

ISHIMASA ELECTRIC HELICOPTER, EH-1, "SKY LARK"

Parts List

No.	Description	Q'ty	Remarks	No.	Description	Q'ty	Remarks
1	Mast	1		28	Tail-Rotor Holder	4	
2	Mast Stopper	1		29	PC Plate	1	
3	Frame	1		30	Tail-Pipe Band	1	
4-1	Frame Stay A	1	Assembled	31-1	Tail Support	2	Assembled
-2	Frame Stay B	1		-2	Tail Support Band A	1	
-3	Tail-pipe Stay	1		-3	Tail Support Band B	1	
5-1	Mast B Holder	1	Assembled	32	Flexible Rod	1	
-2	Shaft B Holder	1		33	Drive Belt	1	
6	Top Frame	1		34	Tail-Fin	1	
7	Mast Housing	1		35-1	Servo Mount	2	
8	Motor Mount	1		-2	Servo Band	1	
9	Shaft Stopper	1		36	L-Crank	3	
10	Shaft Pulley	1		37-1	Controller	1	
11	Shaft	1		-2	Controller Bar	1	Assembled
12	Primary Gear	1		-3	Controller Terminal	1	
13-1	Motor	2	Assembled	38	Main Rotor	2	
-2	Motor Pinion Gear	2		39	Rotor Holder	4	
14	Secondary Gear	1		40	Rotor Holder Spacer	2	
15-1	Swash-Plate	1		41	Stabilizer Plate	2	
-2	Pivot Bolt A		Assembled	42	Stabilizer Bar	1	
-3	Pivot Bolt B			43	Stabilizer Stopper	2	
16	Stopper Rod for Swash-Plate	1		44	Rod for Stabilizer	1	
17-1	Upper Lock	1	Assembled	45	Controller Lever	1	
-2	Rod for Upper Lock	1		46	Gimbal Head	1	
18-1	Skid	2		47	Stabilizer Metal	2	
-2	Skid Base	2	Assembled	48	Gimbal Shaft	1	
-3	Skid Stay	4		49-1	Pipe for Centre-Shaft	1	Assembled
-4	Rubber Cushion	4		-2	Pipe for Centre	1	
19	Battery Hook	4		-3	E-Ring for Centre-Shaft	2	
20	Tail-Pipe	1		50	Gimbal Hub	1	
21	Tail-End	1		51-1	Canopy A	1	Assembled
22	Tail-Shaft	1		-2	Canopy B	1	
23	Tail-Shaft Pulley	1		52-1	Ball Joint	9	
24	Tail-Shaft Stopper	1		-2	Steel Ball for Ball Joint	2	
25	Tail-Rotor Hub	1		-3	Ball-Joint Rod	2	
26-1	PC Rod	1		53	Rod Adjuster	2	
-2	PC Rod Metal	2	Assembled	54	Battery Band	2	
-3	PC Rod Stopper	2					
27	Tail-Rotor	2					

— Subject to change with or without notice —

ASSEMBLING

Caution Before Assembling

This electric helicopter has been partially assembled at the factory to eliminate trouble, so that you may enjoy earlier flight. As the power source is two electric motors, which are smaller in output power than petrol engines, it is essential to minimize the power loss at each moving part. Please assemble and adjust it carefully.

All bolts and nuts should be tightly fastened with proper locking agent before making the test flight.

Be sure to check the contents of the kit with the list on the last page of this manual.

Assembling

1. Main Mast

The sketch shows the assembled one. First, attach the mast stopper at the bottom of the main mast with 3 x 3 hollow screw. The mast should be threaded through the underside of the bearing on the mast B holder, and the bearing of the top-frame, until the stopper hits the bearing below. Fasten the mast with the secondary hollow set screw.

2. Swash-plate

Put the swash-plate to the main mast so the smaller diameter on the swash-plate is up. Attach the upper-lock and fasten it with 2.6 x 8 cap screw and nut. Be sure to minimize the clearance of the swash-plate.

3. Adjustment of Gears

To minimize power loss, carefully adjust the clearance of gears. The proper backlash is necessary for maximum adjustment — about 0.1 to 0.2 mm. The easiest way to attain this is to put a strip of newspaper between each gear.

The adjustment of secondary and primary gears should be made by loosening the setting screw of the motor mount, and after adjustment is made, fasten the screw again. Be sure to ascertain the light turning of both gears.

The adjustment of primary and pinion gears on the motor should be made by loosening the motor setting screw. The backlash of two pinion gears with primary gear should be adjusted equally.

After assembling all other parts, check to see if all gears turn lightly.

4. Attaching the Skid

The skid should be assembled under the frame as per the sketch. A rubber cushion, skid base and battery hook, tail-pipe support, and skid stay should all be fastened together with a screw. (See sketch)

5. Attaching the Tail-pipe

Attach the assembled tail-pipe on the frame with a pipe-band and 3 x 15 screw and nut. The tail support should be attached to the tail-pipe as per sketch. Be sure to fasten flexible rod to the tail-pipe.

The tail-fin should be fastened together with a flexible rod by using 2.6 screw.

The rotary drive belt drive belt for tail-rotor should be threaded through PC rod.

6. Installing Servos

First attach three servos on the servo mount, as per sketch, and set the mount on the R/C compartment with screw and nut. (Check position of servo horn on sketch)

Install a R/C receiver and battery ahead of servo with rubber bands and connect each terminal connector. (The position of the servos are left-to-right when looking from rear for aileron, rudder and elevator)

Attach the receiver switch. Check the movement of each servo by switching on both R/C receiver and transmitter.

7. The caution for linkage is: i) check to see if all parts move lightly; ii) all the rod should not hit frame of helicopter; and iii) the rod should be attached properly without any rattle.

Linkage

Attach L-crank at the sides of frame, as per sketch.

Connect rods from servo horn to L-crank by consulting Sketch 1 on the preceding page. Connect rod from L crank to swash-plate. The length of rods should be adjusted properly so that the swash-plate is parallel to the ground, exactly vertical to the main mast.

Connect the tail-pitch controller with a servo at the center with a flexible rod, after setting L-crank in position.

8. Assembling the Controller

Care should be taken to insure equal contact at each terminal. Make sure "Power off" is at the bottom of the transmitter stick. And "Maximum speed" is at the top.

Remove the servo horn and attach the controller bar on the servo. Attach the contact terminal on the controller bar to the lug-plate (to be connected to motor) as per sketch.

Attach the servo on the controller stay with one-touch tape, after adjusting the contact terminal on the controller.

Fasten the servo and controller with servo band, after attaching it just ahead of motor mount.

Attach battery lug-plate to the controller as per sketch.

After assembling, check the contact of terminal, and MAX and OFF position, again.

9. Attaching the Tail-rotor

All tail parts have been assembled. Please fasten the screws again. The tail blade should be attached with a 3 x 15 screw and Nylon nut. The tail-blade should be adjusted to 0 pitch when the rudder stick of the transmitter is at extreme left.

The length of the driving belt should be adjusted.

10. Canopy

Cut the shaded parts along the line and paint them as you like. The assembling of the canopy should be made by 2 x 5 screws and nuts, as per sketch. Setting the canopy to the frame should be made by 2.6 x 5 tapping screws.

ADJUSTMENT

The electric helicopter, as compared to the petro-engine helicopter, cannot fly with much engine power. It is, therefore, essential to make careful adjustments before flying. The electric helicopter is not easy to operate, but enough training and adjustment can be made with the help of the optional accessory, the "power-cord".

1. Balancing Rotors

Although the main rotor has been checked for balance, it is best to check the balance with gimbal-yoke. Put some vinyl tape on the light side. The tail-rotor should also be checked. The final check of rotors should be made by turning them.

The stabilizers should be balanced by adjusting the length of stabilizer-rod.

2. Swash-plate and Rod

Connect the rods from servos to swash-plate and pivot-bolt. The clearance of each connection should be minimal. With the elevator and aileron servos set at neutral, the swash-plate should be adjusted by the rod so that the plate is vertical to the mast and horizontal to the ground.

Adjust the stabilizer-rod to be horizontal when the swash-plate is horizontal to the ground.

3. Adjustment of Pitch

The Pitch of the main-rotor should be adjusted to 5.5 to degrees with the help of the pitch gauge. The pitch of the tail-rotor should be adjusted to 0 when the rudder stick is at extreme left.

4. Position of Gravity

The correct position of gravity may be obtained by installing servos and receiver at the designated positions. The favorable position is just beneath the main mast or a little bit before it.

5. Flight

After finishing these adjustments, make a test flight, selecting flat ground, without wind. Be sure that no personal damage will occur.

It is advisable to use the power cord, an optional accessory, with 12 V automobile battery, as you can maintain the adjustment for a long time. It is also advantageous for training helicopter operators.

Before connecting to the power source, check the operation of each part by switching on transmitter and receiver. Make sure the motor is OFF when the engine control is at the slowest position. Connect the power source taking careful notice of power polarity, and gradually turn the engine control to high position.

Initially, the counter-torque would turn the helicopter in a left turn, as the electric helicopter has no clutch-system. The rudder stick of the transmitter should be turned to the right before switching on.

As the main rotor turns faster, the counter-torque lessens. Gradually turn the rudder stick to neutral. Be sure the operator stays BEHIND the moving helicopter.

As the rotor turns much faster, the skid of the helicopter is apt to leave the ground, and the fuselage will start to turn. To correct this, adjust the rudder stick so that the tail faces the operator; and at the same time, adjust the fuselage to be parallel to the ground by turning the stick of aileron and elevator.

If the helicopter does not take off parallel to the ground, you should adjust the trim or rod before trying again. You should adjust the helicopter for perfect flying — it will take off parallel to the ground, without switching the aileron and elevator stick, when there is no wind.

For a beginner, the adjustment up to this stage may be made by a proficient flyer, and the beginner can be a good flyer without further difficulty.

After finishing the adjustments, try the flight with a battery pack.

The flight time of the helicopter with a battery pack depends on the charged condition of the pack. With a good charged pack, flight time will be approximately four minutes.

If the battery pack does not hold a charge long enough, try charging it again. Care should be taken, as a forced rapid charging would damage the pack. Read the instructions of the charger and follow them.

ACCESSORY

Battery Pack — 9.6 V Ni-Cad Battery Pack, 8N-1200

With a proper charge, it should last for about three minutes with the helicopter. Ordinary and rapid charger are available.

Power Cord — Silicon Cord, 7 meters

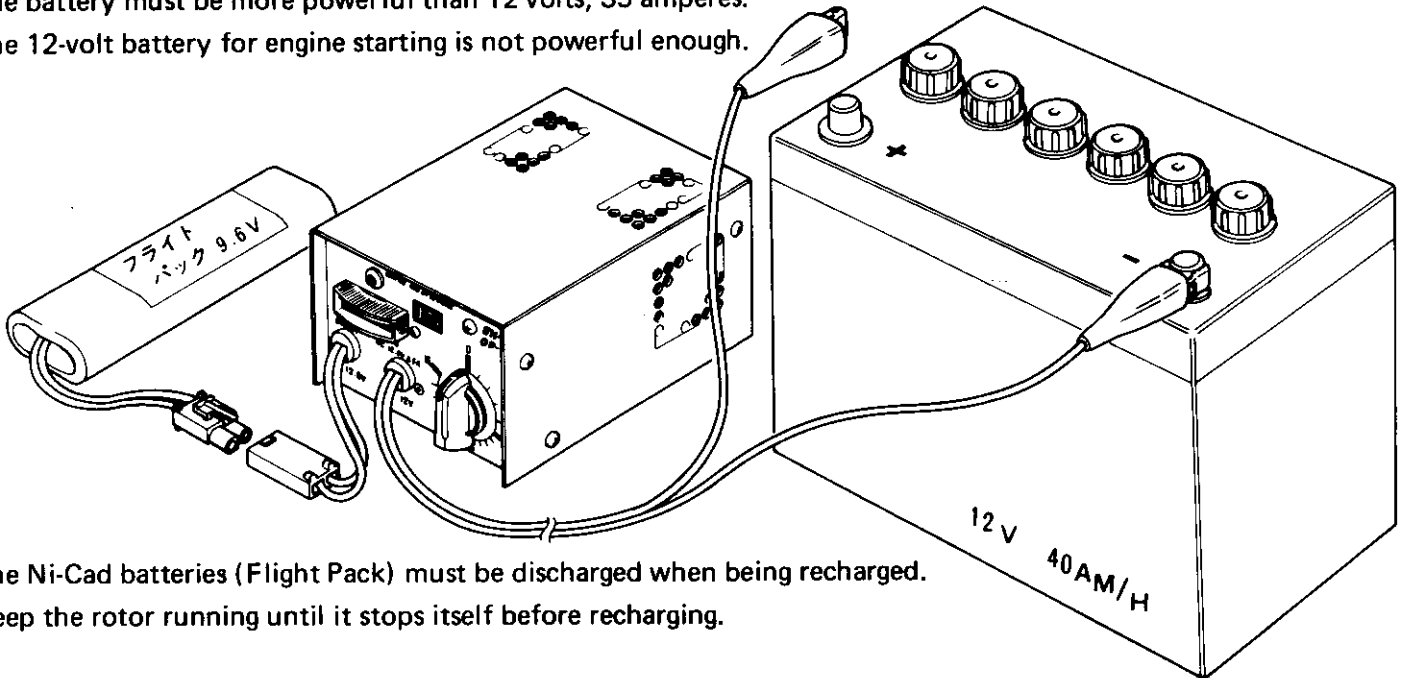
Use this cord with 12 V automobile battery for adjustment and training of helicopter operator.

Charger — for Household currency

For 12 V automobile battery (can charge in 15 min.)

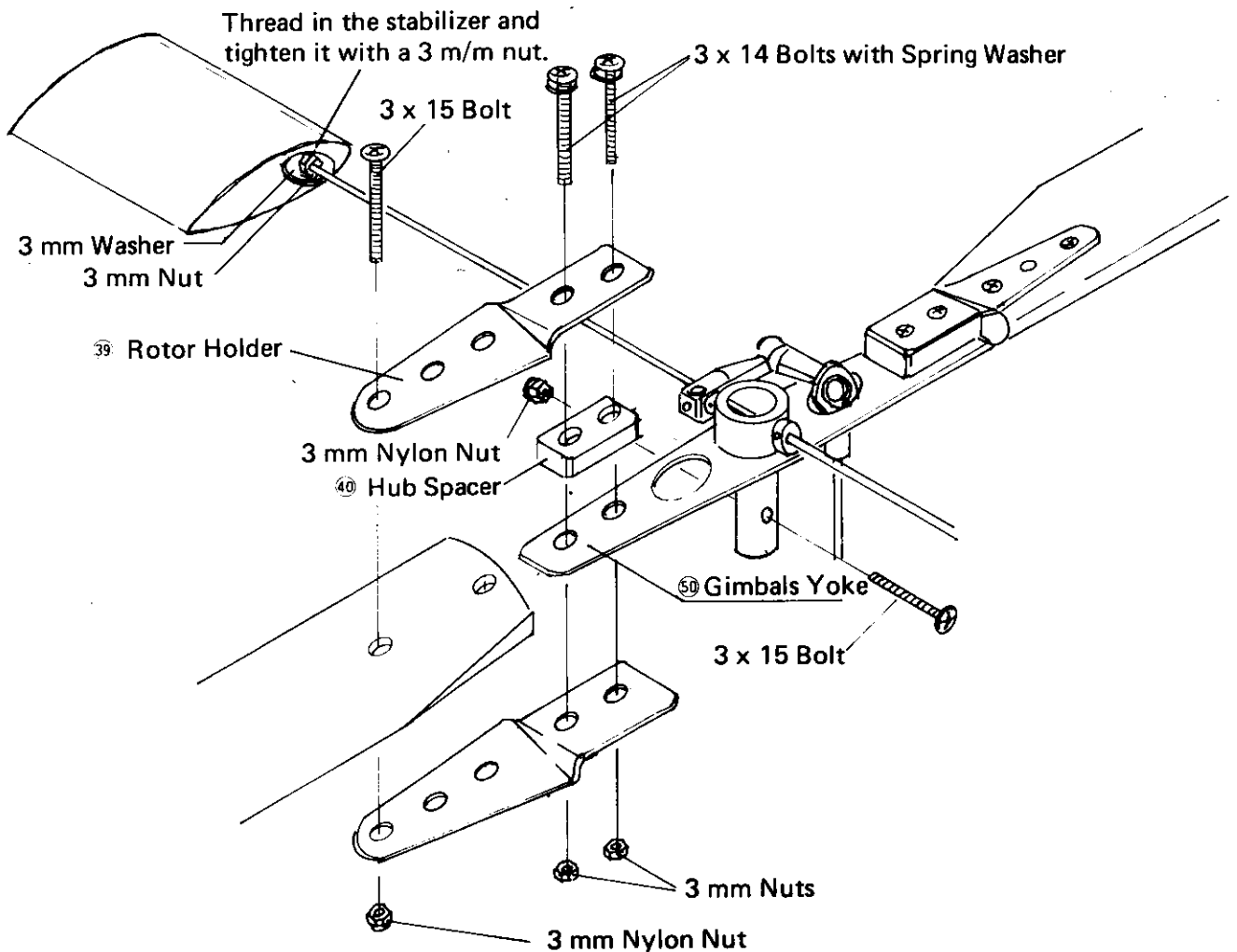
HINTS FOR "SKY LARK EH-1"

Since "Sky Lark" draws 20–30 amperes during a flight, the wiring arrangement should be done as illustrated below for both rapid charging and a flight with the power source on the ground. The battery must be more powerful than 12 volts, 35 amperes. The 12-volt battery for engine starting is not powerful enough.



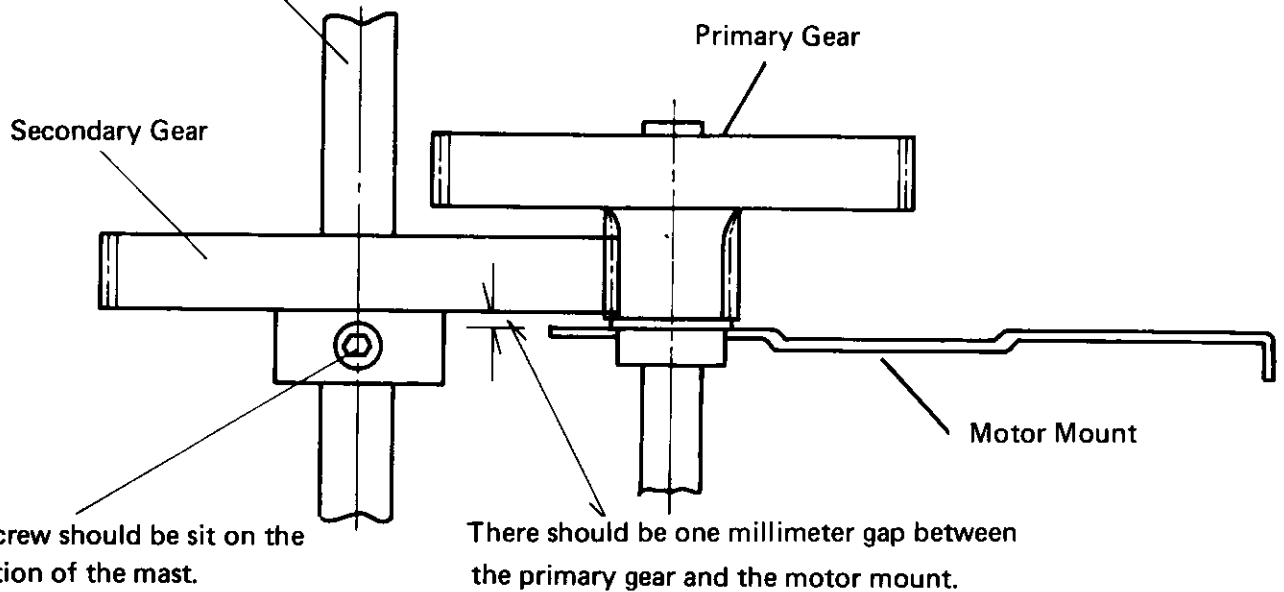
The Ni-Cad batteries (Flight Pack) must be discharged when being recharged. Keep the rotor running until it stops itself before recharging.

Installation of Swash Plate and Rotor

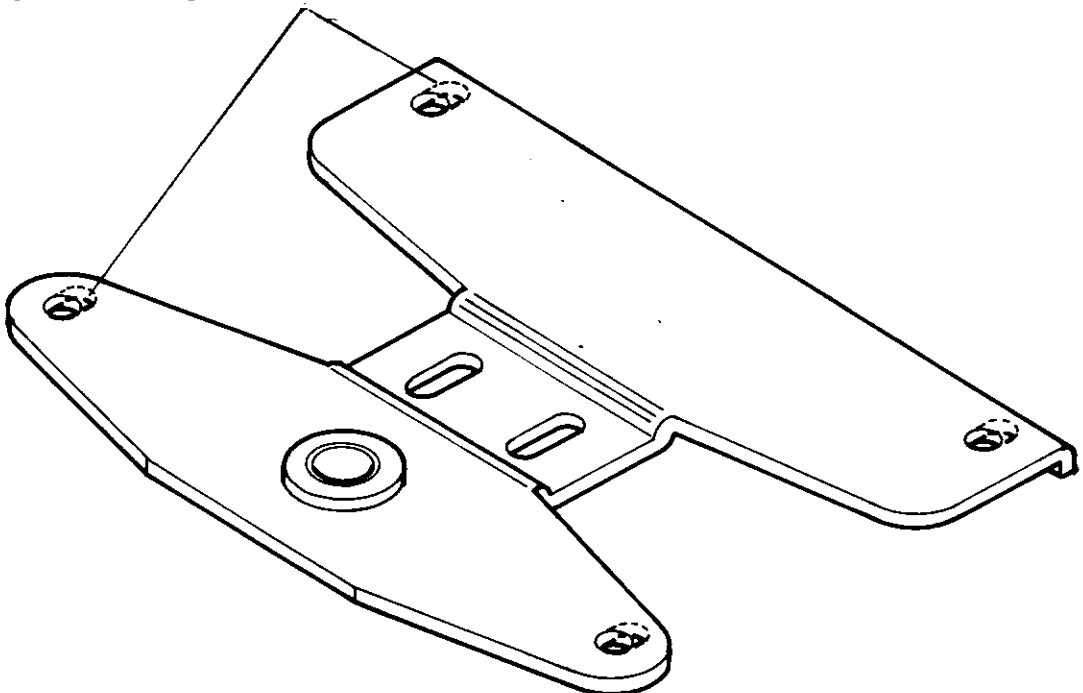


Setting of the Secondary Gear

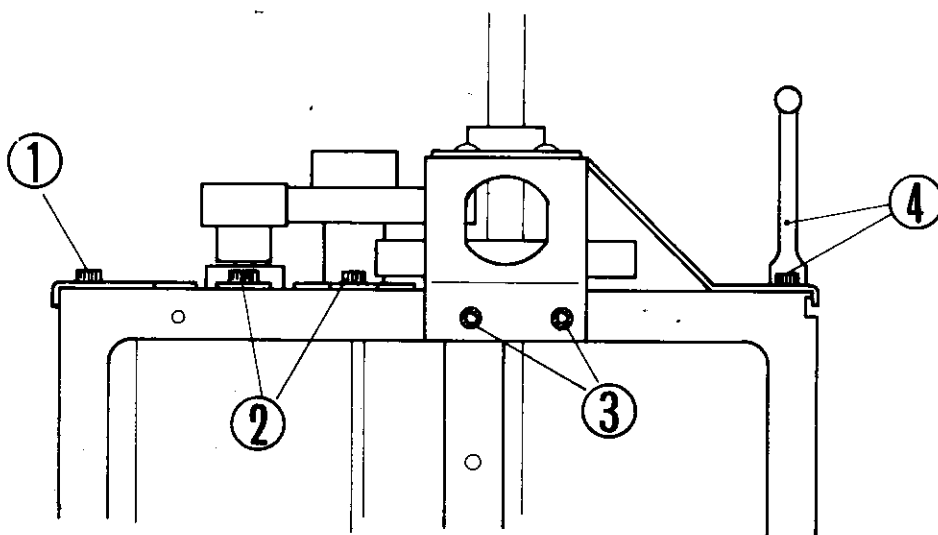
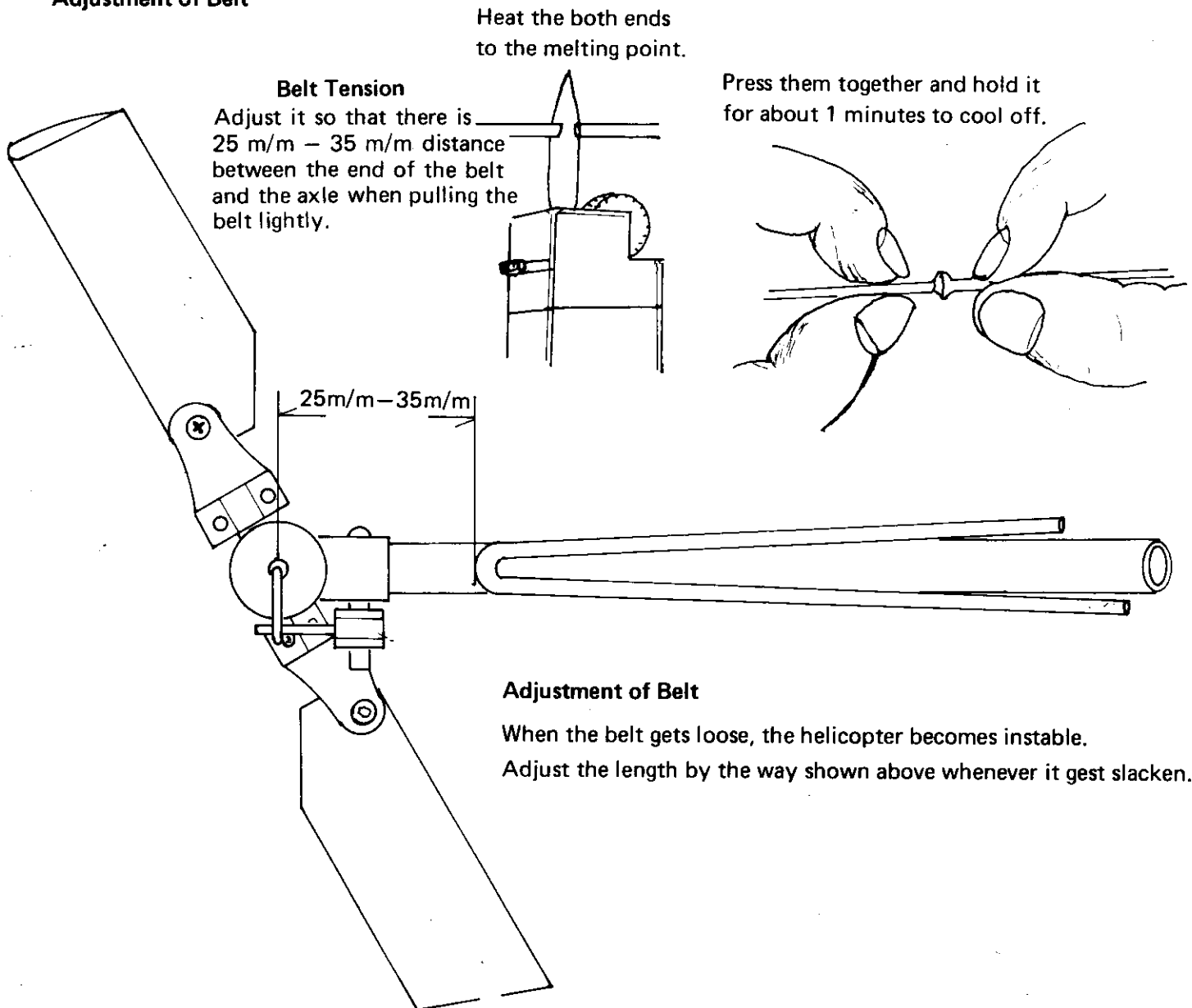
Pull up the mast all the way possible, then tighten the set screw.



The adjustment of gear mesh between Primary and Secondary gears can be done by filing the installing holes on the motor mount with a round fill.



Adjustment of Belt



Adjustment of Mesh between Primary and Secondary Gears

For a pleasant flight, the gears must be adjusted as follows.

- The gears can be adjusted by loosening the bolts 1 and 2 and sliding the motor mount.
- When the adjustment cannot be achieved by the way (a), get the bolts 3 and 4 loosen and arrange it.
- There must be some play in the gear mesh.