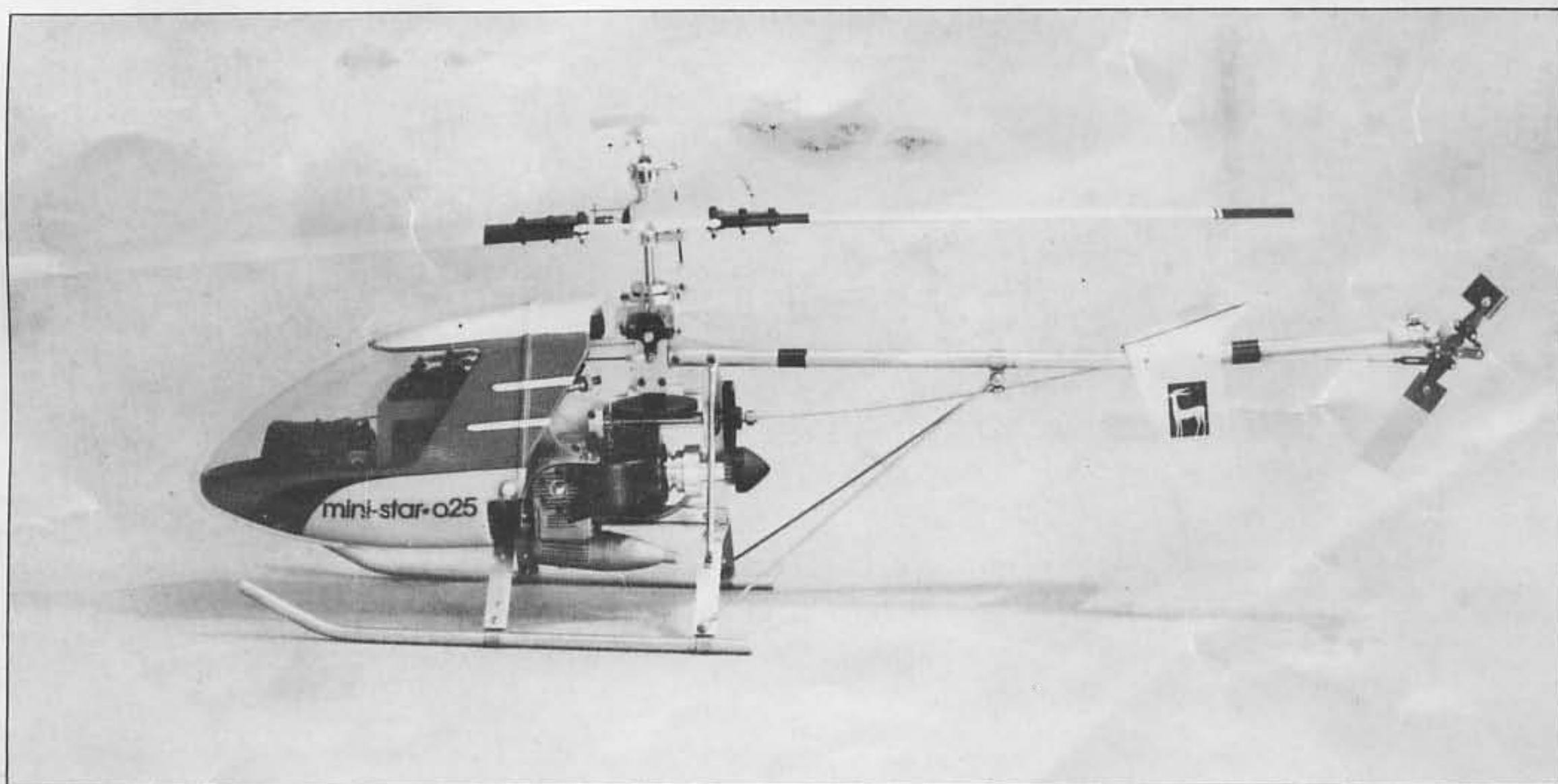


# 組立て説明書

# ASSEMBLY INSTRUCTION MANUAL

## mini-star★o25



メインローター径	900mm	Main Rotor dia	35.4"
テール //	200mm	Tail Rotor dia	7.9"
胴体長	870mm	Fuselage	38.2"
全備重量	2,100 g	Full-equipped weight	4.61bs
エンジン	OS25 エンヤ25	Engine	OS-25 ENYA25
無線機	4 ch. 4サーボ	Radio	4 channels


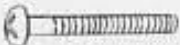


Thank you very much for your purchase of our product "MINI STAR 025". This assembly instruction manual covers all the points necessary for correct assembling, adjustment and handling in order to keep your helicopter under the best conditions and to make joyful flying in safety. Therefore, please be acquainted with the contents of this instruction manual and assemble your MINI STAR 025 in accordance with the description herein.

## Before assembling

### Tools and parts necessary for assembling MINI STAR in addition to this kit:

- |                      |  |
|----------------------|--|
| a). Radio            | 4ch transmitter and receiver for helicopter, battery and a set of other accessories.   |
| b). Engine           | O.S. 25FSR or ENYA 25XTV, Plug (Please make engine break in compliance with the instruction manual of an engine).  |
| c). Engine starter   | Battery for plug heating, Booster cord, fuel, fuel pump, electric starter (or starting rope) and battery for electric starter.   |
| d). Assembling tools | Phillips screw driver, Radio pliers, Gimlet, scissors, Cutter, Paper file, Adhesive (Instant adhesive Epoxi-oriented or for wooden works) Monkey wrench, Vinyl tape, Painting set (Paints, Painting bursh, Masking tape, etc.) and Philips screw wrench (i.e. plug wrench), etc. |

In this instruction manual, the following symbols are used to designate the screws, bolts and nuts.

	Symbol		
* Cap screw	Cs		Size is indicated by the length below the neck.
* Pan head machine screw	PH		Size is indicated by the length below the neck.
* Set screw	Ss		Size is indicated by the whole length.
* Tapping screw	Ts		Size is indicated by the length below the neck.
* Flat washer	FW		Size is indicated by the diameter of inner hole.

Other red nuts are a U nut with a locking means. Please follow the scale shown at the bottom of each page for size identification.

In this instruction manual, assembling photo and parts necessary for each block are shown as a pair as per block. So, please take out a sack designated for a specified assembling block and begin assembling the parts for a block after carefully reading the assembling procedures and cautions with the size and the quantity of parts well checked.

Besides, all the parts are called together with their parts number. The parts information displays the parts number, the name of parts, and their necessary quantity. Therefore, when you will make an inquiry, please refer to the name and number of a specified part.

(Example)

<u>Parts No.</u>	Name of part	Necessary q'ty
A-1	Main frame	1

Now, you may begin assembling your kit. The following pages describes the assembling procedures in accordance with each block and each step of assembly.



# Section I ASSEMBLING

## 1) Assembling frames and landing gears

The parts for each step are included in a sack No. shown at the upper left part of each page.

### Step-1

**(A). Assembling frames**

A-1. Main frame	-----	1
A-2. Front frame	-----	2
A-3. Lower frame (R)	---	1
A-4. Lower frame (L)	---	1
A-5. Linkage band	-----	1
A-6. M3 x 10 PH	-----	8
A-7. M3 Nut	-----	8

**(B). Assembling landing gears**

B-1. Skip pipe	-----	2
B-2. Skip foot	-----	2
B-3. $\phi$ 10 Band	-----	4
B-4. M3 x 12 PH	-----	4
B-5. M3 Nut	-----	4
B-6. $\phi$ 3 FW	-----	2

Temporarily fix the rear side screw of the landing gears

1. Mount both front frame and lower frames at the main frame.
2. Mount skid feet at the lower frames. Link the skid feet with the skid pipes by using  $\phi$  10 bands. After that, tighten the skid feet with M3 x 12PH and M3 nuts from the upper side of the band.

NB: Tighten them without any distortion after the parallelism between them is well secured.

## 2). Assembling the main transmission (Take out L-type wrench from the sack of No.P)

### [Assembling the 3rd shaft (main shaft)] Step-2

**(C). Assembling the mission shaft**

C-1. Main mast	-----	1
C-2. Bevel gear	-----	1
C-3. Roll pin 2 x 16	-----	1
C-4. 696 Brg. block (A)	---	1
C-5. Brg. 696	-----	1
C-6. 696 Brg. block (B)	---	1
C-7. Brg. 696	-----	1
C-8. Shaft lock	-----	1
C-9. Radius arm stay	-----	1
C-10. M3 x 5 Ss	-----	2
C-11. M3 x 28 Cs	-----	4
C-12. M3 U Nut	-----	4
C-13. 6 x 12 x 1 FW	-----	1
C-14. Mast auxiliary plate	---	1

1. Pass a mast through a Brg. block.

NB: Please be careful for the mounting direction of the Brg. block. For the upper block, pass a mast through C-6 (Brg. block) having a M3 screw with the Brg. located upwards. For the lower block, mount a C-4 (Brg. block) so that the Brg. may be located downwards. At this time, place a C-13 between the bevel gear and the Brg. and pass a mast through them.
- 2. Firmly tighten the shaft lock after it is aligned with the 2nd shaft of STEP-3.
- 3. When tightening the bolts, check that the Brg. block may become parallel to the upper edge of main frame and the notched surface of the main frame.

### [Assembling the 2nd shaft] Step-3

**(D). Assembling 2nd shaft of the transmission**

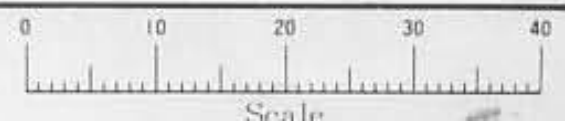
D-1. 2nd shaft	-----	1
D-2. 2nd shaft spur gear	---	1
D-3. 696 Brg. block (A)	---	1
D-4. Brg. 696	-----	1
D-5. Stop ring S-6	-----	1
D-6. Roll pin 2 x 16	-----	1
D-7. 2nd shaft bevel pinion gear	-----	1
D-8. 696 Brg. block (A)	---	1
D-9. Brg. 696	-----	1
D-10. Shaft lock	-----	1
D-11. M3 x 5 Ss	-----	1
D-12. M4 x 4 Ss	-----	1
D-13. M3 x 28 Cs	-----	4
D-14. M3 U nut	-----	4

1. Pass 2nd shaft through a bevel pinion gear and a Brg. block A and mount them at the Step-2. (The bearing should be faced toward the bevel pinion gear).
2. The shaft lock is for tightening a tail drive shaft. So, temporarily fix it now.

NB: Let the rear Brg. come in tight contact with a stop ring at the position where a clearance of about 1mm may be secured between the main frame and the spur gear.

Locate the bevel pinion by taking in and out each gear so that no teeth gap may be caused between mutual teeth. The clearance is such that a cut piece of nylon sack may be placed in the engagement section (so, it is about 0.1mm). After the cut piece of nylon sack is removed, the shaft should lightly turn.

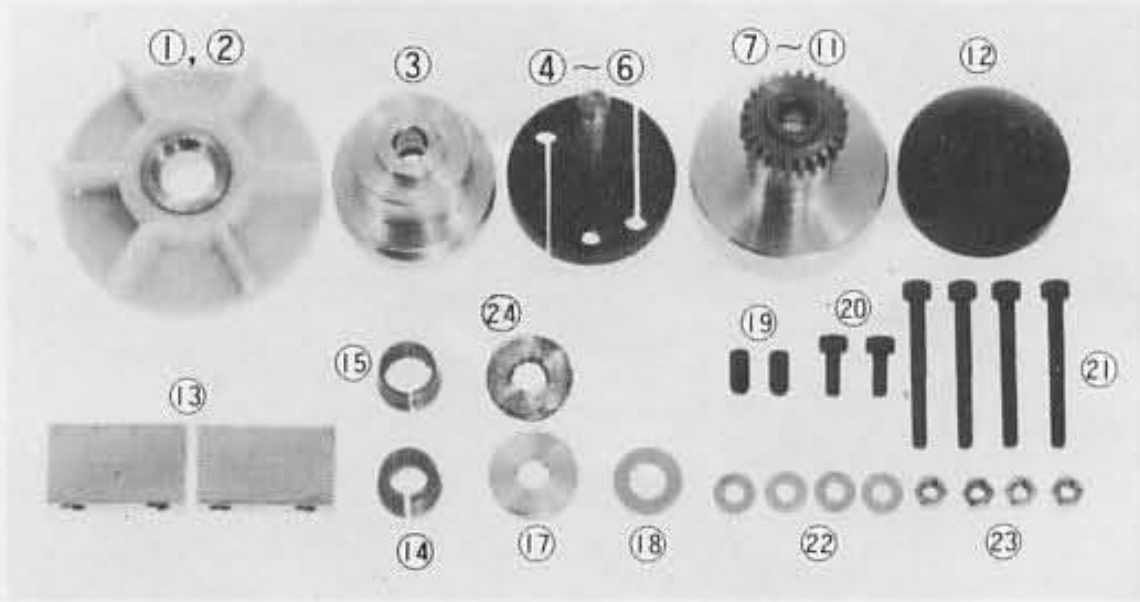
**CHECK** The 2nd shaft should be at right angle to the 3rd shaft (mast).





## Step-4

### Assembling the 1st shaft of transmission

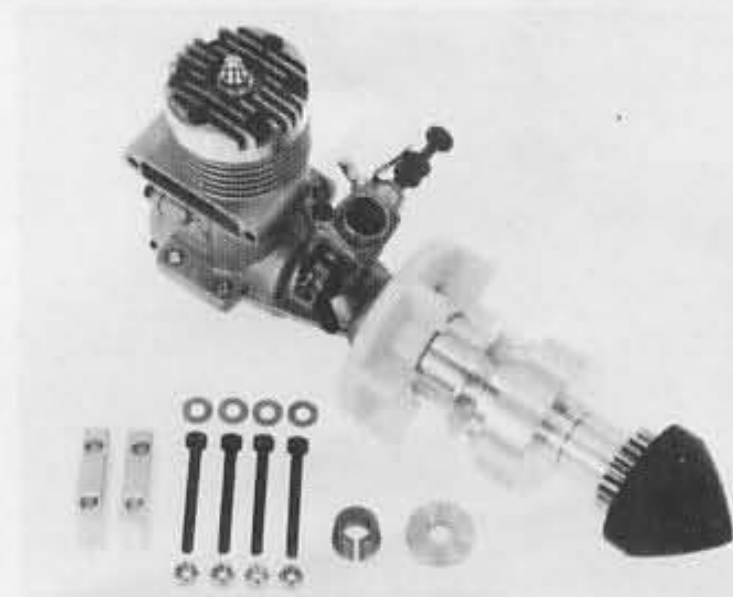


#### (E) Assembling the 1st shaft of transmission

E-1. Cooling fan ----- 1	E-13. Engine block ----- 2
E-2. Cooling fan stud metal ----- 1	E-14. Taper collar A (for ENYA) -- 1
E-3. Flywheel ----- 1	E-15. Taper collar B (for O.S.) ----- 1
E-4. Clutch shoe ----- 1	E-17. Flywheel collar for ENYA -- 1
E-5. 1st shaft ----- 1	E-18. $\phi 6$ Plain washer -- 1
E-6. Roll pin 2 x 8 ----- 1	E-19. M4 x 8 Ss ----- 2
E-7. Clutch bell liner -- 1	E-02. M3 x 8 Cs ----- 2
E-8. Clutch bell ----- 1	E-21. M3 x 28 Cs ----- 4
E-9. 1st joint collar -- 1	E-22. $\phi 3$ FW ----- 4
E-10. 1st shaft gear ----- 1	E-23. M3 U nut ----- 4
E-11. F6 x 8 x 3 : 10 x 1 ----- 2	E-24. Flywheel collar for OS ----- 1
E-12. Spinner ----- 1	



1. Select and determine the taper collar to your engine. Though the parts are assembled as shown in the assembling illustration, firmly tighten the drive nut (for engine shaft) by using a cross-type wrench. (Insert a fly wheel collar for alignment of the flywheel).
2. Tighten the clutch shoe by M3 x 8 Cs. At this time, it is very important that the two M3 x 8 Cs should be uniformly tightened for centering).



1. After that, mount a clutch bell and a spinner. Fix the spinner at the position where the clutch bell moves by 0.5mm in the axial direction. Supply grease to the metal section of clutch bell.

#### (CHECK)

- \* The gears are to smoothly rotate without swing.
- \* Centering of spinner is to be secured without swing.

**NB : 1).** 1st shaft section is long and has a joint section. Firmly tighten the drive nut and the two screws of the clutch shoe should be uniformly tightened. Otherwise, it will become difficult to secure centering of the clutch shoe. Please check it one more time.

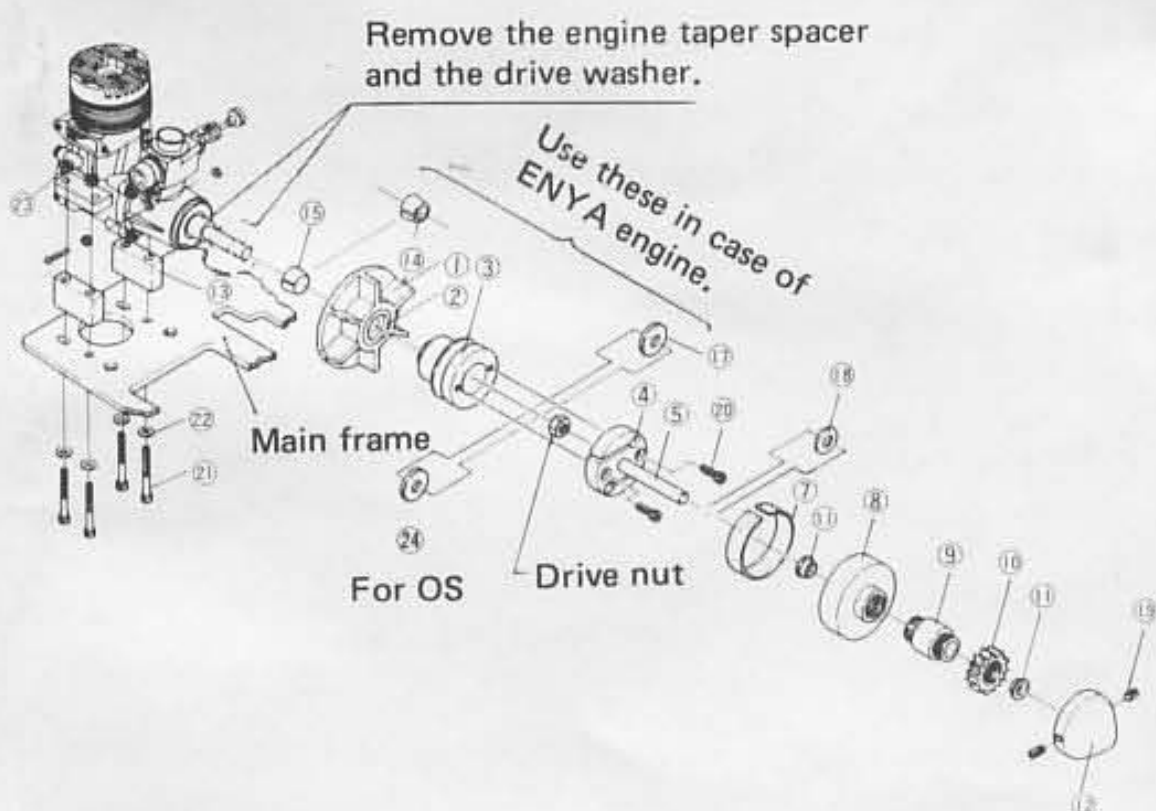
**NB : 2).** Mount an engine block after the cooling cover (Step-5) is worked.

**NB : 3).** When mounting the assembled section at the main frame, please insert a  $\phi 6$  FW between the clutch shoe and the clutch bell if facial alignment comes off between the 1st shaft spur gear and the 2nd shaft spur gear.

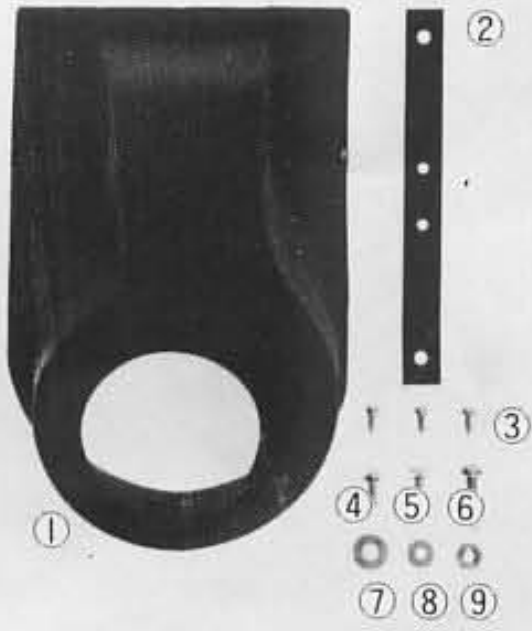
#### Additional footnote :

Turn the engine carburettor lever downwards. And locate the carburettor lever so that it may be perpendicular, may equally move forwards at slow and backwards at its full speed. And the drum should be fully opened at maximum and it will be closed at minimum. As a matter of course, the brake-in of engine should be effected in accordance with the instruction manual of an engine.

Assemble the muffler after the engine block is mounted.



### 3). Working and mounting the cooling fan cover



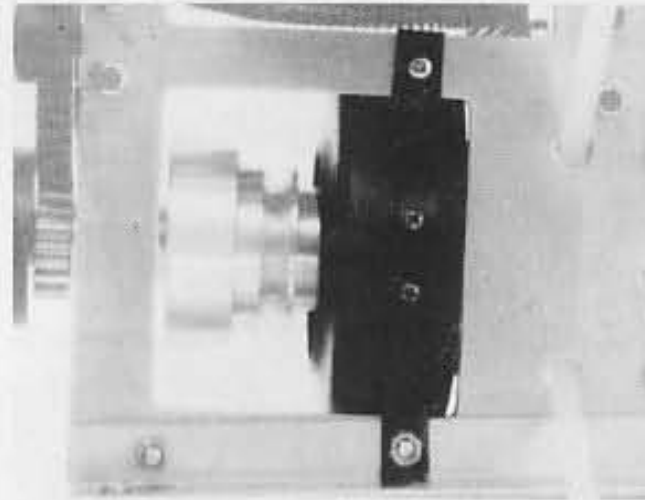
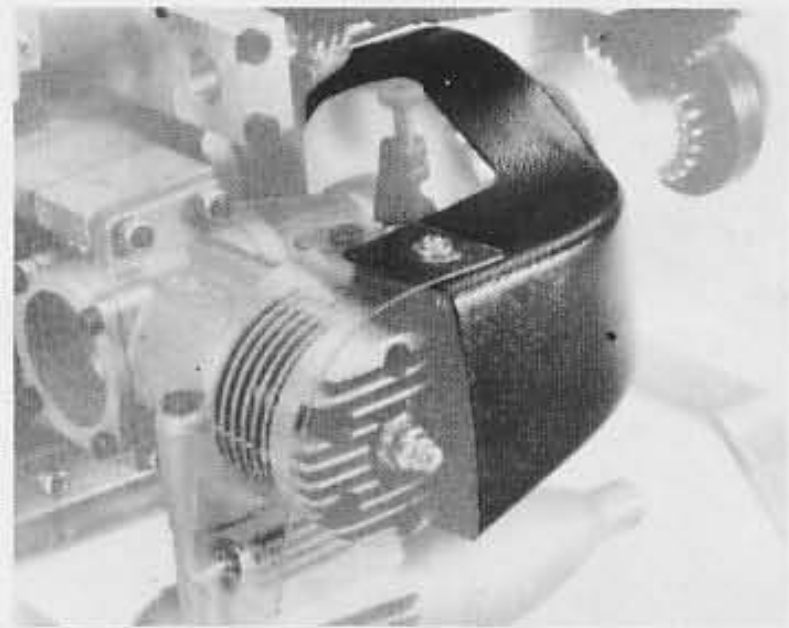
#### (F). Mounting the cooling cover

F-1.	Cooling cover	-----	1
F-2.	Cooling cover mount member	-----	1
F-3.	M2 x 5 Ts	-----	3
F-4.	M2.6 x 6 Ts	-----	1
F-5.	M2.7 x 10 Wood screw	-----	1
F-6.	M3 x 12 PH	-----	1
F-7.	φ3 FW	-----	1
F-8.	φ2 FW	-----	1
F-9.	M3 Nut	-----	1

#### Working :

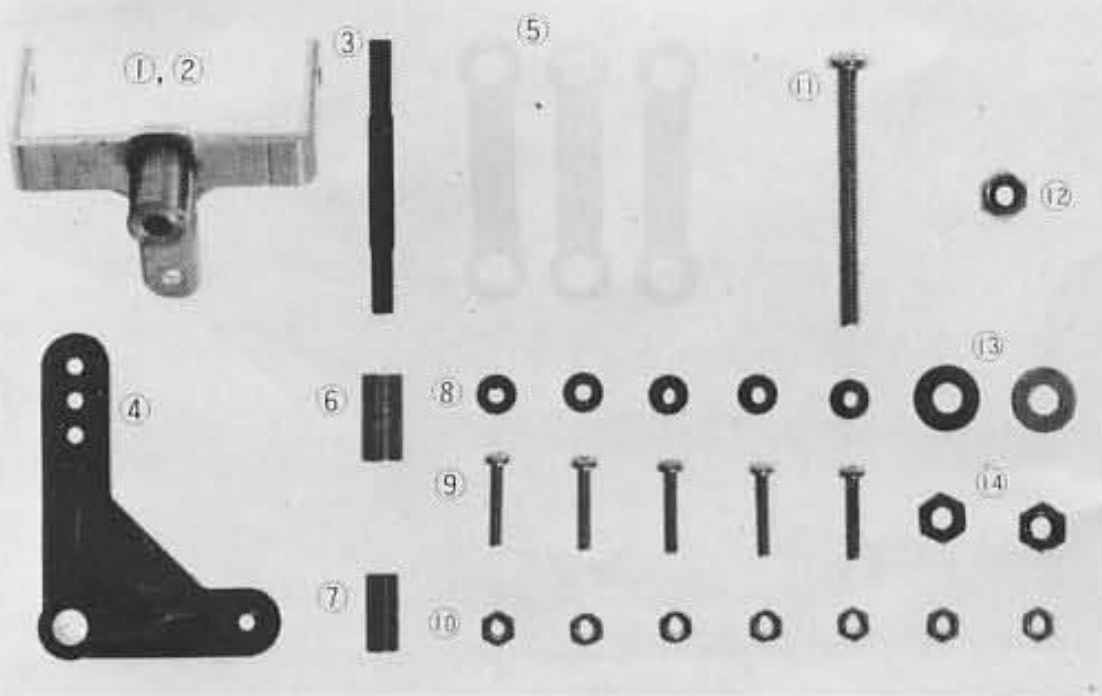
1. Finish a penetrated hole of the cover body by a file so that a flywheel may pass through.
2. Cut the sides of the cooling cover to the plug, the carburettor lever and the needle.
3. Cut off the central section of canopy to make a transparent components (See No. Q View). The cutting width is about 30mm.

#### Step-5



1. Fix the cooling cover where it may not come in contact with the cooling fan. Drive in the tapping screw by a philips screw driver with the cover firmly held.
  2. Fix the front side at the body frame.
  3. Fix the assembly of Step-4 at the main frame. Adjust the engagement of gears by inserting a nylon sheet of a sack. Correct clearance between the gears is about 0.1mm. After taking it out, check that the gears may lightly move.
- NB : The engine shaft should be parallel to the 2nd shaft. (The gear face should be straight.)

### 4). Mounting aileron and elevator



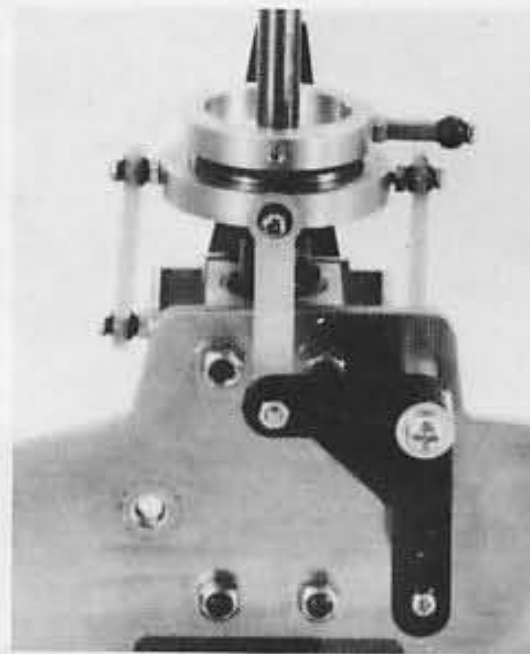
#### (G). Mounting the lever

G-1.	Elevator lever	-----	1	G-8.	φ5 Ball	-----	5
G-2.	Elevator lever bush	-----	1	G-9.	M2 x 10 PH	-----	5
G-3.	Elevator lever shaft	---	1	G-10.	M2 Nut	-----	7
G-4.	Aileron lever	-----	1	G-11.	M3 x 30 PH	-----	1
G-5.	Double ball link	-----	3	G-12.	M3 Nylon nut	-----	1
G-6.	Aileron lever bush	---	1	G-13.	φ3 FW	-----	2
G-7.	3 x 4 x 9.1 Collar	---	1	G-14.	M3 Nut	-----	2

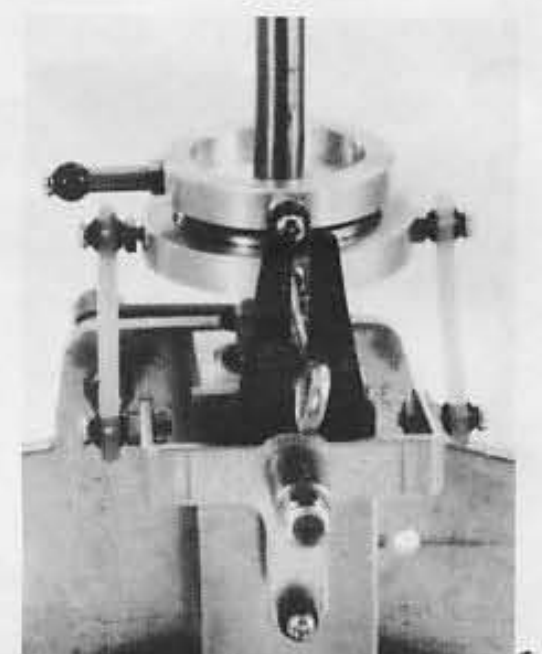
(Assemble this step at the same time when assembling the swash plate).

#### Step-6

Aileron lever



Elevator lever

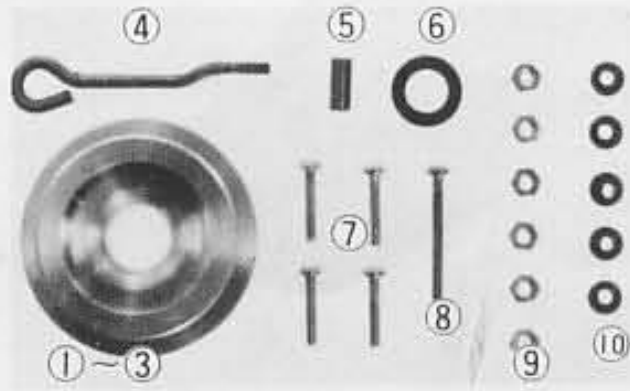


- \* The aileron lever's fulcrum hole rotates together with the outer periphery of the collar 3 x 4 x 9.1. (Supply oil there).
- \* Pass a M3 x 30 PH through an aileron lever bush, φ3 FW, a 3 x 4 x 9.1 collar, an aileron lever, and φ3 FW in this order. Placing the main frame between them, fix them with M3 nuts.

- \* Provide the elevator lever shaft with M3 nut and mount it at the Brg. block (B). Firmly tighten the nut of turn stop. Next, insert the elevator lever (supply oil) and tighten the nylon nut. This nylon nut is an adjust nut which is used for adjusting to rotate the lever without play.



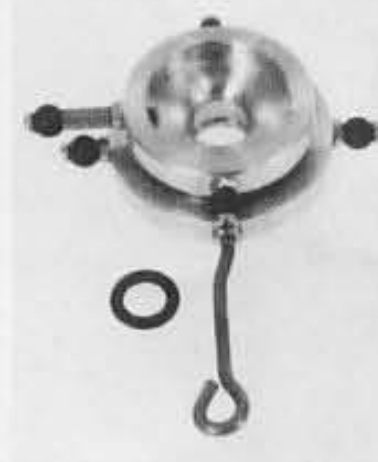
## 5). Assembling the swash plate



### (H). Mounting the swash plate

H-1.	Upper swash plate	---	1
H-2.	Lower swash plate	---	1
H-3.	Brg. 6901	-----	1
H-4.	Radius arm	-----	1
H-5.	2 x 3 x 7 Collar	-----	1
H-6.	O ring P-6	-----	1
H-7.	M2 x 10 PH	-----	4
H-8.	M2 x 18 PH	-----	1
H-9.	M2 Nut	-----	6
H-10.	φ 5 Ball	-----	5

### Step-7



1. Mount  $\phi 5$  ball and a radius arm at the lower plate. All the nuts here are a lock nut.
2. Mount  $\phi 5$  ball at the upper plate. Provide the upper plate with a 2 x 3 x 7 collar at its other side. (Please check the sequence carefully.)
3. Place O-ring in the inner groove of the upper ring.
4. Pass a mast through this swash plate and join them together by double ball link.

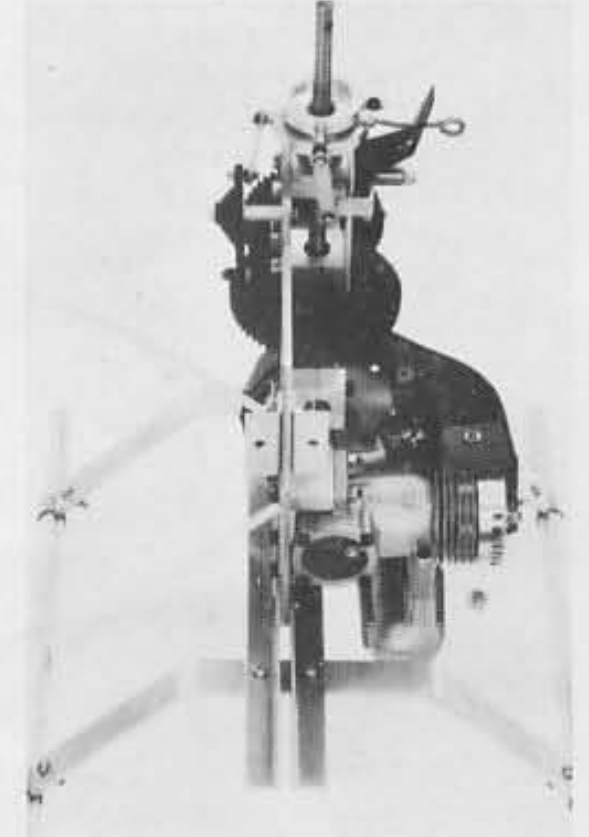
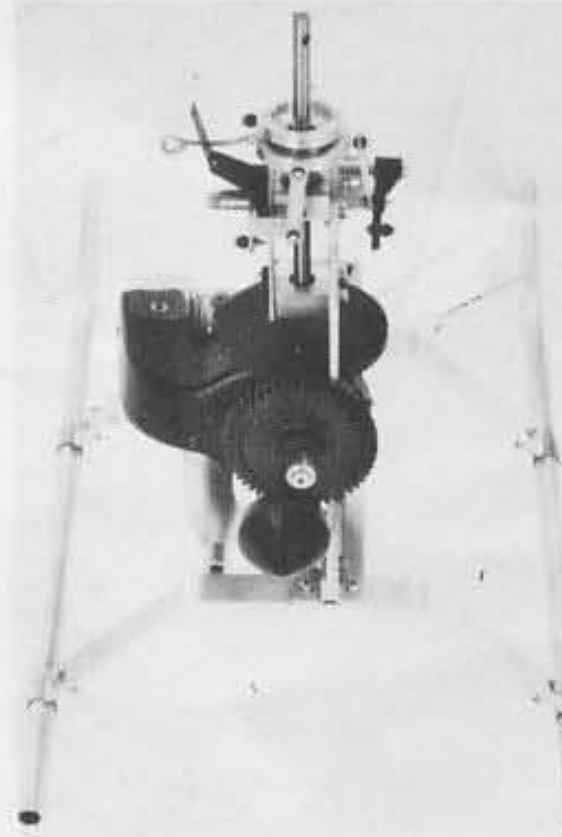
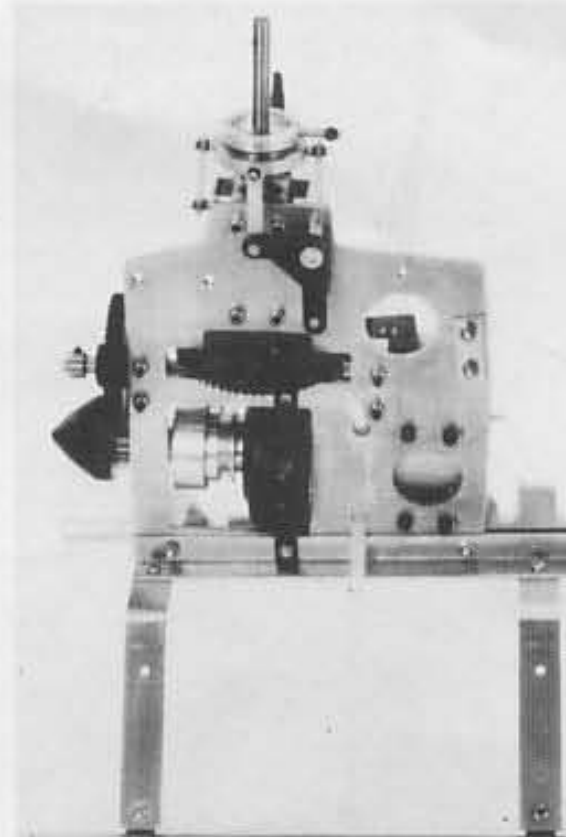
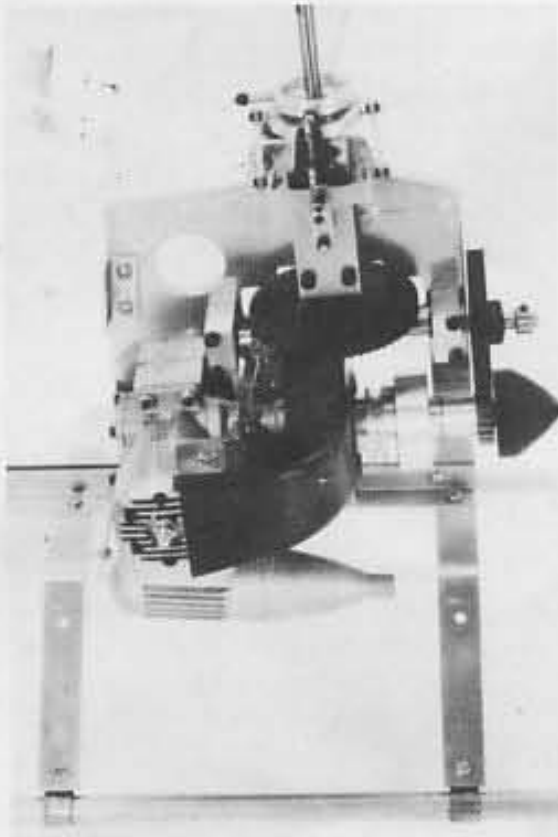
#### (Additional notes)

- \* The O-ring supports the fulcrum of the swash plate.
- \* Link the collar-mounted side of the upper plate with the control arm and link the short side with the mixing arm.
- \* Rudder degree is variable by the radius arm. (Further details is described later).

### CHECK

### Step-8

(Photo is taken from the completed view)



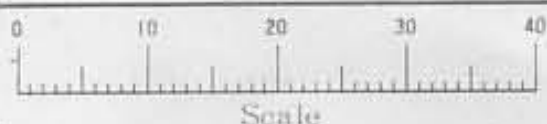
Now, assembling the frame body is completed. Here, check each part in accordance with the above illustrations for whether or not every part is correctly mounted.

1. Are the rotary parts smooth? Check that no swing is produced.
  - \* 1st shaft, clutch bell and spinner
  - \* 2nd shaft, engagement of gears
  - \* 3rd shaft, distortion of mast
2. Are all the screws firmly tightened?
  - \* Especially the lock nuts, U nuts, and Set screws. If necessary, tighten them more.
3. Is oil or grease supplied?
  - \* Nylon resin gears require no lubrication. The metal parts, especially a clutch bell requires oil or grease lubrication to prevent them from being seized.
4. Are all the parts or screws available?
  - \* If any screw of part is left, please check the drawing and illustration again for making double sure.

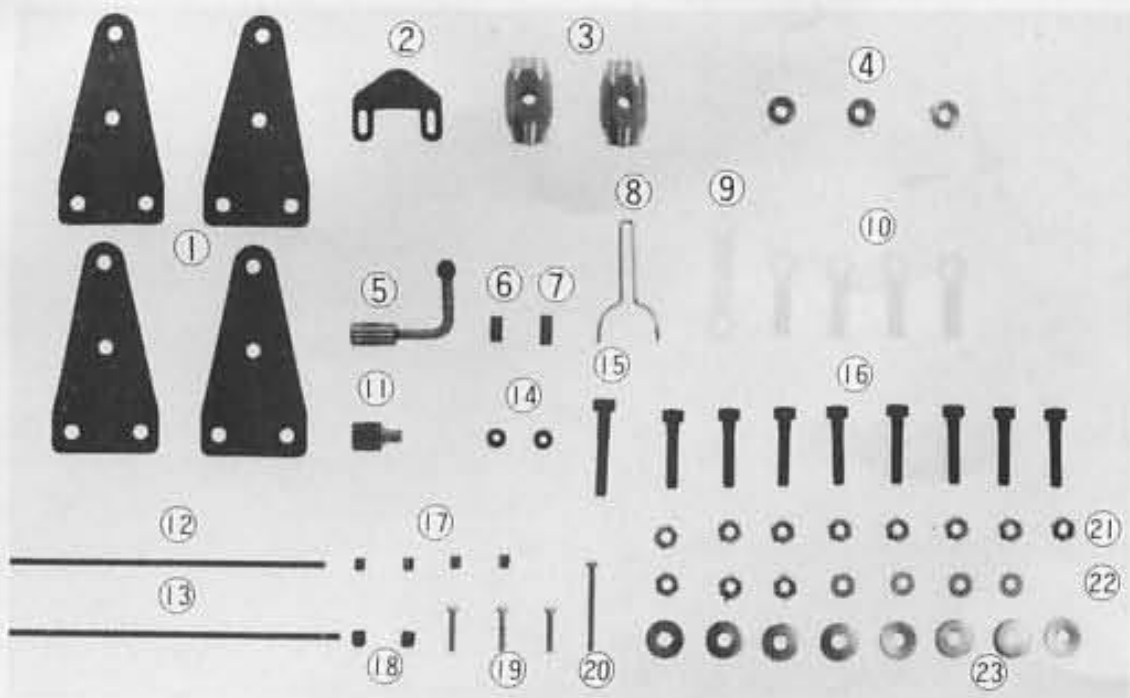
## 6). Assembling the rotor head

### Step-9

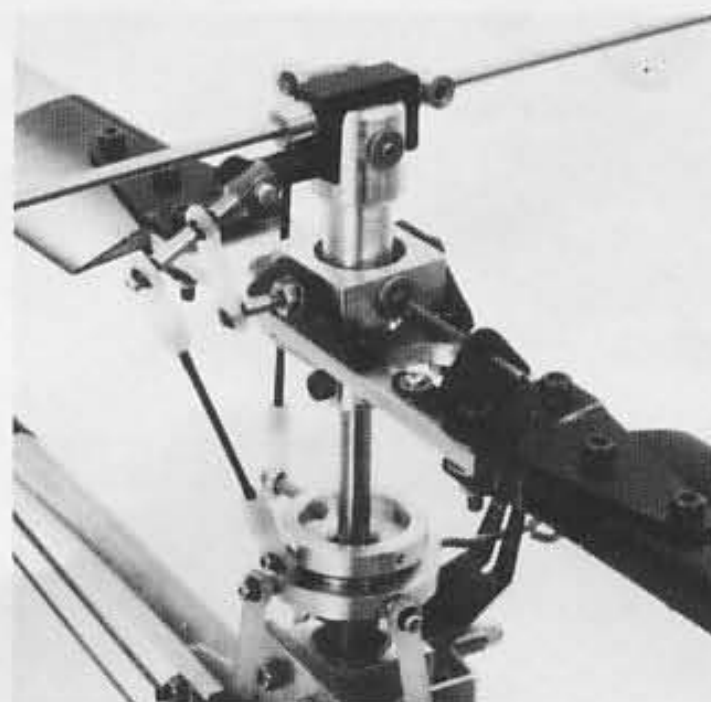
- 1). **Mounting the mixing arm**
  - \* The collar between  $\phi 5$  balls is 8mm long.
  - \* Place a  $\phi 2$  FW at both sides of the fulcrum and insert a collar 6mm long in the mixing arm boss and tighten it by a M2 x 10PH.
- 2). **Mounting the damper adjuster**  
At the beginning, mount the adjuster outsides.
- 3). **Mounting the blade holder**  
Place a yoke between plain washers (FW) of 3 x 9 x 1. Then, tighten the blade holder by a M3 x 16 Cs and M3U nut. (Tighten it so that no disalignment of the mounting holes may be produced.)
- 1). Locate the stabilizer bar by the stopper and the control arm so that the length of both sides of the stabilizer bar from the metal section of the seesaw may become 239mm.
- 2). Set the length of a rod so that the mixing arm may become 72mm at the between-center interval of the rod ends and control arm may become 80mm at the between-center interval.
- 3). At the beginning, fix the stabilizer weight at the out side (at the top side) of the stabilizer blade by M4 x 4 Ss.
- 4). Tighten the inside of the stabilizer blade by a stopper and the outside of it by M3U nut. Firmly tighten the U nut and lock it.







Completion view  
of assembling



Mounting View

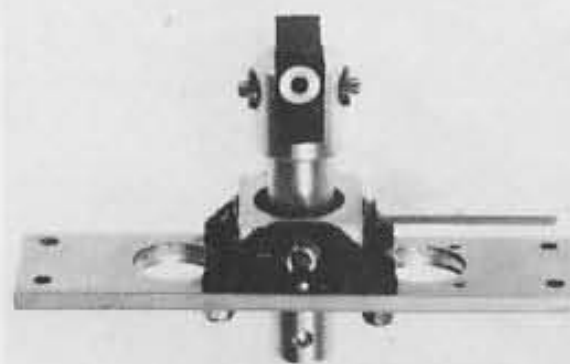
(Mount a main blade in STEP-14).



View for lower side

(I). Assembling the rotor head

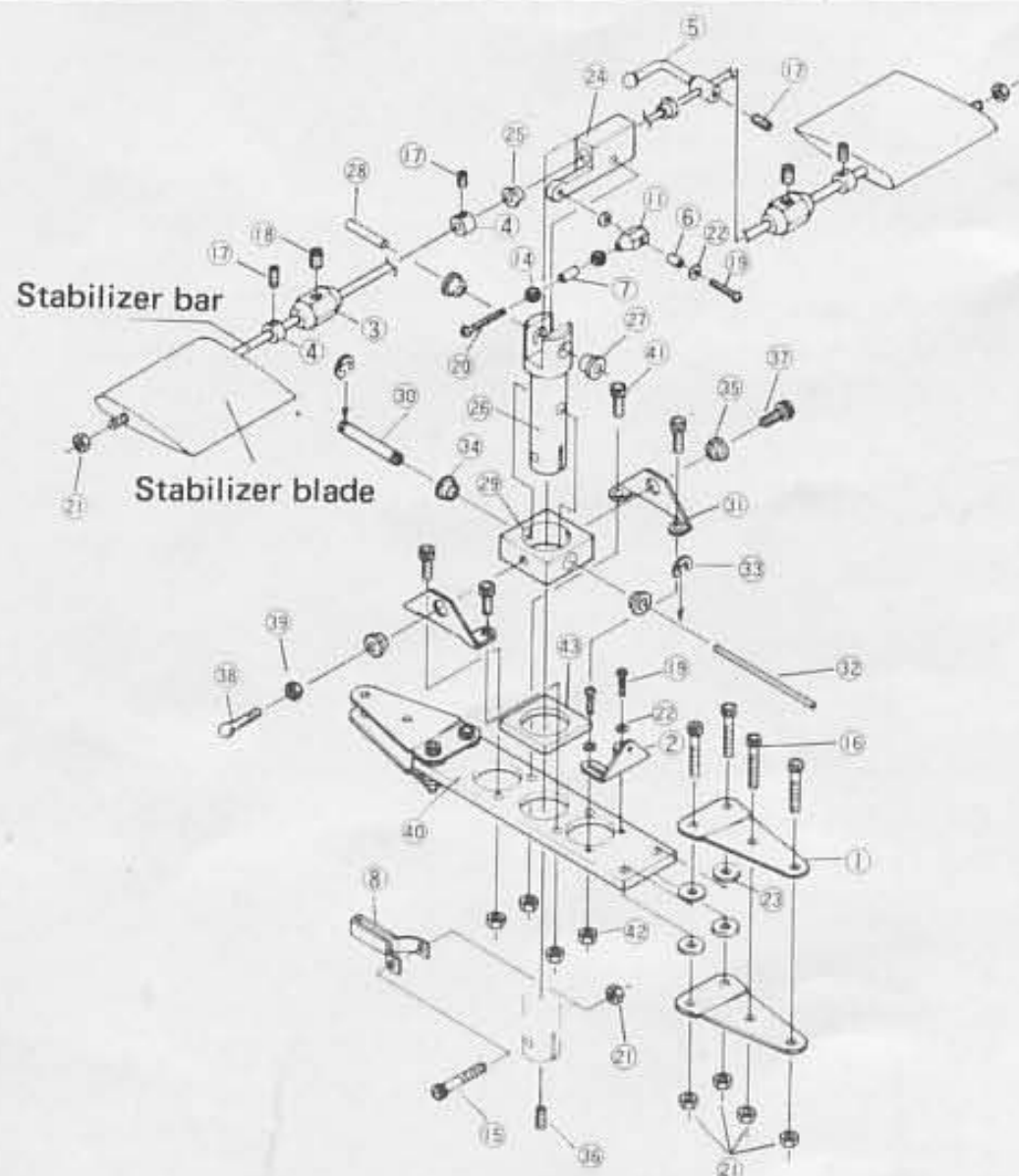
I-1. Blade holder	4	I-17. M3 x 3 Ss	4
I-2. Damper adjuster	1	I-18. M4 x 4 Ss	2
I-3. Stabilizer weight	2	I-19. M2 x 10 PH	3
I-4. Stopper	3	I-20. M2 x 20 PH	1
I-5. Control arm	1	I-21. M3 U Nut	11
I-6. 2 x 3 x 6.1 Collar	1	I-22. $\phi 2$ FW	4
I-7. 2 x 3 x 8 Collar	1	I-23. 3 x 9 x 1 FW	8
I-8. Rod guide	1	I-24. Seesaw	1
I-9. Double ball link	1	I-25. M3 x 5 x 4 : 7 x 1	2
I-10. Rod end	4	I-26. Center hub	1
I-11. Mixing arm boss	1	I-27. F3 x 6 x 4 : 7 x 1	2
I-12. Adjust rod M2 x 50	1	I-28. Needle pin 3 x 19.8	1
I-13. Adjust rod M2 x 60	1	I-29. Yoke center block	1
I-14. $\phi 5$ Ball	2	I-30. Yoke center pin	1
I-15. M3 x 20 Cs	1	I-31. Yoke side plate	2
I-16. M3 x 16 Cs	8	I-32. Damper pin	1
		I-33. E-ring $\phi 3$	2
		I-34. F4 x 6 x 2.5 : 8 x 1	2
		I-35. F3 x 6 x 2.9 : 7 x 1	2
		I-36. DQM4 x 8 Ss	1
		I-37. M3 x 6 Cs	1
		I-38. Pitch arm	1
		I-39. M3 Nut	1
		I-40. Yoke	1
		I-41. M3 x 10 Cs	4
		I-42. M3 U Nut	4
		I-43. Damper stopper	1



Pre-assembled No.1

Check :

- \* Does the metal section of the yoke side plate and the yoke center block smoothly move? The side plate section may move at the shaft side. Sufficiently supply oil to them in advance.
- \* The spherical center of the pitch arm is eccentric by 25mm from the center of the center hub.



- 1). When mounting the rotor head on the mast, use a rod guide and tighten it by a M3 x 20Cs.
- 2). The yoke center pin of the pre-assembled section is locked from the lower mast hole of the center hub by a M4 x 8 Ss. At the same time, the damper pin is fixed. So, check them.

Assembling and adjustment

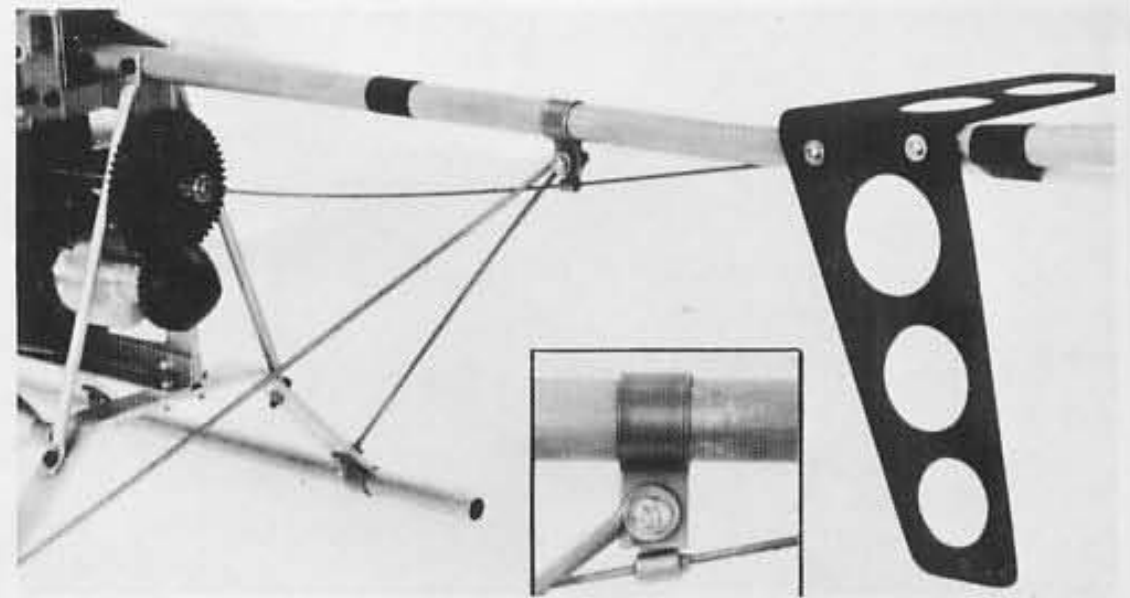
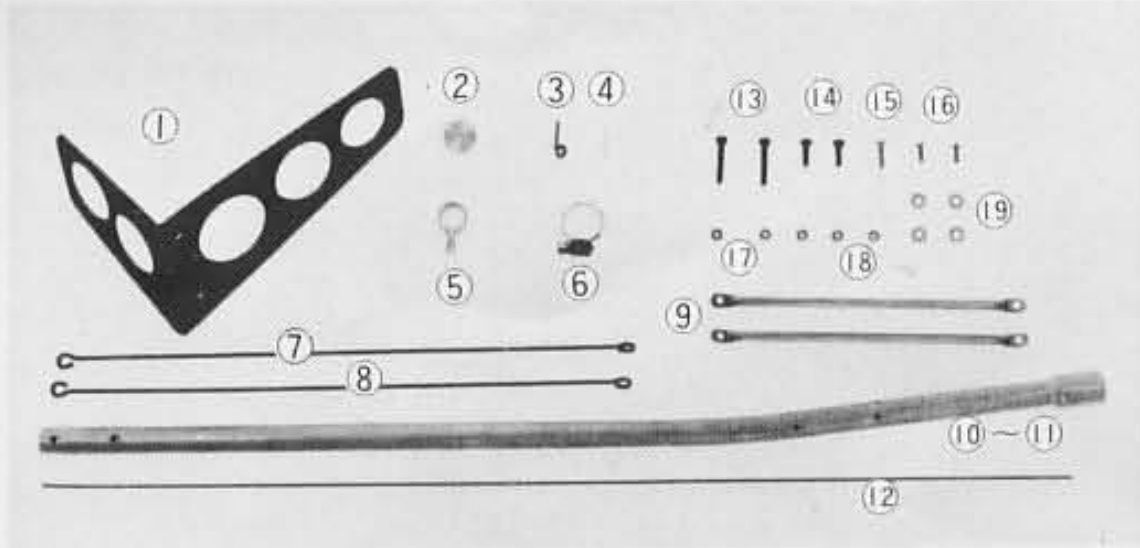
1. The adjustment for main blade and the stabilizer blades will be described later.
2. Set the stabilizer bar, the weight and the stopper so that both sides of them may become equal in length from the center.
3. When positioning the stabilizer bar horizontally (at the right angle to the mast), the upper surface of the center block is to be parallel to the stabilizer bar. If not, make them parallel by changing the length of the adjust rod of the mixing arm.
4. The yoke side plate section becomes like a bushing between the yoke side plate and the outer boss of the metal section, and the others will function as a bearing. Again, check that they are well lubricated, they may smoothly rotate and they are free from any play.
5. Lubricate the rod ends if it is hard for them to move.
6. Fix the control arm by using M3 x 5 Ss so that it may become horizontal as it is at its neutral (at this time, the stabilizer blade is also horizontal.)



## 7). Assembling the tail section

(Mounting the tail pipe)

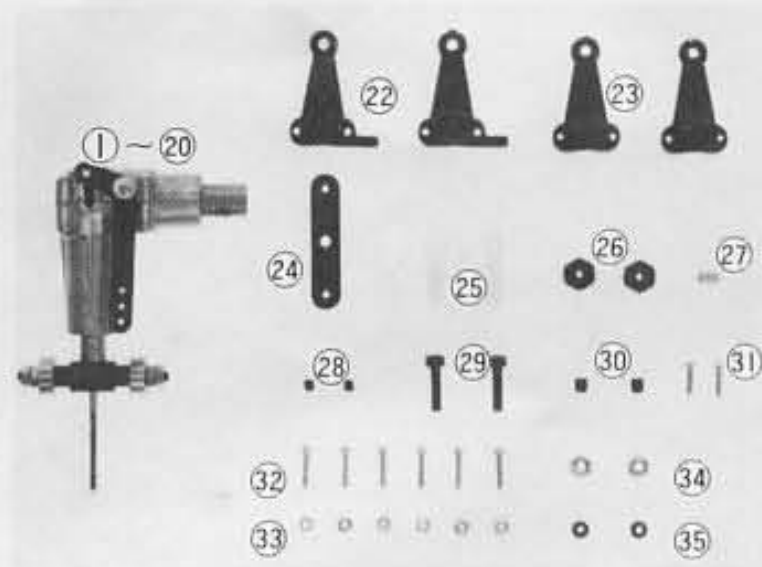
Step-10



### (J). Mounting the tail pipe

J-1.	Tail wing	-----	1
J-2.	Tail pipe guide	-----	1
J-3.	Drive shaft bracket	---	1
J-4.	Tail drive shaft bush	---	1
J-5.	φ 12 Band	-----	1
J-6.	φ 16 Pipe clamp	-----	1
J-7.	Tail pipe brace R	---	1
J-8.	Tail pipe brace L	---	1
J-9.	Side brace	-----	2
J-10.	Tail pipe	-----	1
J-11.	Tail pipe bush	-----	1
J-12.	Tail drive shaft	-----	1
J-13.	M3 x 22 Cs	-----	2
J-14.	M3 x 10 Cs	-----	2
J-15.	M3 x 12 PH	-----	1
J-16.	M3 x 8 Ts	-----	2
J-17.	M3 U Nut	-----	4
J-18.	M3 Nut	-----	1
J-19.	φ 3 FW	-----	4

1. Mount the side brace at the main frame at the same time when mounting the tail pipe. (The tail pipe is to be parallel to the 2nd shaft). At this time, it is better to provide the tail pipe with φ 12 band.
2. The tail pipe braces are for right side and left side. Bend them to the skid foot for mounting. Tighten the lower side of the braces with washers placed between them after loosening the screw of Step-1. Fit the upper end of the braces to the drive shaft bracket. Fix them with washers placed at both sides. Cement the drive shaft bracket after a tail drive shaft bushing is provided. (Use an instant adhesive at this time).
3. The tail pipe guide is for guiding the tail drive shaft. Take in the tail pipe guide by about 50mm from the tail transmission mount section. (Use an instant adhesive at this time).
4. Mount a tail wing at the tail pipe by M3 x 8 Ts. (Use φ 3 FW for mounting this tail blade). Lock the tapping screws with an epoxi adhesive for firm fixing. Adhere transcribing marks to the penetrated sections of the tail wing. At this time, please refer to the package case.



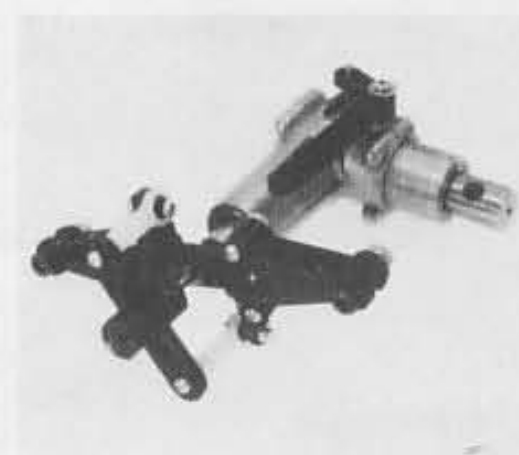
(Mounting tail transmission)

Step-11

Completion view of mounting

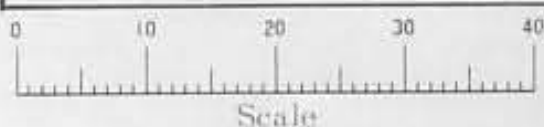


Assembling view



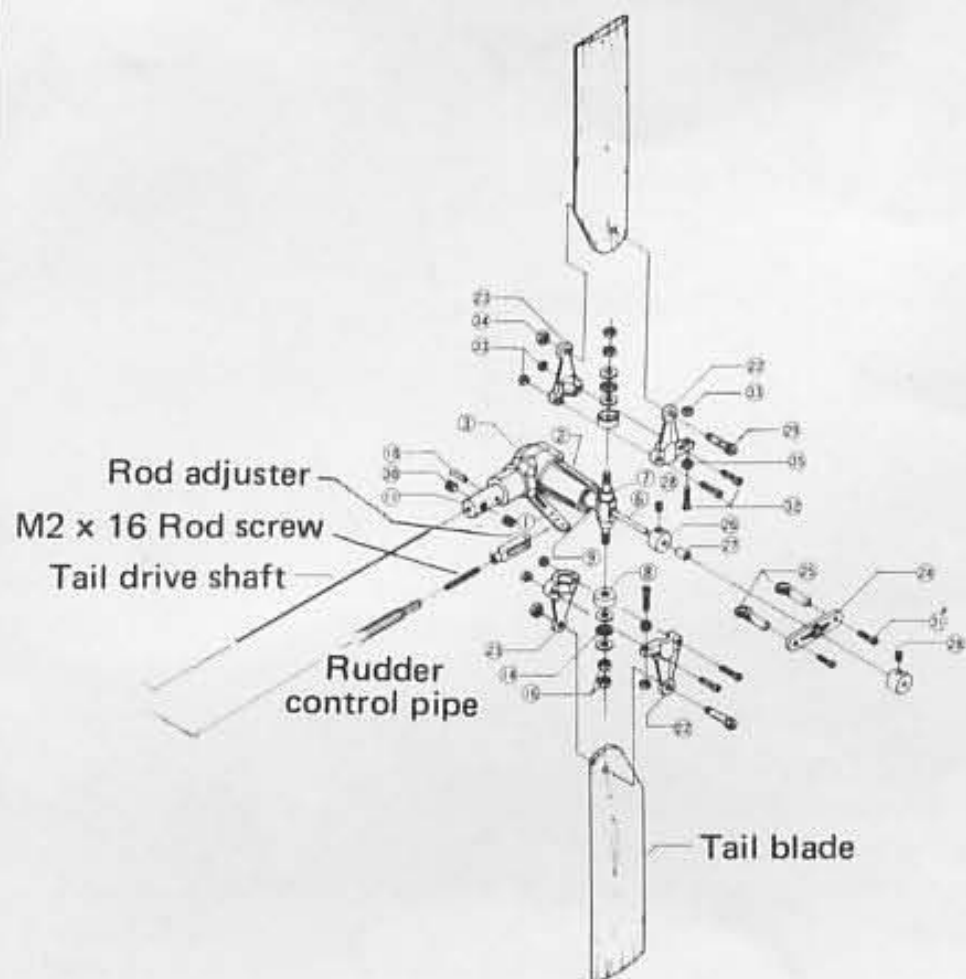
### (K). Assembling the tail transmission

K-1.	Tail pitch lever	-----	1
K-2.	Tail gear box (A)	---	1
K-3.	Tail gear box (B)	---	1
K-4.	Tail 1st shaft	-----	1
K-5.	Tail 2nd shaft	-----	1
K-6.	Tail pitch rod	-----	1
K-7.	Tail housing	-----	1
K-8.	Thrust coupling	-----	2
K-9.	7 x 7 BS collar	-----	1
K-10.	3 x 5 BS collar	-----	1
K-11.	Joint C	-----	1
K-12.	Brg. 685	-----	2
K-13.	Brg. 685 ZZ	-----	2
K-14.	Brg. SKT3.2 x 8	-----	2
K-15.	M2 x 10 PH	-----	5
K-16.	M3 Nut	-----	4
K-17.	φ 2 FW	-----	2
K-18.	Roll pin 2 x 10	-----	1
K-19.	Miter gear (Gear)	---	1
K-20.	Miter gear (Left)	---	1
K-22.	Tail blade holder (A)	-----	2
K-23.	Tail blade holder (B)	-----	2
K-24.	Tail pitch plate	-----	1
K-25.	Rod end	-----	2
K-26.	Tail pitch stopper	---	2
K-27.	3 x 5 BS Collar	-----	1
K-28.	M3 x 3 Ss	-----	2
K-29.	M3 x 12 Cs	-----	2
K-30.	M4 x 4 Ss	-----	2
K-31.	M2 x 8 PH	-----	2
K-32.	M2 x 10 PH	-----	6
K-33.	M2 Nut	-----	6
K-34.	M3 U Nut	-----	2
K-35.	φ 5 Ball	-----	2





Disassembling view

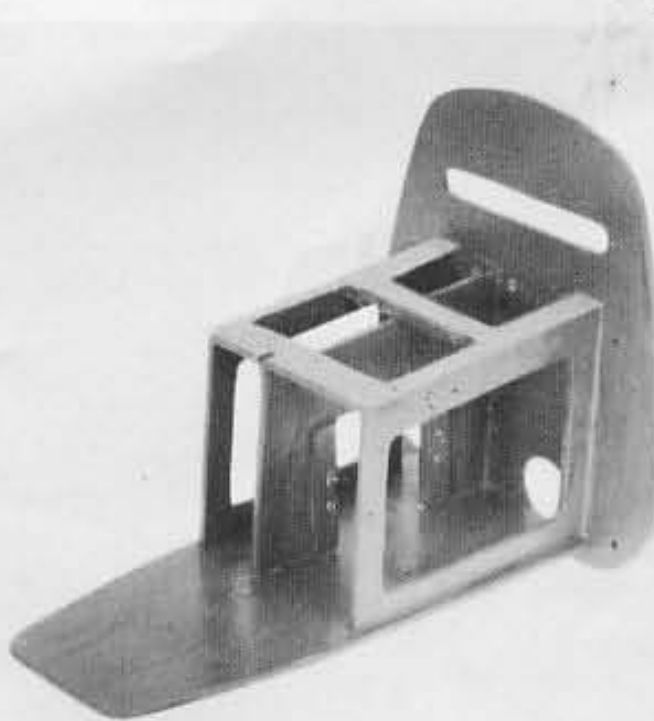
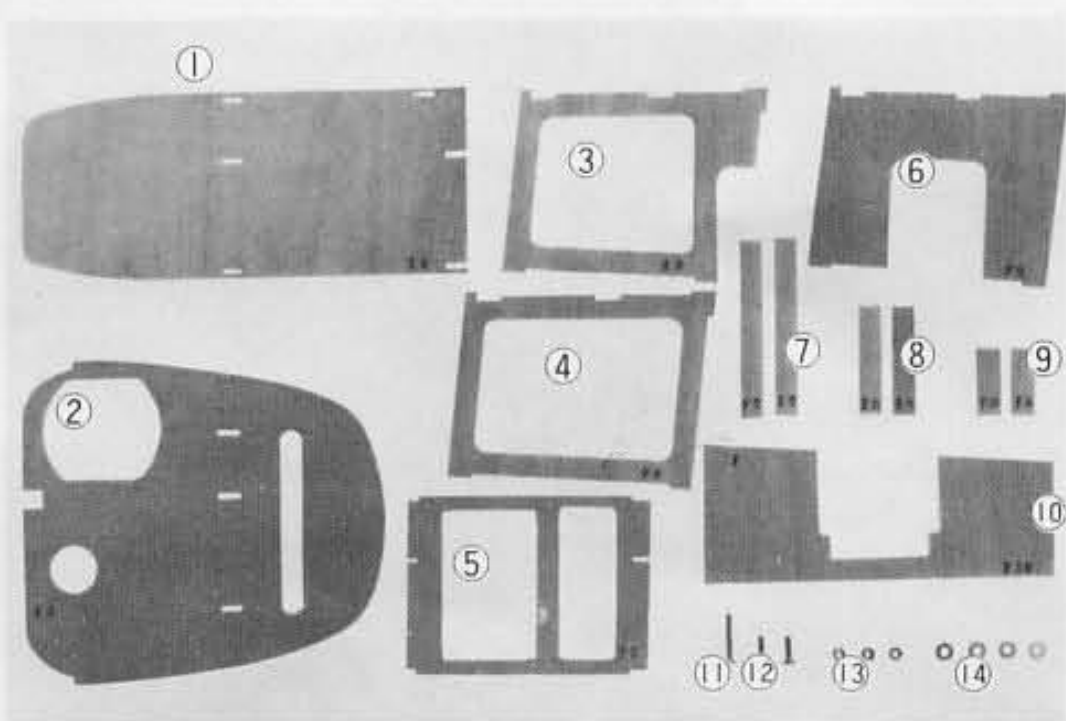


1. Mount the tail blade holder section and the tail pitch plate section at the pre-assembled tail gear box. (Please refer to the illustrations and the assembling view).  
The mounting position of the tail pitch stopper will be described in the rudder section of Section II.
2. Mount the tail drive shaft at the joint.  
Tightening one end of the M4 x 4 Ss firmly, tighten the other set screw. At this time, secure the centering of the drive shaft by turning the joint. (Please compensate the drive shaft by your hand so that it may smoothly rotate without any swing.)
3. Pass a tail drive shaft through the tail pipe and determine the length of the drive shaft. Tighten the 2nd shaft side by M3 x 5 Ss. Then, secure the centering as well as the former. Tighten all the screws so that they may not be loosened.
4. Lubricate the bushing of tail drive shaft with oil.
5. Tighten the tail transmission body by a  $\phi 16$  pipe clamp. Then, check that the tail 2nd shaft may be horizontal.
6. Again check the lubricating conditions of each bearing and bushing.

(Additional note)

Adjust the tail blade in the procedure of Step-14 as well as the main blade.

8). Assembling the body frame



Step-12

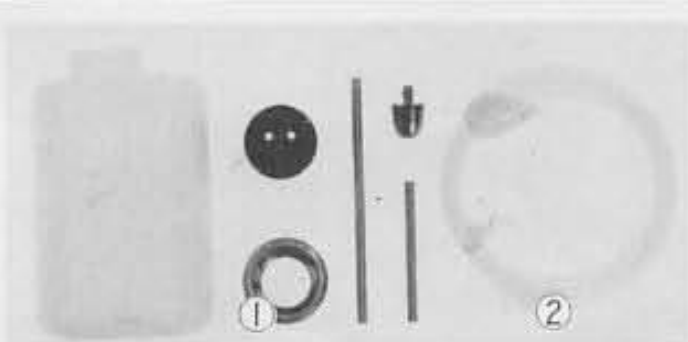
Cement altogether after the whole parts are temporarily assembled. It is much recommended that you will use an epoxi adhesive or a pond for wooden articles.

(L). Assembling the body frame

- |                                     |                                 |   |
|-------------------------------------|---------------------------------|---|
| L-1. Body frame base                | L-7. Auxiliary member (A) ----- | 2 |
| L-2. Rear plate for body frame      | L-8. Auxiliary member (B) ----- | 2 |
| L-3. Right side plate of body frame | L-9. Tank support plate -----   | 2 |
| L-4. Left side plate of body frame  | L-10. Pitch gauge -----         | 1 |
| L-5. Upper servo mount              | L-11. M3 x 20 PH -----          | 1 |
| L-6. Lower servo mount              | L-12. M3 x 10 PH -----          | 2 |
|                                     | L-13. M3 Nut -----              | 3 |
|                                     | L-14. $\phi 3$ FW -----         | 4 |

- 1). The member L-7 is an auxiliary member for the lower L-5 (on the servo mount). It is also an auxiliary member for wooden screws for mounting the servoes.
- 2). The member L-8 is an auxiliary member for mounting the engine control servo (for longitudinal reinforcement of the servo mount). Fit this member L-8 to the left side of L-6 when observed from the rear side.
- 3). The mounting section of the servoes is made comparatively small. So, please form the servo mount to your servoes.
- 4). After the whole part is assembled, please set the mounting holes in alignment.

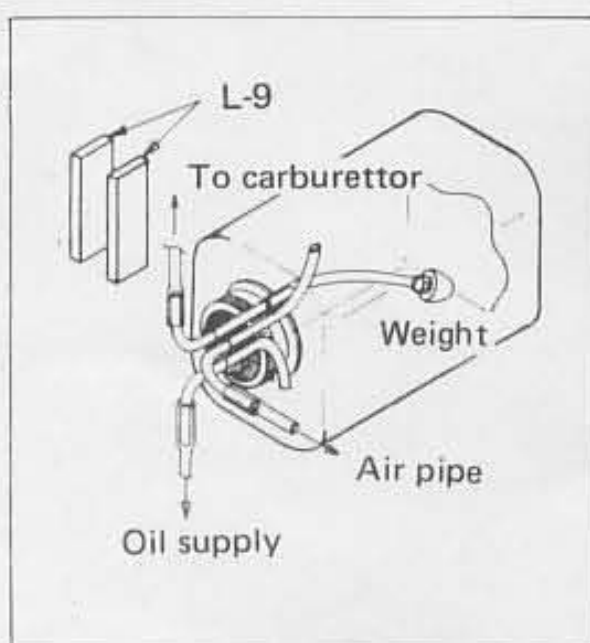
9). Working and mounting the fuel tank



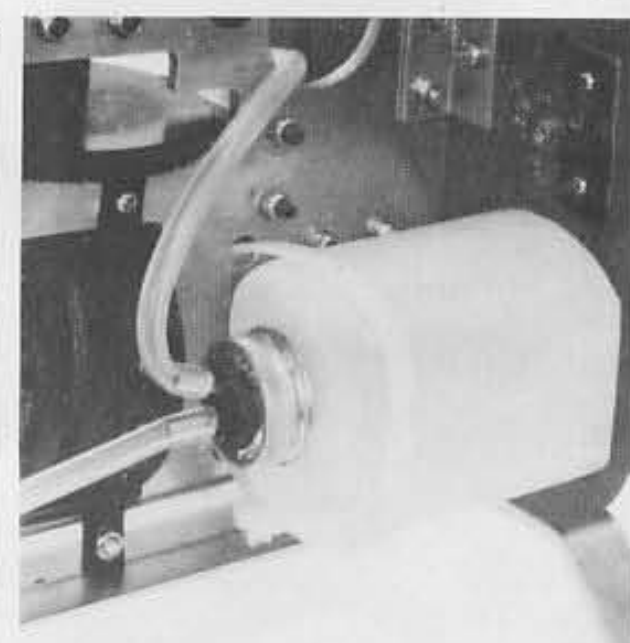
- (M) Fuel tank
- |                      |   |
|----------------------|---|
| M-1. Fuel tank ----- | 1 |
| M-2. Fuel pipe ----- | 1 |

1. Stick two members of L-9 together by an epoxi adhesive or a bond for wooden articles.
2. Place the member L-9 between the main frame and the fuel tank. Fix it by a linkage band.
3. Work the metal fittings of the fuel tank according to the working diagram. It is better to provide a filter on the way up to the carburettor.

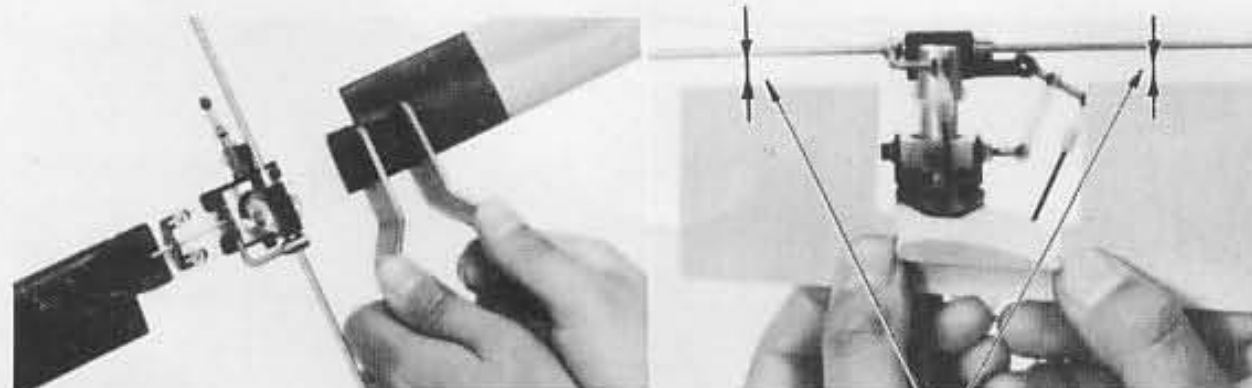
Working diagram



Step-13







(Use the stabilizer bar in the procedures Step-9)

Make the clearance same.

(N). Assembling of blade

- N-1. Main blade ---- 2
- N-2. Tail blade ----- 2
- N-3. Stabilizer blade --- 2
- N-4. Stabilizer bar ----- 1

As the blades rotate at a high speed, please carefully adjust the balance of the blades. Otherwise, control trouble or vibration may be caused.

1. Balance adjustment (Same as for tail blades)

- (a). Center of gravity -----  
Coincide the center of gravity of the two blades. Firstly, place a round pencil or round bar on a plain surface like the desk top. Then, place the blades on it in order to seek for the balanced point (where you mark at this time). If the center of gravity of one blade is different from that of another, place a weight like solder on a lighter blade to secure the balance. Namely, the balanced position on the blade is the weight-applying point. If a weight is located at the tip end too much, please increase the weight of a solder.
- (b). Weight balance -----  
Use a balance. Adjust the weight of the two blades so that the weight of one blade may become completely equal to that of another blade. If the weight is different, return to the clause (a) for re-adjustment.

2. Film covering and protection of blades

As the blades are made wooden member, the weight may be influenced by humidity. So, protect the blades by covering film (mono koto or sola-film) to the whole surface of the blades.

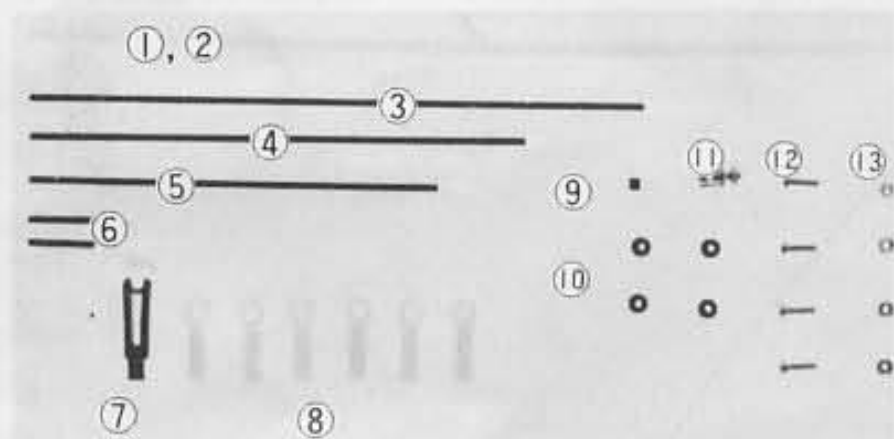
3. Pitch adjustment (Wind a color tape to the main blade to make the tracking adjustment easier).

**Main blades** -----  
Adjust the pitch by using a pitch gauge (shown in the right illustration). Correct it by using a monkey wrench (or pliers) (See the central view). Check the gauge when the stabilizer bar is horizontal. And adjust the pitch of the two blades so that it may become equal.

**Tail** -----  
The standard of pitch adjustment is about 40° for the right side, about 20° for the neutral and about 0° for the left side when the engine control stick is located at the SLOWEST position.

11). Linkage of rods

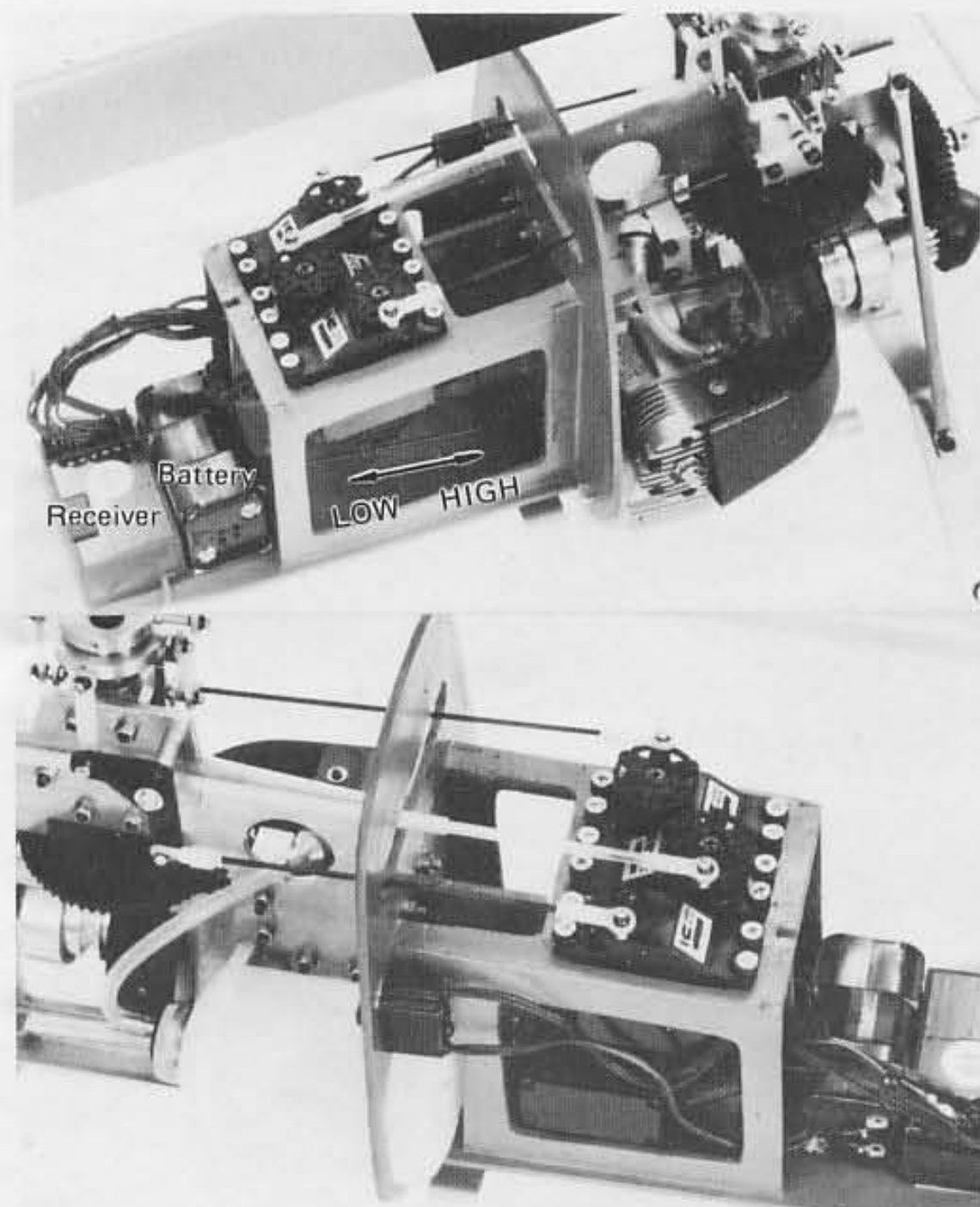
(Double-side stick tape is contained in the sack of NO. P. Stick the receiver and the battery by this tape).



- O-1. Rudder control tube--- 1
- O-2. Rudder control pipe--- 1
- O-3. Adjust rod (Single side threaded M2 x 150 ----- 1
- O-4. Adjust rod M2 x 120-- 1
- O-5. Adjust rod M2 x 100-- 1
- O-6. Adjust rod M2 x 16 -- 2
- O-7. Rod adjuster ----- 1
- O-8. Rod end ----- 6
- O-9. M3 x 3 Ss ----- 1
- O-10. φ5 Ball ----- 4
- O-11. Rod connector -- 1
- O-12. M2 x 8 PH ----- 4
- O-13. M2 Nut ----- 4

(P). Transcribing mark and accessories

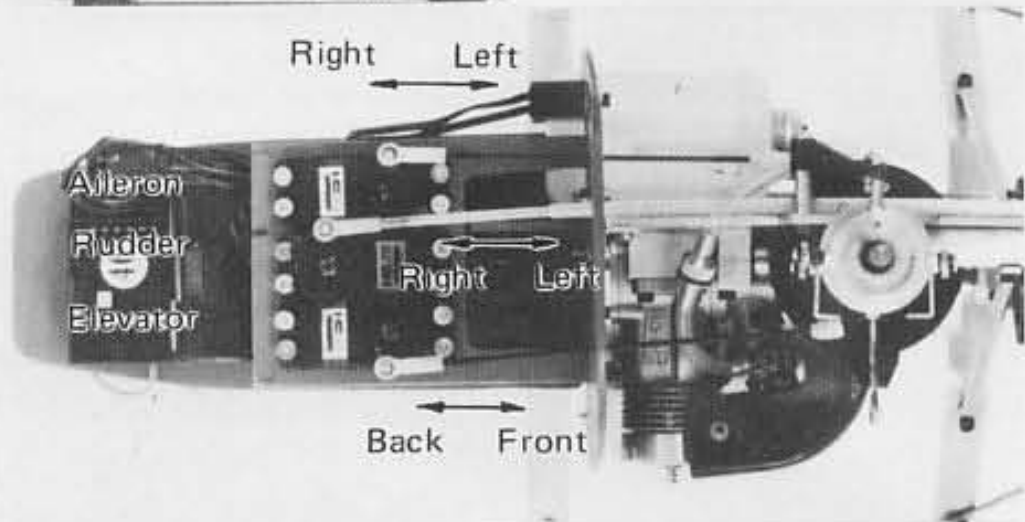
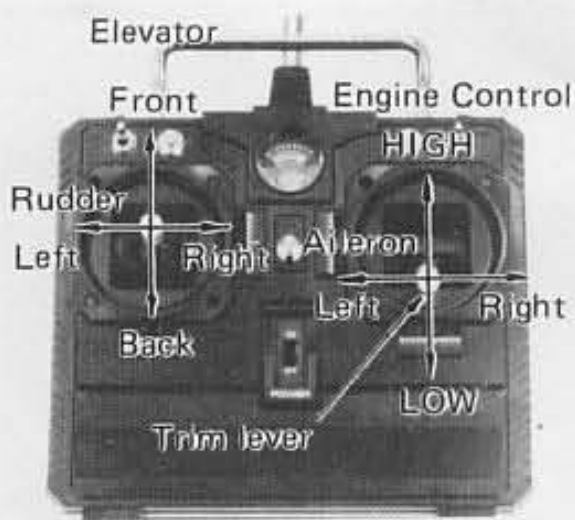
- P-1. Transcribing mark -- 1
- P-2. Double-side adhesive tape ----- 1
- P-3. Ring rubber ----- 1
- P-4. L-type wrench 1.5 -- 1
- P-5. L-type wrench 2.0 -- 1
- P-6. L-type wrench 2.5 -- 1
- P-7. Instruction manual ----- 1
- P-8. Parts list ----- 1





**For transmitter and receiver**

As shown in the left illustration, each stick undertakes each position. The lever located at the side or the lowerside of the stick is a trim lever by which you can make micro adjustment of each control volume. Besides, please understand the micro adjustment according to the instruction manual in case of a mixing prop.



1. Mount each servo in a position. Switch on the transmitter and receiver. Set the trim lever of the engine control to **SLOWEST** and the other trim levers to **NEUTRAL**. And set the stick of engine control to **SLOWEST** and the other sticks to **NEUTRAL**. This position is for engine stop (i.e. the carburettor drum is closed). The other positions are for **NEUTRAL SETTINGS**. (In case of a mixing type prop for helicopter, the **NEUTRAL** position of the rudder servo horn is the intermediate position of the engine control stick.)

	Rod length	Between-centers distance
2. Aileron	M2 x 100 Adjust rod	(123) mm
Elevator	M2 x 120 Adjust rod	(142) mm
Rudder shaft	660mm	(695) mm
Engine control	M2 x 150 Single side threaded rod	Bending is required. Adjust the rod connector.

(As the between-center distance may differ to the size of servo, please measure the dimension of practical servo).

3. Link the rods. Connect each lever to the center position of the movable range so that it may uniformly move in either direction (i.e. right and left direction, or forward and backward direction). (The tail pitch lever position of the rudder is a little biased to the gears box from the center. And the position of the engine control lever is the **SLOWEST/engine cut-down** position). It is necessary to work the engine control rod. Namely, bend the rod so that it may not come in contact with the muffler or the engine block. After the rod connectors are positioned and mounted, fix the engine control rod with M3 x 3 Ss. (Check that smooth rotation is secured between the M2 of the rod connector and the servo horn.) After the linkage of rods is over, tighten the rod ends and the rotary parts such as connectors firmly. Then, lubricate them with oil adequately.

**12). Working and painting of canopy**

(A rubber band is provided in No. P)

**Step-16**



- (Q). Canopy
- Q-1. Canopy ----- 1

(A square sheet taken out of the canopy is used as a front member for fixing the cooling fan cover)

1. Cut off the canopy by scissors or a cutter knife with flange width of 3 to 5mm remained. Try to temporarily fix it to the body frame. The rib of the side will be fit in the member F-2 located at the rear part of the body frame from the upper side.
2. Paint the rear side first. Please devise your favorite pattern of design and provide maskings for painting. Before beginning to paint, wash up the canopy with neutral detergent. It is recommended that water-soluble paints are used. Use a brush or a spray for painting. (NB) : please never give any paints to the joint parts.
3. Assembling and mounting  
Cement the right side with the left side together. (Use an instant adhesive or cemedine for cementing). Use several clips to unite both sides together.  
After the adhesive is dried well, cut off the joint part of both sides for trimming up. Then, stick your favorite transcribing mark on the surface. Insert the canopy in the rib section and hook a rubber band at the projected part. Then, lead the rubber band under the frame for fixing the canopy.

(Remain the flange at the whole periphery)



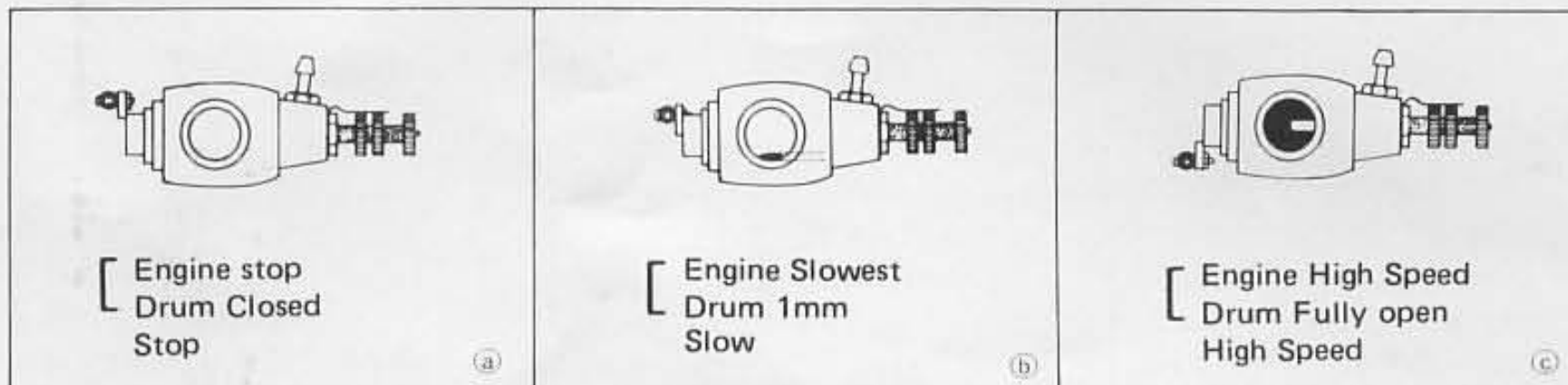


A. Adjustment of rudder angle and of each part

1. Stabilizer blade and main blade

- (1). Two stabilizer blades are oppositely faced respectively and are to be mounted in parallelism.
- (2). The stabilizer blades are at right angle to the main blade. Check this point. (This is a track adjustment. And unless the main blades are straightly mounted, rudder functioning may be disordered and abnormal vibrations may be produced.)
- (3). Check that the stabilizers are uniform in the right and left direction and may smoothly move lightly.

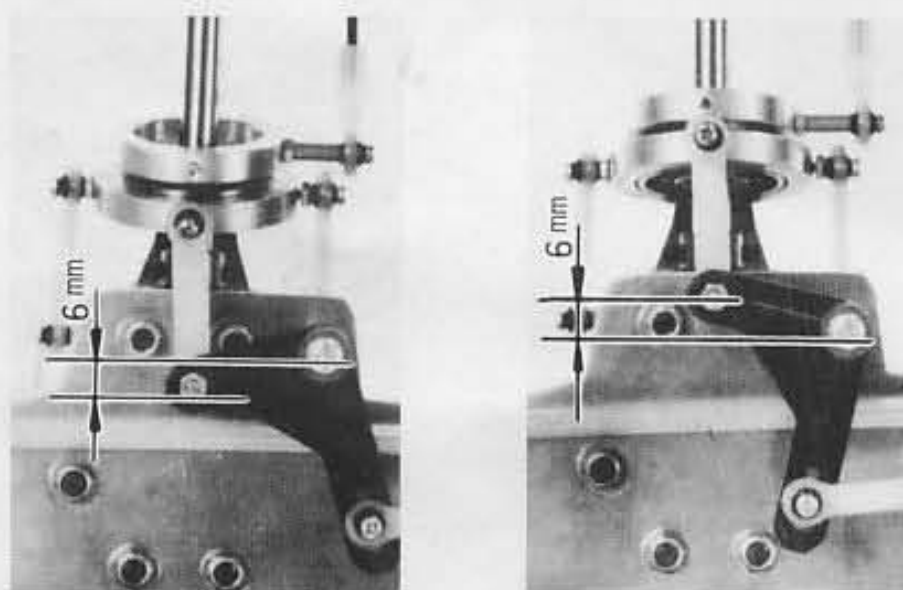
2. Engine control



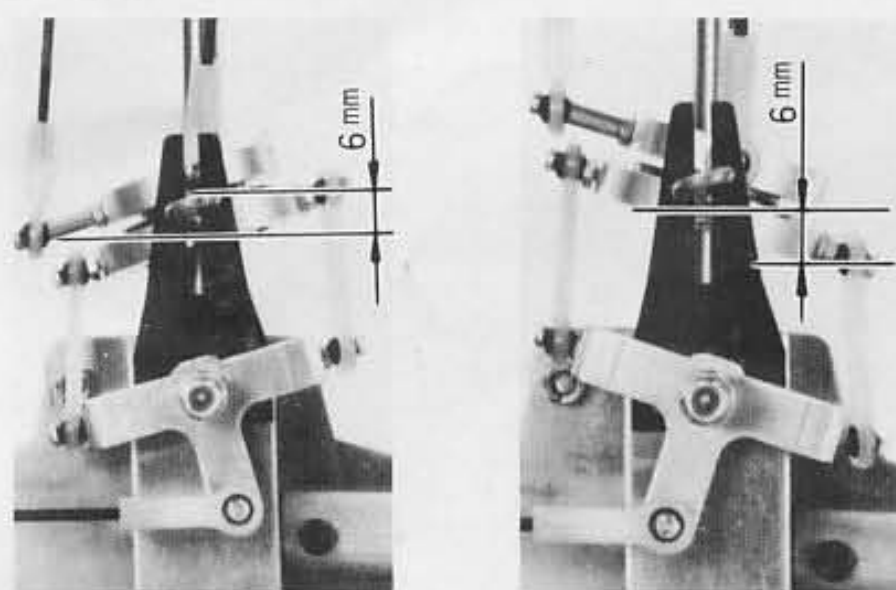
- |  |                                      |                     |
|--|--------------------------------------|---------------------|
| (a). Trim, Lowest position, Stick, Lowest position | Carburettor drum closed              | Engine stop         |
| (b). Trim, Middle, Stick, Lowest position          | Carburettor drum opened by about 1mm | Engine Slow (Start) |
| (c). Trim, Middle, Stick, Upmost position          | Carburettor drum fully opened        | Engine High Speed   |

\* In case the stroke is short or it remains, change the mounting positions of the servo horn and of each lever.

3. Aileron



4. Elevator



UP (Retreat)

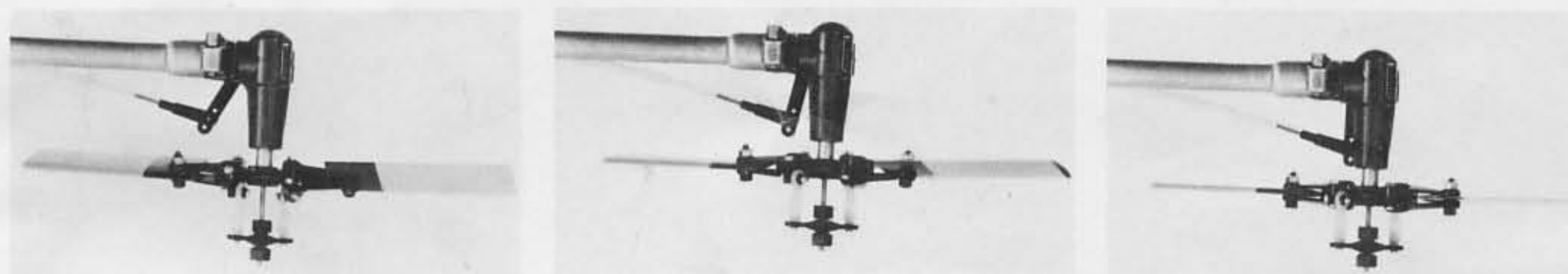
DOWN (Forward)

Check that all the levers smoothly move without any paly.

Each lever may incline by about 20° degrees in both right and left directions. (The adjustment is the same as for engine control).  
 "NEUTRAL" is the conditions that the upper surface of the aileron lever is at right angle to the mast.

The lever can move by about 20° degrees in the forward and rearward direction. (The adjustment is the same as for other levers). "NEUTRAL" is the condition that the upper surface of the elevator lever is at right angle to the mast.

5. Rudder



(RIGHT)

(NEUTRAL)

(LEFT)

- |   |   |
|---|---|
| <p>(1). "Neutral" position of rudder (Engine control stick is at SLOWEST position).</p> <p>(a). Tail pitch lever position -----<br/>The lever is a little biased to the tail gear box from the middle of the whole movable range.</p> <p>(b). Tail pitch plate position -----<br/>The distance (inside dimension) between the tail housing and the tail pitch plate stopper (tail gear box side) is about 10mm.</p> <p>(c). Servo horn -----<br/>Set each servo horn so that it may be positioned at the middle of its whole movable range (i.e. it may move uniformly in the right and left direction). (The right stick increases the pitch angle of tail blade and the left one decreases it).</p> | <p>(2). Movable range of the rudder<br/>Pitch variable range of the tail balde (Retractable distance of the tail pitch rod)</p> <p>Right stick -----<br/>Length (inner dimension) of tail hosuing and tail pitch plate stopper : Approx. 13mm.</p> <p>Left stick -----<br/>Length (inner dimension) of tail housing and tail pitch plate stopper : Approx. 7mm.</p> |
|---|---|

Please use the aboves as standard. Namely, the mounting positions of each lever and each servo horn are to be re-adjusted in the flight adjustment. (Tighten all the screws, nuts and bolts so that they may not be loosened during flight).



## B. For center of gravity

Set the center of gravity so that the skid pipes may be a little inclined forwards when raising the helicopter body with the stabilizer blades turned right in the cross direction of the body and held by your both hands. Please never set the center of gravity so that it may be inclined backwards. If necessary, adjust the center of gravity by adding a weight like lead. (in this case, a weight like lead should be fixed in a position so that it may not move during flight.

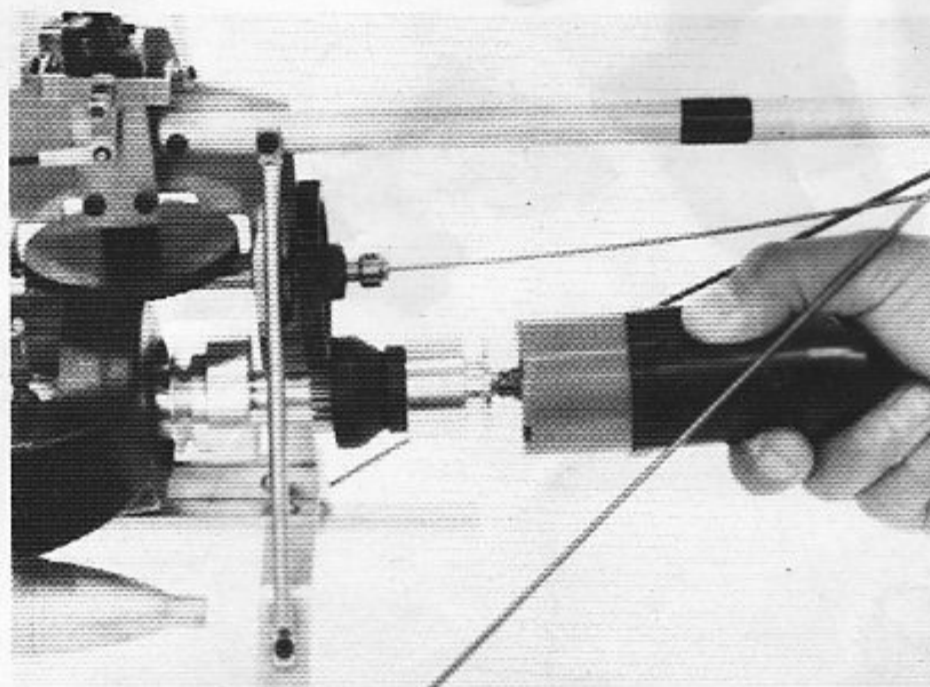
## C. Inspection and checking each section of the helicopter before flying

Now, all the assemblings are over. Please review all the processes of assembling before starting the flying adjustment. After all the processes are satisfactory, please tighten all the nuts, bolts and nuts of each section. And lock all of them. Use a new battery for both transmitter and receiver. Checking each section prevents a trouble in advance and is one of the most important elements for safety flying. Even after you will master flying and controlling your helicopter, you will be required to keep these cautions.

## Section III Flying (Flight)

### A). Adjustment before flying

1. Supply fuel in the tank.
2. Turn on the switches of transmitter and receiver. Set the engine control stick to SLOWEST position and each trim to NEUTRAL position.
3. Start the engine. In this helicopter, spinner start is basical. Replace the pressure-fit rubber for a smaller one. Next, connect a plug heater and fit a starter to the spinner under pressure to start the engine. At this time, hold the main rotor to stop even if excessive rotation occurs.
4. Step on the skid after the engine starts and firmly hold the main rotor. And blow the engine one or two times in order to check the meeting condition of the clutch. If the head is apt to strongly rotate at this time, complete meeting of the clutch is secured.



### 5. Adjust the tracking.

Lift up the engine control stick one step by one step. In case the rotor tip can be seen doubly when the helicopter is about to land off, check by the distinguishing tape provided at the rotor tip which rotor is upper or lower than the other one. In this case, increase the pitch of the lower rotor to coincide the tracking. Finally, perform the micro adjustment by changing the rod length of the mixing arm and the swash upper plate. (The standard pitch angle is 4° degrees).

NB : In case the helicopter issues an abnormal noise, abnormal vibration is produced or a tracking gap is produced, it means that some part of the helicopter is strained or troubled. In these cases, set the engine control stick to SLOWEST to stop the engine. Then, seek for a cause for repair.

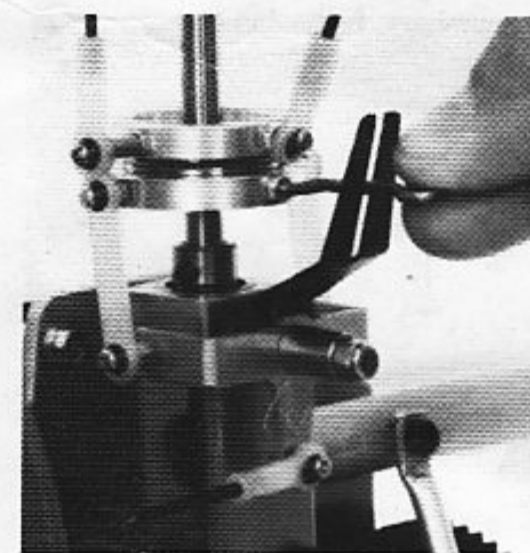
### B). Adjustment of flying

Carry out the trim adjustment after the tracking is adjusted. (Apply an aluminum bar or a bamboo rod 1 meter long to the skid of the helicopter and fix it with tape or so).

1. Turn the helicopter windwards and stand at a little backward of the helicopter at either right or left side. Please never stand at the front or the rear ward of the helicopter. Otherwise, it will become impossible to control the helicopter because you can not see the posture of a helicopter in the elevator direction.
2. Increase the engine rotation speed gradually. Correct the settings of helicopter if the following moves are produced when the helicopter is about to land off.

Forward or backward -----  
Change the length of the rod between the elevator lever and the elevator servo horn.

Right or left -----  
Change the length of the rod between the aileron levers.



Set each trim lever to NEUTRAL during these adjustments. If the helicopter moves to right when horizontally flying forwards, turn the swash plate counterclockwise when observed from upwards. If the helicopter moved leftwards under the same conditions, turn the swash plate clockwise. (The swash lower plate may slide by turning the hinge section of the radius arm ----- Please refer to the right photo).

### 3. Adjustment of rudder

In case the tail swings rightwards, take outsides the position of the tail pitch plate stopper. In case it swings leftwards, bring the stopper inwards. Then, adjust the tails with the trim lever located at NEUTRAL. For further details of subsequent rudder mixing, please follow the instruction manual of a mixing prop used for your helicopter.



#### 4. Adjustment of the engine control

In case the engine rotation speed is not increased with your helicopter high in the air, the pitch angle of the main rotor is too great. At this time, lower the pitch angle of the main rotors by the same degree for both. If it is difficult for the helicopter to rise even though the engine rotation speed is increased, please increase the pitch angle a little more. At this time, it is necessary to adjust the tracking again.

It is dangerous to make a mistake in adjustment and handling. So, please keep the instructions and advices given by a good instructor.

### C). Safety measures for R/C Helicopters

Now, you have assembled your KIT with your heart and skill. To ensure comfortable and safe flight of the helicopter, please keep the followings.

#### (1). Selection of flying yard

Select as wide and vacant flying yard as possible. And select a flying yard that is free from any transformer substation, high-voltage electric wires, and/or buildings.

#### (2). Cautions before flying

Check if the R/C unit is actuating without fail before engine starts. Check all the screws, nuts and/or linkages to see if they are loosened or not.

#### (3). Cautions for flight

When you begin to operate your helicopter, pay attention to the neighbors. Please never let the people approach to the helicopter. Please do not fly your helicopter on or over houses, trains, and cars, power-transmission lines, and warehouses of combustible matters. If you find that the output of the helicopter is lowered, please immediately land it on a safe place. Please never let childrens or viewers approach to the helicopter.

#### (4). Check the screws and nuts or bolts to see if they are loosened or not.

Please pay attention specially to the rotary parts of the rotor head. If you should find a loosening or a rattling, immediately give complete adjustment before flying.



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