LION MODEL

HELICAT

LION HELICAT is a new age 32-46 engine power R/C Helicopter. It is excellent for both trainers and experts who will enjoy the fun and performance flying, even winning for a contest. As a result of nearly three years' research and development, this new model features an entirely new structural design philosophy, incorporating strong yet light modern materials.

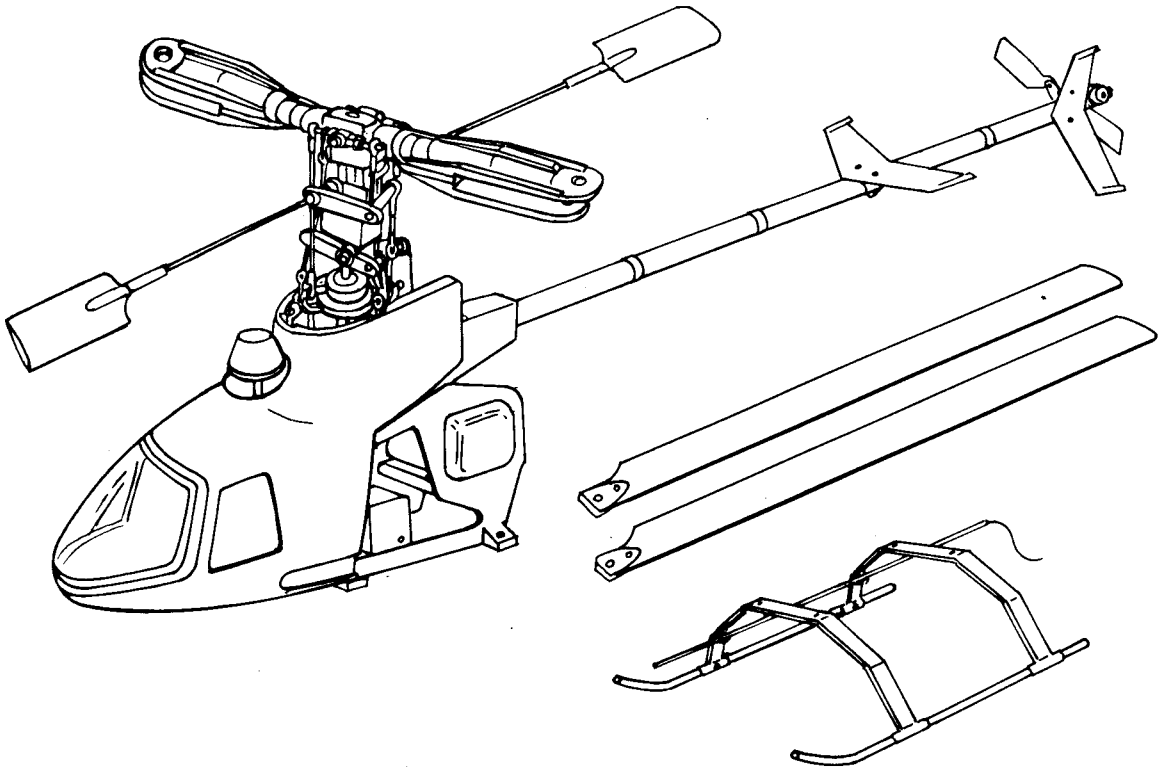
It features:

1. Perfect design AUTO ROTATION.
   - for safety flying and landing.
2. Two ball bearing and metal TAIL ROTOR GRIP.
   - limited vibration.
3. Preadjusted balanced TAIL ROTOR BLADE.
   - for convenience trainer.
4. SEPARATE power and control system in FUSELAGE design.
   - for convenience repair and examination.
5. Perfect design for both starter and PULL STARTER.
6. Perfect design in BALANCE WING.

MAIN ROTOR DIAMETER	1180 mm
TAIL ROTOR DIAMETER	220 mm
OVERALL LENGTH	1080 mm
TOTAL WEIGHT	2800 - 3100 g
GEAR RATIO	9.76 : 1 : 4.9
ENGINE	HELI ENGINE 32 - 46
RADIO CONTROL	5 CHANNELS

INTRODUCTION

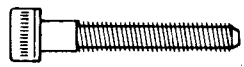
This kit is arranged in the following groups for convenience and safety in packing. Please check each item as soon as you receive the kit.



PACKING LIST

1. Pre-assembled body ..... 1 set
2. Landing gear assembly ..... 1 set
3. Main rotor blades ..... 1 pair
4. Tool set (1.5, 2.0, 2.5mm wrenches) 1 set
5. Servo fixing screw ..... 1 set
6. Body fixing screw ..... 1 set
7. Both surface tape ..... 1 pcs
8. Rubber Band ..... 1 pcs
9. Instruction book ..... 1 pcs
10. Sticker ..... 1 pcs

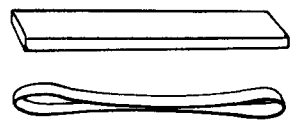
TP 2.3 X 12 ..... 20 pcs



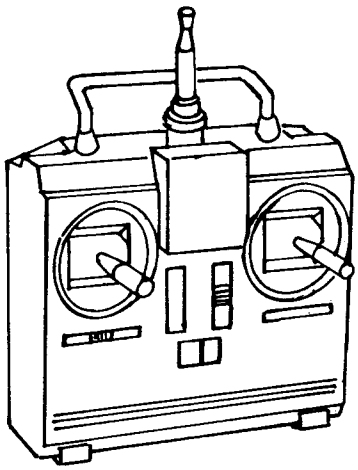
M 3 x 16 ..... 4 pcs
M 3 x 30 ..... 2 pcs

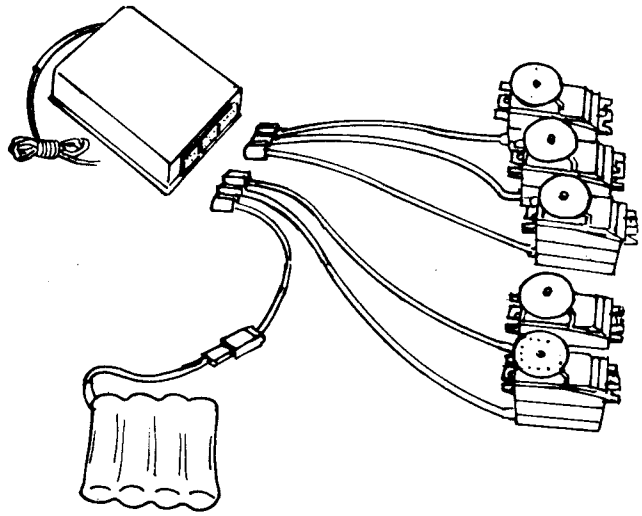
..... 4 pcs

..... 5 pcs

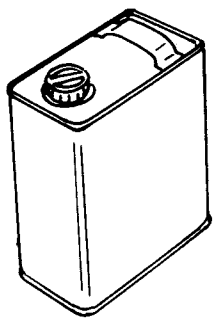


ADDITIONAL ITEMS REQUIRED

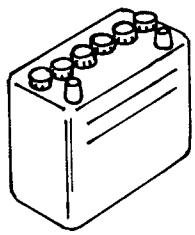




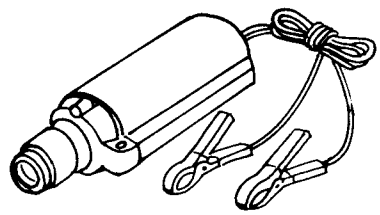
1. Radio control equipment with at least four channels (4 to 5 servos)



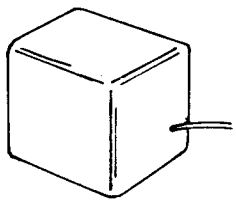
2. Glow fuel



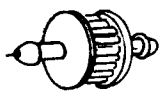
3. Starter battery



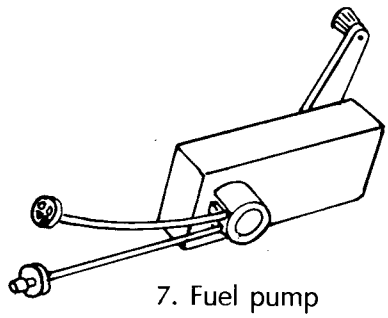
4. Starter motor



5. Gyro



6. Fuel filter

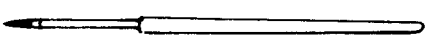


7. Fuel pump

TOOLS NECESSARY FOR ASSEMBLING

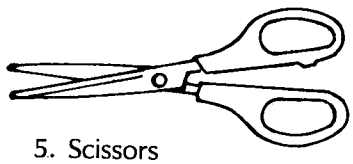
1. 5.5mm nut driver (for 3mm nuts)

2. Philips screw drive (large and small)



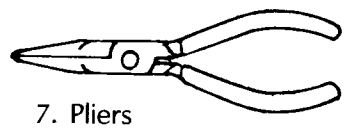
3. Four sided gimlet

4. Modelling knife

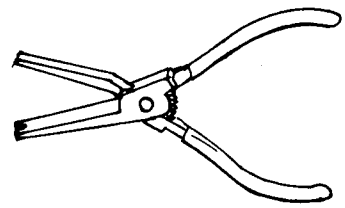


5. Scissors

6. Hobby oil

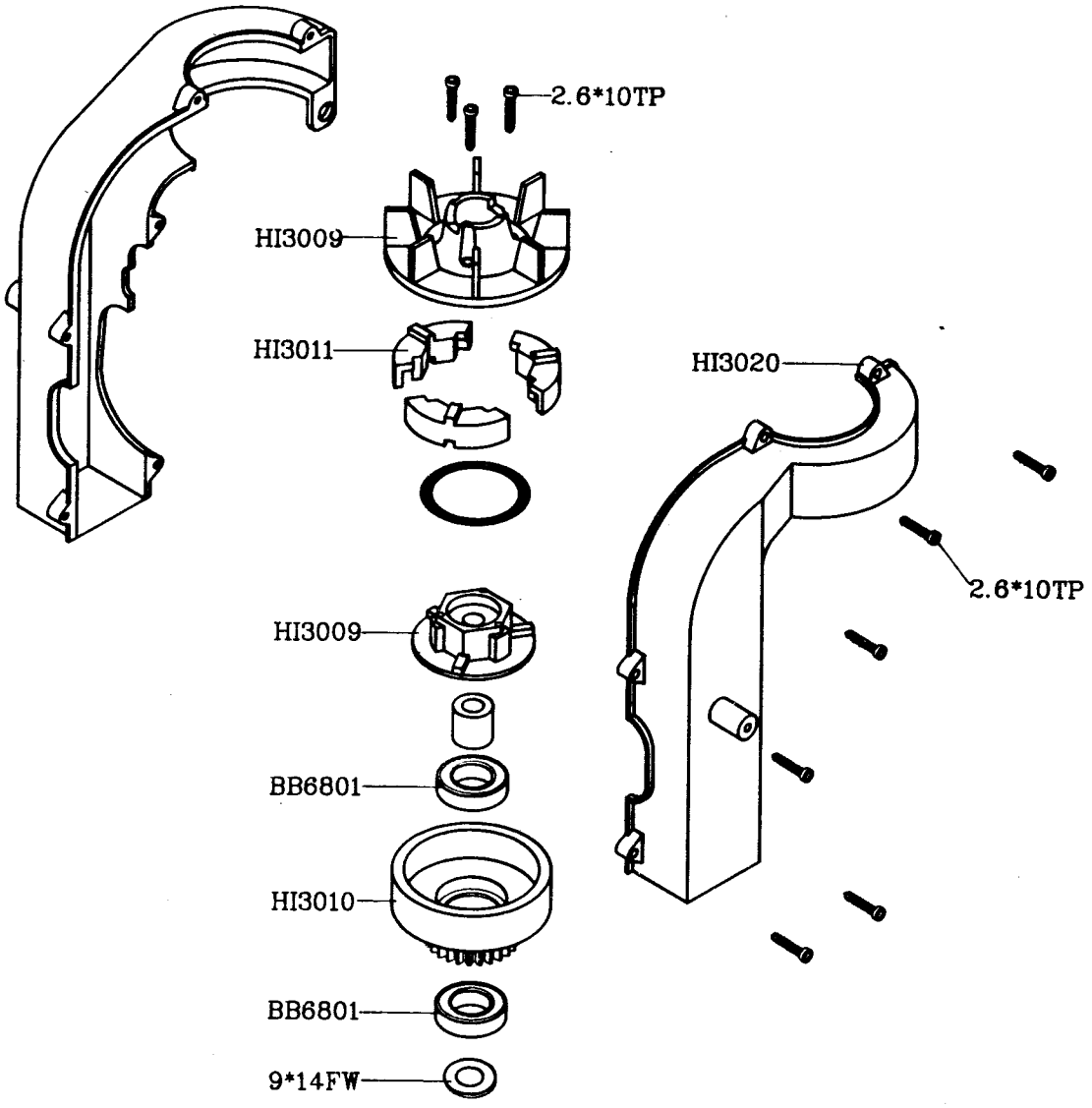


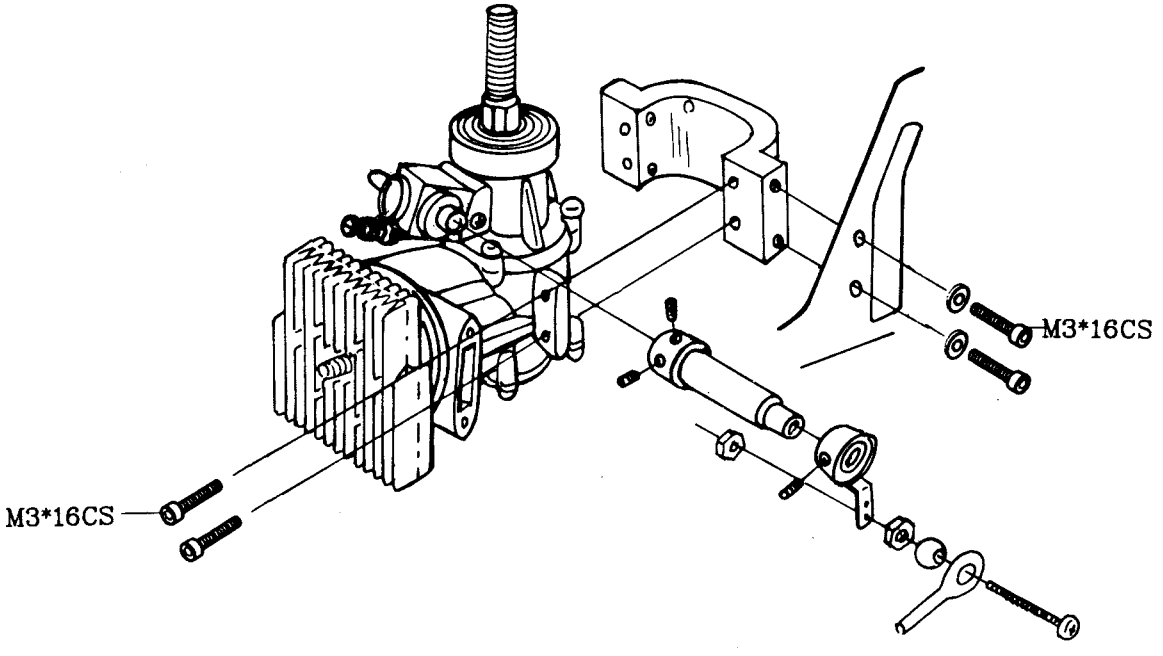
7. Pliers



8. Ball link plyers

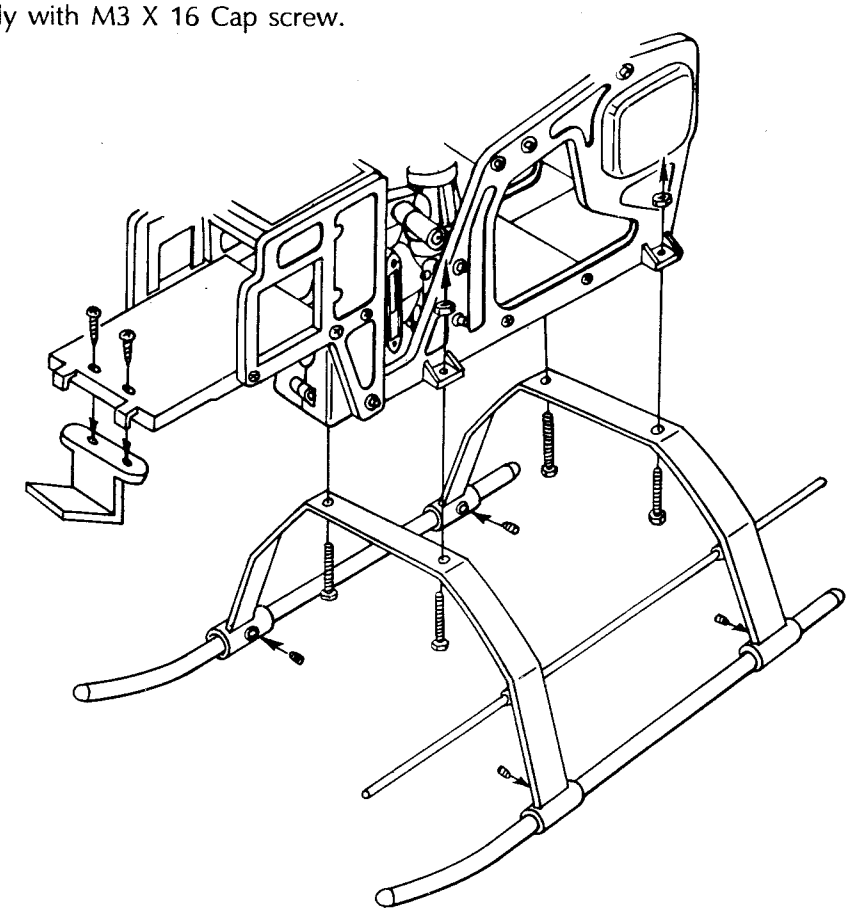
ASSEMBLING THE ENGINE SECTION





MOUNTING THE LANDING GEAR

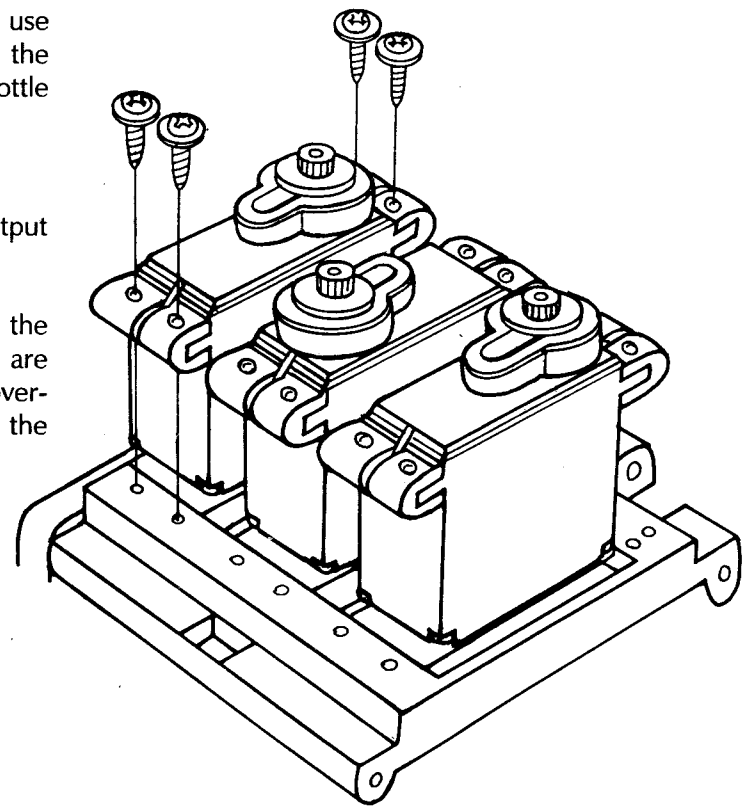
Combine the landing gear to the body with M3 X 16 Cap screw.



MOUNTING THE TOP THREE SERVOS

Aileron/Elevator/Rudder

Mount a rubber grommet of a servo as described in your radio instruction manual. Do not use brass eyelets. Do the same as above for both the collective pitch control servo and the throttle control servo.

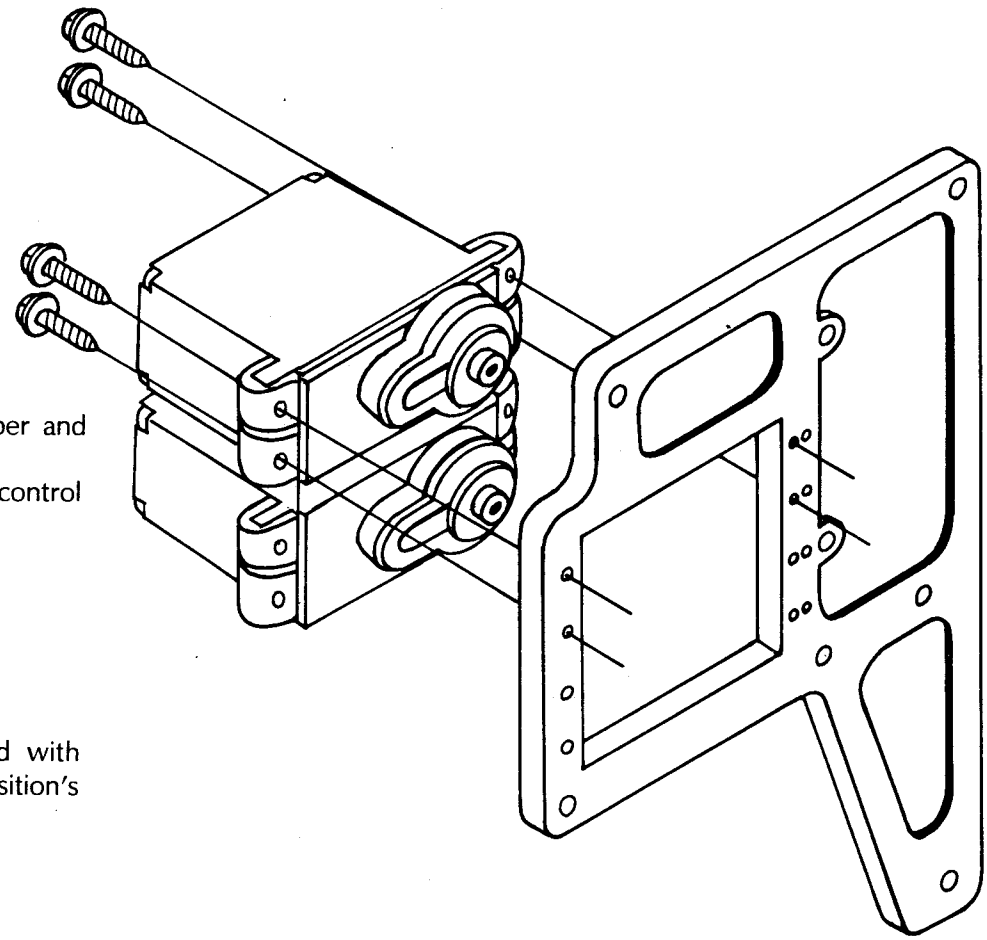


PLEASE CHECK

1. That the servos are mounted with the output arms in the position shown.

2. The attachment screws are screwed into the servo mount directly. Check that they are driven in securely but be careful of over-tightening each screw since the threads in the frame holes could be stripped as a result.

MOUNTING THE HORIZONTAL SERVO(S) COLLECTIVE PITCH CONTROL/ENGINE CONTROL

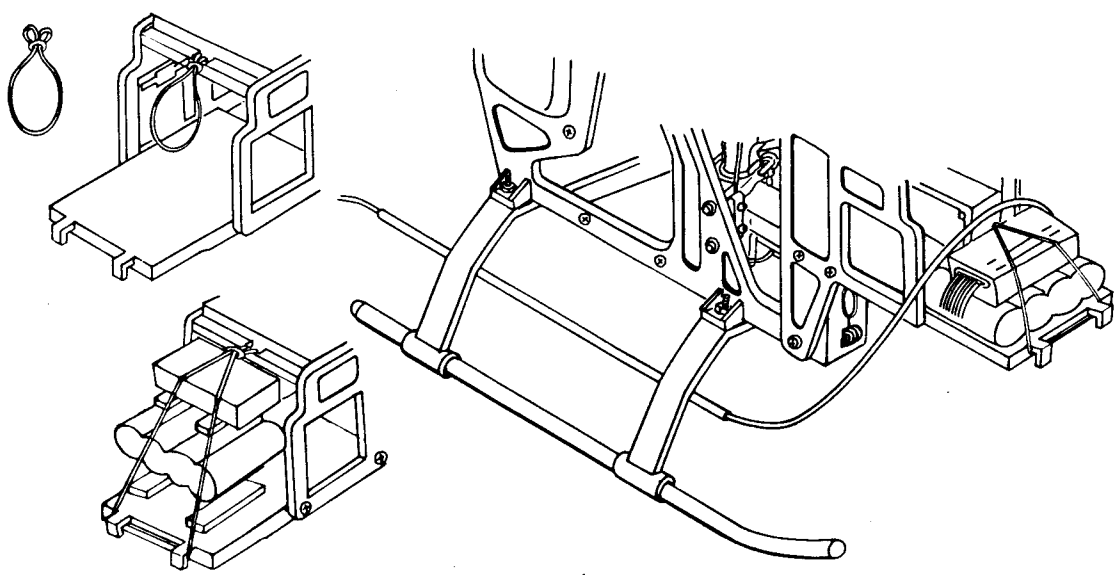


Five servos
Mount two servos at the upper and the lower parts.
Upper ..... Collective pitch control
Lower ..... Engine control

PLEASE CHECK

That the servos are mounted with the output arms in the position's shown.

MOUNTING THE RECEIVER AND BATTERY

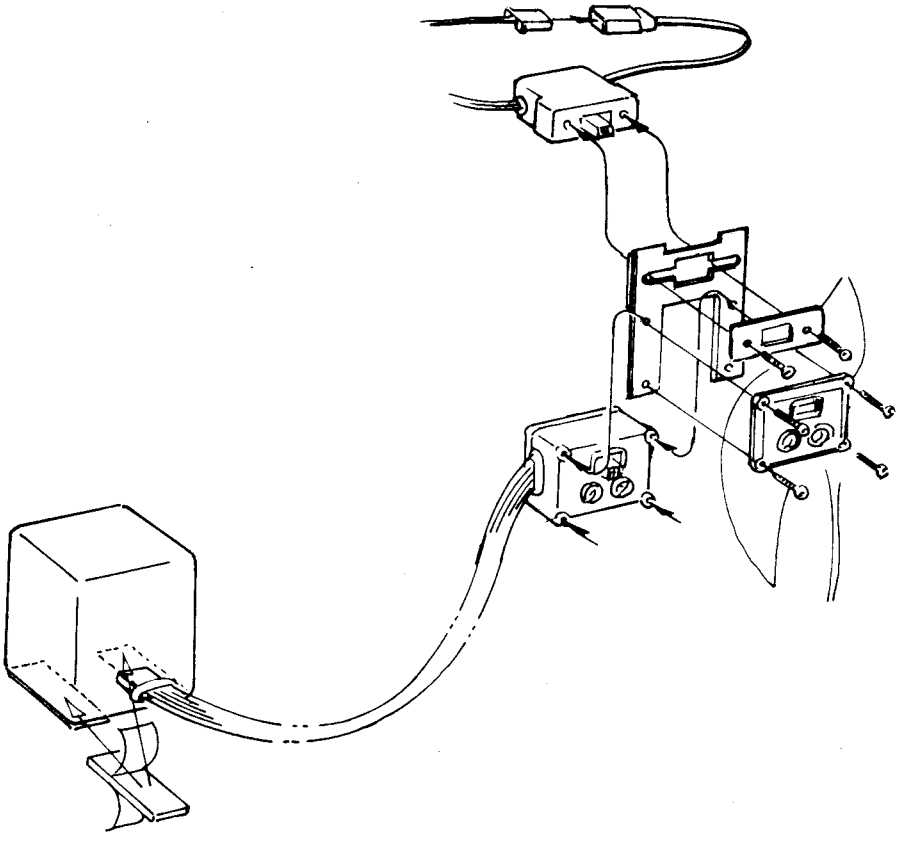


PLEASE CHECK

1. Fix the receiver and the battery with a rubber band.

2. If it is difficult to pass the antenna wire through the guide tube, lubricate the wire with a little water.

MOUNTING A GYRO AND SWITCH

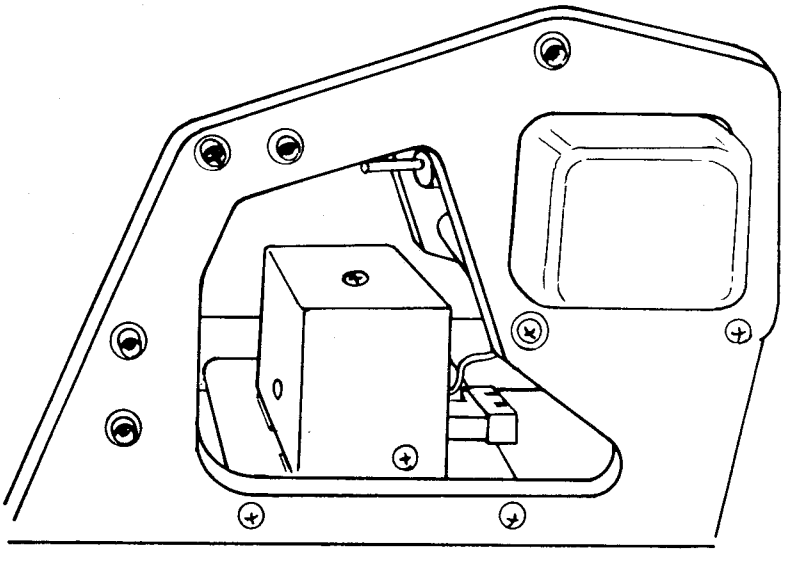


It is highly recommended that a gyro is used for improved yaw control in flights. With a gyro built in, the tail rotor operation will be semi-automated. Then, flying will become much easier because there will be one less channel to worry about.

PLEASE CHECK - WHEN A GYRO IS USED

If one battery is used for a receiver, servos and gyro, it is recommended that a good capacity (minimum of 1000 MAH) geniune nickel - cadmium battery from your radio manufacturer is used.

Mount a gyro so that its casing may not be brought into contact with the main frame.



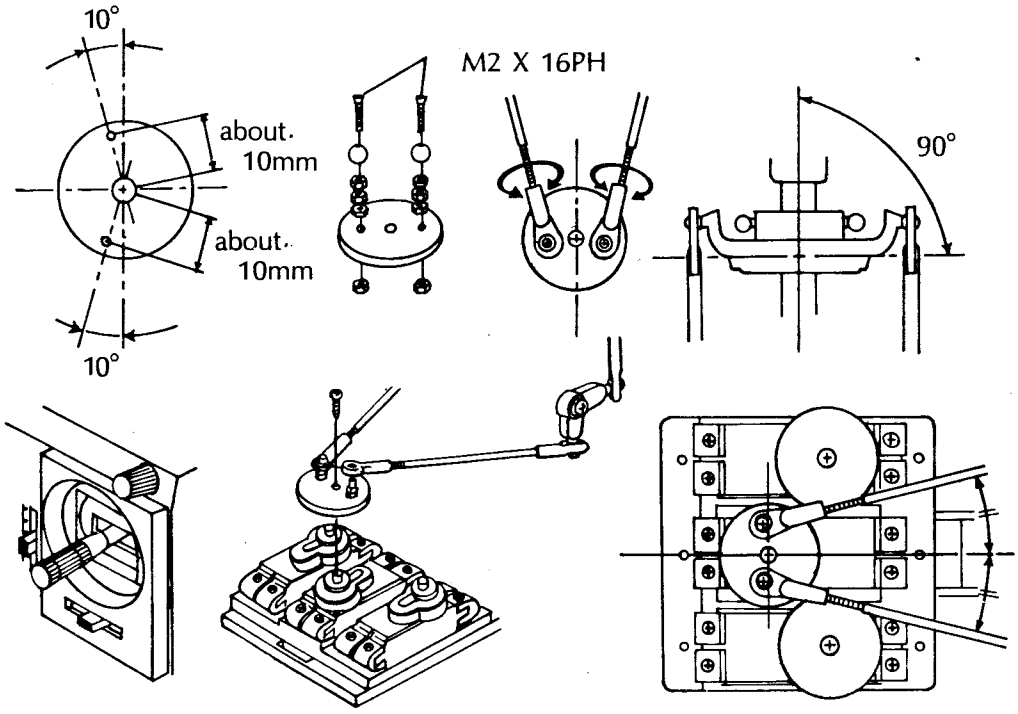
ROLL LINKAGE

PLEASE CHECK

1. Set the swashplate, by adjusting the length of the control rod, so that it is lever (horizontal) with the servo positioned at neutral.

2. Check that a full movement of the transmitter throttle/collective pitch stick is not restricted by the control rod adjustments. If it is, then adjust both aileron rods equally to remove the restriction.

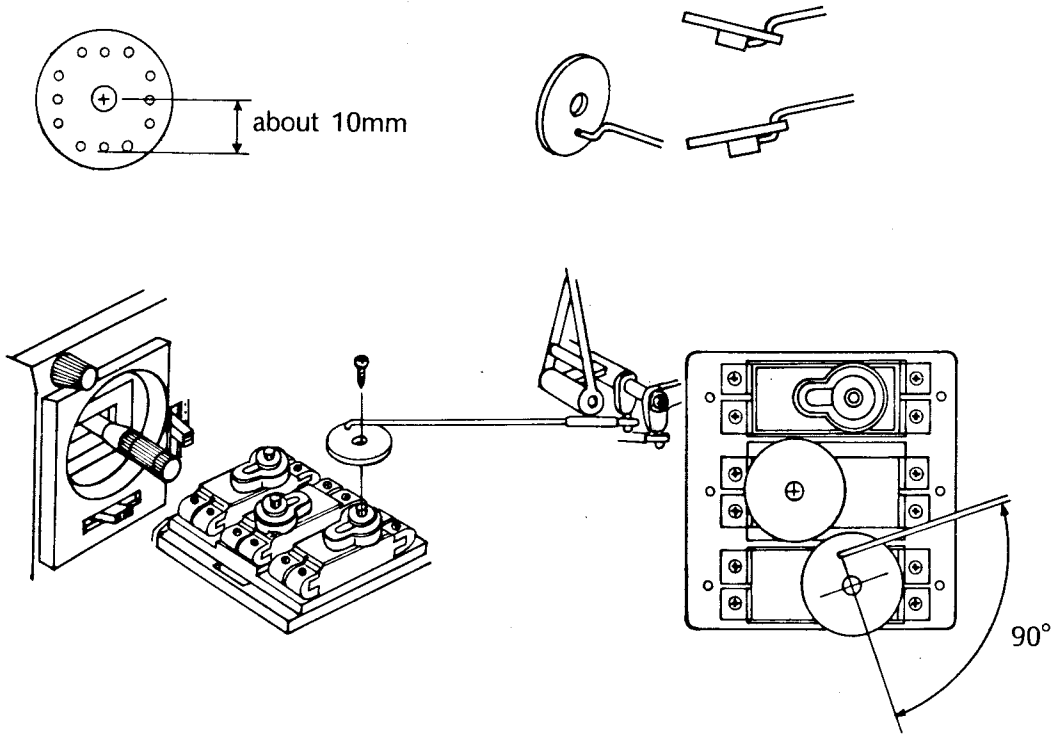
3. Be sure that the swashplate stays level when it is moved from the low to high position.



ELEVATOR LINKAGE

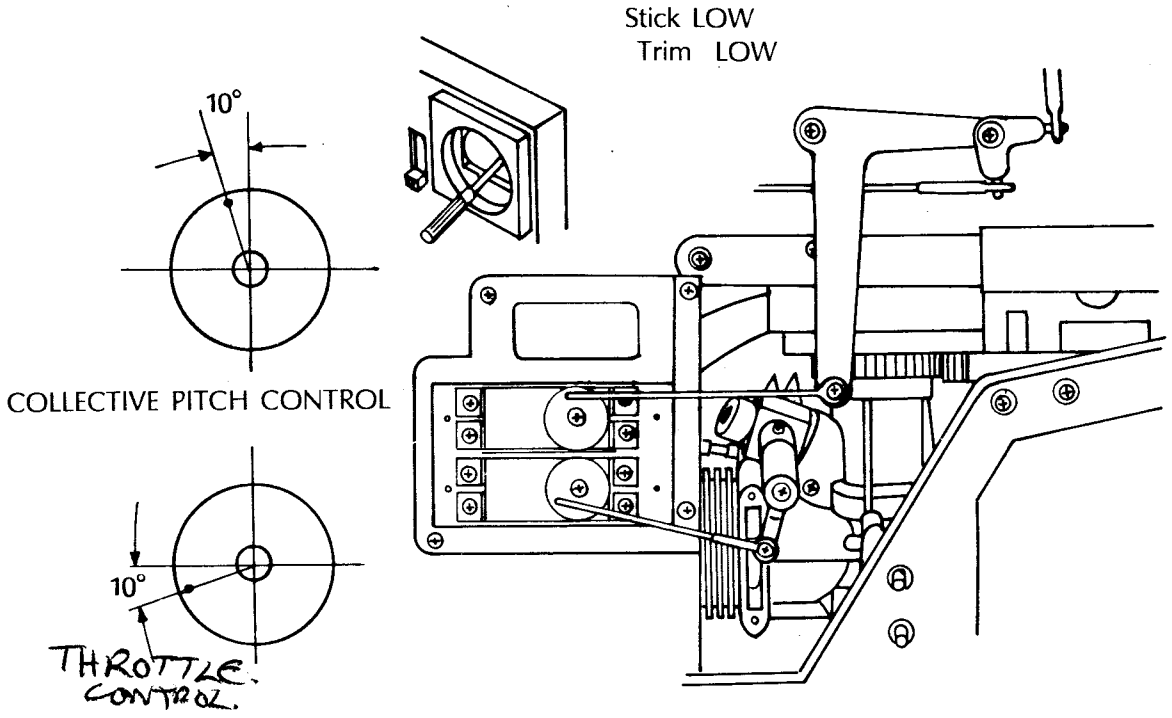
PLEASE CHECK

That the hole in the servo arm through which the control rod is passed, has no play. An oversized hole can adversely effect your control ability and hence the flight accuracy.



THROTTLE AND COLLECTIVE PITCH LINKAGE

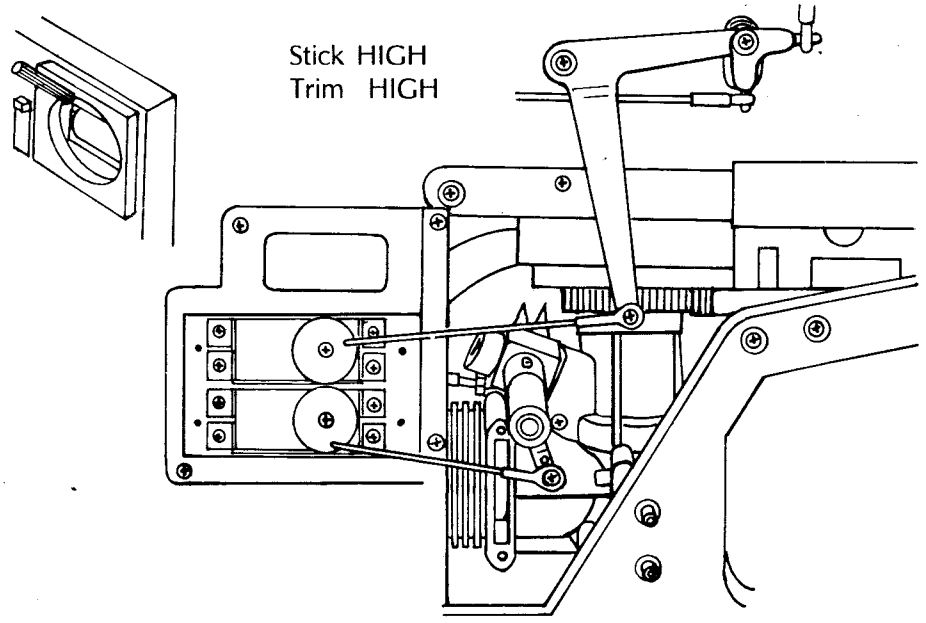
NOTE: This section is particularly important in it's influence on the performance of the HELICAT, so please do your setup work very accurately.



Drill a hole at the position shown in the illustration with both the transmitter stick and the trim set to the ~~high~~ LOW position.

Engine Control

Connect the throttle control rod with the collective pitch control as shown. Drill a hole at the position shown in the illustration when both the stick and trim are set to LOW.

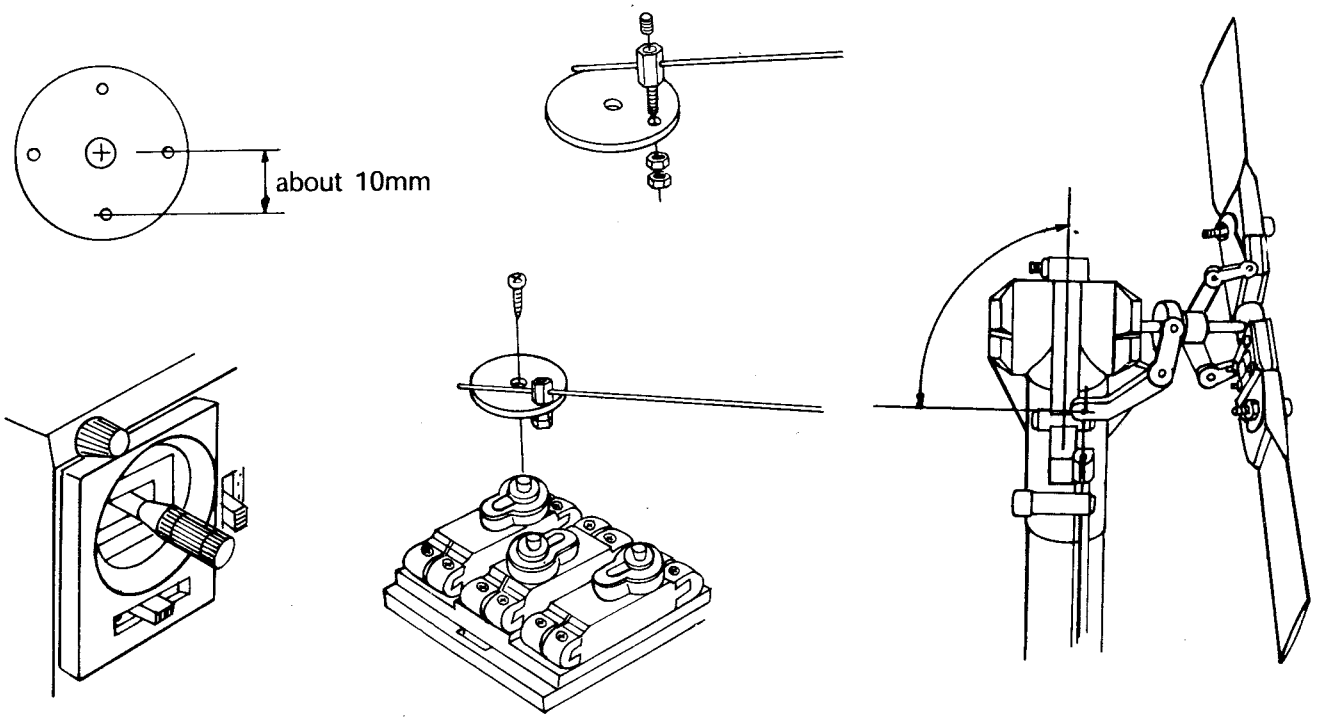


PLEASE CHECK

Does the servo move freely and can it move through it's full control range? If any control rod moves too much it can strain the linkage & cause excessive current drain. In this case, re-drill the hole in the wheel a little closer in, so that the servo movement matches the movement of the collective servo arm.

In this helicopter, it is the standard setting that the pitch of main rotor can vary in the range from +7 to -1 . (On hovering, 5.5 to 6 is the standard).

TAIL ROTOR CONTROL LINKAGE



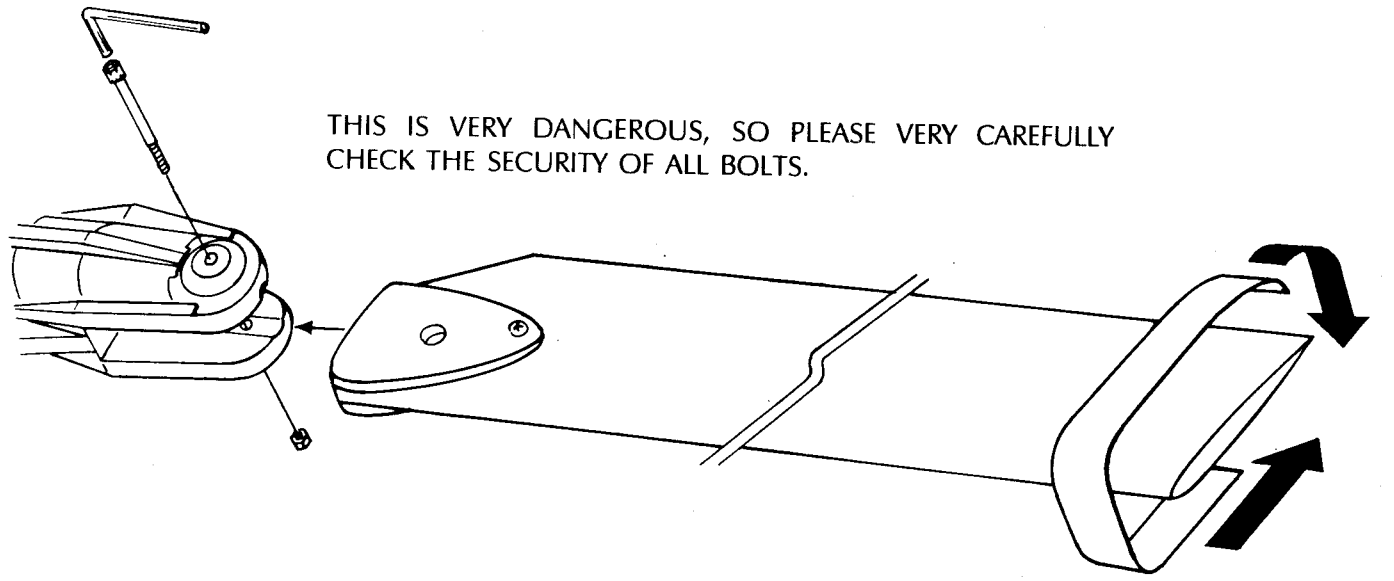
PLEASE CHECK

Set the rudder revolution mixing knob (if fitted), the throttle stick, the rudder stick and the trims of the transmitter to central position. Mount a servo arm in the central position when the servo is neutral.

MOUNTING THE MAIN ROTOR BLADES

PLEASE CHECK

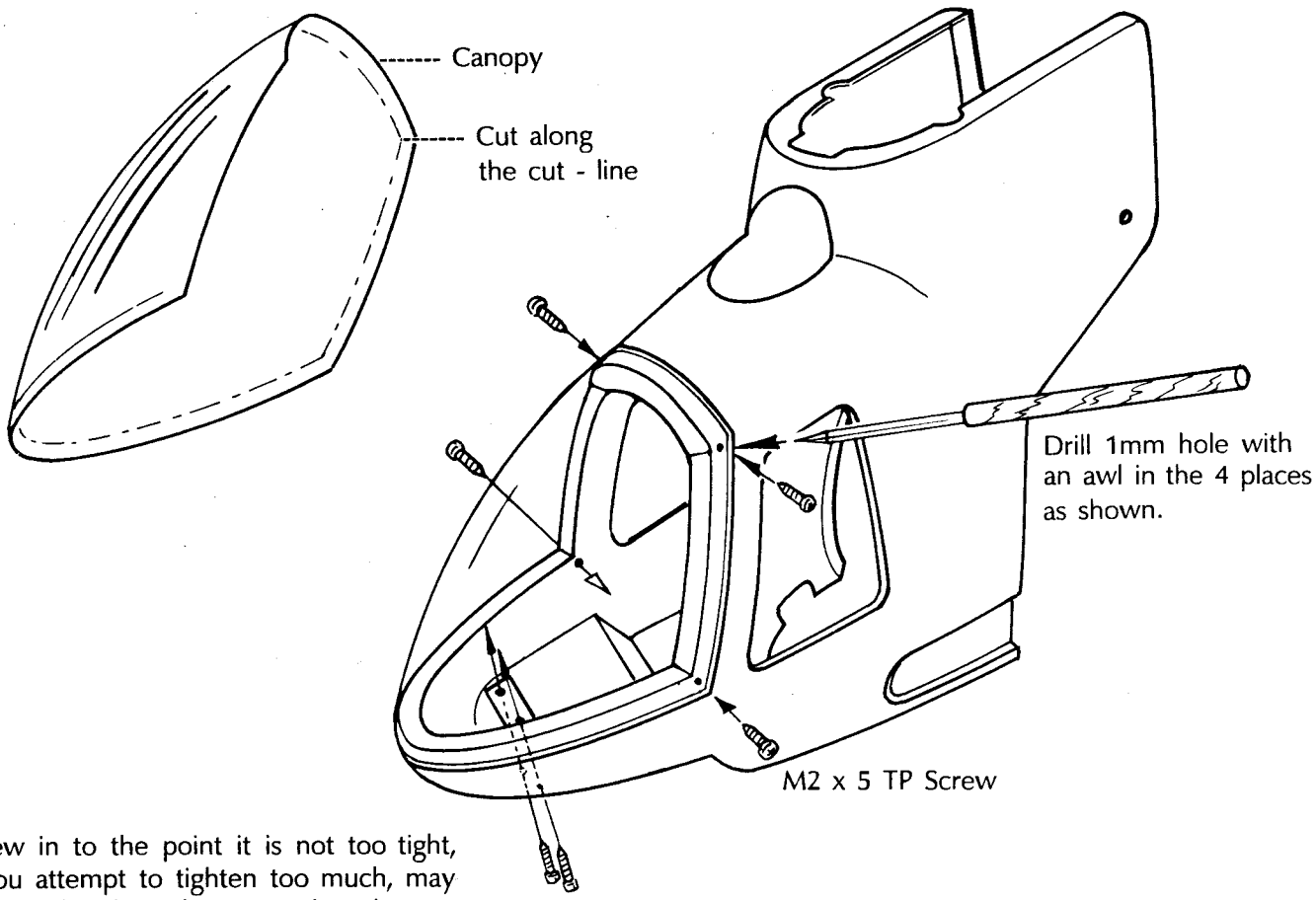
Nylon lock nuts are used to prevent them from being loosened by vibration. A little firmly tighten all bolts until they protrude through the nylon section. If the bolt is not firmly tightened, a main blade may be lost while running.



THIS IS VERY DANGEROUS, SO PLEASE VERY CAREFULLY CHECK THE SECURITY OF ALL BOLTS.

Position the tracking tape at the top of the main blades as shown.

INSTALLATION OF CANOPY

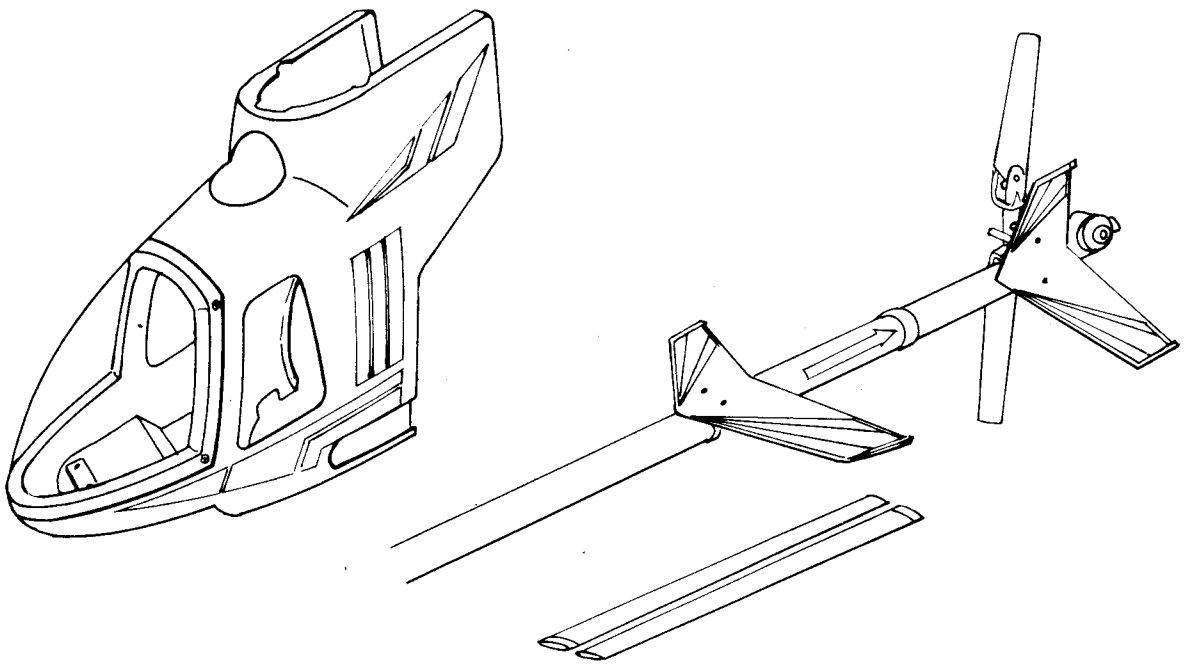


Screw in to the point it is not too tight, if you attempt to tighten too much, may result in breaking the screw thread.

ATTACHING OF DECAL

Caution in the attaching of decal

**Cut out the decals without leaving any blank space.



FLIGHT TRAINING SECTION

Your HELICAT has been completed.Now is the time to check each part of the helicopter carefully once again.

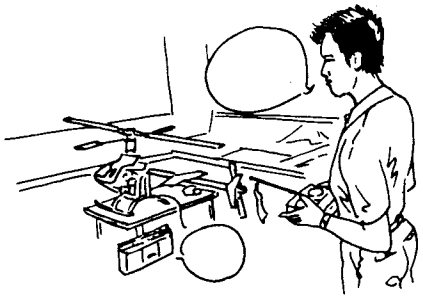
If your national organization for modelling provides for insurance against accidents for your model helicopter we strongly recommend that you join and become protected as soon as you can.

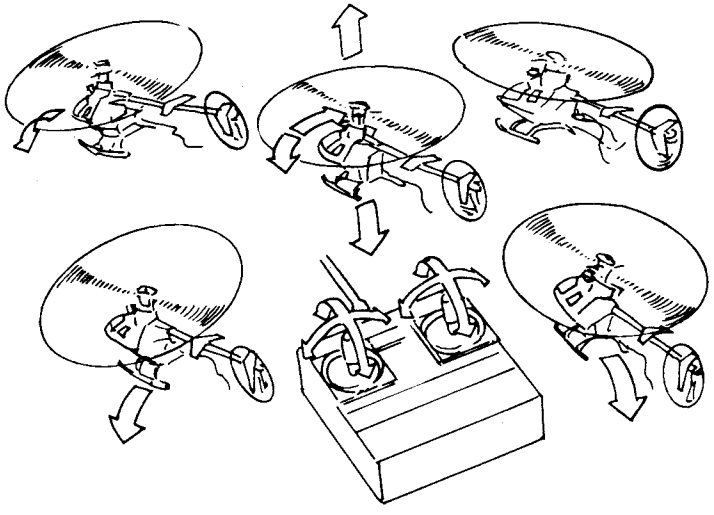
For further details, please ask the hobby shop where you have bought the kit.

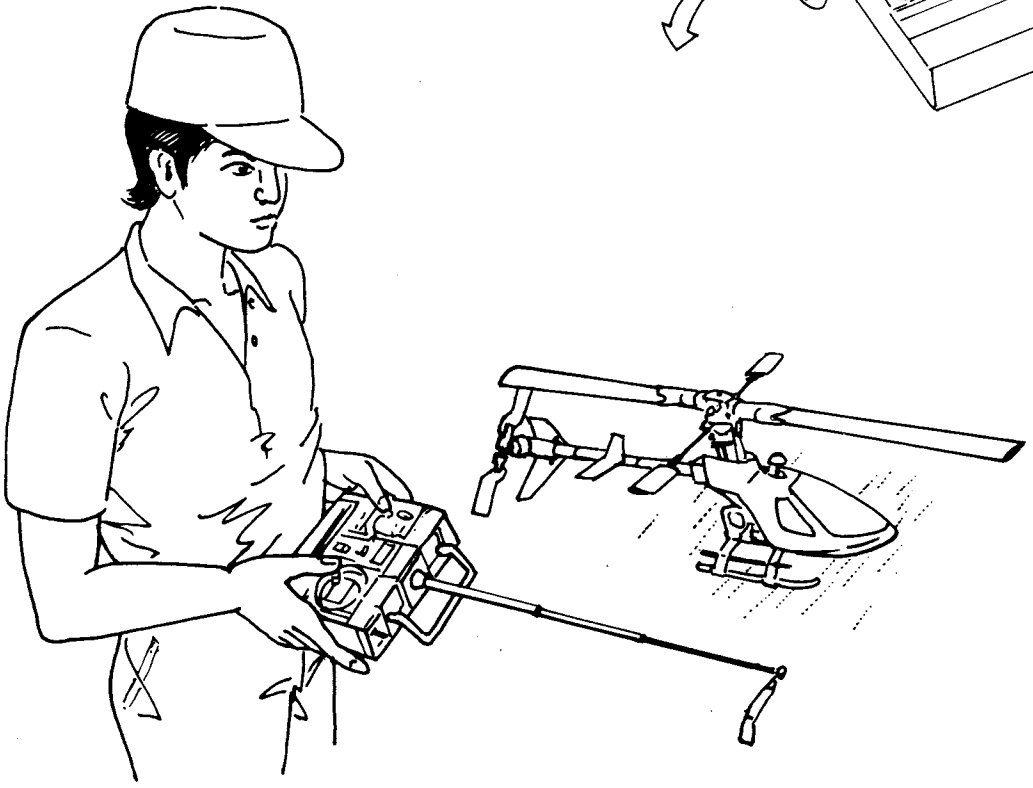
PRE-FLIGHT FAMILIARISATION

Let your fingers/thumbs learn the movements of each channel which are basics of the operation. Practice until the fingers/thumbs move naturally.

1. Place your HELICAT in the center of your room.
2. Speaking "Roll RIGHT, LEFT, nose RIGHT, LEFT, Pitch UP, DOWN and Engine Control HIGH, LOW....." Operate the sticks accordingly.
3. This imaginary flight control will help you to display improved performance in subsequent real flights. So, we suggest you exercise the imagined flights.
4. Record some of your operations on a cassette tape recorder. It is very effective way to speed up your learning process.







BEFORE GOING TO THE FLYING FIELD

Check again to see if bolts, nuts and other fasteners are tight.
Check that the batteries of your radio are charged well.

NECESSARY ITEMS TO TAKE WITH YOU

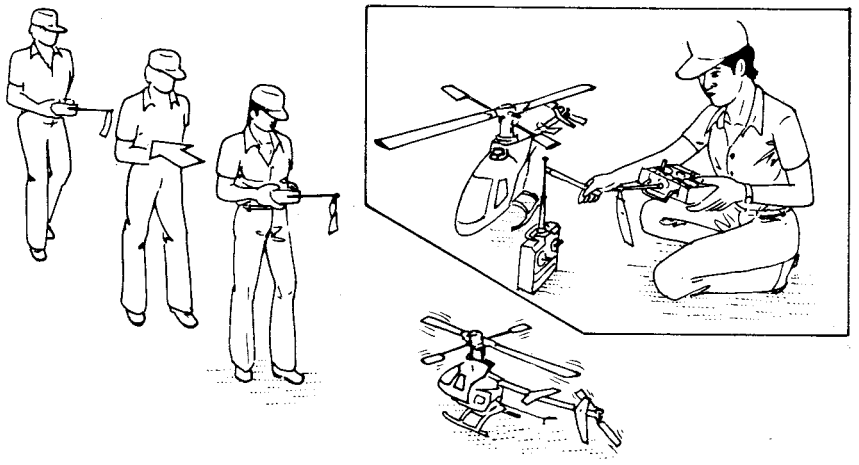
Transmitter: Charged ?
Is the flight battery charged enough ?
Fuel pump: Manual type or electric type.
Fuel: Glow fuel (nitro; about 15%)
Starter Battery Cable for glo-plug
Battery (1.5V) for glo-plug heating. And a full set of tools.

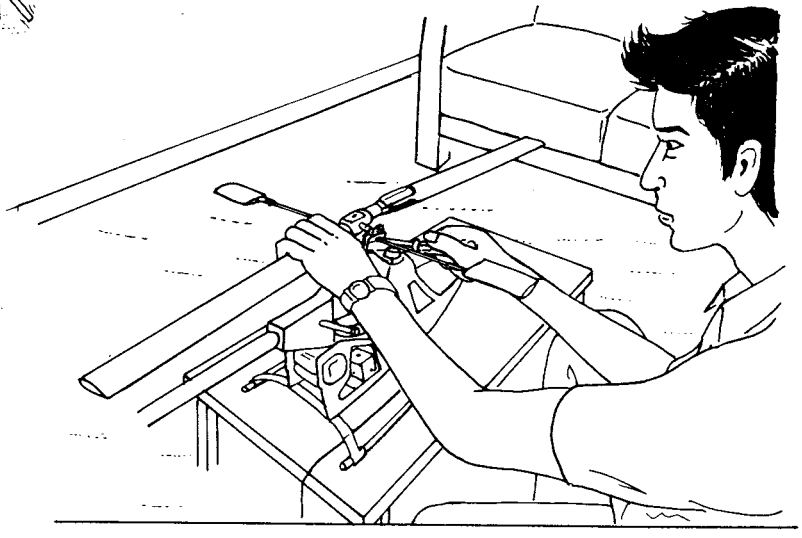
WHEN YOU ARRIVE AT A FLYING SITE

(Please avoid flying when the wing is strong)
A concrete or asphalt surface is suitable for flight exercises for beginners.
Make sure that you check the frequency of others flying near, before switching on your transmitter. If there is a frequency control board or system make sure you respect and use it.

PLEASE CHECK

1. Please disply your frequency by using a flag on your transmitter. Check the frequency board or the frequency of any fliers in the air. Then loudly speak "I will turn on the transmitter of XXX frequency."
2. Turn on the transmitter.
3. Turn on the receiver. If your helicopter is provided with a gyro, turn on the gyro, too.
4. Does each of the controls move as per movements of each stick.
5. Make a range test according to the description of the instruction manual of your radio system.
6. After the range test is over, turn off the transmitter and the receiver. (Turn off the receiver, first).





SUPPLY OF FUEL & ADJUSTMENT OF NEEDLE

Fuel supply

When filling your helicopter with fuel, please be careful to avoid foreign matter or dirt entering the fuel tank.

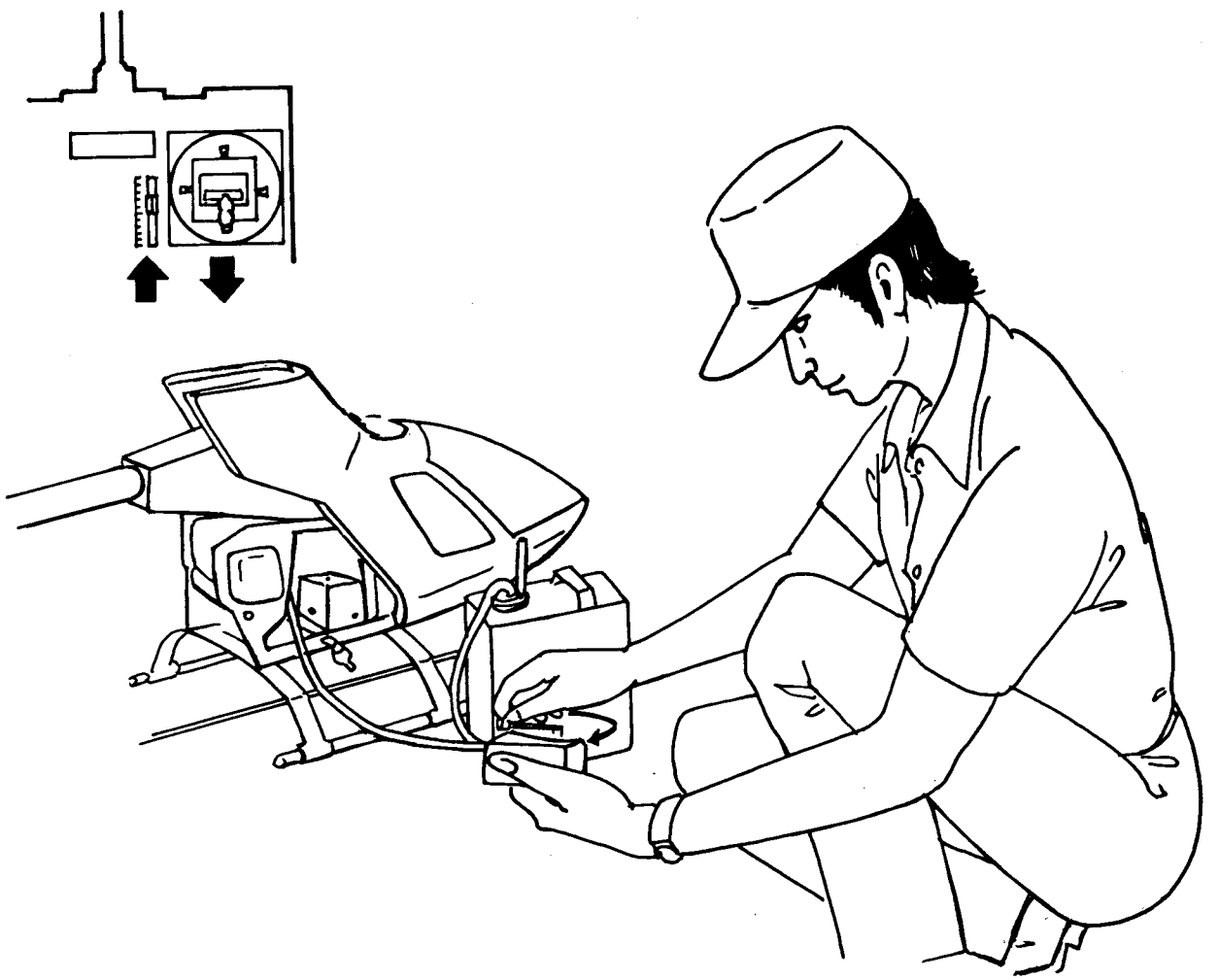
CARBURETOR NEEDLE ADJUSTMENT

1. Close the main needle valve.
2. Open it by one and half turns.

SWITCH ON

1. Turn on the transmitter and the receiver in this order.
2. Set the engine control trim to HIGH
3. Keep the engine control stick at LOWEST

* When supplying fuel, be careful so that fuel may not be overflown to the cabin and the canopy.



STARTING AND STOPPING OF YOUR ENGINE

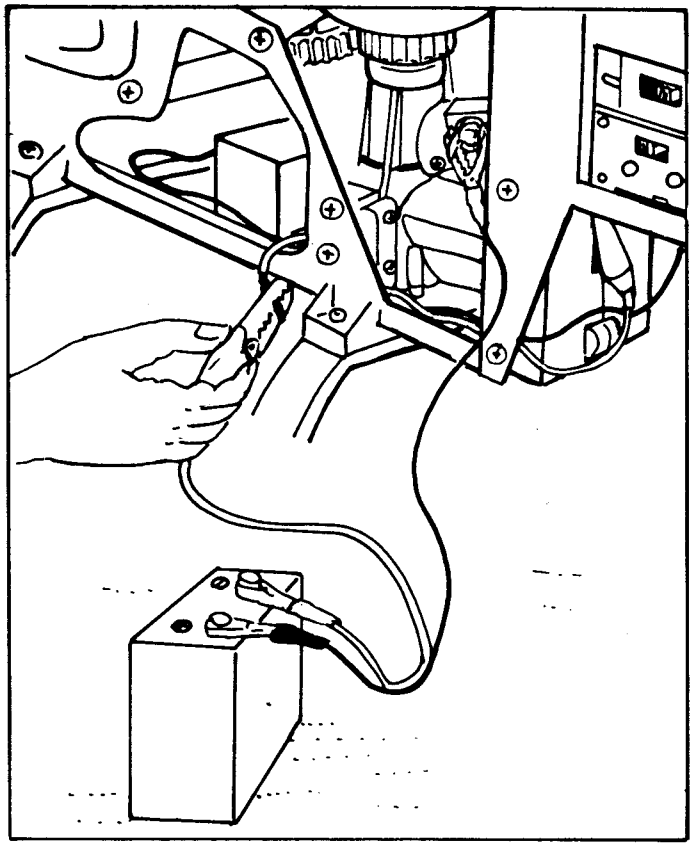
TO START

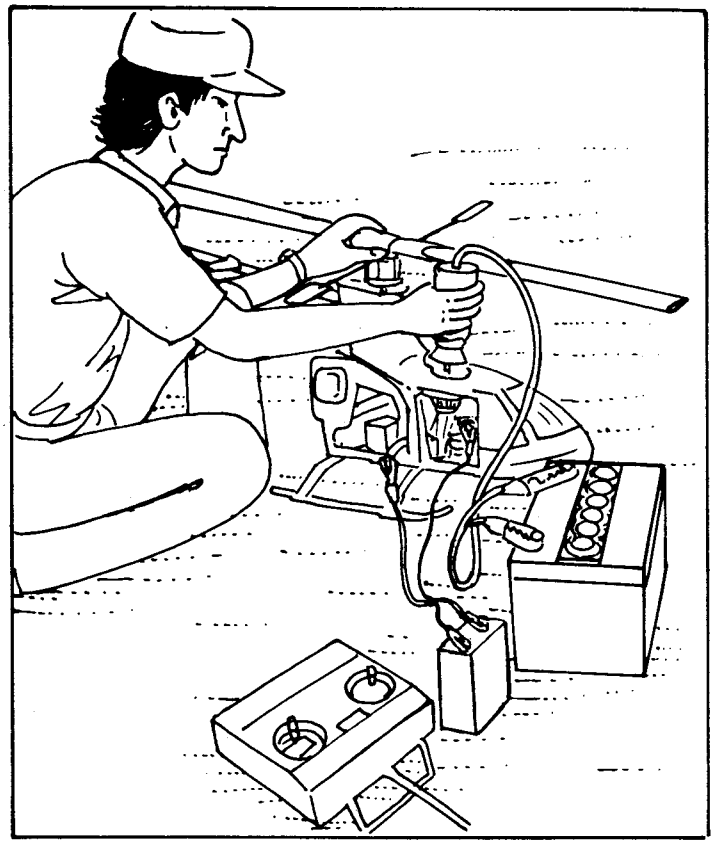
1. Connect the glo-plug battery cable to the plug and to the glo-plug battery.
2. Connect the starter to the starter battery and check the rotation direction of engine. The engine rotates counterclockwise when it is observed from the above.
3. Hold the rotor head very firmly with one hand.
4. Press the start shaft into the well of starter pulley as shown then start with starter.

When the engine starts, remove the starter and glo-plug cable.

TO STOP

Set the engine control lever and trim to it's lowest setting to stop the engine. If it does not stop, but is running slowly enough for you to halt the rotor blades, then do this and pull off the fuel tubing. In this case, correct the linkage in reference with the instructions on page 8. So that the engine may be stopped by moving levers/turn to zero. This is a very important safety rule.





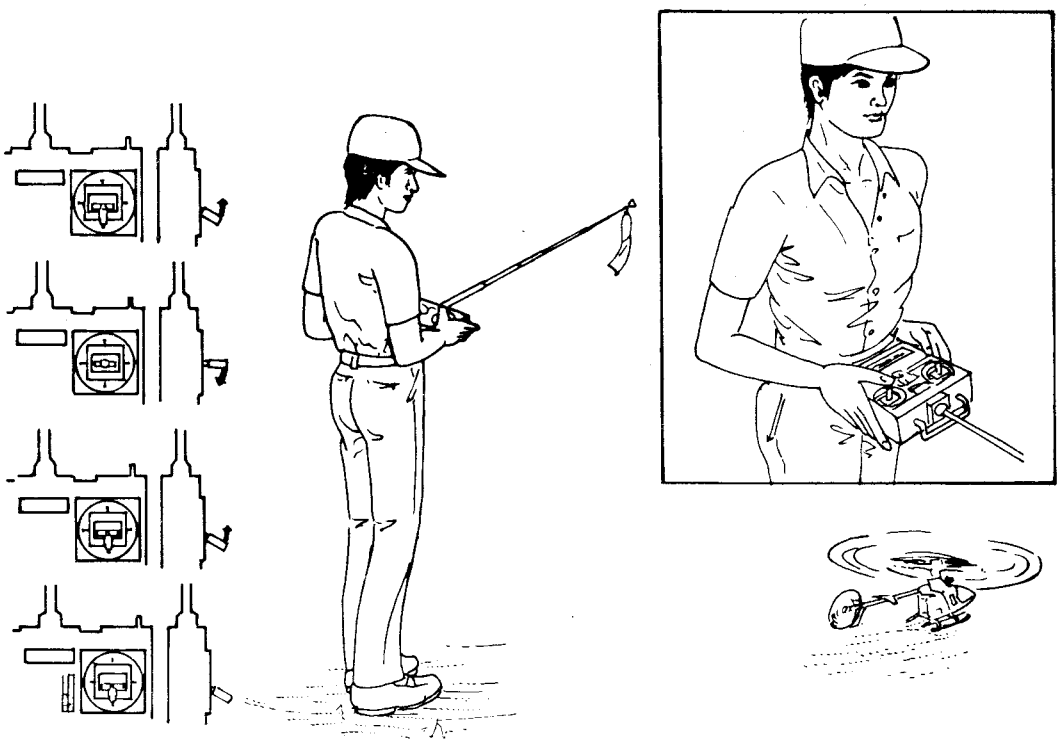
WHEN THE ENGINE DOES NOT START

Conditions	Cause	Troubleshooting
1. Though the engine turns, it does not fire.	1. No fuel Plug does not heat. Rotation of the starter is reverse.	1.Check that the main needle is opened one and half turns. Reverse the wire if wrong.
2. Though engine fires, it does not keep running.	2. Rotation of the starter is reverse. The throttle is not opened enough.	2. Reverse the wires if wrong. Raise the throttle stick.
3. The engine will not turn over.	3. Engine is flooded. Starter is not turning.	3. Turn the engine. Turn the engine over with glow plug removed to clean engine out. Check starter connections.
4. The rotatiion of the starter is weak.	4. Battery is weak.	4. Charge starter battery.

RUN UP THE ENGINE

Place your helicopter at the center of flying site. And confirm that there are no persons close to the helicopter. Please stand at least 10 to 15 feet back and to one side of the helicopter. Draw a deep breath and try to relax.

1. Gradually increase the engine control stick setting.
2. Return the engine control lever to LOW when your helicopter is about to take off.
3. Repeat this operation (about 5 to 10 times)
4. Stop the engine and have a rest.
5. Is your helicopter vibrating? This point is explained in the clause of "ADJUSTMENT OF TRACKING" of next page. If the vibration is small, don't worry about it at this time. If large, stop flying & check for bent shafts or loose screws etc.
6. Don't worry about lateral movements of the bow at this stage.



ROTOR BLADE TRACKING

It is important to check and if necessary adjust the tracking of the main rotor blades before flight.

METHOD

1. Gradually raise the engine control lever towards a HIGH setting until the helicopter is just about to take off. Stand in a position to the rear and side of the helicopter.
2. Carefully watch the tracking of the rotor blade tips. If both rotors blades are the same track, it is all right. However, if the tracks of one blade is higher/lower than the other, it is necessary to adjust the tracking.
3. To adjust tracking, remove the rod end of the collective pitch control.
4. Shorten the rod end of the blade whose track is higher than the other. Elongate the rod end of another blade whose track is lower than the other. (Turn each rod and one or two times.)

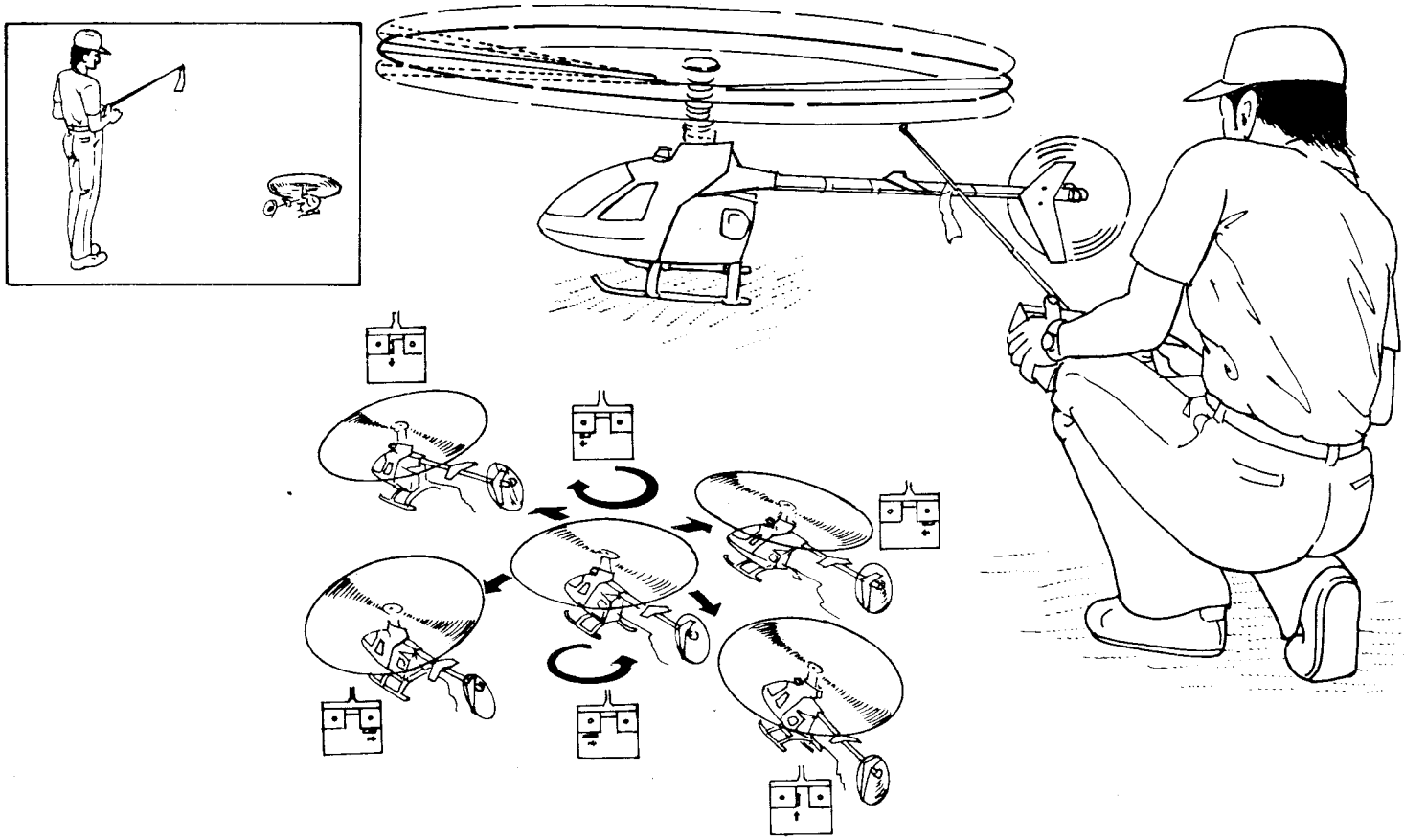
* Keep yourself apart by 5m (17 feet) or more from the helicopter.

ADJUSTMENT OF EACH TRIM

Adjust each of control lever & trim in accordance with the instruction manual of your radio. Slowly raise the engine control lever to HIGH. Correct the inclination of your helicopter when it is just about to take off, by using each trim lever.
Adjust each trim of the tail control, the pitch and the roll in this order.

The trim shown in the illustration is for the mode I specification.

Inclination of helicopter		Correction of trim		
Nose	Turns right. Turns left.	Trim the tail control channel	Left Right	(1) (2)
Body	Inclined forwards Inclined backwards	Trim of the pitch channel	UP ~~DOWN~~ DOWN ~~UP~~	(3) (4)
Body	Inclined right. Inclined left.	Trim of the roll channel	Left Right	(5) (6)



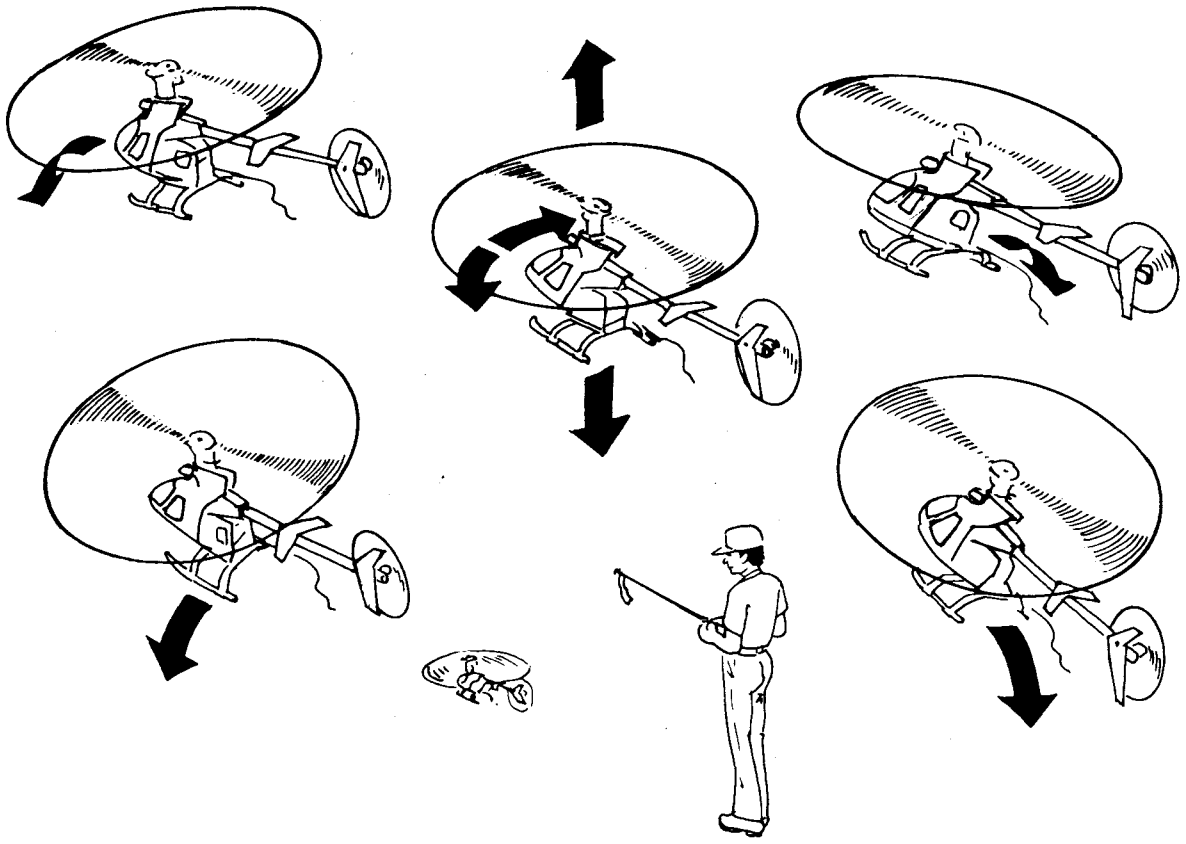
BASIC HOVERING

During this exercise, do not raise the helicopter too high in the air. One of the basic elements of correct and safe helicopter flights is HOVERING.
So, take time to become accomplished at hovering.

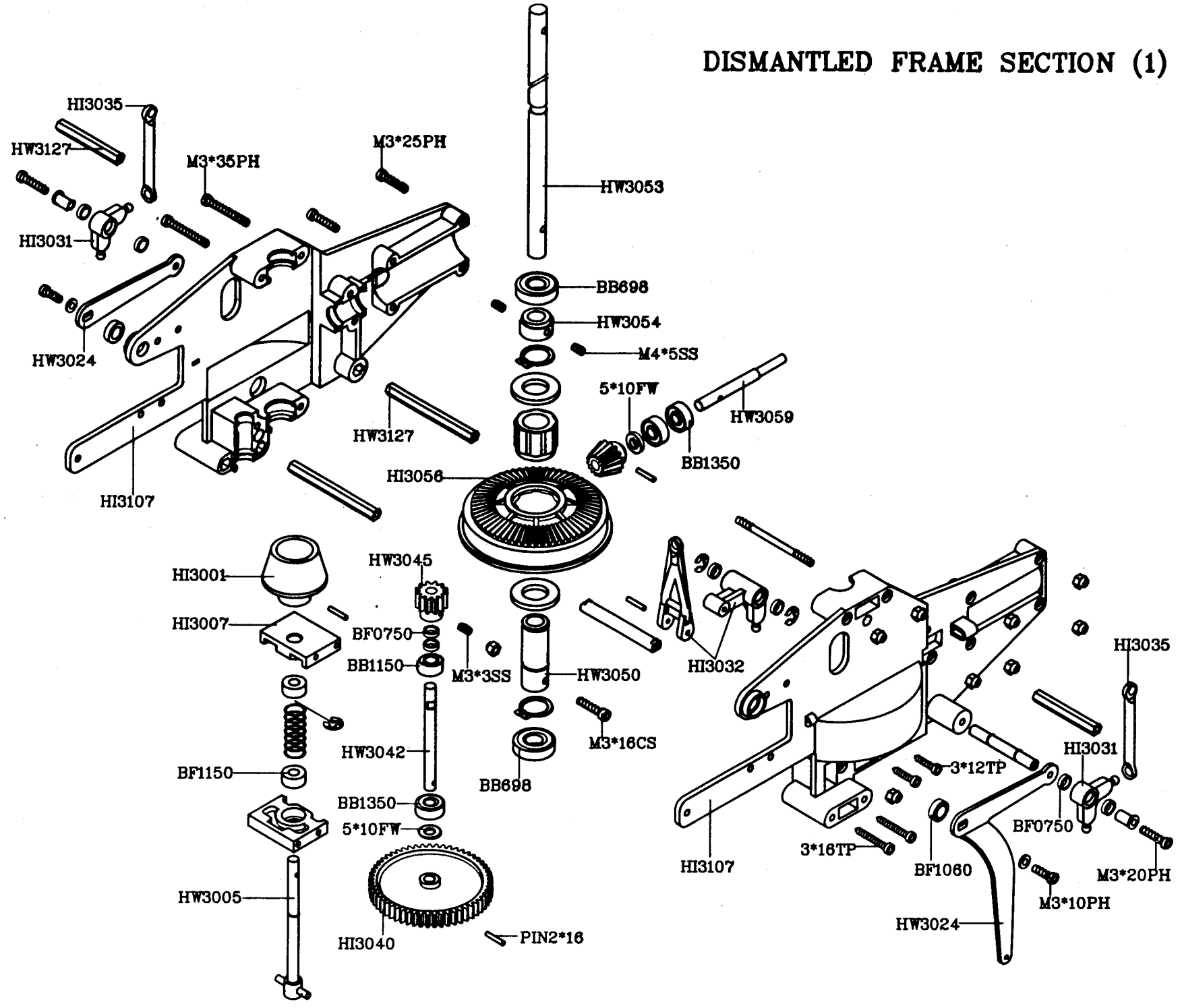
1. Open the throttle and lift the helicopter off. As soon as your helicopter reaches 5 to 10 centimeters (2-4") high, reduce the throttle setting and lands. Repeat this operation until you are accustomed to raise your helicopter about 10 centimeters (4") high.
2. The next stage is to master the maneuvers shown in the illustrations one by one.

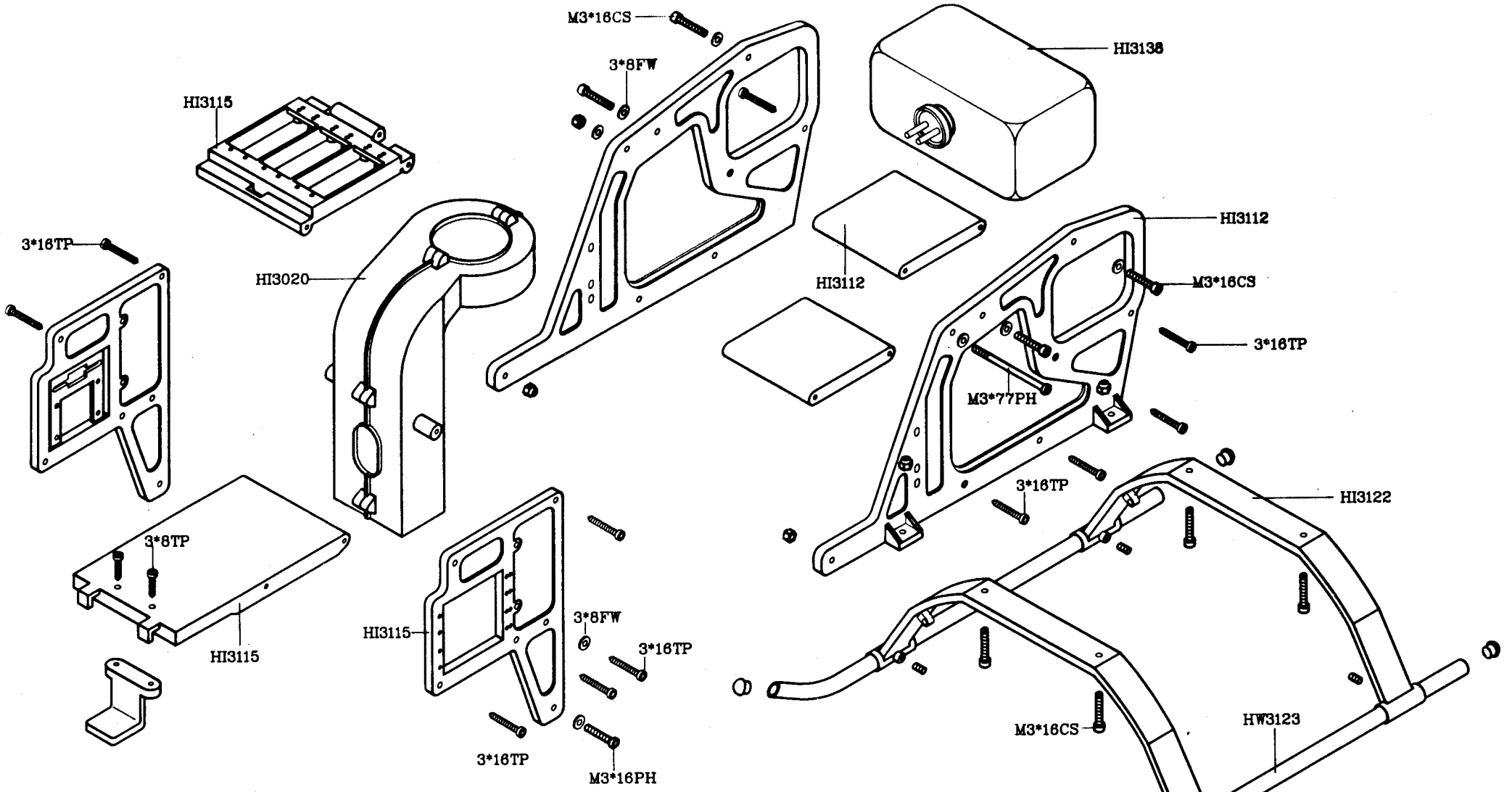
The above exercise is to maintain the helicopter at a fixed position.
These are the basic maneuvers for HOVERING.

1 - 6) Operate with the stick instead of the trim adjustments of the table on the last page.
7) Open the throttle until the helicopter takes off to about 10 cm (4") height.
8) Reduce the engine control stick to low after the helicopter reaches about 10 cm high.



DISMANTLED FRAME SECTION (1)





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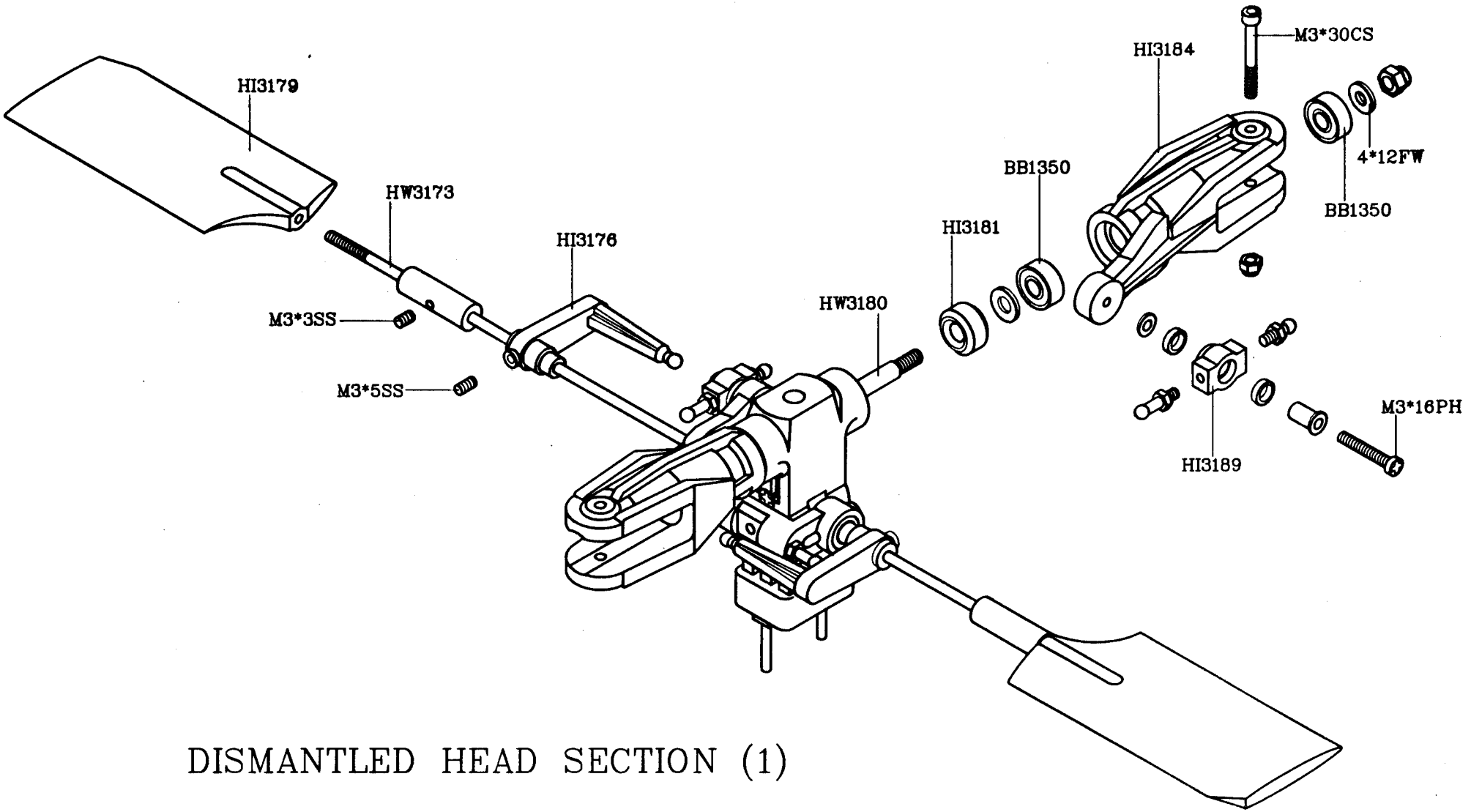
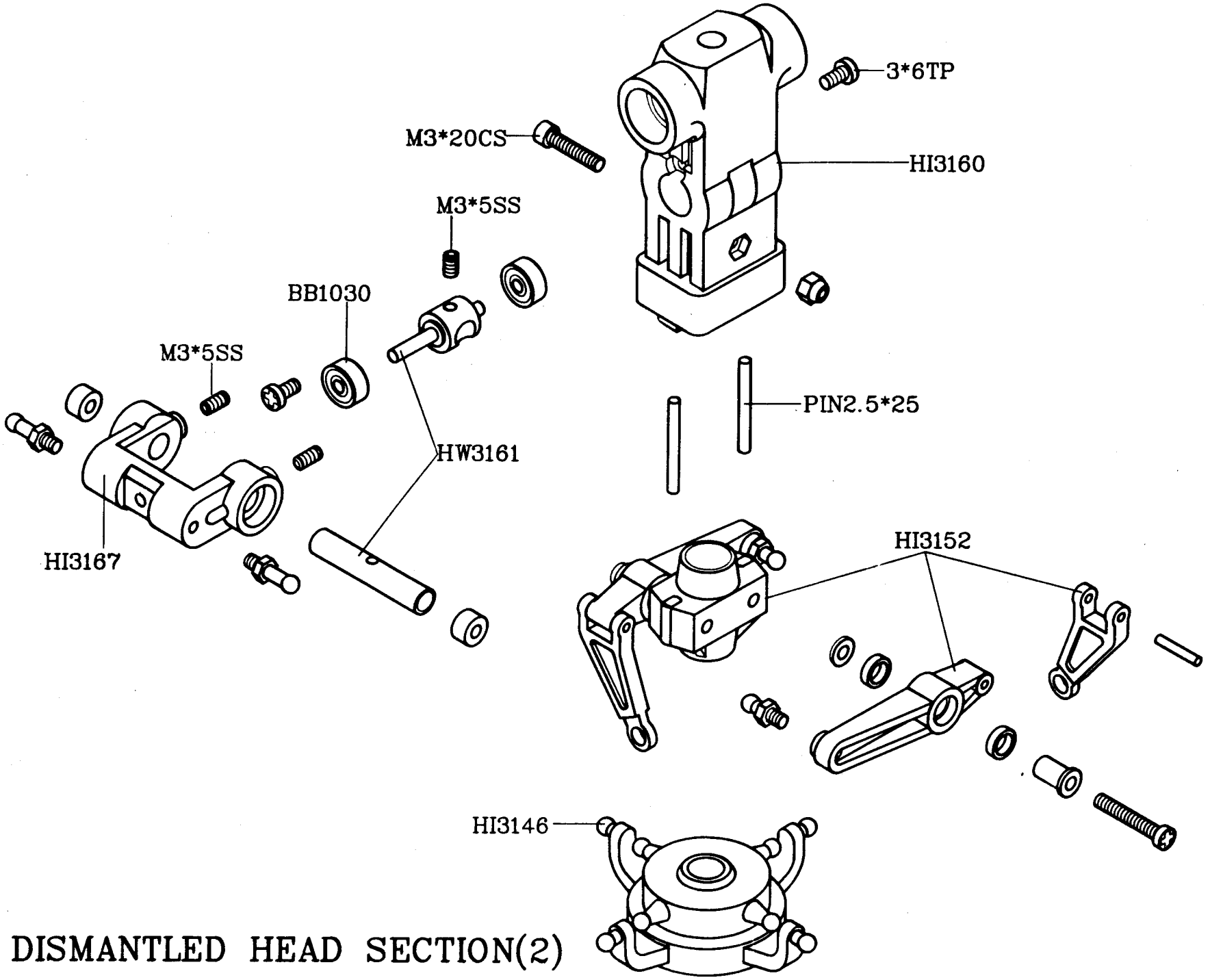
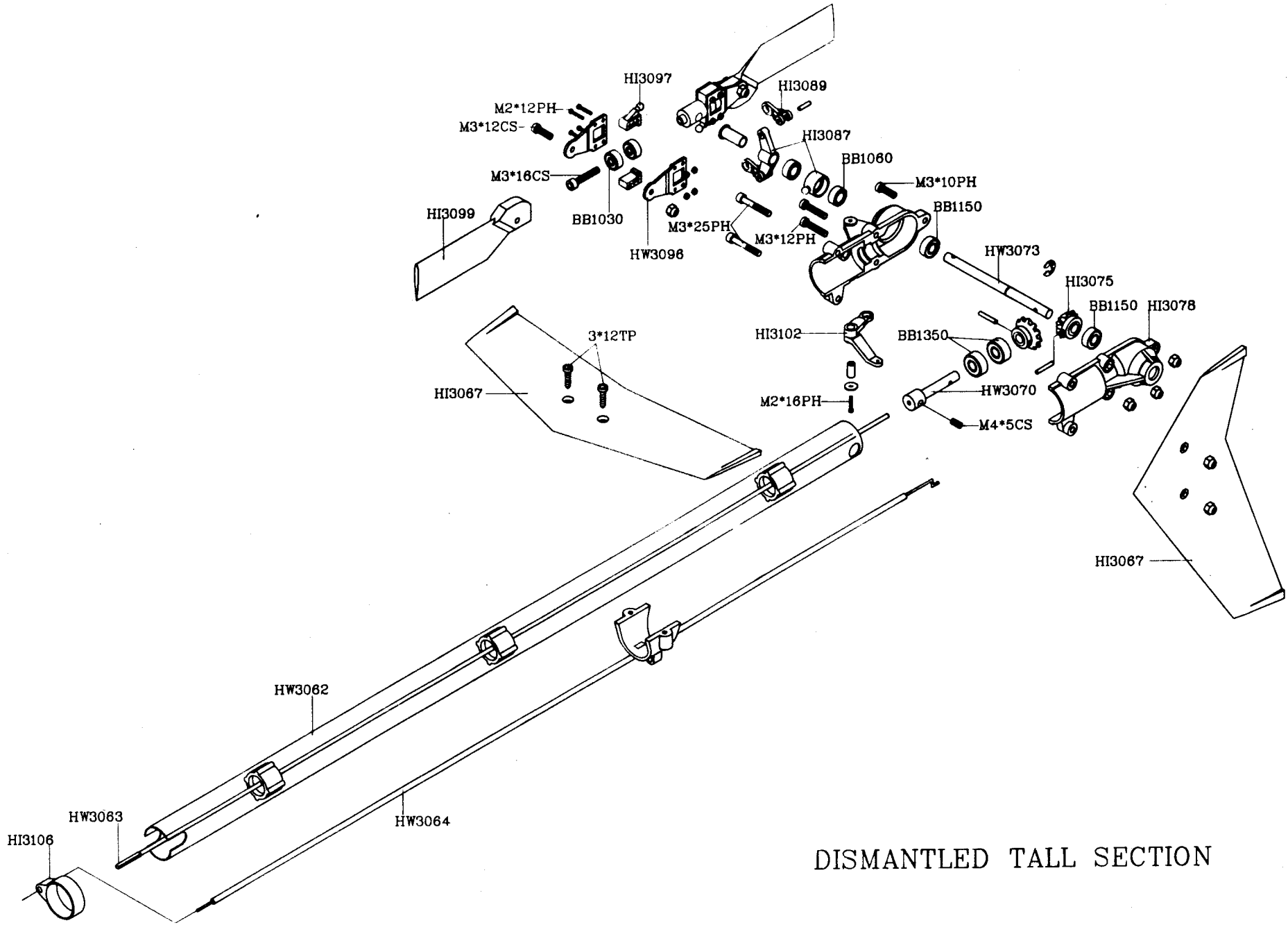


DISMANTLED HEAD SECTION (1)



DISMANTLED HEAD SECTION(2)



DISMANTLED TALL SECTION

THE HELICAT
ADDITIONAL NOTES

PLEASE READ THESE NOTES BEFORE COMMENCING ASSEMBLY OF THE HELICAT.

GENERAL

THE Helicat divides readily into four major sub-assemblies; tail mechanics and boom, upper sideframes, main mechanics and head, lower sideframes and undercarriage, and radio section. The radio section is fixed to the sideframes at four points and by removing the upper screws, loosening the lower ones and undoing the control links, the whole radio section may be swung forwards to give access to the motor/clutch assembly, which is then removed (or installed) complete with the cooling shroud. The lower sideframes (plus undercarriage) may be separated from the upper sideframes by removal of four cap-head screws, leaving the two sub-assemblies intact (note; the lower sideframes are interchangeable). The rear end is removed by undoing the control rod, loosening the clamping bolts and pulling - the tail drive wire has a square front end which engages in a square socket in the tail drive shaft. Plastic clamps on the tailboom support the tail control rod - these tend to slide along the boom and must be secured with silicone (bath sealant).

THE motor is started by a cone start - one consequence of this layout is that there is no flywheel or pulley to grip when tightening the nut which holds the assembly on the crankshaft. The approved method for preventing rotation of the crankshaft when tightening this nut is to insert a suitable piece of fairly hard wood through the exhaust port - it's crude but, with care, it works. The cone start on the Helicat is not permanently engaged. The cone and starting shaft are held clear of the cooling fan by a spring; to start the motor the cone is pushed down to engage a pin at the end of the shaft into a slot in the fan and the starter is then energised; it is essential that the pin is correctly engaged in the slot in the fan before power is applied to the starter.

THE mast lock set screws and the bolt which secures the main gear on the mainshaft are reached via holes in the sideframes. The mast lock is below the upper bearing and this means that the mastlock supports the weight of the model in flight; for this reason it uses two setscrews and there is a groove in the mainshaft as well. This arrangement is necessary in order to prevent flight loads being transferred to the tail drive bevel gears and to keep these gears in correct mesh - it means that, during assembly, the mainshaft (with the main gear bolted in place) is pushed down, and the mastlock is then pulled up to the upper bearing before tightening the set screws. There should be no vertical movement of the shaft in the bearings when this adjustment is done correctly.

ADJUSTABLE weights are mounted on the flybar. These may be slid in or out and they have a marked effect on the stability and response of the Helicat - the handling is very sensitive with the weights inboard and, since the model is aerobatic with them fully outboard and the positioning is critical to maintain the flybar in balance, it is suggested that any movement of the weights inboard is gradual.

ERRORS IN THE MANUAL

1. page 8; the upper diagrams show the servo output discs, and the control rod positions and 10° offsets from vertical and horizontal, when the throttle is closed and collective at minimum pitch. The upper disc is the collective and the lower disc is the throttle. The sentence above 'Engine control' should read 'Drill a hole at the position shown in the illustration with both the transmitter stick and the trim set to the LOW position.'
2. page 16; in the box above the diagrams, for 'Body Inclined forwards', 'Trim of the pitch channel' should be UP. For 'Body Inclined backwards' 'Trim of the pitch channel' should be DOWN. Note; the radio shown is Mode 1.

FINAL ASSEMBLY

ENGINE INSTALLATION

Please note:

a. The landing gear may be installed before the engine. This makes the model easier to work on since it may then be stood upright.

b. The diagram on page 3 of the manual shows the components for the engine/clutch assembly.

c. The throttle extension shown in the diagram is not included in the Helicat kit.

1. Fit the engine mount to the engine - the mount may be fitted either way round. Use liquid silicone or loctite to secure the bolts.
2. Remove the propeller nut, washer and propeller driver from the engine - do NOT remove any washer which is fitted between the propeller driver and the front bearing of the engine. Note; if you are using the ASP 32 engine, fit the washer as shown in the diagram.
3. Insert bearings BB 6801 in the clutch bell (HI 3010) if not already fitted.
4. Slide the components, in the correct order onto the crankshaft - the washer in the kit is only required if there is no washer already fitted to the motor.
5. Screw the clutch shoe carrier onto the crankshaft, using liquid silicone to secure it, followed by the propeller nut, which acts as a lock nut. A suitable piece of wood is used as described above to prevent the crankshaft from rotating. NEVER USE ANY METAL OBJECT FOR THIS PURPOSE.
6. Fit the clutch shoes and spring to the clutch shoe carrier.
7. Fit the cooling fan and tighten the three screws.
8. Fit a suitable glowplug to the engine.
9. Assemble the cooling shroud around the engine/clutch assembly and insert all the screws.

The radio mounting section at the front of the model must now be tilted forwards. Undo the two screws at the top rear corners of the radio section sideframes and loosen the two lower screws slightly - the whole section will now swing forwards and downwards. To instal the engine/clutch assembly;

1. (See page 19 - DISMANTLED FRAME SECTION). Remove the bolt which passes completely through the main sideframes at the top front (M3*77PH).
2. Position the engine mount between the sideframes and insert the securing bolts - use liquid silicone to secure. The engine mount is positioned vertically so that the clutch bell is clear of the driven (white) plastic gear and horizontally so that the gears mesh correctly (but not too tightly).
3. Replace the long bolt (M3*77PH), which now passes through the cooling shroud,but do not tighten it yet.
4. Insert the remaining screws which secure the cooling shroud to the sideframes.
5. Refit the radio section.
6. Tighten the long bolt (M3*77PH).
7. Continue with the radio installation as described in the manual.

When the model is complete and fully assembled (including the canopy) apart from the main blades, check the centre of gravity; with the flybar across the fore/aft axis, the model should be level when suspended by the flybar - if it is not, move the nicad and receiver or add weight as necessary.
Finally, fit the main blades and check ALL screws, bolts &c. for security.

*****

PRICE LIST JANUARY 1992

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