TSK®

MAKING NEW LEGEND

Instruction Manual

Black Star–DL

Super Kaiser Set

!! WARNING !!

A radio-controlled (R/C) model helicopter is not a toy R/C models are capable of causing serious bodily injury and/or property damage. It is your responsibility to assemble this model correctly and to install all components and accessories in a safe and correct manner. The model should be operated and flown in strict accordance with all safety standards of the Academy of Model Aeronautics Safety Code. Do not attempt to test or fly the model without the assistance of experienced, competent help. The buyer and user assume all risks associated with the use and operation of this product.

Federal law requires use of only those radio frequencies specified for model aircraft use.

R/C building and flying are great fun, but safety sould always be your primary concern.

TOHKOH SEIKI CO., LTD.
17-10, 3-Chome Maeno-cho
Itabashi-Ku Tokyo 174 Japan

Thank you for your purchase of the **TSK Black Star-DL Super Kaiser Set**.

Based on the power drive unit **Black Star-DL** featuring a "dual linkage system" for superior flight performance and endurance, this is the top-of-the-line RC helicopter kit including the Super Kaiser body and other components of proven quality.

For assembly read this instruction manual carefully and be careful of the direction of mounting parts and other details.

Items to be purchased separately

Main rotor blades (650 - 680 mm)

Engine (60 class)

Gyro unit

Silicone rubber tube

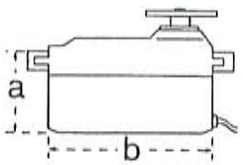
Tail rotor blades

RC set
(5-servo specification kit for model helicopter)

Fuel filter

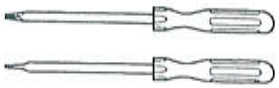
Notice

1. When using a YS or ENYA engine, have on hand a cooling fan dedicated to the engine. (The cooling fans are available, part numbered DI20I for the YS engine and DI202 for the ENYA engine.)
2. The maximum dimensions of acceptable servo units are shown below. A larger unit cannot be installed because it will not be compatible with the linkage system.



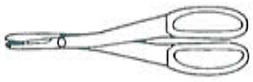
a=Max 30.5 mm
b=Max 42 mm

Tools and adhesives required for assembly



Phillips and standard
head screwdrivers
(thin type)

Cutting pliers



Scissors for
model assembly

Hexagon head wrench

Opposite sides:
1.5 mm, 2.0 mm
2.5 mm, 3.0 mm

Box screwdriver

Opposite side: 7 mm
Outside: 9.5 mm max.

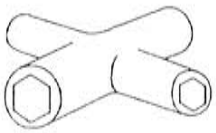
Round file

Spanner

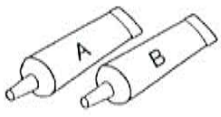
Opposite side: 5.5 mm

Grease

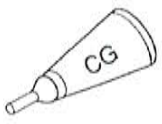
Anaerobic lock agent
(not so strong type)



Cross wrench for engined
model assembly



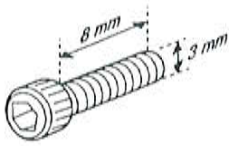
Epoxy adhesive
(30-minute setting type)



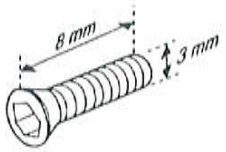
Instant adhesive

Bolts, nuts, etc.

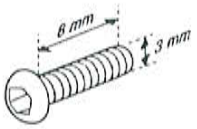
The names of the bolts, nuts, etc. in this kit are abbreviated as shown below for marking in the illustrated instructions for assembly.



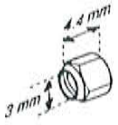
Cap screw (CP)
Ex: CP M3-8



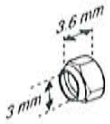
Flathead cap screw (FCP)
Ex: CP M3-8



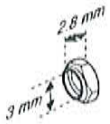
Flathead cap screw (FCP)
Ex: CP M3-8



Nylon nut (N.N)
N.N M3-N

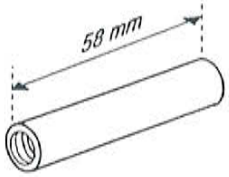


Nylon nut (N.N)
N.N M3-T

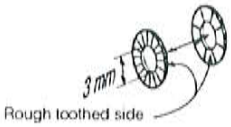


Nylon nut (N.N)
N.N M3-ST

Set screw (SS)
Ex: SS M4-4



Cross member (CM)
Ex: CM58



Nort lock washer (NW)
Ex: NM-3

Rod end (RE)
RE SS

Rod end (RE)
RE S

Rod end (RE)
RE L

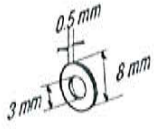
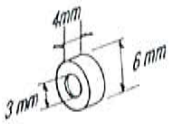
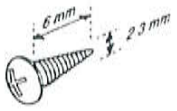


Plate washer (PW)
Ex: PW3-8-0.5



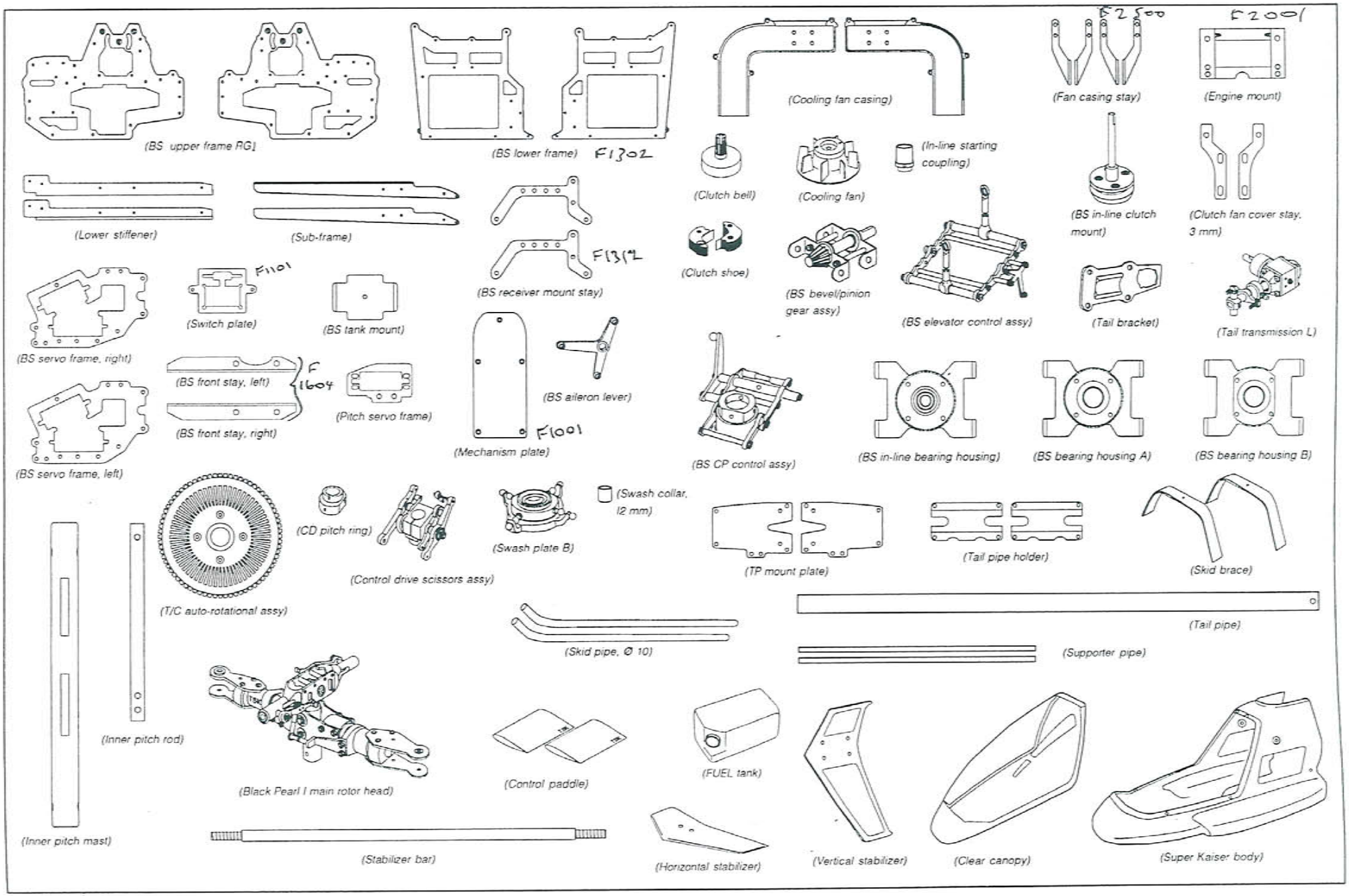
Spacer
Ex: Spacer 3-6-4



Tapping screw (TP)
Ex: TP M2.3-6

Illustration of parts

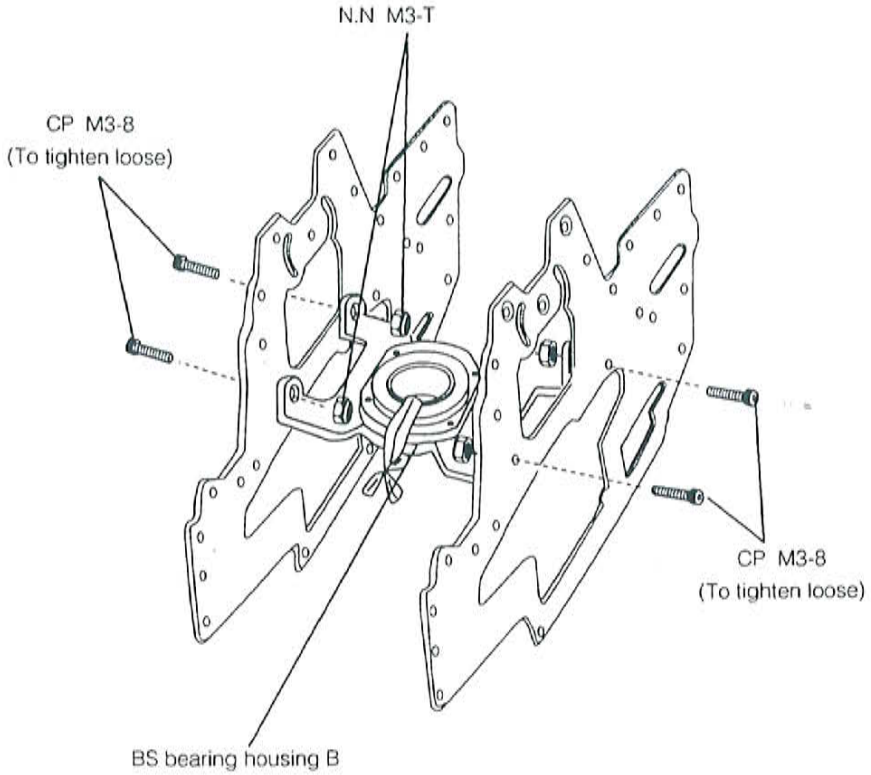
The screws, etc. are shown in actual size on the left side of the assembly procedure illustrations.



A. Upper Frame

CP M3-8 x 4

N.N M3-T x 4



CP M3-8 x 1

CP M3-12 x 1

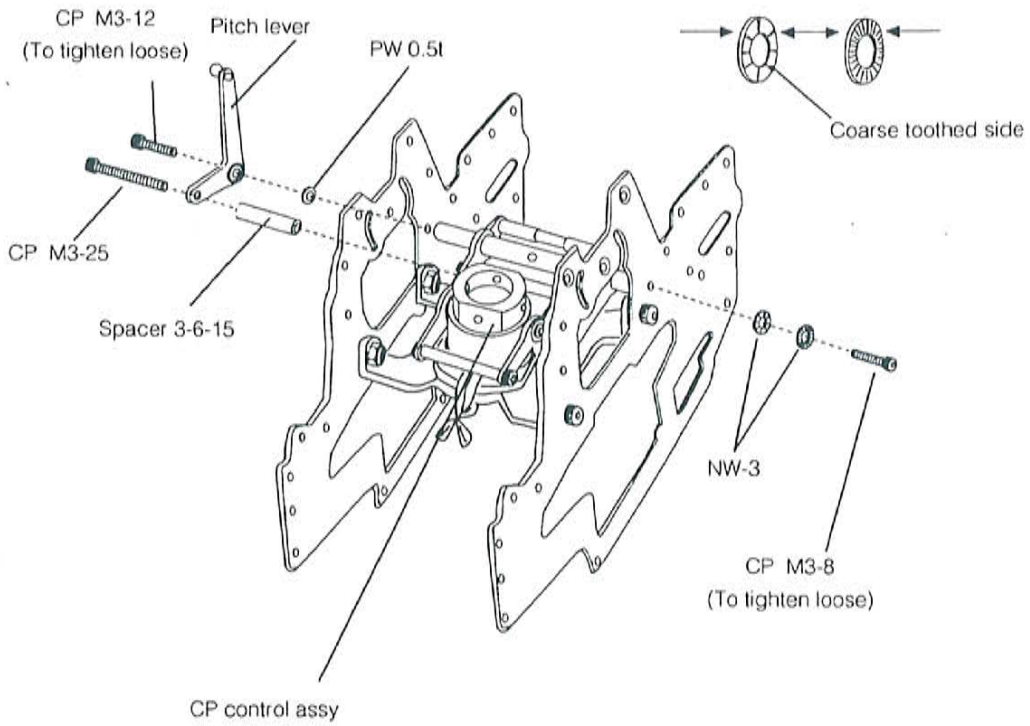
CP M3-25 x 1

PW 0.5t x 1

NW-3 x 2

The screws, etc. above are set temporarily in the CP control assy.

* Mate coarse toothed sides of nort lock washers.



CP M3-10

 x 1

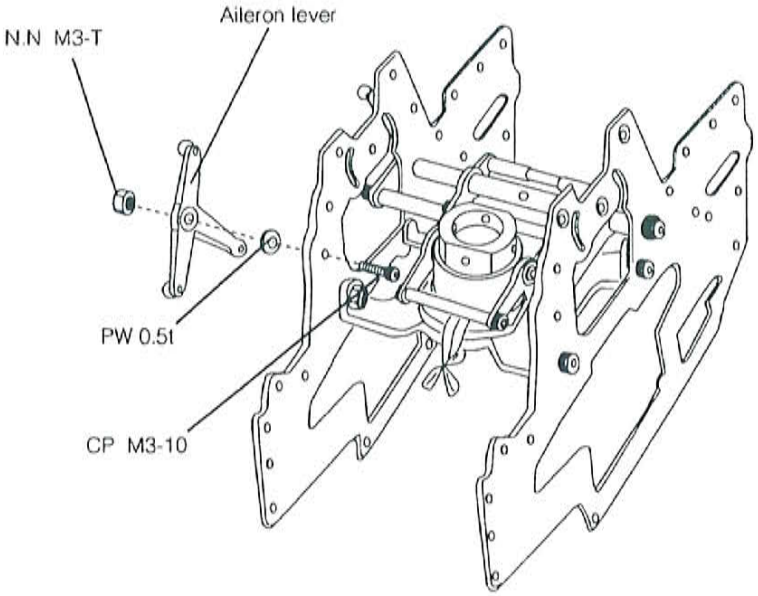
N.N M3-T

 x 1

PW 0.5t

 x 1

The screws, etc. above are set temporarily in the aileron lever.



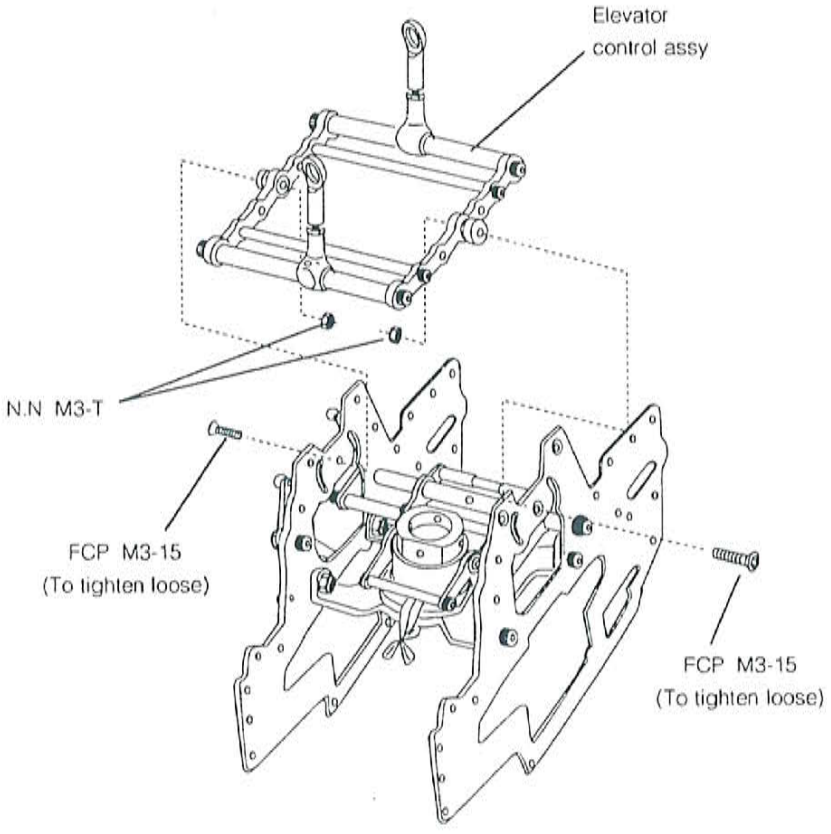
FCP M3-15

 x 2

N.N M3-T

 x 2

The screws, etc. above are set temporarily in the elevator control assy.



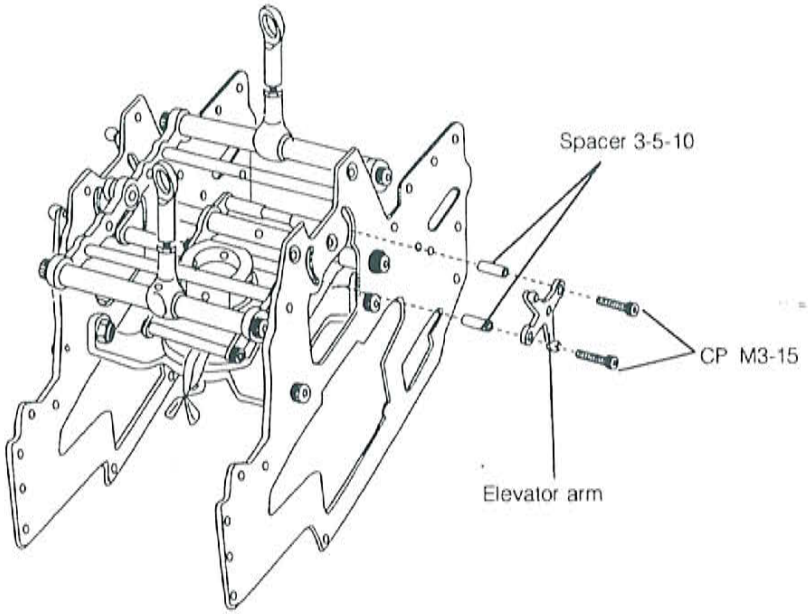
CP M3-15

 x 2

Spacer 3-5-10

 x 2

The screws, etc. above are set temporarily in the elevator control assy.

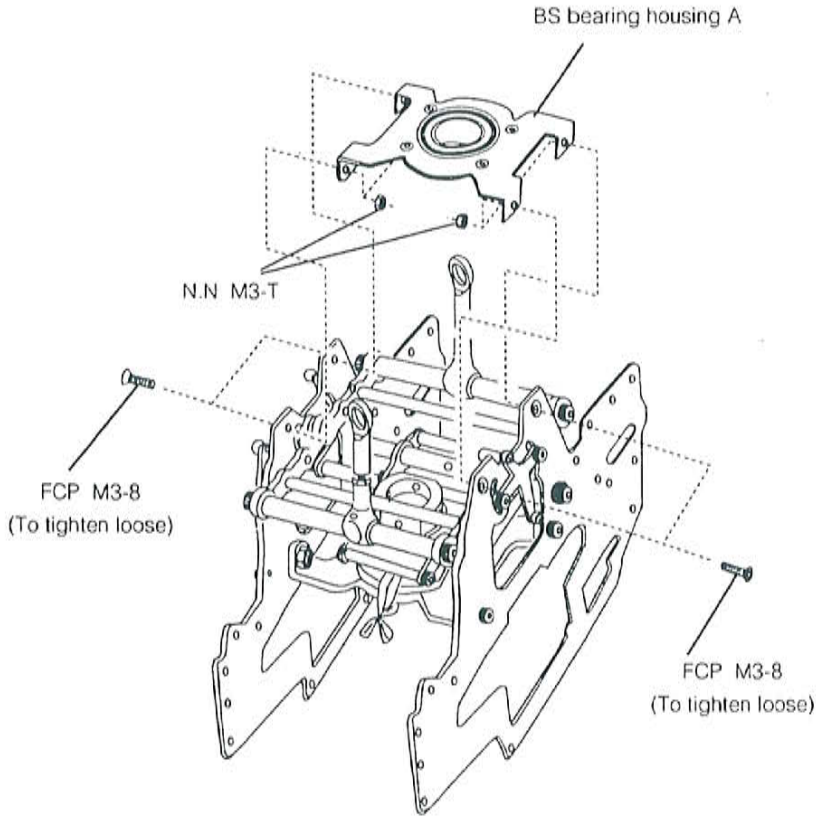


FCP M3-8

 x 4

N.N M3-T

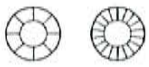
 x 4



CP M3-8

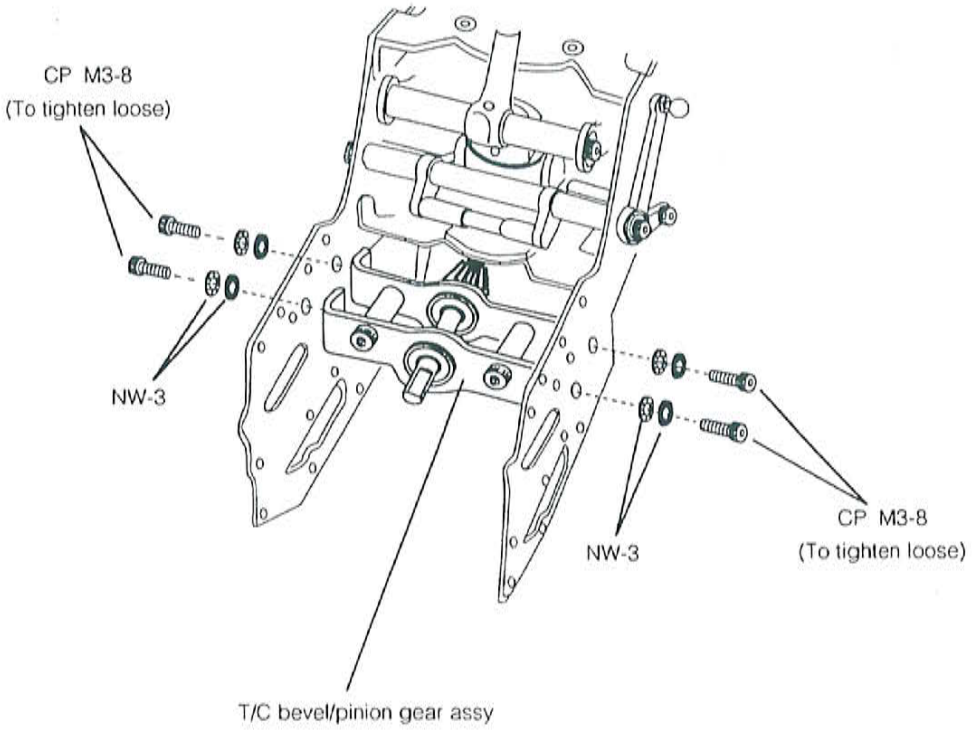
x 4

NW-3



x 8

The screws, etc. above are set temporarily in the T/C bevel/pinion gear assy)

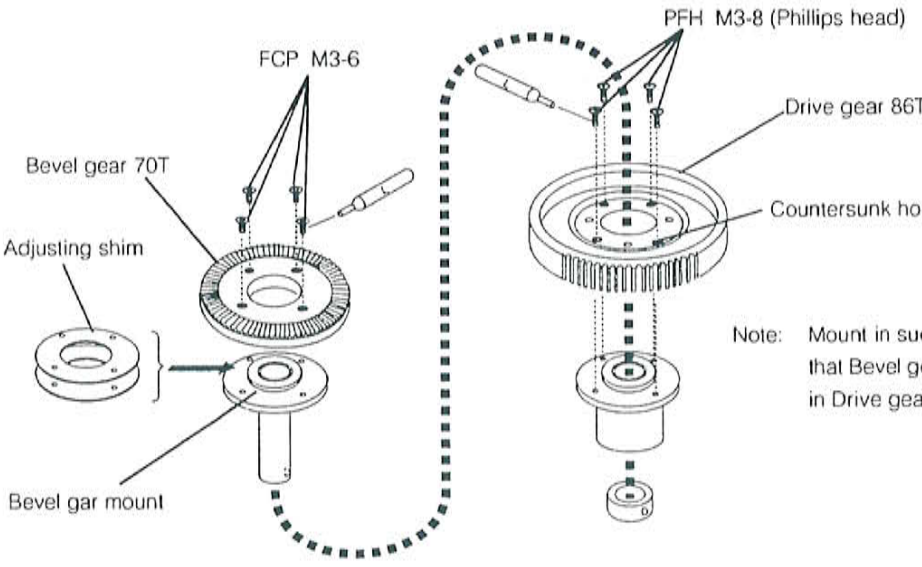


FCP M3-6

x 4

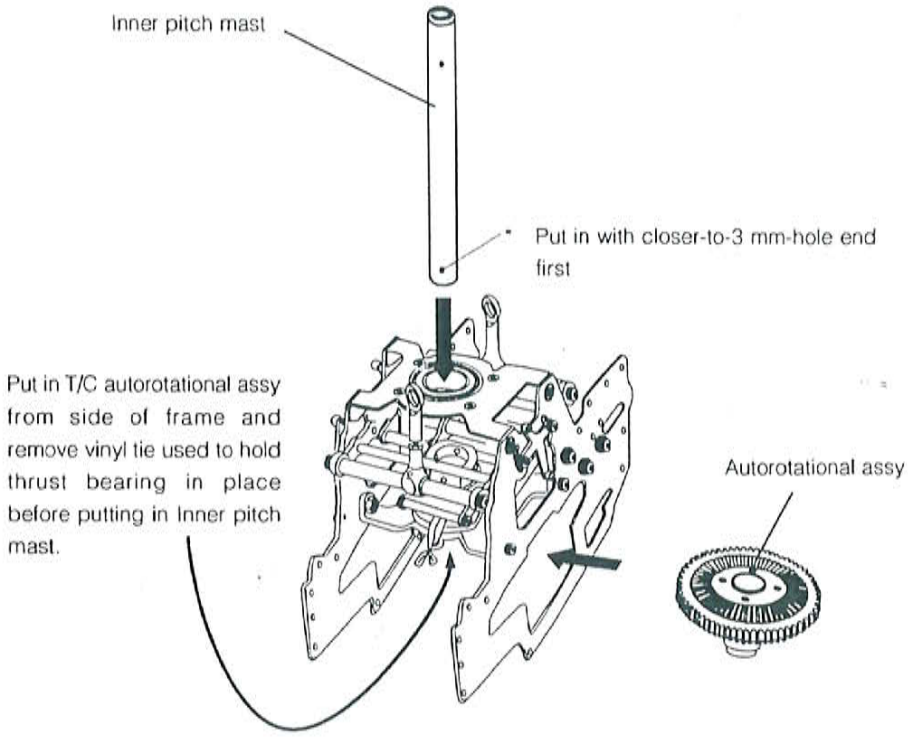
PFH M3-8

x 4

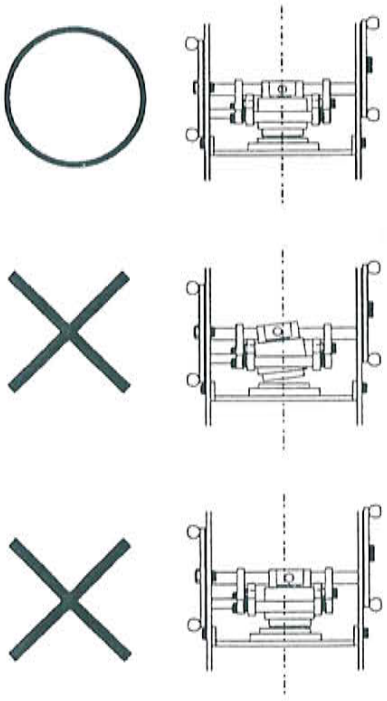


Note: Mount in such direction that Bevel gear 70T is fit in Drive gear 86T.

* If necessary, adjust backlash between Bevel/pinion gear I4T and Bevel gear 70T by attaching one to two adjusting shims to Bevel gear mount on top of Autorotational shaft to change height of Bevel gear 70T.



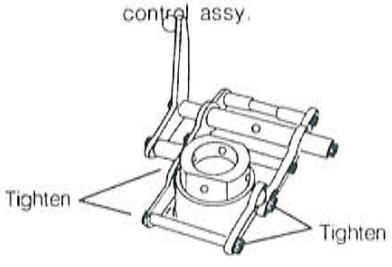
* After putting in Inner pitch mast, tighten screws set loosely in frame.



* Adjust CP control assy.

OK if assy components are in alignment as shown on top and Inner pitch mast is put in smoothly.

After adjustment tighten screws set loosely in CP control assy.



CP M3-23

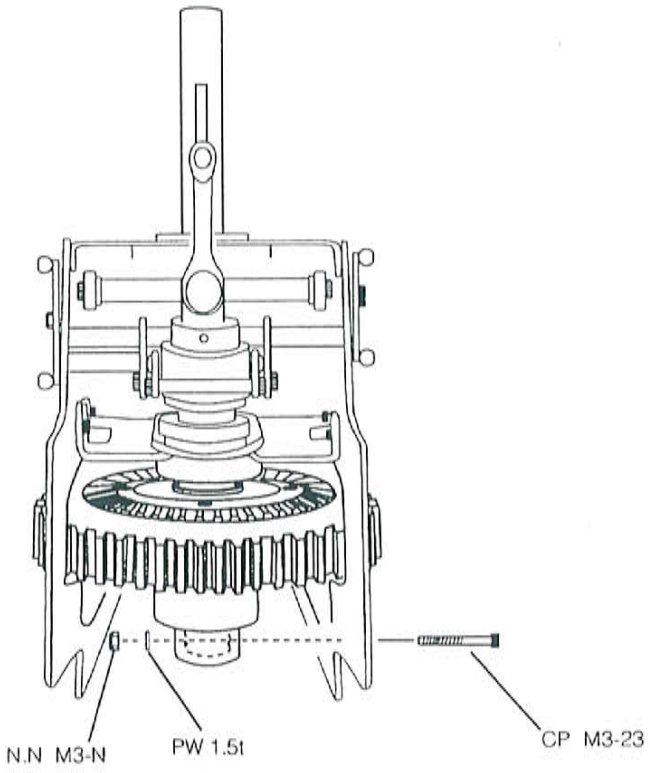
x 1

N.N M3-N

x 1

PW 1.5t

x 1



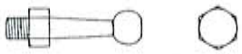
Pivot bolt (4 mm)

x 4

Pivot bolt (6 mm)

x 2

Pivot bolt (12 mm)

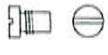


x 1

M3 nut

x 1

Stepped screw



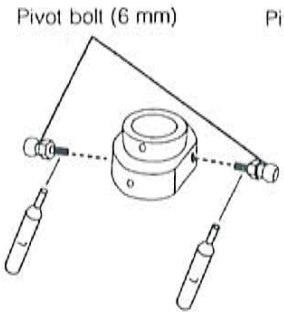
x 1

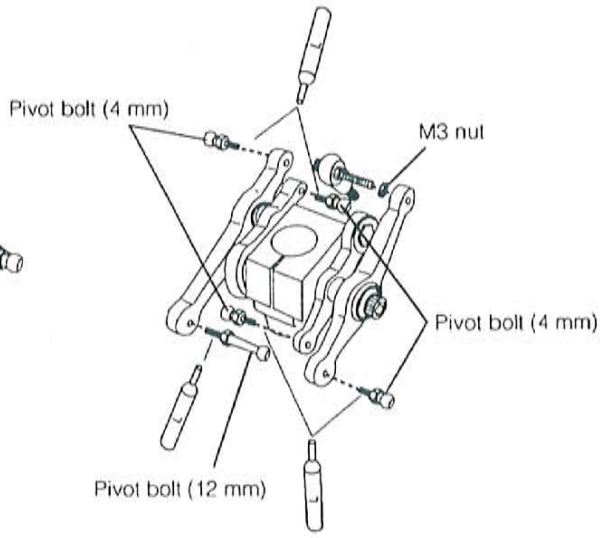
0.8t washer

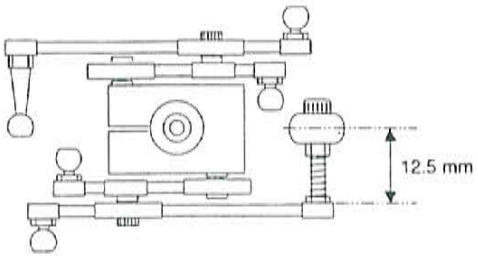
x 1

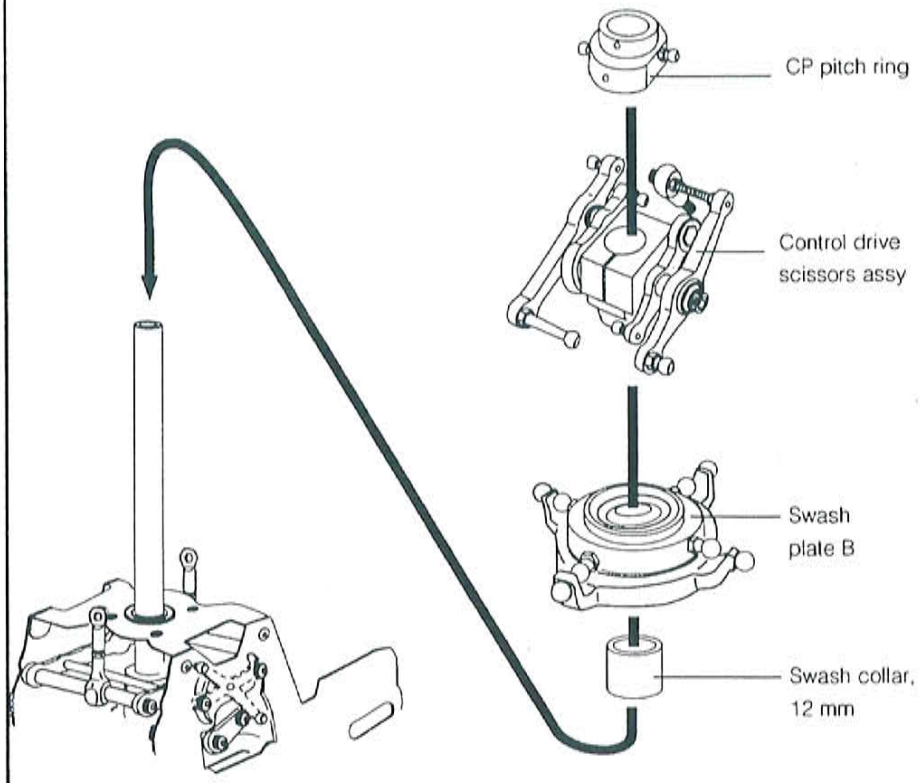
(Not used in assembly of this kit)

The screws, etc. above are furnished in the Control drive scissors bag.









Note: Do not fix Control drive scissors assy to mast in this stage.

CP M2.6-5 x 1

Pitch rod mounting screw x 1

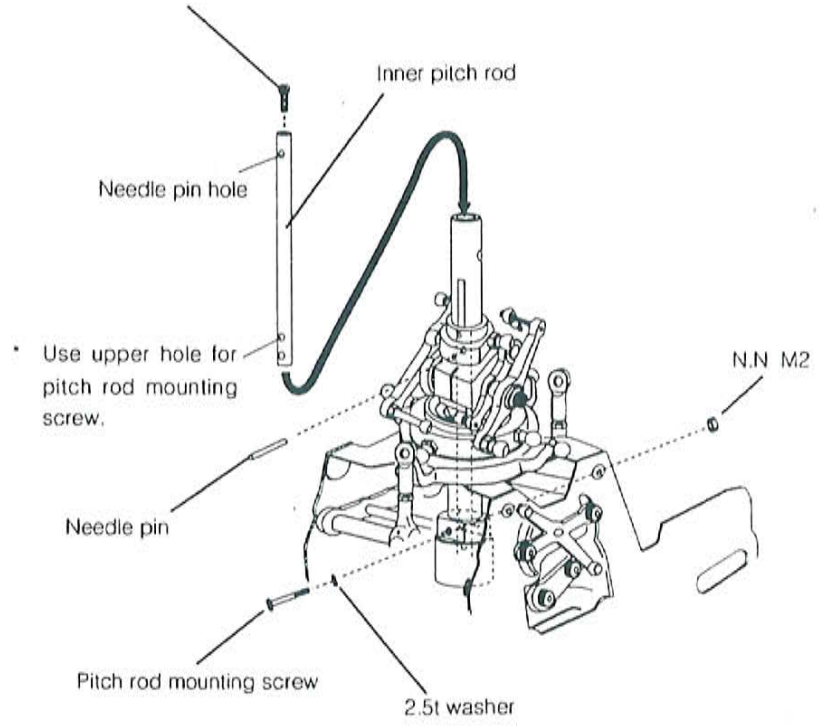
N.N M2 x 1

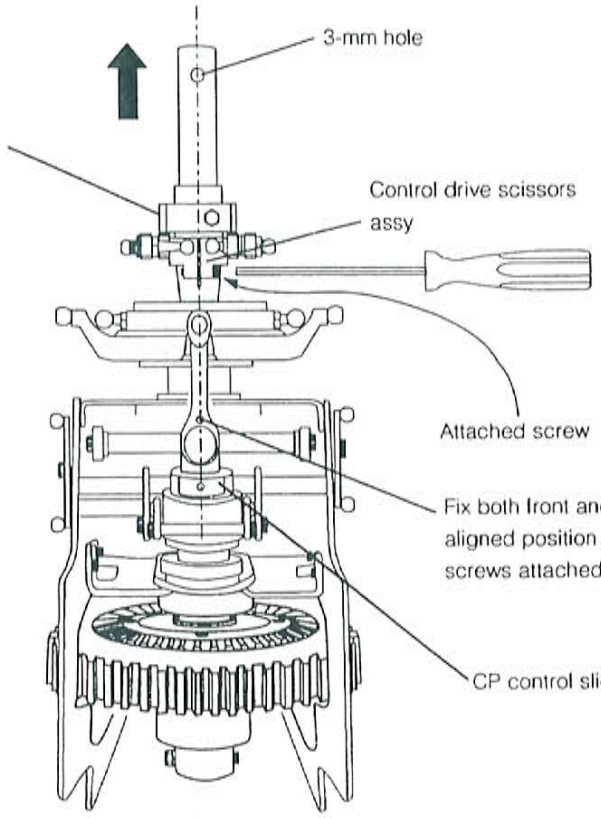
Needle pin x 1

2.5t washer x 1

The screws, etc. above are furnished in the small bag of the Screw set.

CAP M2.6-5
(Tighten loose. Turn in tight after putting in Needle pin.)

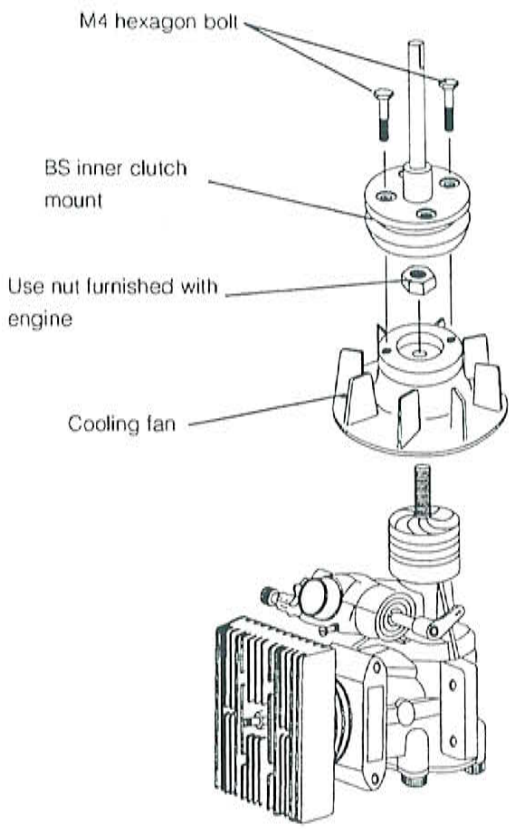




* Pull up Inner pitch mast all way and fix by tightening Control drive scissors bolt until center of 2-mm hole in CP control slide ring and that of slit in Control drive scissors assy are in alignment.

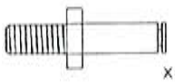
M4 hexagon bolt

x 2



* Be very careful to prevent eccentricity. It is especially important to insure that Cooling fan top (to hold Clutch mount) will be square to Engine crank shaft. Check very carefully.

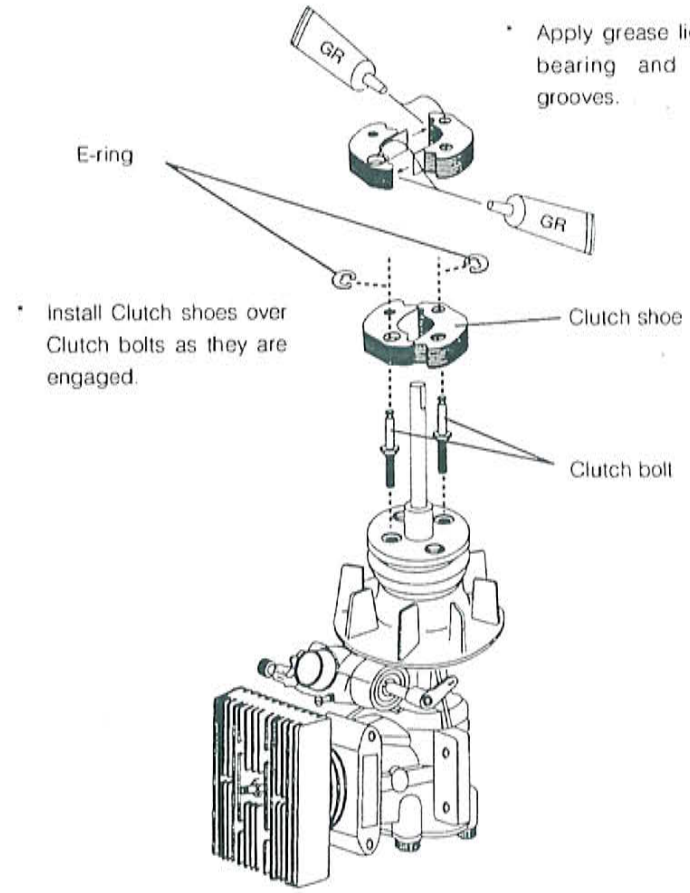
Clutch bolt



x 2

E-ring

x 2

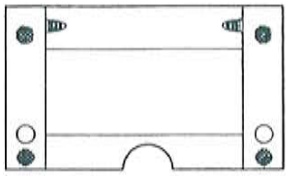


* Apply grease lightly to bearing and spring grooves.

* Install Clutch shoes over Clutch bolts as they are engaged.

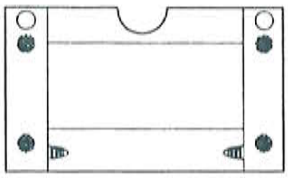
When using OS engine

Direct the arc cutout side to the rear of the engine.



When using YS or ENYA engine

Direct the arc cutout side to the front of the engine.

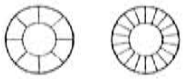


Note: The direction of mounting may differ from the above, depending on the engine you choose. So, be careful.

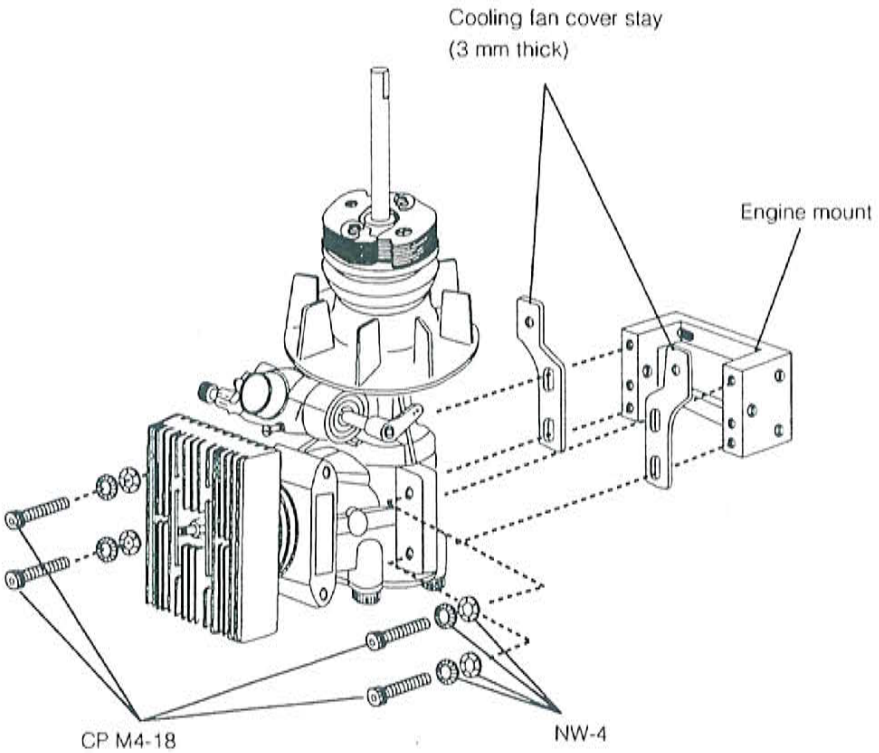
CP M4-18

x 4

NW-4



x 8

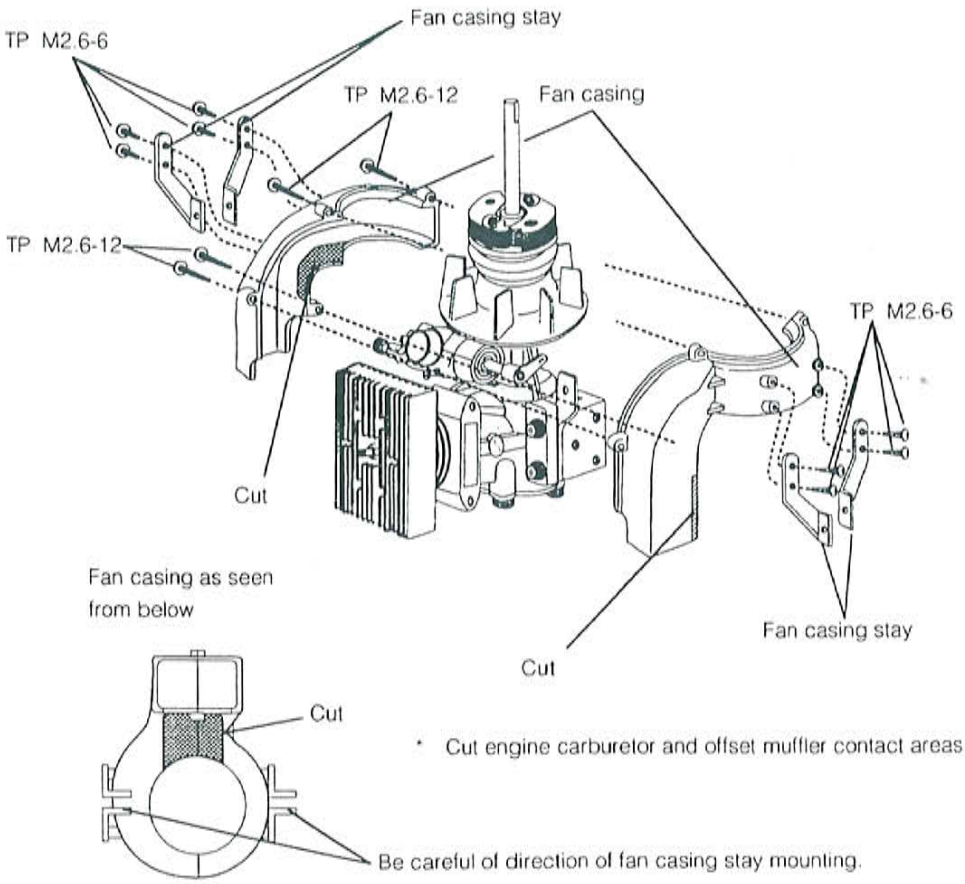


TP M2.6-6

x 8

TP M2.6-12

x 4



* Cut engine carburetor and offset muffler contact areas.

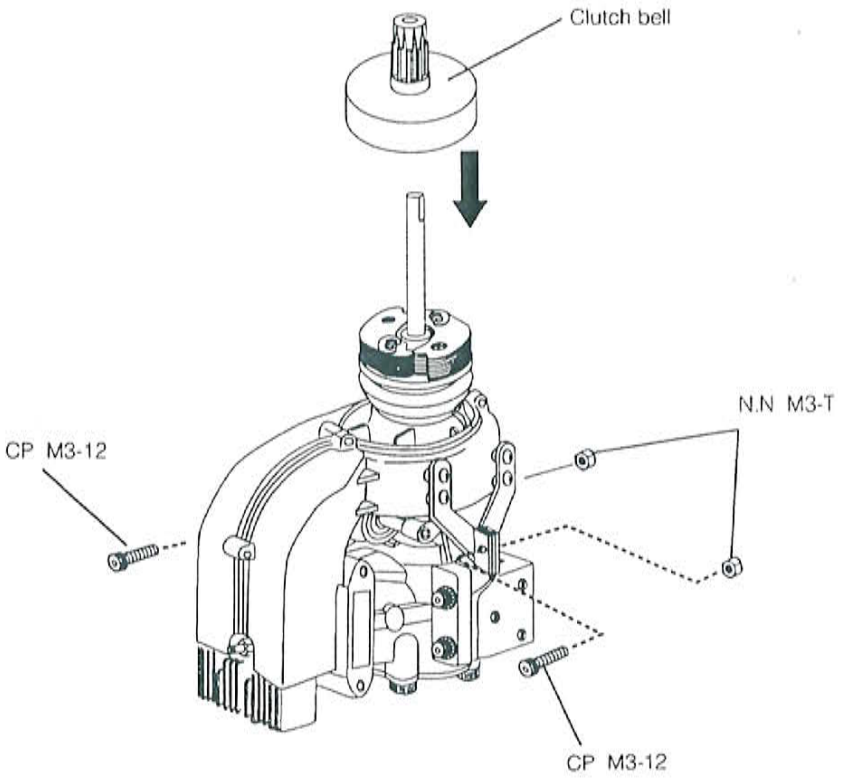
Be careful of direction of fan casing stay mounting.

CP M3-12

x 2

N.N M3-T

x 2

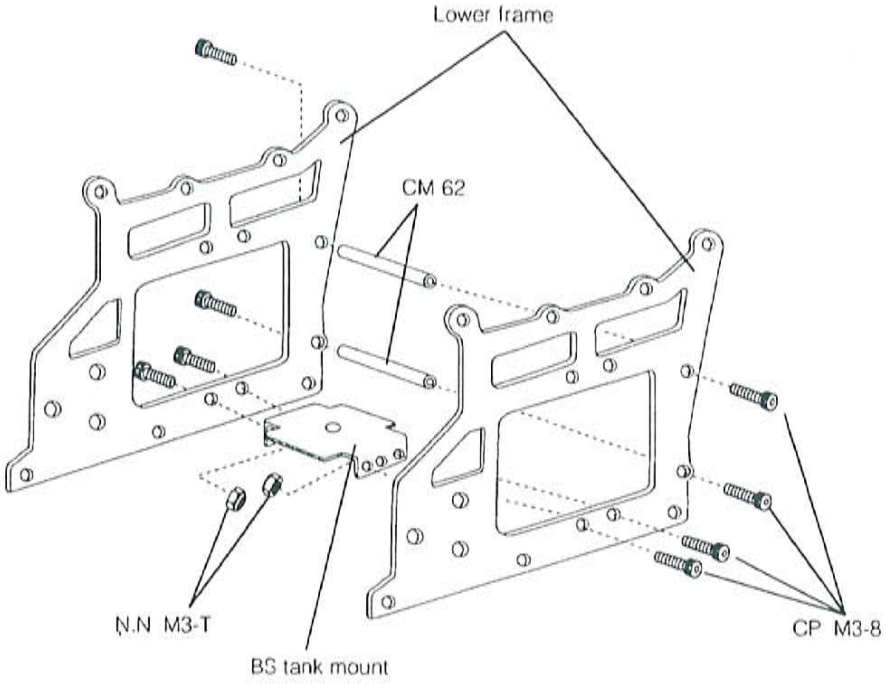


C. Lower Frame

CP M3-8 x 8

N.N M3-T x 4

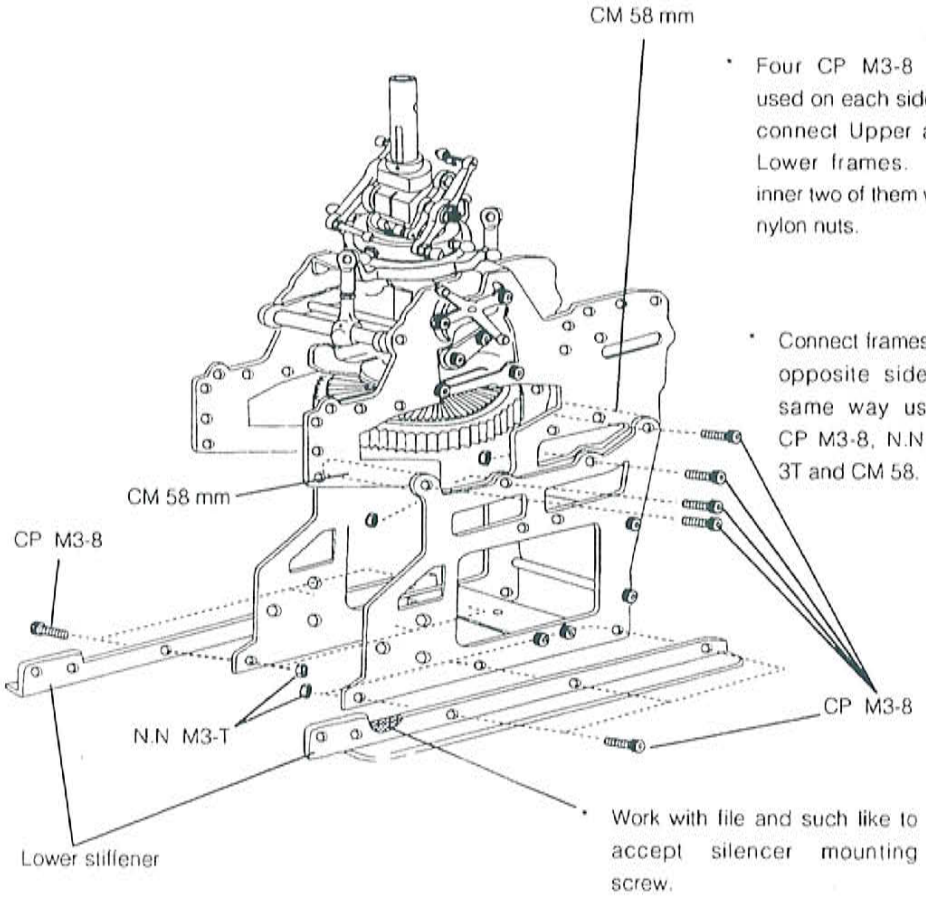
CM 62 x 2



CP M3-8 x 14

N.N M3-T x 10

CM 58 x 2



- Four CP M3-8 are used on each side to connect Upper and Lower frames. Fix inner two of them with nylon nuts.
- Connect frames on opposite side in same way using CP M3-8, N.N M-3T and CM 58.
- Work with file and such like to accept silencer mounting screw.

CP M3-8

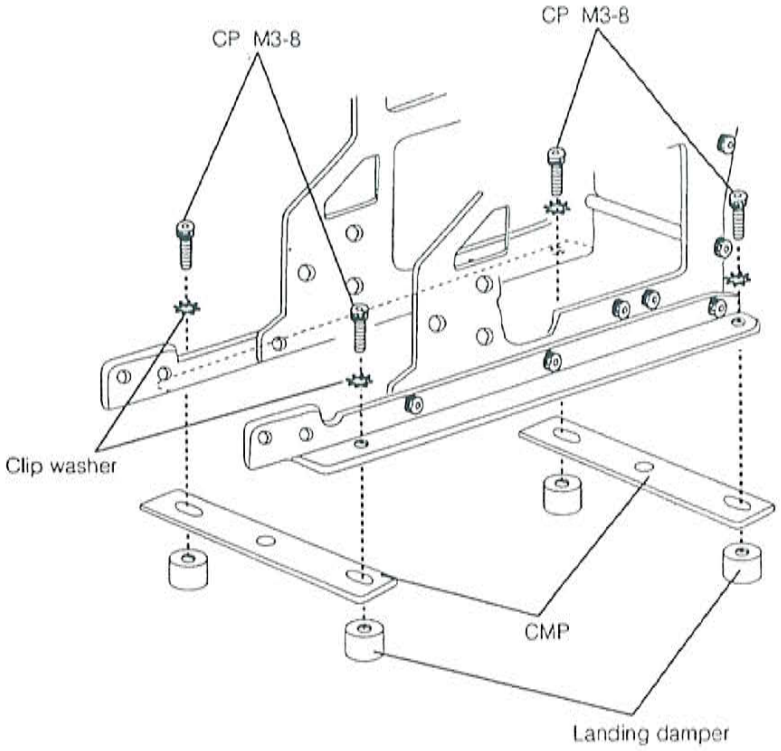
x 4

Clip washer

x 4

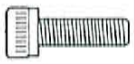
CMP

x 2



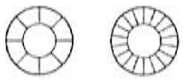
D. Engine Mounting

CP M4-12

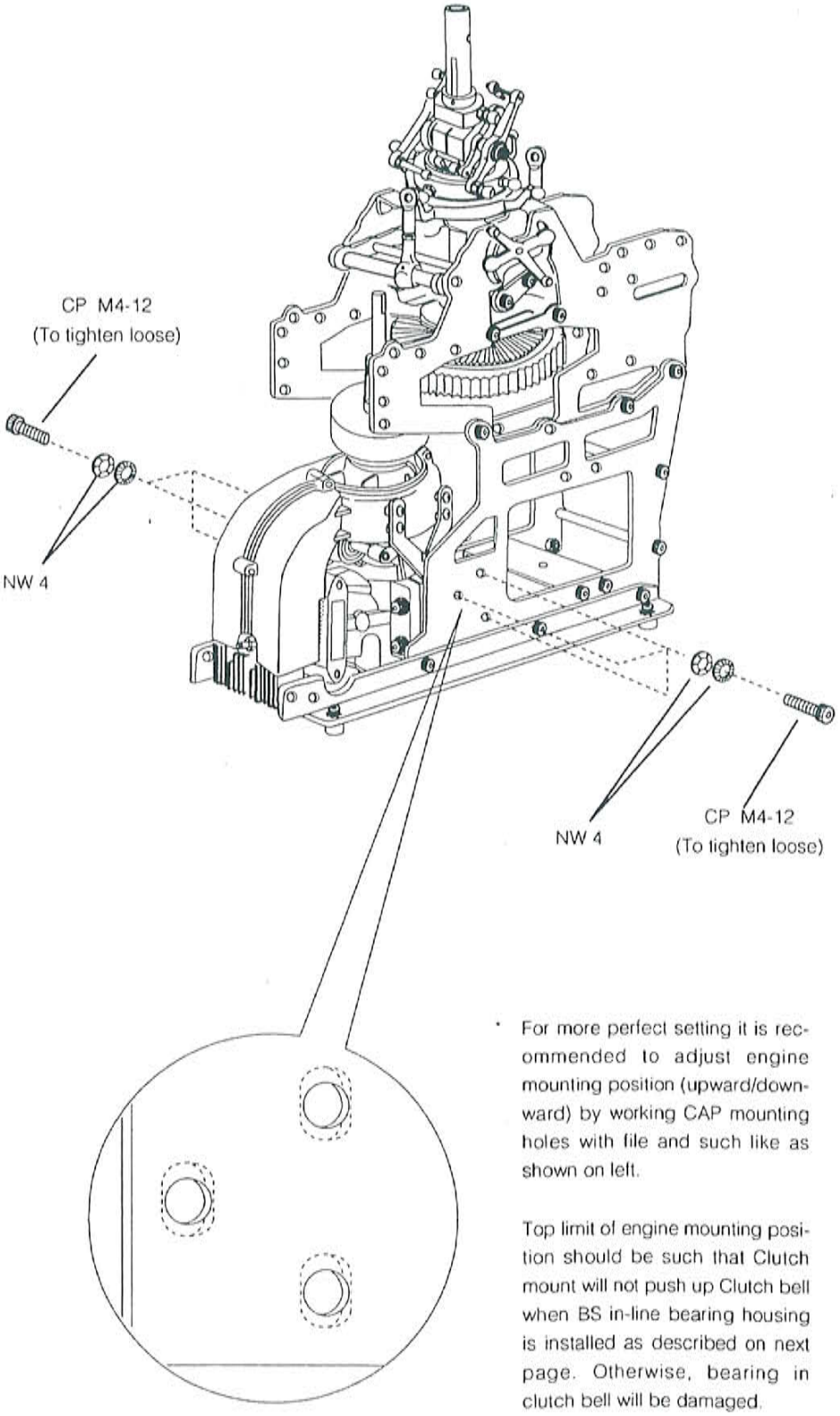


x 6

NW 4



x 12



- For more perfect setting it is recommended to adjust engine mounting position (upward/downward) by working CAP mounting holes with file and such like as shown on left.

Top limit of engine mounting position should be such that Clutch mount will not push up Clutch bell when BS in-line bearing housing is installed as described on next page. Otherwise, bearing in clutch bell will be damaged.

CP M3-8

x 4

N.N M3-T

x 2

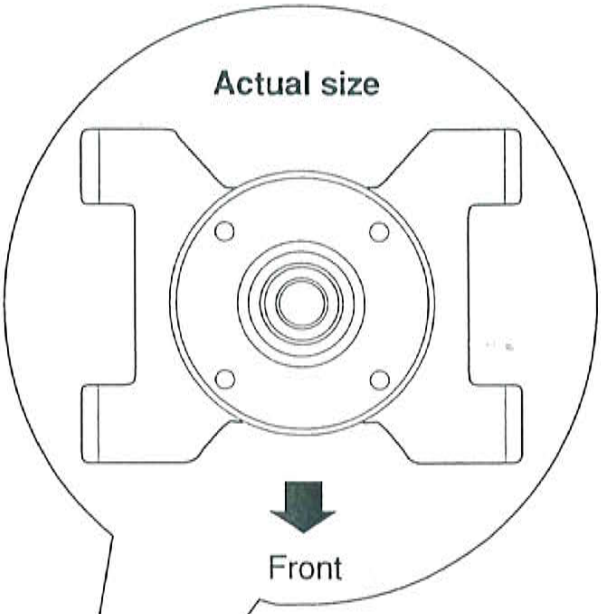
SS M4-4

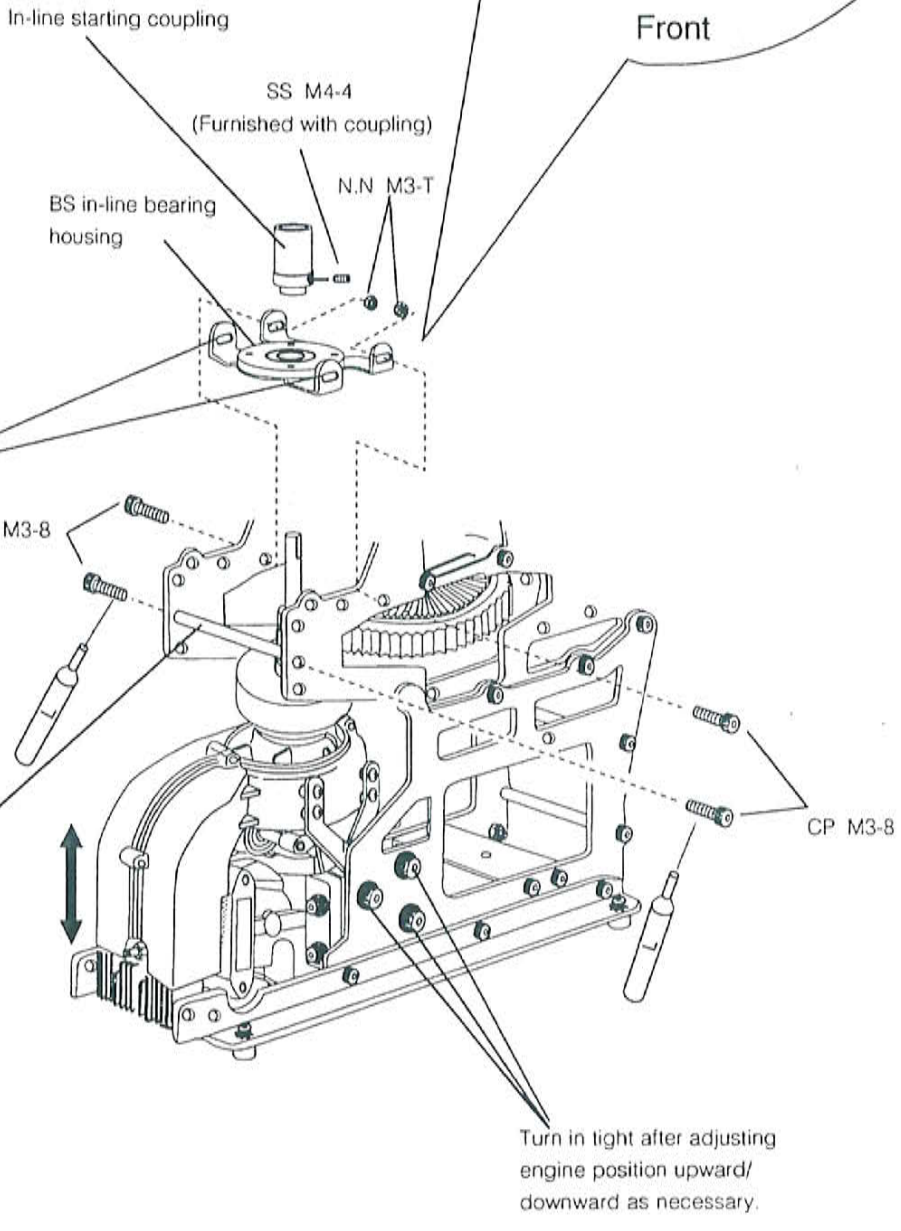
x 1

CM 58

x 1

* Be sure that smaller cut-out side of BS in-line bearing housing is directed to front at installation. Check by actual size drawing on right.





* Do not attach screws in this stage. They should be used to tighten Servo frame together with BS in-line bearing housing.

FCP M3-10

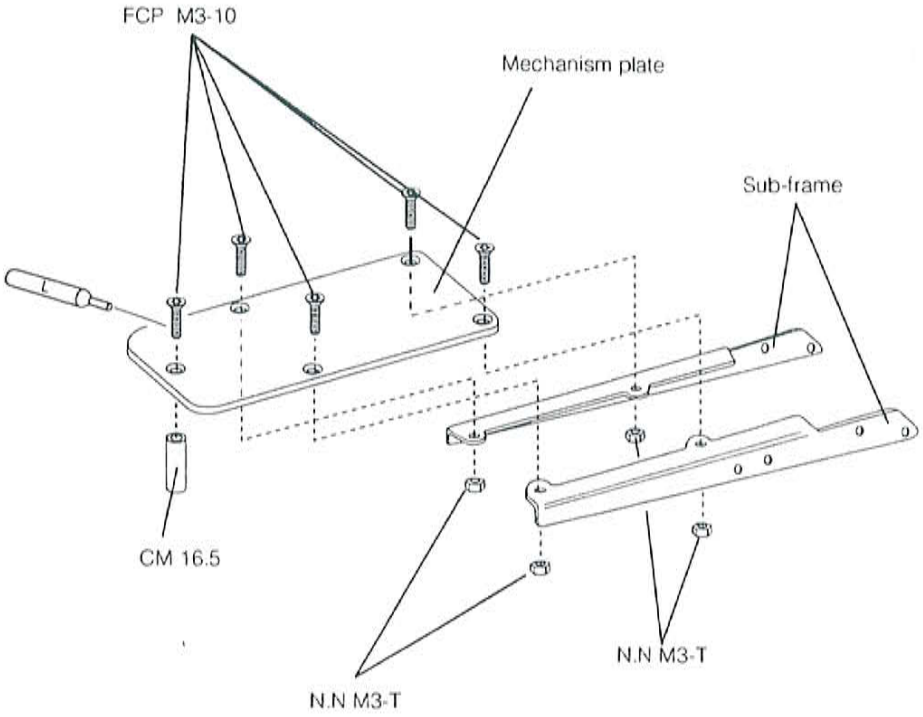
x 5

N.N M3-T

x 4

CM16.5

x 1

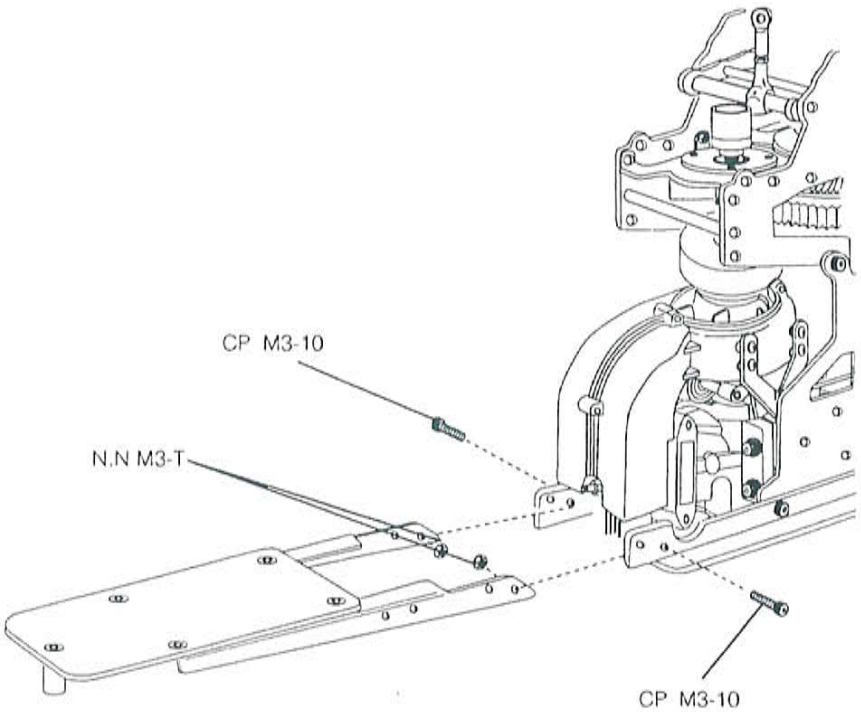


CP M3-10

x 2

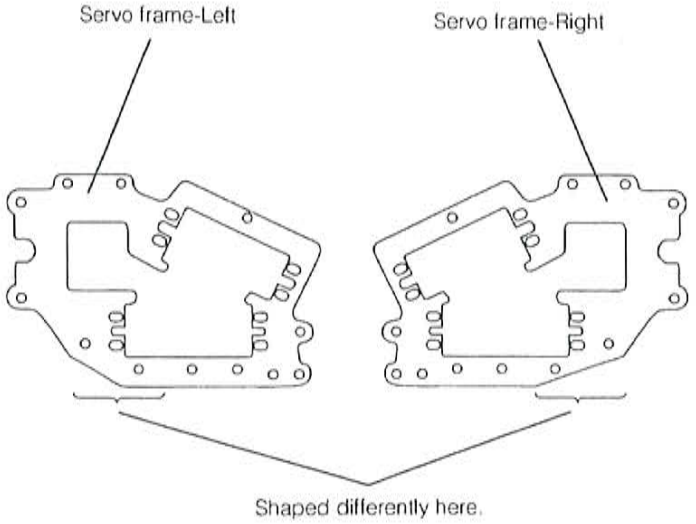
N.N M3-T

x 2



F. Servo frame and receiver

* Be careful not to confuse Servo frame-Left and Servo frame-Right.



CP M2.6-12

x 16

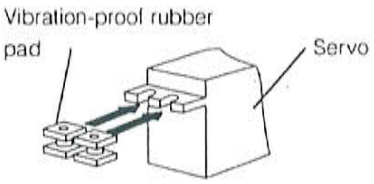
N.N M2.6

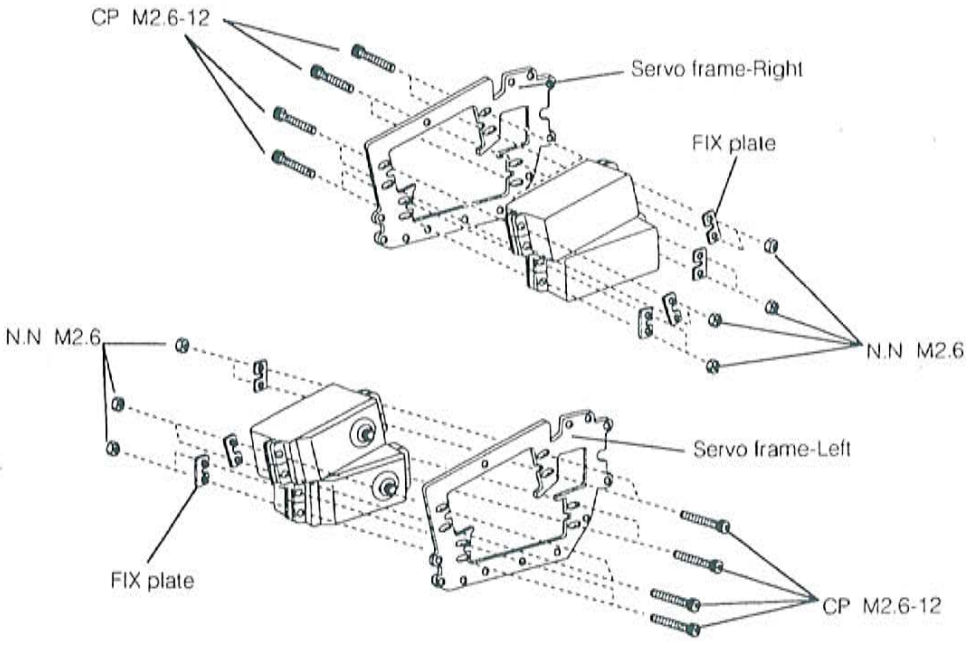
x 16

FIX plate

x 8

* For installation Servo unit should have vibration-proof rubber pads attached without fail.



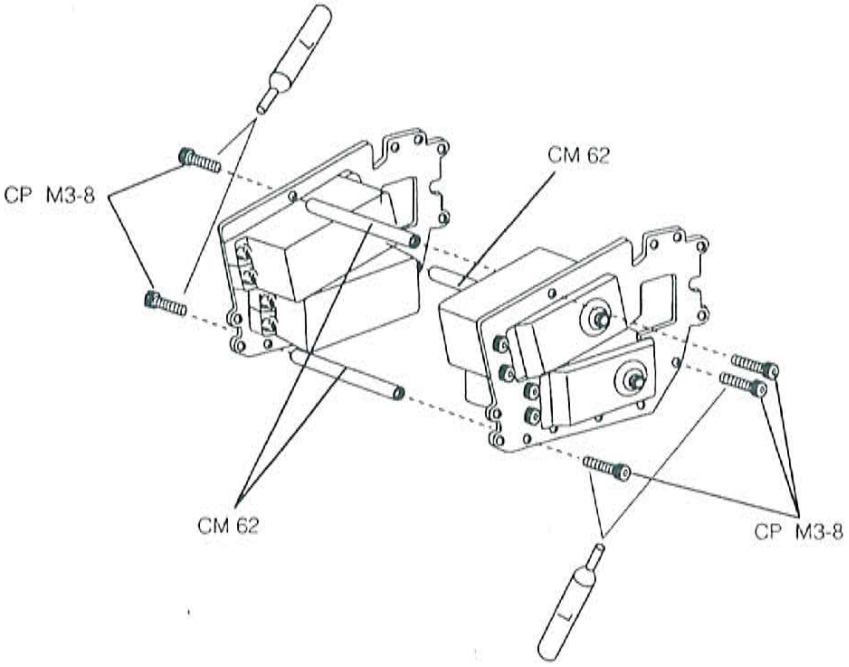


CP M3-8

x 6

CM 62

x 3



CP M3-8

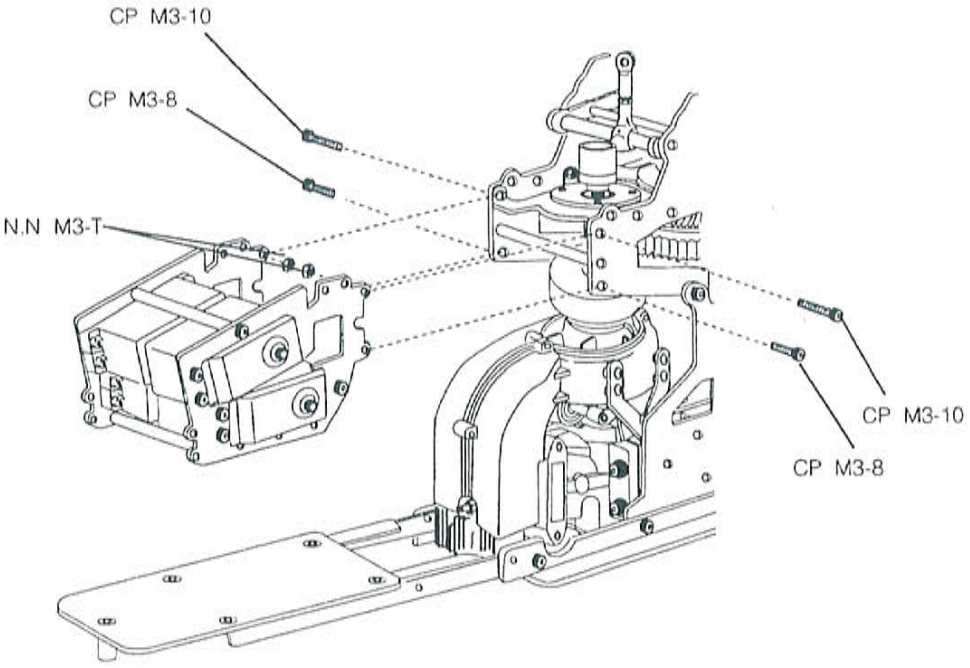
x 2

CP M3-10

x 2

N.N M3-T

x 4



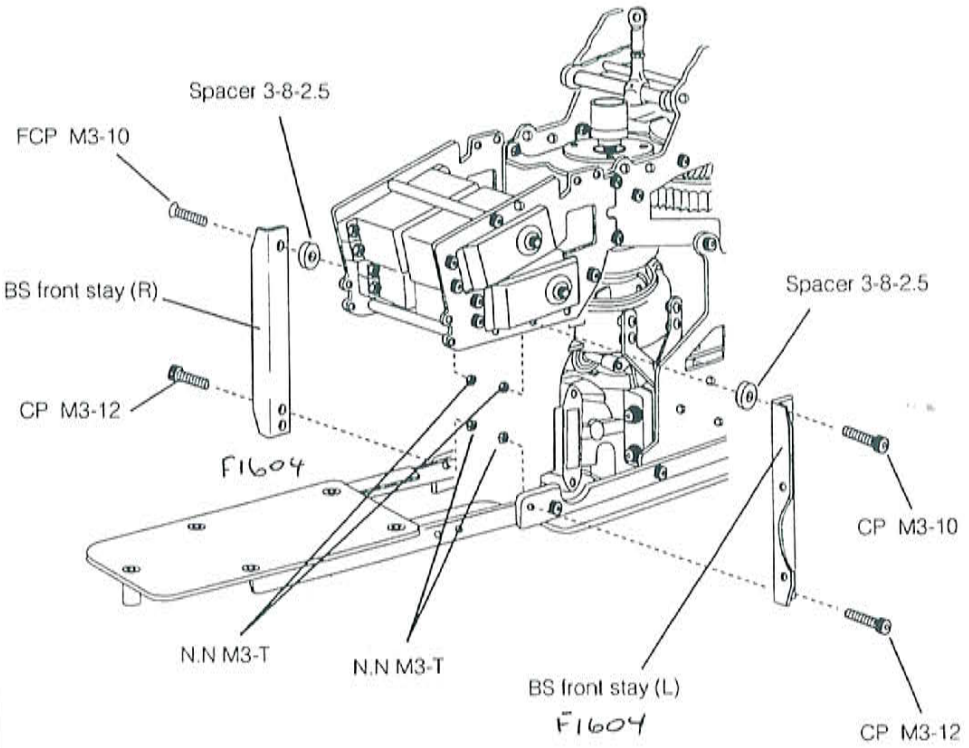
CP M3-10 x 1

CP M3-12 x 2

FCP M3-10 x 1

N.N M3-T x 4

Spacer 3-8-2.5 x 2



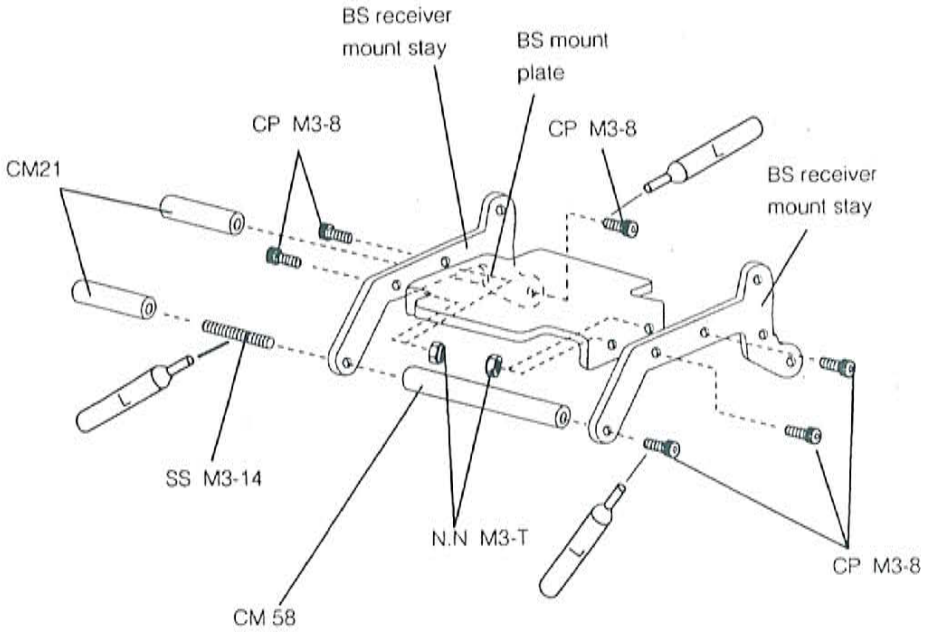
CP M3-8 x 6

N.N M3-T x 4

SS M3-14 x 1

CM 21 x 2

CM 58 x 1

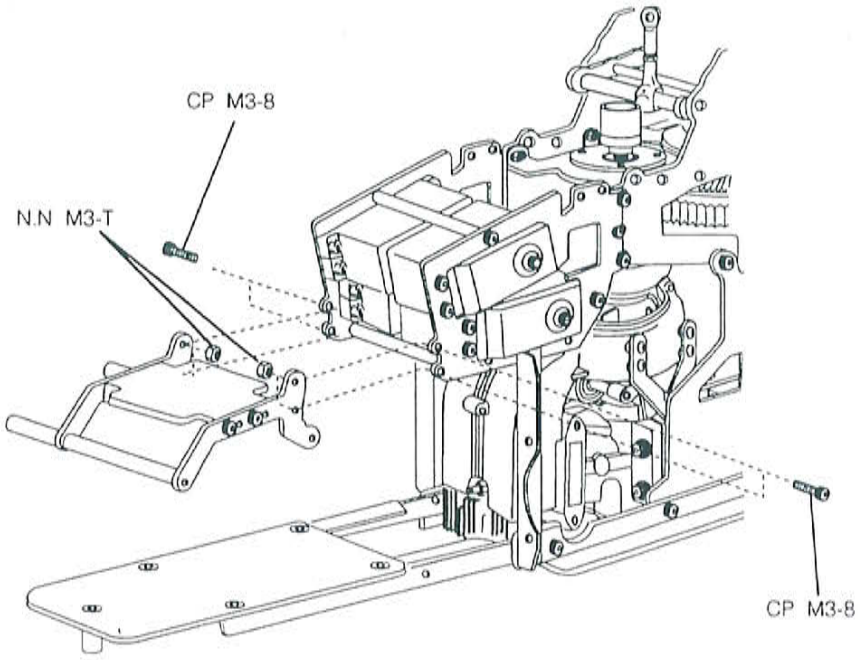


CP M3-8

 x 4

N.N M3-T

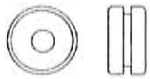
 x 4



CP M3-12

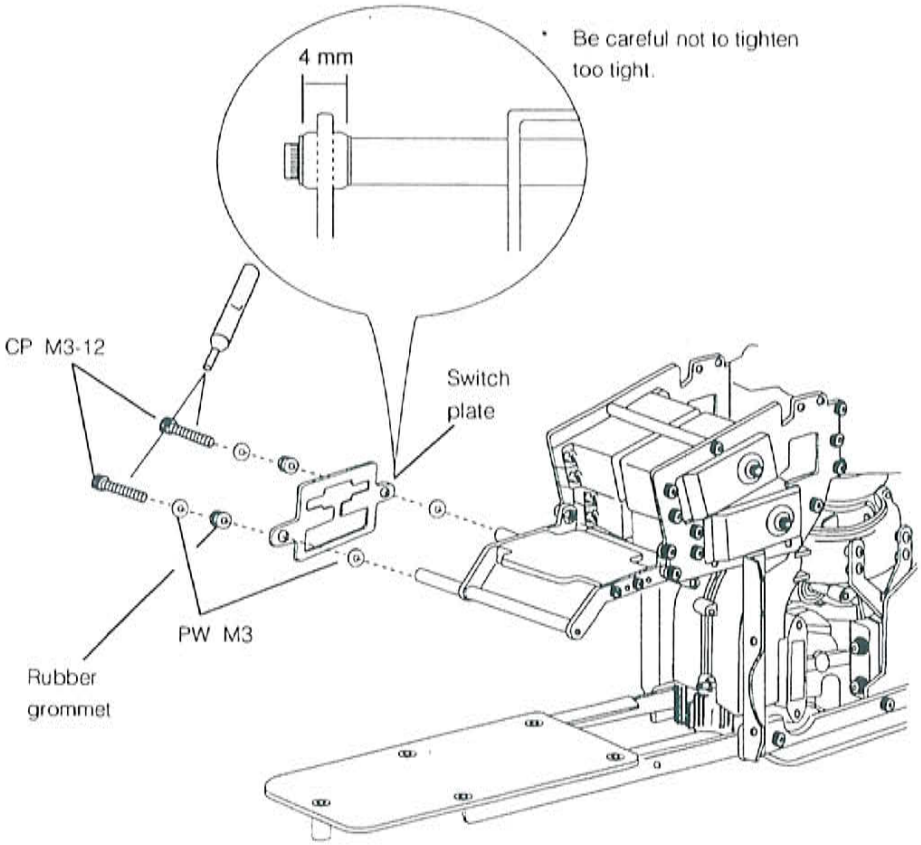
 x 2

Rubber grommet

 x 2

PW M3

 x 4

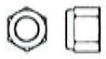


G. Landing skid

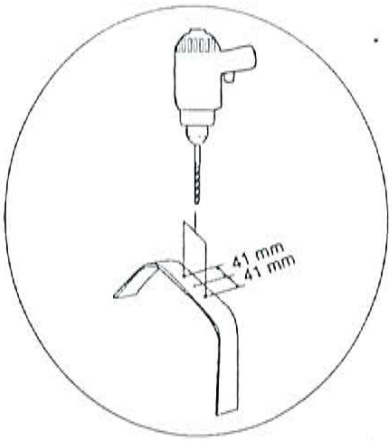
BCP M3-8

x 8

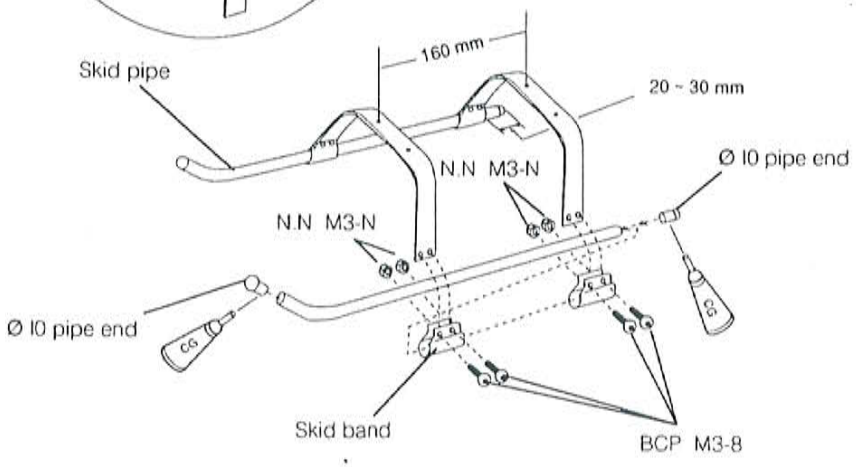
N.N M3-N



x 8



* Drill 3-mm hole 41 mm away on each side from punch mark.



CP M3-8

x 4

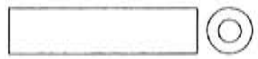
CP M3-6

x 4

Clip washer

x 4

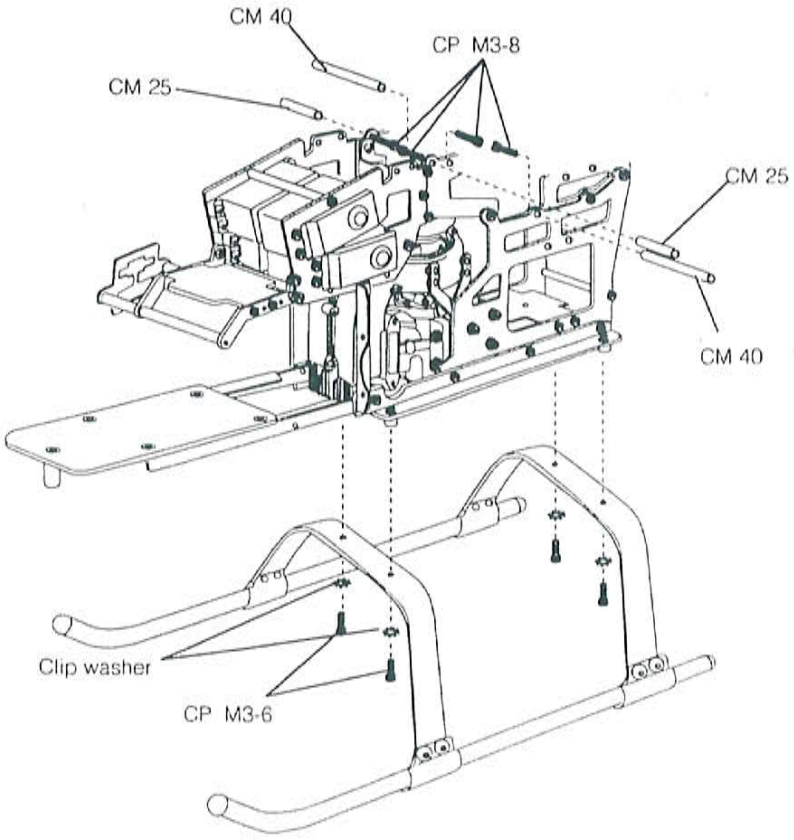
CM 25



x 2

CM 40

x 2



H. Tail assembly

CP M3-I4 (stainless steel)
x 2

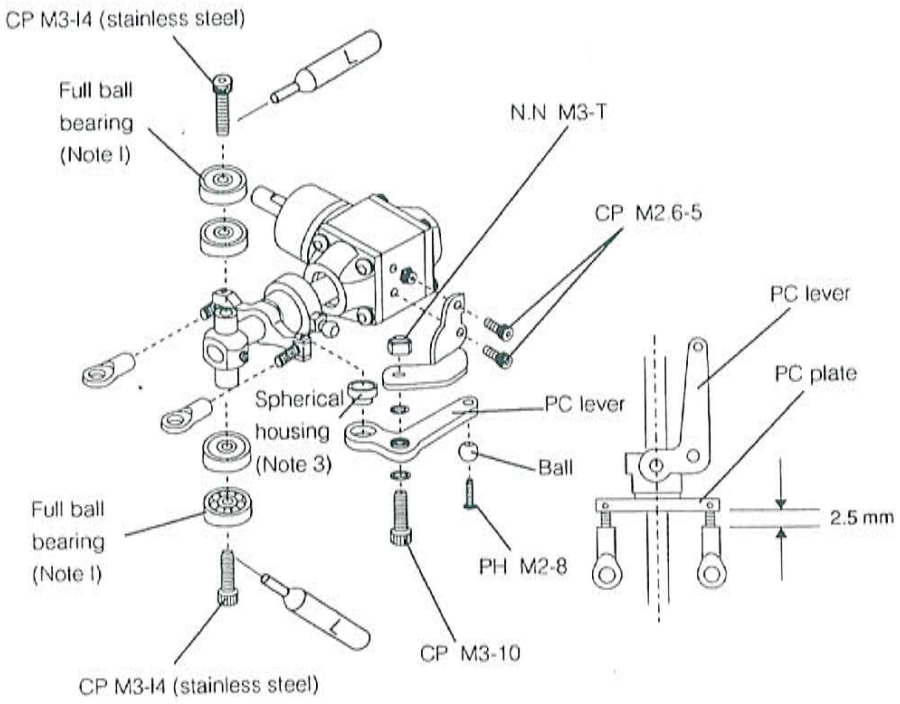
CP M3-10
x 1

PH M2-8
x 1

CP M2.6-5
x 2

N.N M3-T
x 1

É(Å[Ëa
x 1



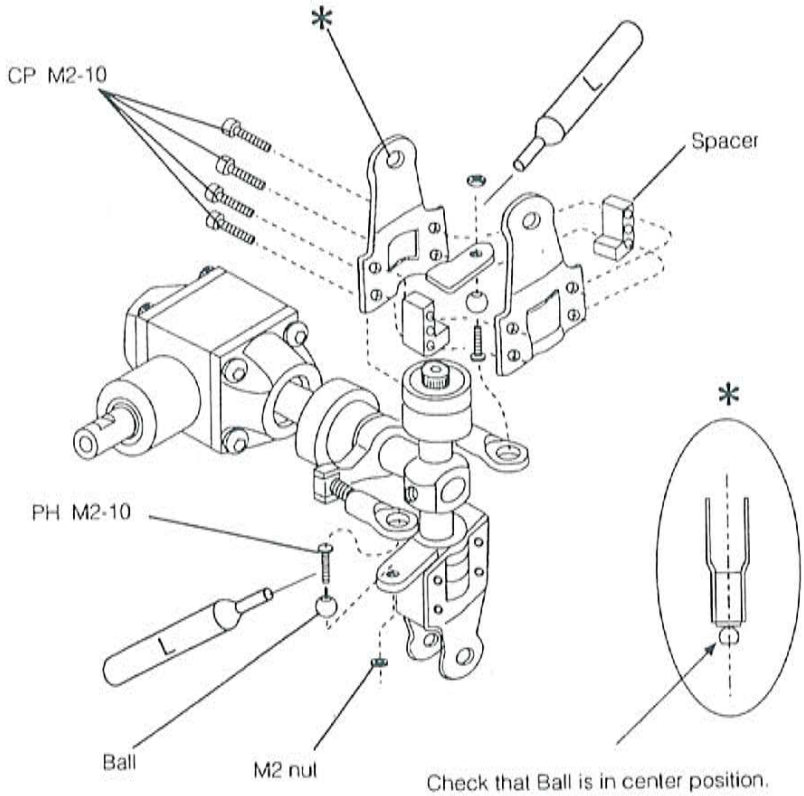
Note 1: Direct washer side outward for installation.
Note 2: Overtightening may break tail rotor assembly during flight. Never use L-shaped wrench and such like for tightening.
Note 3: Carefully degrease PC lever surface for adhesion and adhere with epoxy adhesive.

CP M2-10
x 8

PH M2-10
x 2

M2 nut
x 2

Ball
x 2



Check that Ball is in center position.

CP M3-8

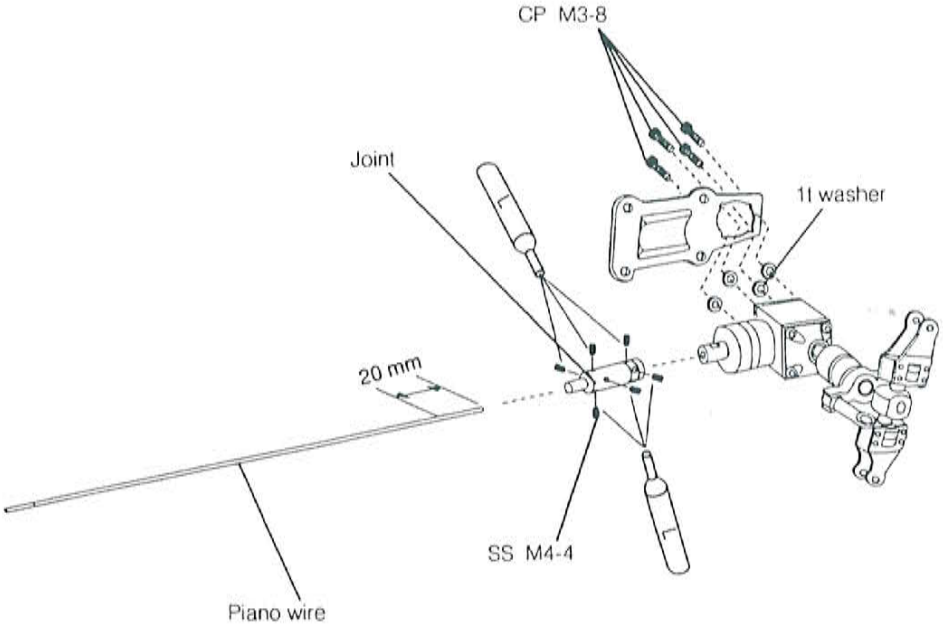
x 2

1t washer

x 4

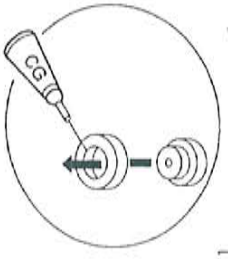
SS M4-4

x 6

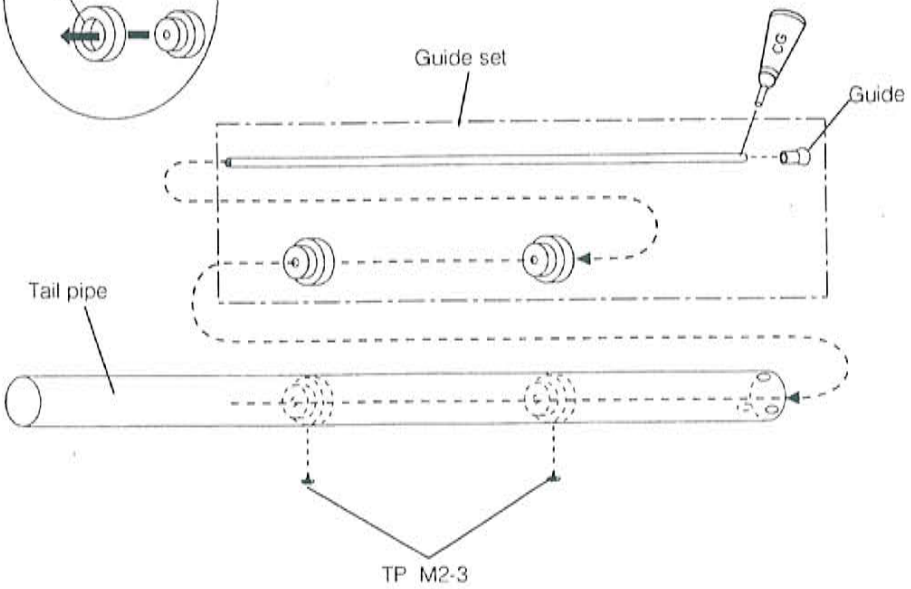


TP M2-3

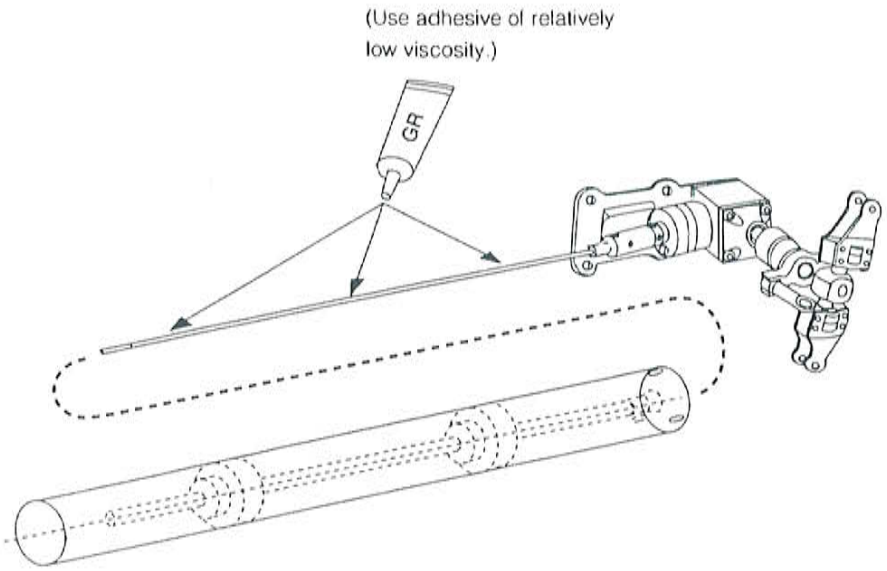
x 2



- Put Rubber holder into Holder link and adhere with instant adhesive.
- Adhere Guide and Stainless steel pipe with instant adhesive.



- When assembling Guide set into Tail pipe, mark Holder ring positions on Tail pipe surface with pencil and such like and drill holes 1.5 mm or so in diameter. In this way Guide set is smoothly put in Tail pipe and adhered precisely.



BCP M3-8

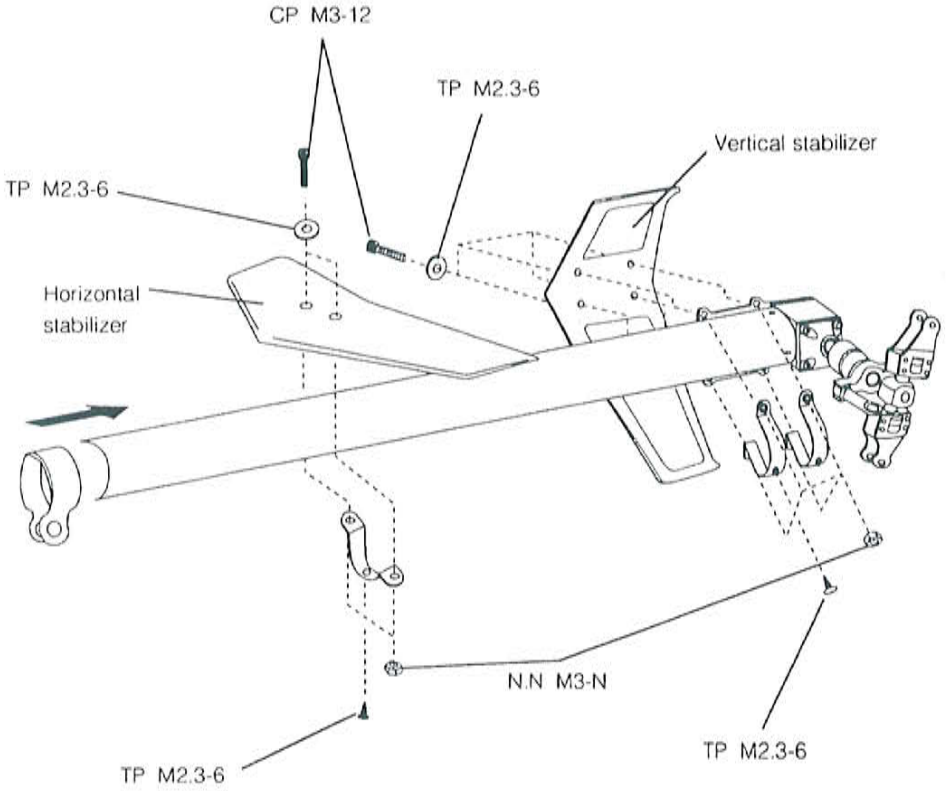
x 6

N.N M3-N

x 8

x 6

x 2



* Drill holes 1.8 mm or so in diameter before turning in TP M2.3-6 screws. Fix with epoxy adhesive, if they are loose.

I. Tail pipe installation

CP M3-30

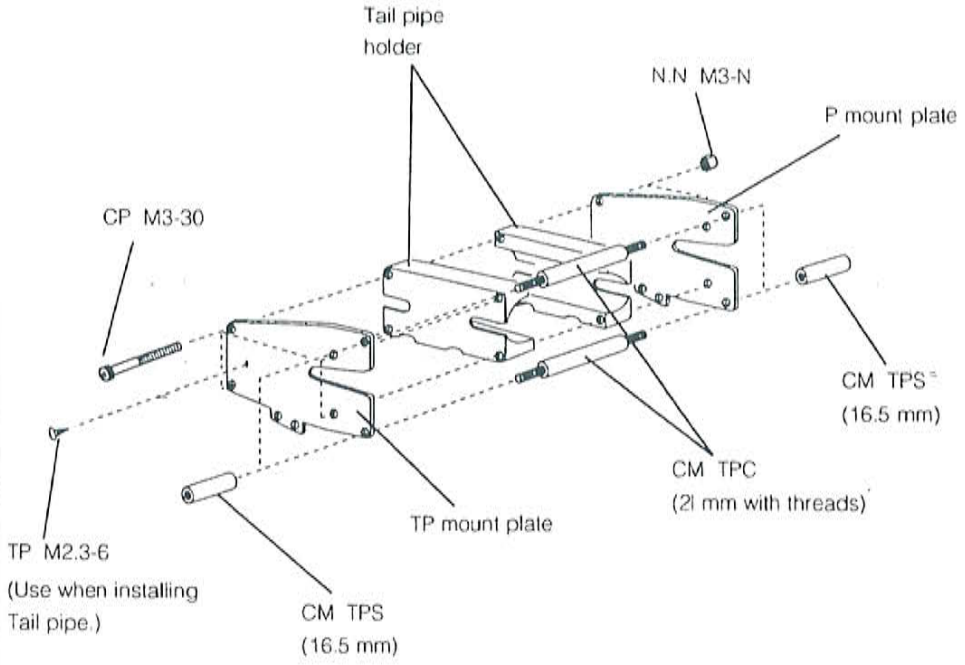
x 4

N.N M3-N

x 4

TP M2.3-6

x 2



CP M3-10

x 1

CP M3-8

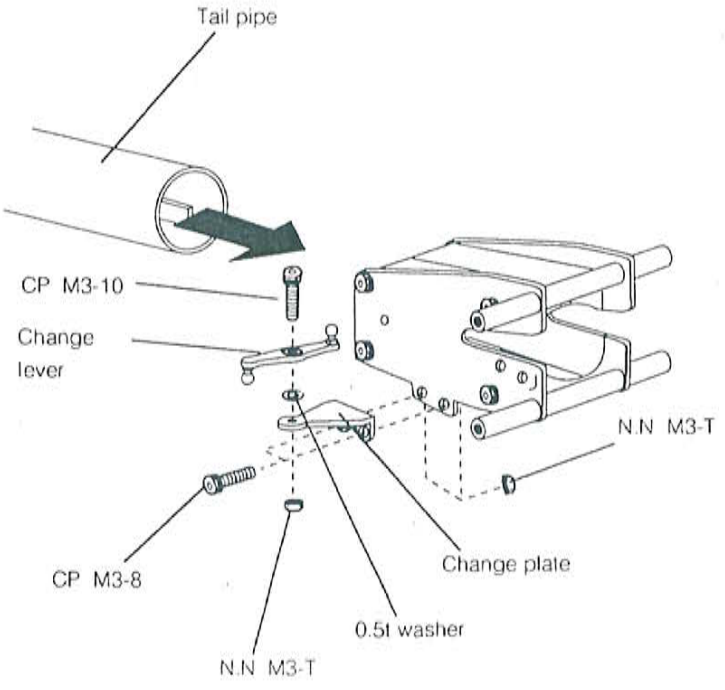
x 2

N.N M3-T

x 3

0.5t washer

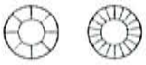
x 1



CP M3-10

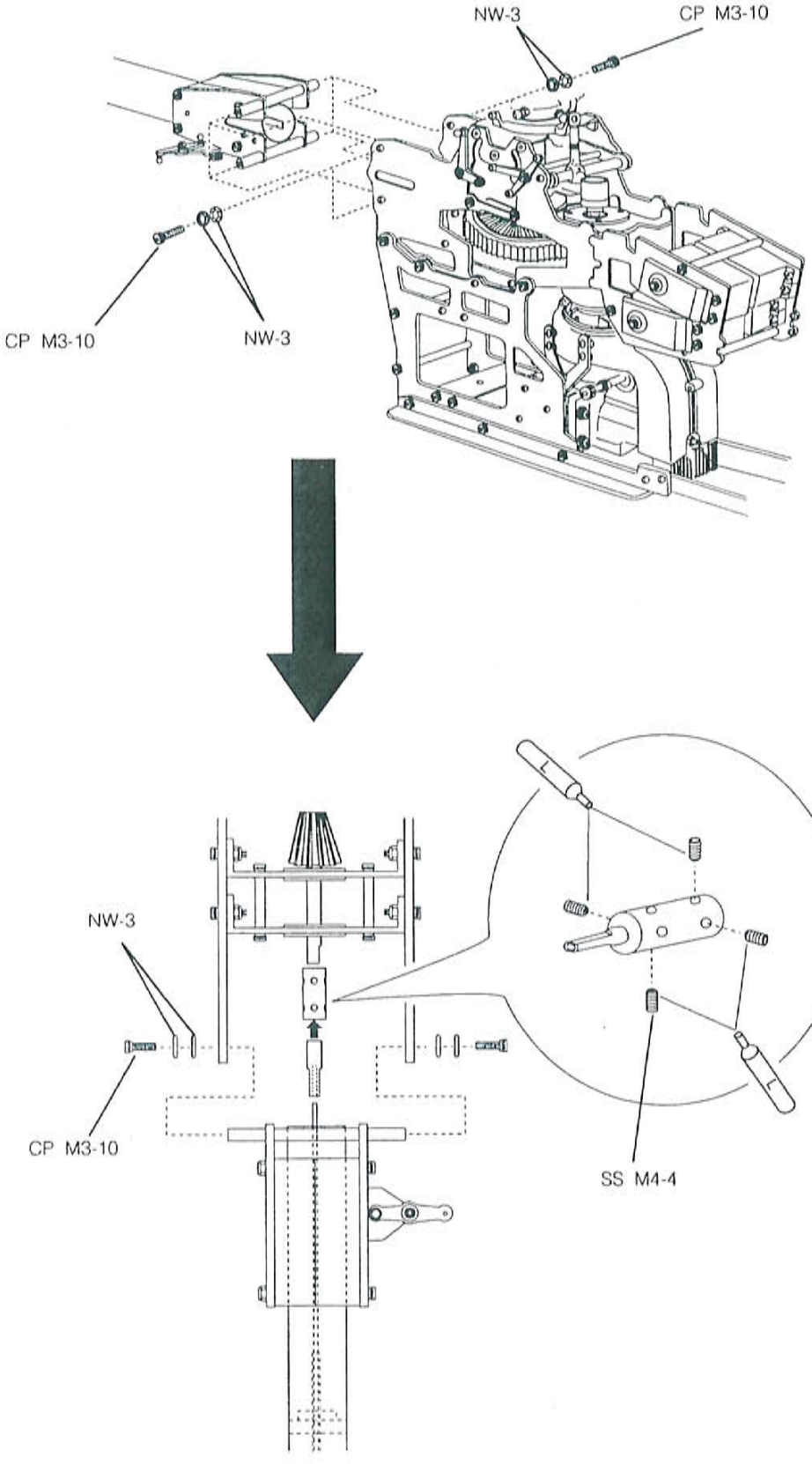
 x 4

NW-3

 x 8

SS M4-4

 x 4



CP M3-15

x 1

N.N M3-N

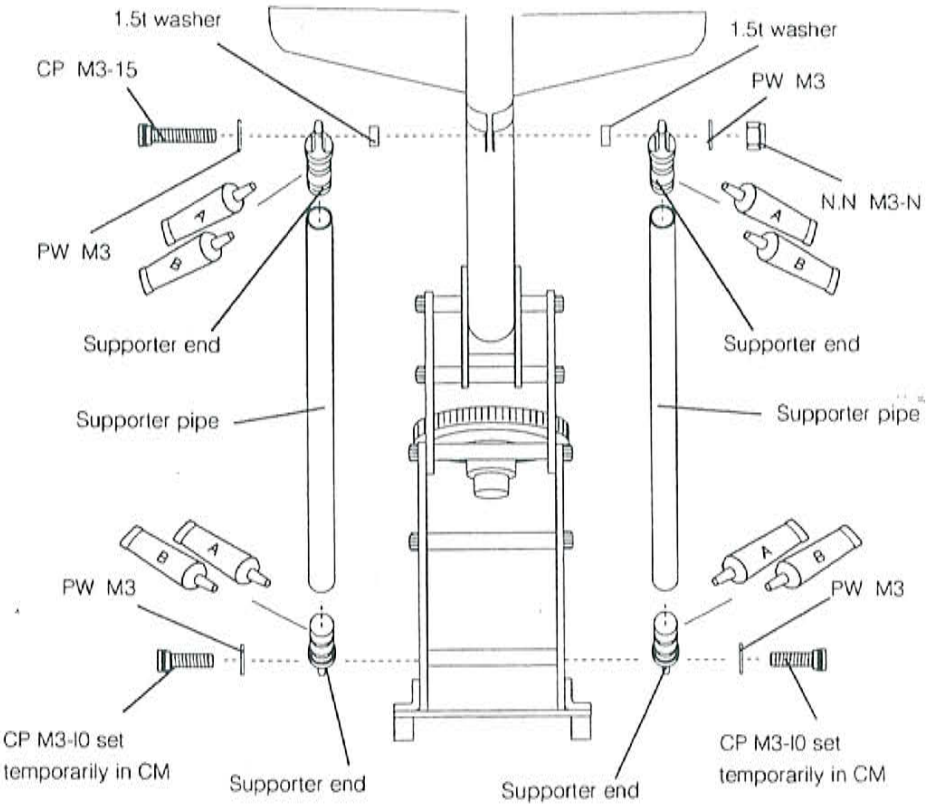
x 1

1.5t washer

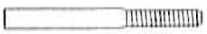
x 2

PW M3

x 4

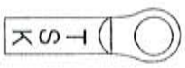


Rod joint



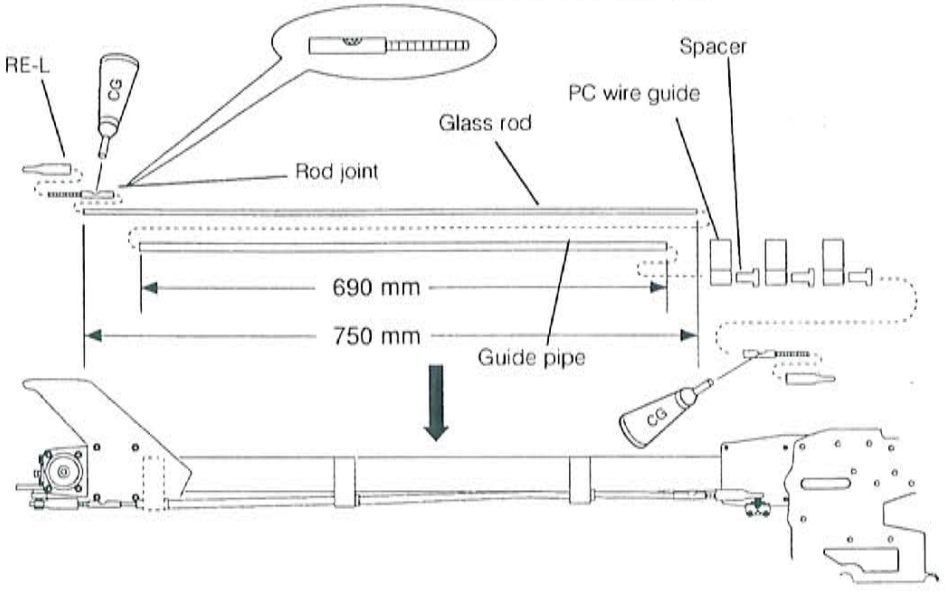
x 2

RE-L



x 2

* Open hole to apply instant adhesive. Use round file and such like.



1. Put Spacer in PC wire guide and adhere with instant adhesive.
2. Cut Guide pipe to length of 690 mm and run through Wire guide spacers.
3. Cut Glass rod to length of 750 mm and run through Guide pipe.
4. Adhere Rod joint to each end of Glass rod and turn in Rod end L until inter-ball dimension becomes 805 mm. Connect Rod end with PC lever of Drive transmission and PC change lever of Tail pipe mounting plate.
5. Adhere Wire guide to Tail pipe.

J. Pitch servo unit

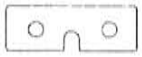
CP M2.6-12

 x 4

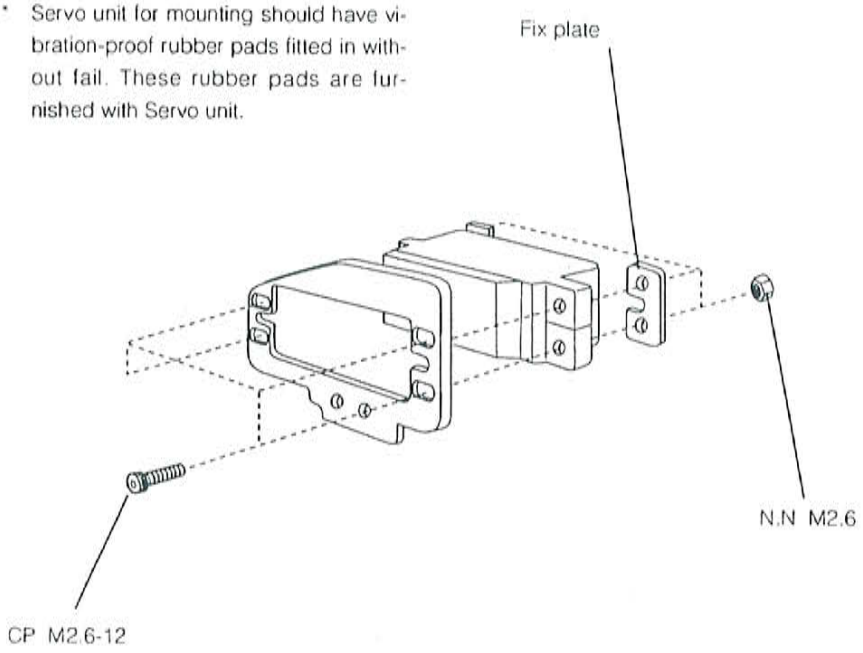
N.N M2.6

 x 4

Fix plate

 x 2

* Servo unit for mounting should have vibration-proof rubber pads fitted in without fail. These rubber pads are furnished with Servo unit.



CP M3-15

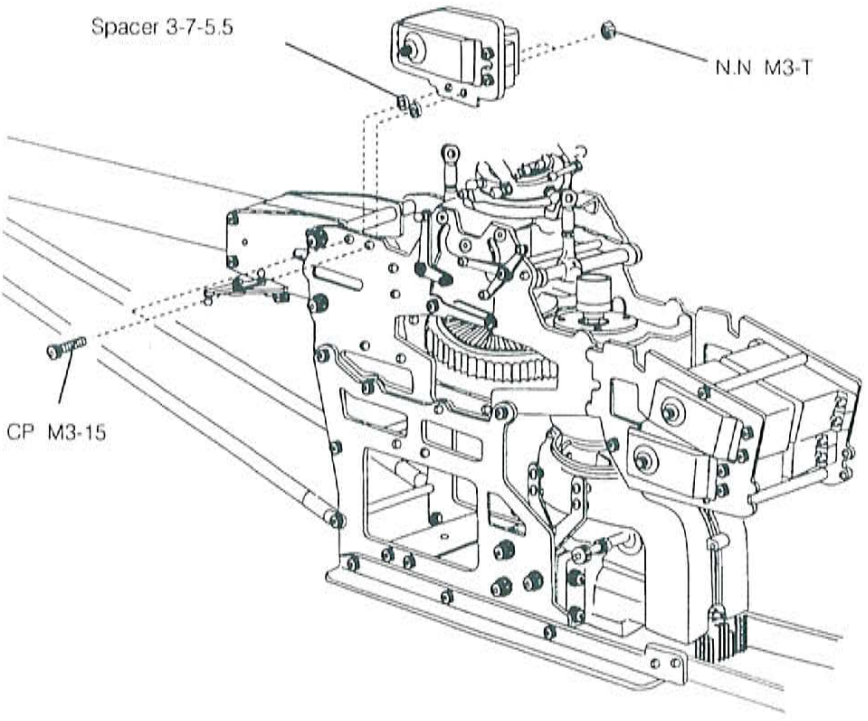
 x 2

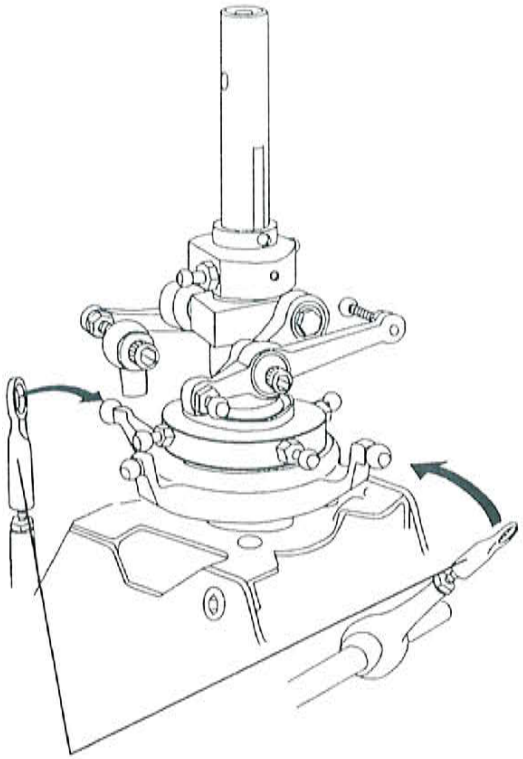
N.N M3-T

 x 2

Spacer 3-7-5.5

 x 2





- When connecting with Swash plate, adjust Rod length again so that Swash plate may move lightly.

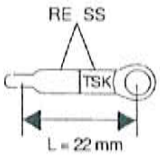
RE SS

TSK x 7

Threaded rod M2.3-10

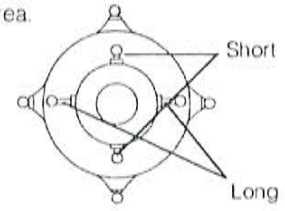
x 4

The Rod ends, etc. above are furnished in the Control drive scissors bag.

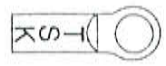


- Prepare Linkage rod using RE SS and Rod (10 mm) as shown on left.

- Long and short pivots are provided in Swash plate upper area.

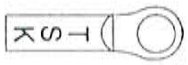


RE S



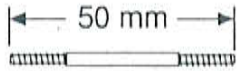
x 2

RE L



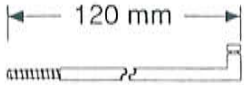
x 2

Rod (50 mm)

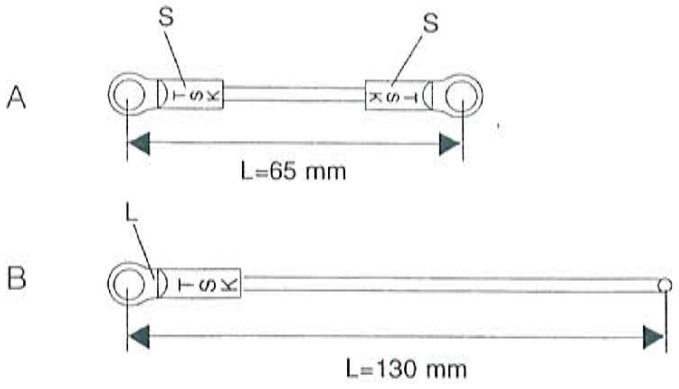


x 1

Rod (120 mm)



x 2



- Prepare A using Rod end S and Rod (50 mm) and B with Rod end L and Elevator rod (120 mm). Be sure to prepare two B linkages.
- Adjust Dimension L again according to Servo unit of your choice.

PH M2-8

x 2

Special ball MH

x 2

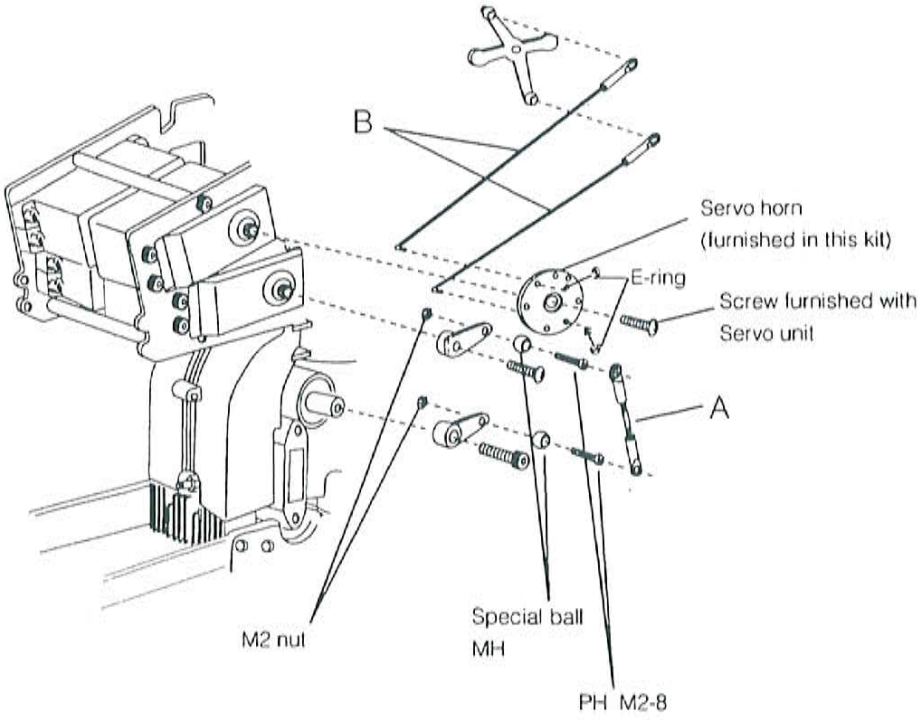
M2 nut

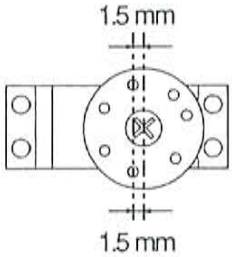
x 2

E-ring 1.5 mm

x 2

(Two spares provided)



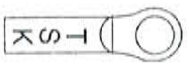


Set by identifying hole position to realize dimension shown on left when Elevator servo unit is set in neutral position.

Holes should be used in pairs of (1 - 1), (2 - 2) and (3 - 3).

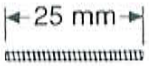
- When using a Futaba radio control unit, work genuine Futaba servo horn so that hole positions may be same as those Servo horn furnished in this kit.

RE L



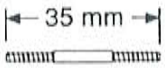
x 8

Rod (25 mm)



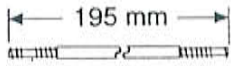
x 1

Rod (35 mm)



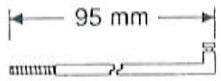
x 1

Rod (195 mm)

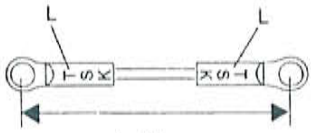


x 1

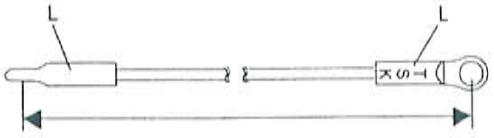
Rod (95 mm)



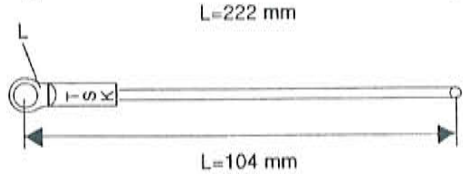
x 2



L=47 mm - - - - C
L=57 mm - - - - D



E



F

- Prepare C using Rod end L and Rod (25 mm), D Rod end L and Rod (35 mm), E Rod end L and Rod (195 mm) and F Rod end L and Rod (95 mm). Be sure to prepare two F linkages.
- Adjust Dimension L again according to Servo unit of your choice.

PH M2-8

x 2

Special ball MH

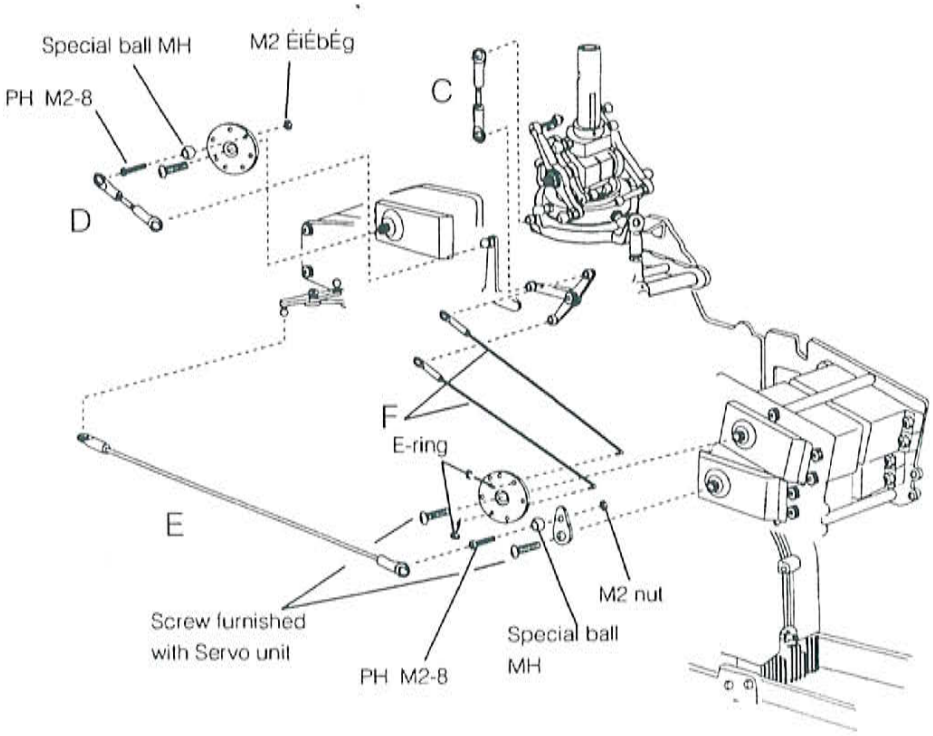
x 2

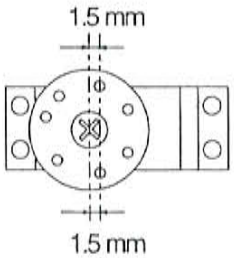
M2 nut

x 2

E-ring 1.5 mm

x 2





Set by identifying hole position to realize dimension shown on left when Aileron servo unit is set in neutral position.

Holes should be used in pairs of (1 - 1), (2 - 2) and (3 - 3).

- When using a Futaba radio control unit, work genuine Futaba servo horn so that hole positions may be same as those Servo horn furnished in this kit.

L. Installation of receiver, gyro, etc.

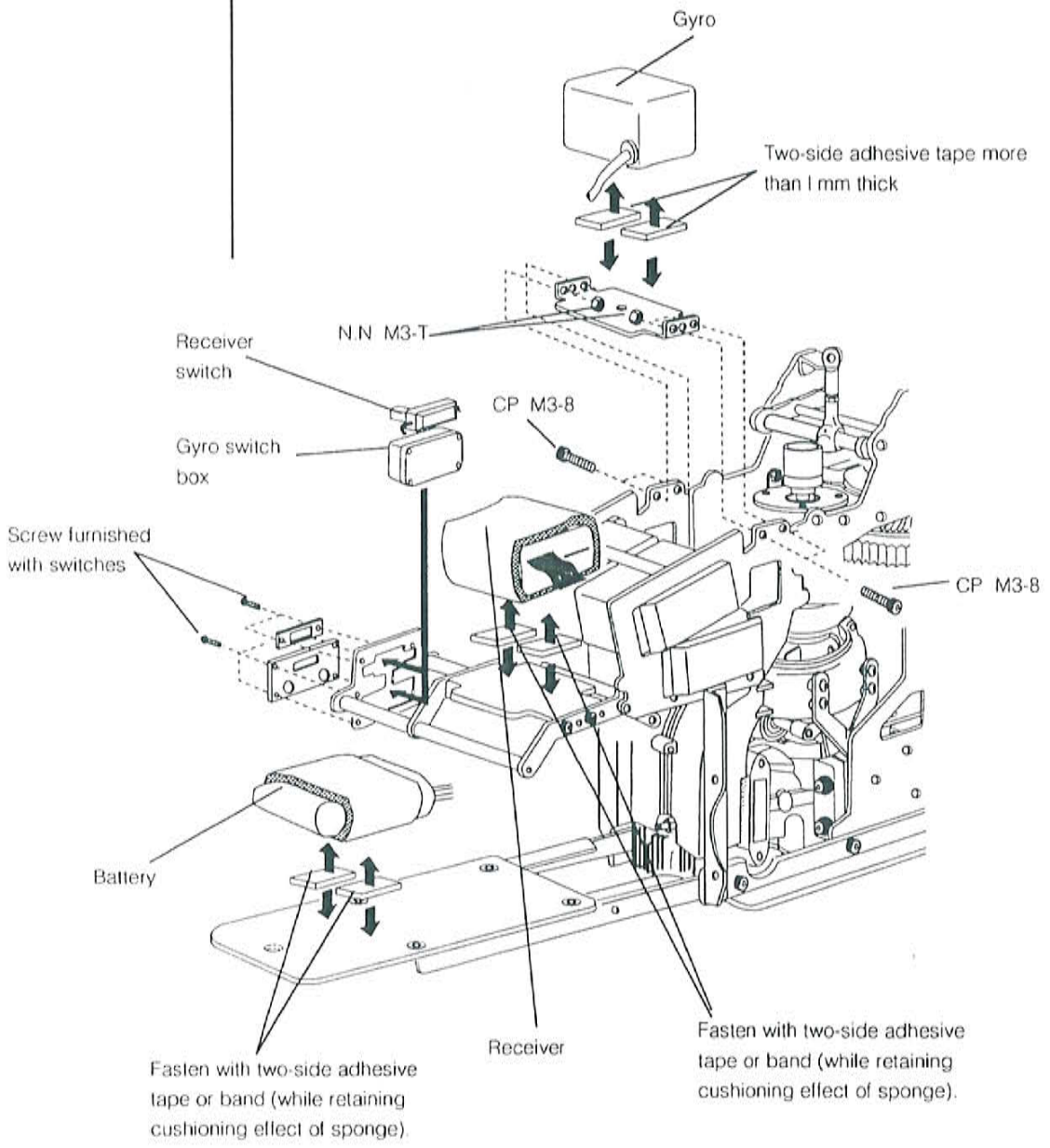
CP M3-8

 x 4

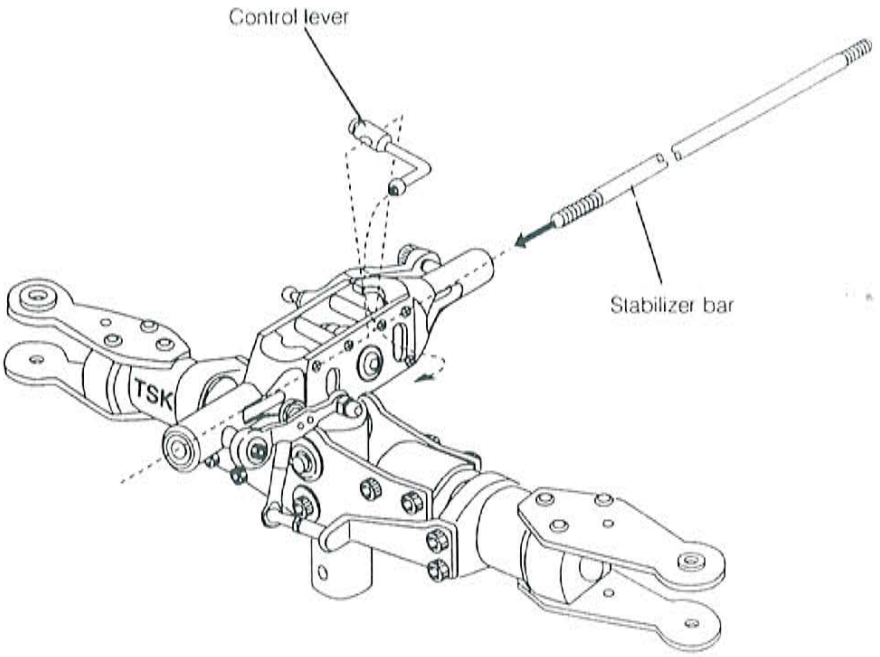
N.N M3-T

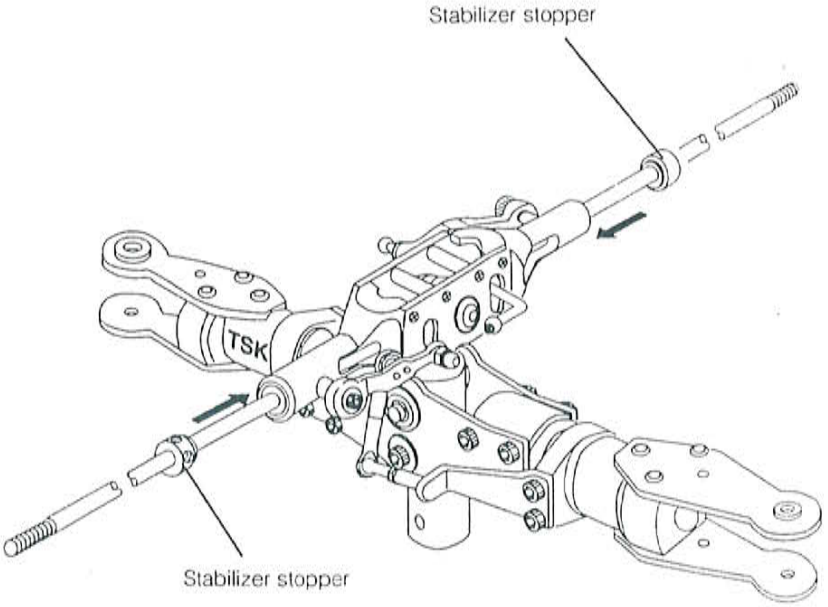
 x 4

- Be sure that Receiver, Gyro amplifier and Battery are wrapped in sponge sheets for installation.

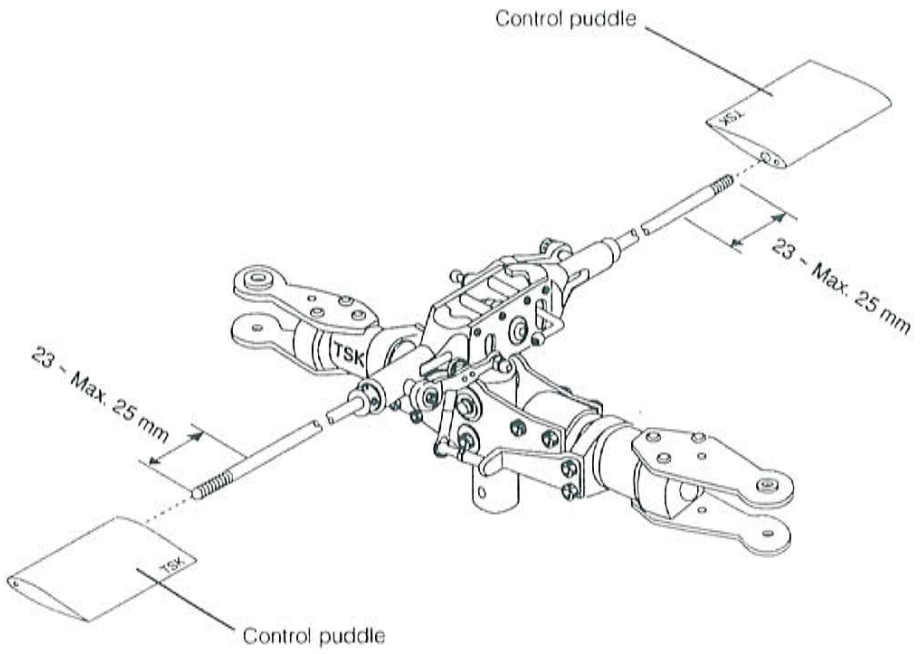


M. Rotor head assembly





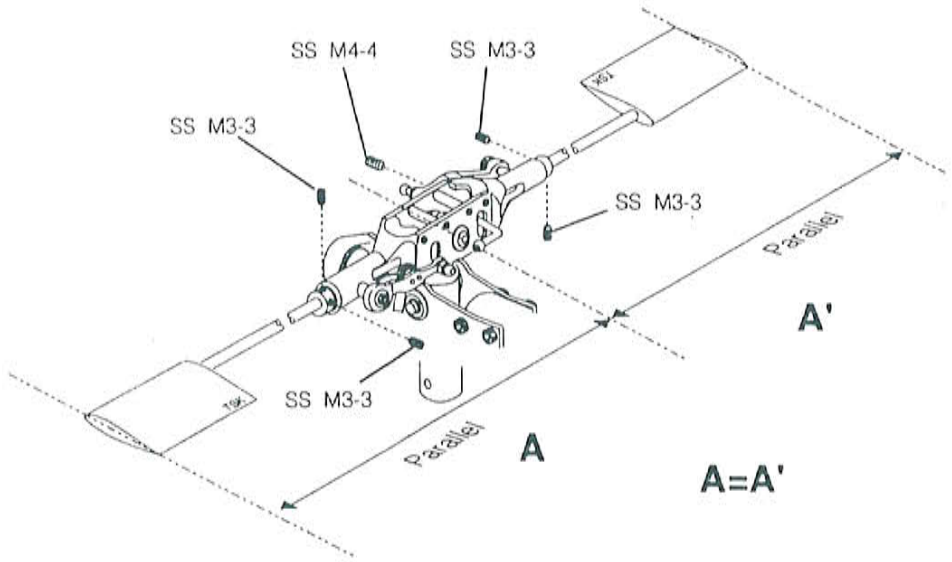
* Direct Stabilizer stopper so that its stepped side meets bearing.



- Each Control paddle is turned onto Stabilizer bar. Marking point on bar surface 25 mm away from its end with color pencil and such like helps turning Control paddle onto bar.

SS M4-4 x 1

SS M3-3 x 1

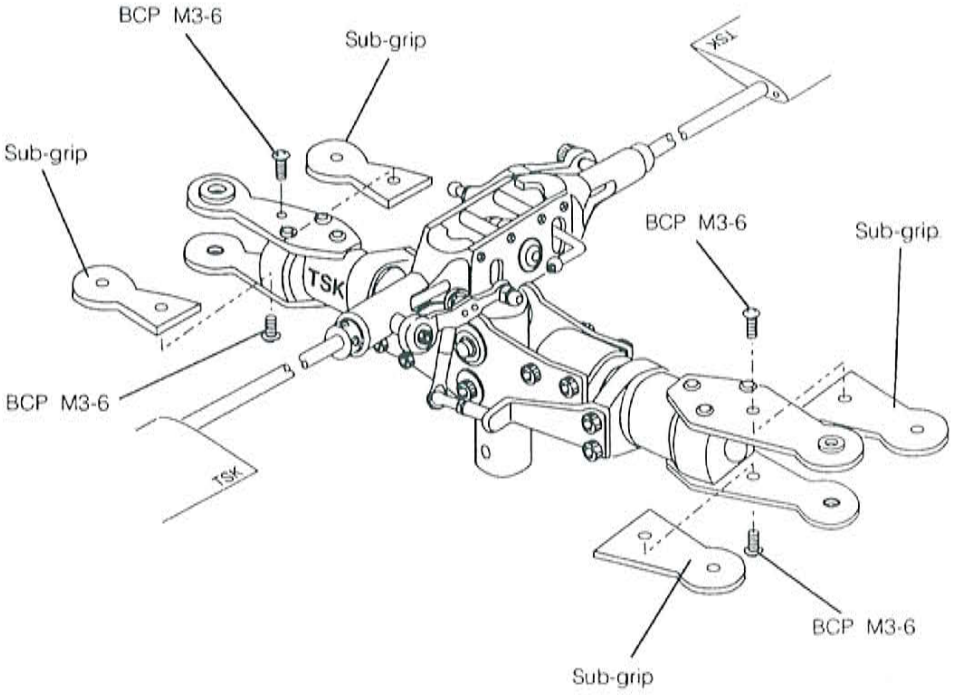


- Be sure that Control paddles and Control lever are parallel when installed.
- Insure that Dimensions A and A' are equal before securing with SS M3 and SS M4 furnished in this kit.

BCP M3-6

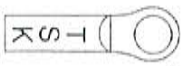
x 4

Note: If your Rotor blade grip is 12 mm thick, attach Sub-grip. No Sub-grip is required, if grip is 14 mm thick.



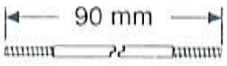
N. Rotor head linkage

RE L



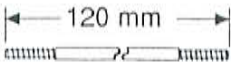
x 6

Rod (90 mm)

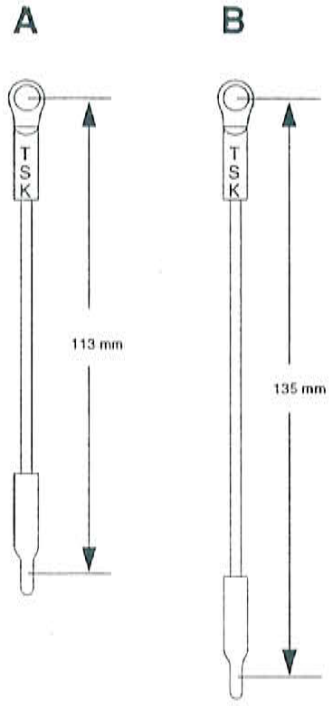


x 2

Rod (120 mm)



x 1

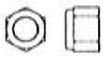


- Have on hand two 90-mm Rods and one 120-mm Rod.
- Main rotor blades that will measure 1540 - 1560 mm in diameter and weigh heavier toward their tip (center of gravity located more than half way toward blade tip) when they are attached to Rotor head, are recommended.

CP M3-23

x 1

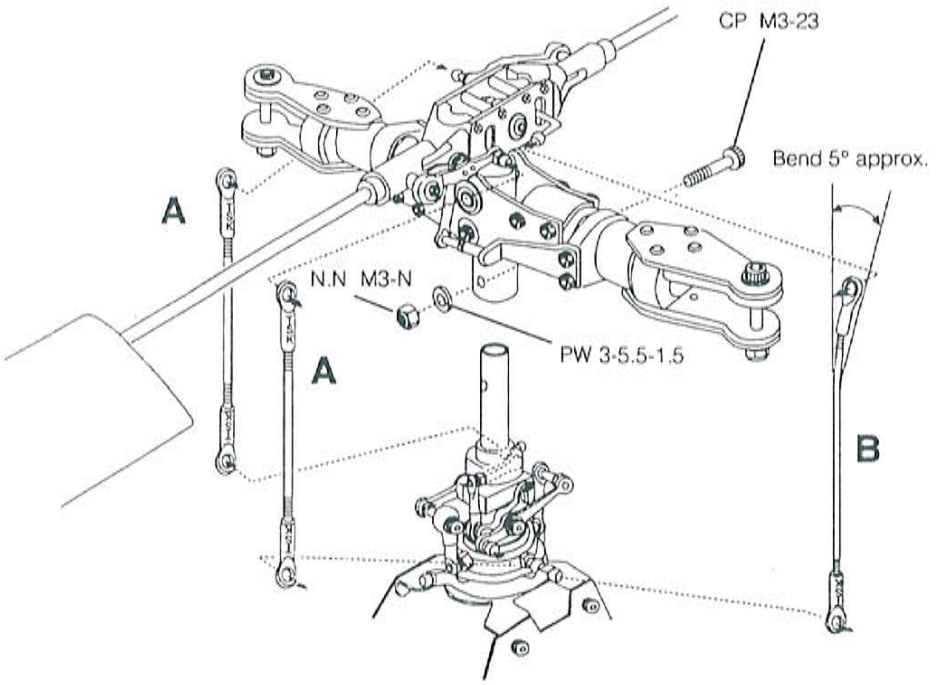
N.N M3-N



x 1

PW 3-5.5-1.5

x 1



O. Muffler installation

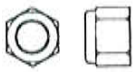
CP M4-35

x 1

CP M3-10

x 1

N.N M4

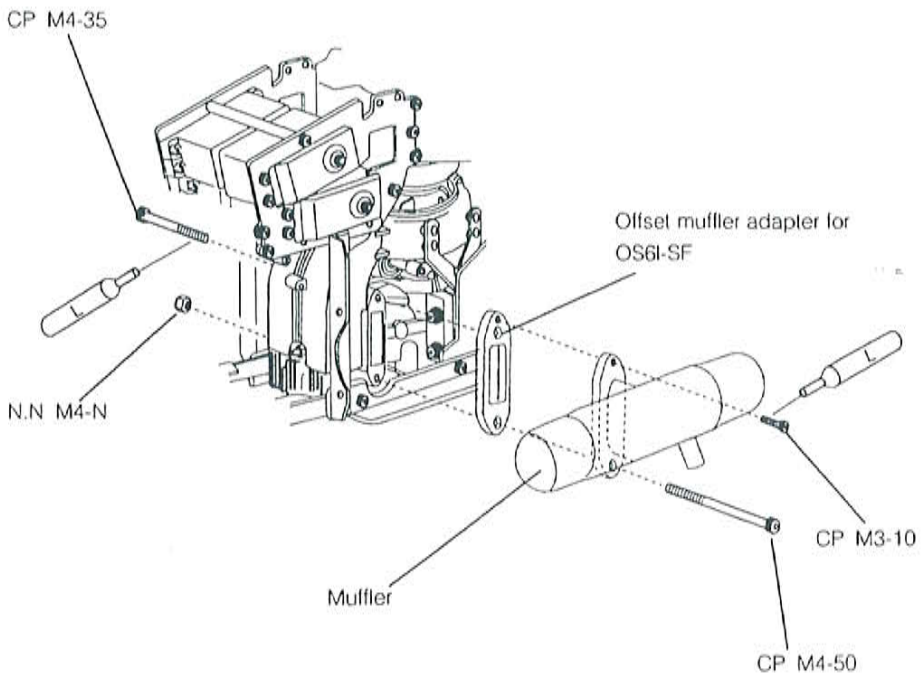


x 1

CP M4-50

x 1

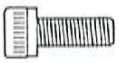
In case of OS engine



CP M4-15

x 1

CP M4-10

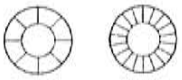


x 1

CP M3-10

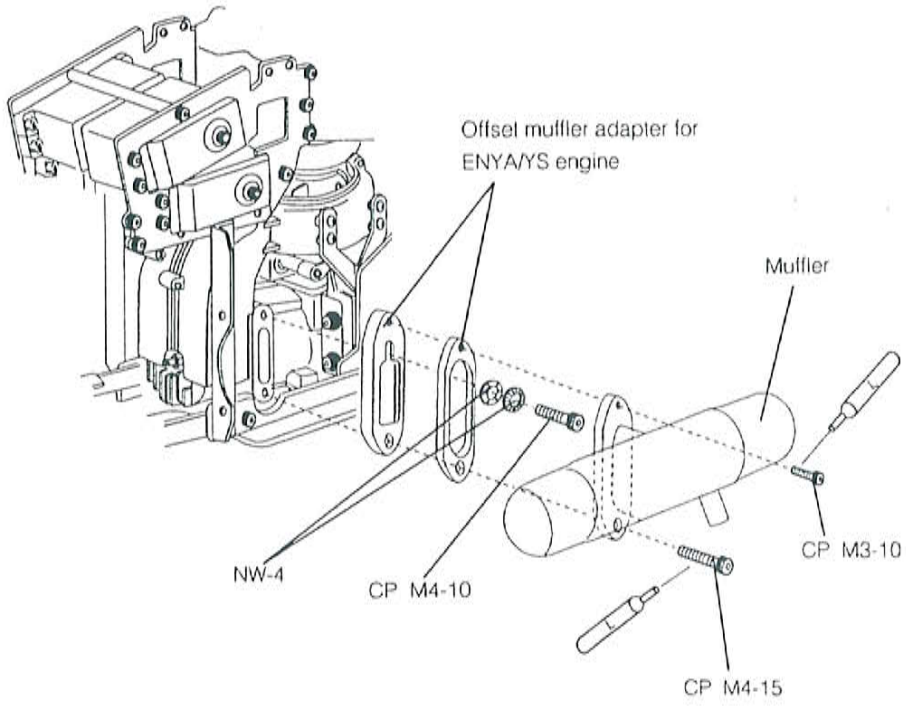
x 1

NW-4



x 2

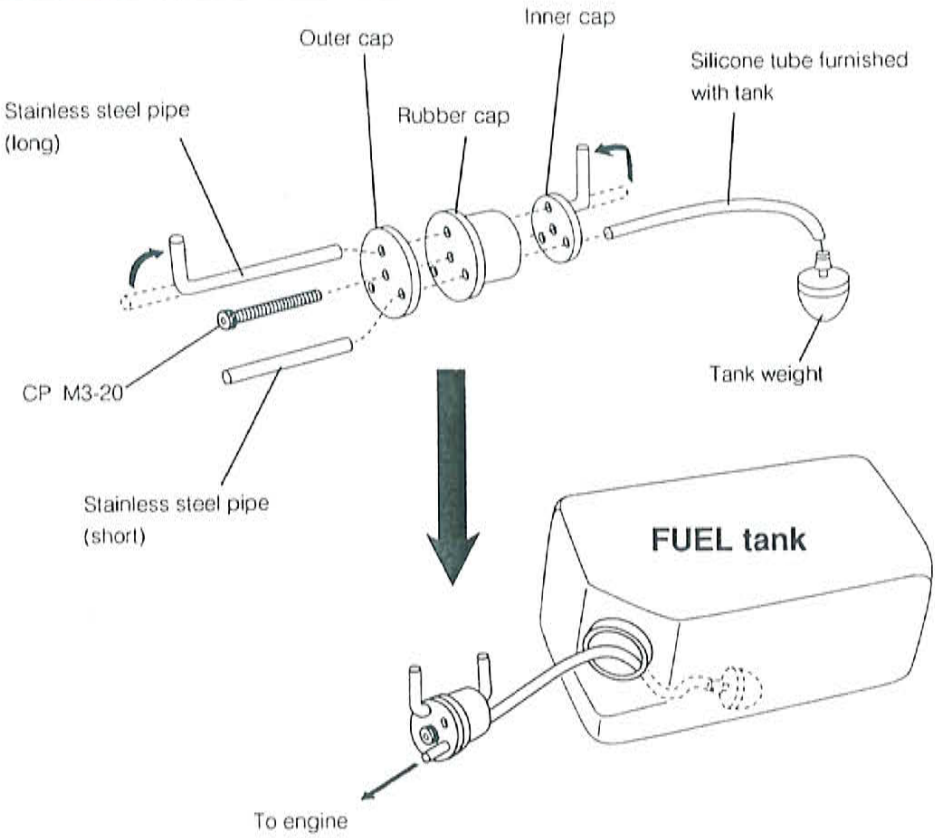
In case of ENYA or YS engine



P. Fuel tank

CP M3-20 (stainless steel)

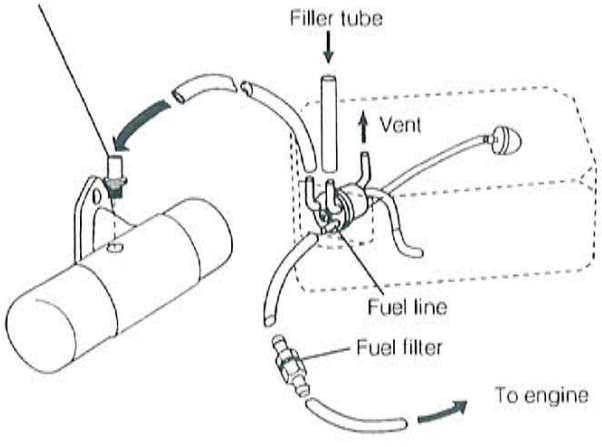
x 1



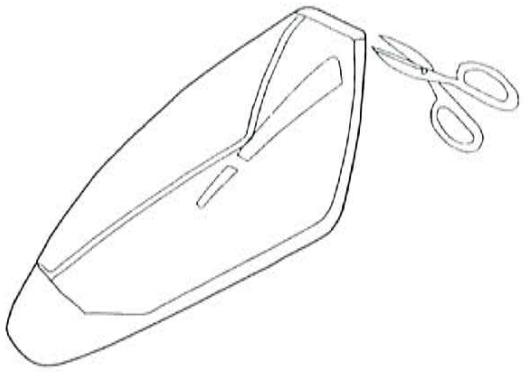
- Tank inside and Weight are packaged after cleaning. But be sure to clean them again before assembly.
- Put in complete FUEL tank from right side of Frame so that Cap may be directed to Engine.
- Connect FUEL tank and Carburetor with Silicone tube having fuel filter attached.

- When applying muffler pressure, attach Pressure fitting to Silencer and connect Pressure fitting and FUEL tank with silicone tube.

Attach Pressure fitting (nipple).



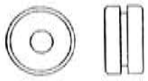
- After filling be sure to stop filling port with CAP screw and such like.



- Cut off unnecessary areas with scissors, etc.

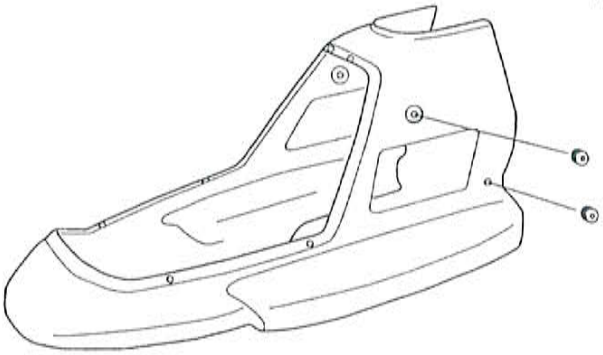
Note: Clear canopy has no marking to help cut. Be sure to put it over Body to make sure where to cut.

Rubber grommet

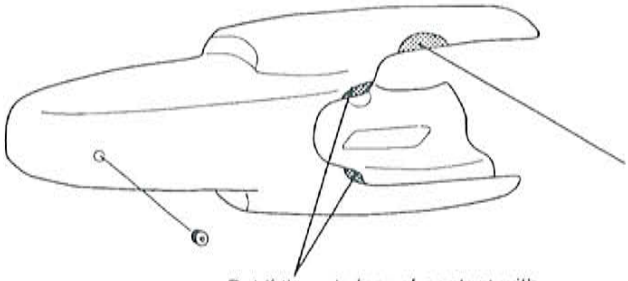


x 5

- Put in Rubber grommets on opposite side, too.



Note: When making Rubber grommet holes, put Frame assembly in Body, open holes 2 mm or so in diameter while confirming their position and enlarge their diameter to 6 mm with file and such like. This prevents mistake in hole making

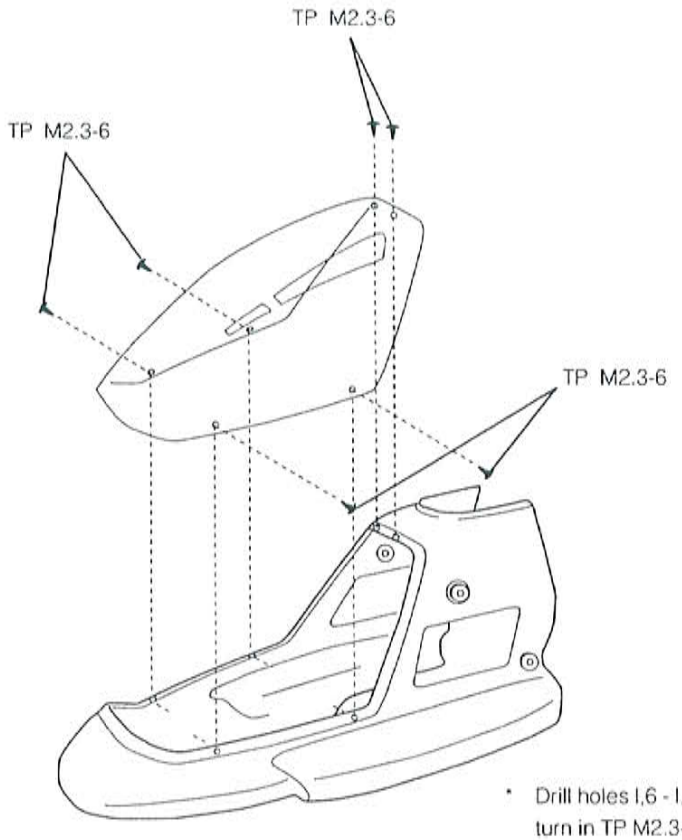


Cut area that will touch Muffler.

Cut if there is fear of contact with Frame assembly.

TP M2.3-6

x 6



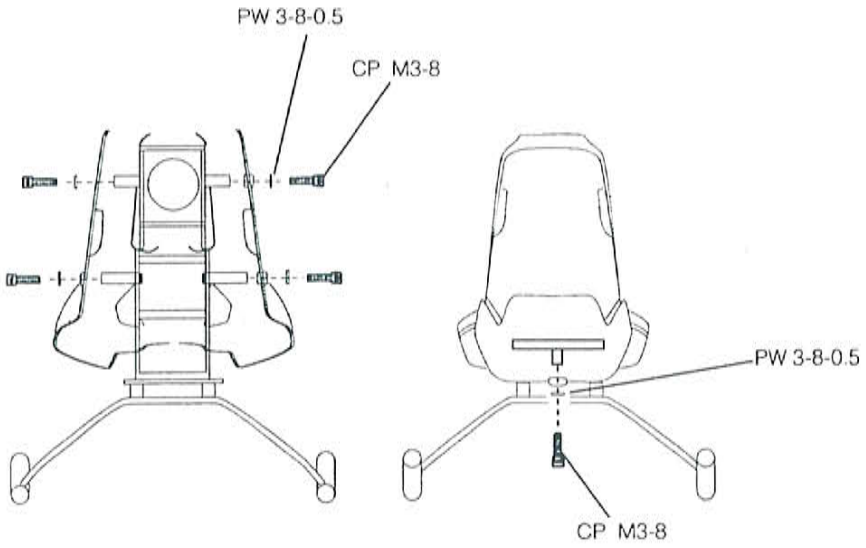
* Drill holes 1,6 - 1,8 mm in diameter and turn in TP M2.3-6 gradually.

CP M3-8

x 5

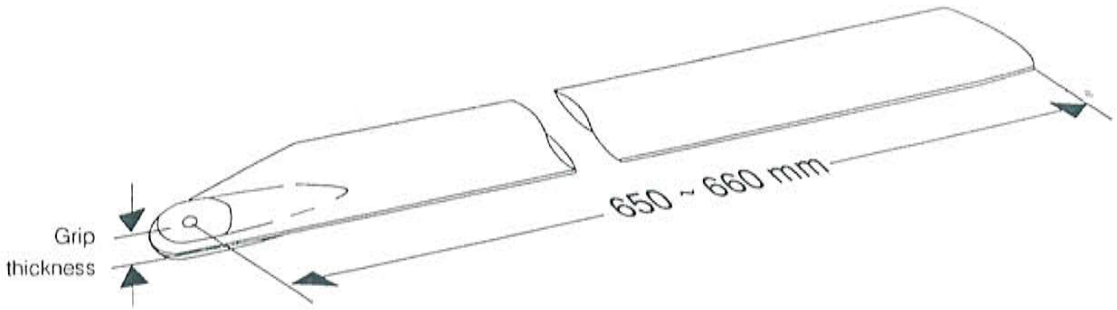
PW 3-8-0.5

x 5



Main rotor blades

Select Rotor blades whose grip is 12 mm or 14 mm thick.
(Sub-grip furnished with Rotor head is not used, when Grip thickens is 14 mm.)

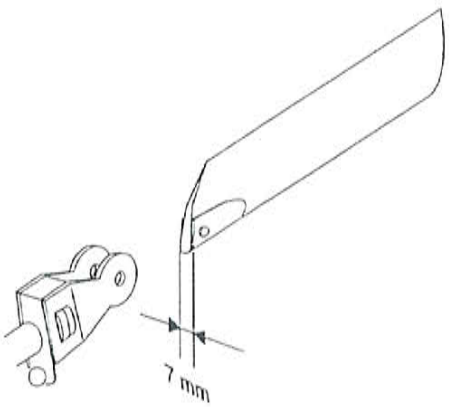


Tail rotor blades

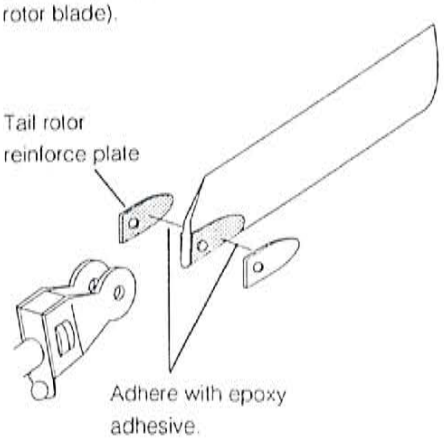
- Select Tail rotor blades based on following.

1. In case of chord length of about 30 mm: Tail rotor diameter as attached to Tail rotor grip should be 280 - 290 mm.
2. In case of chord length of more than 30 mm: Tail rotor diameter as attached to Tail rotor grip should be 260 - 270 mm.

Select blade whose grip is 7 mm thick.

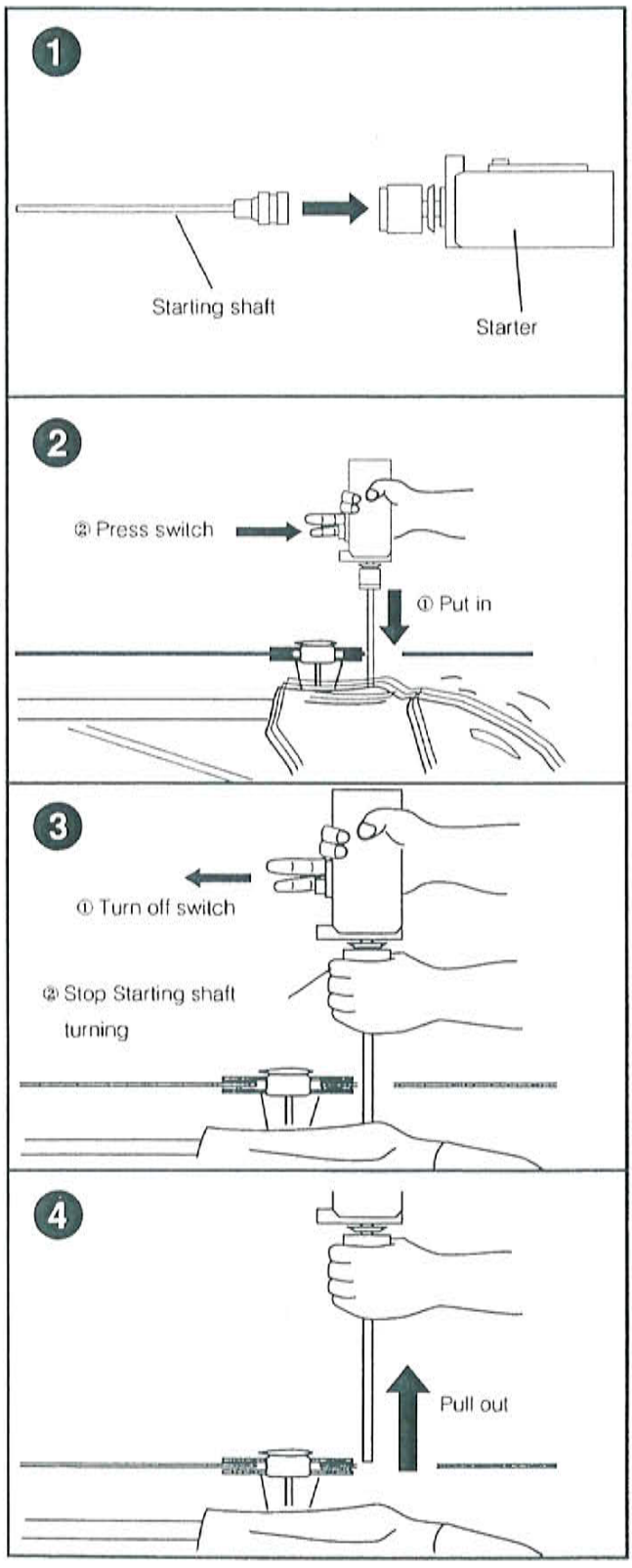


If Tail rotor grip is not thick enough, adhere Tail rotor reinforce plate furnished in this kit (or spacers furnished with Tail rotor blade).



This kit includes Starting shaft to start engine. Connect with Starter as shown below.

(Purchase Starter of your choice.)



Put Starting shaft in Starter. (Wrap vinyl tape and such like around base of Starting shaft for adjustment, if it is not put in tight enough.)

Put Starting shaft in In-line starting coupling and press switch to start.

Turn off switch when engine has started, hold Starting shaft by hand and stop it turning.

Putt out Starting shaft from In-line starting coupling.
(In-line starting coupling will be damaged, if Starting shaft is pulled out while turning. So, be careful.)

Now you have assembled your **Black Star-DL Super Kaiser**. Just like any other RC models of superior quality, yours waits for complete setting for before completion in the true sense of the word. Remember that you cannot be too careful of safety when flying your model for the first time and subsequent setting. Constant maintenance and inspection after completion are essential to the joy of flying your advanced RC helicopter.

Matters to be noted after completion

1. Miniature bearings of highest quality are used extensively in TSK RC helicopter parts. Be sure lubricate carefully with high-grade machine oils before and after flying your model for the day.
2. If a frame develops a crack as a result of a crash or light for many hours, be sure to replace.
3. Periodic parts replacement is necessary even when your model is in normal conditions. It so important to check your model constantly.
4. When starting the engine, never try to pull out the Starting shaft from the In-line starting coupling until you have stopped it turning by hand. Otherwise, the coupling will be damaged.
5. Should your model develops an accident by any chance, TSK should not be held responsible.

Replacement parts

The parts used in our kits are sold in pieces. If any part of your model is damaged in a crash or roll-over on the ground, you will be able to buy its replacement at the model shop where you purchased the kit.

If a replacement part is not in stock, check our Part List (sold separately) for its official name and part number and place an order with the model shop by the part name and number.

It should be noted that we are not engaged in direct sale to customers.

Repair

Our repair service is available for the rotor head, tail rotor transmission, etc. marketed assembled (finished parts). For the repair please bring the finished part in trouble to the model shop where you bought it or send it directly to us.

Reminder: In case of a rotor head repair, be sure to remove the stabilizer bar when sending the rotor head. Please do not forget also to tell us symptoms of trouble and how far they should be corrected.