylate to the underside of the flange of the 1480ZZ ball bearing and push it into the moulding in the upper frame.
- ❑ 2. Carefully put a single tiny drop of cyanoacrylate onto the *inside* wall of the lower bearing housing and immediately push the 1260ZZ ball bearing into the housing.
- ❑ 3. Carefully put a single tiny drop of cyanoacrylate onto the *outside* wall of the lower bearing housing and immediately push the housing into the frame moulding as per the diagram.
- ❑ 4. Temporarily attach the M2x8 cap bolt and nut to the mast stopper.
- ❑ 5. Push the outer mast moulding into the upper main shaft bearing.
- ❑ 6. Place the mast stopper onto the outer mast.

▲ Be very careful when applying cyanoacrylate during the above steps. If the ball bearings are contaminated with cyanoacrylate they will be unusable.

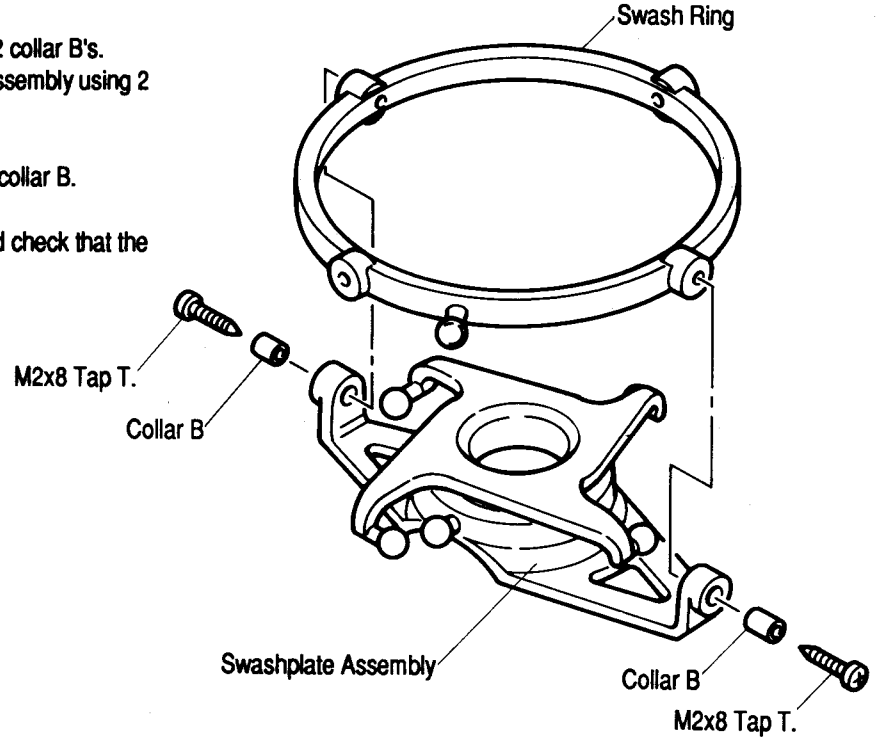


1-2.2 Main Frame and Control System Assembly

- ❑ 1. Apply a thin film of grease to the outside of the 2 collar B's.
- ❑ 2. Assemble the swash ring onto the swashplate assembly using 2 M2x8 tap tite screws and 2 collar B.

▲ The M2x8 tap tite screws must be screwed into collar B.

▲ Do not overtighten the M2x8 tap tite screws, and check that the swash ring pivots freely with no binding.

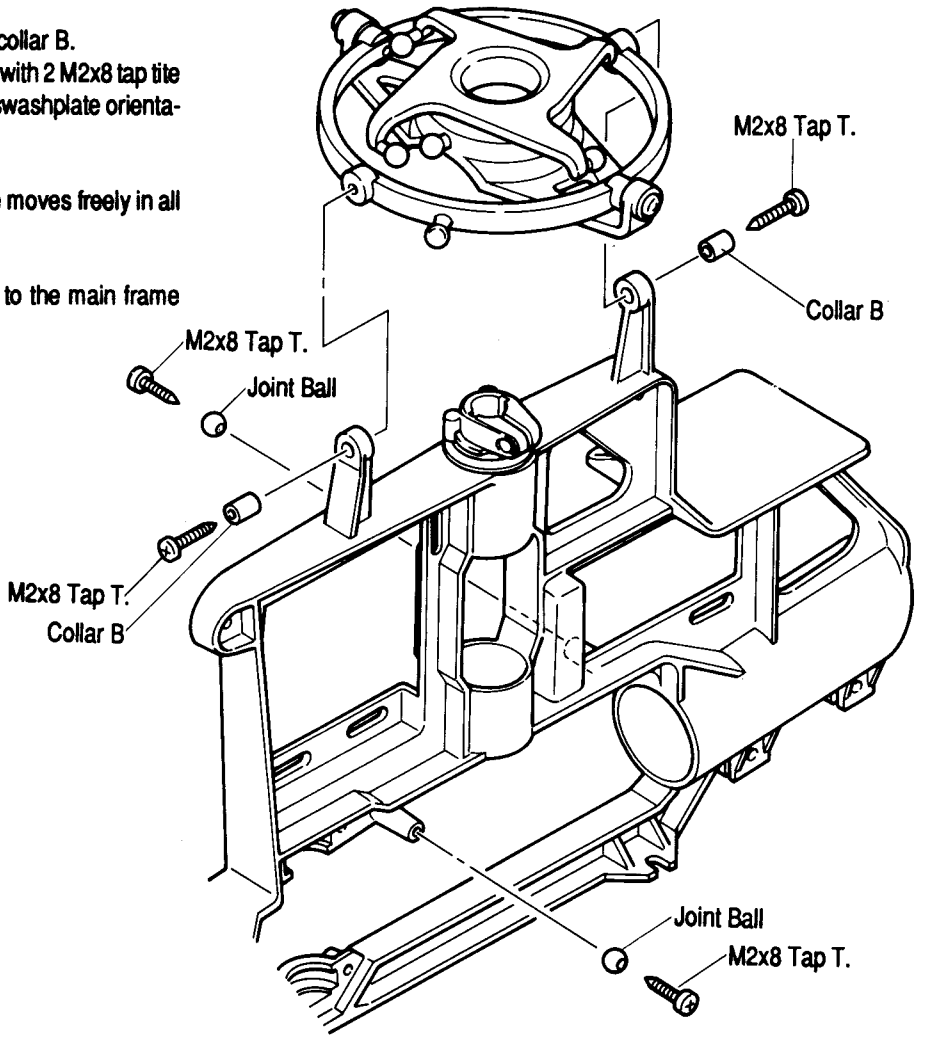


1-2.3 Main Frame and Control System Assembly

- ❑ 1. Apply a thin film of grease to the outside of the 2 collar B.
- ❑ 2. Attach the swashplate assembly to the main frame with 2 M2x8 tap tite screws and 2 collar B, paying careful attention to swashplate orientation.

▲ Do not overtighten, and check that the swashplate moves freely in all directions with no binding.

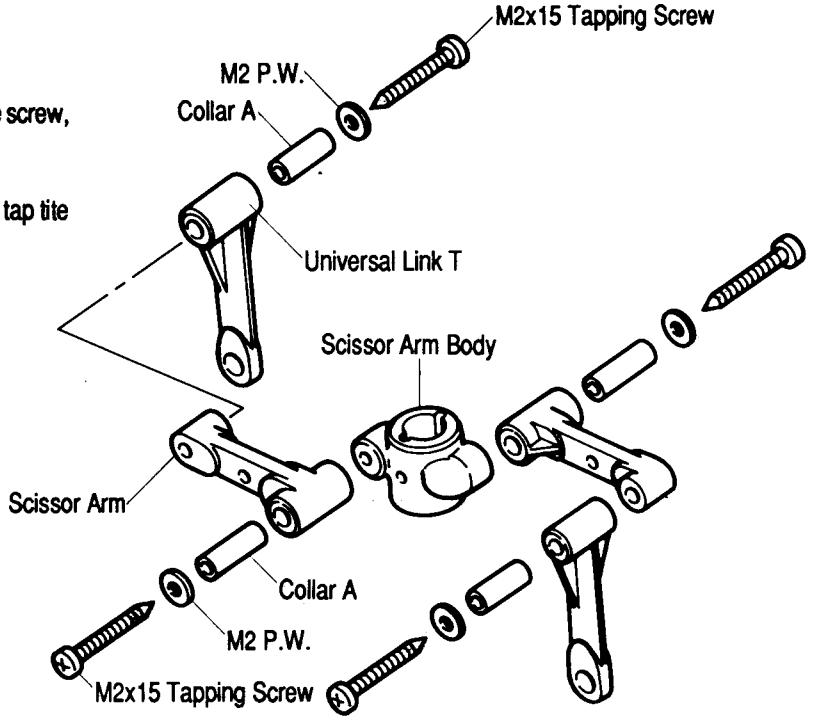
- ❑ 3. Attach 2 joint balls using 2 M2x8 tap tite screws to the main frame mounting points. Do not overtighten.



1-2.4 Main Frame and Control System Assembly

- ❑ 1. Apply a thin film of grease to the outside of the 4 collar A.
- ❑ 2. Attach a universal link T to a scissor arm using an M2x15 tap tite screw, plate washer and collar A.
- ❑ 3. Repeat step 2 for the other universal link T and scissor arm.
- ❑ 4. Screw a scissor arm to the scissor arm body using an M2x15 tap tite screw, plate washer and collar A.
- ❑ 5. Repeat step 4 for the other scissor arm.

▲ Check that all pivoting parts move freely without any binding.



1-2.5 Main Frame and Control System Assembly

❑ 1. Slide the Scissor (without the pitch rods) assembly onto the main shaft, checking that it moves freely up and down the main shaft. If you can detect any binding, then use fine sandpaper inside the mixer body to remove any excess material that may be present.

▲ Step 1 is the first stage in this very critical part of the assembly. All the following steps are equally important, and determine how well your collective pitch system will operate in flight.
If this section is assembled correctly, you will benefit from superb and smooth height control in flight, and possibly more importantly, you will also benefit from prolonged battery life because there will be no binding in your control system.

❑ 2. Push a single pitch control rod into the hole in the mixer body as per the diagram.

▲ The accepting hole in the mixer body is very small, and may need to be eased slightly to accept the pitch wire.
Use one end of the pitch wire to do this very carefully.

❑ 3. Check that the pitch control rod inserted in step 2 sits fully seated in its slot in the mixer body. Use very fine sandpaper in the mixer body slot in order to fully seat the pitch wire if necessary. Check that the pitch wire emerges from the mixer body parallel to the mixer body. Adjust carefully the 90° angle in the end of the wire if required.

❑ 4. Repeat steps 2 and 3 for the other pitch wire.

❑ 5. Slide the Scissor mixer assembly with the 2 pitch wires inserted onto the main shaft.

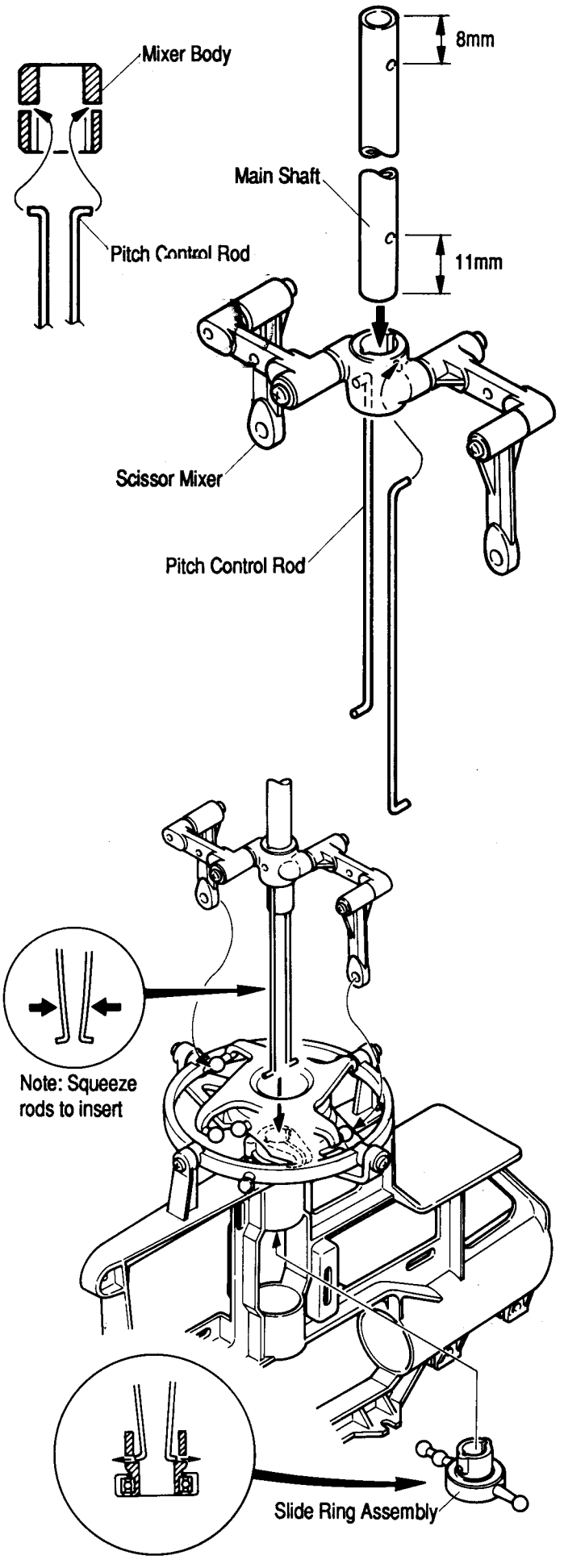
▲ The top end of the main shaft is the end that has a bolt hole 8mm from the end of the shaft. See diagram.

❑ 6. Take the main shaft and scissor assembly and slide it into position in the main frame, locating the bottom ends of the pitch wire into the slide ring assembly in the centre of the main frame by carefully springing the pitch wires into position.

▲ See slide ring assembly detail diagram for how the pitch wires fit.

❑ 7. Check that the mixer assembly moves freely up and down the main shaft with no binding.

▲ If any binding is detected, then systematically retrace the preceding steps. It is most important that the scissor assembly moves freely.



1-2.6 Main Frame and Control System Assembly

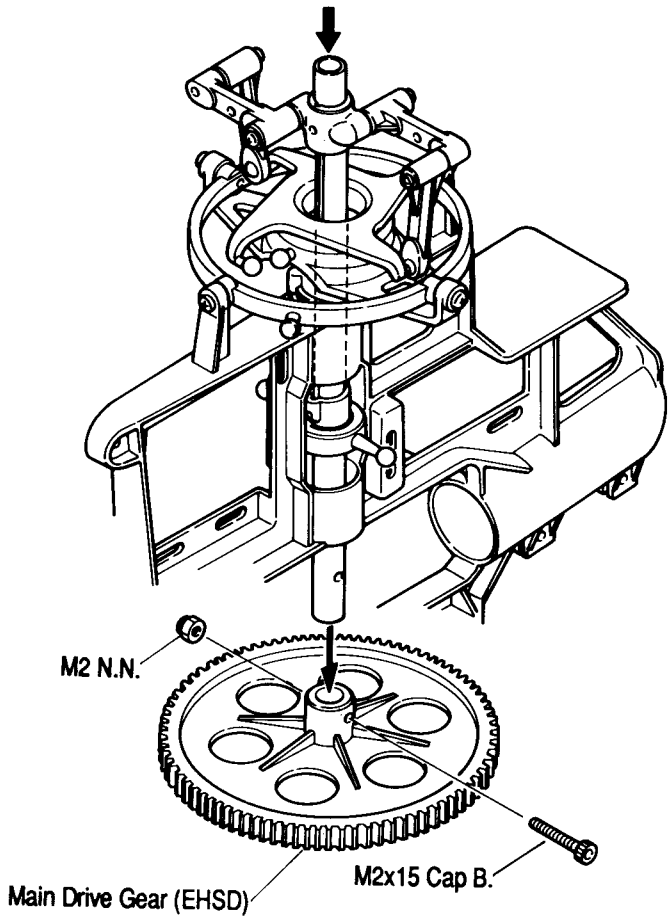
- ❑ 1. Attach the main drive gear (EHSD) to the main shaft using an M2x15 cap bolt and M2 nyloc nut.
- ❑ 2. Temporarily tighten the mast stopper bolt, whilst simultaneously pulling up the main shaft and pushing down on the mast stopper.

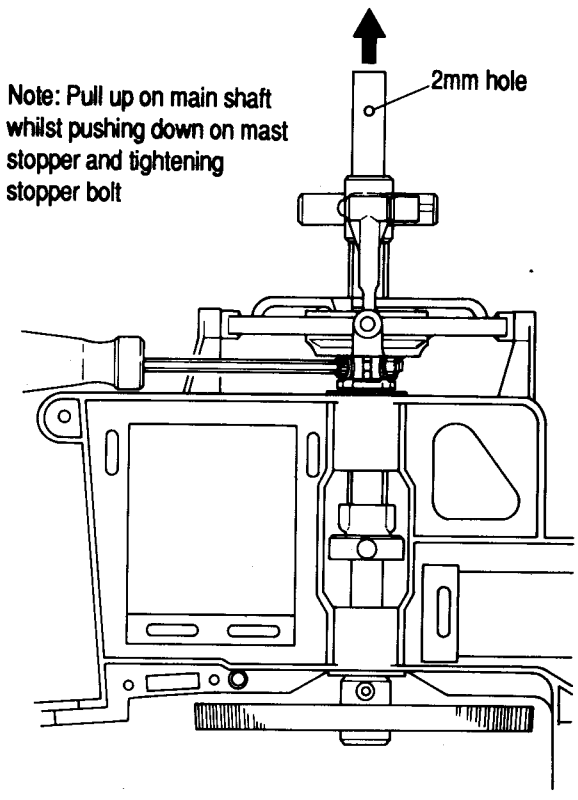
▲ This procedure will lock the main shaft into the correct position in the main frame and will remove any end float on the main shaft. Double check that this has been achieve

- ❑ 3. Check that the mixer assembly still slides smoothly over its travel.

▲ Please note that if the mast stopper bolt is overtightened the mixer will jam up. The mast stopper bolt must be tight enough only to prevent rotation of the shaft, and to prevent the shaft from dropping down in the main frame.

- ❑ 4. Snap the 2 universal link T onto the swashplate balls as per the diagram.
- ❑ 5. Now adjust the angle of the mast stopper by slightly releasing the mast stopper bolt so that an imaginary line drawn through the mast stopper bolt is perpendicular to the 2mm hole in the top of the main shaft.
- ❑ 6. Ensure that T links are also in line as per the diagram.
- ❑ 7. Carefully retighten the mast stopper bolt.
- ❑ 8. Check that the mixer assembly still slides smoothly over its travel.





1-3.1 Tail Section Assembly

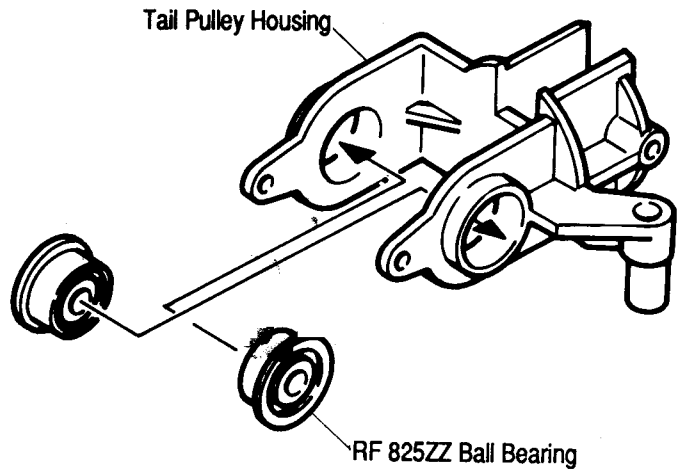
❑ 1. Push the 2 RF 825ZZ ball bearings into the tail pulley housing, securing them with a small drop of cyanoacrylate.

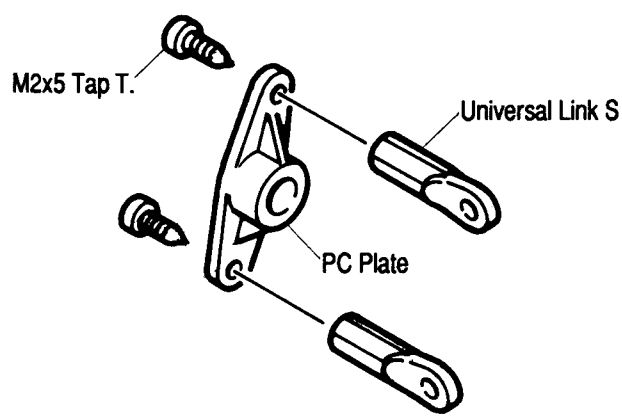
▲ Ensure that the flanged faces of the bearings face inboard, and that cyanoacrylate is applied carefully, thus avoiding any bearing contamination.

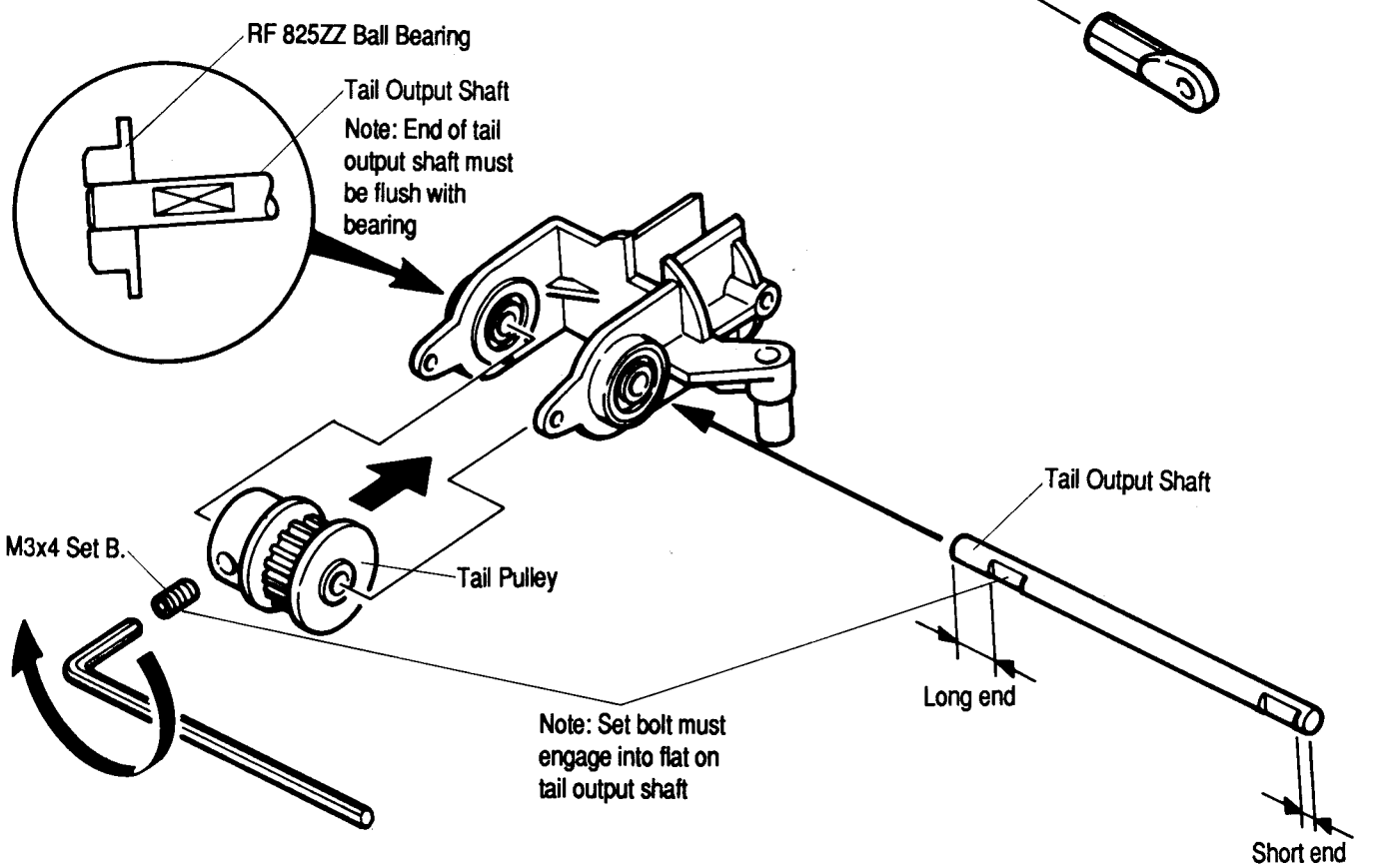
❑ 2. Attach the tail pulley and tail output shaft to the tail pulley moulding using an M3x3 set bolt, paying careful attention to the correct direction of the tail output shaft. See diagram.

▲ When inserting the tail output shaft, make sure that the inboard end of the shaft sits flush with the outside face of the RF 825ZZ ball bearing.

❑ 3. Attach the 2 universal link S to the PC plate with 2 M2x5 tap tite screws.







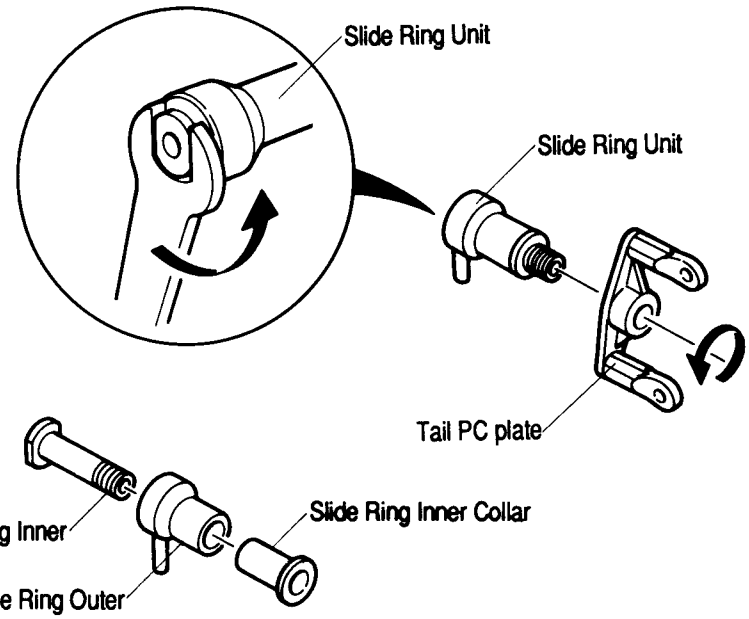
1-3.2 Tail Section Assembly

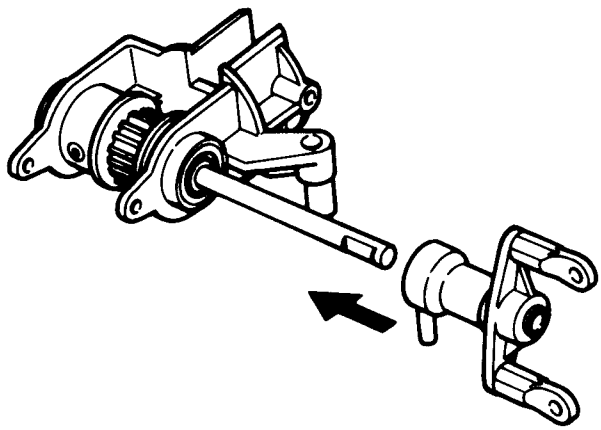
- ❑ 1. Assemble the slide ring inner and slide ring outer onto the slide ring inner collar as per the diagram.
- ❑ 2. Attach the PC plate assembly to the slide ring unit by screwing it *counter-clockwise*. See diagram.

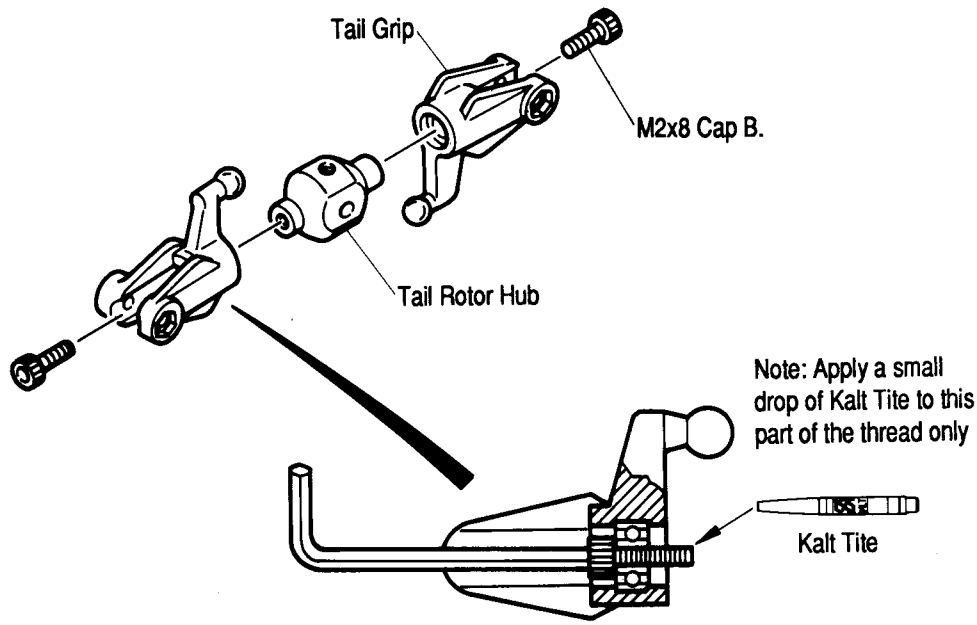
▲ Be very careful when screwing on the PC plate in order not to cross-thread the unit.

- ❑ 3. Slide the assembled slide ring assembly over the tail output shaft.
- ❑ 4. Apply a small drop of Kalt Tite to 2 M2x8 cap bolts and bolt the 2 tail grips to the tail rotor hub.

▲ Be very careful when applying Kalt Tite that none seeps into the tail grip bearings.

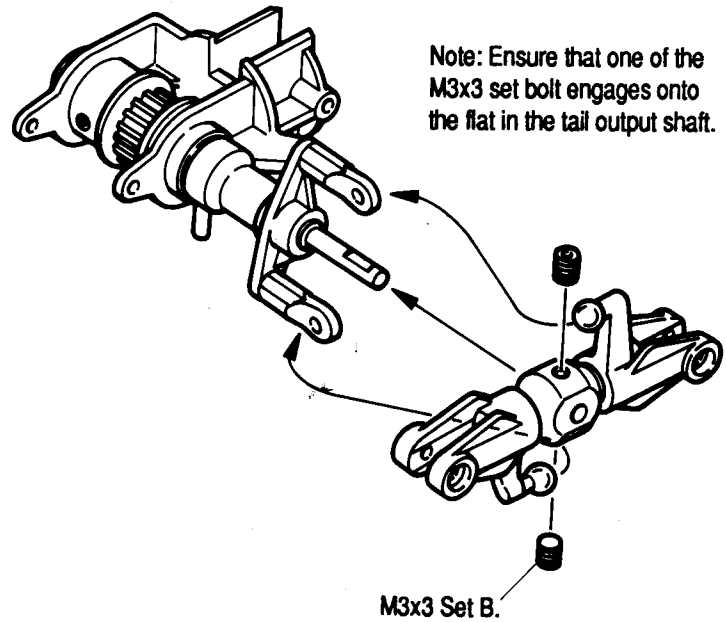


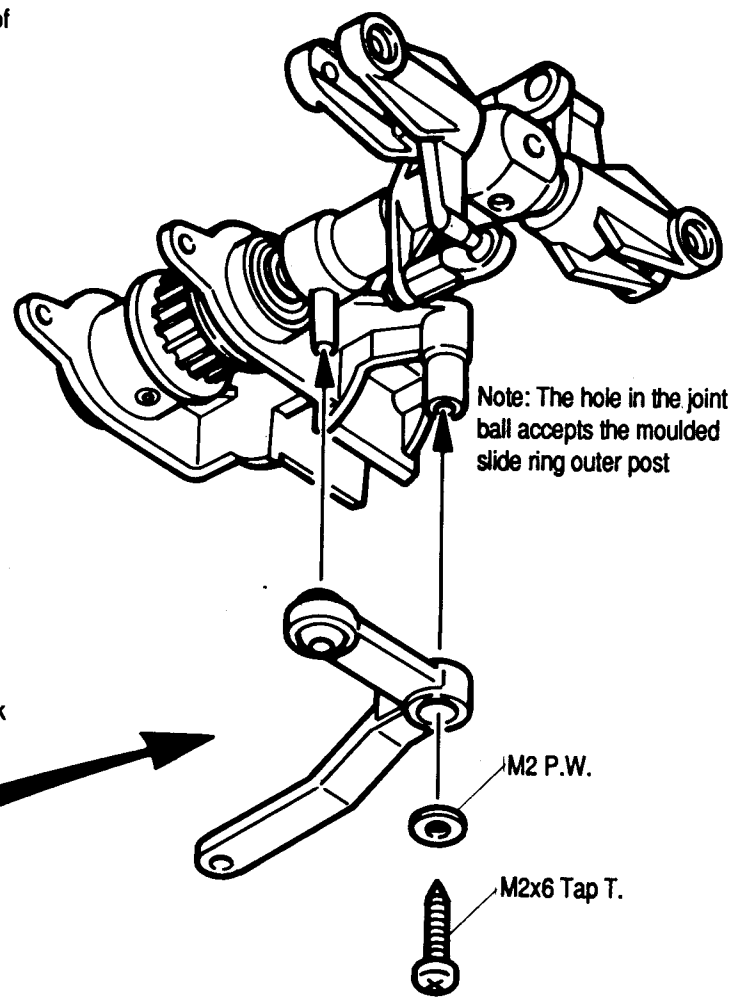




1-3.3 Tail Section Assembly

- ❑ 1. Apply Kalt Tite to two M3x3 set bolt, and using these attach the tail grip and hub assembly to the tail out put shaft.
- ▲ Ensure that one of the M3x3 set bolt engages onto the flat in the tail output shaft.
- ❑ 2. Snap the PC plate ball joints into position onto the moulded tail grip balls *exactly* as per the diagram.
- ▲ Please note that the ball joints can be snapped into position in two possible ways: *leading* the direction of tail blade rotation, or *trailing* the direction of tail blade rotation.
  They must be snapped on as per the diagram in a *leading* fashion.
- ❑ 3. Snap the loose joint ball into position in the moulded socket of the tail PC bellcrank.
- ▲ Please note that the socket in the bellcrank is handed, and that the joint ball will snap in from one direction only !
- ❑ 4. Bolt the tail PC bellcrank into position on the tail pulley housing using an M2x6 tap tite and M2 plate washer, making sure that the post in the slide ring outer passes through the hole in the centre of the joint ball as per the diagram.

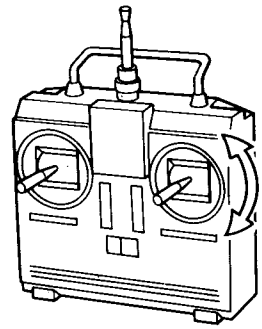




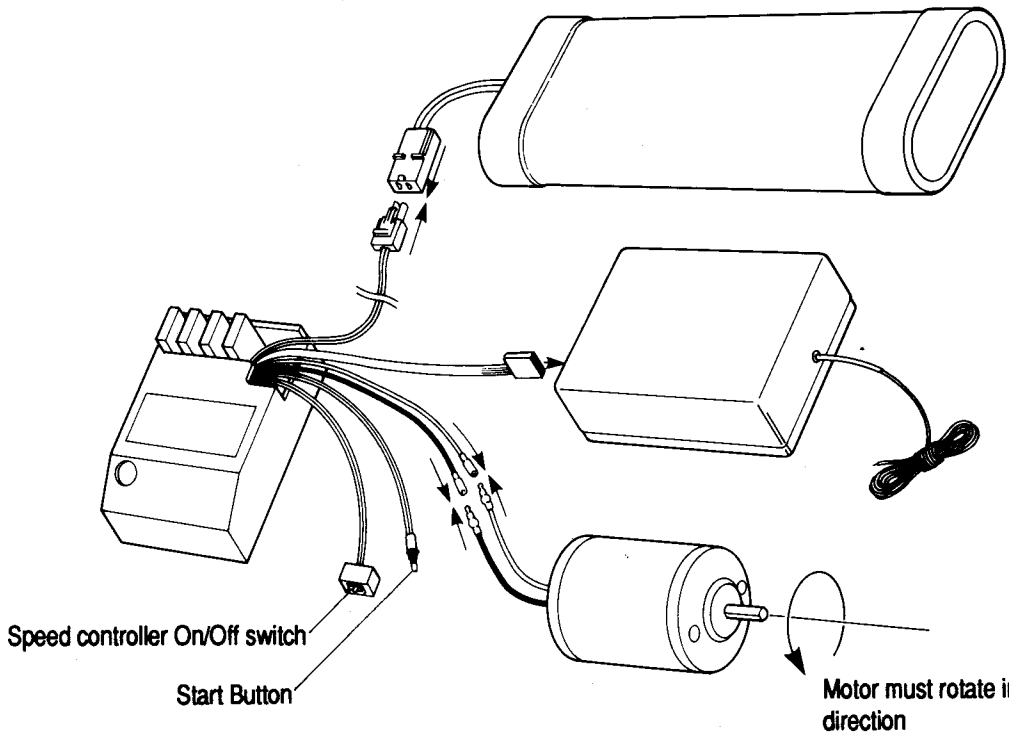
Motor, Battery and Speed Controller Operation

Before installing the speed controller, nicad, and 540VS drive motor into the helicopter; it is most important that you check that the system functions satisfactorily, and that any adjustments that are needed to be made to the speed controller end points (full throttle and low throttle) are made at this point before installing these items into the helicopter.

- When switching the speed controller to the on position, make sure that you have first switched the transmitter power switch to the on position and that the motor is firmly held in your hand.
- With the throttle in the low position, press the start button. As you increase power, the motor will increase in speed.
- Make any adjustments that are required as per the instruction manual with the speed controller and your R/C system.
- Ensure that the motor rotates in the direction indicated, and that the speed controller operates so that full power is given when the transmitter throttle/collective stick is pushed to the full power position.
- Ensure that when switching the system off, you switch the speed controller switch off first, and then the transmitter.

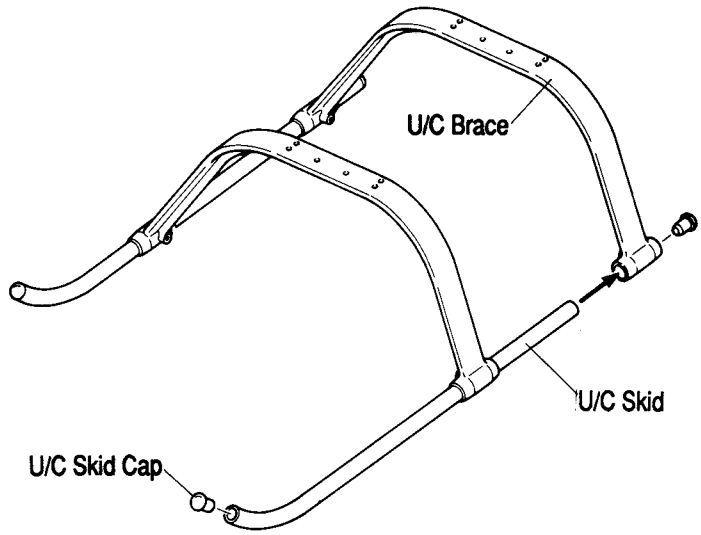


Throttle stick is at high-position, motor runs at max. speed, and throttle stick is down, motor will stop running.



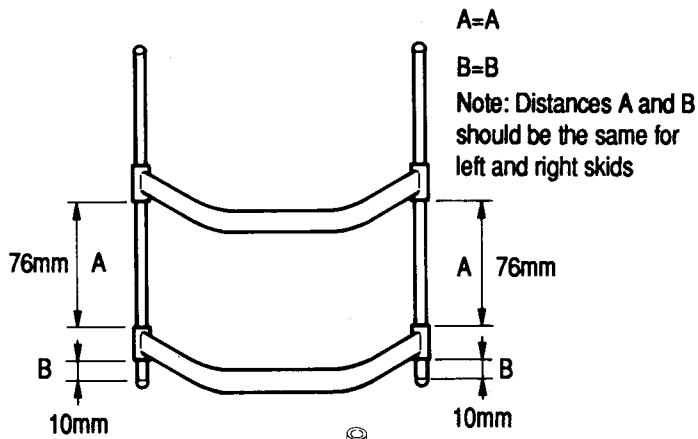
Screws and links required

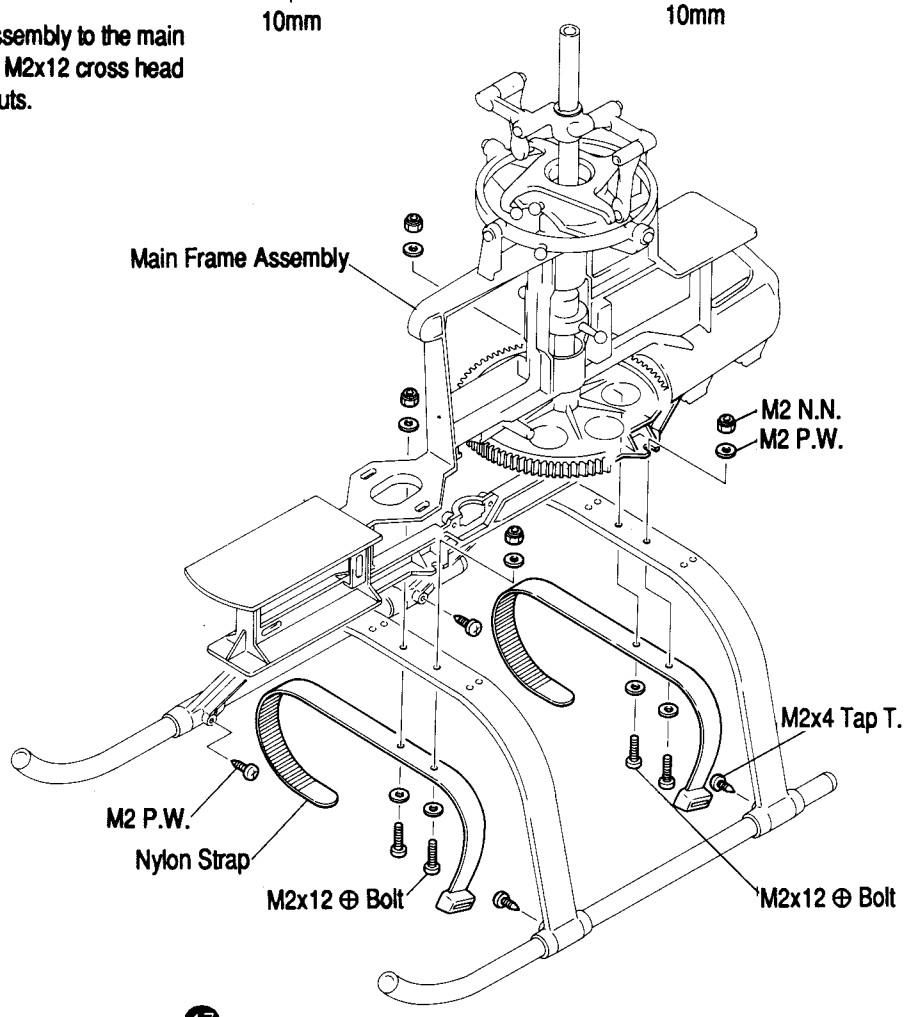
M2x12	⊕ Bolt	x4
M2x4	TAP T.	x4
M2	P.W.	x8
M2	N.N.	x4



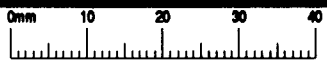
2-1.1 Undercarriage and Side Arm Assembly

- ❑ 1. Assemble the undercarriage as per the diagram, and press the U/C skid caps into position.
  Secure the skid caps with a drop of cyanoacrylate.
- ❑ 2. Clamp skids to the undercarriage braces using 4 M2x4 tap tite screws.
- ❑ 3. Place the main frame assembly onto the undercarriage assembly.
- ❑ 4. Adjust undercarriage braces until they line up with the locating slots in the frame.
- ❑ 5. Attach the nylon straps and undercarriage assembly to the main frame assembly as per the diagram, using 4 M2x12 cross head bolts, 8 M2 plate washers, and 4 M2 nyloc nuts.



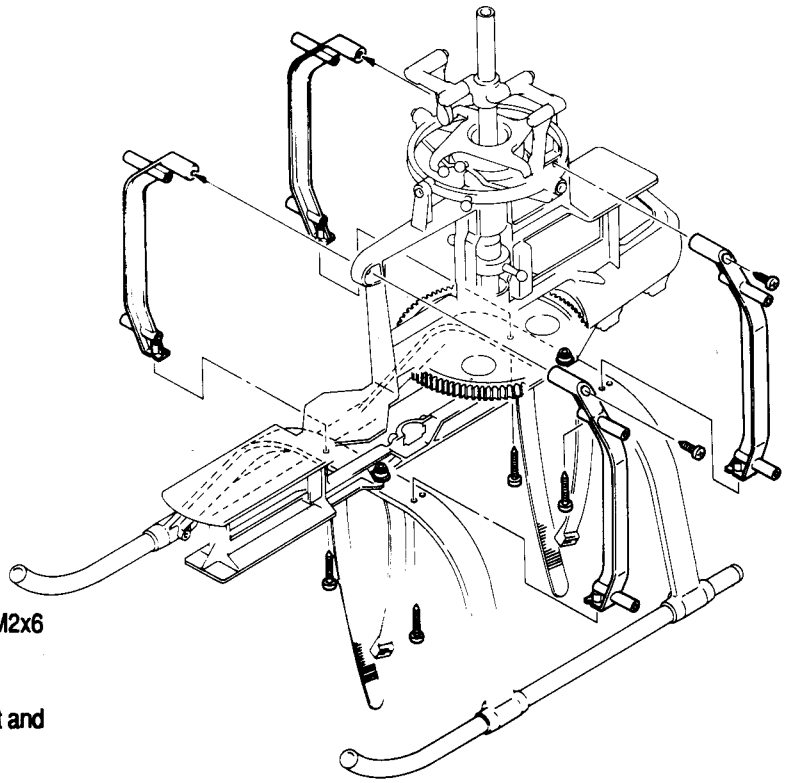


N.B.
Please read Important Additional Notes, Page 1.



Screws and links required

M2x10	TAP T.	x4
M2x6	TAP T.	x2
M2x8	⊕ Bolt	x2



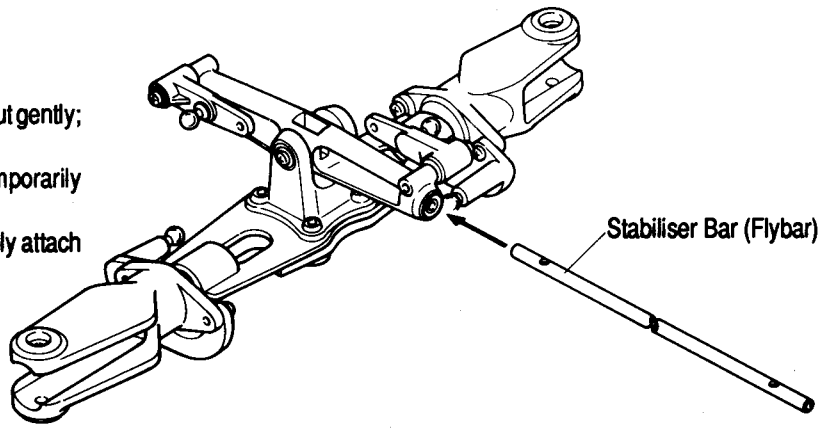
2-1.2 Undercarriage and Side Arm Assembly

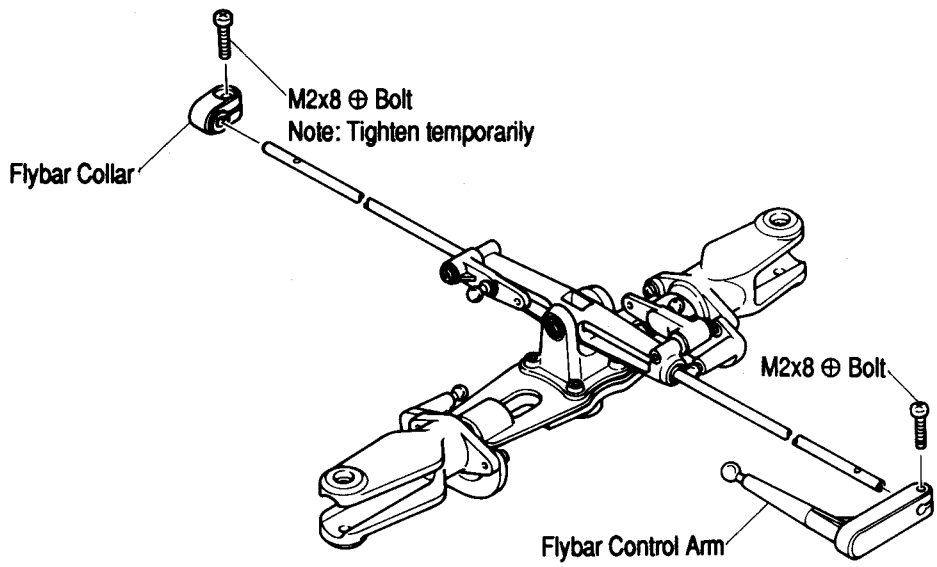
❑ 1. Attach the 4 side arms to the mainframe assembly using 2 M2x6 tap tite screws and 4 M2x10 tap tite screws.

▲ 2 Side arms marked with an "L", and 2 with an "R"; for the left and right hand side of the frames respectively.

2-2.1 Rotor Head Final Assembly

❑ 1. Push the stabiliser bar through the flybar see-saw firmly but gently; rotating as you push.
❑ 2. Push the stabiliser collar onto the stabiliser bar and temporarily tighten with an M2x8 bolt and M2 nut.
❑ 3. Push the flybar control arm onto the flybar and temporarily attach it with an M2x8 bolt and M2 nut.





Screws and links required

M2x8	CAP B.	x2
M2	N.	x4
M2	N.N.	x1
M2x15	CAP B.	x1

2-2.2 Rotor Head Final Assembly

- ❑ 1. Attach a flybar paddle with an M2x8 cap bolt and M2 nut.
- ❑ 2. Repeat step 1 for the other flybar paddle.

▲ Do not overtighten the M2x8 cap bolts, and apply Kalt Tite as indicated.

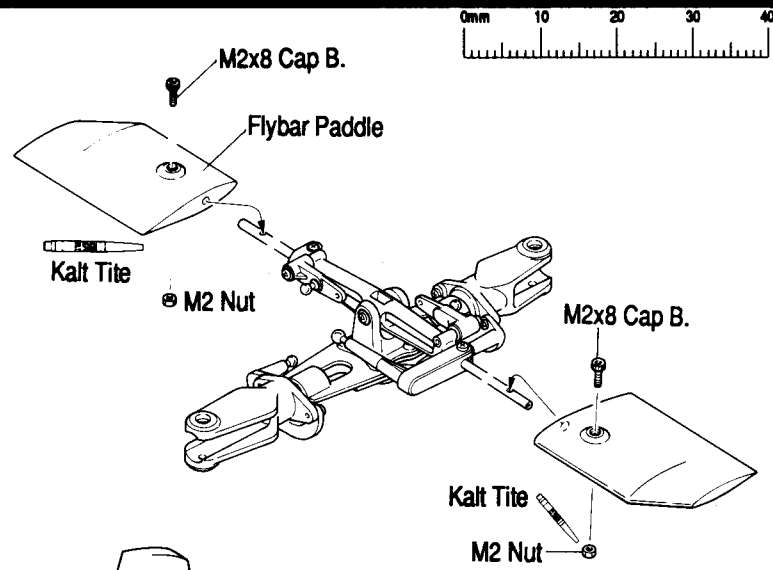
- ❑ 3. Adjust the position of the flybar so that the distance from each paddle to the centre of the rotor head is the same as per the diagram.
- ❑ 4. Tighten the M2x8 bolts retaining the control arm and flybar collar, ensuring that the paddles and control arm are parallel and in line as shown.
  Apply Kalt Tite to the M2 nuts.

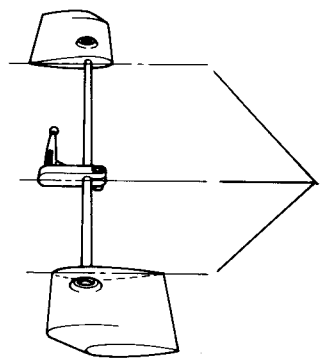
▲ Make sure that control arm and collar are securely fastened and that they are pushed home against the flybar bushes.

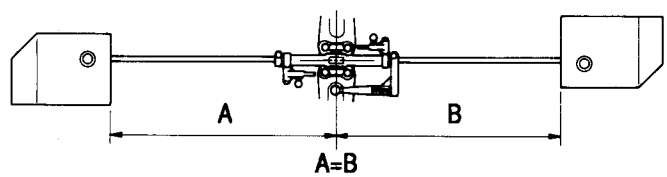
▲ Double check that the flybar is accurately centred as per the above diagrams.

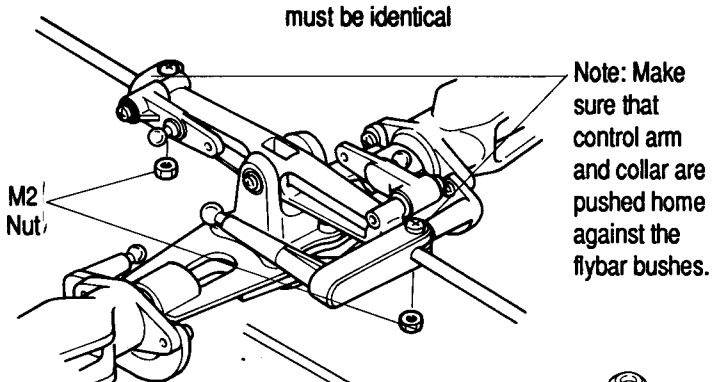
- ❑ 5. Attach the rotor head to the main shaft using an M2x15 cap bolt and M2 nyloc nut.

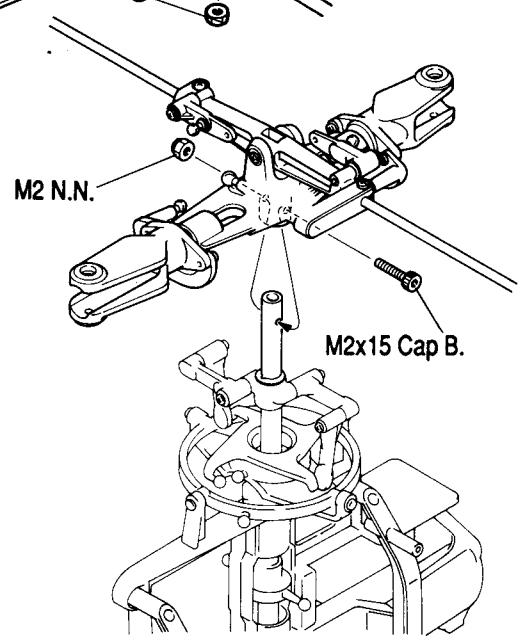
▲ This completes the main rotor head assembly. Please take your time to go over the preceding steps to ensure that all have been carried out correctly, and that all bolts are properly secured and Kalt Tite applied where indicated.
An accurately assembled rotor head is an essential requirement for obtaining a safe and smooth flying helicopter.

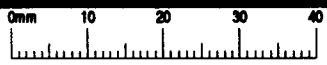




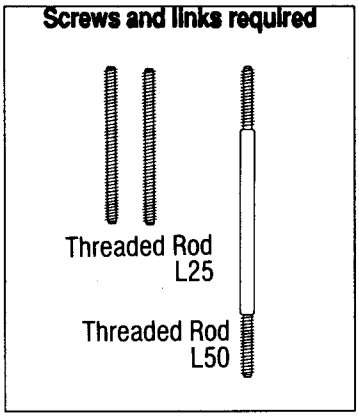








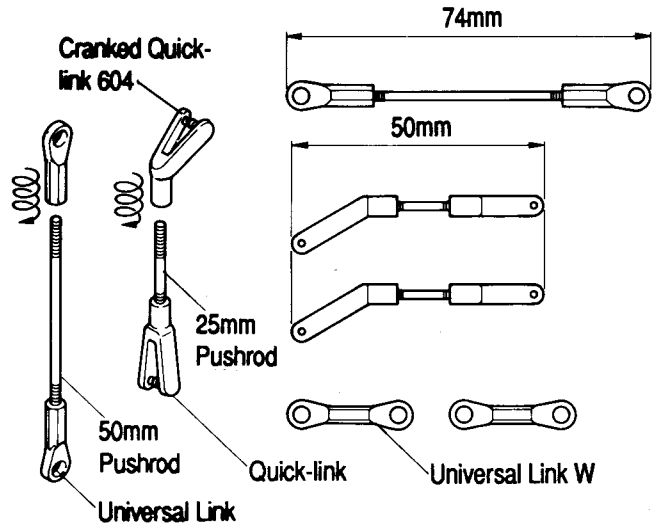
Screws and links required

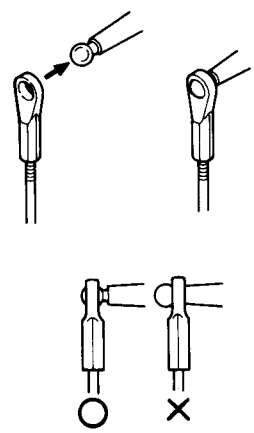


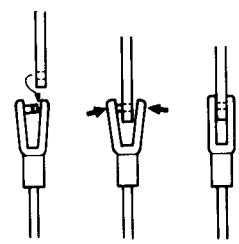
2-3 Rotor Head Linkage Assembly

- ❑ 1. Screw 2 universal links onto the 50mm flybar control arm pushrod.
- ❑ 2. Adjust the total length to 74mm ensuring that at least 5mm of rod is inside the universal links at both ends.
- ❑ 3. Screw a cranked quick-link (604) onto one end of a 25mm pushrod.
- ❑ 4. Screw a straight quick-link onto the 50mm flybar control arm pushrod, and adjust total length to 50mm ensuring that both quick-links are screwed on securely by the same amount.
- ❑ 5. Repeat steps 3 and 4 for the other 25mm pushrod.
- ❑ 6. Attach the 3 pushrods to the rotor head as per the diagram.
- ❑ 7. Attach the 2 universal link W to the rotor head as per the diagram.

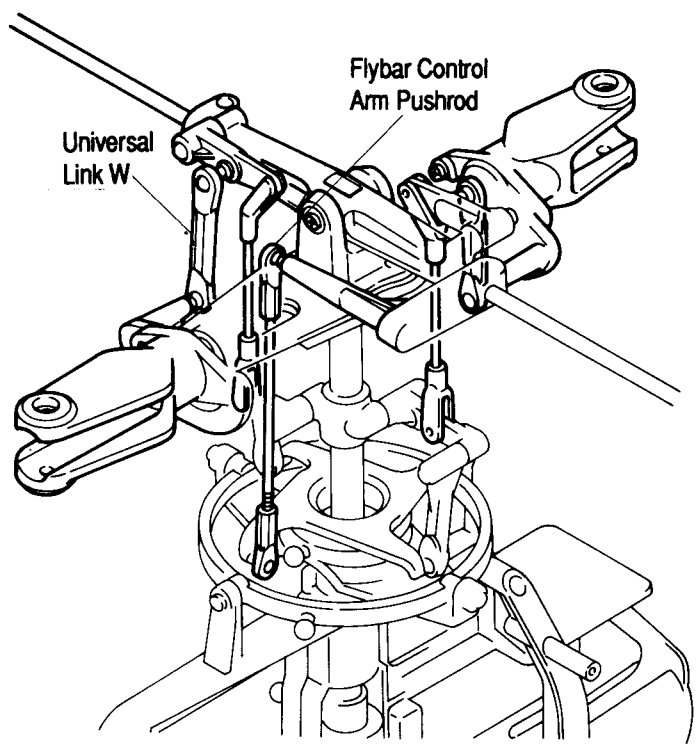
▲ Pay special attention to fitting the universal links.
The ball sockets of these links are handed and will accept the balls from one direction only. Do not try and force the balls into position on the links. Check that the universal links are facing in the correct direction. See diagram.







Note: Snap linkages on like this paying careful attention to the direction of the universal links



Screws and links required

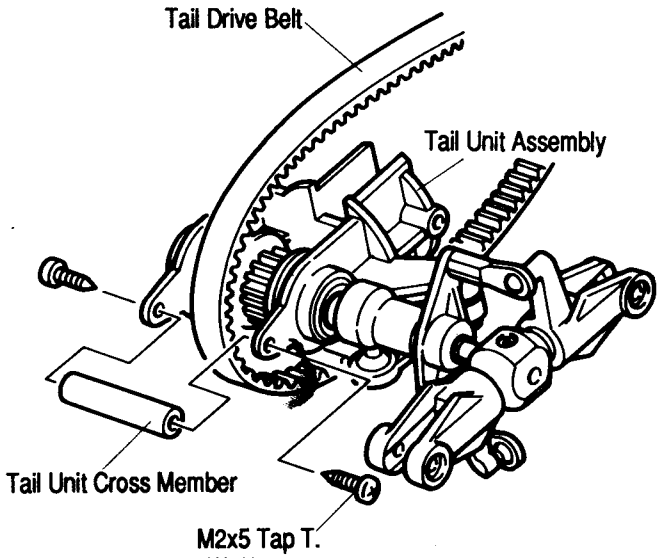
M2x5 TAP T. x3

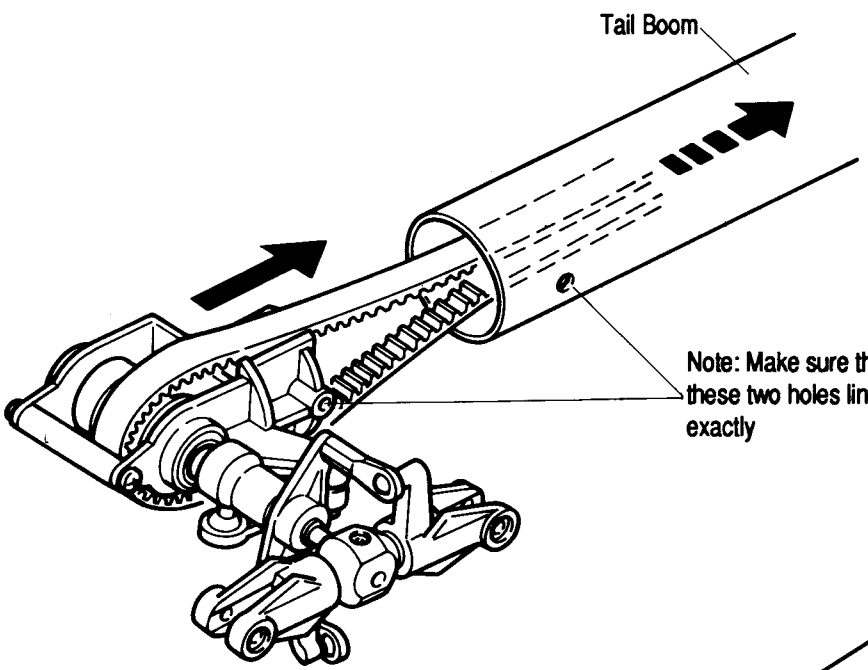
2-4.1 Tail Section Final Assembly

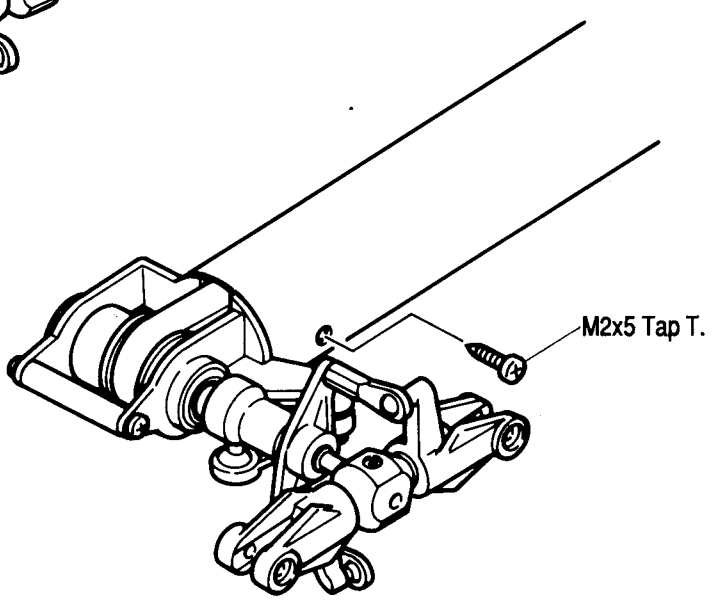
- ❑ 1. Slip the tail drive belt over the tail pulley, ensuring that the toothed side of the belt engages with the toothed pulley.
- ❑ 2. Attach tail unit cross member using 2 M2x5 tap tite screws.
- ❑ 3. Push the tail belt into the end of the tail boom, feeding carefully to ensure that it does not twist.

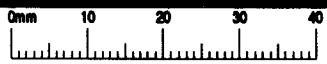
▲ Push the belt into the end of the boom that has two holes drilled into it.

- ❑ 4. Pull the tail belt out from the other end of the boom and sight down the centre of the boom to check that the belt is not twisted.
- ❑ 5. Attach the tail pulley unit assembly with one M2x5 tap tite screw.









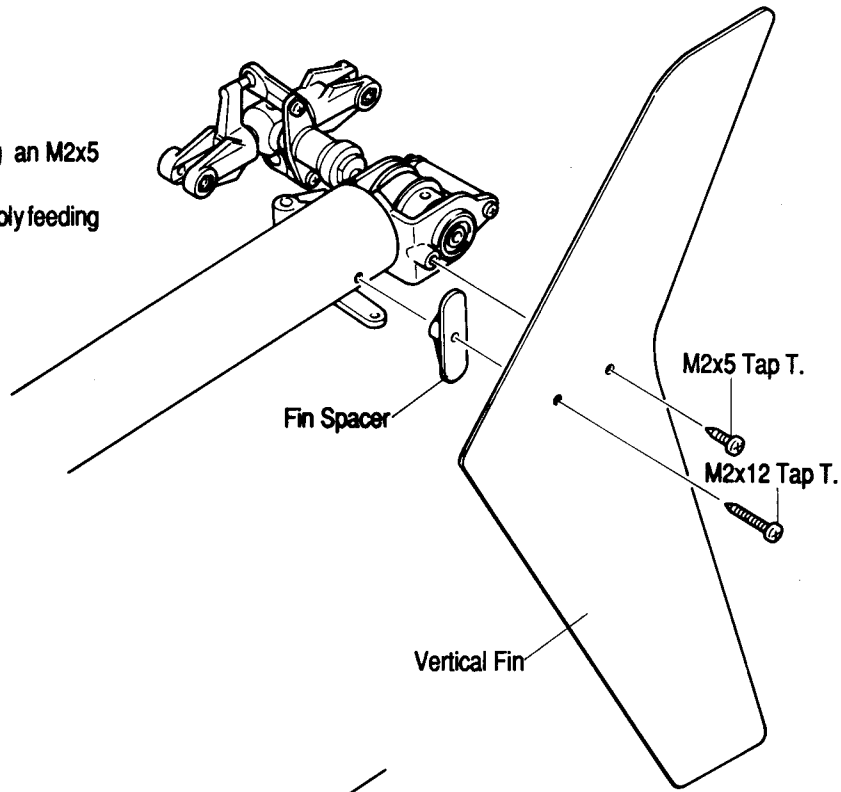
Screws and links required

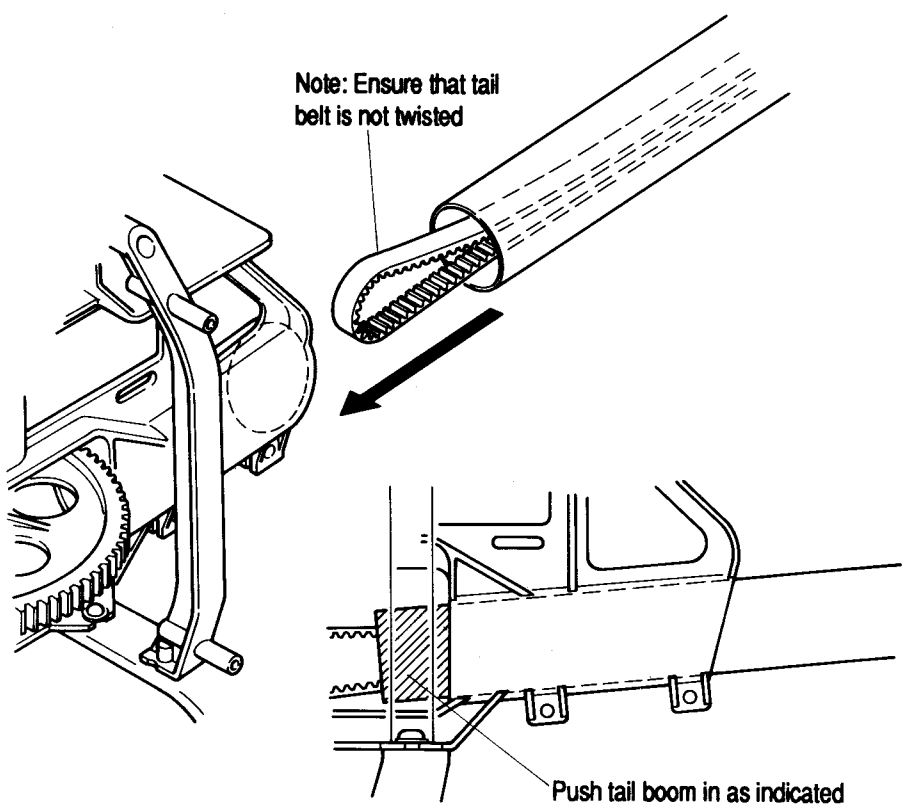
M2x12 TAP T. x1

M2x5 TAP T. x1

2-4.2 Tail Section Final Assembly

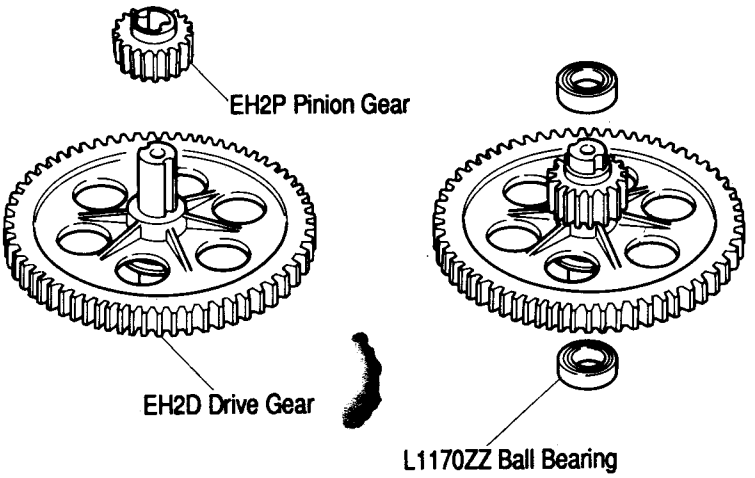
- ❑ 1. Attach fin spacer and vertical fin to the tail boom using an M2x5 tap tite and an M2x12 tap tite screw.
- ❑ 2. Slide the tail boom assembly into the main frame assembly feeding the tail belt carefully to ensure that it does not twist.

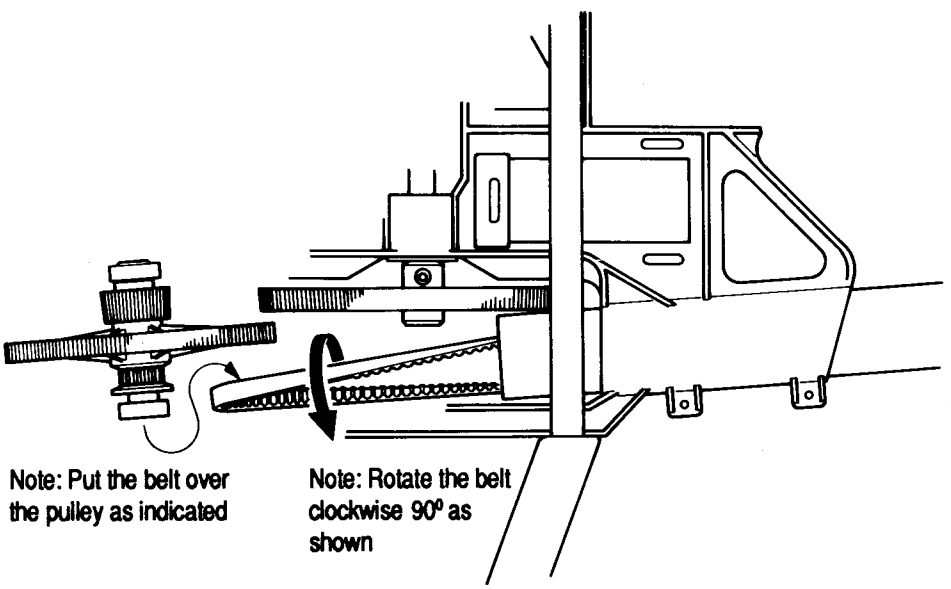




2-5.1 Drive Gear Installation

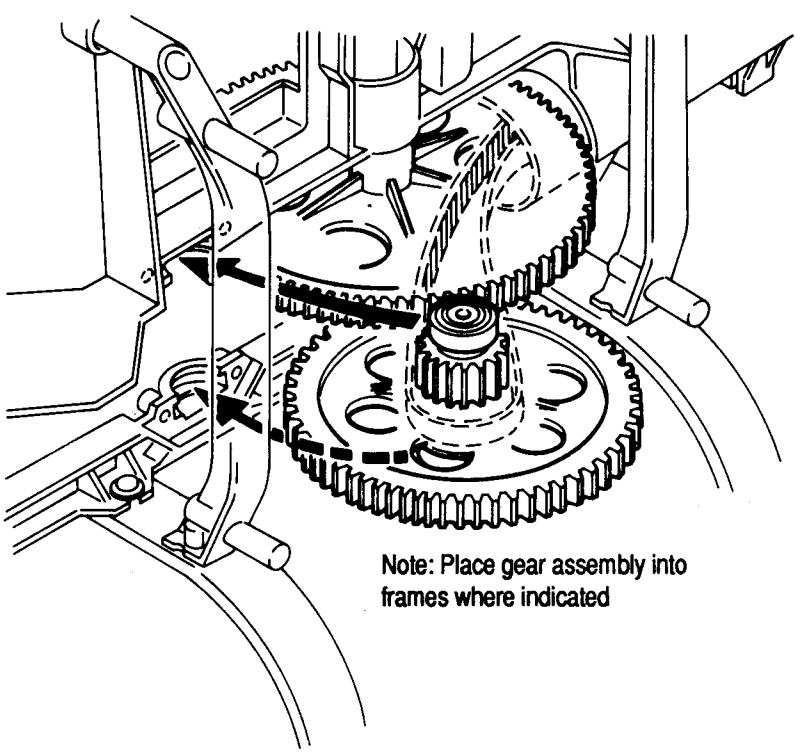
- ❑ 1. Push the plastic pinion gear (EH2P) onto the drive gear (EH2D), ensuring that the extended section of the pinion gear is uppermost.
- ❑ 2. Slide the two L1170 ball bearings onto the EH2P pinion gear and EH2D main gear.
- ❑ 3. Place a finger into the end of the tail drive belt, and rotate the belt by 90° clockwise as per the diagram.
- ❑ 4. Slip the belt over the toothed pulley and slot the gear assembly into position in the main frames.



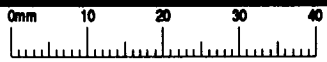


Note: Put the belt over the pulley as indicated

Note: Rotate the belt clockwise 90° as shown



Note: Place gear assembly into frames where indicated



Screws and links required

M2x6	TAP T.	x4
M2x8	CAP B.	x2
M2	N.N.	x2

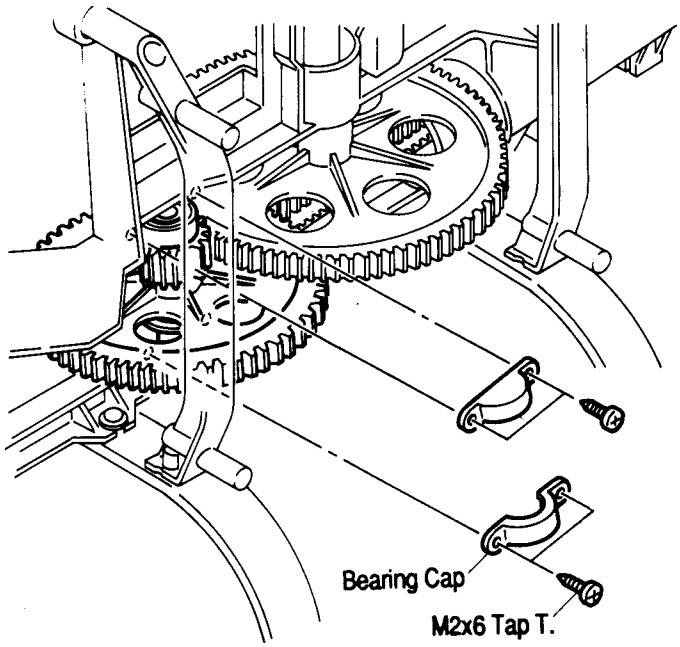
2-5.2 Drive Gear Installation

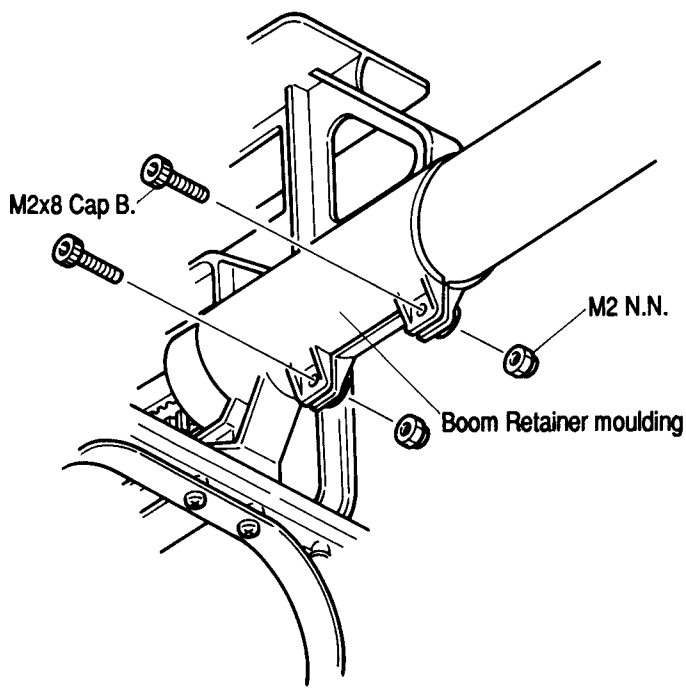
- ❑ 1. Using 4 M2x6 tap tite screws; screw the 2 plastic bearing caps into position over the L1170ZZ ball bearings.
- ❑ 2. Insert the 2 M2x8 boom retaining cap bolts and M2 nyloc nuts into position in the main frame, and tighten loosely so that the boom can still rotate.
- ❑ 3. Pull the boom out from the main frames until the vertical fin is parallel to the vertical line of the main shaft.
- ❑ 4. Lightly tension the belt by gently pulling on the tail boom, and at the same time tightening the boom retaining bolts.

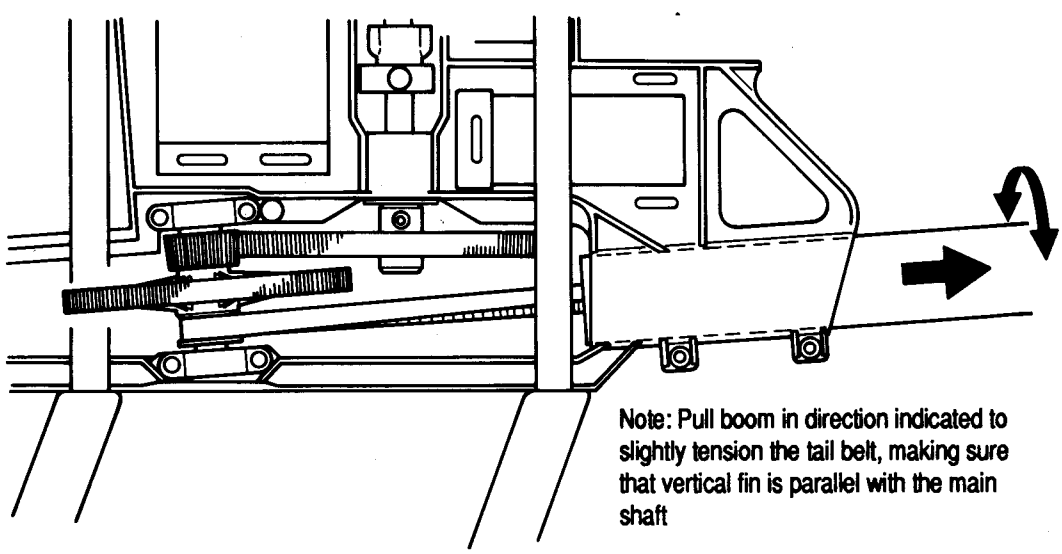
▲ Do not: (i) Overtighten the bolts or the retainer moulding will be damaged; the bolts are tight enough when rotation of the boom is not possible with gentle force.

(ii) Over-tension the tail drive belt. The belt should not be so tight that it twangs like a fully-tensioned guitar string ! The tension is correct when gentle pulling on the tail boom is met with slight resistance from the tensioned tail drive belt.

- ❑ 5. Check that the drive gear and tail rotor unit rotate freely with no binding or friction. If there is any friction then it usually means that the belt is too tight or perhaps twisted. Repeat the earlier steps to eliminate any problems if necessary.







Note: Pull boom in direction indicated to slightly tension the tail belt, making sure that vertical fin is parallel with the main shaft

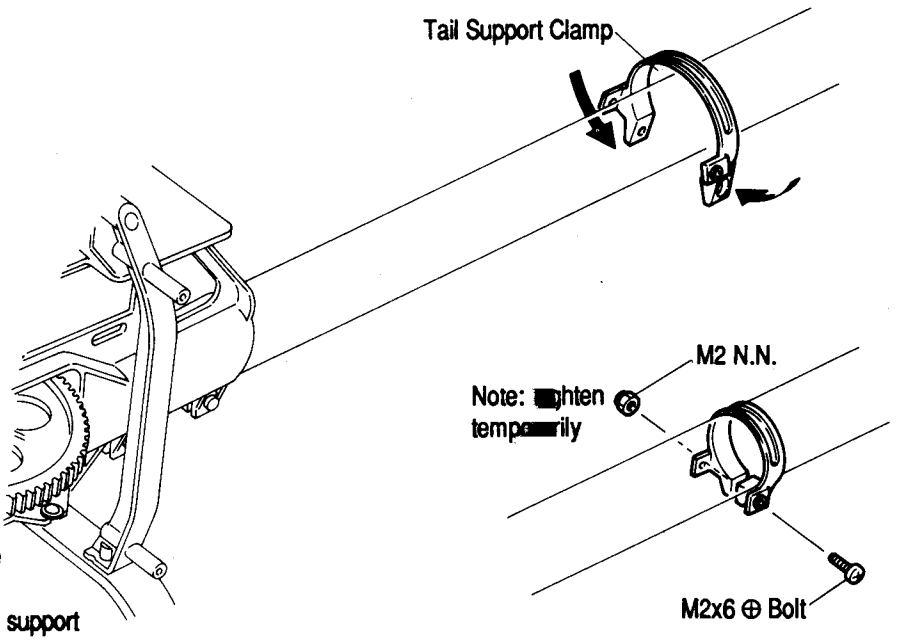
Screws and links required

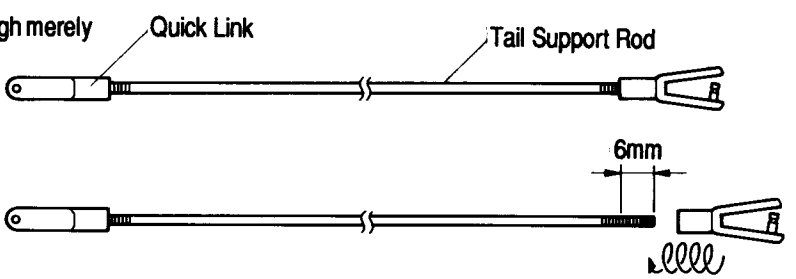
M2	N.N.	x1
M2x6	⊕ Bolt	x1

2-6 Boom Support Installation

- ❑ 1. Assemble quick-links onto the push-rods, making sure that at least 6mm of thread is screwed into each link.
- ❑ 2. Make sure that both rods with links attached are identical length.
- ❑ 3. Attach the tail support clamp temporarily to the boom using an M2x6 ⊕ bolt and M2 nyloc nut.
- ❑ 4. Snap the tail supports into position on the tail support clamp.
- ❑ 5. Snap the tail supports into position on the undercarriage cross brace.
- ❑ 6. Tighten the tail support clamp bolt.

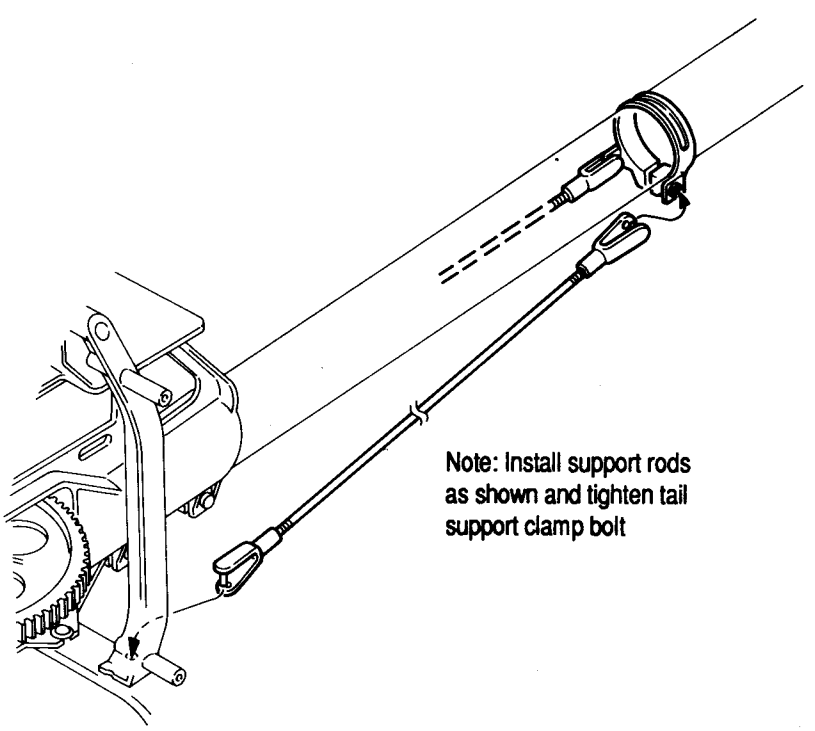
▲ Do not overtighten the clamp bolt. It must be tight enough merely to prevent rotation of the tail support clamp.



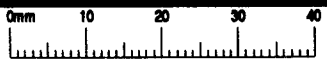


Note: Screw quick-link on by at least 6 mm

N.B.
Please read Important Additional Notes, Page 2.



Note: Install support rods as shown and tighten tail support clamp bolt



Screws and links required

M3x6	CAP B.	x2
M3	P.W.	x2
M3x3	SET B.	x1

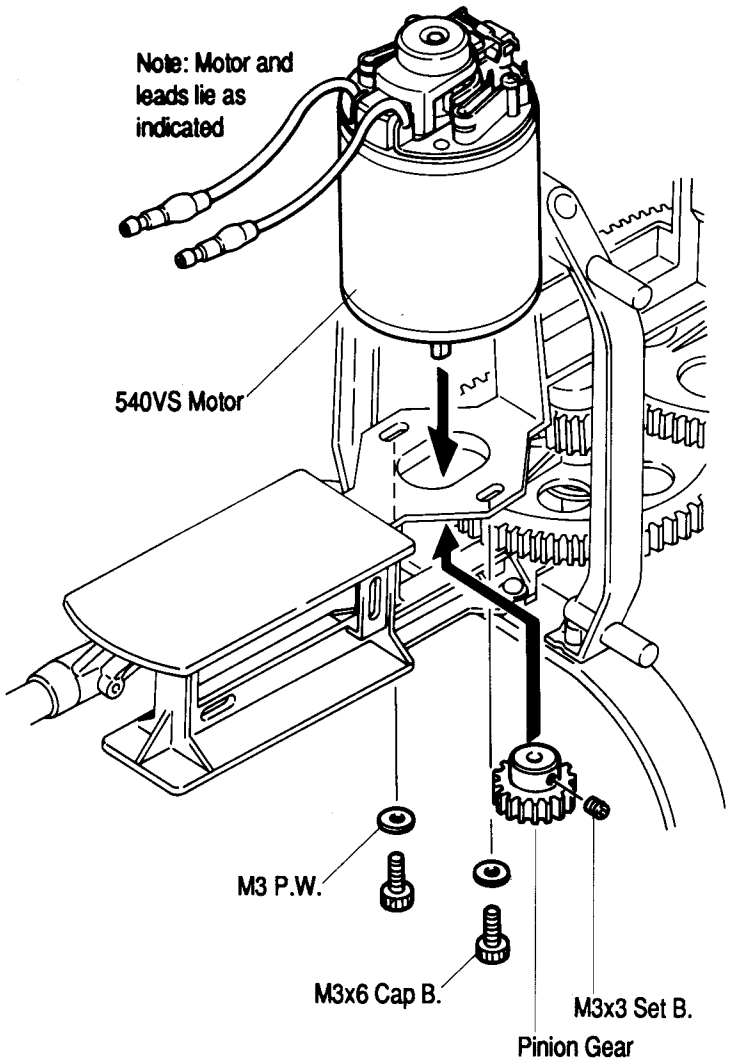
2-7 540VS Motor Installatio

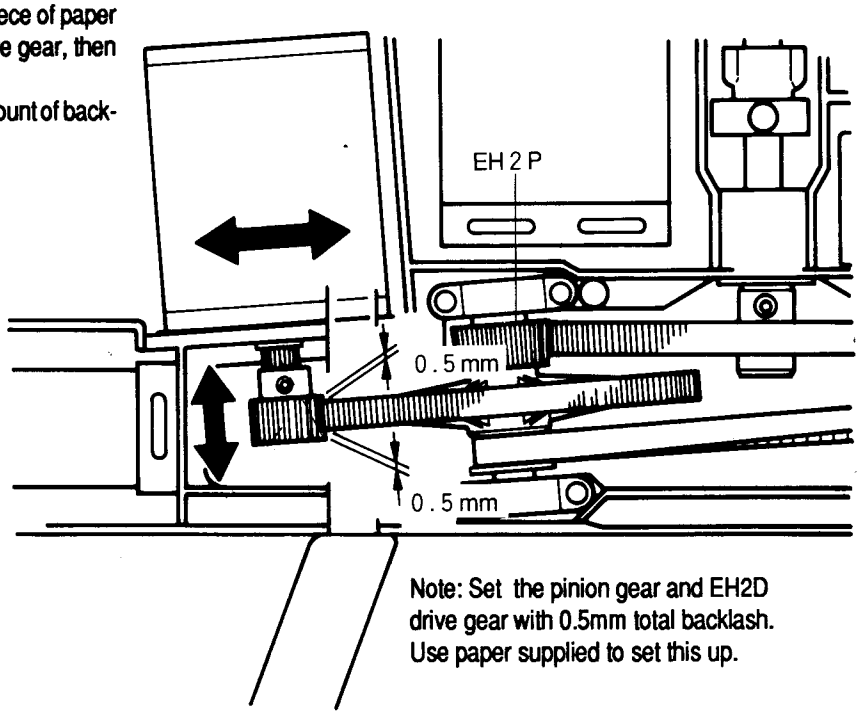
- ❑ 1. Slot the motor into its moulding in the main frame, paying careful attention to the direction of the motor wires.
- ❑ 2. Apply a small amount of threadlock to the M3x3 set bolt and screw it into the brass pinion gear.
- ❑ 3. Attach the pinion gear to the motor shaft, tightening the set bolt temporarily.

▲ There is a flat machined into the motor shaft. Ensure that the set bolt is positioned on this flat.

- ❑ 4. Apply a small amount of threadlock to the 2 M3x6 cap bolts and screw them and the 2 M3 plate washers temporarily into position through the frame motor mount plates into the motor front mounting plate.
- ❑ 5. Adjust the pinion set bolt and the 2 M3x6 cap bolts to achieve the correct meshing of the metal pinion gear to the plastic EH2D drive gear.

▲ The correct mesh is achieved when there exists 0.5mm back-lash between the 2 gears, and when the entire depth of the meshing teeth on the EH2D drive gear is meshed with the pinion gear. Adjust the motor mount bolts to achieve this. See diagram. Alternatively, obtain the correct mesh by slipping a piece of paper supplied between the pinion gear and the EH2D drive gear, then tightening the motor mount bolts. Remove the piece of paper and check that a small amount of back-lash is present between the two gears.



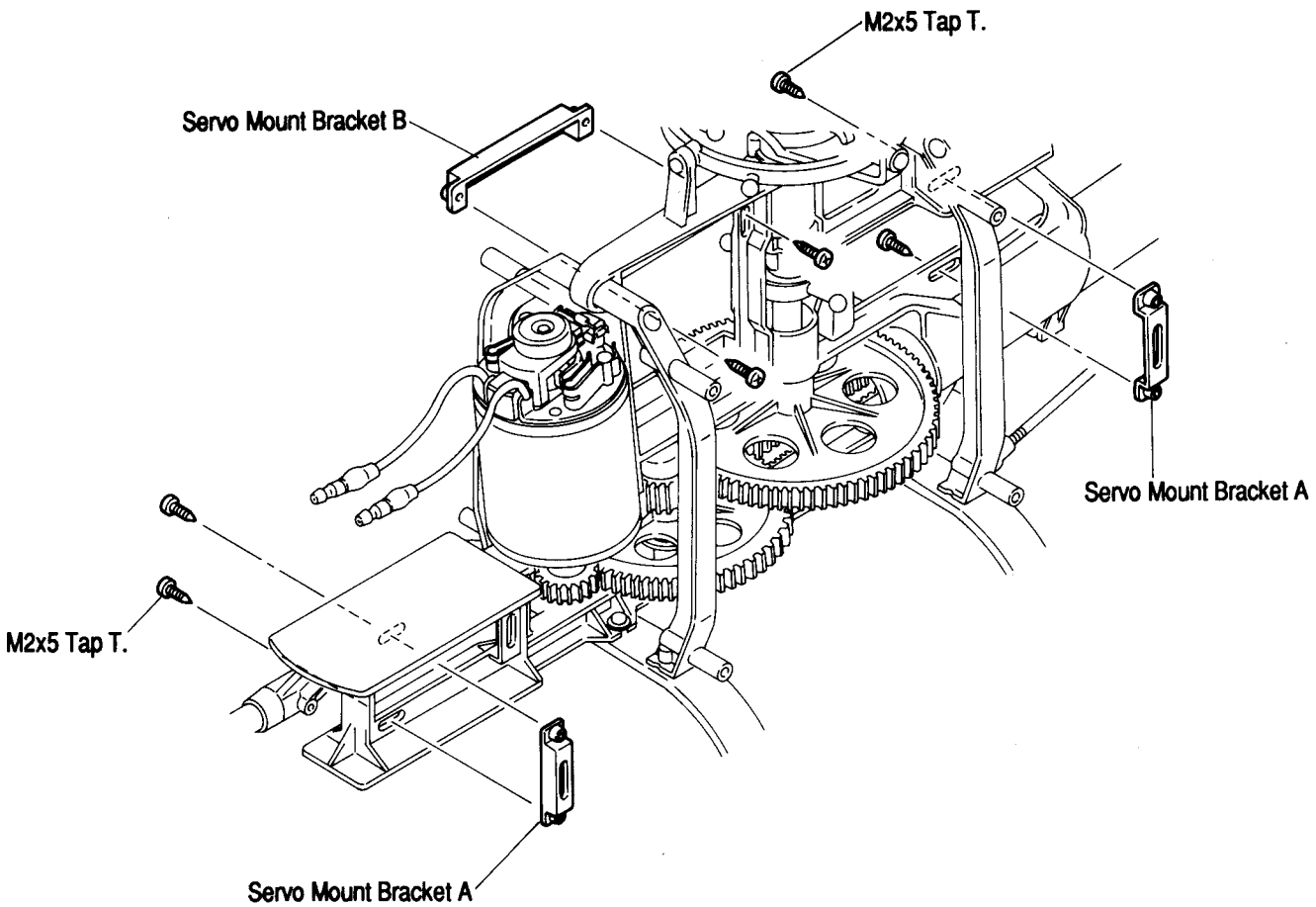


Note: Set the pinion gear and EH2D drive gear with 0.5mm total backlash. Use paper supplied to set this up.

Screws and links required		
M2x5	TAP T.	x6

2-8.1 Servo Bracket Installation

- ❑ 1. Using the six M2x5 tap tite screws, assemble the 3 servo mount brackets A and B onto the main frame as per the diagram.
- ❑ 2. Tighten screws temporarily.

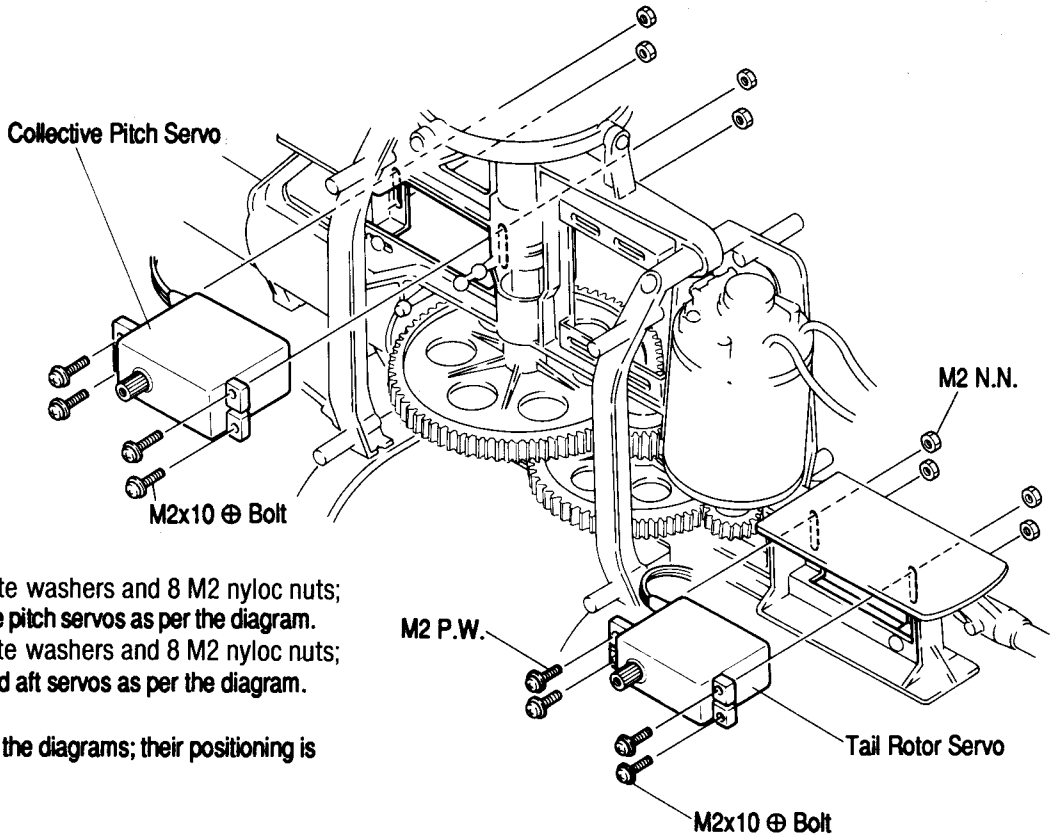


Screws and links required

M2 P.W. ⊕ Bolt x16

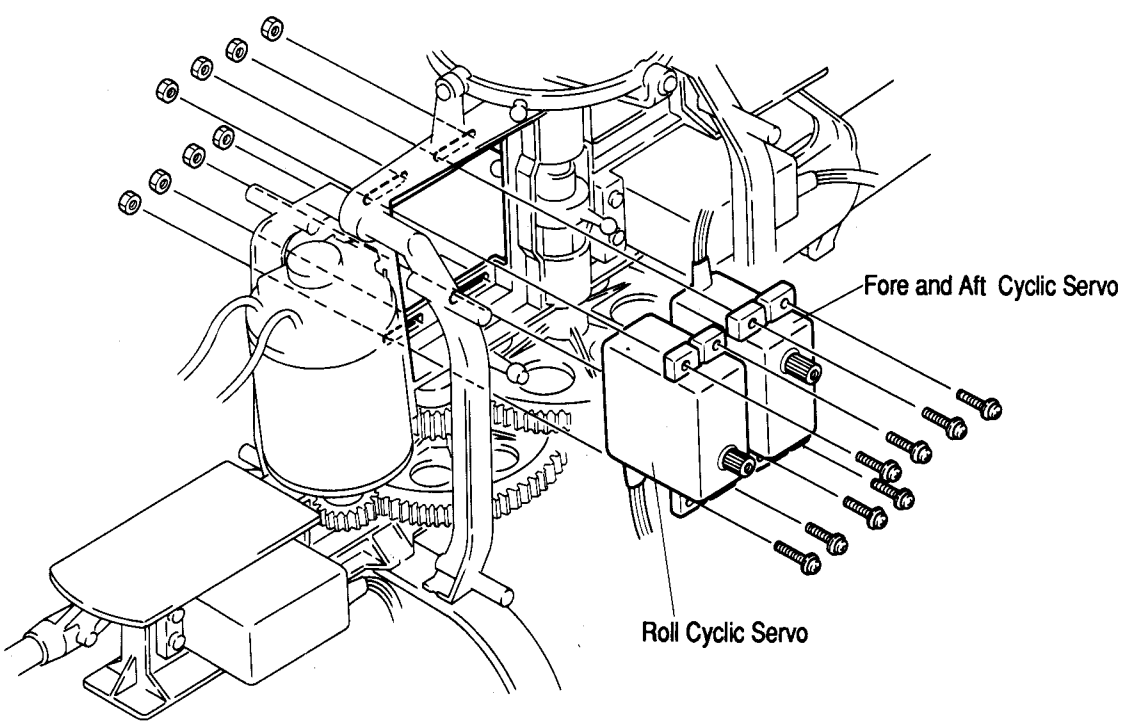
M2 N. x16

2-9 Servo Installation



- ❑ 1. Using 8 M2x10 bolts with plate washers and 8 M2 nyloc nuts; **install the tail rotor and collective pitch servos as per the diagram.**
- ❑ 2. Using 8 M2x10 bolts with plate washers and 8 M2 nyloc nuts; **install the roll cyclic and fore and aft servos as per the diagram.**

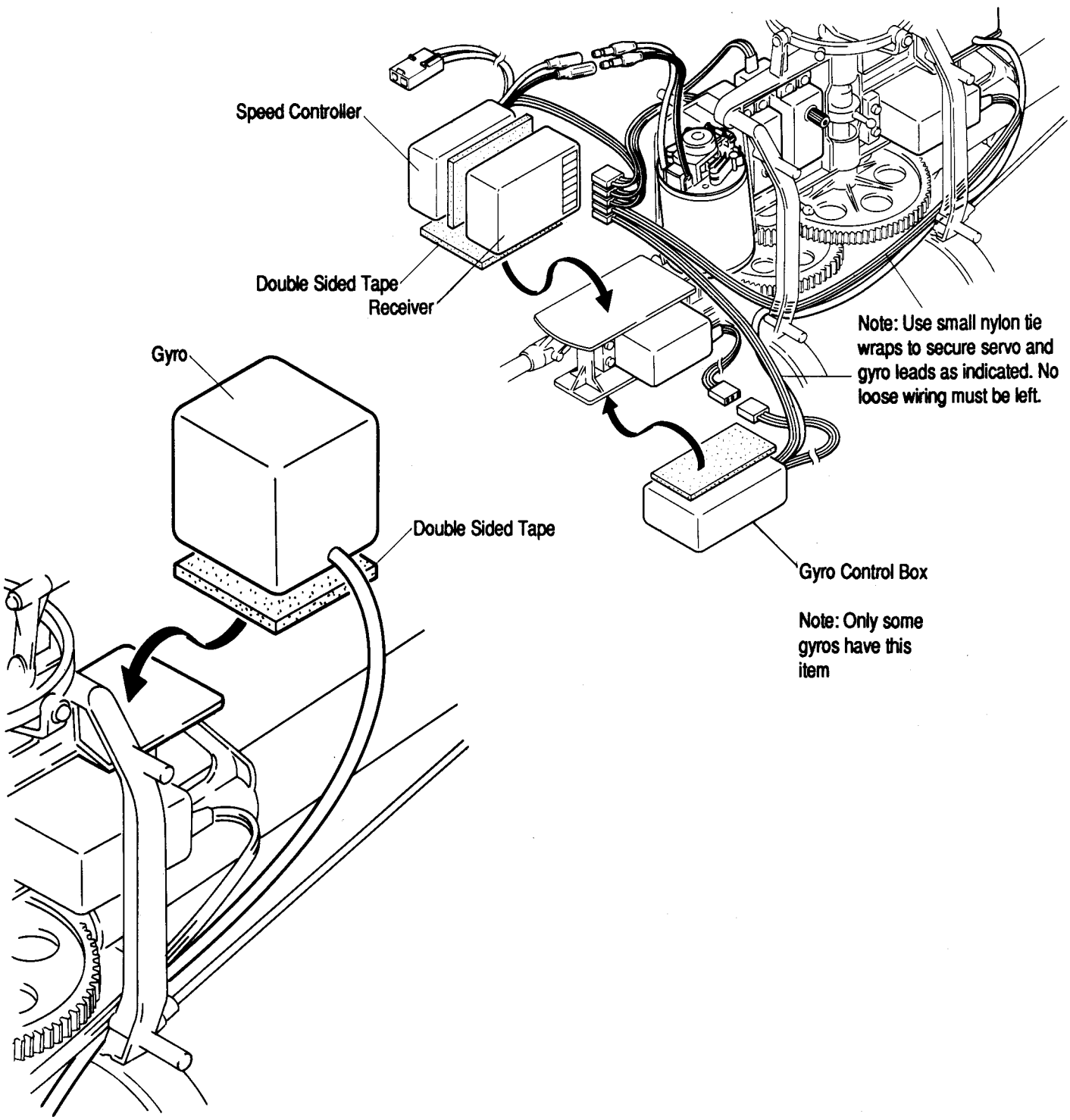
▲ **Install the servos exactly as per the diagrams; their positioning is most important.**

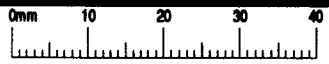


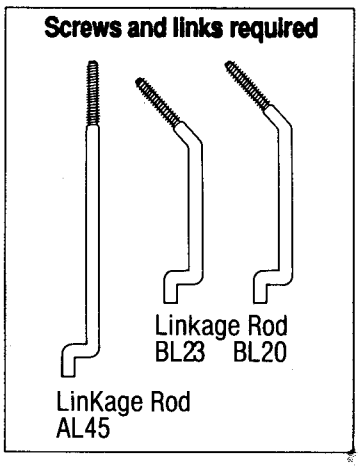
2-10 Receiver and Gyro Installation

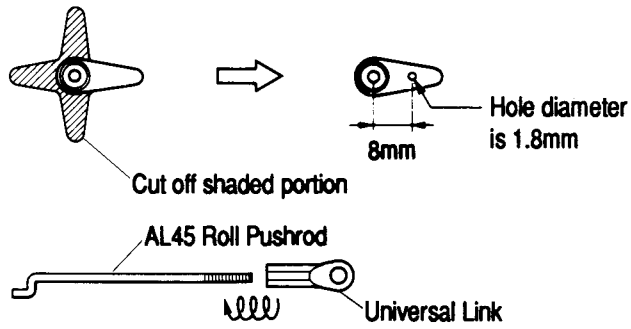
- ❑ 1. Using double sided tape; install the receiver, gyro control box (only supplied with some brands of gyro), and speed controller as per the diagram.
- ❑ 2. Connect the appropriate leads to their appropriate sockets in the receiver. See your R/C instruction manual for how to do this.
- ❑ 3. Connect the motor leads to the speed controller leads.
- ❑ 4. Install the gyro onto the gyro platform at the rear of the main frame assembly using double-sided tape.

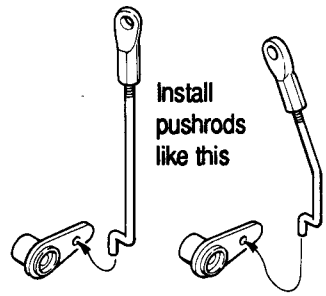
▲ Use small nylon tie wraps to secure servo and gyro leads as indicated. No loose wiring must be left.











2-11.1 Servo Pushrod Installation

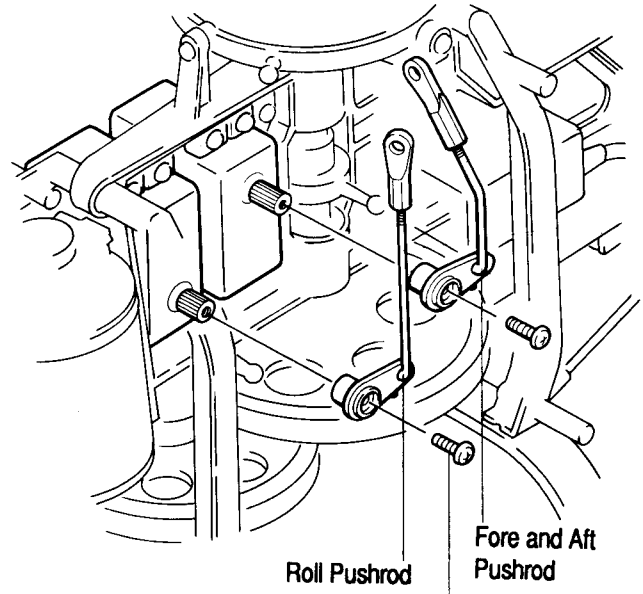
- ❑ 1. Cut off the shaded portions of the roll cyclic servo and the fore and aft cyclic servo as indicated.
- ❑ 2. Screw a universal link onto the AL45 pushrod and onto either of the 2 cranked pushrods depending on which is most suitable for the size of your fore and aft servo.

▲ Ensure that at least 5mm of the pushrod is screwed into the universal links in all cases.

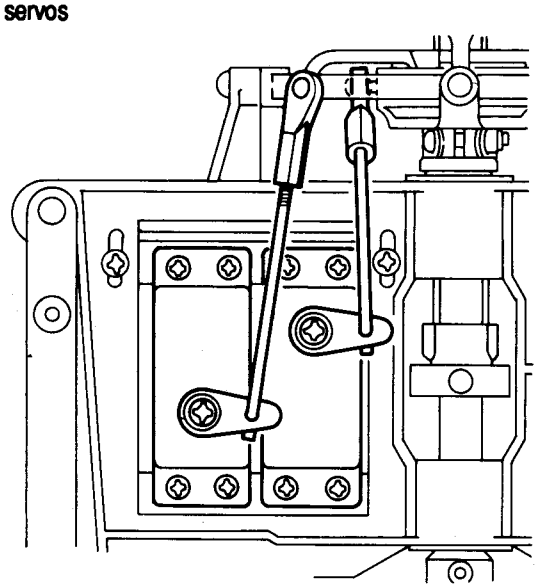
- ❑ 3. Push the cranked ends of the 2 pushrods into the holes in the 2 servo horns.

▲ Note that the servo horn hole accepting the pushrod should be 1.8mm, and that the distance of this hole from the centre of the horn should be approximately 8mm.

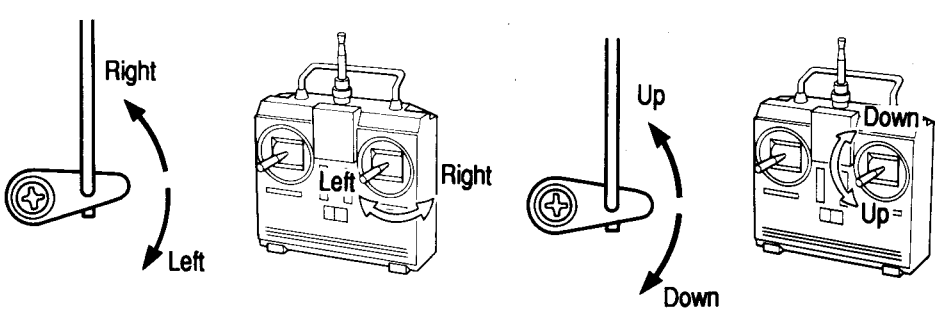
- ❑ 4. Screw the 2 servo horns and arms onto their respective servos.
- ❑ 5. Switch on the R/C system and make sure that the swashplate is horizontal when the servos are in their mid-stick (neutral) position. See diagrams.



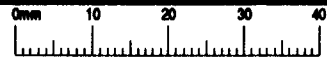
Note: Servo horn screws are supplied with servos



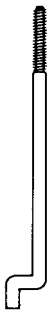
Note: Make sure that the swashplate is horizontal when the servos are in their mid-stick (neutral) position



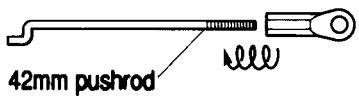
Roll cyclic servo direction | Transmitter stick movement | Fore and aft cyclic servo direction | Transmitter stick movement

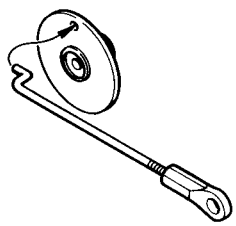


Screws and links required

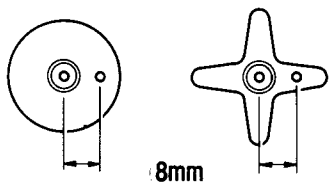


Linkage Rod AL42



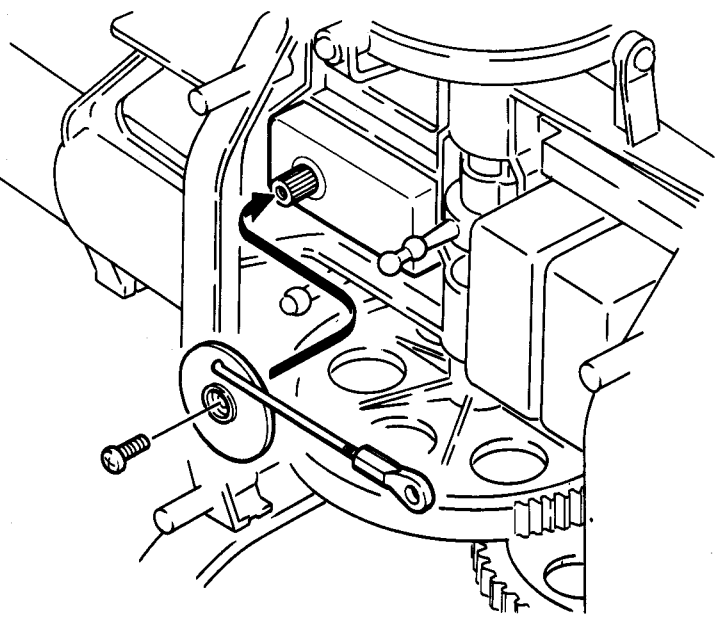


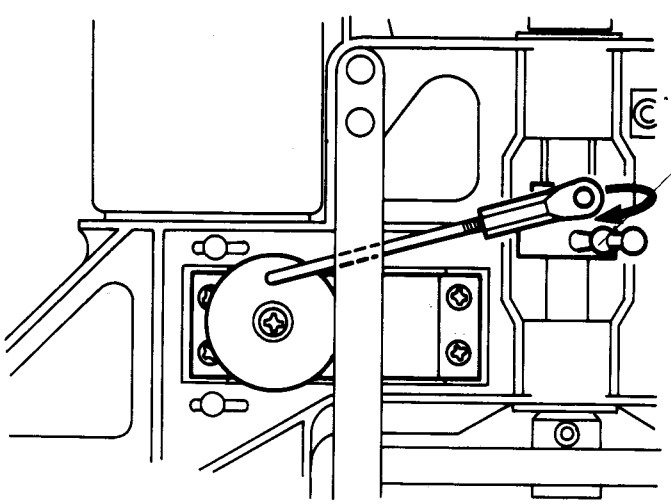
Note: Make the hole in the servo horn 1.8mm diameter



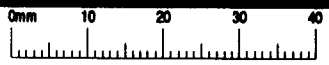
2-11.2 Servo Pushrod Installation

- ❑ 1. Attach a universal link to the 42mm pushrod.
- ❑ 2. Attach the pushrod to the collective pitch servo horn ensuring that the rod is mounted approximately 7-8mm out from the servo horn centre.
- ❑ 3. Push the cranked end of the pushrod into the hole in the servo horn.
- ❑ 4. Screw the servo horn onto the collective pitch servo.
- ❑ 5. Snap the universal link onto the *inner* slide ring ball as indicated.

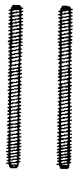




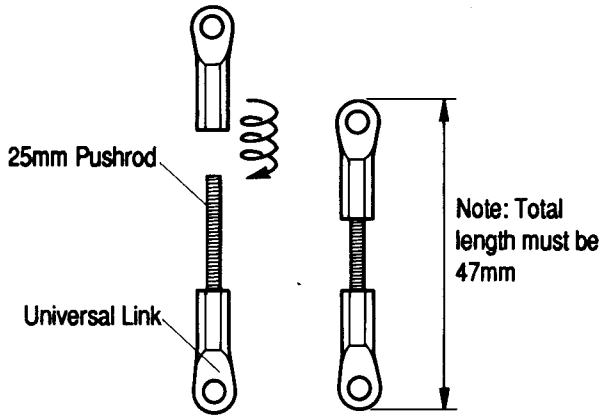
Note: Snap universal link onto *inner* ball of slide ring assembly



Screws and links required



Threaded Rod L25



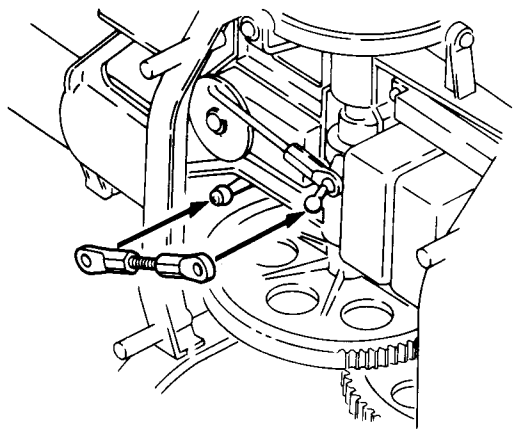
2-11.3 Servo Pushrod Installation

- ❑ 1. Attach a pair of universal links to each of the 2 25mm pushrods.
- ❑ 2. Screw a universal link onto the AL45 pushrod and onto either of the 2 cranked pushrods depending on which is most suitable for the size of your fore and aft servo.

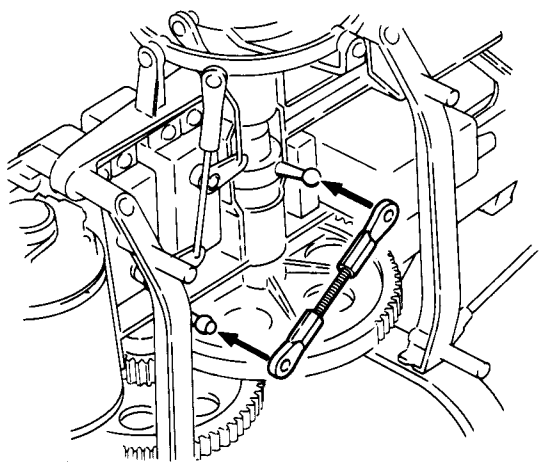
▲ Ensure that these pushrods are identical in length down to the last half turn. If they are different in length then the collective pitch mechanism will bind up.

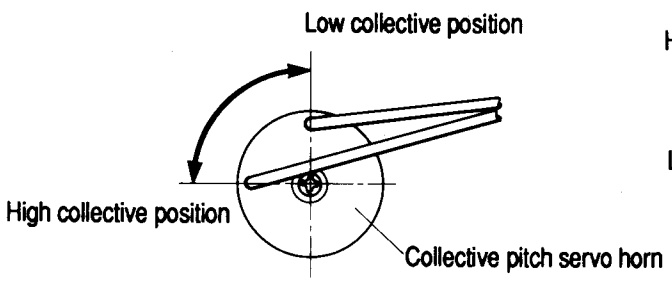
- ❑ 3. Snap the 2 pushrods into position on the slide ring assembly and main frame joint balls as per the diagram.
- ❑ 4. Temporarily disconnect the collective servo horn from the servo, and check by operating the pushrod manually that the slide ring assembly moves smoothly up and down the shaft with no stickiness or binding. If any binding is detected then alter the length of one of the 25mm pushrod units by a half turn and try again. Experiment with these rods in this fashion until the slide ring assembly operates as smoothly as silk.
- ❑ 5. Reconnect the collective pitch horn to the collective servo.
- ❑ 6. Switch on the transmitter and receiver and set up the collective pitch servo travel as per the diagram.

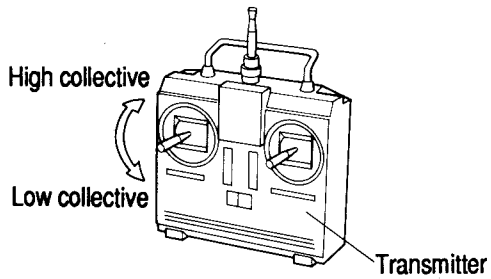
▲ You will notice that the collective servo travel is non-linear, and that there is relatively little slide ring movement from the half-stick position to the full throttle position. *This is a vital requirement for this helicopter.*



Note: Snap the 2 pushrod assemblies onto the slide ring assembly and balls as indicated

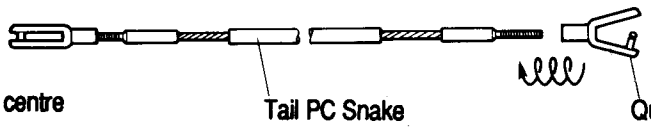


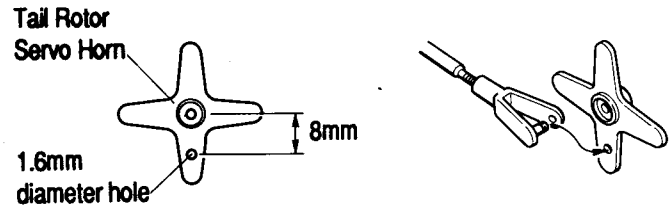


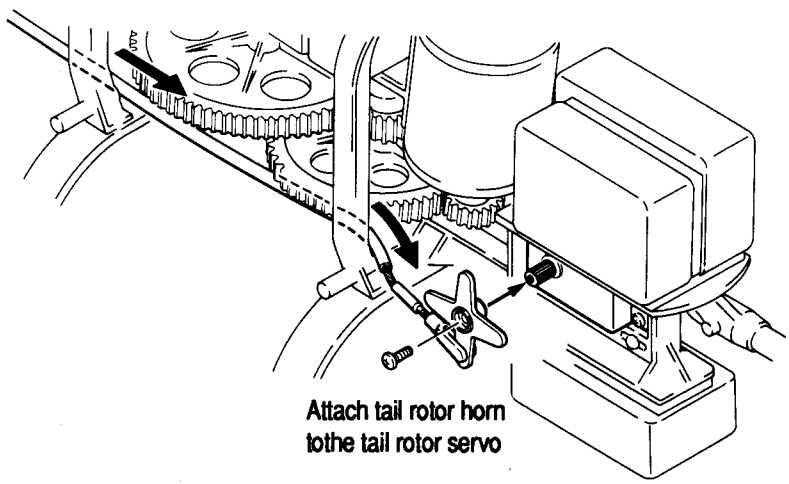


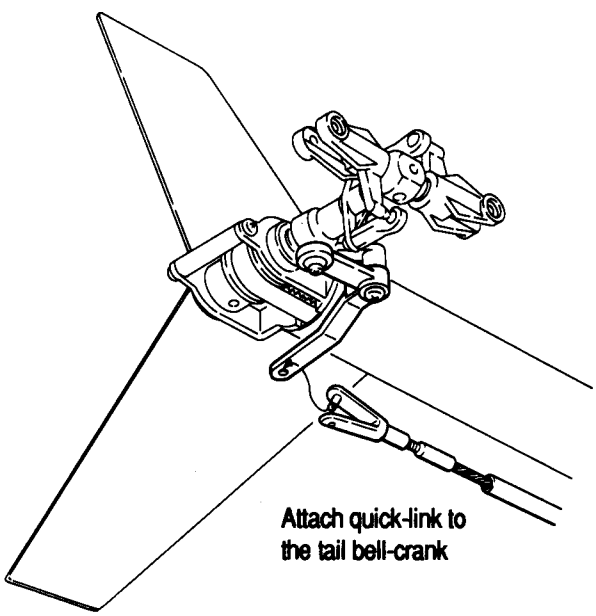
2-11.4 Servo Pushrod Installation

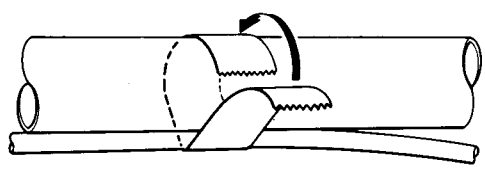
- ❑ 1. Attach 2 quick-links to the tail PC snake.
- ❑ 2. Drill a 1.6mm hole approximately 8mm outboard from the centre in the tail rotor servo horn.
- ❑ 3. Route the snake through the frame assembly as indicated.
- ❑ 4. Attach the servo end quick-link to the tail rotor servo horn and attach the horn to the servo.
- ❑ 5. Attach the tail end quick-link to the tail bell-crank.
- ❑ 6. Attach the snake to the boom -ensuring that the routing of the snake is as straight as possible- using vinyl tape in several places to support the snake over its length.
- ❑ 7. Check that the tail pitch change mechanism operates freely and smoothly with no binding.
  To do this; disconnect the quick-link from the servo end and manually operate the tail system. There must be no binding, and the system should operate like the collective mechanism, -as smooth as silk.
  If you can detect any binding then check that the snake is straight and that no more than 3 pieces of vinyl tape have been used to support it.
- ❑ 8. Reconnect the tail quick-link.





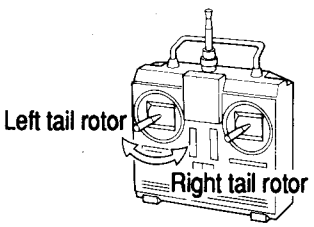


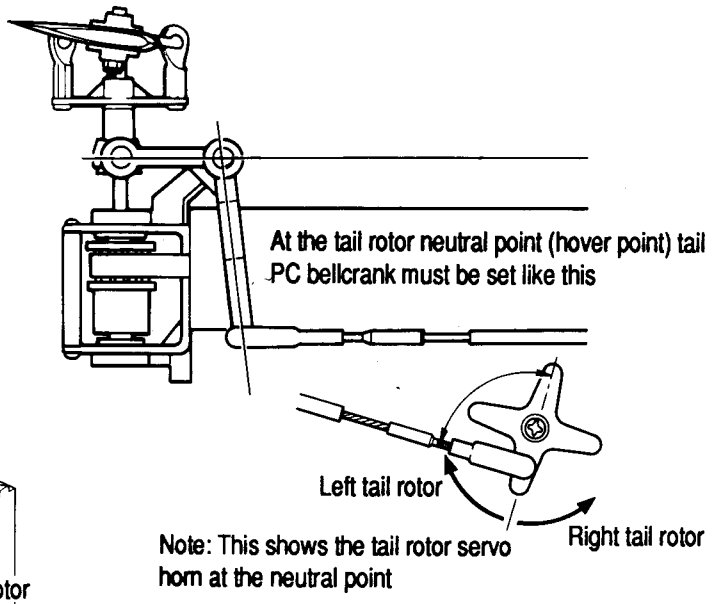




2-11.4 (cont) Servo Pushrod Installation

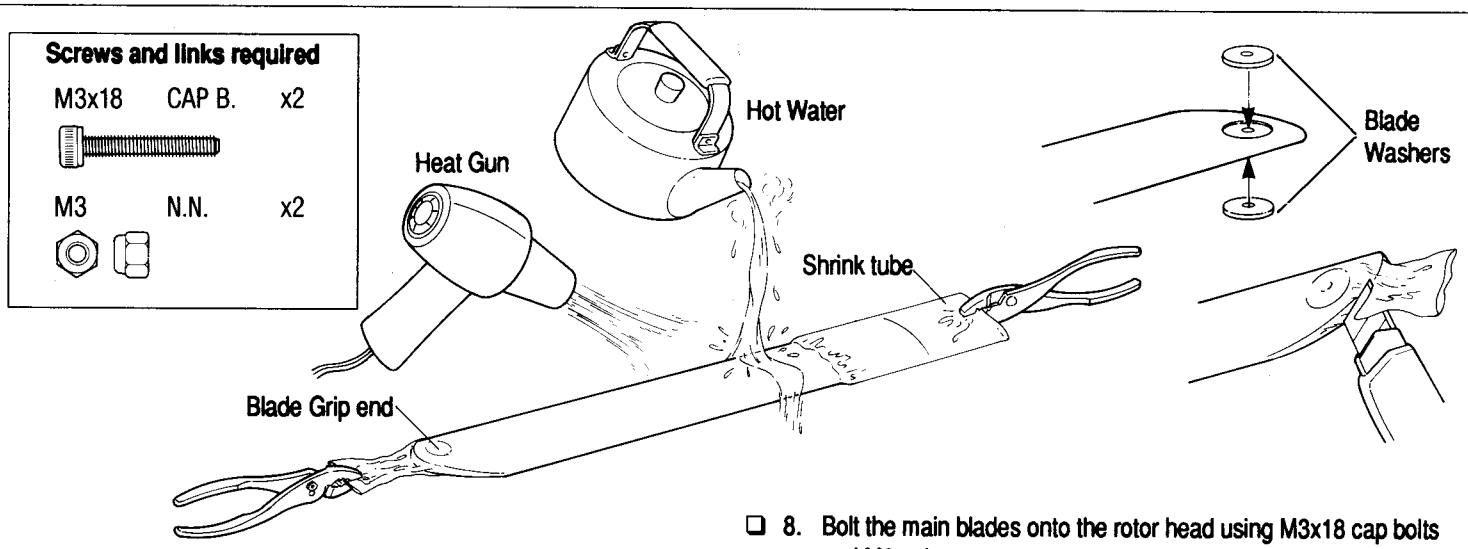
- ❑ 1. Switch on the transmitter and receiver and and set up the tail rotor servo neutral position as per the diagram.
- ❑ 2. Adjust the length of the tail PC snake so that at the tail rotor neutral position (at the hover-point) the tail PC bell-crank is set as per the diagram.
- ▲ See *cyclic phasing and tail rotor adjustment* later in this manual for a fuller explanation of these terms.





Screws and links required

M3x18	CAP B.	x2
M3	N.N.	x2



2-12.1 Blade Fitting and Installation

- ❑ 1. Lightly sand each rotor blade with 220 grit sandpaper, and remove all dust.
- ❑ 2. Clean the 2 metal root reinforcement washers thoroughly with sandpaper and alcohol.
- ❑ 3. Attach the blade washers to the main rotor blade roots as per the diagram using epoxy resin adhesive.

- ▲ Make sure that epoxy coats all the internal surfaces of the blade washers *except* inside the 3mm bolt hole through the centre of the washers.

- ❑ 4. Cut the shrink tube in half. Slide a main rotor blade into one of the 2 pieces of shrink wrap and centre the blade.
- ❑ 5. Whilst pulling on each end of the shrink wrap, begin heating with a heat gun or hot water from the middle and working to each end. Rotate frequently to ensure uniform shrinkage.

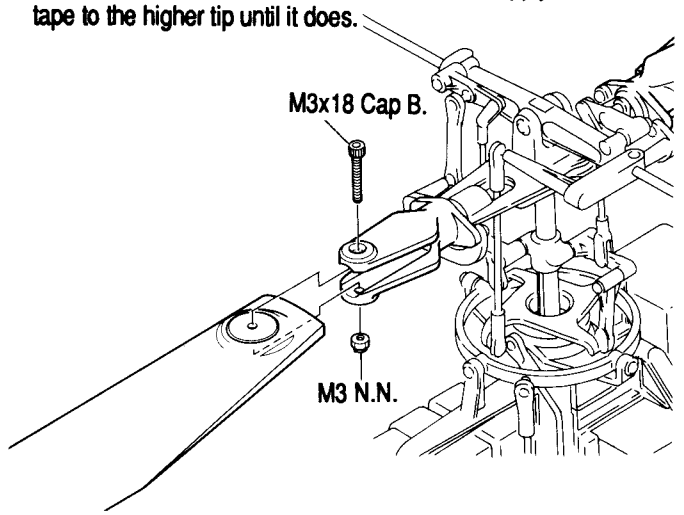
- ▲ You will find that rotating the blade grip end of the heat shrink will allow the heat shrink to conform to the taper of the blade root area.

- ❑ 6. Once shrinking is complete; trim the excess shrink tube from each end using a modellers knife. Seal both ends of the rotor blade with cyanoacrylate.
- ❑ 7. Repeat steps 1 through 6 for the other rotor blade.

- ❑ 8. Bolt the main blades onto the rotor head using M3x18 cap bolts and M3 nyloc nuts.

- ▲ Do *not* overtighten the main blades; they must be free to move in flight. The rotor head rotates clockwise when viewed from above; please ensure that the blades are fitted correctly as per the diagram.

- ❑ 9. Check the balance of the blades by removing the rotor head and blade assembly and supporting the head on blocks by the flybar; check to see that the head and blade assembly balances perfectly level. If it does not balance level, then apply tape to the higher tip until it does.



Screws and links required

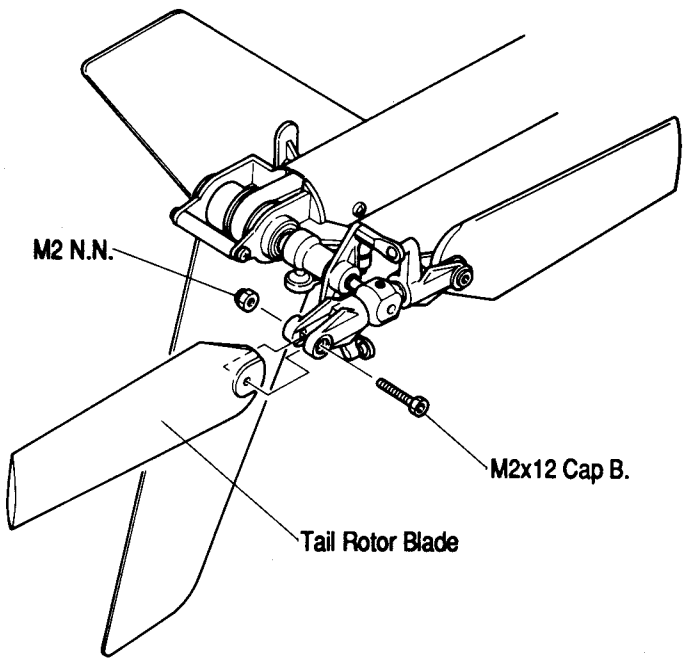
M2x12 CAP B. x2

M2 N.N. x2

2-12.2 Blade Fitting and Installation

❑ 1. Attach the tail blades to the tail grips using 2 M2x12 cap bolts and 2 M2 nyloc nuts.

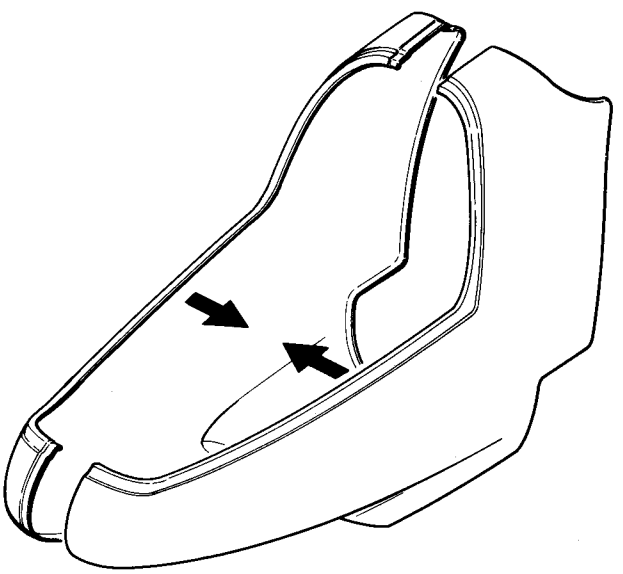
▲ Do not overtighten; the blades must be free to move in flight.

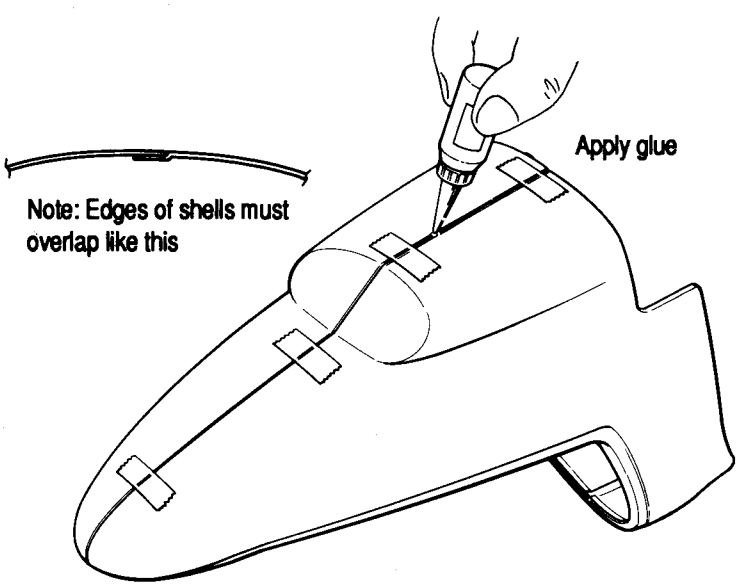


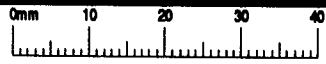
2-13.1 Body Assembly and Installation

❑ 1. Join temporarily the 2 halves of the body shell together with tape, ensuring that the edges overlap as per the diagram.

❑ 2. Using canopy cement or cyanoacrylate, run a thin film of it into the body shell joint.

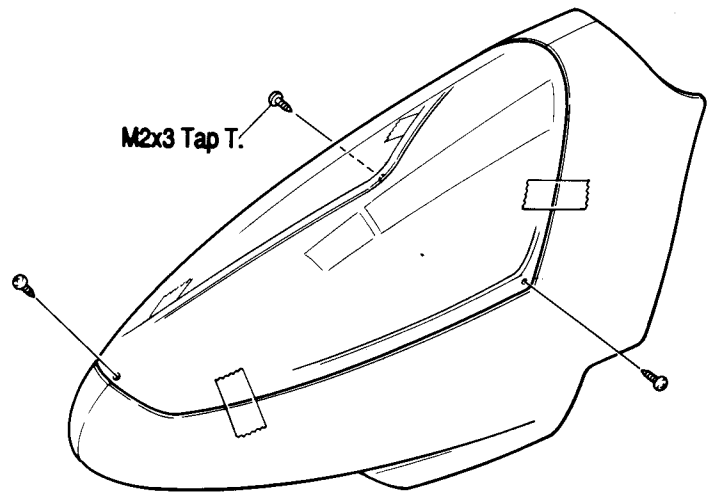






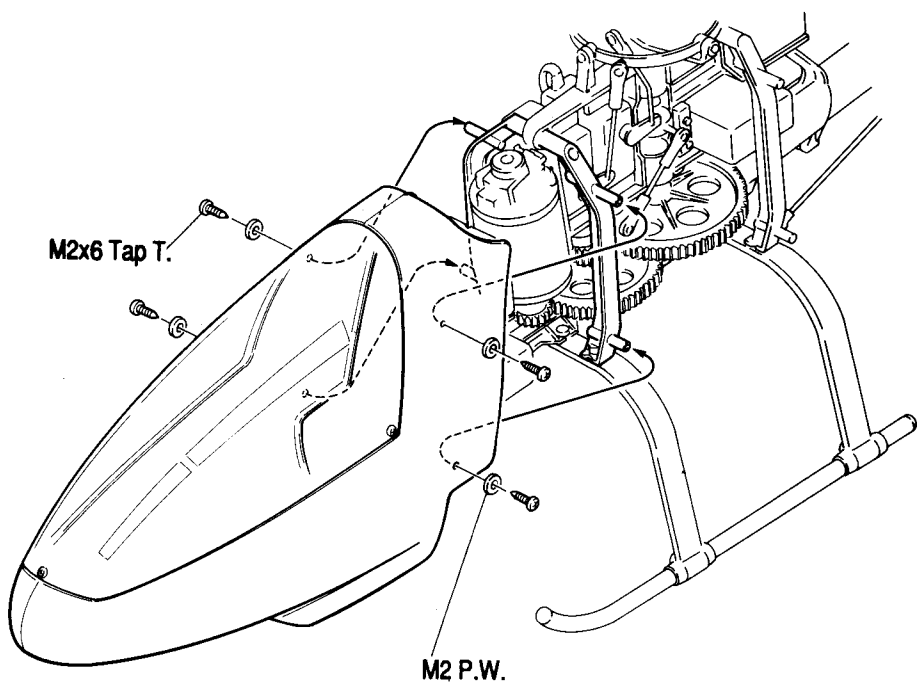
Screws and links required

M2x6	TAP T.	x4
M2x3	TAP T.	x3
M2	P.W.	x4



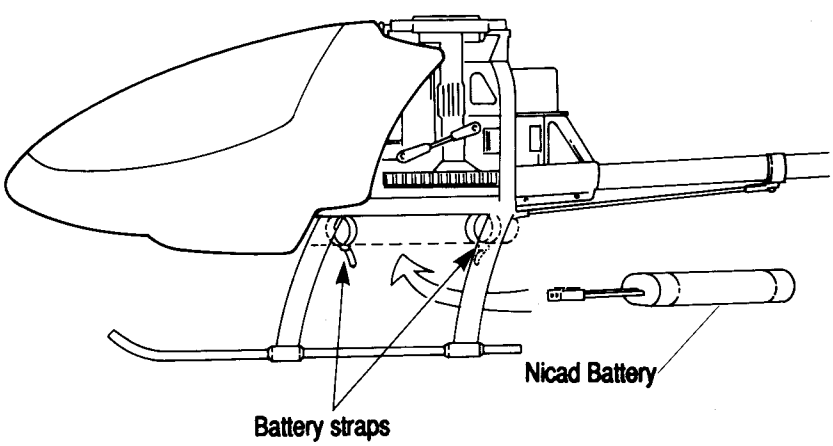
2-13.2 Body Assembly and Installation

- ❑ 1. Attach the canopy to the body using tape.
- ❑ 2. Carefully make 3 2mm diameter holes in the canopy through which the M2x3 canopy retaining screws will pass.
- ❑ 3. Carefully make 3 1.7mm diameter holes in the body. See diagram.
- ❑ 4. Attach the canopy using 3 M2x3 tap tite screws.
- ❑ 5. Attach the body to the helicopter using 4 M2x6 tap tite screws and 4 M2 plate washers.

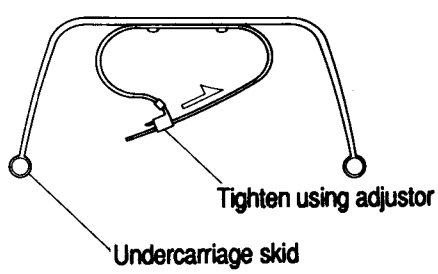


Nicad Battery Charging and Installation

- Charge Battery for 14 hours using the Kalt Whisper slow charger.
- If Battery becomes hot during the charging cycle using the slow charger then it must be disconnected immediately.
- After charging is complete, then disconnect the charger and un-plug the battery.
- A red light indicates that the battery is charging.
- After charging is complete make sure that the power switch on your Whisper is in the *off* position.
- Connect the battery in the manner illustrated below.
- Kalt also produce a quick charger that runs from a 12 volt car battery or equivalent and will fast charge the battery in approximately 30 minutes.
- After completing a flight it is best to discharge the battery completely.
- Never try to discharge the battery with it fitted in the helicopter and connected to the speed controller.
- Special discharging resistors for fully and safely flattening the nicad pack are available from your model shop.



Positioning the nicad battery



Undercarriage view

Pre-Flight Checks

Please follow these steps in sequence:

- ❑ 1. Make sure all screws are tight.
- ❑ 2. Make sure that all connections are secure.
- ❑ 3. Make sure that swashplate, slide ring assembly, and tail slide ring all move smoothly.
- ❑ 4. Check gear back-lash.
- ❑ 5. Check direction of rotation of tail rotor.

Switching on

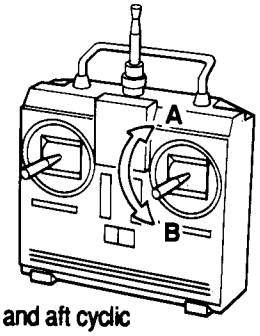
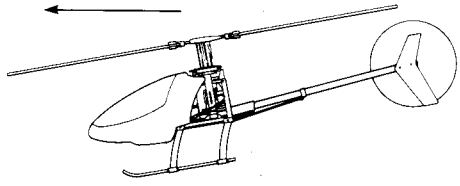
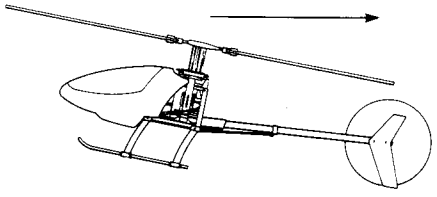
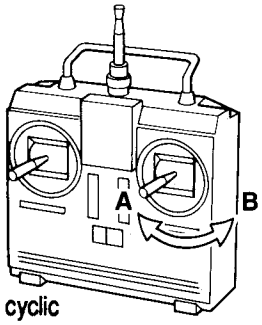
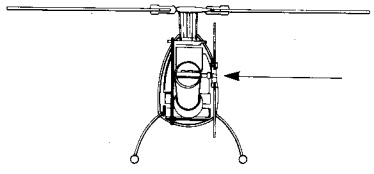
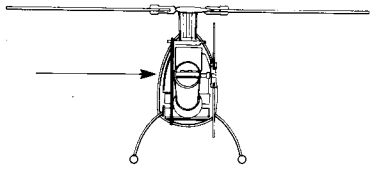
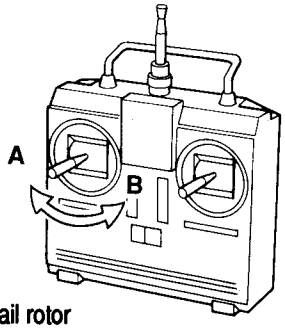
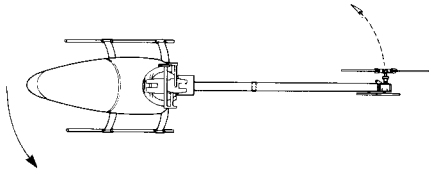
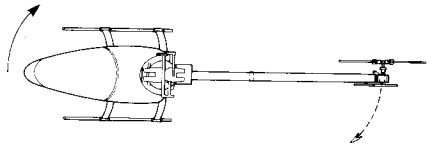
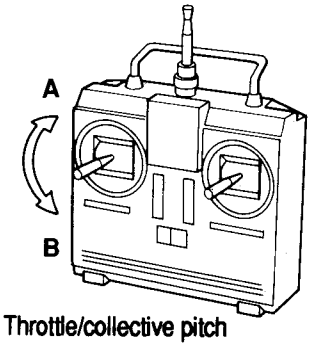
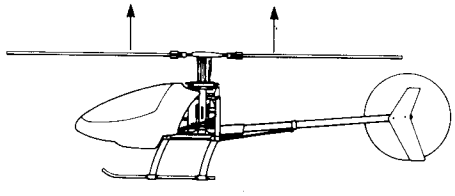
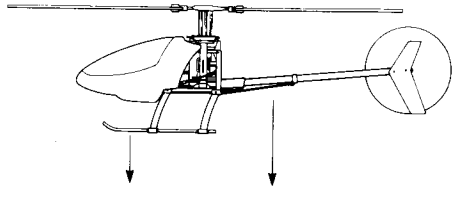
- ❑ 1. Check that battery has been charged.
- ❑ 2. Check that transmitter battery is charged.
- ❑ 3. Check that idle-up is switched off.
- ❑ 3. Check that the throttle/collective stick is in the low position.
- ❑ 4. Turn the transmitter power switch to the on position.
- ❑ 5. Turn the helicopter power switch to the on position.
- ❑ 6. Check that all servos operate correctly in the correct sense.
- ❑ 7. Then -and only then push the start button on the helicopter.
- ❑ 8. After flying, turn off power switch on the helicopter.
- ❑ 9. Turn off the transmitter power switch.
- ❑ 10. Disconnect the nicad battery from the helicopter.

Whisper Flying -Vital Cautionary Notes

- Make sure before switching on the transmitter that the throttle stick is in the low position.
- Make sure that the transmitter is switched on before switching on the power in the helicopter.
- Make sure in the event of an accident or tip-over that the throttle is reduced *immediately;* otherwise the motor and speed controller may be irreparably damaged.
- Make sure that before attempting circuit flight or aerobatics *-only attempt this if you are an experienced pilot-* that you carefully monitor the amount of flying time that you get per charge by hovering the helicopter in one place for a complete charge .
- If you are flying aerobatics your flying time will be reduced.
- Make sure that when you land at the end of your flying session that you turn off the power in the helicopter *before* you switch off the transmitter.
- The Whisper is a very quiet helicopter, and it is very easy to accidentally fly the helicopter closer to people than is safe. So make sure that you or any people in the vicinity do not inadvertently approach the helicopter and the potentially dangerous rotating blades in flight.
- Always keep the helicopter at least 5 metres away from you in flight.
- If you are not flying the helicopter, always disconnect the battery and remove it from the helicopter.
- If you are not flying the helicopter, always take off the main rotor blades. The rotor head is a very precise and critical piece of equipment and blades if accidentally knocked can damage the head.
- The flying time of the Whisper varies according to the mechanical condition of the helicopter, the weight of the helicopter and on-board equipment, the type of flying style adopted by the pilot, as well as many other factors. Aerobatic flying considerably reduces the duration of flight. For general flying however, we have found in tests that flight times of up to seven minutes are possible.
- Make sure that if you have to land the helicopter because the battery is nearly discharged, that you immediately switch off the helicopter. This will ensure that your servos and receiver will always be under full command from the transmitter.

Transmitter Lay-out and Control Function

Mode 1 controls illustrated.

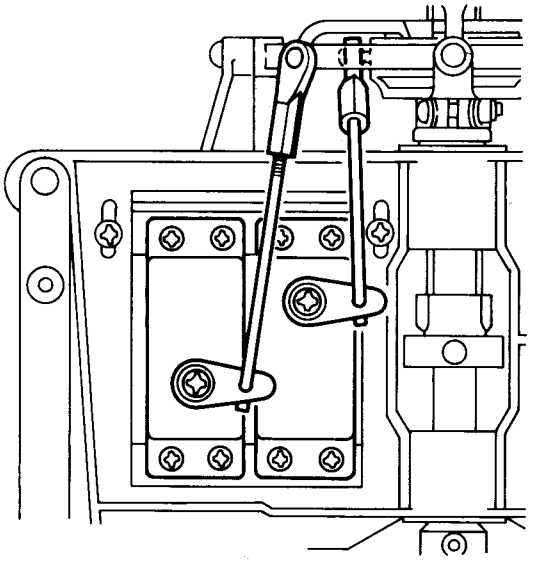
Transmitter stick movements	Resultant helicopter movement	
	A	**B**
 Fore and aft cyclic	 Forward cyclic pitches helicopter nose-down	 Rear cyclic pitches helicopter nose-up
 Roll cyclic	 Left roll cyclic rolls helicopter to the left (rear view)	 Right roll cyclic rolls helicopter to the right (right rear view)
 Tail rotor	 Left tail rotor yaws helicopter nose left (and tail right)	 Right tail rotor yaws helicopter nose right (and tail left)
 Throttle/collective pitch	 Increasing throttle/collective pitch (A) causes the helicopter to climb	 Decreasing throttle/collective pitch (B) causes the helicopter to descend

Please note that this is only a guide to control function and is not a training procedure

Important: Never push the start button when you are adjusting the helicopter!

Cyclic Trim Adjustment

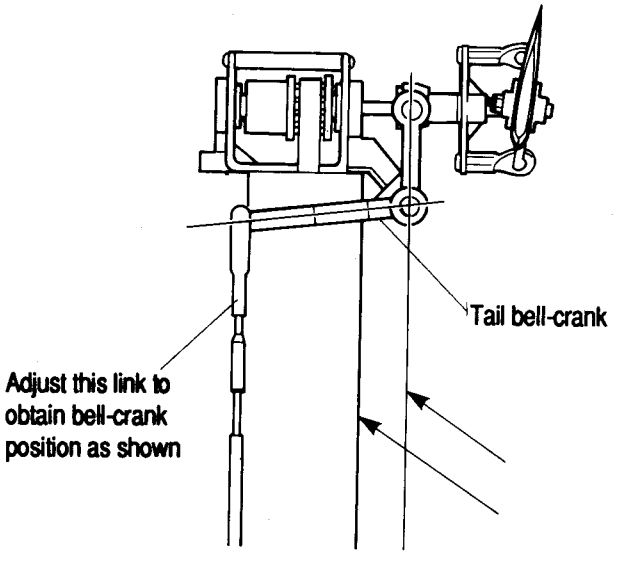
When the roll and pitch (elevator) transmitter trimmers are set in the neutral (centre position) the swashplate must be perfectly level in both the roll plane and the pitch plane.
If the swashplate is not perfectly horizontal, then proceed as follows:
Adjust the servo output arm position by unscrewing the servo arm retaining screw, removing the servo arm and repositioning the arm until the swashplate is horizontal.
Adjust both roll and elevator servos in this way if necessary.
If only a very small adjustment is required; do this by rotating the universal links only.
See diagram below.
During hovering you may find that a small amount of cyclic re-trimming will be required in order to achieve an accurate hover. Make any adjustments by using the trims on the transmitter.



Tail Rotor Hovering Pitch Adjustment

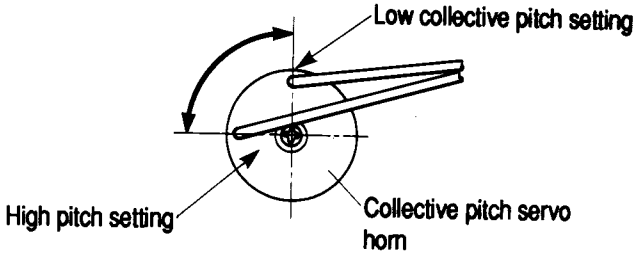
In flight, any helicopter requires a certain amount of tail rotor thrust to off-set the torque of the main rotor.
Make sure that when you set up tail rotor travel you follow the illustration below, which shows the correct position for the tail rotor blades and the tail bell-crank.
The position shown below is the hover point setting, which is the mid-stick throttle position on your transmitter.
This is the point at which the helicopter will be in the hover in front of you.
Adjust the snap link at the bell-crank end to achieve the set-up illustrated in the diagram.

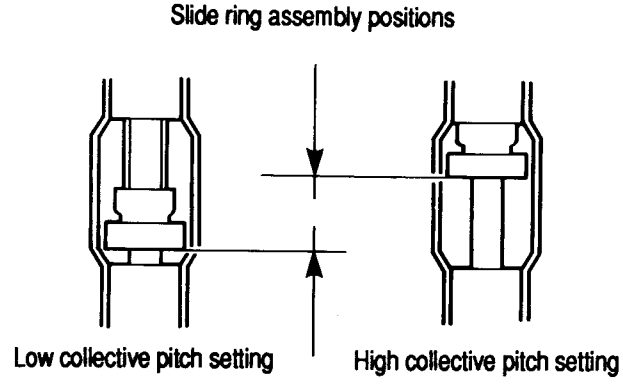
Note: Achieving the correct amount of tail thrust in the hover is an extremely delicate balance, and will depend on other factors such as main rotor speed and main rotor pitch angle. The diagram below is a guide only, and you may well find that the helicopter tends to rotate about the yaw axis. If it does tend to rotate then adjust the transmitter tail rotor trimmer to achieve the correct balance. If the tail rotor trim change required for correct balance is greater than that allowable using the trim lever, then adjust the tail bell-crank snap link.
If gross discrepancies appear to exist, then check your main rotor pitch angle at the hover point, and that your battery is fully charged.



Collective Pitch Control and the Slide Ring Assembly

Adjust the throw of your collective pitch servo, so that when you move the transmitter stick from the low position to the high position, 13mm of travel is measured at the slide ring assembly.
Note that differential movement will be registered at the slide ring assembly, with relatively small amounts of slide ring travel occurring above the half transmitter stick position and relatively large amounts below the half stick position.
See diagram.
Adjust or change (if neccessary) your servo horn to achieve this.
If you are an experienced model helicopter pilot and intend to fly aeobatics with the Whisper, then you must use 15mm of slide ring travel rather than 13mm.

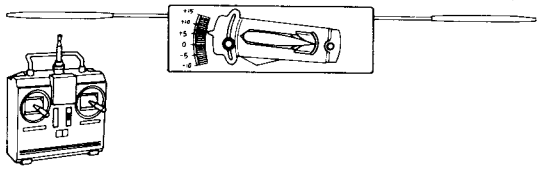


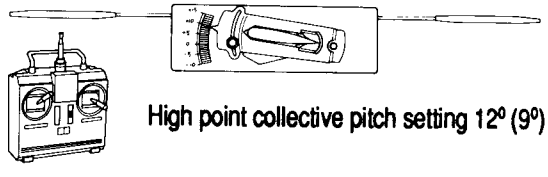


Collective Pitch Measurment (Using Kalt Pitch Gauge -not included with this Kit)

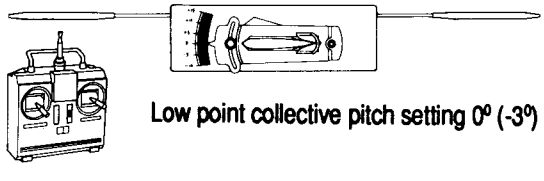
Making sure that transmiter and receiver are switched on, move the throttle stick to the low position.
Adjust the main blade angle by sliding the gauge onto a main rotor blade, and using the collective pitch trimmers on your transmitter to achieve 0° pitch on the main blade.
Note: If you do not have collective pitch trimmers on your transmitter then adjust collective take-off point on the servo horn to achieve this setting.
Repeat this procedure for the hover-point setting (9°), and the high pitch setting (12°).
Please note that if you are experienced and intend to fly aerobatics and autorotations (an autorotation unit is available as an optional extra), then we recommend you adopt the settings shown in brackets in the diagrams. However, be very prudent when experimenting with aerobatics with the Whisper, as the handling is different from engine powered helicopters, and pitch settings may have to be adjusted to suit a particular pilots flying style.

Hover point collective pitch setting 9° (8°)





High point collective pitch setting 12° (9°)

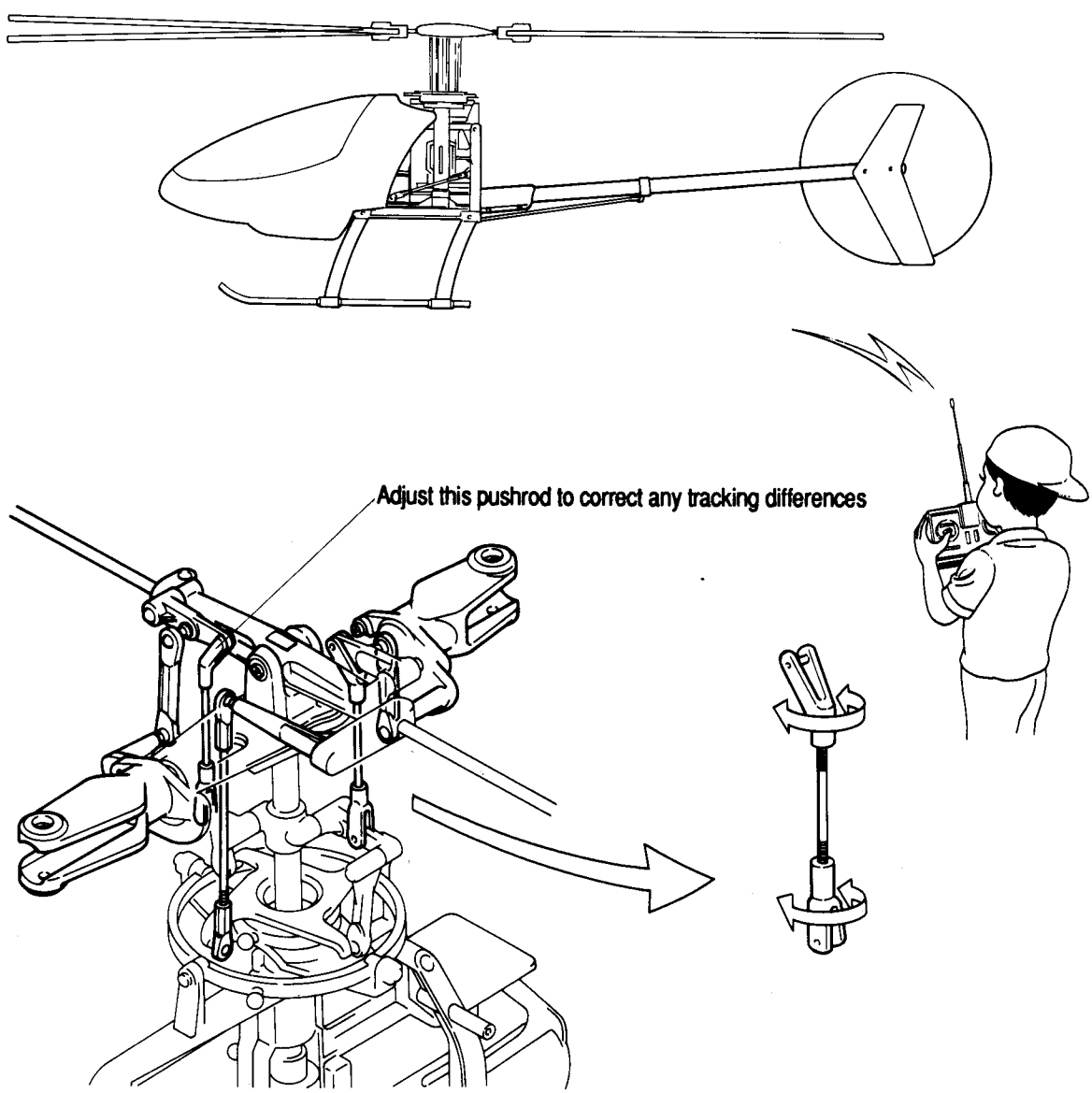


Low point collective pitch setting 0° (-3°)

Tracking the Main Rotor Blades

Place the helicopter on the ground **at least 5 metres away** and gradually increase the main rotor r.p.m. until the helicopter is about to leave the grouund.
Carefully sight along the plane of the main rotor disc and check whether you can see a single disc.
If the tracking is correct then you will see one disc.
Note: Be very careful when sighting the plane of the disc, and proceed with this step as fast as is safely possible.
If the tracking is incorrect then two discs will be apparent.
If you have fitted the tracking tape to the tips of the blades; either a black coloured tip will be higher, or a red coloured tip.
Adjust the links as per the diagrams to either raise the lower blade up to the higher blade, or drop the higher blade down to the level of the lower blade.
Adjust a half turn at a time until correct.
If the tracking is correct then you will see one disc in flight.

A blade running out of track



Tail Rotor and Throttle Mixing

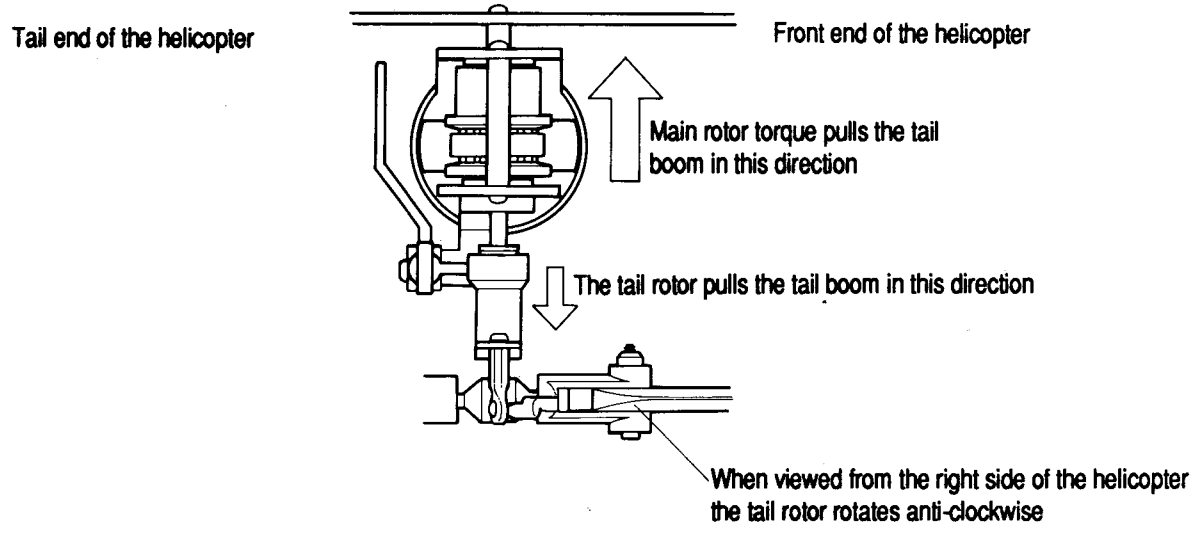
Many modern transmitters incorporate throttle rudder mixing to compensate in flight for collective pitch/throttle changes. As far as tail mixing is concerned the requirements of the Whisper are no different from any normal collective pitch helicopter, and you should follow the instructions in the manual of your R/C system.
Make sure that the mixing works in the correct sense. As throttle is increased so also should the pitch on the tail rotor blades.

Tail Rotor Direction of Rotation

Double check at this point that your tail rotor is rotating in the correct direction.
The main rotor rotates clockwise in flight, and the tail rotor when viewed from the *right hand side* of the helicopter rotates counter-clockwise.
It is vital that this is double checked.

Gyro

Set up the gyro as per the manufacturers recommendations.
Make sure that the gyro gain is not set too high -or the tail will wag in flight, and make sure that it is not set too low -the helicopter will not be so stable about the yaw axis.
Check also that the gyro gain is working in the correct sense.
A helicopter with the gyro gain reversed is far more difficult to fly than a helicopter with no gyro at all !



Vital safety information.
Please read this carefully!

SAFETY - THE TEN COMMANDMENTS

❑ 1. If this is your first helicopter, then follow religiously these instructions, and any additional updated instructions supplied.

❑ 2. Do not be tempted to hurry any part of the construction.

❑ 3. Do not be tempted to change any part of the construction because the local helicopter expert says so. This design is the result of thousands of man-hours of research and development, and over 15 years of model helicopter manufacturing.

❑ 4. **It is essential to seek help if you are a newcomer to model helicopters.** It is vital to enlist the aid of an experienced model helicopter pilot to check over and test fly it before attempting to fly your helicopter yourself. Ask him to check your assembled helicopter for any construction errors and to double check the control linkages and Radio Control equipment installation. When he is satisfied that the helicopter is safe to fly, then ask him to test hover the helicopter.
At this stage do not be tempted to try it yourself!
Take time to listen to his advice concerning the techniques required for learning to fly, and to read the books available on the subject.

❑ 5. When you first get to try the machine, make sure that you are standing at least 15 feet away from it before increasing the throttle from the idle setting. Your helicopter can accelerate very rapidly if incorrect control inputs are applied, so it is vital that you do not stand too close to it!

❑ 6. Do not be tempted to fly in confined spaces, either indoors or your back garden, or if there are children or animals in the vicinity. There is only one safe place to fly your model .....and that place is the local model flying field. Remember at all times that an R/C Model Helicopter is controlled by 1/2 a watt of transmitter power, and therefore you should never fly in areas where there may be strong radio interference present, or in confined areas.

❑ 7. During main rotor 'spin-down', do not be tempted to stop the rotating blades with your hand or anything else. Even at low speeds a main blade posesses enough energy to severely damage a persons' hand. Wait till the blades have stopped before you approach your helicopter.

❑ 8. Main blade stored energy.
Main blade tips can reach speeds that exceed 200 mph. Treat them with a tremendous amount of respect.
Very great forces are exerted on the rotor head and main blades in flight, so if your blades have been damaged in a crash, then do not be tempted to repair them. Discard them and fit a new set as per the original instruction manual and/or supplementary instruction sheet.
In flight we recommend a main rotor speed of 1100 rpm. If this limit is exceeded, premature wear of components may occur and damage may result.
Warning: It is dangerous to exceed this limit.

❑ 9. Take out third party Insurance, join the local model club, and the British Radio Controlled Helicopter Association, and apply your patient responsible nature to the exciting challenge of flying helicopters. Model helicopter flying today is not difficult; but it requires a thorough and responsible attitude in order to achieve proficiency; and for most of us this does not just "happen overnight".

❑ 10. Please contact your model shop for any advice that is required concerning these points.

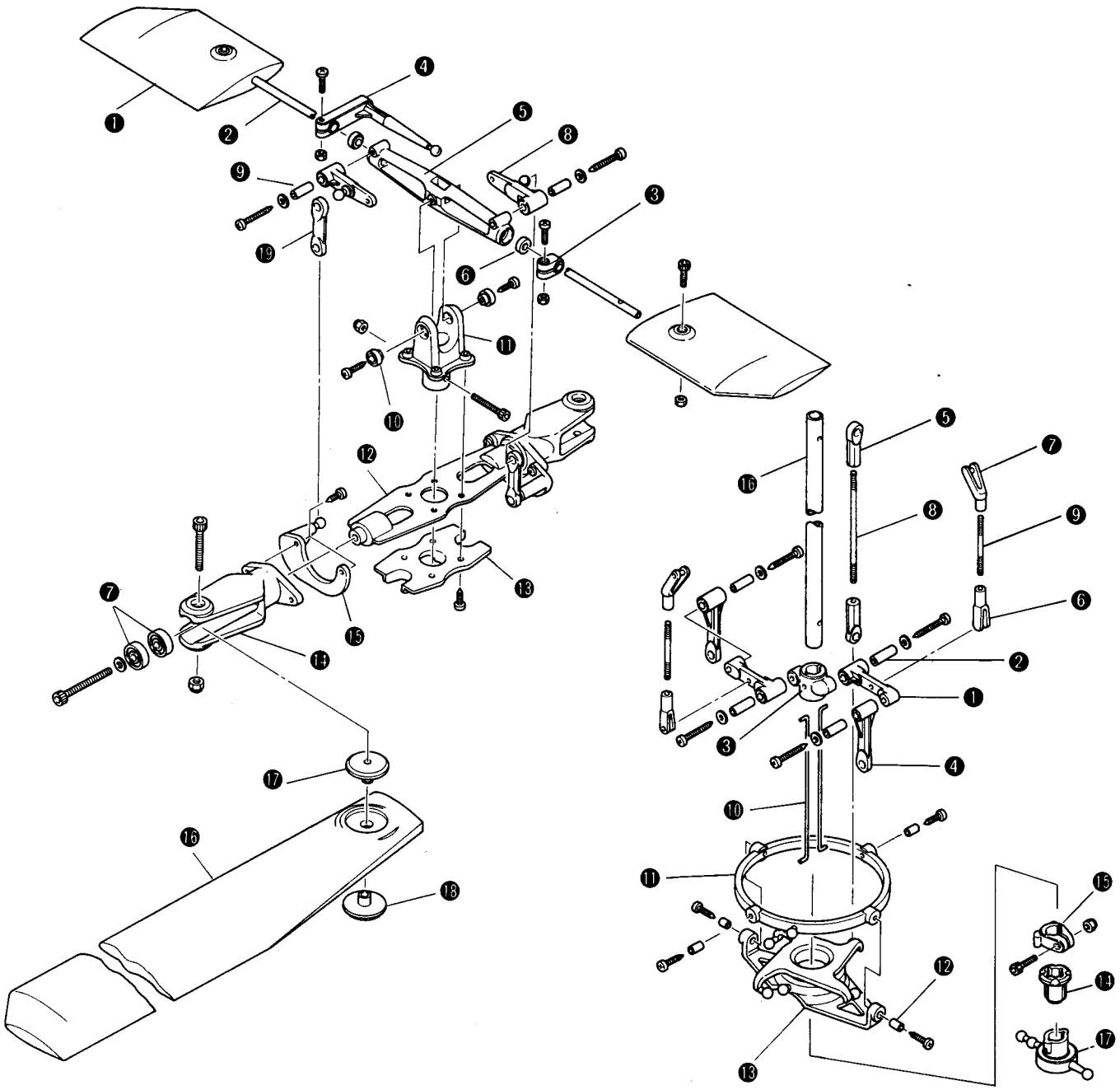


Diagram No.	Part No.	Part Description	Quantity
Head Assembly			
1	42001	Flybar Paddle	2
2	42002	Flybar	2
3	42003	Flybar Collar	1
4	42004	Flybar Control Arm	1
5	42005	Flybar See-saw	1
6	42005	Flybar See-saw Collar A	2
7	42006	Blade Grip Bearing (pr)	2
8	42007	See-saw Arm	2
9	42007	Seesaw Arm Bush	2
10	42008	L630 Ball Bearing	2
11	42009	Centre Hub	1
12	42010	Hub Plate	1
13	42011	Hub Plate Supporter	1
14	42012	Blade Grip	2
15	42013	Pitch Arm	2
16	42014	Main Blade	2
17	42014	Blade Washer A	2
18	42014	Blade Washer B	2
19	43002	Universal Link W (set A)	2

Diagram No.	Part No.	Part Description	Quantity
Mast Assembly			
1	43001	Scissor Arm	2
2	43001	Scissor Arm Collar A	4
3	43001	Scissor Arm Body	1
4	43001	Scissor Arm Link T	2
5	43002	Universal Link (set A)	2
6	43002	Snap Link (set A)	2
7	43002	Snap Link L (set A)	2
8	43002	50mm Pushrod (set A)	1
9	43002	25mm Pushrod (set A)	2
10	43005	Pitch Control Rod	2
11	43006	Swash Ring	1
12	43006	Pitch Control Rod	4
13	43007	Swashplate Assembly	1
14	43010	Outer Mast	1
15	43010	Mast Stopper	1
16	43012	Mast (MainShaft)	1
17	43013	Slide Ring Assembly	1

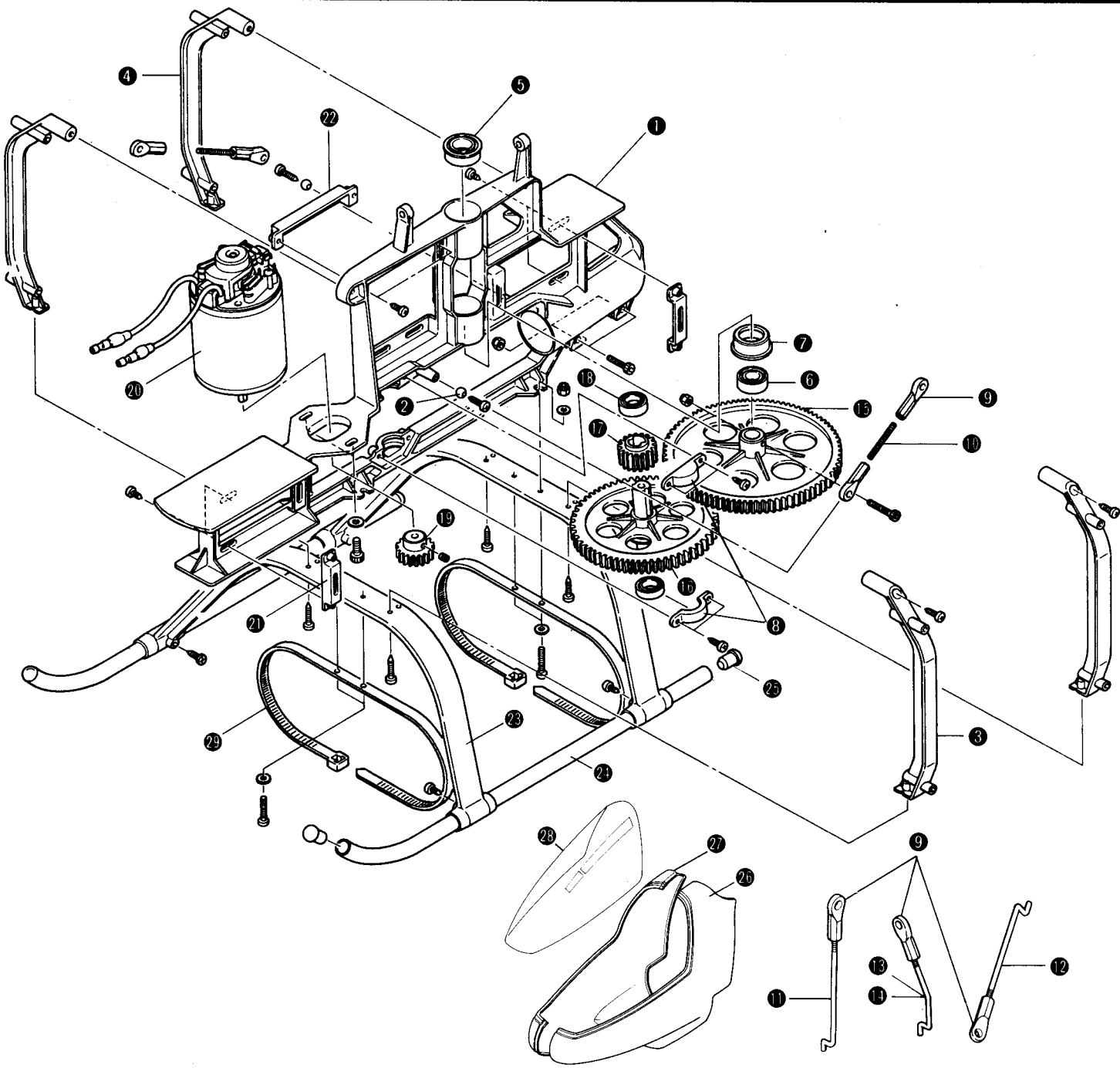


Diagram No.	Part No.	Part Description	Quantity
Main Frame Assembly			
1	44001	Main Frame	1
2	44001	Main Frame Joint Ball	2
3	44002	Side Arm L	2
4	44002	Side Arm R	2
5	44003	Upper MainFrame Bearing	1
6	44003	Lower Main Frame Bearing	1
7	44004	Lower Bearing Housing	1
8	44004	Bearing Cap	2
9	44005	Universal Link (set B)	7
10	44005	25mm pushrod (set B)	2
11	44005	45mm pushrod (set B)	1
12	44005	23mm pushrod (set B)	1
13	44005	20mm pushrod (set B)	1
14	44005	23mm pushrod (set B)	1
15	44006	Main Drive Gear (EHSD)	1
16	44007	Main Drive Gear (EH2D)	1
17	44008	EH2P Pinion Gear	1
18	44009	EH2D Drive Gear Bearing	2
19	44010	Motor Pinion Gear	1
20	44011	540VS Motor	1
21	44012	Servo mount Bracket A	2
22	44012	Servo mount Bracket B	1
23	44013	Undercariage Brace	2
24	44013	Undercariage Skid	2
25	44013	Undercariage Skid Cap	4
26	44020	Whisper Body Left	1
27	44020	Whisper Body Right	1
28	44020	Whisper Canopy	1
29	47001	Battery Strap	2

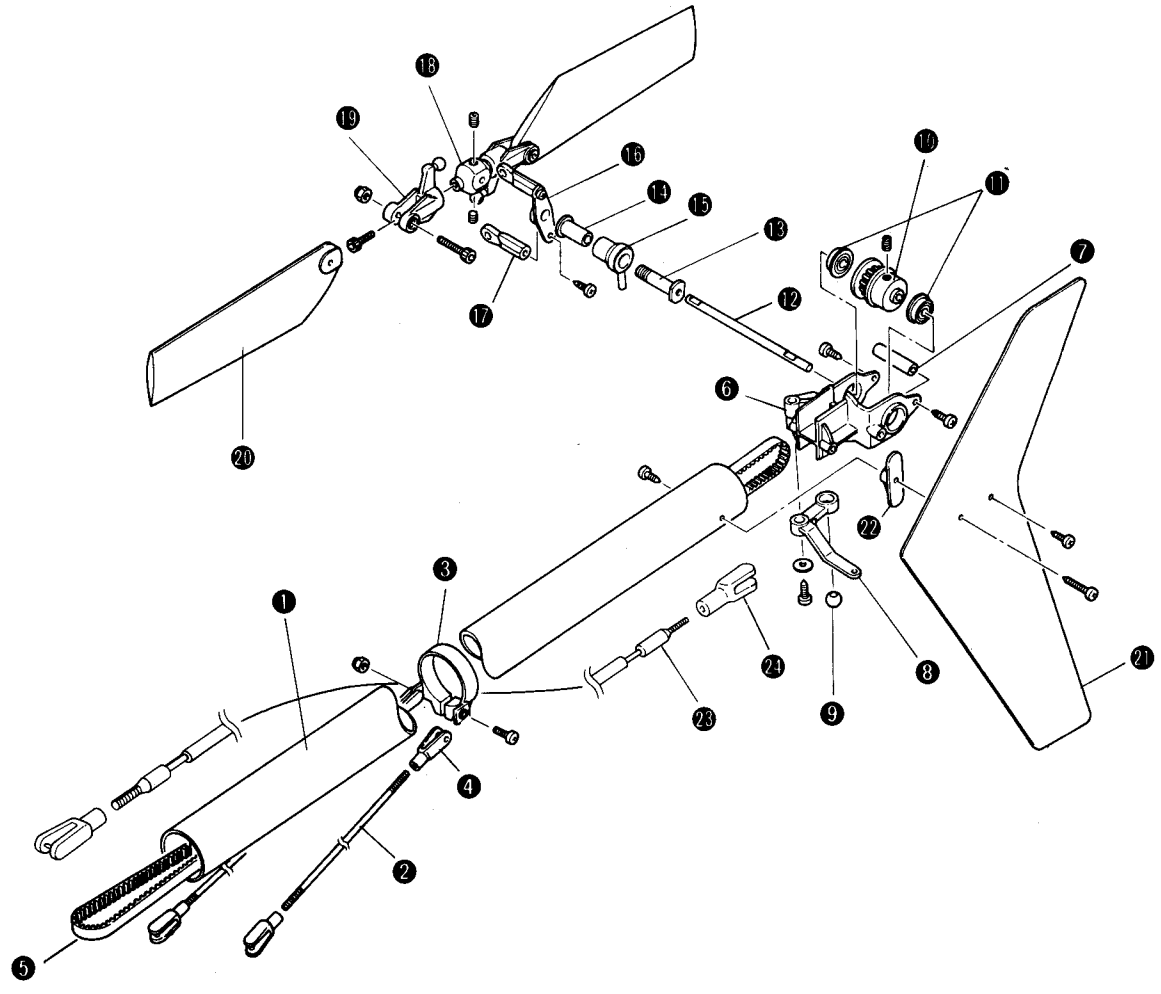


Diagram No.	Part No.	Part Description	Quantity
Tail Assembly			
1	45001	Tail Boom	1
2	45002	Boom Support	2
3	45003	Boom Support Clamp	1
4	45002	Quick Link	4
5	45004	Tail Drive Belt	1
6	45005	Tail Pulley Housing	1
7	45005	Tail Unit Cross Member	1
8	45005	Tail Bell-crank	1
9	45005	Tail Bell-crank Joint Ball	1
10	45006	Tail Pulley	1
11	45007	Tail Unit Bearing	2
12	45008	Tail Output Shaft	1
13	45010	Tail Slide Ring Inner	1
14	45010	Slide Ring Inner Collar	1
15	45010	Slide Ring Outer	1
16	45010	PC Plate	1
17	45010	Universal Link S	2
18	45013	Tail Rotor Hub	1
19	45014	Tail Grip	2

Diagram No.	Part No.	Part Description	Quantity
20	45018	Tail Blade	2
21	45019	Vertical Fin	1
22	45019	Vertical Fin Spacer	1
23	45021	Tail PC Snake	1
24	45021	Quick Link	2
	47002	Whisper Decal	1
	47003	Whisper Screw Set	1

Repairs and Spare Parts

All the parts used in this kit are available as replacement spare parts. If any part is damaged in a crash or accident, then please contact your model shop for the replacement parts required.
When ordering parts please use either the part numbers given in this manual, or the computer number generated for each of these parts in the *Whisper Parts Master Guide.
Should you be unfortunate enough to crash or damage the helicopter, then be sure to check *all parts* and to replace those that are damaged and those that you may have doubts about.
Neither Kalt Sangyo Co Ltd. nor any of its appointed distributors can accept responsibility for any problems arising from the use of parts other then genuine Kalt parts.
For all main parts and designs of this helicopter, the applicable Patents, Utility Model, Registrations, and Registrations of Design have been granted or applied for.

*Whisper Parts Master Guide
May not be available for your market, please consult your model shop.

Specifications

Main Rotor Diameter 950mm
Total Length of Helicopter 890mm
Total Weight .....1150-1250 grams
R/C Equipment required .....5 channel (Heli)
Body Material .....ABS plastic
Safe Flight Temperature Range .....0°C @ 40°C

Important Additional Notes for Whisper Standard and Semi-kit Versions

Important -These Instructions supercede those detailed in the relevant sections in the Whisper Instruction Manual. Please read them carefully before you start assembly.

Additional Parts		Quantity
U/C Damper Stay		2
U/C Brace Reinforcement Plate		2
U/C Damper Tube		1
Collar A		1
M2x21	⊕ Bolt	4
M2x6	⊕ Bolt	4
M2x6	Tap Tite Screw	4
M2	Nyloc Nut	8
M2	Plate Washer	4

2-1.1 and 2-1.2 Undercarriage and Side Arm Assembly

- ❑ 1. Using 4 M2x6 ⊕ bolts, 4 M2 plate washers, and 4 M2 nyloc nuts; attach the U/C damper stay onto the main frame assembly.
- ❑ 2. Attach the 4 side arms to the main frame assembly and U/C damper stay using 6 M2 tap tite screws.

▲ 2 side arms are marked with an "L", and 2 are marked "R"; for the left and right hand sides of the frame respectively.

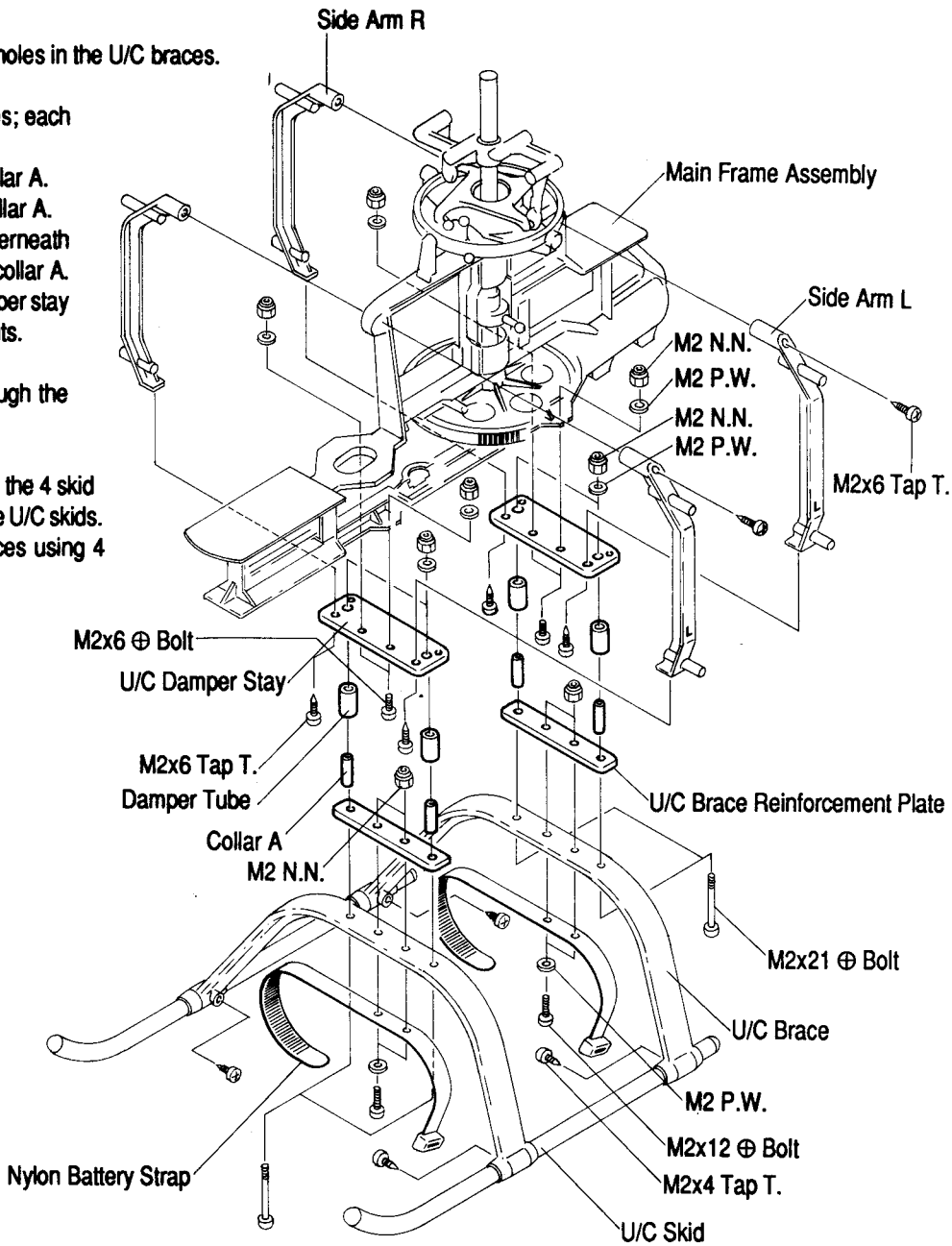
- ❑ 3. Bolt the nylon strap, undercarriage braces, U/C brace reinforcement plates together using 4 M2x12 ⊕ bolts, 4 M2 plate washers, and 4 M2 nyloc nuts.

▲ Install the bolts through the 2 *centre* holes in the U/C braces.

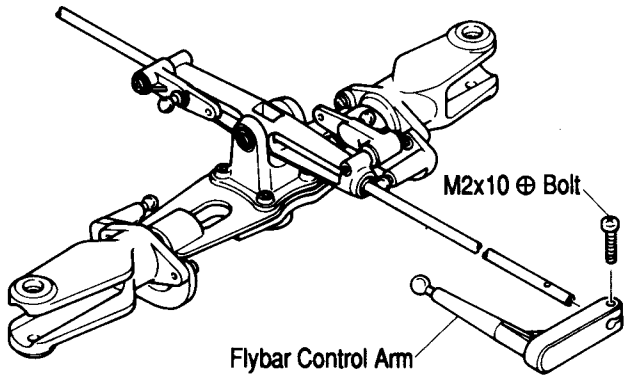
- ❑ 4. Cut the U/C damper tube into 4 pieces; each 8mm long.
- ❑ 5. Apply a thin film of grease to the 4 collar A.
- ❑ 6. Slip the 4 damper tubes over the 4 collar A.
- ❑ 7. Push 4 M2x21 ⊕ bolts through the underneath of the U/C braces, and through the 4 collar A.
- ❑ 8. Secure the U/C braces to the U/C damper stay using M2 plate washers and nyloc nuts.

▲ The 4 M2x21⊕ bolts must pass through the largest hole in the U/C damper stay.

- ❑ 9. Apply a small drop of cyanoacrylate to the 4 skid caps and push them into the ends of the U/C skids.
- ❑ 10. Clamp the U/C skids to the U/C braces using 4 M2x4 tap tite screws.



2-2.1 Rotor Head Final Assembly



- ❑ 1. As per the original instruction manual.
- ❑ 2. As per the original instruction manual.
- ❑ 3. Push the flybar control arm onto the flybar and temporarily attach it with an M2x10 ⊕ bolt.

2-6 Boom Support Installation

- ❑ 1. to ❑ 4. As per the original instruction manual.
- ❑ 5. Snap the tail boom supports into position onto the smaller holes in the U/C damper stay, *-not onto the U/C brace as per the instruction manual.*

2-13.1 Body Assembly and Installation

- ❑ 1. Sand body join-line(L and R) smooth.
- ❑ 2. Join temporarily the 2 halves of the body shell together with tape, ensuring that the edges overlap as per the diagram in the manual.
- ❑ 3. Using canopy cement or cyanoacrylate, run a thin film of it into the body shell joint. Allow to dry.
- ❑ 4. Cut out the air scoop on the lower half of the body.

2-13.2 Body Assembly and Installation

- ❑ 1. Carefully cut the edge of the canopy to match the body.
- ❑ 2. Attach the canopy to the body using tape.
- ❑ 3. Carefully make 3 2mm diameter holes in the canopy through which the M2x3 canopy retaining screws will pass.
- ❑ 4. Carefully make 3 1.7mm diameter holes in the body. See diagram in the manual.
- ❑ 4. Attach the canopy using 3 M2x3 tap tite screws.
- ❑ 5. Attach the body to the helicopter using 4 M2x8 tap tite screws and 4 M2 plate washers.

Vital Post-Assembly Check

▲ Before *and after* flying your Whisper (whether it is a kit or semi-kit version) check that **all nuts bolt, screws and linkages are tight and secure. This is the resonsibility of the pilot.**

Main Blade Balance Tip

▲ If you find -despite checking blade balance as per the original manual-, that there is vibration present, then proceed as follows:

- ❑ 1. Attach one and a half inches of tracking tape to the tip of one of the rotor blades and test fly the helicopter. If vibration is reduced then, then try adding and/or reducing the quantity of tape attached by half inch increments until there is no vibration after test flying.
- ❑ 2. If vibration increases, then attach the tape to the tip of the other blade and repeat the technique outlined in step 1.

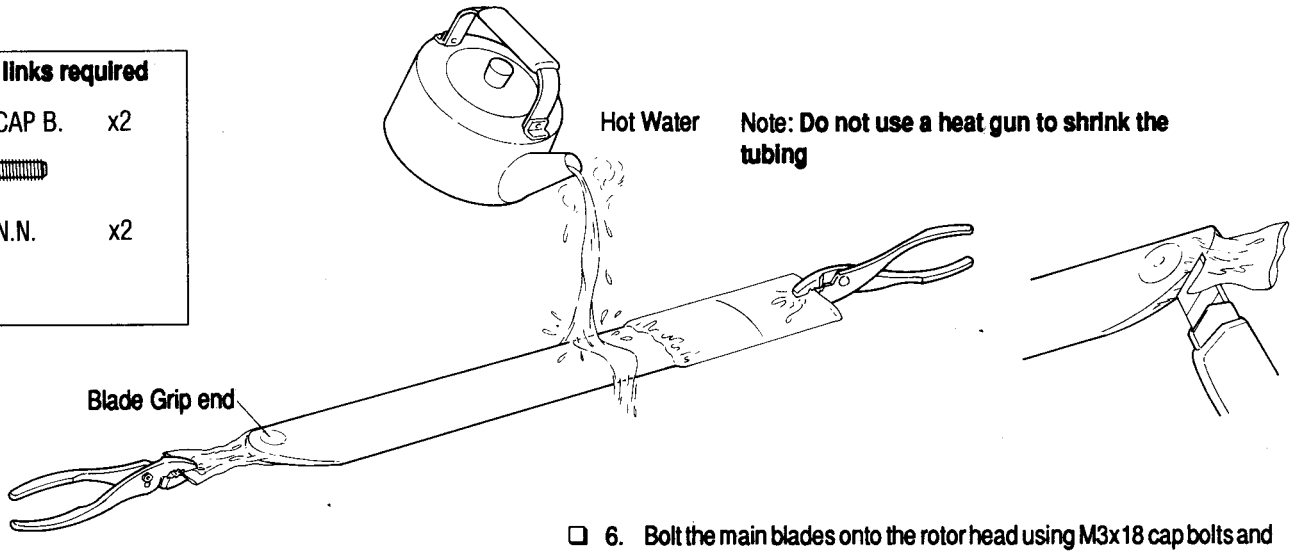
Whisper and the 540VS motor

▲ Unlike a glow-engined helicopter the Whisper has been developed around -and designed for one specific motor -the Mabuchi 540VS; and although it is normal to be able to fit a number of different glow engines of varying power into a glow engine-powered helicopter; we recommend most strongly that only the 540VS motor **-and no other** should be used in the Whisper.
If you use any alternative motor or higher power 540 variant; then you do so entirely at your own risk.

Screws and links required

M3x18 CAP B. x2

M3 N.N. x2



Note: **Do not use a heat gun to shrink the tubing**

2-12.1 Blade Fitting and Installation For Plastic Main Blades Only

❑ 1. Attach the blade washers A and B to the main rotor blade roots as per the diagram using epoxy resin adhesive.

▲ Make sure that epoxy coats all the internal surfaces of the blade washers *except* inside the 3mm bolt hole through the centre of the washers.

❑ 2. Cut the shrink tube in half. Slide a main rotor blade into one of the 2 pieces of shrink wrap and centre the blade.

❑ 3. Whilst pulling on each end of the shrink wrap, carefully pour hot water over the blade starting from the middle and working to each end. Rotate frequently to ensure uniform shrinkage.

▲ You will find that rotating the blade grip end of the heat shrink will allow the heat shrink to conform to the taper of the blade root area.

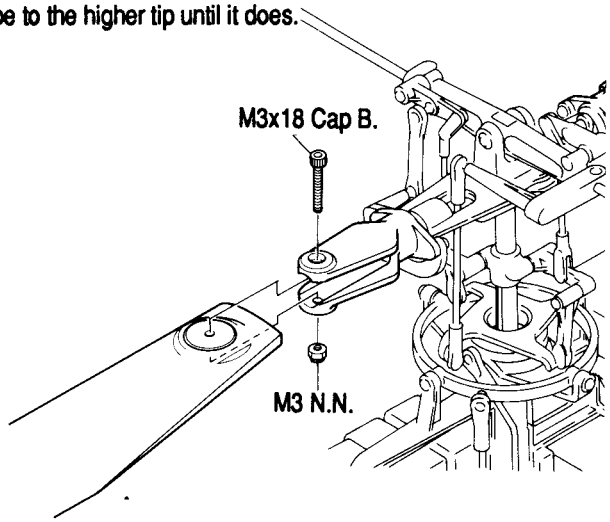
❑ 4. Once shrinking is complete; trim the excess shrink tube from each end using a modellers knife. Seal both ends of the rotor blade with cyanoacrylate.

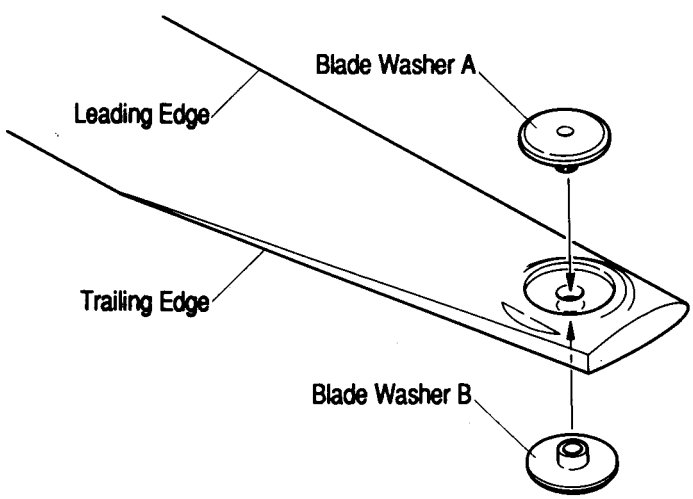
❑ 5. Repeat steps 1 through 4 for the other rotor blade.

❑ 6. Bolt the main blades onto the rotor head using M3x18 cap bolts and M3 nyloc nuts.

▲ Do *not* overtighten the main blades; they must be free to move in flight. The rotor head rotates clockwise when viewed from above; please ensure that the blades are fitted correctly as per the diagram.

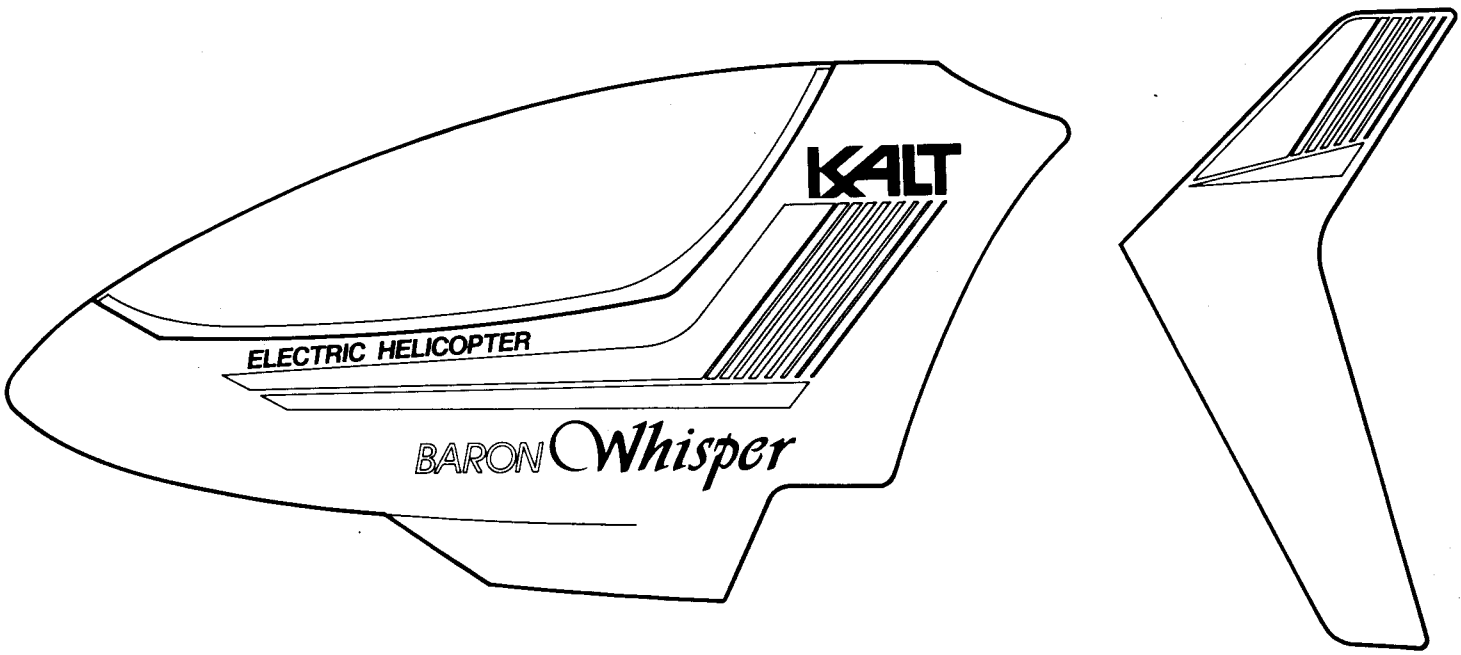
❑ 7. Check the balance of the blades by removing the rotor head and blade assembly and supporting the head on blocks by the flybar; check to see that the head and blade assembly balances perfectly level. If it does not balance level, then apply tape to the higher tip until it does.

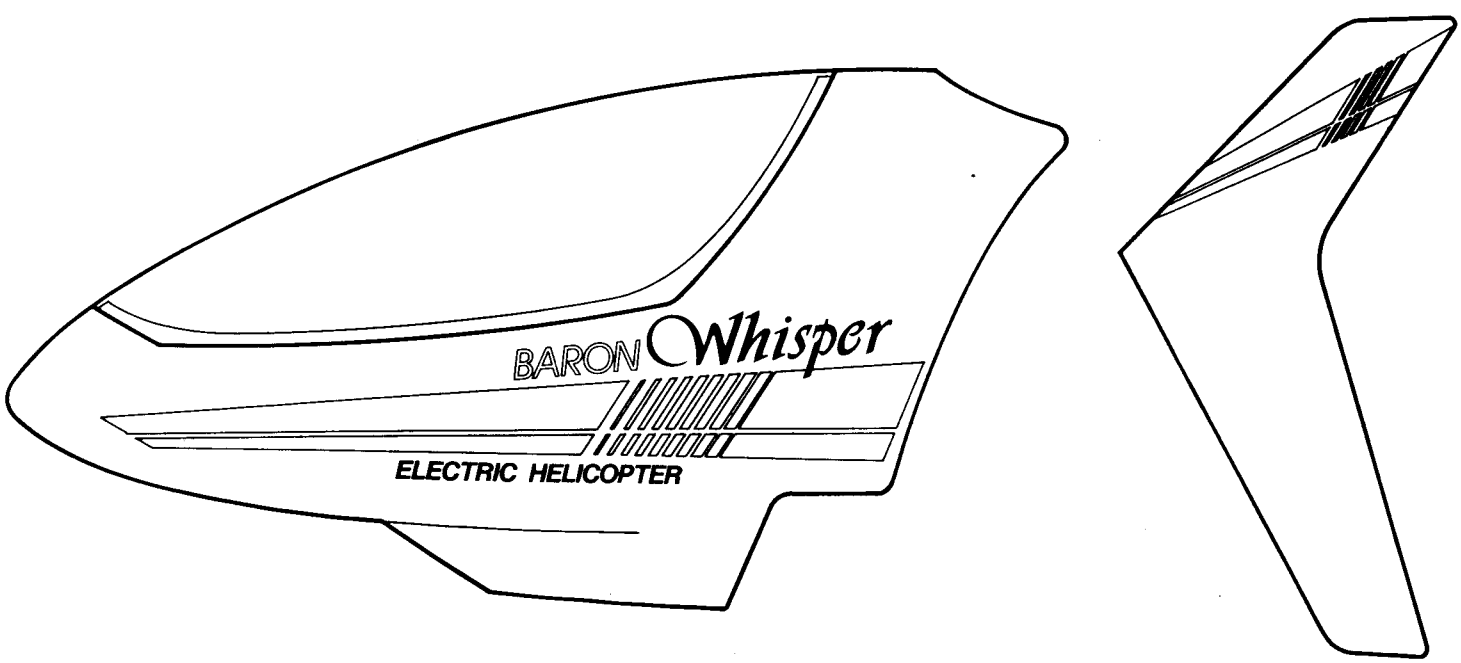




2-14 Decal Application

▲ Below are some examples of decal application.
Cut out and apply the self-adhesive decals carefully. Using a soft cloth working out from the decal centre, smooth the decals into position to obtain a wrinkle-free and bubble-free finish.





株式会社 カルト産業
〒412 静岡県御殿場市東田中1447-1
TEL 0550(83)8181 FAX 0550(83)8180

KALT SANGYO CO., LTD.
Head Office: Tokyo, Japan
Gotenba Office: 1447-1 Higashi-Tanaka, Gotenba, Shizuoka 412, Japan
Phone: (0550)83-8181 Fax: (0550)83-8180