



hirobo

aerospatiale

SA-341G

gazelle

with **COLLECTIVE PITCH**
and **DUCTED FAN**



Assembly and flying instructions.
HIROBO INDUSTRIAL CO.,LTD.





Aerospatiale SA-341G = Gazelle

Aerospatiale SA-341G = Gazelle is a small-sized helicopter which has been developed for the purpose of high speed long flying capacity with a novel design by which a tail rotor is replaced by ducted fan as a successor of small-sized turbine helicopter " Aerospatiale SA-318 Alouette II " that had been developed by Schudz Corporation in West Germany, leading the world at the middle of 1950 years..

So far as a helicopter is of single rotor type, the tail rotor is inevitable to eliminate the torque. However, such tail rotor has many dangerous elements such as to injure people and/or come in touch with the unlevelled ground on which the helicopter is landed. There are certainly some measures against these kinds of danger. But they are not a perfect measure to eliminate such dangerous things. The ducted fan of this type helicopter greatly contributes to eliminate such danger.

In this large vertical tail blade, 13-blade fan of 69.5 cm Ø rotates at the high speed of 5,774 r.p.m. and takes effect for high speed flying of helicopter. Comparing with usual tail rotor, though output consumption will become great in this type of ducted fan when the helicopter is hovering and flying at a low speed, they will reversely become small while it is flying at a high speed.

This Gazelle is provided with a high output engine of Asters III. The whole body of the helicopter is improved to be beautifully streamlined. And there are five seats in the cabin, ensuring wide space. Besides, a cargo room whose pay load is 500Kg to 600Kg is provided at the left side behind the seats. There are so many models of this helicopter for military use of this Gazelle, for example, the model SA-341B for the British Army, 341C for naval forces, 341D for training use in air forces, 341E for liaison helicopter in air forces, 341F for French Army and 341H for export market. Besides, another model 341G for commercial basis.

Gazelle for military use is provided with automatic pilot system for instrument flight by SFENA stabilizer unit and is used for communication, transportation and rescue work. On the other hand, Gazelle is used as an offense helicopter by providing it with six TOW anti-tank missiles, four HOT induction missiles, 72 rocket bombs of 50 mm and two sets of 7.62 mm machine gun.

Hirobo's Gazelle is designed exactly as per this Gazelle SA-341G.

Diameter of main rotor	10.50m	Practical elevation limit	5000m
Overall length	11.97m	Hovering height limit(within ground effect)	2850m
Body length	9.53m	Hovering height limit(without ground effect).....	2000m
Overall height	3.15m	Flying distance	361Km
Self-weight	908Kg	Cabin seat.....	5
Full-equipped weight	1800Kg	First flight (Original type SA-340)	1967.4.7.
Engine, Turbomeca Asters IIIB	600 shp	Mass production SA-341	1971.8.6.
Fuel capacity	464 lit. + 90 lit.		
Maximum speed	167Kt		
Flying speed	142kt		



OUTLINE OF HIROBO'S AEROSPATIALE SA-341G GAZELLE MODEL KIT

Thank you very much for your having purchased our Gazelle model kit. Accompanying with the appearance of the real Gazelle SA-341G, we have put emphasis on its safety and high speed stabilization. Hirobo's Aerospatale SA-341G Gazelle Model Kit has been developed and manufactured in 1/6.4 scale exactly as per the real Gazelle SA-341G. The rotor head system is of a highly stable gyro system. However, venturi effect is provided in the gyro-end balancer in order to eliminate the pre-session phenomena peculiar to the gyro. And the swivel capacity and independent stability is secured as the gyro follows the inclination of the main rotor well. Besides, the stable piloting capacity is obtained by employing the collective pitch control system. The tail rotor mechanism is of ducted fan having high safety and high speed stability.

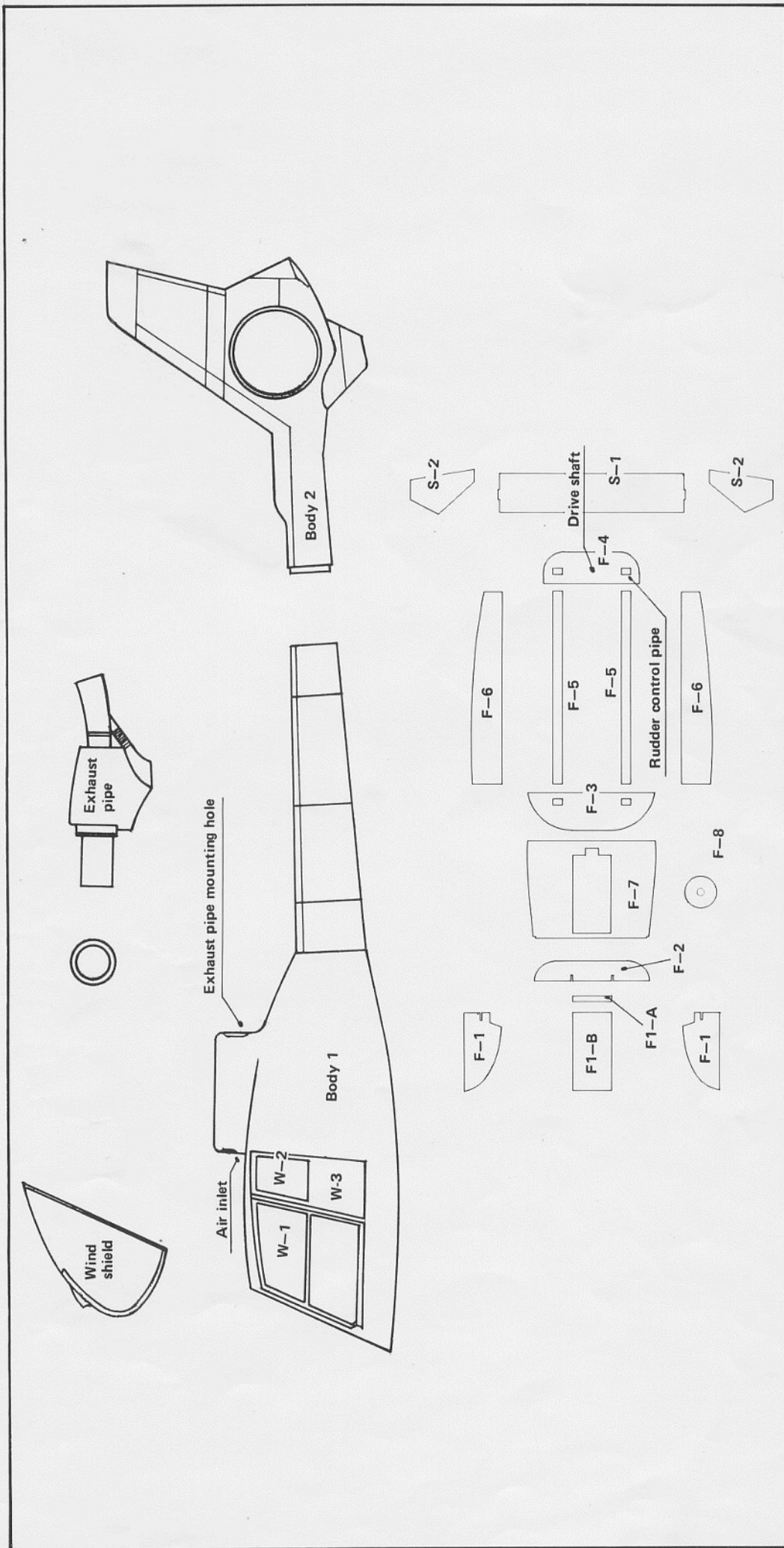
To draw out all the above capacity and performance of this Hirobo's Aerospatale SA-341G Gazelle, we hope you will be well acquainted with the structure and mechanism of this helicopter by carefully reading this flying and assembling instruction manual.

Diameter of main rotor -----	1600 mm	Engine -----	60
Body length -----	1500 mm	Radio -----	4-channel, 4-servo
Self-weight -----	4700 g.		

((Remarks)) The names, marks, symbols and direction that are used in this instruction manual are as follows;

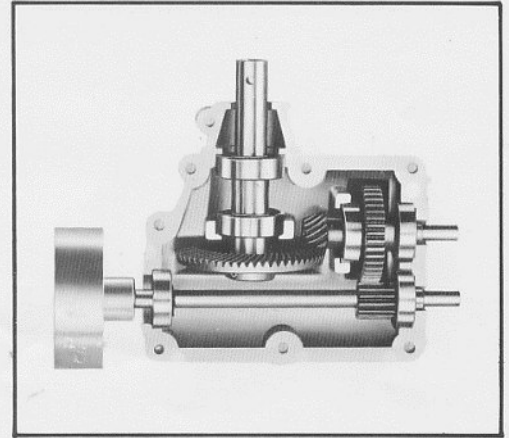
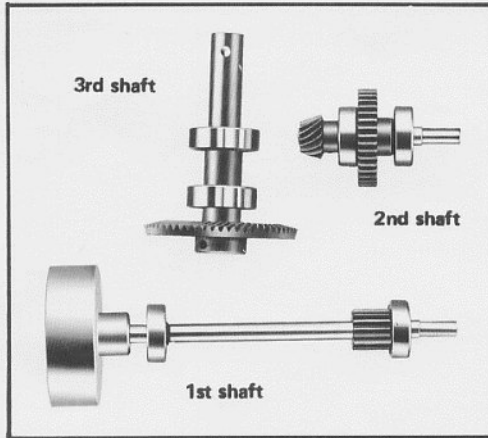
C/P ----- Collective pitch control, \emptyset ----- Diameter, M ----- Milimeter, Pitch Servo ----- Servo for collective pitch control (common for engine control), Cyclic servo ----- equivalent to the aileron and elevator servo of airplane, Forward ----- forward when looking from the rear part of the body, Rearward (backward) ----- Direction toward the tail rotor of the body, Left and right ----- On looking from the rear part of the body, Outside ----- outside in the right and left direction from the center line, Inside ----- Center line side of the body.

MAKING OF BODY PART



1. Cut off the windows W-1 and W-2 smaller by about 2mm than the cut-line. And cut off the exhaust pipe mounting port and air inlet port at the pre-determined size.
2. Cut off the exhaust pipe largier by about 5 mm than the cut line. And adhere both left and right sides from the inside. After that, cut off the flange and amend it.
3. Insert the beam material F-5 into the body frames F-3 and F-4. Set the F-5 so that each of the F-5 may be parallel and horizontal. Then, adhere F-3, 4 and 5 each other. After that, temporarily, set them in the body and check them so that they may be set to the drawing positions.
(Note): At this time, please do not adhere them to the body yet. The adhesives should be of epoxy-lined agent.
4. Make an opening of 10 mm to 12 mm in the pre-determined position for the mast-penetration hole in compliance with the drawing dimension.
5. Make an opening for exhaust ports for cooling (W-3).

ASSEMBLING OF MISSION

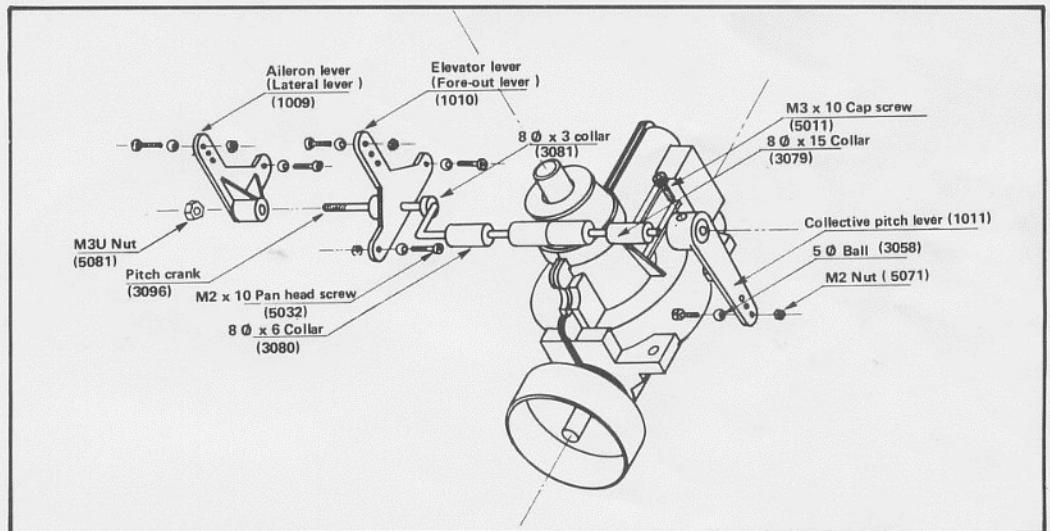


1. Polish the contact surfaces of the casings on the sand paper located on an even place.
2. Set the gear assembly (1st, 2nd and 3rd shafts) at a correct position in one of the half casings. At this time, check the engagement of the three shafts by turning them by your fingers.
3. Remove oil that may be adhered to the peripheral part of the bearings and to the contact surface of the casings. Give a light and thin coat of epoxi-adhesives to the adhering surfaces of the casings and to the holding part of the bearings. Here, set each gear at a most desired position and fit the casings together. Then, clamp the casings with M3 x 10 cap screws and M3 nuts.

4. Provide the main mission (1 st shaft) with a joint and fix the joint by 4 x 4 set screws.
5. Supply an accessory oil (20 to 25 cc) in the mission part through the lower drain port. And clamp the M5 x 8 pan head machine screw provided with a bake washer in order to close the drain port.

NOTE: You may supply oil just before trial run in order to prevent oil leakage during assembling. In this case, please never forget the oil supply before the trial run. Please use Hirobo Hobby Oil No. 50 (highest quality oil containing 2% molybdenum bisulfide MoS_2) for further oil supply.

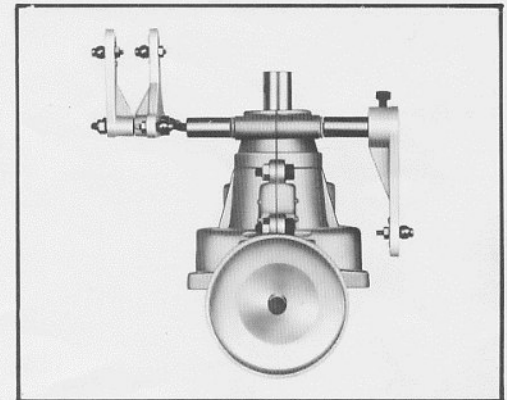
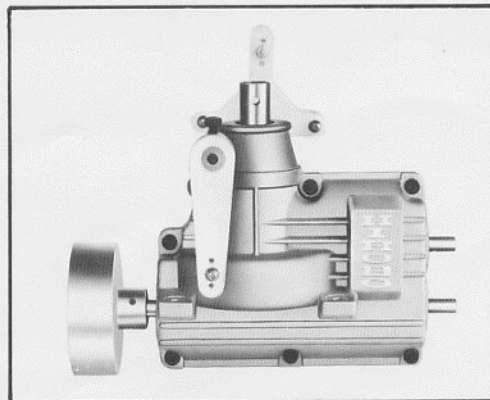
ASSEMBLING OF PITCH CRANK



1. Mount the 8 Ø x 3 collar to the pitch crank by soldering.
2. As shown in the illustrations, mount the balls at each lever with M2 x 10 pan head screws and clamp them by nuts.

3. Insert the elevator lever firstly and the aileron lever secondly into the pitch crank. Then, set each lever by M3U nut so that it may be lightly turned.

MOUNTING OF PITCH CRANK TO MISSION

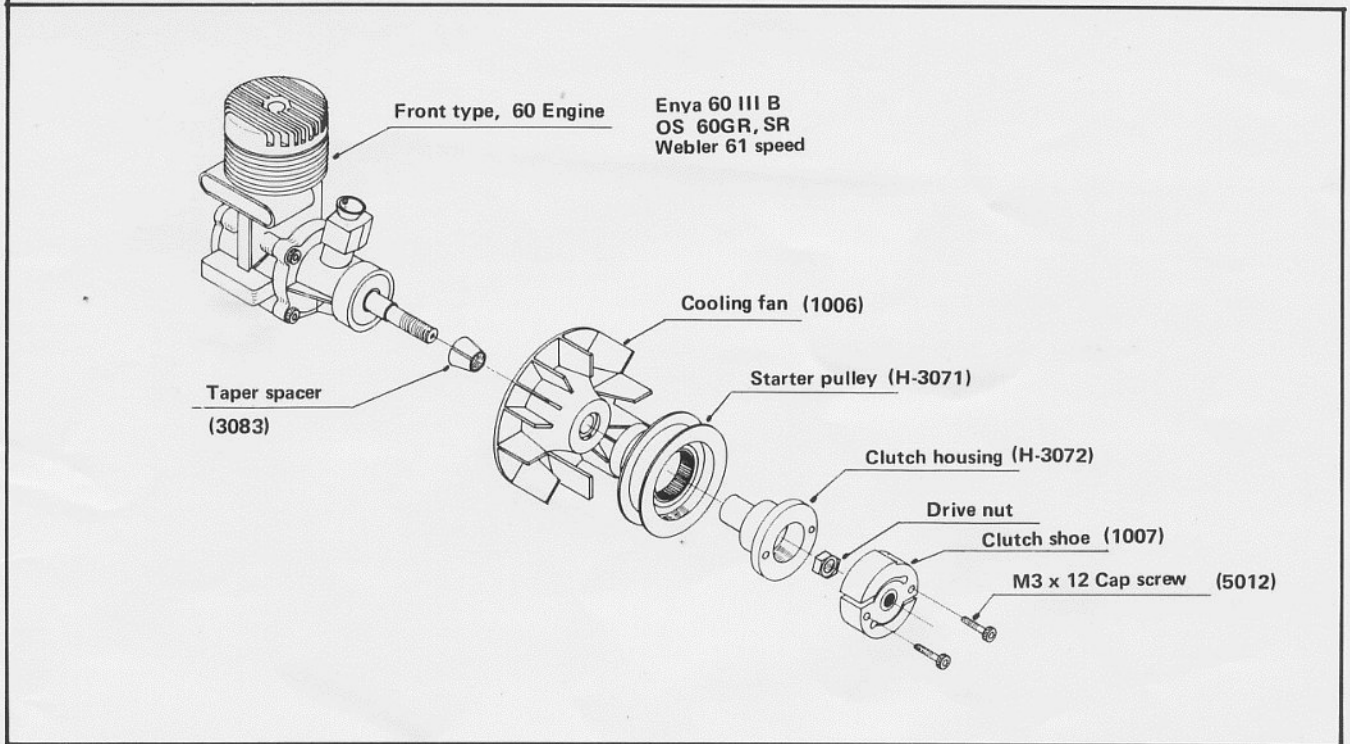


1. Insert the 8 Ø x 6 collar into the assembled crank and insert it into the mission casing.
2. Next, insert the 8 Ø x 15 collar firstly and the collective pitch

lever secondly on the pitch crank. Then, set them by M3 x 10 cap screw.

(Please refer to the photos for the lever positions). At this time, set them so that they may be lightly turned.

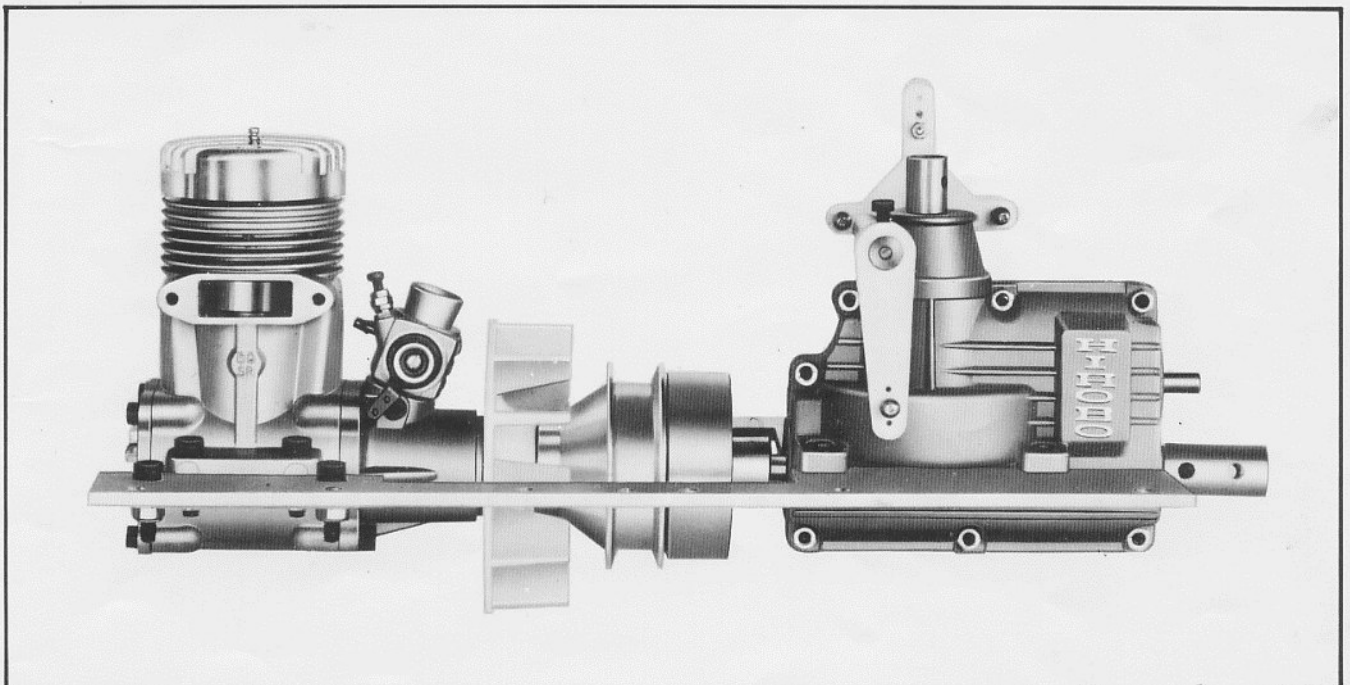
ASSEMBLING OF POWER PART



1. Remove the drive washer of the engine and insert the accessory taper spacer there. Then, set the cooling fan, starter pulley and housing in this order. After that, clamp them firmly by a drive nut.

2. Mount the clutch shoe with two pieces of M3 x 12 cap screws. Note: Check the starter pulley if the pulley will be made loose in the right direction and if it will be made locked in the left direction.

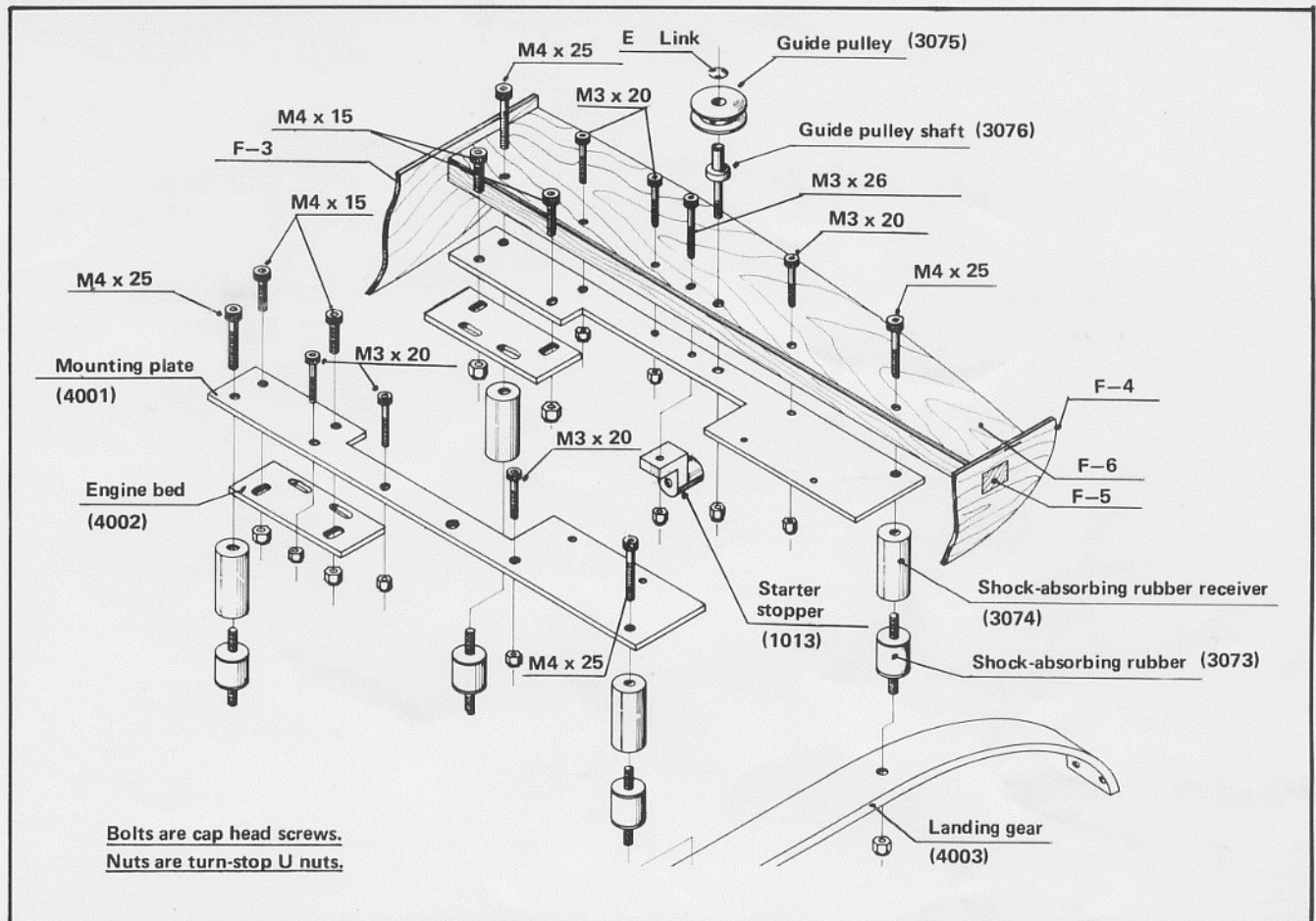
MOUNTING OF MOUNT



1. Mount the mission on the mounting plate (F-4001) with M3 x 12 cap screws and clamp it by nuts.
2. Temporarily set the engine bed (F-4002) from the underside of the mount frame with M4 x 15 cap screw.

3. Clamp the pre-assembled engine part by M4 x 15 cap screws from the upside of the engine bed. Note: Position the clutch so that it may not come in touch with the clutch bell and set the power part and the mission so that they may be on the same axial alignment.

SETTING OF POWER PART

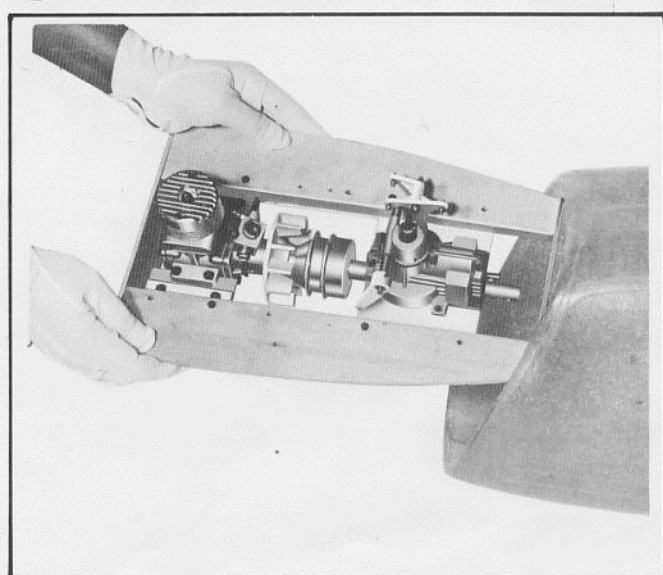


1. Put the power part on the pre-assembled body frame. Mount the main mast and correct the inclination of the mast. Particularly, correct the right/left inclination of the mast. Set the mast vertically or in a little forwardly-inclined state.
Note: At this time, correct the body frame, if necessary.
2. After the above works are over, make 4 \emptyset openings at the four corners. And take out the body frame and the power part.

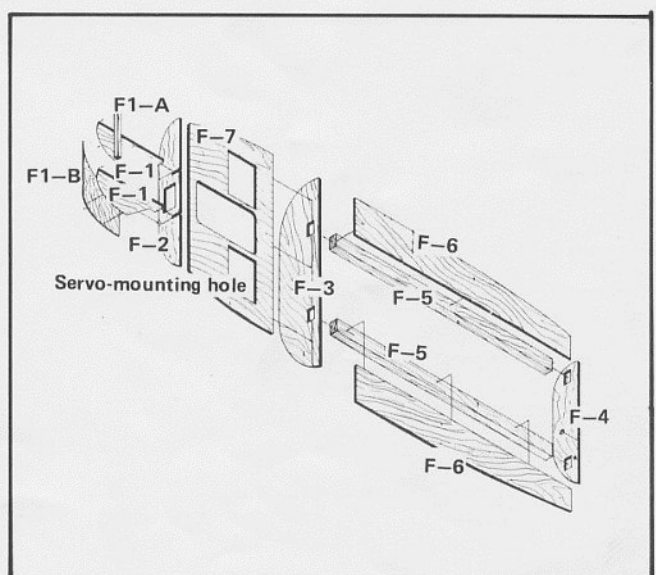
Then, make all the necessary openings. At this time, pay attention to the diameter of the openings so that you may not make a mistake.

3. After the openings are made, mount the power part on the body frame from its underside. Then, provide the pre-drilled holes of 4 \emptyset with M4 x 25 cap screws for temporary setting. (See the photo).

MOUNTING OF POWER PART TO BODY



1. Insert the temporarily assembled power part into the body from its front. Then, insert the mast from the upper part of the body and fit it in the joint of the mission.
2. Correct the inclination of the mast. Then, temporarily, set the body frames F-3 and F-4 in the body.
3. Insert the F-8 into the mast and adhere it to the body.
4. After temporarily setting them, remove the mast and the



- power part and adhere the body frames by epoxy-lined adhesives without fail.
5. Adhere the member F-6 (both right and left) on the member F-5. By this, reinforce the body.
6. Drill the servo-mounting member (F-7) for the servo-mounting hole. And set it in a position.
7. Reinforce it by F-2. Then, assemble F-1, F-1A, and F-1B and insert them into F-2. Adhere them each other.

SETTING OF POWER PART IN BODY

- (1) Put the pre-assembled power part at the body from its underside. Fix the four corners of the body together with the damper-receiving members (aluminum) by M4 x 25 cap screws.
- (2) Put the guide pulley at the tension shaft. Set it by 4 Ø E link. Then, insert the tension shaft into the frame from its upperside and clamp it by M4U nut.

MOUNTING OF LANDING GEAR

- (1) Set a shorter screw of the shock-absorbing rubber in its receiver. Then, mount the landing gear and clamp it by M4U nuts.
- (2) Set the skid band in the skid pipe and clamp it by M3 x 10 pan head machine screw and M3U nut.

MOUNTING OF MAIN MAST AND BEARING PLATE

- (1) Insert the mast, which is provided with a bearing plate in advance, into the opening located at the top of the helicopter body frame. And set the mast in the 3rd shaft joint of the main mission. Link it with the joint by M3 x 16 cap screw and M3 nut.
- (2) Adjust the clearance between the bearing plate and F-8 by F-8. Make four mounting holes on the top of the helicopter body frame so that the mast can lightly rotate. Then, set the mast by M3 x 16 cap screws and M3U nuts.

MOUNTING OF POWER CABLE PIPE & RUDDER CONTROL PIPE

- (1) Insert 3 Ø x 800 brass pipe from the tail duct opening. Then, pass it through the opening of the member F-4. Fit it to the center of the 1st shaft joint of the main mission. Bend the pipe a little at the rear part of the body so that it may come in touch with the lower side of the body frame.
- (2) Set the pipe at the position far by 2 to 3mm from the member F-4 and reinforce the part of the pipe, which comes in touch with the body frame, by adhesives.
(Note): Please never adhere the penetrated part of the pipe at the member F-4. This is because it will become a cause of break-down (cut-off).
- (3) Make an opening for taking out the rudder control pipe at the rear part of the horizontal tail blade and at the right side of the body frame. However, temporarily set the tail duct and make the opening at the same level as that of the tail pitch lever.
- (4) Insert the 3 Ø x 1100 brass pipe. Pass it through the hole of member F-4. And adhere each penetrated part at the position where the pipe is taken out by about 5mm to 10mm.
(Note): Please never cut the pipe until the servo is mounted.

MOUNTING OF DUCTED FAN

Fit the ducted fan in from the left side when seeing it from the rear part of the body. Then, mount the ducted fan so that the penetrated hole of drive shaft is fit to the brass pipe and so that the brass pipe may be put in the groove of the duct rings from the right side. And clamp it by M2 nuts from both sides through M2 x 45 duct-mounting rod.
Note: Clamp the six rod screws equally.

MOUNTING OF TAIL DRIVE SHAFT

(Tail side)

Insert the 1.6 x 900mm piano wire into the brass pipe from the tail side. And after it is sufficiently inserted into the joint of the tail, firmly clamp the piano wire by two set screws of M4 x 4.

(Mission side)

Cut the piano wire shorter by about 1mm than the tip end of the 1st shaft of the mission. Provide the piano wire with the joint and slide the joint to the 1st shaft of the mission. Then, clamp it by M4 x 4 set screws.

PAINTING OF EACH PART

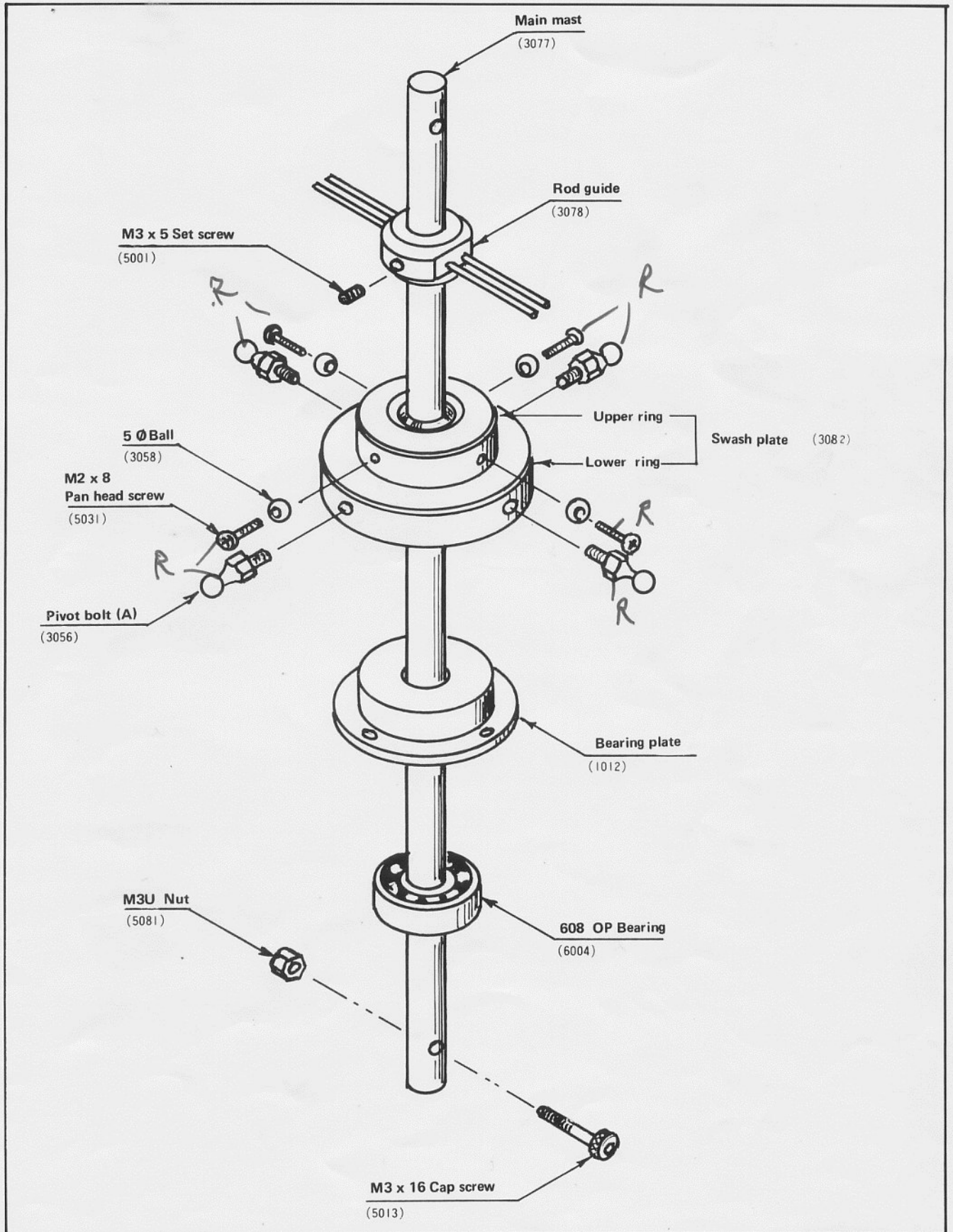
- (1) Before painting, polish the outside surface of F.R.P. by sand paper of No.240 and correct it with a surfacer or putty. After that, re-polish the surface by sand paper of No.300 to 400. Then, paint it for finish. It is recommended that polyurethane, vinyl chloride, epoxy or acrylic lacquer is used for painting. However, give a thick coat of a clear around the fuel tank and the drive parts such as engine and gear box.

MOUNTING OF STARTER ROPE & STARTER RUBBER

- (1) Make a ring at one end of the starter rubber and connect the other end of the rubber with the starter rope. Then, take out the ring end of the starter rubber through the lead-out hole and set it in the starter hook.
- (2) Set the starter rope in the guide pulley and wind the rope in the groove of the starter pulley by one and half times in the counter clockwise direction. Pass it through the starter stopper and take it out to the right side of the body.
- (3) Pass the rope, taken out to the right side of the body, to the starter knob. Set (knot) the rope so that it may be under a little tension.

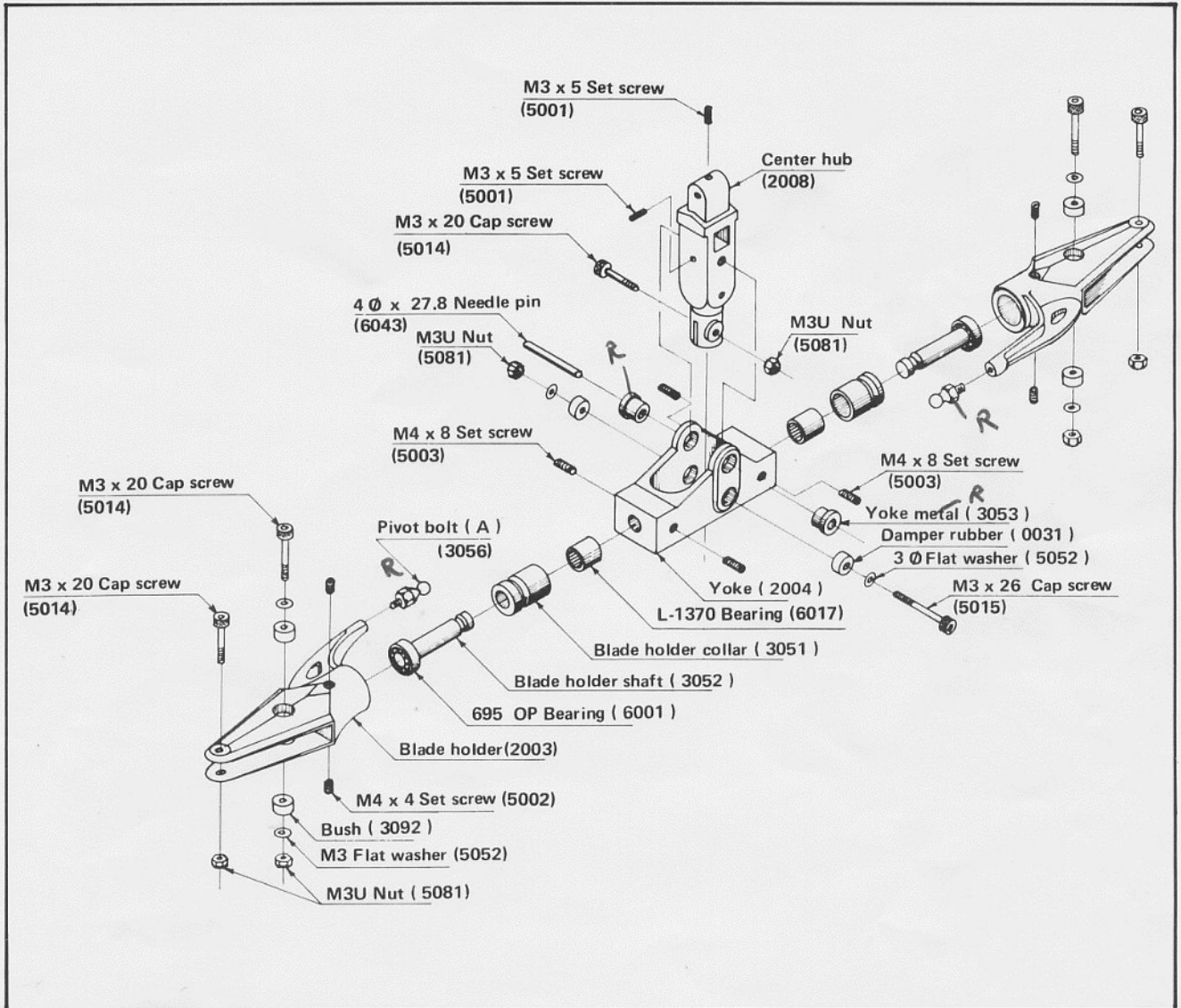
ASSEMBLING OF SWASH PLATE

1. Mount four balls at the upper ring of swash plate by M2 x 8 pan head machine screw.
2. Drive four pivot bolts (A) into the lowering ring.
3. Fit the assembled swash plate in the main mast. At this time, check if the swash plate can be slid in vertical direction.
4. Then, insert the rod guide and fix it with M3 x 5 set screws.



ASSEMBLING OF YOKE BLADE HOLDER


1. The blade holder and yoke are already assembled at our workshop. So, please check if the right and left blade holders can move lightly.
2. Wipe off stains and dust on the yoke-metal mounting part and the metal itself. Then, adhere the metal to the yoke by gum adhesives or instant adhesives.
3. Fit the center hub in the yoke. Then, insert 4 \emptyset x 27.8 needle pin. Here, drive M3 x 5 set screw in the threaded hole at the center hub side for fixing the needle pin.
4. Insert the assembled head part into the main mast and clamp it by M3 x 20 cap screws and M3U nuts.
5. Set M3 flat washer and damper rubber on the M3 x 26 cap screw. Set them into the center hub through the lower hole of the yoke. After that, pass the M3 x 26 cap screw through the other damper rubber and M3 flat washer. Then, clamp them by M3U nut. At this time, there is no need to clamp them too tightly.
6. Provide the tip end of the blade holder arm with the pivot bolt (A). Then, fit it with an adhesive.



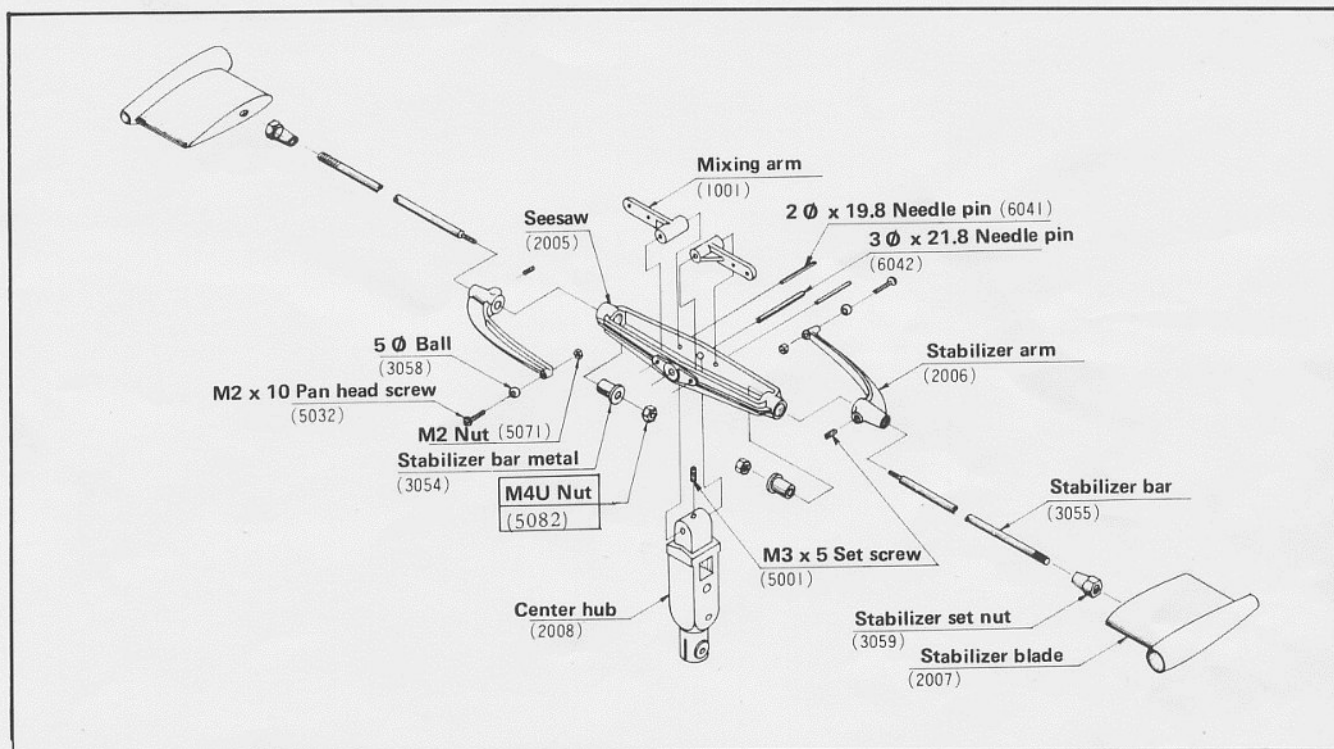
NB. Now, you will begin assembling the rotary parts. However, as the rotary parts exceed 1,000 r.p.m., please carefully read the instruction manual hereafter so that you may not forget the clampings of the members and that you may not make any mistakes in assembling of these rotary parts. If you find anything abnormal or inadequate though all the members and components including the pre-assembled parts were well checked before delivery, please send it back to us without use for immediate replacement.

ASSEMBLING OF SEESAW STABILIZER

1. Drive the stabilizer set nut in the M4 screw of the stabilizer bar. And drive the stabilizer blade in. Next, restore the set nut for clamping the stabilizer blade.
2. Provide the stabilizer arm with a ball by M2 x 10 pan head screw and clamp it by M2 nut.
3. Insert the stabilizer arm into the stabilizer bar and set the stabilizer bar metal of the seesaw at the end of the stabilizer bar. Clamp them by M4U nut. At this time, the stabilizer bar should lightly move. And check the relationship between the stabilizer blade and stabilizer arm. To be parallel in the relative position between them. Please pay attention to the clamping of the

M4U nut of the stabilizer bar so that no accident may be caused to be present in flying. So, never fail to lock the M4U nut. Before beginning to fly, check if no loosening nor unclamping has been caused. ( in the illustration below).

4. Don't clamp the M3 x 5 set screw of the stabilizer arm at this moment.
5. Insert the assembled seesaw stabilizer part into the tip end of the pre-assembled center hub part. And insert 3 \varnothing x 21.8 needle pin there and drive the M3 x 5 set screw for fixing the needle pin.



MOUNTING OF PUSH-PULL ROD

(Refer to the drawing)

1. Mount the rod adjuster at one end of the M2 x 16 rod screw and the rod end at the other end of the rod screw. (2 pieces).
2. Put the assembled rod in the inside hole of the mixing lever of the seesaw part. And fit the rod end in the pivot bolt of the blade holder.
3. Mount the rod adjuster at one end of M2 x 80 adjuster rod and the rod end at the other end of the adjuster rod. (2 pieces).
4. Provide both ends of M2 x 80 adjuster rod (A) with the rod ends. (3 pieces).
5. Put the adjuster rod (A) prepared in the previous clause 4 inside the yoke. And then, insert the adjuster rod (A) between the two piano wires of the rod guide. After that, fit it in the ball of the stabilizer arm. Besides, fit the other end of the adjuster rod in the ball of upper ring of the swash plate. (2 pieces).
6. Fit the rod adjuster side prepared in the clause 3 at the outside of the mixing lever of the seesaw part and fit the rod end side in the ball of the swash plate upper ring. (2 pieces).
7. Slide the rod guide until it reaches the center hub. Then, clamp the M3 x 5 set screw where the blade spindle (the axis center of blade holder) is made parallel to the piano wire of the rod guide.
8. Fit the remaining rod prepared in the clause 4 in the ball of the lower ring pivot bolt (A) of the swash plate.
9. In referring to the drawing, position the pivot bolt (B) backward of the center line of the body. And drill the body by 3 \varnothing . Clamp it from the backside by M3U nut. Then, fit the rod prepared in the clause 8 there.
10. Make a through-hole, which is for the connection rod (adjuster rod (B)) linking each lever mounted on the main mission with the position of three pivot bolts of the swash plate lower ring. Note: see the side view of the drawing.
11. Provide both ends of M2 x 120 adjuster rod (B) with rod ends. (3 pieces).
12. Connect each lever A, B or C, which are mounted in the mission case, with pivot bolt balls A, B, or C of the swash plate lower ring.
Note: A ----- for aileron; B and C ----- for elevator
13. The clearance between the lower surface of the swash plate and the upper surface of the bearing plate should be more than 5mm at the position " Pitch Zero " (eg. when the collective pitch lever is in vertical position). And adjust by three adjuster rods (B) so that the swash plate may be parallel to the body.

NB. (As each rod is made a little longer than necessary, cut it at both ends for use).

■ MOUNTING AND ADJUSTMENT OF SERVO

Set each trim lever of the transmitter to each central position. Adjust the servo horn so that they may be positioned at their neutral position. For the engine control, set the stick and trim levers to their lowest positions.

■ MOUNTING OF SERVO

1. Set each servo to the position shown in the drawing. Check if each servo does not come in touch with each other. If it comes in touch with the other one, set each servo alternately. At this time, pay attention to the rotation direction of each servo horn.
2. Set the collective pitch lever and aileron elevator lever to the position shown in the assembling photo of pitch crank to the mission at page 4.
3. Drive the rod end into the threaded end of M2 x 290 adjuster rod (C). (Prepare three pieces).
4. Drive the rod end into the M2 x 25 x 2 \emptyset adjuster joint (A). (Prepare three pieces).

■ COLLECTIVE PITCH

1. Drive the M2 x 290 rod into the ball joint and fit it at the ball of the collective pitch lever. Drive into the adjustment joint. Pass the M2 x 10 mm screw through the ball and clamp it by M2 nut. Further, temporarily set it at the servo horn. Set the collective pitch lever so that it may be positioned as shown in the drawing and determine the length of M2 x 290 rod. Cut it to the length. Then, take out the ball joint. Here, insert the rod into the 2mm \emptyset hole of the adjustment joint A and solder it without fail. After that, mount it at the servo.

■ AILERON & ELEVATOR

1. As well as the case of the collective pitch, put the rod end of the M2 x 290 adjustment rod (C) in the 5 \emptyset ball of each lever and set it to the position of the servo horn for aileron elevator.
2. Set the 5 \emptyset ball in the rod end arranged in the adjuster joint (A) and temporarily set it at each servo horn by M2 x 10 pan head machine screw.

■ CUTTING OF EACH ROD & SOLDERING OF ADJUSTMENT JOINT

1. Check if the pitch crank is right below and if the foreout and lateral levers are right above. At this time, refer to the photos showing the mounting of the pitch crank in the mission in page 4. Then, cut each rod in relation to the rod ends which are temporarily set in each servo horn and put each rod in the hole of 2 \emptyset of the adjustment joint (A) for soldering.

Note: When soldering, remove the rod ends.

■ RUDDER CONTROL

1. Adjust the length of the control cable (1.2 \emptyset piano wire) so that the pitch rod of the tail (a part from which the ball joint of tail gear box is removed) may be positioned at the middle of the slide slot. Set the rotation direction of the servo by the right stick of the transmitter so that the angle of the turbine blade may become strong (+).
2. Set the tail side of the rudder control wire (1.2 x 1100 piano wire) in the adjuster joint (B) (M2 x 25 x 1.3 \emptyset) and solder it well. Then, drive into the rod adjuster.
3. Set the rod adjuster in the hole of the tail pitch lever. Then, set it so that the pitch may be positioned at the middle.
4. Extend the other side of the control wire up to the rudder servo. As shown in the paragraph (2), solder the adjuster joint (B). Then, set the control wire at the servo horn.

■ ENGINE CONTROL

1. Loosen the slow adjustment screw of the carbureter by about two times. And adjust the carbureter so that the engine may stop completely. See the instruction manual of the engine.
2. For the linkage with the servo, firstly confirm the whole range of the carbureter when it is fully opened and fully closed and determine the length of the servo horn. (At this time, use an accessory piano wires of 1.2 \emptyset).

Note:

Adjust the relationship between the engine and the stick so that the engine may stop when the stick is positioned in the slowest position and when the trim lever is also positioned in the slowest position. Besides, adjust it so that the engine may be under idling when the trim lever is in its neutral position.

ASSEMBLING & BALANCE ADJUSTMENT OF MAIN ROTOR BLADE

1. COLOR DISTINCTION OF MAIN ROTOR WING END

For adjustment of tracking, it is impossible to adjust the tracking of wing ends unless the tracking of the right and left blade ends can be distinguished. Therefore, paint one of the blade ends or both of them with a distinguishable color or provide them with a distinguishably-colored tape.

2. ADJUSTMENT OF CENTER OF GRAVITY OF BLADE

As this main blade rotates at a very high speed, it requires perfect balance. Otherwise, it is difficult to control it or vibrations may be caused. So, please completely balance the blade. First of all, put a round pencil or a mast on the flat table. And put the two blades on the pencil or the mast. Turn the pencil or the mast for looking into the center of gravity of the blades in its length direction. Mark the center of gravity by pencil or the like. At this time, check if the points of the center of gravity of the two blades are aligned each other. If not, make an opening of 2 ϕ at the end of the root of the lighter blade. Then, insert a threaded type solder into the opening. After that, caulk the solder. Then, you may secure the aligned points of the center of gravity at the two blades.

3. MOUNTING OF BLADES & BALANCE ADJUSTMENT

Insert the blades in the blade holder. Set the M3 x 20 cap screw in the 3 ϕ hole at the tip end of the holder and clamp it with M3U nut lightly. After that, set the two blades so that they are straightly positioned. Fit an aluminum bush of 8 ϕ x 3 in the upper and lower part of the 8 ϕ hole of the blade holder. And clamp them by M3 x 20 cap screws and M3U nuts. After the two blades are mounted, begin the balance adjustment. For this purpose, remove the cap screw which mounts the center hub and the mast. Then, remove the rotor head from the mast. Next, keep the stabilizer bar or put it on the stand and check the right and left balance of the blades. If the balance is not secured, drill the surface of a lighter blade by a very small opening. Insert a threaded solder into the opening for balancing. After the balance is secured, mount the head on the mast and clamp each screw of each part firmly. Lock all the screws by screw locks.

ADJUSTMENT OF STABILIZER & PITCH ANGLE OF MAIN BLADE

1. Cut off the gauge in the drawing for the pitch angle of the main blade. Adhere it to the 3mm balsa or veneer. And cut off the section so that the main blade may be positioned. Then, the pitch gauge of the main blade is now assembled.
2. Insert the gauge into the tip end of the blade so that the gauge may be faced insides. And set the engine control stick to the position of full throttle. When checking it from the opposite side of the blade, the scale in which the angle line of the stabilizer bar and pitch gauge is made parallel means the pitch angle of the main blade. Adjust the length of pitch rod linked from the swash plate so that the angle of this time is made to be 6° and adjust it so that the right and left blades may be aligned correctly.
3. Next, set the engine control stick to "Slow" position (idle position). And set the length of pitch arm and the arm of the servo torque plate so that the pitch angle may become 1° to 2°. The pitch angle of the main blade may become 6° at maximum and 1° to 2° at minimum.
4. After the pitch angle of the main blade is adjusted, adjust the stabilizer blade. First of all, set the engine control stick to a little upper position (60% position) than the central position of the whole stroke. At this time, set the stabilizer blade so that it may be horizontal. And clamp both M3 x 5 set screws of the stabilizer control lever evenly. Next, try to set the engine control stick to the full throttle position. At this time, check the angle for whether or not its angle may become (-) angle a little. When the stick is set to the "SLOW" position, check whether or not the stabilizer blade may be in (+) position.

INSPECTION AND ADJUSTMENT OF EACH PART BEFORE FLIGHT

The R/C helicopter consists of mechanism and screws and nuts composing the mechanism. To carry out the cheerful flight with your mind at ease, daily inspection and maintenance are one of the most important points. Therefore, please inspect even a minute point and put the parts in order at all times before you begin the flight.

1. INSPECTION BEFORE FLIGHT

Check all the screws. If necessary, clamp them more. All the screws should be locked with screw locks. Next, switch on the transmitter and receiver. Then, check the functions of servo and the rudder angle.

2. POSITION OF CENTER OF GRAVITY

Check if the position of the center of gravity is as per that of the drawing. Adjust the position of the center of gravity so that the head part of the helicopter may be inclined a little forward when holding the stabilizer bar by your hand. If the center of gravity is positioned too close to the mast, no great influence may not be given to the forward flight and/or the hovering against wind in a low height. However, for other flying postures, it may cause a danger because the helicopter will be headed up or the restoration of each movement comes too late. Therefore, please pay attention to this point.

(3) ADJUSTMENT OF TRACKING

Fill the tank with fuel. Check that the engine control lever is set to " SLOW " and that the trim lever is kept idle. Lead the current to the plug for heating. Then, start the engine. Hold the rotor head by your left hand and pull the starter knob by your right hand. After the engine is started, hold the head strongly and step the skid by your foot. Accelerate the engine two times or three times. At this time, if the head is strongly apt to be rotated, the clutch is well engaged. However, if not so, (if you feel that the rotor head drive is a little weak), decelerate the engine to " SLOW " . And check the clutch bell by your hand. At this time, pay attention to high temperature. If the clutch bell is heated, cool it by water or waste cloth for adequate engagement of the clutch. Please never engage the clutch shoe with the clutch casing when the clutch shoe is heated. Because the clutch shoe may be dissolved as it is made of resin).

When the temperature is restored to the normal temperature, begin re-setting the clutch shoe. After the adequate engagement of the clutch shoe with the clutch casing is well checked, accelerate the engine gradually. When the helicopter is going to float, check the rotor balance. Namely, if the tip ends of the rotor can be seen doubly on rotation, one of the rotors is rotated at a higher level than the other. Check this balance by the color painted at the tip ends of the rotors. For this purpose of adjustment, drive into the ball link of pitch rods. And adjust them so that the two rotor blades can seem to be single.

(4) ADJUSTMENT OF MAXIMUM PITCH ANGLE

This maximum pitch angle is subject to change according to the kind of engine and of fuel. Therefore, it is necessary to adjust the pitch angle so that it may fit to the engine. After the tracking adjustment is over, subsequently, adjust the maximum pitch angle. For this purpose, check if the rotation of the engine can be smoothly increased gradually when gradually accelerating the rotor as you firmly hold the skid. If the revolution speed of the engine goes slow at the neighborhood of the maximum pitch angle and if the revolution speed of the engine goes up by a little lowering of pitch, the balance between the output of the engine and the pitch angle is not secured. In these case, drive in the ball link of both pitch rods and generally lower the pitch. At this time, please adjust the needle all together.

(5) ADJUSTMENT OF EACH TRIM

Begin the adjustment of each trim after the adjustment of tracking and the maximum pitch angle is over. Hold the tail part of the helicopter by your left hand (at this time, pay attention to the tail rotos). Gradually increase the rotation speed of the rotor for floating the helicopter by about 20 to 30 cm. If the helicopter goes forwards or backwards at this time, correct it by the elevator trim. And correct the right and left inclination by aileron trim. Here, land the helicopter once. And adjust each link rod so that the helicopter can be floated when the trim lever is positioned at its neutral position. Next, set the helicopter right against the wind and increase the rotor rotation speed gradually. If the helicopter is moved to left hand side when checking it from its rear side, loosen the M2 nut of pitch rod coming out of the center of the tail shaft. Slide the pitch plate in the direction along which the pitch angle of the tail blade is reduced. Then, adjust the pitch plate so that the helicopter can be floated without the tail parts swung out to the right and left directions. After the above adjustment is over, fill the fuel tank with a suitable fuel and begin flying the helicopter. But, wait a moment. breathe deeply to set your mind at ease. Pay attention to neighbors, especially to children. Please check the safety at the neighborhood. Then, begin flying the helicopter.

(6) FLIGHT

If you are a beginner of flying the helicopter, there is an idea to protect your helicopter from being fallen down. That is to mount or provide a bamboo material or aluminium bars whose ends are upward and its length is about 1 meter at the landing skid. However, this helicopter is provided with very high stability as you know already. Therefore, if you fly the helicopter without providing with such bar material at the landing skid, you may quickly acquire the flying skill because you will pay more attention to flying and landing. And if you are an expert, make the stabilizer blade area wide by adhering balsa material to the stabilizer blade in order to smoothly control the rudder and to ensure more efficient motion capacity.

SAFETY MEASURES FOR R/C HELICOPTER

Now, you have assembled your Hirobo's Gazelle 341-G Helicopter with your heart and engineering. To ensure comfortable and safe flight of the helicopter, please pay attention to the following points.

(1) SELECTION OF FLYING YARD

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

(2) NOTICE BEFORE FLYING

Check the R/C unit if it is actuating without fail before engine starts. Check all the screws and nuts and linkage parts if they are not loosened.

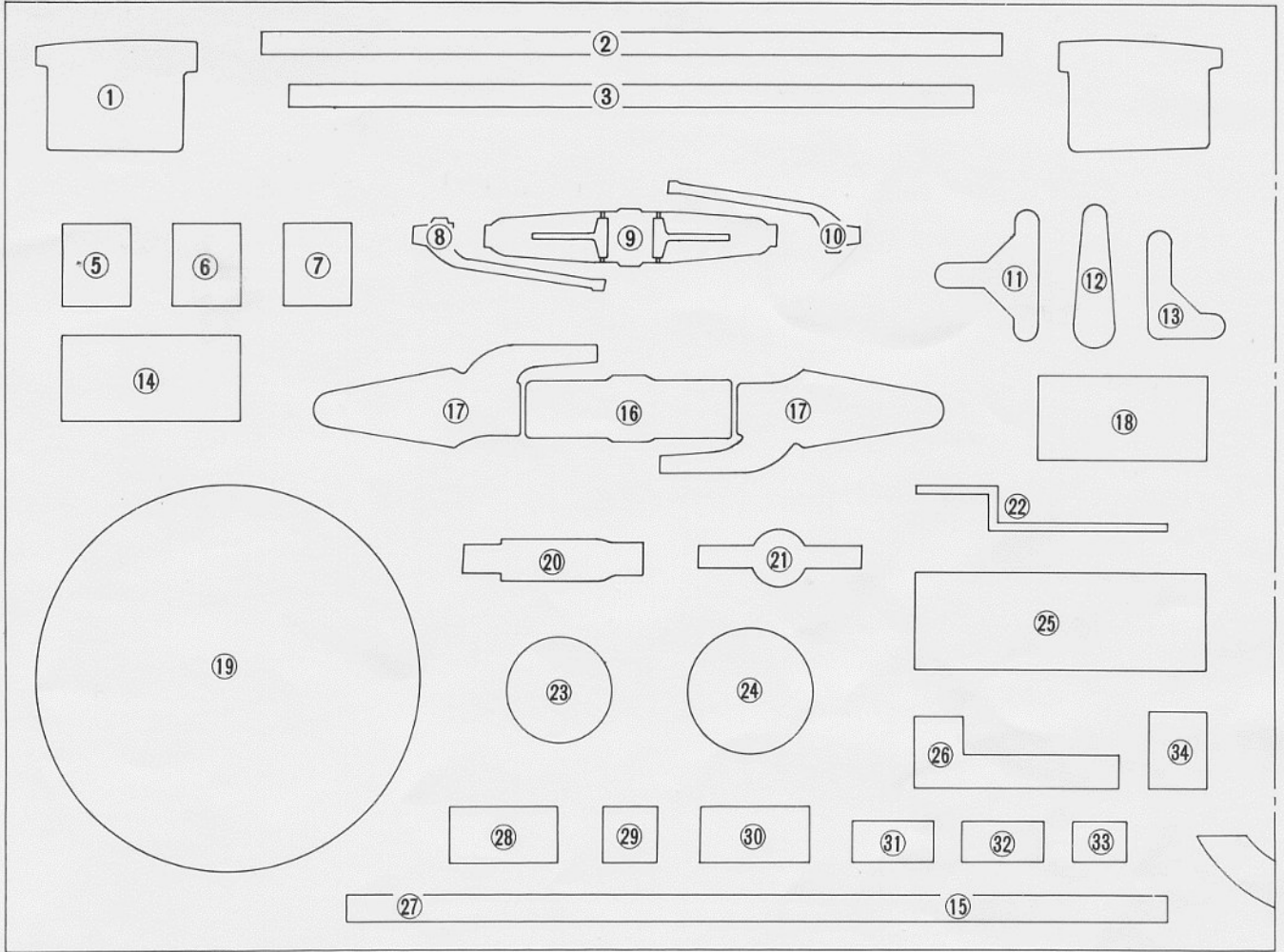
(3) NOTICE FOR FLIGHT

When you begin to operate your helicopter, pay attention to the neighborhood people. Please never approach the people to the helicopter. Please do not fly your helicopter on houses, trains and cars, power-transmission lines, and warehouses of combustible matters. If you find your helicopter lowered in output, immediately land it on a safe place.

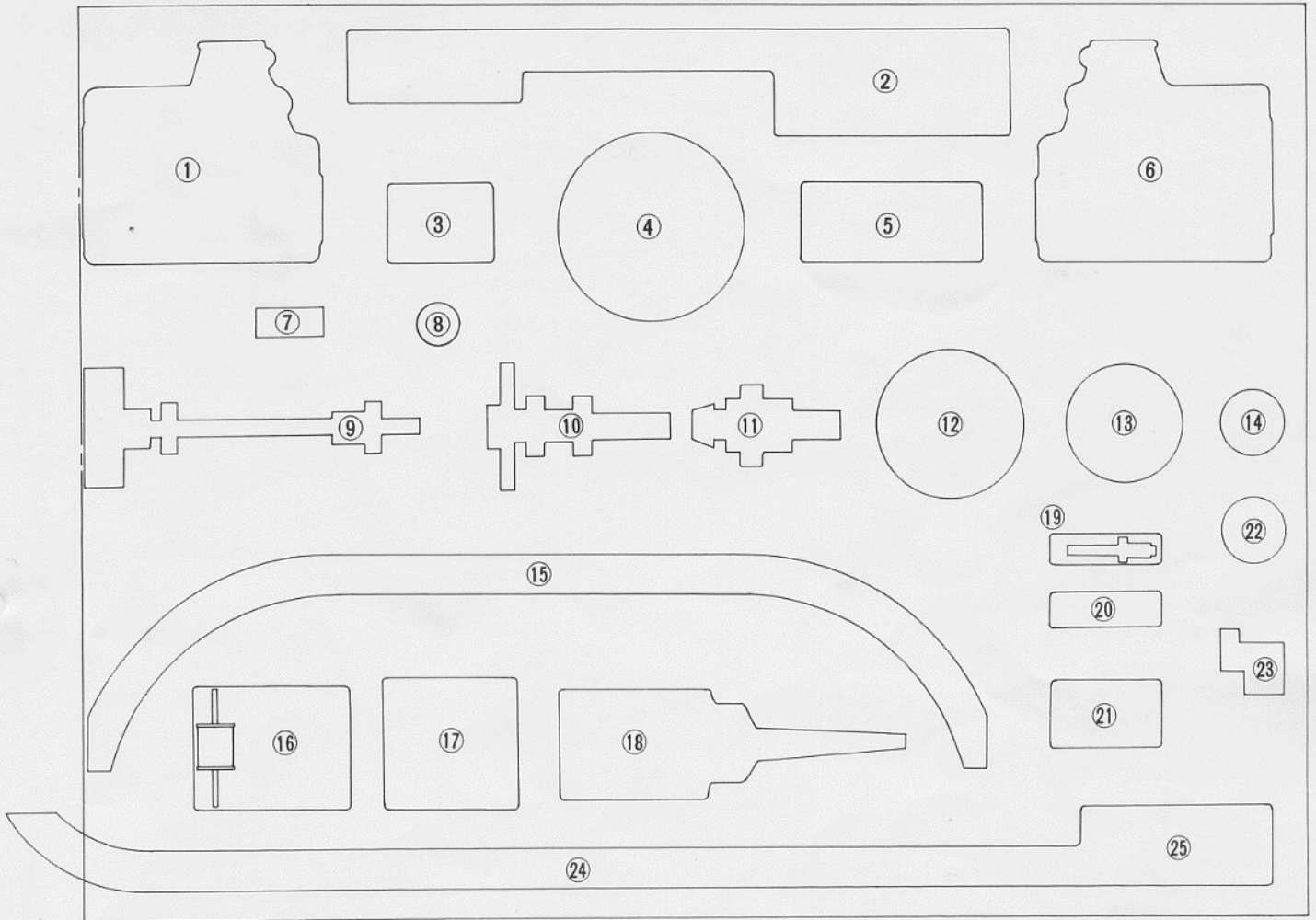
(4) CHECK FOR LOOSENING OF EACH SCREW & NUT BEFORE FLYING

Please pay more attention to the rotary parts of the rotor heads. If you should find a loosening of such parts, please carry out complete adjustment and clamp them firmly before flying.

PARTS DETAILS OF MECHA-CASE, LEFT SIDE



1	F-2007	Stabilizer blade	1	18	F-5081	M3U Nut	1	23	F-1012	Bearing plate	1
2	F-3077	Main mast	1		F-5011	M3 x 10 Cap screw	1		F-6004	Bearing 608 OP	1
3	F-3055	Stabilizer bar	2		F-5052	3 Ø Flat washer	1	24	F-3082	Swash plate	1
4	F-2007	Stabilizer blade	1		F-5071	M2 Nut	6		F-6013	Bearing 16003	1
5	F-5013	M3 x 16 Cap screw	1		F-5032	M2 x 10 Pan head screw	6		F-6012	Pillow ball SF-8	1
	F-5014	M3 x 20 Cap screw	1		F-3058	5 Ø Ball	6	25	F-1005	Rod end	22
	F-5081	M3U Nut	2		F-3079	Pitch crank collar(8x15)	1		F-3058	5 Ø Ball	3
6	F-3059	Stabilizer set nut	2		F-3080	Pitch crank collar (8x6)	1		F-1014	Rod adjuster	6
	F-5082	M4U Nut	2		F-3081	Pitch crank collar (8x3)	1	26	F-7001	L-type wrench 1.5Ø	1
7	F-6042	3 x 21.8 Needle pin	1	19	F-1020	Duct (A)	1		F-7002	L-type wrench 2 Ø	1
	F-3058	5 Ø Ball	2		F-1021	Duct (B)	1		F-7003	L-type wrench 2.5 Ø	1
	F-5032	2 Ø x 10 Pan head screw	2		F-1018	Tail blade holder	1		F-7004	L-type wrench 3 Ø	1
	F-5071	M2 Nut	2		F-1019	Blade holder cap	1	27	F-3119	Adjust rod (A) M2x80	5
	F-5001	M3 x 5 Set screw	2		F-1017	Turbine blade	6		F-3102	Adjust rod(B)M2x 190	3
8	F-2006	Stabilizer arm	1		F-6044	1.5 x 11.8 Needle pin	6	28	F-3103	Adjust rod(C)M2 x 290	3
9	F-2005	Seesaw	1		F-3113	Tail blade metal	6		F-3105	Duct-mounting rod M2x 45	6
	F-1001	Mixing arm	2		F-5054	1.7 Ø Flat washer	8		F-5071	M2 Nut	12
	F-3054	Stabilizer bar metal	2		F-1022	Duct ring	1	29	F-5013	M3 x 16 Cap screw	4
	F-6041	2 Ø x 19.8 Needle pin	1		F-6008	Bearing 685 OP	3		F-5081	M3U Nut	4
10	F-2006	Stabilizer arm	1		F-6007	Bearing 685 ZZ	1	30	F-3056	Pivot bolt (A)	4
11	F-1010	Elevator(Foreout) lever	1		F-6015	Bearing 692 OP	2		F-3058	5 Ø Ball	4
	F-1011	Collective pitch lever	1		F-1004	Tail pitch lever	1		F-5031	M2 x 8 Pan head screw	4
12	F-1009	Aileron(lateral) lever	1		F-3097	Pitch rod	1	31	F-3099	Adjust joint (A)	3
	F-6043	4 Ø x 27.8 Needle pin	1		F-3058	5 Ø Ball	1			M2 x 25 x 2 Ø	3
	F-5015	M3 x 26 Cap screw	1		F-3110	Pitch ring	1	32	F-3100	Adjust joint (B)	2
	F-5014	M3 x 20 Cap screw	4		F-5036	M2 x 20 Pan head screw	4			M2 x 25 x 1.3 Ø	2
	F-5081	M3U Nut	5		F-5035	M2 x 15 Pan head screw	6	33	F-3098	Rod screw 2 x 16	2
	F-5052	3 Ø Flat washer	2		F-5071	M2 Nut	7	34	SPARE PARTS & OTHERS		
	F-5053	Yoke metal	2		F-5081	M3U Nut	1		F-5031	M2 x 8 Pan head screw	4
	F-3056	Pivot bolt (A)	2		F-5002	4 x 4 Set screw	2		F-5071	M2 Nut	4
	F-0031	Damper rubber	2		F-3005	Spiral mighter (Right)	1		F-3057	Pivot bolt (B)	1
	F-3092	Bush	4		F-3006	Spiral mighter (Left)	1		F-5011	M3 x 10 Cap screw	2
15	F-3104	Piano wire	1		F-3067	Tail mission 1st shaft	1		F-5013	M3 x 16 Cap screw	2
16	F-2004	Yoke	1		F-3068	Tail mission 2nd shaft	1		F-5014	M3 x 20 Cap screw	2
	F-5002	M4 x 4 Set screw	4		F-3098	M2 x 16 Rod screw	1		F-5001	M3 x 5 Set screw	2
	F-5003	M4 x 8 Set screw	4		F-1005	Rod end	1		F-5002	M4 x 4 Set screw	2
	F-3051	Blade holder collar	2	20	F-1014	Rod adjuster	1		F-5081	M3U Nut	6
	F-3052	Blade holder shaft	2		F-2008	Center hub	1		F-5082	M4U Nut	2
	F-6001	Bearing 695	2	21	F-5001	3 Ø x 5 Set screw	2		F-0031	Damper rubber	2
	F-6017	Bearing L-1370	2		F-3078	Rod guide	1		F-5052	M3 Flat washer	6
17	F-2003	Blade holder	2	22	F-5001	M3 x 5 Set screw	1				
					F-3096	Pitch crank	1				



COMPONENTS PARTICULARS OF MECHA-CASE (RIGHT SIDE)

1	F-2001	Mission case (L)	1	11	F-3003	40T Gear	1
	F-3088	Juracon bush	1		F-3002	Bevel pinion gear	1
2	F-4001	Mounting plate	2		F-3061	Main mission 2nd shaft	1
	F-4002	Engine bed	2		F-6006	Bearing 626 DD	1
3	F-5011	M3 x 10 Cap screw	7		F-6005	Bearing 626 OP	1
	F-5072	M3 Nut	7		F-6065	2.5 Ø x 10 Roll pin	1
	F-5034	M5 x 8 Pan head screw	1		F-6062	2 Ø x 12 Roll pin	1
	F-5061	3 Ø x Fluted washer	7	12	F-3071	Starter pulley	1
	F-5053	Nylon washer	1		F-3072	Clutch housing	1
	F-5002	4 x 4 Set screw	4		F-6009	Bearing RC 081208	1
4	F-1006	Cooling fan	1		F-6001	Bearing HK2212	1
5	F-5012	M3 x 12 Cap screw	4	13	F-1007	Clutch shoe	1
	F-5014	M3 x 20 Cap screw	6		F-6010	Bearing 0609	1
	F-5016	M4 x 15 Cap screw	8		F-5012	M3 x 12 Cap screw	2
	F-5017	M4 x 25 Cap screw	4	14	F-1008	Starter knob	1
	F-5081	M3U Nut	10	15	F-4003	Skid foot	2
	F-5082	M4U Nut	8	16	F-3073	Shock-absorbing rubber	4
6	F-2002	Mission case (R)	1	17	F-4005	Skid band	4
	F-3088	Juracon bush	1	18	F-0035	Hobby Oil 50	1
7	F-3066	Joint	1	19	F-3076	Tension shaft	1
8	F-3083	Taper spacer	1		F-5082	M4U Nut	1
9	F-3065	Clutch bell	1		F-5091	4E Link	1
	F-3060	Main mission 1st shaft	1	20	F-3095	Starter hook	1
	F-3004	16T Gear	1		F-5011	M3 x 10 Cap screw	1
	F-6006	Bearing 626 DD	2		F-5081	M3U Nut	1
	F-6063	M2 x 14 Roll pin	2	21	F-5033	M3 x 10 Pan head screw	8
	F-6081	6 Ø Set ring	1		F-5081	M3U Nut	8
10	F-3001	Bevel gear	1		F-5082	M4U Nut	4
	F-3062	Main mission 3rd shaft	1	22	F-3075	Guide pulley	1
	F-3063	Collar (Large)	1	23	F-1013	Starter stopper	1
	F-3064	Collar (Small)	1		F-5015	M3 x 26 Cap screw	1
	F-6003	Bearing 608Z	1		F-5081	M3U Nut	1
	F-6004	Bearing 608 OP	1	24	F-4004	Skid pipe	2
	F-6064	3 Ø x 16 Roll Pin	1	25	F-3074	Receiver rack of shock-absorbing rubber	4

COMPONENTS PARTICULARS OF BODY CASE

1	F-0001	Body F.R.P. (1) (2)	1 set
2.	F-0002	Wind shield	1
3	F-0012	Exhaust pipe	1
4	F-0003	Body frame	1 set
		F-1AX1, F-1B x 1, F-1X2, F-2X1, F-3X1, F-4X1, F-5X2, F-6X2, F-7X1, F-8X1	
5	F-0006	Window sheet	1
6	F-0005	Horizontal tail blade	
		Balsa (S-1 x 1, S-2x2)	1 set
7	F-3085	Tail drive pipe (3 Ø x 800)	1
8	F-3086	Rudder control pipe (3 Ø x 1100)	1
9	F-3069	Tail drive shaft (1.6 Ø x 900)	1
10	F-3070	Rudder control wire (1.2 Ø x 1200)	1
11	F-0009	Cooling cover	1
12	F-0034	Fuel tank (400cc)	1
13	F-0101	Main blade (1 mm Veneer x 1)	2
14	F-0033	Starter rope	1
15	F-0032	Starter rubber	1
16	F-0008	Transcribing mark	1
17	F-3114	Wire net	1
18	F-0007	Drawing	1

Thank you very much for your purchase of our product " HIROBO'S R/C Helicopter Gazelle SA-341G ".

The quantity and quality of all the components have been well checked at our workshop before delivery. However, please look into them before you open each sack of components. If you should find anything inconvenient, please don't hesitate to contact to the head office of Hirobo Industrial Co., Ltd. or to the shop where you bought it. In case the sack of components is already opened at your side, you might not have a new one.

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