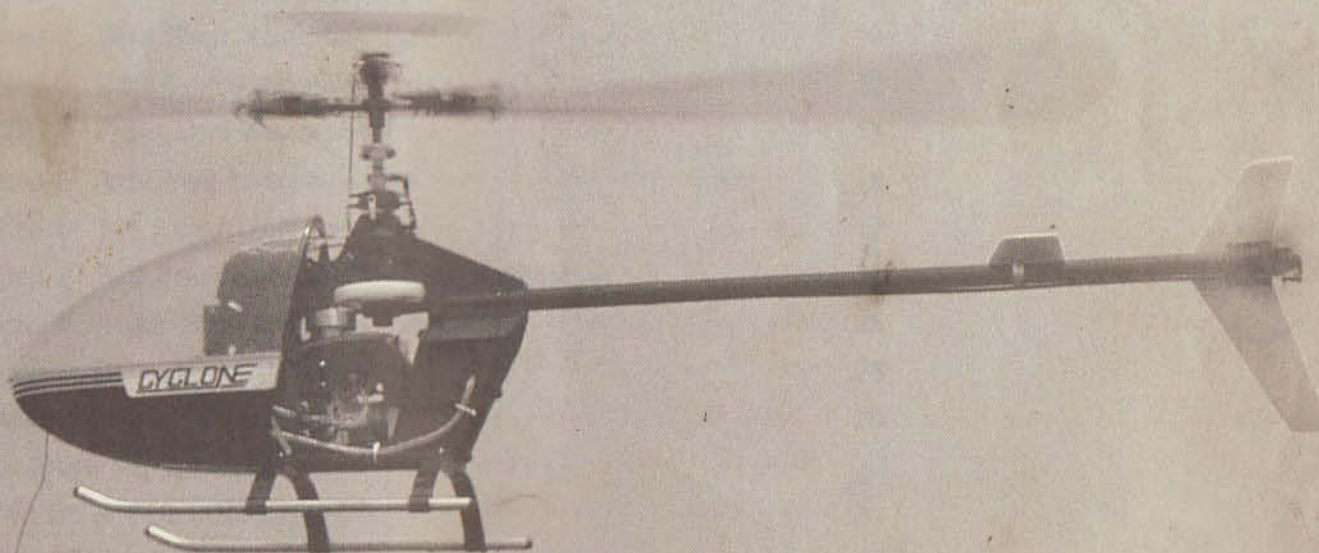


CYCLONE



- Become thoroughly familiar with this manual prior beginning construction.

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CYCLONE PARTS LIST

No.	Name	Quan.
0102-010-8	Throttle Lever, Spacer for ENYA	1
0102-009-8	Throttle Adapter for O.S.	1
0102-013-6	Cooling Fan	1
0102-004-6	Engine Mounting Block	1
0102-081-8	Pulley	1
0102-082-7	Clutch Stopper	2
0102-083-7	Clutch Shaft	2
0102-084-8	Clutch Shoe	2
0102-085-7	Clutch Spring	2
0101-071-8	Pinion Gear	1
0102-034-8	Clutch Bell	1
1002-013-6	1960 Ball Bearing (W/Housing)	1
0401-073-8	Scissors Arm Ass'y	1
0400-015-7	Pitch Control Rod	1
0200-009-6	Main Shaft	1
0401-068-8	Upper Plate Lock	1
0401-070-8	Swash Plate	1
0401-012-6	Swash Plate Collar	1
1002-011-6	1910 Ball Bearing	2
0402-023-8	Slide Ring Ass'y	1
0101-072-6	Rotor Drive Gear	1
0101-073-6	Drive Pulley	1
0601-109-8	Main Frame (R, L)	1ea.
0400-032-8	Bell Crank, Spacer	2ea.
0102-039-8	Cooling Cover	1
0100-029-6	Starting Belt	1
0601-119-8	Radius Support Ass'y	1
0601-117-6	Cross Member	1
0601-120-7	Guide Roller	2
0601-121-7	Guide Roller Shaft	2
0601-112-8	Servo Frame (A,B)	1ea.
0601-114-8	Servo Frame (C,D)	1ea.
0601-111-6	Front Bed	1
0603-041-7	Landing Gear Brace	2
0603-009-7	Landing Gear Skid	2
0603-012-7	Skid Cap	4

No.	Name	Quan.
0301-017-6	Tail Rotor Shaft	1
0301-016-8	Tail Pulley	1
1002-008-6	1350 Ball Bearing	2
0100-049-6	Tail Drive Belt	1
0301-014-8	Tail Housing (R,L)	1ea.
0601-063-5	Tail Boom	1
0601-080-8	Vertical Fin	1
0300-001-8	Tail Rotor Hub Ass'y (W/1030 Bearings)	1
0300-003-8	Tail Rotor Grip (W/Arm)	2
0300-003-8	Tail Rotor Grip (WO/Arm)	2
0403-009-8	Tail P.C. Bracket	1
0403-009-8	Tail P.C. Crank (W/Plastic Ball Joint)	1
0403-008-6	Tail P.C. Lever	1
0403-007-6	Tail P.C. Plate	1
0403-012-8	Tail P.C. Retainer	2
0601-080-8	Horizontal Stabilizer	1
0601-069-7	Tail Clamp	1
0903-011-6	Tail Rotor Blade	1set
0000-001-6	Cord Protector	1
0601-116-6	Switch Plate	1
0501-003-8	Fuel Tank	1set
0400-028-8	Flexible P.P. Rod	1
0402-030-6	Slide Ring Horn	1
0204-080-8	K-4 Rotor Head	1
0204-021-8	Control Lever	1
0200-016-8	Stabilizer Retainer	2
0200-015-7	Stabilizer Bar	1
0200-018-7	Stabilizer Blade	2
0204-022-7	Blade Reinforcement	2
0902-002-6	K-600 Main Rotor Blade	1set
0602-074-6	Body	1
0602-075-6	Canopy	1
0602-076-6	Cabin Frame	1
0001-004-6	Liquid Glue for ABS	1

CYCLONE SCREW SET LIST

Bag No.	Size & Name	Quan.
No. 1	1.5 Hex. Wrench	1
	2.0 "	1
	2.5 "	1
	3.0 "	1
	2.4 " (for JIS M3)	1
	M3 x 25 Cap B. (JIS)	1
	M3 x 8 Cap B.	1
	M3 x 15 Cap B.	4
	M3 Plate Washer	4
	M3 Serrated Washer	4
	M3 Spring Washer	1
	M3 x 4 Set B.	4
	M3 x 10 x 1 Plate Washer	1
	M4 x 15 Cap B.	2
	M4 x 28 Cap B.	2
	M4 x 4 Set B.	2
No. 2	M3 x 18 Cap B.	4
	M3 x 25 Cap B.	1
	M3 N.N.	1
No. 3	M3 x 10 Cap B.	4
	M3 x 12 Cap B.	4
	M3 x 15 Cap B.	1
	M3 x 22 Cap B.	1
	M3 x 25 Cap B.	9
	M3 x 30 Cap B.	3
	M3 N.N.	19
	M3 Plate Washer	6
	M3 Nut	1
	M4 x 15 Cap B.	6
	M4 Plate Washer	6
	M4 Serrated Washer	6
No. 4	M3 x 10 Tap T.	4
	M3 x 12 Cap B.	2
	M3 N.N.	2
	M2.3 x 12 Tap T.	20

Bag No.	Size & Name	Quan.
No. 5	M3 x 20 Cap B.	4
	M3 N.N.	4
	M4 x 4 Set B.	4
	M3 x 10 Tap T.	12
No. 6	M2 x 10 ⊕ Bolt	11
	M2 Nut	8
	M2 Plate Washer	3
	M2.3 x 8 ⊕ Bolt	2
	M3 x 6 Cap B.	4
	M3 x 10 Cap B.	3
	M3 x 15 Cap B.	6
	M3 N.N.	9
	M3 Plate Washer	6
	M3 x 4 Set B.	4
	M4 x 4 Set B.	2
	Universal Link	2
	Ball Joint	2
No. 7	M2.3 x 12 Tap T.	4
	M3 x 10 Tap T.	1
	M2.3 x 17 Threaded Rod	4
	ℓ48 Crank Rod	2
	ℓ70 Crank Rod	1
	ℓ77 Crank Rod	1
	ℓ105 Crank Rod	1
	ℓ118 Crank Rod	1
	Universal Link	6
	Quick Link	6
No. 8	M3 x 18 Cap B.	2
	M3 x 20 Cap B.	1
	M3 N.N.	3
	M3 x 4 Set B.	4
	M4 x 4 Set B.	1
	M2.3 x 110 Threaded Rod	1
	M2.3 x 62 Threaded Rod	2
	M2.3 x 17 Threaded Rod	2
	Universal Link	10
No. 9	M3 x 12 Tap T.	4

Prior to beginning construction

The construction of this kit is divided into 9 groups. The parts bags and screw sets are numbered. Open only the bag required for the group you are constructing.

- **Additional equipment required for construction and flying your CYCLONE:**
 - 5 or more channel R/C equipment for helicopter.
The CYCLONE can be flown with 4 channel equipment; however, for best results we recommend that you install a 5th. servo for collective pitch.
Servo frames included in this kit will accept standard size servos. You can not install large or special shaped servos.
 - Gyro
CYCLONE can be flown without gyro; however, we recommend that you install a gyro for easier piloting.
 - Engine: O.S. 50 FSR-H or ENYA 49 XTV
 - Muffler: KALT Muffler (for CYCLONE).
(Optional, not included in kit)
 - Fuel tubing and filter. (Optional, not included in kit)
 - Engine starting equipment. (Electric starter, batteries etc.)

- Additional tools etc..

- ⊕ Screwdriver (small, large)

- 5.5mm nut driver

- Pliers, nippers

- ⊖ Screwdriver (small)

- Knife

- File

- Taper Reamer

- Vinyl Tape

- Cyanoacrylate adhesive or KALT TITE

- Clips (Paper clips or clothes pins)

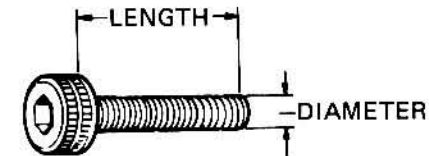
- KALT Precision Pitch Gauge

- In addition, KALT Universal Link Snap Pliers and Link Driver are handy.

- **About the Nuts and Bolts.**

- Nuts and bolts used during construction are identified as follows:

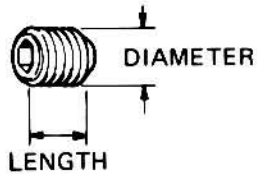
- Cap Bolt



- It has a hexagon hole in the head. Tighten with the hex wrench supplied.

- (Example) M3 x 15 Cap B.
Diameter 3mm ————
Length 15mm ———— Abbreviation for Cap Bolt

- Set Bolt (Grub Screw)



It has a hexagon hole in the end, but no head.

(Example) M4 x 4
 Diameter 4 mm ————
 Length 15mm ————

Set B.
 Abbreviation for Set Bolt

- Self locking nut



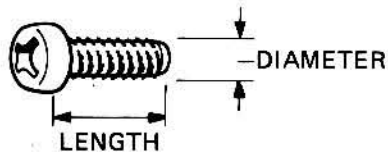
It has a nylon insert in the top of the nut.

(Example) M3
 3mm ————

N.N.
 Abbreviation for Nylon Nut

Use a 5.5mm box wrench to tighten the M3 nuts.

- Tap Tite



These are special self tapping screws for plastic parts. Do not enlarge the existing holes. They must be a tight fit.

(Example) M3 x 10
 Diameter 3mm ————
 Length 10mm ————

Tap T.
 Tap Tite

- ⊕ Bolt

These are pan head ⊕ Screws. Use a suitable size screw driver for tightening.

- Serrated Lock Washer



These are lock washers with gripping teeth around the edges.

- All of the nuts, bolts and washers are called out by number as explained on page 4 and 5.

- Use of the hexagon wrenches.

This kit contains 4 sizes of hex wrenches. Use for tightening cap and set bolts as follows:

Dia.	Cap bolts	Set bolts
M3	2.5mm	1.5mm
M4	3 mm	2 mm

The necessary nuts, bolts and washers needed for each step in construction, are listed at the end of each step.

Be careful to use the correct parts as called out, as only the required number of nuts, bolts and washers are provided in the kit.

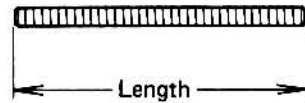
- (Example)

[M3x8 Cap B.4] Use 4 M3 x 8 cap bolts.

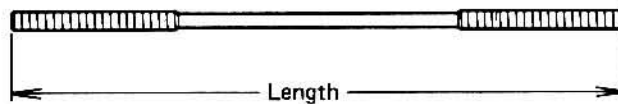
■ Regarding of threaded rods.

Threaded rods used for linkage are identified as follows:

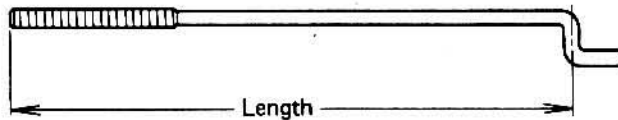
- All threaded rod

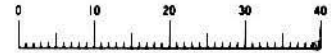


- Both ends threaded



- Crank rod





<Step 1> Power Unit Assembly

- 1** The throttle lever must be extended whether O.S. or ENYA. Use the extension adapter as shown in fig. 1 and 2. Unscrew the idling adjust screw on the carburetor so it can be closed fully. Make sure that the throttle lever position and throws are as shown in figure 3.

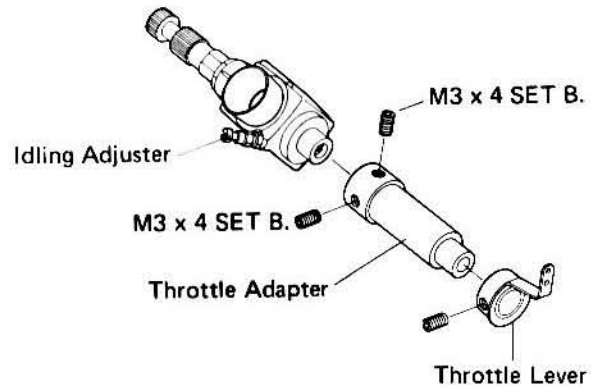


Fig. 1 O.S. ENGINE

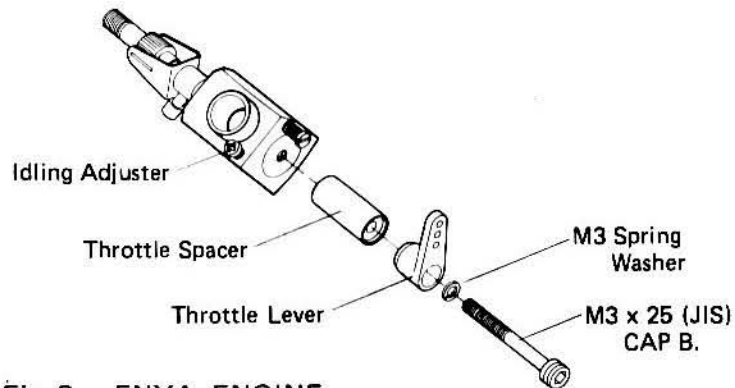
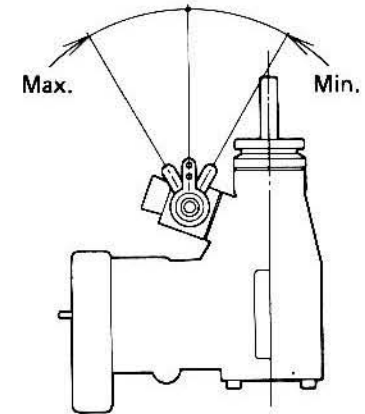


Fig. 2 ENYA ENGINE

Fig. 3



- 2** Enlarge the hole of the cooling fan using a tapered reamer, for a close fit. Do not over enlarge the hole. See fig. 4.

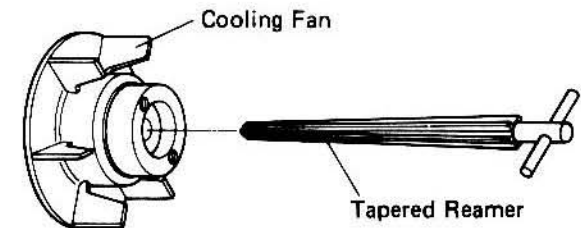
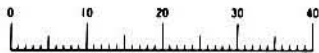


Fig. 4



- 3** Bolt the engine to the engine mounting block. At this time, make sure of the direction of engine mounting block. See fig. 5.

M3×15	Cap B.	.....	4
M3	Plate Washer	.....	4
M3	Serrated Washer	.....	4

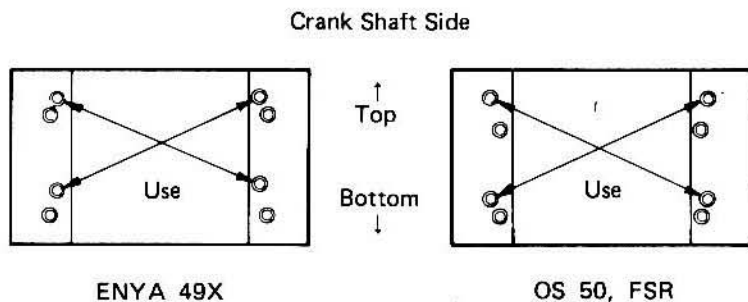


Fig. 5

- 4** Install the cooling fan to the engine, without prop washer, and tighten firmly.
- 5** Attach the pulley and clutch stoppers to the cooling fan. Use straight holes of pulley. see fig. 6. At this time, make sure that the center of the pulley is correctly line up with the engine.

[M4×28	Cap B.	2]
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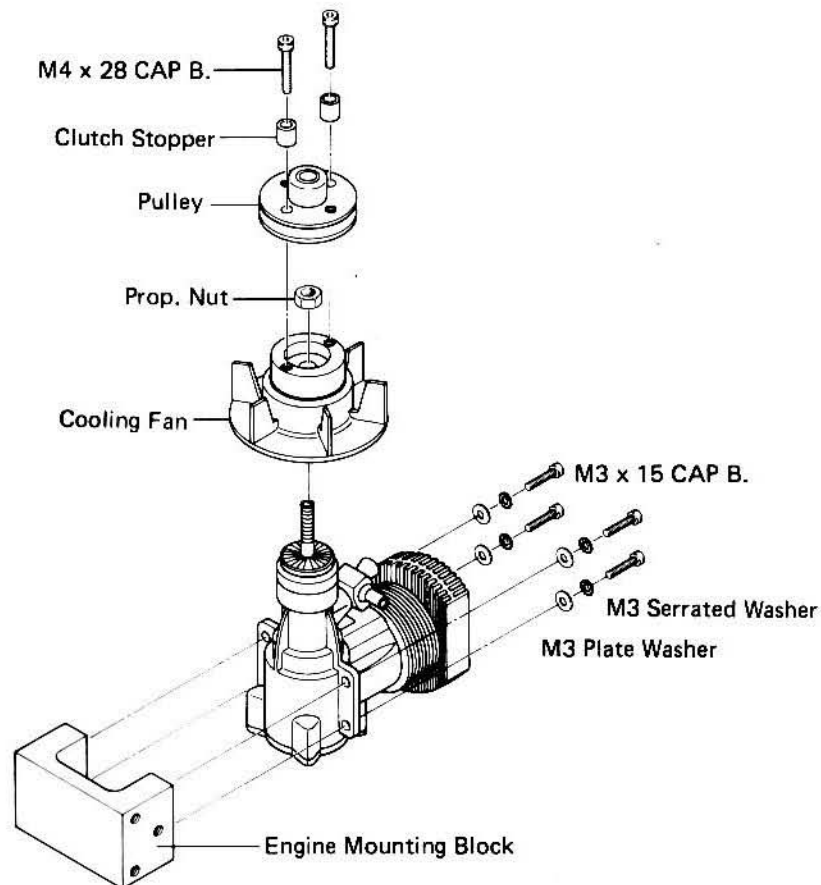
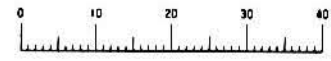


Fig. 6

- 6** Bolt the clutch shoes to the pulley. At this time put some grease to the clutch shafts and the needle bearing of the tip of pulley. See fig. 7.

[M4×15	Cap B.	2]
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7 Insert the clutch springs to the clutch shoes from outside and secure them with set screws.

[M3×4 Set B.2]

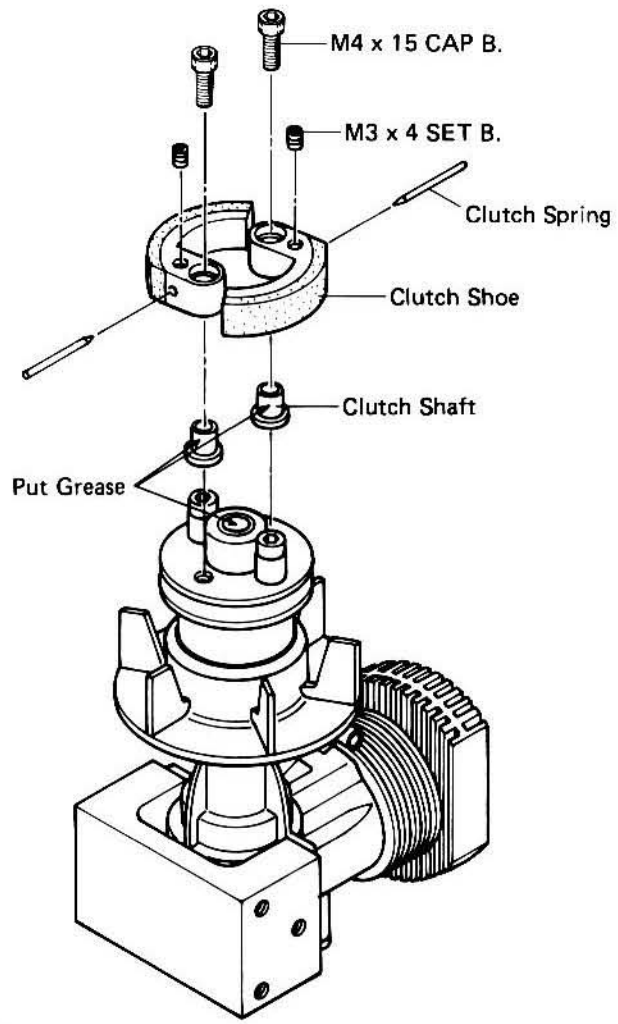


Fig. 7

8 Assemble the pinion gear, clutch bell and the 1960 ball bearing. The set bolts must be Placed on the flat faces of the pinion gear shaft.

[M3×8 Cap B.1]
[M3×10×1 Plate Washer1]
[M4×4 Set B.2]

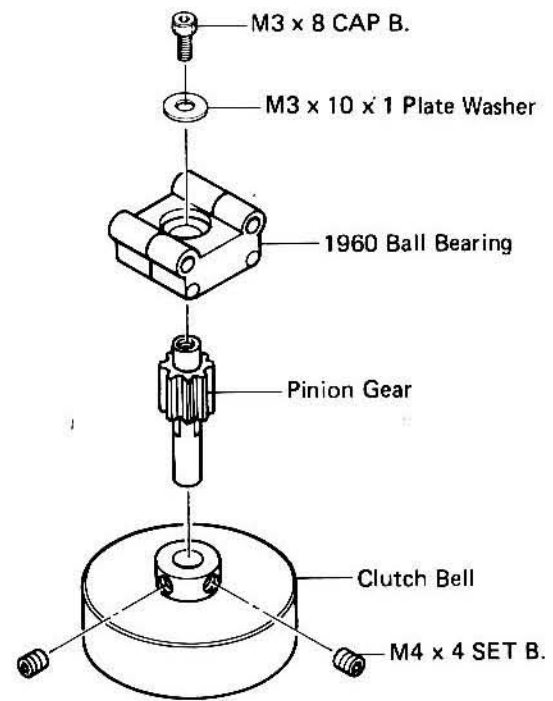
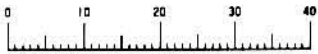


Fig. 8



〈Step 2〉 Main Shaft Assembly

- 9 Insert one end of the pitch control rod into the 2mm hole in the scissors arm unit, then slide the unit about halfway down the main shaft.

At this time make sure that the pitch control rod moves freely in the main shaft. If there is any friction, adjust the angle of the bent end of the pitch control rod. See fig. 9.

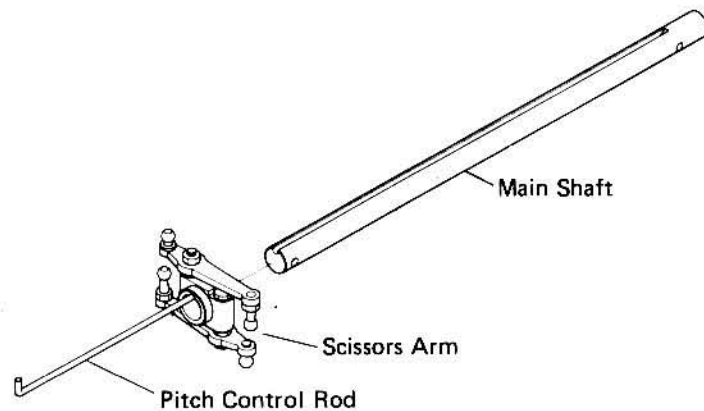


Fig. 9

- 10 Insert the upper plate lock, swash plate collar and 1910 ball bearing, in that order, from the bottom of the main shaft. And insert the bottom end of the pitch control rod into the 2mm hole in the slide ring assembly, then slide onto the main shaft completely.

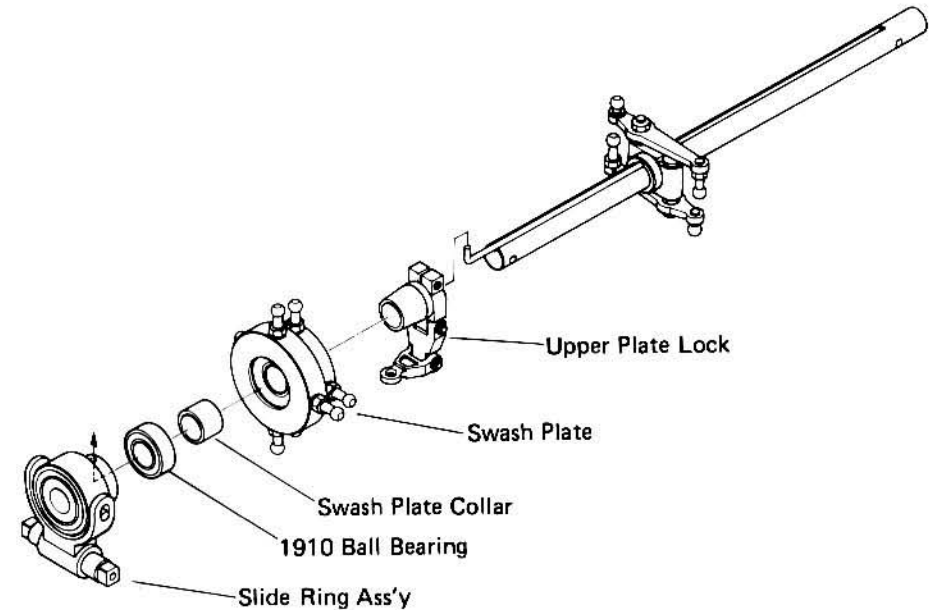
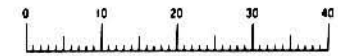


Fig. 10



- 11** Bolt the drive pulley to the rotor drive gear.
See fig. 11.

[M3×18 Cap B.4]

- 12** Insert the 1910 ball bearing and bolt the rotor drive gear to the main shaft. See fig. 11.

[M3×25 Cap B.1]
[M3 N.N.1]

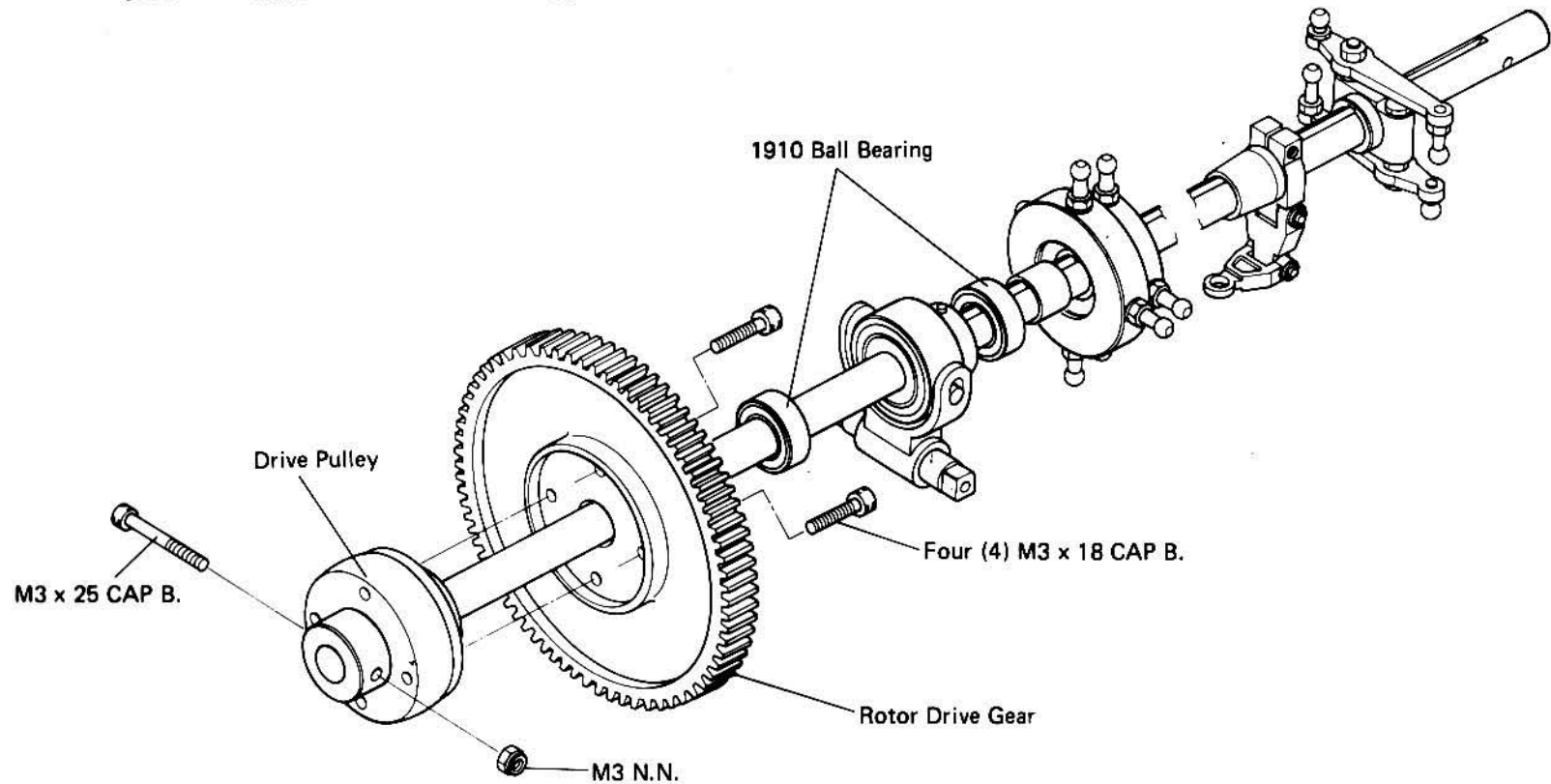
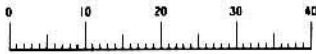


Fig. 11



《Step 3》 Main Frame Assembly

13 Attach two bell cranks to the main frame. See fig. 12.

M3×22	Cap B.	.....	1
M3×30	Cap B.	.....	1
M3	N.N.	.....	2
M3	Plate Washer	.....	2

14 Add the cooling cover and starting belt to the engine assembly, and put the clutch bell on the clutch, then bolt the unit to the right side frame temporarily. See fig. 12.

M4×15	Cap B.	.....	3
M4	Plate Washer	.....	3
M4	Serrated Washer	.....	3

15 Place the main shaft assembly to the right side frame. Two 1910 ball bearings must be placed in the bearing housing of the frame. See fig. 12.

16 Put the radius support and cross member to the right side frame. See fig. 12.

17 Insert the guide roller shafts into the guide rollers and set them into the frames. See fig. 12.

At this time, press the shafts into the proper grooves of the frame with a small screwdriver. Do not push on the guide rollers as they might break. The guide rollers are subject to breakage. They are made from a special material which resists high rotating friction, but will not flex.

18 Join the left and right frames, with the parts in their proper positions, making sure that the slide ring arm, radius support, cross member etc. are in their proper places. Fasten together using the following nuts and bolts. Secure up the shaded ones, leaving the others temporarily loose for later adjustments.

1910 ball bearing position

Tail boom position (Temporarily)

Above rear position

M3×25	Cap B.	.....	9
M3	N.N.	.....	9

1960 ball bearing position (Temporarily)

M3×30	Cap B.	.....	2
M3	N.N.	.....	2

Joining together tabs position

M3×10	Cap B.	.....	2
M3	N.N.	.....	2

Installing the cooling cover

M3×12	Cap B.	4
M3	Plate Washer	4
M3	N.N.	4

Cross member position

M3×10	Cap B.	2
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Installing the engine mounting block (Temporarily)

M4×15	Cap B.	3
M4	Plate Washer	3
M4	Serrated Washer	.....	3

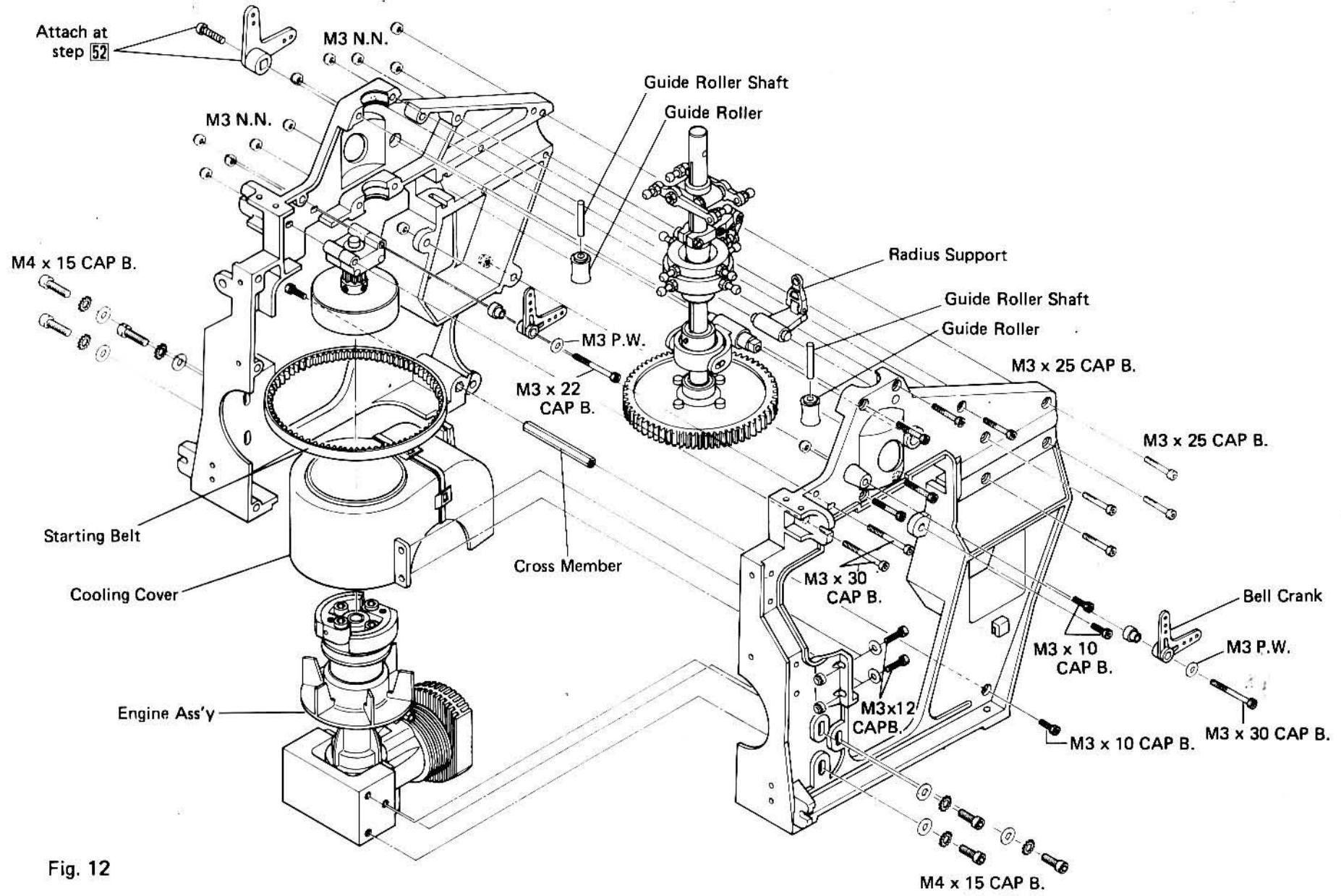
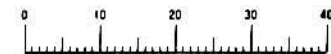
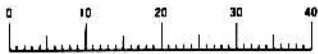


Fig. 12



- 19** Pull the main shaft upwards, and push down the upper plate lock, then tighten up the bolt on the upper plate lock. At this time, the upper plate lock must be 90 degrees from the 3mm hole in the main shaft. See fig. 13.

M3×15	Cap B.	.....1
M3	Nut	.....1

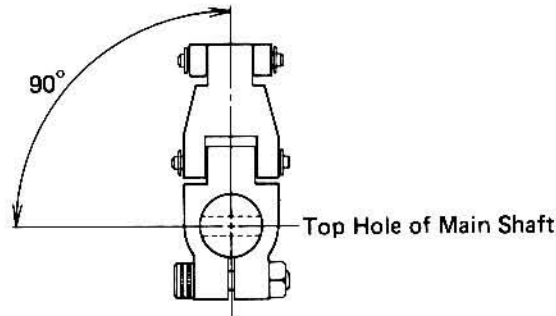


Fig. 13

Notice: After tightening up the screw, make sure that the main shaft does not move up and down against the frames. Then fasten the M3 nut. If there is play, do it again. .

- 20** Adjust the gear meshing (backlash) between the rotor drive-gear and pinion by moving the 1960 ball bearing. When satisfied, tighten up the screws. There must be as little backlash as possible, but no binding. A simple way to do this is to use a thin piece of paper between the gears when tightening up the screws. Make sure that the pinon gear is not tilted. It must be parallel with the main shaft.

- 21** Secure the engine mounting block. The height of the block must be adjusted so that the clearance between the clutch bell and pulley is 1mm as shown in fig.14. Be sure that the clutch bell and pulley are parallel. If not, unfasten the screws (tightened at step 20) and readjust the mounting block to make them parallel. (Readjust the backrash.) You can also loosen the engine mounting bolts (M3 x 15) and adjust the engine to make them parallel. This is important. If the center line of the engine, pulley and pinion are not lined up, you will experience vibration, damage to the plastic gears, clutch problems etc.

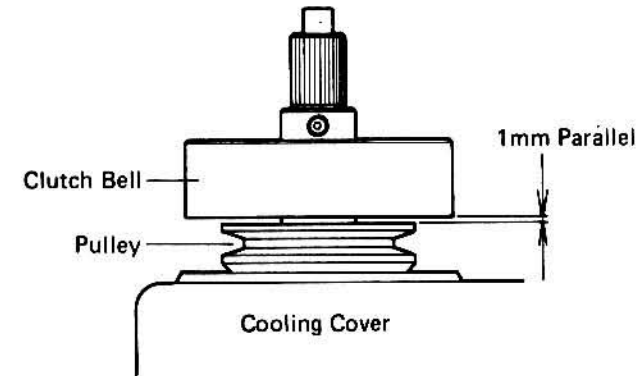
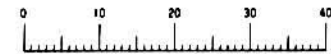


Fig. 14



<Step 4> Front Unit Assembly

- 22** Install three servos to the servo frame (A) and (B). Make sure that the directions of each servos is as shown in fig. 15. The rubber dampers of servos must be used. Refer to the instructions of your servo.
- [M2.3×12 Tap T.12]
- 23** Install two servos to the servo frame (D), and attach to the servo frame (C). Make sure of the direction of servos.
- [M2.3×12 Tap T.8]
[M3×10 Tap T.2]
- 24** Bolt **23** to the front bed.
- [M3×12 Cap B.2]
[M3 N.N.2]
- 25** Temporarily attach **22** to **23**.
- [M3×10 Tap T.2]

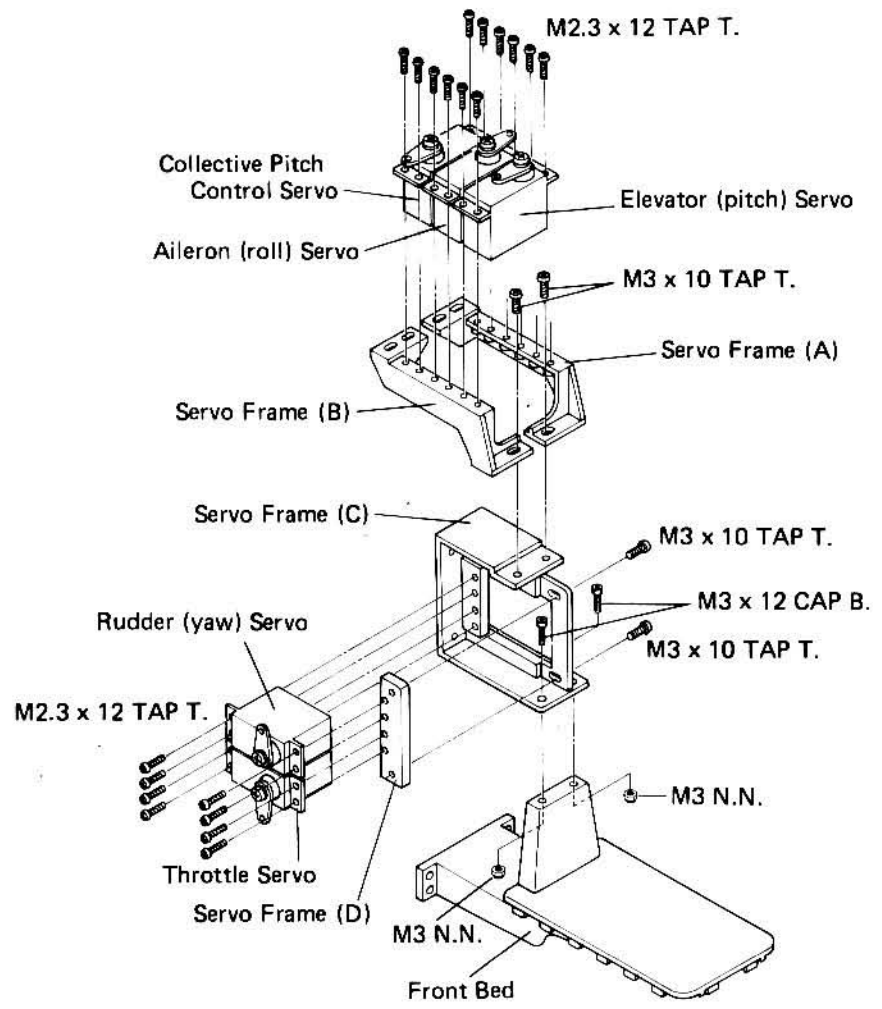
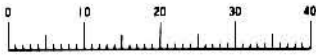


Fig. 15



《Step 5》 Attaching to Main Frame

- 26** Attach the completed front assembly to the main frame. See fig. 16.

[M3×10 Tap T.12]

- 27** Fasten two tap tite screws temporarily screwed at **25**, and fix **22** and **23**.

- 28** Bolt the two landing gear braces to the bottom of the main frame. See fig. 16.

[M3×20	Cap B.	4]
M3	N.N.	4]

- 29** Feed the landing gear skids to the brace from front, and glue four skid caps to the each end of skids. Take the skid 5cm out from the rear braces, and turn the bent tip upward, then secure them with set bolts.

[M4×4 Set B.4]

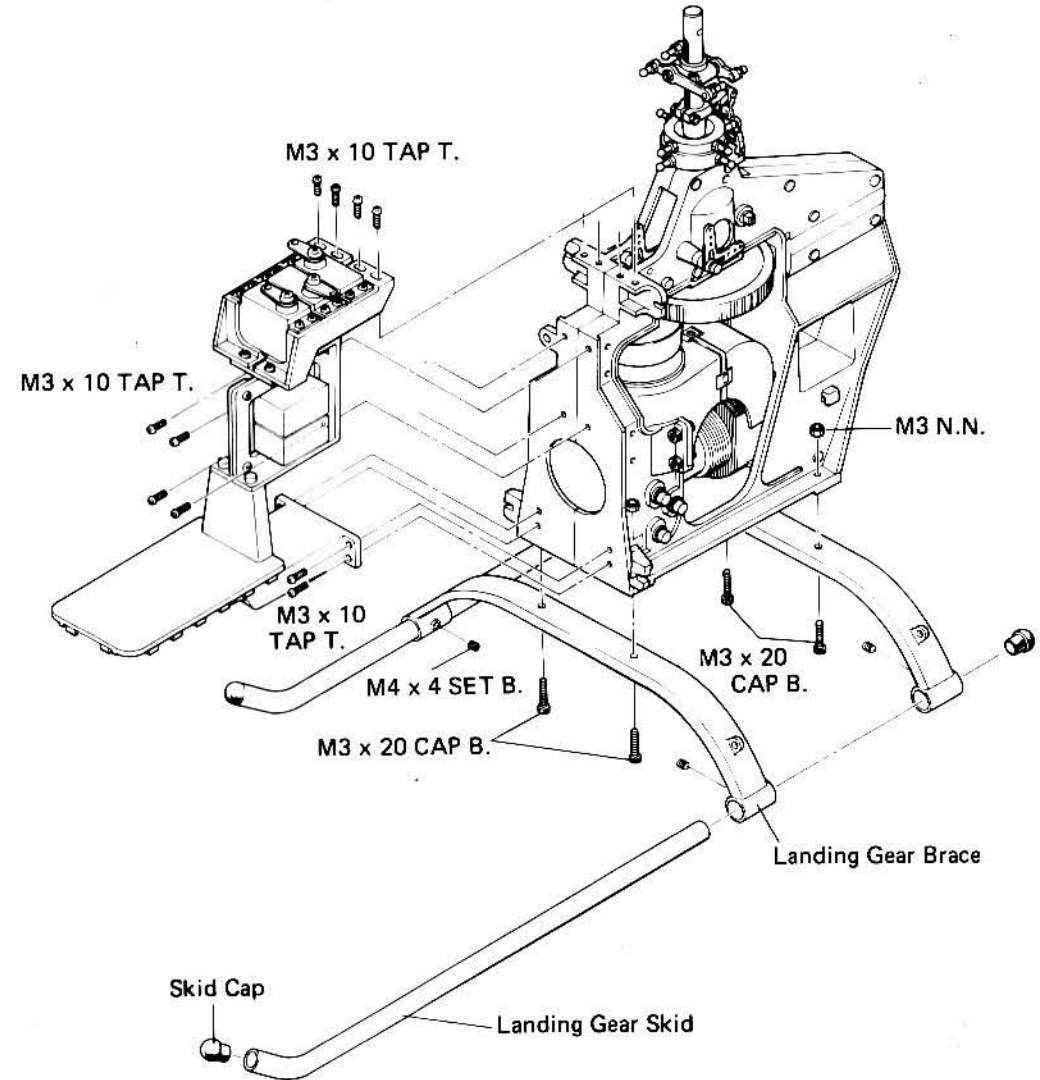


Fig. 16

<Step 6> Tail Rotor Unit Assembly

30 Attach the tail pulley to the tail rotor shaft. At this time, take the shaft 4mm out from the pulley, so that when you add the 1350 ball bearing, the tip of the shaft and bearing are flush. Make sure of the direction of pulley and shaft. See fig. 17.

[M4×4 Set B.....2]

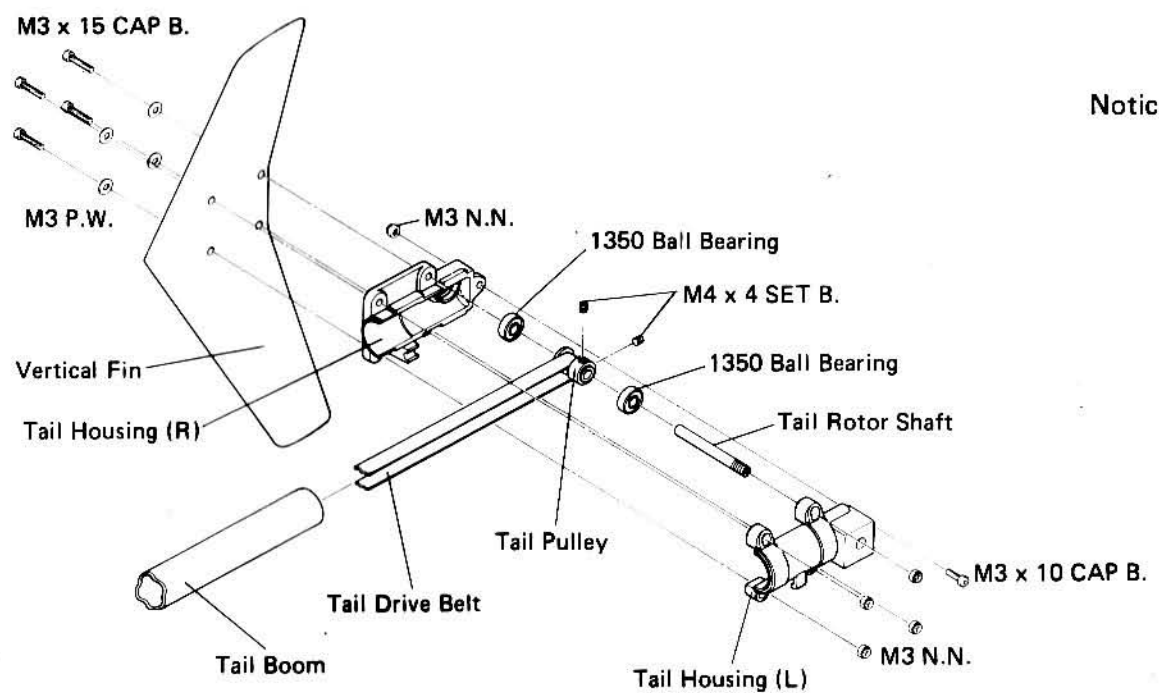


Fig. 17

31 Remove all oil from the shaft and the inner ring of 1350 ball bearings. Put two bearings at the sides of pulley, and glue the inner ring of bearings to the shaft with a little cyanoacrylate, being very careful not to get any glue elsewhere.

32 Feed the tail drive belt to the tail boom, and assemble the tail shaft, housings and tail boom as shown in fig. 17.

M3×15	Cap B.	4
M3×10	Cap B.	1
M3	N.N.	5
M3	Plate Washer	4

Notice: The small diameter end of the tail boom is at the rear. Use a thin, long rod, when inserting the tail drive belt to the tail boom. Tail boom must be pushed into the tail housing completely. (to the dead end)

The smooth side of the belt should be touching the pulleys, and white stamped side should be outside.



33 Screw tail rotor hub (counter clockwise) to the tail rotor shaft tightly and secure with a little cyanoacrylate.
See fig. 18.

34 Bolt two ball joints to the arms of the tail rotor grips.
See fig. 18.

[	Ball Joint.....	2]
[	M2×10 ⊕Screw.....	2]

35 Place the tail rotor grips to the 1030 ball bearings, and secure with nuts and bolts. See fig. 18.

[	M2×10 ⊕Screw.....	8]
[	M2 Nut.....	8]

36 Insert the tail P.C. lever to the tail P.C. bracket. See fig. 18.

37 Snap in the plastic ball joint to the tail P.C. crank. Secure the crank in the bracket with a screw and plate washer. Do not screw down too tightly as the crank has to move smoothly.
See fig. 18.

[	Plastic Ball Joint.....	1]
[	M2×10 ⊕Screw.....	1]
[	M2 Plate Washer.....	1]

38 Insert the tail P.C. lever to the tail gear shaft, and bolt the bracket to the tail housing. Make sure that the tail P.C. lever move smoothly. See fig. 18.

[M3×6 Cap B.....	4]
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39 Attach the two universal links to the pitch control plate.

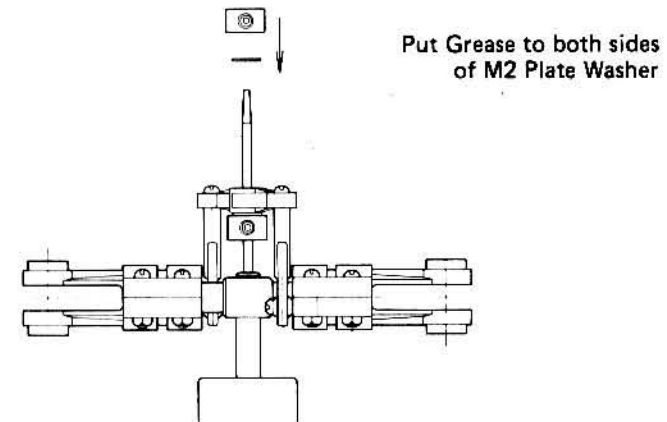
[Universal Link.....	2]
[	M2.3×8 ⊕Screw.....	2]

40 Place, in order the pitch control retainer, M2 plate washer, P.C. plate, M2 plate washer, and another retainer to the pitch control lever. Temporarily hold the two retainers together with set bolts.

See fig. 19.

[	M2 Plate Washer.....	2]
[	M3×4 Set B.....	4]

Fig. 19



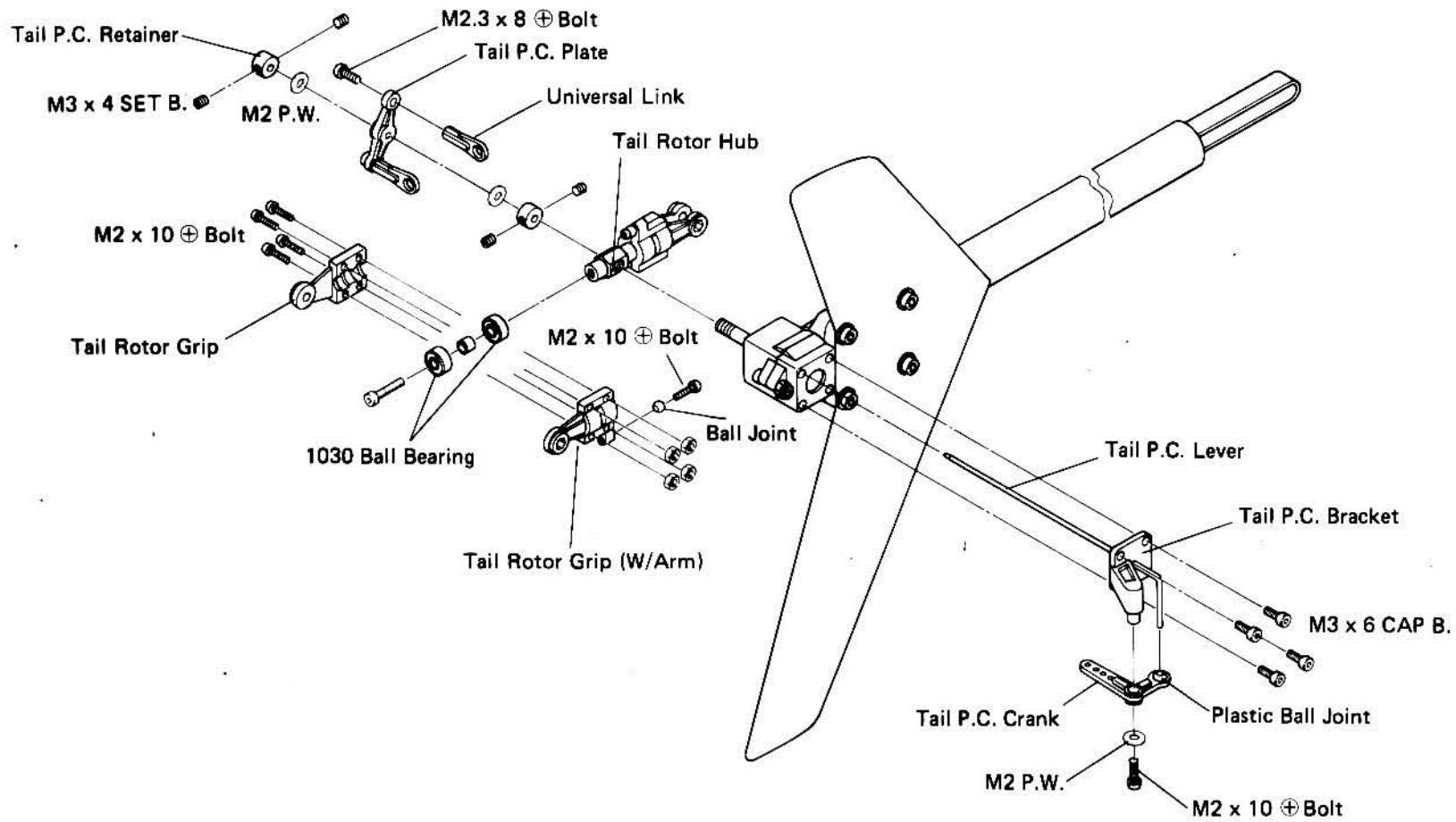
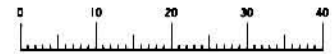
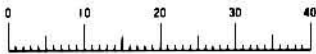


Fig. 18



41 Attach the completed tail unit to the main frame. Check that the tail drive belt is not twisted, then rotate it one quarter turn (90 deg.) counterclockwise as shown in fig. 20. Insert the tail boom all the way into the main frame and slip the belt over the drive pulley, checking that the guide rollers are in proper position, and the belt is not twisted more than quarter turn. Pull tail boom rearwards and secure with the previously fastened M3 x 25 cap bolts.

The correct tension on the tail drive belt is 8kg and never more than 10kg. To do this, hang an 8kg weight to the tail boom. Hold the nose of the helicopter vertical and secure the cap bolts, making sure the fin is also vertical. If it is inclined after securing the bolts, loosen the tail housing bolts and turn the housing. After this operation, make sure of the rotating direction of the tail rotor. See fig. 20.

42 Install tail rotor blades onto the tail rotor grips. These bolts and nuts must not be tightened too much. Just tighten the blades leaving a slight slack so they fan out by centrifugal force when the tail rotor blades are rotating. See fig. 21.

M3×15	Cap B.	.....2
M3	N.N.	.....2

43 Bolt the horizontal stabilizer to the tail boom with tail clamp. Make sure that the clearance from tail rotor blades is 5cm, and 90 degrees from the vertical fin. See fig. 21.

M3×10	Cap B.	.....2
M3	Plate Washer	.....2
M3	N.N.	.....2

〈Step 7〉 R/C equipment and linkage installation

44 Install the receiver, battery, and gyro, using foam rubber and rubber bands for vibration protection. Protect the gyro's cord using a cord protector including in this kit. Refer to fig. 20.

45 Attach the switches of receiver and gyro to the switch plate, and bolt it to the main frame. See fig. 20.
[M2.3×12 Tap T.4]

46 Assemble the fuel tank cap, then insert it into the tank, and secure with the M4 x 22 cap bolt. Place the completed fuel tank into the frame. Use a KALT fuel filter and a stopper between the fuel tank and engine. These are optional, not included in the kit. See fig. 22.

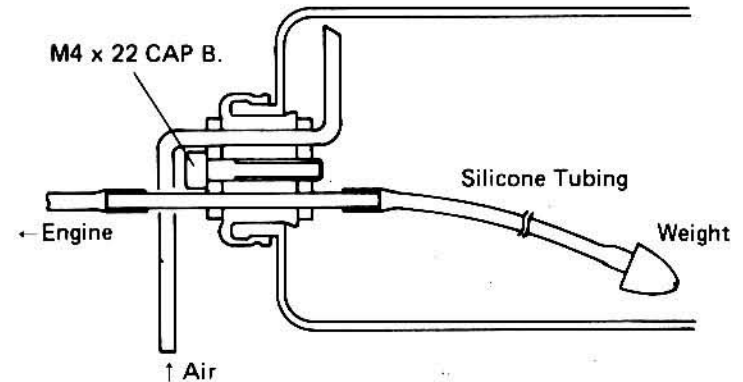


Fig. 22

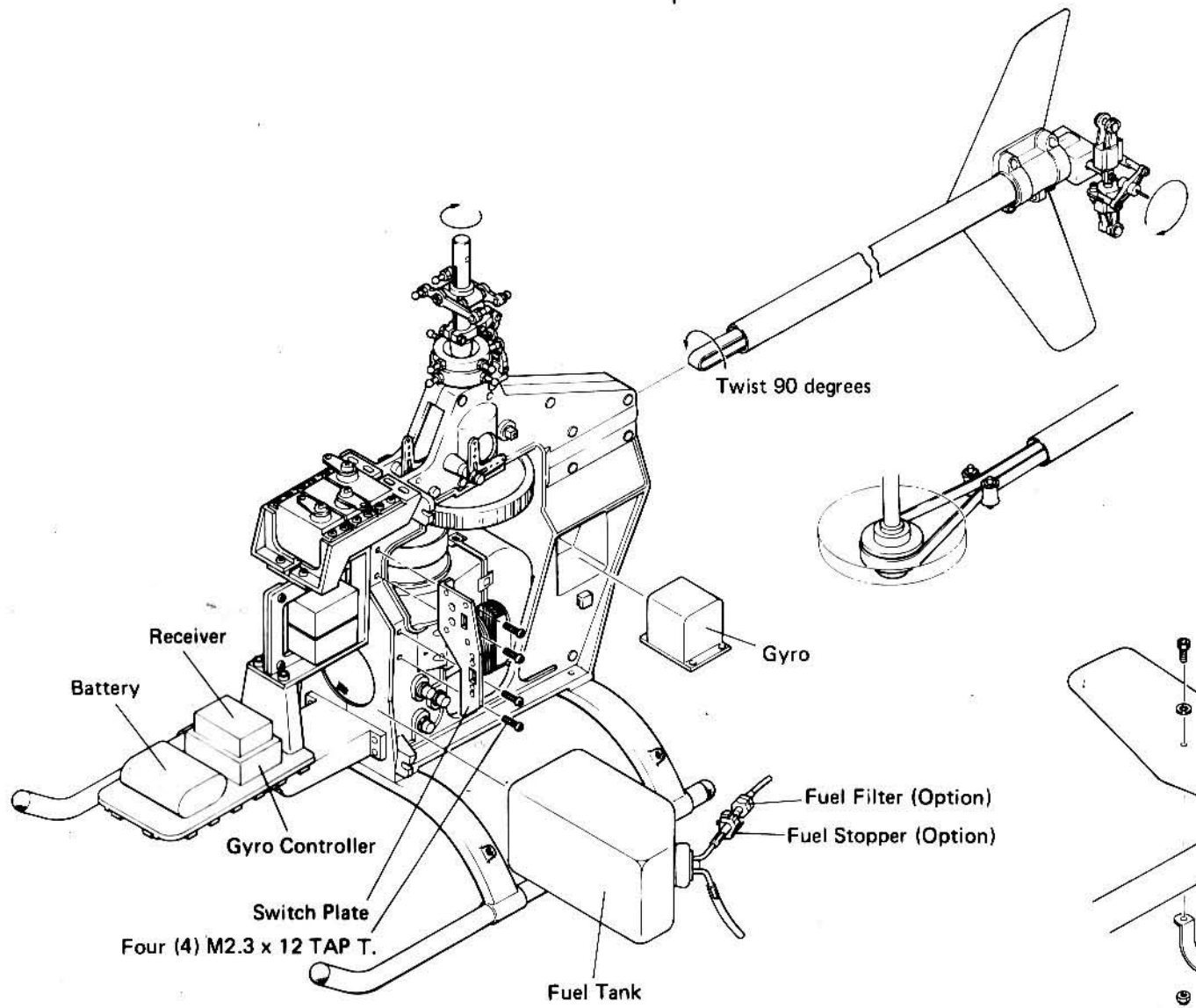
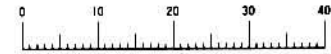


Fig. 20

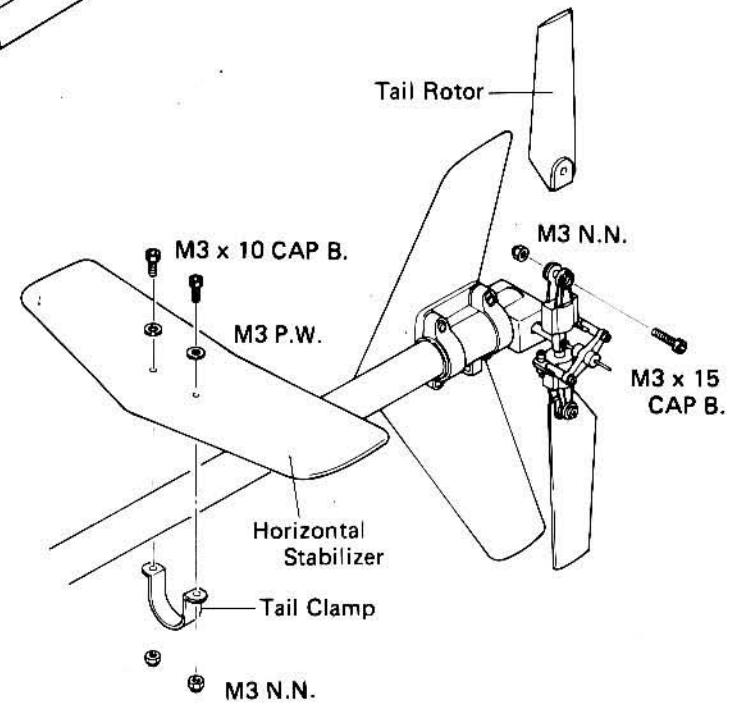
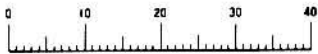


Fig. 21



- 47** Connect servos, gyro, and battery to the receiver referring to the instruction book of your R/C equipment, and check the moving directions of each servo. Attach servo horns which has holes 10~13mm from its center, to each servo. At this time make sure that all servo horns are at neutral, when all transmitter sticks and trims are neutral. (Read servo's instruction book.) Remove the unnecessary horns to avoid hitting other horns. See fig. 23.

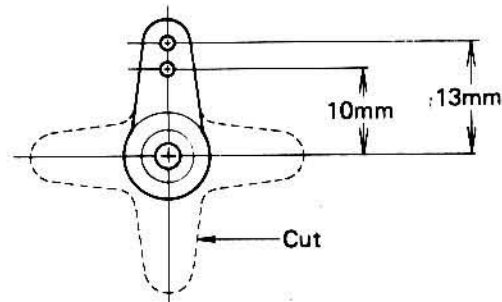


Fig. 23

- 48** Connect up two universal link arms from the radius support and the upper plate lock to the ball joints of the swash plate. Refer to fig. 29 and 30 on page 23.
- 49** Connecting bell crank and swash plate. Make two rods as shown in fig. 24. And connect up two bell cranks to the swash plate.

ℓ 48 Crank Rod	2
Universal Link	2

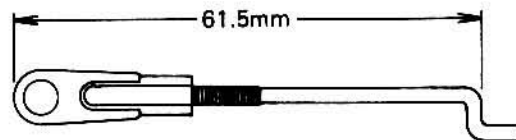


Fig. 24

- 50** Connecting up bell crank and aileron servo. Make a rod as shown in fig. 25, and connect up aileron servo to bell crank.

ℓ 77 Crank Rod	1
Quick Link	1

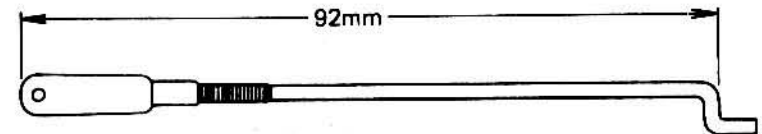


Fig. 25

- 51** Connecting bell crank and elevator servo. Make a rod as shown in fig. 26, and connect up elevator servo to bell crank.

ℓ 70 Crank Rod	1
Quick Link	1

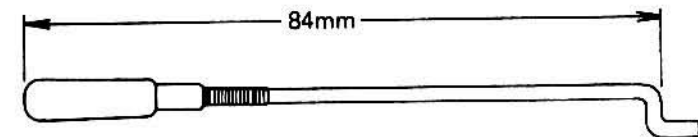
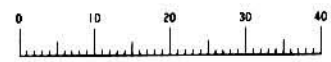


Fig. 26



52 Connecting collective pitch control.
 Attach the slide ring horn to the slide ring shaft which comes out from the right side of the main frame. Make a rod as shown in fig. 27, and connect up pitch control servo to the slide ring horn. Use a inside hole of servo horn.

M3×10 Tap T.....	1
ℓ 105 Crank Rod.....	1
Quick Link.....	1

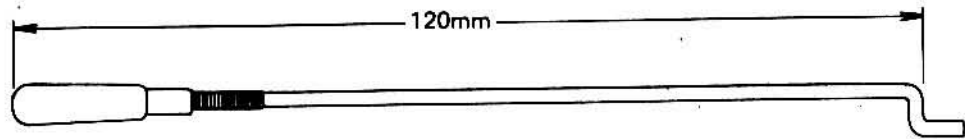


Fig. 27

53 Connecting throttle lever and throttle control servo.
 Make a rod as shown in fig. 28, and connect up the throttle control servo to the throttle lever. Do not bend the threaded rod too sharply.

ℓ 118 Crank Rod.....	1
Quick Link.....	1

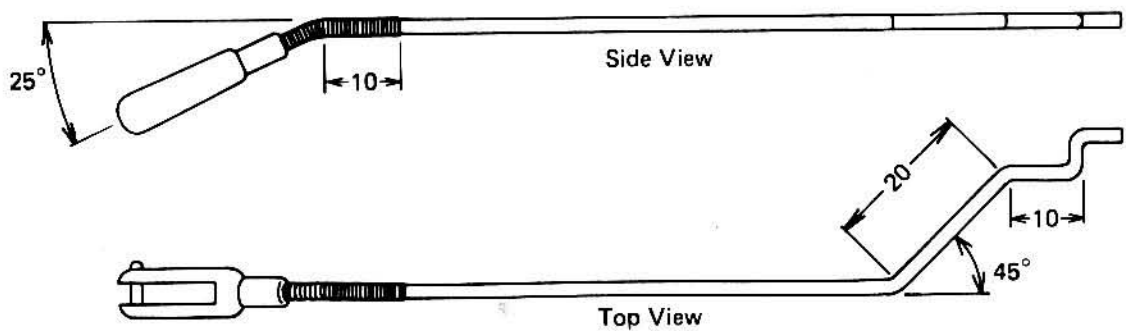


Fig. 28

Fig. 29

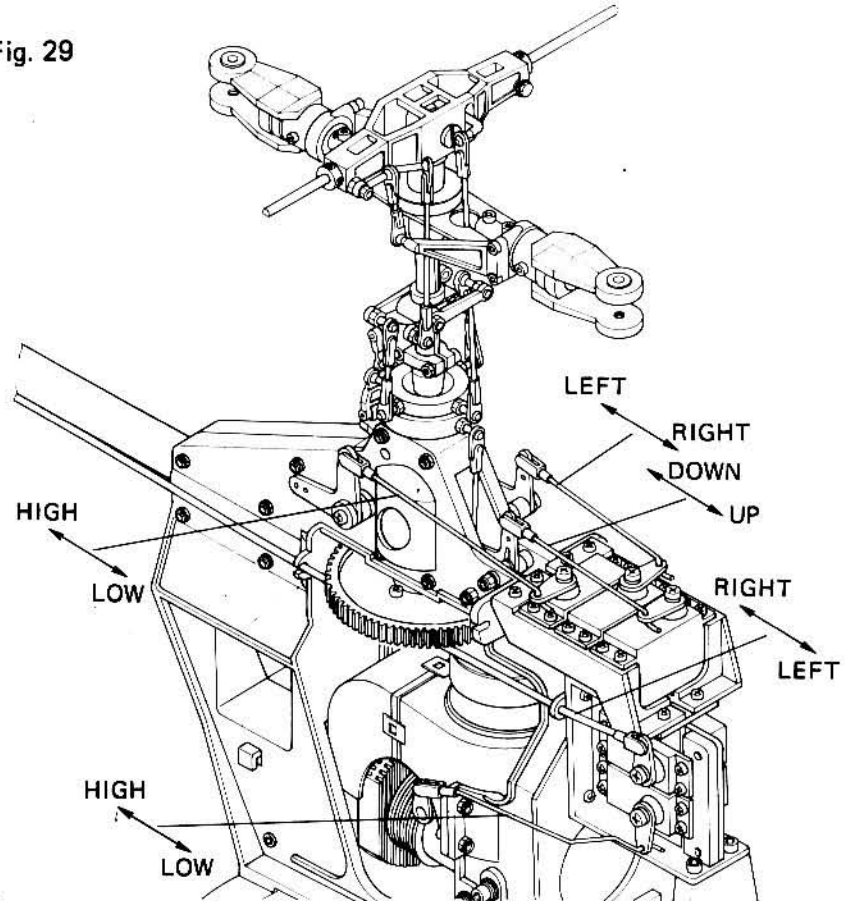
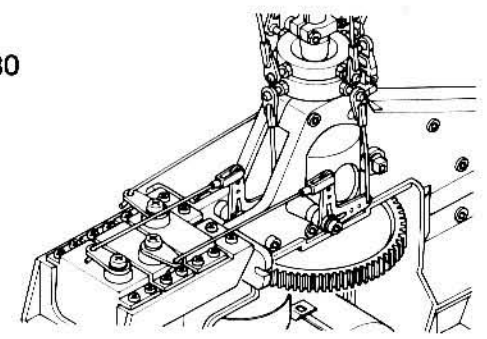
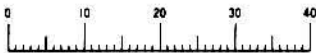


Fig. 30





Notice: The length of this rod will change due to the size of servo or engine. Adjust the length, when the servo horn is neutral, the throttle lever is also neutral.

If you use 4 servos, link up the slide ring horn and throttle lever using an extra rod, quick link and bell crank as shown in photo 1. These parts are optional, not included in this kit.

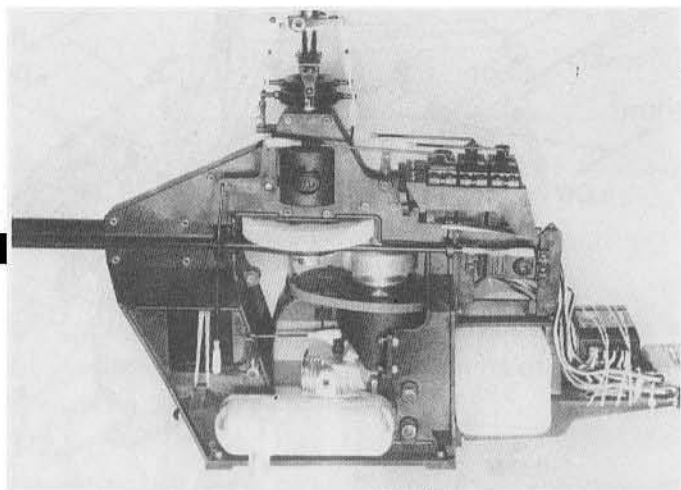


Photo 1

54 Connecting the tail pitch control.

Attach two M2.3 x 17 threaded rods to the both ends of flexible P.P. rod, then link up tail P.C. crank and rudder servo as shown in fig. 31. The flexible P.P. rod must be secured at several places to prevent bending or flexing during operation. Use vinyl tape and three guides which locate on the main frame and tail housing.

The length of this rod must be adjusted so that when the servo is neutral, the tail P.C. crank is also neutral. At this time, it is better to screw down two threaded rods completely to the quick links and flexible rod. The rod length will have to extend to meet the extension of the tail drive belt.

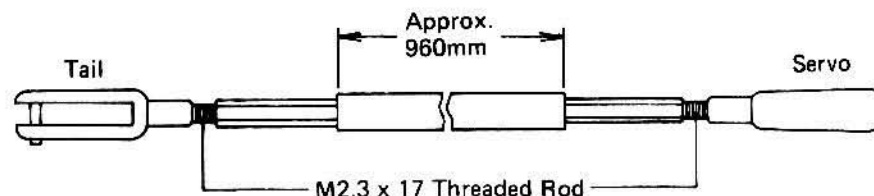


Fig. 31

55 Connecting scissors arms.

Connect the swash plate and the scissors arms with the two M2.3 x 17 threaded rods and four universal links.

Adjust the length of the rods (both are same length) so that the scissors arm is horizontal when the swash plate and the slide ring are neutral.

M2.3 x 17 Threaded Rod	2
Universal Link	4

<Step 8> Rotor Head Assembly And Installation

56 Place the control lever into the see-saw, insert the stabilizer bar to the see-saw and control lever. Put two stabilizer retainers to both sides of the see-saw. See fig. 32.

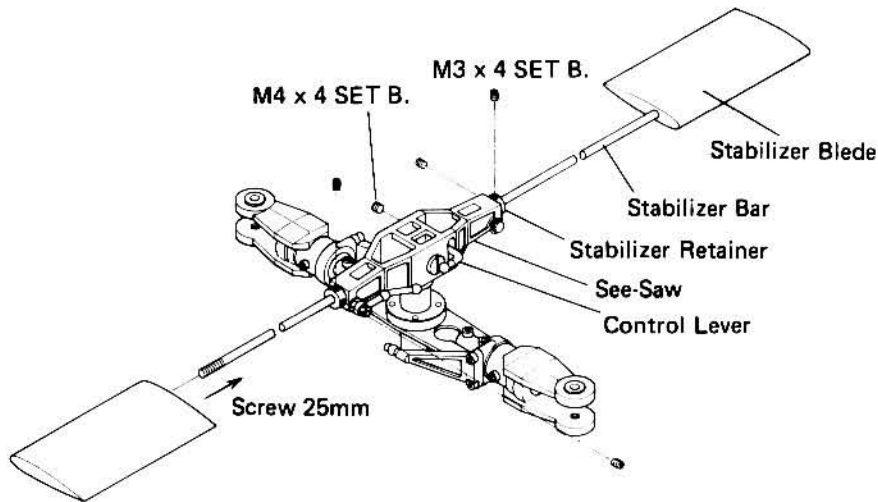


Fig. 32

57 Screw stabilizer blades to the both ends of the bar. At this time make a mark 25mm from each tip of the bar, and screw on the stabilizer blade to exactly line up with the mark. Adjust the chord lines of the two stabilizer blades so that they are exactly parallel and face in opposite directions. See fig. 33.

58 Two stabilizer retainers are properly positioned when the distance between the two stabilizer blades and the see-saw is equal. At this time put grease on the see-saw bearings and retainers, and there must be a little clearance between them for smooth operation.

[M3×4 Set B.4]

59 Secure the control lever to the stabilizer bar with a M4 x 4 set bolt. At this time secure the ball joint of the control lever to the same level as the blades, and the center of the see-saw. See fig. 33.

[M4×4 · Set B.1]

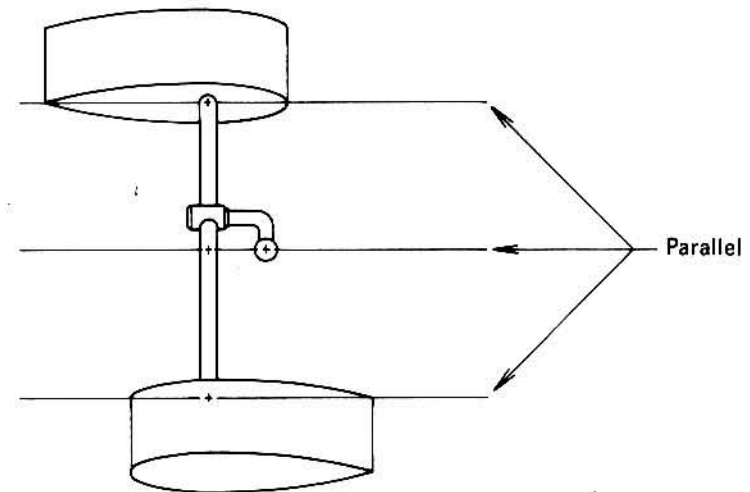
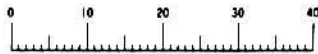


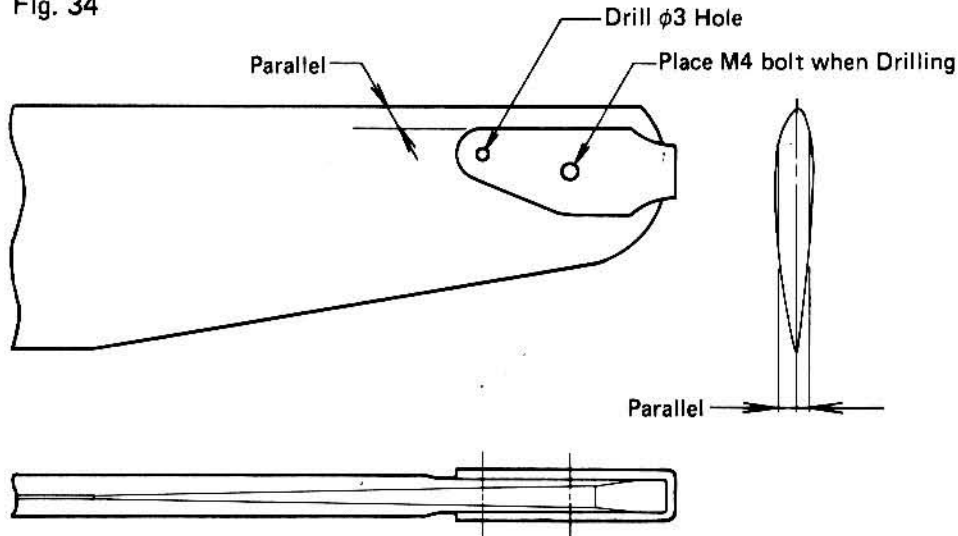
Fig. 33



60 Shave down the root end of the main rotor blades to an 8mm thickness. Add the blade inforcement, drill 3mm holes and bolt them to the blades. See fig. 34.

M3×18	Cap B.	.....2
M3	N.N.	.....2

Fig. 34



61 Install the rotor blades to the blade grip of the rotor head. The bottom hole of the grip is threaded, then screw the bolt from underneath and lock it with a nylon nut. Do not tighten down the screws too tightly as the blades must be free to move. Centrifugal force keeps them in position during rotation.

62 Hold the stabilizer bar horizontally and balance the blade. If they are not in balance, apply vinyl tape to the lighter blade tip. Even if the blades are in balance, place different colored tape on each blade tip for tracking adjustment. Use a sticker included in this kit.

63 Attach the completed rotor head to the main shaft. At this time, make sure of the direction of the rotor head so that the ball joint of control lever is placed above the remaining ball joint of the swash plate.

M3×20	Cap B.	.....1
M3	N.N.	.....1

64 Cut four universal links 4mm from the end as shown in fig. 35, and screw M2.3 x 17 threaded rods into them. Adjust the length of these rods to 41mm temporarily. These rods lengths will be adjusted during flight adjustment. Connect to the center ball of see-saw arm and pitch arm.

M2.3×17	Threaded Rod	.....2
	Universal Link	.....4

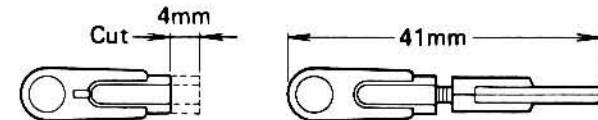
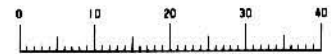


Fig. 35

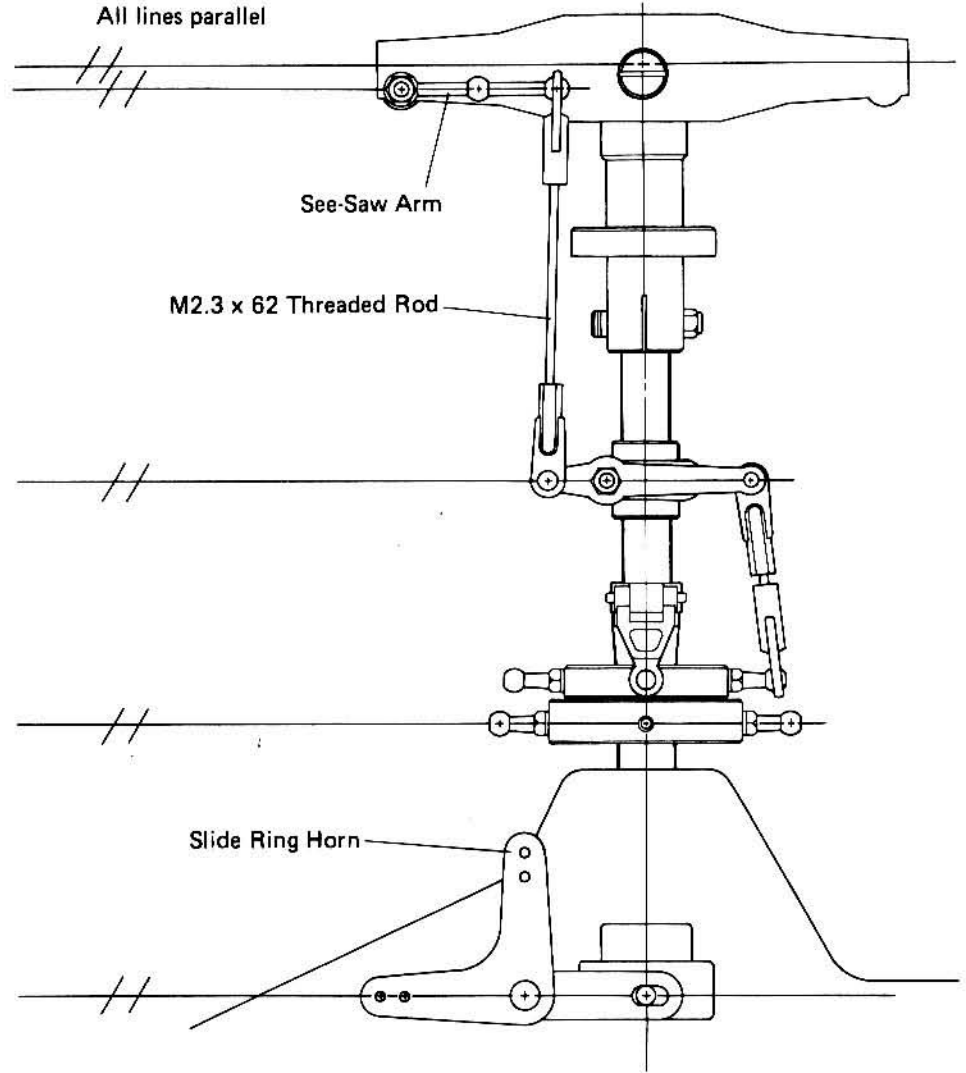


65 Connect up the control lever and the swash plate with two universal links and M2.3 x 110 threaded rod. The rod length is approximately 133mm, but adjust it carefully so that the chord lines of the stabilizer blades and swash plate are exactly parallel.

- [M2.3 x 110 Threaded Rod.....1]
- [Universal Link.....2]

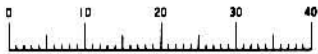
66 Connect up the scissors arms and see-saw arms with M2.3 x 62 threaded rods and universal links. The rod length is approximately 88mm, but adjust it so that the see-saw arm is horizontal when the swash plate and scissors arm is horizontal. See fig. 36.

Notice: The rod lengths of (65) and (66) will be shorter when using the optional auto rotation drive pulley.



Sketch shows half side only

Fig. 36



<Step 9> Cabin Construction

- 67** Temporarily put together the cabin frame, body and canopy, then make sure whether the body and canopy is a close fit or not. If not, trim the cabin frame. Trim away the excess parts of the body and canopy. At this time do not cut the flange of body and canopy where it will be glued together.
- 68** Put plastic glue or silicone sealant in the grooves of body and canopy, then put together with the cabin frame. At this time make sure of the direction of the frame. Clamp the flange with clothes pins or paper clips. Remove excess glue.
- 69** Glue the flanges of body and canopy together, using liquid glue (included in this kit) and a small brush. Before glueing them, make sure that the body and canopy have not slipped out of position. Leave until the glue has set.
- 70** After the glue has cured, remove the cloth pins and trim the flange. The trimmed width of this flange must be at least 5mm.
- 71** Attach the completed cabin to the main frame temporarily. It will be removed for linkage adjustment.

[M3×12 Tap T.....4]

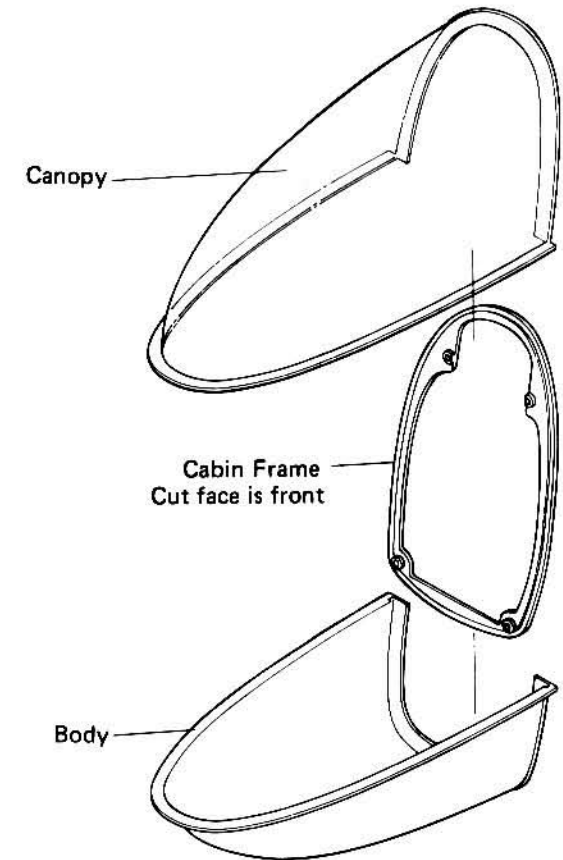


Fig. 37

After Construction Adjustments

Upon completion of this kit, go back over every step to make sure that there are no loose nuts, bolts, misalignment or binding of movable components.

Check all linkages for proper movement by using the transmitter. Charge the batteries of the R/C equipment for the following adjustments.

- **Check the servo's strokes and moving directions.**
- Switch on the transmitter, receiver and gyro, then check all moving directions.
- The strokes of aileron and elevator are 6 mm each way (total 12 mm) at the ball joints of swash plate. If the stroke is too much, change the servo horn or adjust it using your transmitter trimmer. Make sure the swash plate is horizontal when the control sticks and trimmers of the transmitter are neutral. If not, adjust the length of linkage rods. At this time servo horns and bell cranks must be parallel or right angled against the main frame.
- Make sure that the stroke of the throttle lever and engine control servo is equal. Throw should be adjusted so that the engine can be stopped when the throttle stick and trimmer is pull down.
- The strokes of the tail pitch control is 5~6 mm each (total 10~12 mm) at the tail P.C. lever.
The moving direction of tail pitch control is, when the transmitter stick is moved to the right, the tail rotor pitch is increased.

The tail pitch will be adjusted during flight test, however, temporarily set the pitch at approximately plus 5 degrees when rudder servo is at neutral, by moving the two tail P.C. retainers. These tail P.C. retainers must be secured firmly with set bolts before the first test flight.

- Check the moving direction of the gyro.
At first move the helicopter to the right and left suddenly and check the rudder (tail pitch control) servo is moving. If the servo does not move, increase the gyro sensitivity.
Still not work, check the connection of gyro and receiver or transmitter switch. When the tail control servo is moving, check the mixing direction. When you move the tail boom to the right (nose to the left), the tail pitch will increase. If the pitch decreases, change the mixing direction of gyro referring its instruction.
The sensitivity of the gyro will be adjusted during the test flight, but temporarily set the servo horn move 5~6 mm when you move the helicopter right and left suddenly.
- The main rotor pitch will be adjusted at the next stage, however, go back to step 7 [52](#), [55](#) and step 8 [64](#), [65](#), [66](#) again, and make sure that the slide ring horn, scissors arms and see-saw arms are all neutral when the pitch control servo is at neutral.

■ Main Rotor Pitch

The main rotor pitch is an important factor in flying a R/C helicopter. Use our precision pitch gauge for the following pitch settings.

- Set all pitch trims of your transmitter and cancel the pitch curve. (set the high pitch maximum.)
- Adjust the rod length between see-saw arm and pitch arm so that the main rotor pitch is 0 degree when the throttle control stick is minimum position. At this time adjust the stroke of pitch control by changing the holes of servo horn or slide ring horn so the max pitch is 9 degrees. If you change the stroke, the minimum pitch is also changed. Re-adjust the minimum pitch to 0 degree.
- When you have succeeded setting the stroke between 0 and 9 degrees, cut the maximum pitch to 7 degrees using the pitch curve trimmer on your transmitter. Now the main rotor pitch can be changed between 0 and 7 degrees, when moving the throttle stick from low to high positions. At this time make sure the pitch is approximately 4 degrees when the stick is neutral (at middle position).
- These adjustments are basic settings. If you do aerobatics or auto-rotation landings, more complicated setting will be required. We leave out these settings in this book, but in case of doing a roll with minus pitch, set the minimum pitch -2 degrees, and for autorotation adjust it -3 degrees.

In Flight Adjustments

Range check your R/C equipment prior to starting the engine.

- Tracking of main rotor blades
Gradually open up the throttle, and when the helicopter is almost ready to lift off, watch the rotor blades to see if they are tracking the same. If not, adjust the pitch of one blade, so that they then both track the same.
- Needle valve adjustment
Adjust mixture control screw and needle valve according to the manufactures instructions.
If after flight fine adjustments are required, make sure that it is not adjusted too lean.
- Tail rotor pitch
Face the helicopter into the wind, and gradually open up the throttle. If the tail boom moves to the right (nose moving left) increase the pitch, and if it moves opposite, decrease the pitch. To adjust the tail mixing system of your transmitter, refer to the manufacturers instructions.
- Adjustment of main blade pitch
At first, check the throttle stick position during hovering. If the pre-setting is correct, the position is about at neutral. However, if it is different from the neutral position, the pitch should be adjusted. At this time the engine mixture must be adjusted completely.
It is recommended that the main rotor blades rotate at 1,400 RPM. If you have an electronic tachometer available, you can

check the rotation of the tail rotor, and since it rotates 5 times that of the main rotor, an RPM of 7,000 is correct. The rotor head of the CYCLONE is a flapping system, and it needs high speed RPMs. If the pitch is too much, it rotates slower and the helicopter will not fly well.

Tail Drive Belt Information

The belt driven tail rotor system of the CYCLONE is one of its main features. It provides precise tail control, is easy to set up and has excellent reliability based upon long experimentation; however, you must pay attention to the following:

- The correct tension of the tail drive belt is 8 kgs.
- During initial use, the belt will stretch approximately 3 mm in about 3 days of flying. It will stretch very little thereafter. Check the tension after the first few days and readjust if necessary, and also readjust the tail pitch control linkage.
- During extreme temperature changes, there is a possibility of belt tension changes. Check prior to flight.
- After many flights, the belt may become frayed. Cut away the frayed strands with scissors taking care not to cut the belt.
- The tail drive belt eventually wear out after long use. Replace it when required.

- The guide roller is also subject to wear, so replace it periodically.
- Do not get any oil on the belt pullys or the belt itself.

Repairs and Spare Parts

Should you have an accident or crash the helicopter, check the entire airframe over for broken or damaged parts, and replace those that are obvious, and those that you are in doubt about. Spares can be obtained from your dealer, using the parts number and name. Some of these are not sold in bulk, and some small parts are assembled. Ask your dealer for details. Follow this instruction manual when re-building or repairing.

Optional Parts

Following parts are available as an optional extra for the CYCLONE.

- Autorotation A'ssy (0101-074-8)
- Tail Support Set (0601-083-8)
- Muffler for CYCLONE (0100-055-8)

Specifications of CYCLONE

Main rotor dia.	1,400 mm
Length	1,280 mm
Weight	4.1~ 4.2 kg
Engine	49~ 50
Radio Control	5 Channel
Mechanism	CYCLONE
Revolution Ratio (Engine: Main Rotor: Tail Rotor)	9:1:5
Cabin Material	ABS vacuum formed