ELECTRIC-POWERED RADIO CONTROL HELICOPTER

Voyager E

ASSEMBLY INSTRUCTIONS

VOYAGER E SPECIFICATIONS

Overall Length	33″
Overall Height	12 1/4″
Main Rotor Diameter	38 5/8″
Tail Rotor Diameter	7″
Gear Ratio	23.33:1:1.5
Speed Controller	NEA-300H High Frequency (included)
Motor	NHM-540ST (included)
Battery	8.4V 2000mAh NiCad (not Included)
Weight	52.2 oz– 55.7 oz (weight will vary based on the servos used)

The JR Voyager E is the first electric helicopter to utilize the JR 120-CCPM swashplate control system. This new system features a lower parts count and also reduces weight for increased precision and improve performance. The Voyager's lightweight, yet highly rigid frame design enables the Voyager E to fly with power and control authority never before seen in an electric helicopter.

* Gyro not Included.

JR PROPO®
Heli Division

INDEX

Section	Description	Page
	Introduction	3
	Voyager E Features	4
	Additional Items Required to Complete the Voyager E	4–5
	Hardware Identification	6
	Anatomy of the Voyager E	7
1-1	Preassembled Main Frame Components	8
1-2	Body Mount Attachment	8
1-A	Mini Servo Mounting Plate Installation	9
1-3	Landing Gear Assembly	10
1-4	Landing Gear Attachment	10
2-1	Main Drive Gear Assembly Installation	11
2-2	Swashplate and Washout Assembly Installation	11
2-3	Rotor Head Installation	12
2-4	Flybar Paddle Installation	12
2-5	Flybar Adjustment	13
2-6	Control Rod Installation	13
2-7	Motor Installation	14
3-1	Tail Gear Case Assembly	15
3-2	Tail Output Shaft/Pitch Slider Installation	15
3-3	Tail Rotor Assembly Installation	16
3-4	Tail Pitch Control Lever Installation	16
3-5	Tail Boom Assembly Installation	17
3-6	Tail Rotor Blade Installation	18
3-7	Vertical/Horizontal Fin Installation	18
	Servo Installation and Linkage Suggestions	19
4-1	Aileron/Elevator Servo Installation (Standard Servo)	19
4-2	Pitch/Rudder Servo Installation (Standard Servo)	19
4-A	Aileron/Elevator Servo Installation (Mini Servo)	20
4-B	Pitch/Rudder Servo Installation (Mini Servo)	20
4-3	Tail Pitch Control Rod Assembly	21
4-4	Tail Control Rod Installation	21
4-5	Receiver/Gyro/Speed Controller Installationn	22
	Understanding Swashplate Control Systems	23
	How JR 120 CCPM Works	24
	CCPM Software Activation and Initial Adjustment	25–30
	Important CCPM Programming Dos and Don'ts	31–32
	Speed Controller Setup	33
5-1	Servo Arm Preparation and Installation	34
5-2	CCPM Servo Centering with the Sub-Trim Function	35
5-3	CCPM Linkage Connection	36
5-4	Checking the Swashplate for Level	37
5-5	Pitch-to-Aileron Mixing Adjustment with Travel Adjust	38
5-6	Pitch-to-Elevator Mixing Adjustment with Travel Adjust	39
5-7	Tail Rotor Linkage Connection/Adjustment	40
6-1	Trimming the Body/Canopy	41
6-2	Canopy Attachment	41
6-3	Body Mounting/Decel attachment	42
6-4	Body Attachment/Final Trimming	42
	Decal Placement	43
6-5	Main Rotor Blade Balancing	44
6-6	Main Rotor Blade Attachment	44
	Motor Connection/Battery Installation	45
	Final Servo Adjustment and Radio Setup	46–48
	Radio System Operation/Helicopter Control Movements	49–50
	Final Preflight Check	51
	General Maintenance	52
	Preassembled Components	53–54
	XP652 Heli Data Sheet Voyager E CCPM Initial Setup	55
	X-3810 Heli Data Sheet Voyager E CCPM Initial Setup	56
	10X Heli Data Sheet Voyager E CCPM Initial Setup	57–58
	Body Set/Landing Gear/Servo Plate Assembly Parts	59
	Main Rotor Head/Swashplate/Washout Unit/Main Gear Assembly Parts	60
	Tail Rotor Assembly Parts	61
	Main Frame/Motor/Intermediate Gear Assembly Parts	62
	Motor/Miscellaneous Assembly Parts	63
	Voyager Parts Listing	64–70

Congratulations on your purchase of the JR Voyager E Electric Heli. This model has been designed using the latest in state-of-the-art design technology.

To achieve the best performance and reliability from this model, please read through these instructions carefully so you become familiar with the contents of this kit before assembly.

JR CCPM

To take the electric heli designs to the next level, JR's designers turned to CCPM (Cyclic/Collective Pitch Mixing). CCPM is a unique control system that mounts three servos below the swashplate with short, straight linkages directly to the swashplate at 120-degree intervals. With CCPM, complex collective and cyclic mixing is accomplished electronically rather than mechanically. As a result, many parts are eliminated, along with excessive control system play, not to mention quicker building and lower maintenance.

What's more, you get more servo power from CCPM. That's because instead of one servo moving the collective, you now have three. Instead of one servo moving the cyclic, you have two.

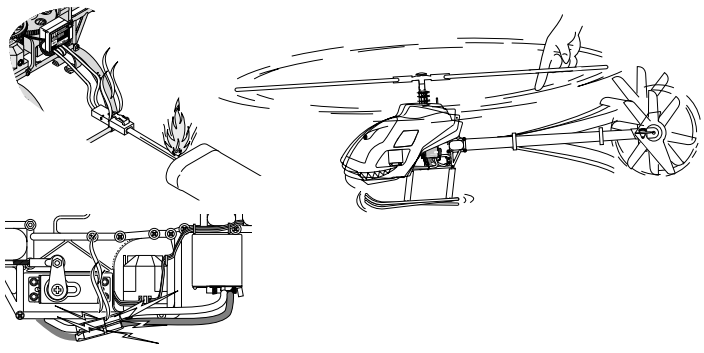
Before you begin the assembly of your Voyager E, we suggest that you first review the entire instruction manual to become familiar with the assembly sequences and parts layout.

WARNING

The radio-controlled model helicopter contained in this kit is not a toy, but a sophisticated piece of equipment. This product is not recommended for use by children. Radio-controlled models such as this are capable of causing both property damage and/or bodily harm to both the operator/assembler and/or spectator if not properly assembled and operated. Japan Remote Control Co., Ltd. assumes no liability for damage that could occur from the assembly and/or use/misuse of this product.

Although the Voyager E is powered by a quiet, smooth-running electric motor, it should be assembled and operated with the same care as its larger glow engine counterparts. When operating your Voyager E, please exercise caution and safety.

Becoming a successful RC helicopter pilots takes many hours of preparation and practice. When watching an experienced RC helicopter pilot flying, it may appear that they are very easy to fly, when in reality it will take many hours to develop these flying skills.



Please understand that it requires hours of practice to master the art of RC helicopter flying. On initial flights with your Voyager E, please begin by attempting simple hovering maneuvers only until you become comfortable with the operation of this model. If possible, please seek help from an experienced RC heli pilot for guidance. With a little time and patience, you will be able to achieve the full satisfaction of RC helicopter flying.

USE SAFETY AND CAUTION WHEN OPERATING

An electric-powered heli is different from a conventional glow-powered model in that it can possible activate the motor as soon as the NiCad battery is connected if the proper procedures and adjustments have not been followed.

Please follow the connection and adjustment instructions carefully during assembly. Use caution and care when handling the NiCad battery to avoid and prevent any possibility of reverse polarity or shorting, as damage to the electronic equipment can occur.

PREASSEMBLY INFORMATION

When first opening your Voyager E kit, you will notice that all of the parts are packaged and numbered to coordinate with the assembly step numbers of this instruction manual.

All small hardware (nuts, bolts, washers, etc.) for each step are packaged separately within the main parts bags. When beginning a section, you will need to open only the bag with the corresponding number to the section you are about to start. It is suggested that you place all of the hardware in an open container (e.g., coffee can) during assembly so as not to lose any of the small parts. It may also be helpful to familiarize yourself with the various sizes of screws, bolts, nuts, etc., as illustrated in the appropriate assembly section before you begin assembly. In most cases, at the end of each assembly section, there should be no parts remaining.

Great care has been taken in filling the bags with the correct quantity of parts and hardware for each section. However, occasional mistakes happen. In the event that you find a parts shortage or are in need of technical assistance, please contact your local JR heli division parts dealer.

VOYAGER E FEATURES

CCPM (Cyclic/Collective Pitch Mixing):
More Accurate: Control system play is greatly reduced.
Simpler: Fewer links to setup and maintain.
More Powerful: Collective has three times the servo power, cyclic has double.

Heavy-Duty Frame Design
Provides excellent durability.

Belt-Driven Tail Rotor Design
Provides easy adjustment and low maintenance.

Precision Ball Bearings at All Critical Locations
Provide low wear, high precision, and reduced maintenance.

Straight Blade Axle Rotor Head Design
Provides high responsiveness and solid blade tracking. Reduces potential boom strikes.

Low Drag Flybar Paddles
Provide quick, yet smooth, cyclic response at all flight speeds.

Heavy-Duty Tail Boom
Provides increased structural rigidity and improved tail rotor precision.

Prefinished Main Rotor Blades
Provide easy assembly with excellent flight characteristics.

Superior Parts Fit and Finish
Make assembly trouble-free and enjoyable.

Powerful NHM-540ST Motor
Provides excellent power for agile flying.

High Quality NEA-300H Speed Controller
Offers smooth throttle response and efficient current flow.

Durable Polyethylene Canopy w/Decals
Reduces assembly time and eliminates the need for paintings.

ADDITIONAL ITEMS REQUIRED TO COMPLETE THE JR VOYAGER E

1. RADIO SYSTEM REQUIREMENTS (NOT INCLUDED):

6-channel or greater R/C helicopter system with 120° CCPM function (see list below), 4 standard or 4 mini servos, and gyro.

CCPM-Ready JR Radio Systems
Most current JR heli radio systems [XP652, X-3810, X-3810A.D.T., PCM-10, PCM-10S, PCM-10S World Champion Model, PCM-10X] are equipped with 120° CCPM electronics for use with the Voyager CCPM machines.

*Please note that some 3810 systems need to have the CCPM function activated.


JR XP652


JR 10X

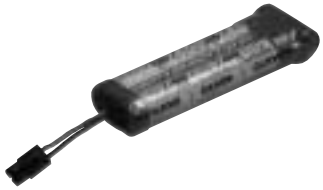

X-3810A.D.T.


4 Servos (standard or mini size), 6-Channel Receiver & Accessories


G400 Piezo Gyro or equivalent

2. ELECTRIC POWER SYSTEM / CHARGER:

NiCad Battery Pack


JR NiCad Battery 8.4V-2000mAh (60623) or equivalent

Battery Charger


JR Quick Charger NHC-101 (60624) or equivalent

3. BUILDING SUPPLIES (NOT INCLUDED):

The following items are needed to complete the assembly of the JR Voyager:

Nylon Wire Ties to secure radio wires

Super Horn (3 pcs) w/Screws (or equivalent)

Double-Sided Servo Mounting Tape

Whip Antenna (optional)

4. TOOLS NEEDED TO ASSEMBLE THE JR VOYAGER E (NOT INCLUDED):

Phillips Screwdrivers (Large and Small)

Nut Drivers: 4, 4.5, 5 mm

Needle-Nose Pliers

Scissors

Drill and Drill Bits

Small Hammer

X-Acto Knife

Metric Ruler (Over 20 cm)

5. OPTIONAL TOOLS AND TRAINING ACCESSORIES:

Voyager E Training Gear (60625)

Ball Link Sizing Tool (60219)

Ball Link Pliers (60242)

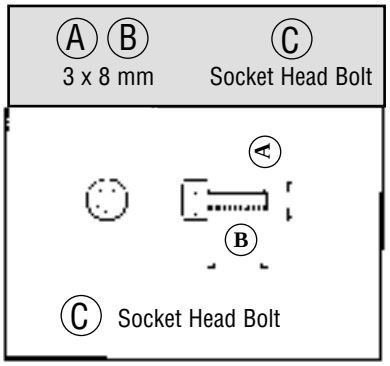
Ball Link Drivers (60085)

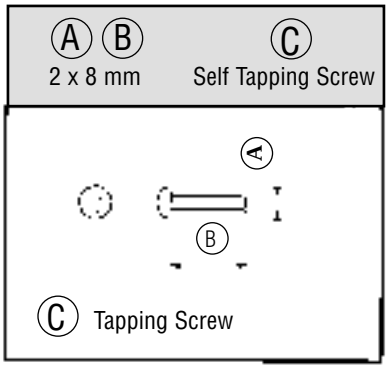
Pitch Gauge (60326)

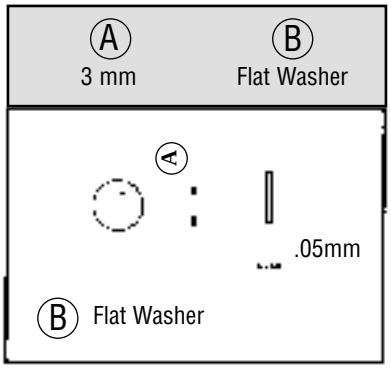
HARDWARE IDENTIFICATION

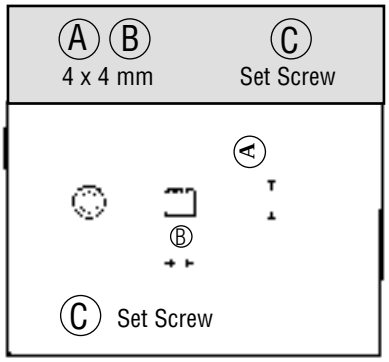
There are various sizes and shapes of hardware included in this kit. Prior to assembly, please be careful to identify each screw by matching it to the full-size screw outlines included in each step.

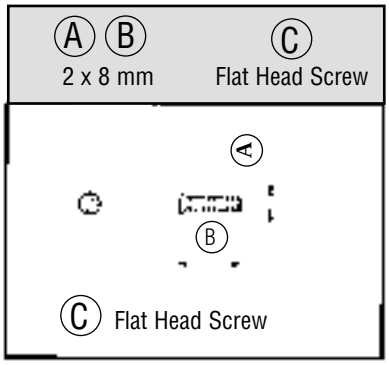
All of the hardware, screws, nuts, etc. contained in the Voyager kit are described in the following A, B, C manner:

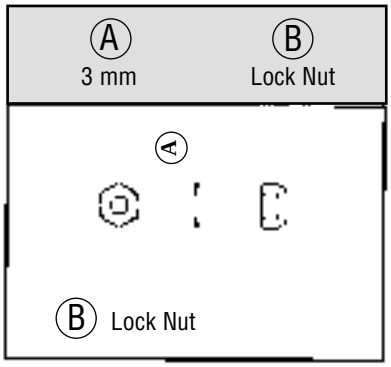


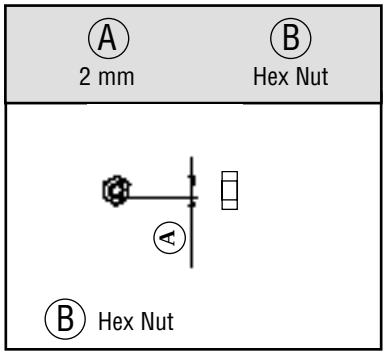


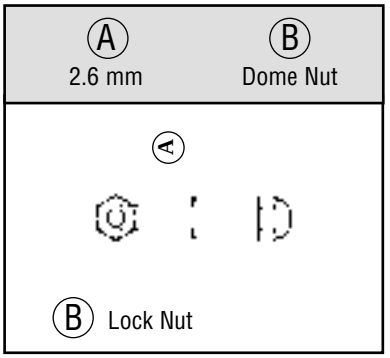




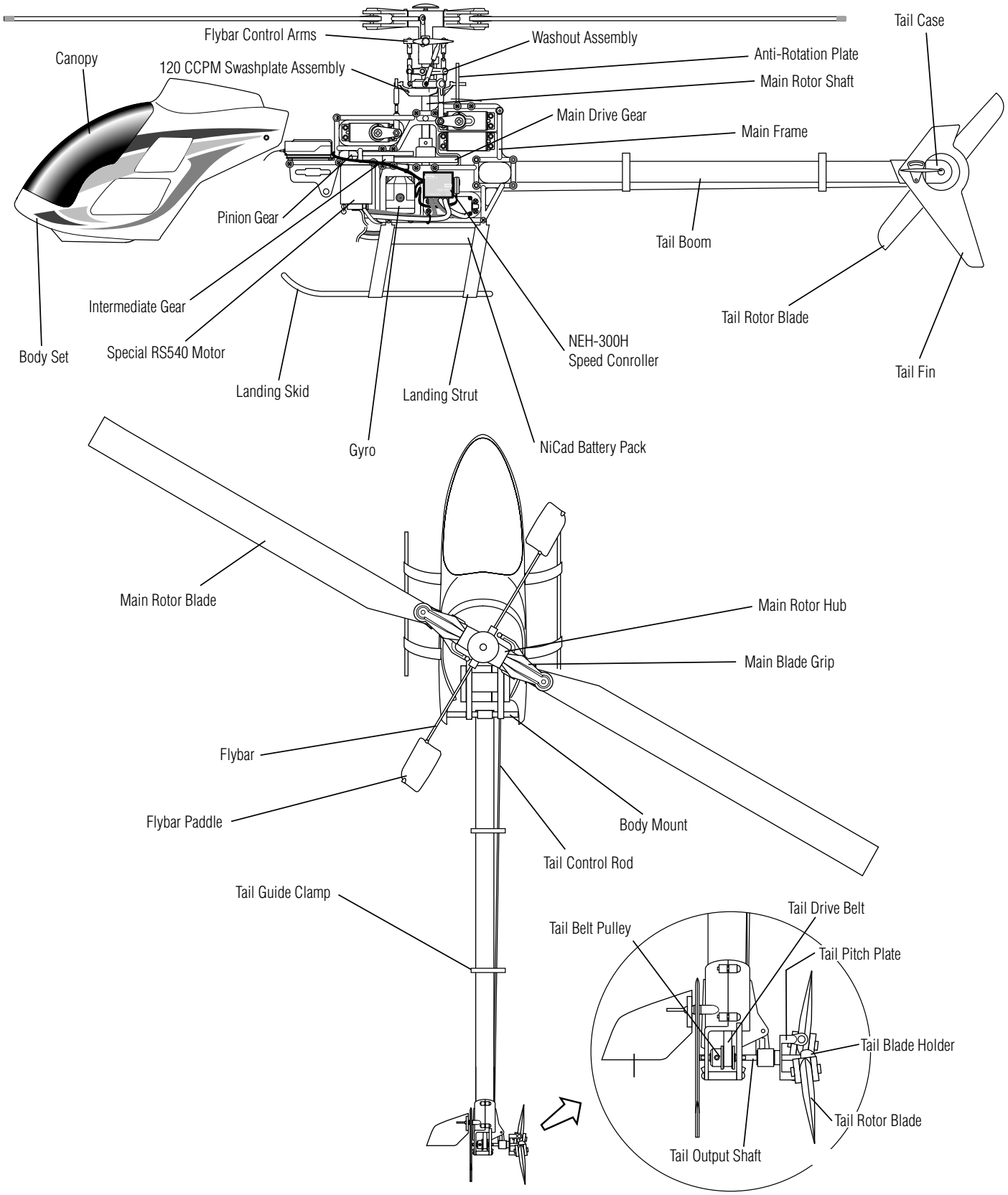






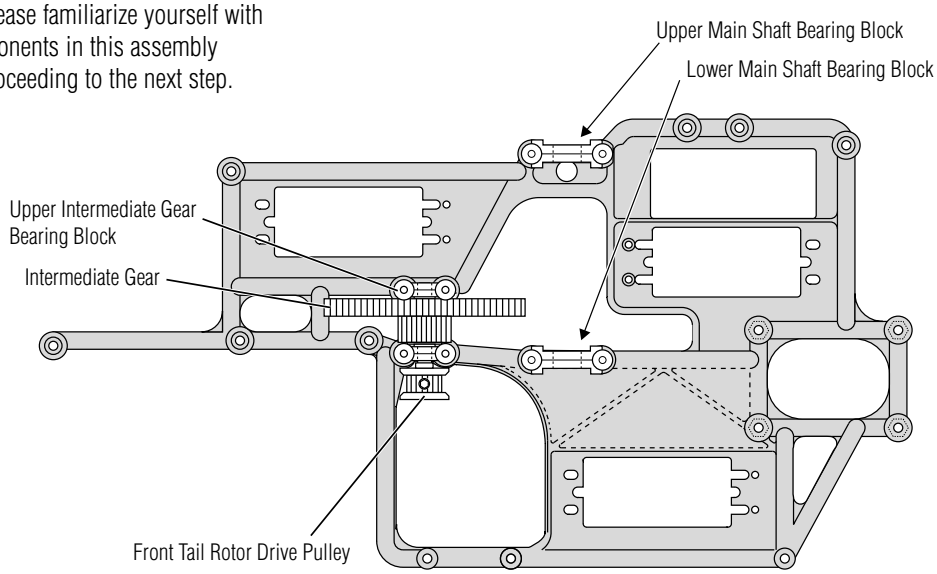


ANATOMY OF THE VOYAGER E



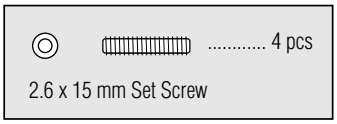
1-1 Preassembled Main Frame Components

Note: Please familiarize yourself with the components in this assembly before proceeding to the next step.



1-2 Body Mount Attachment

Attach the body mounts to the frame as shown.



The 2.6 x 15 mm set screw should protrude past the main frame side by 4 mm.

1-A Mini Servo Mounting Plate Installation

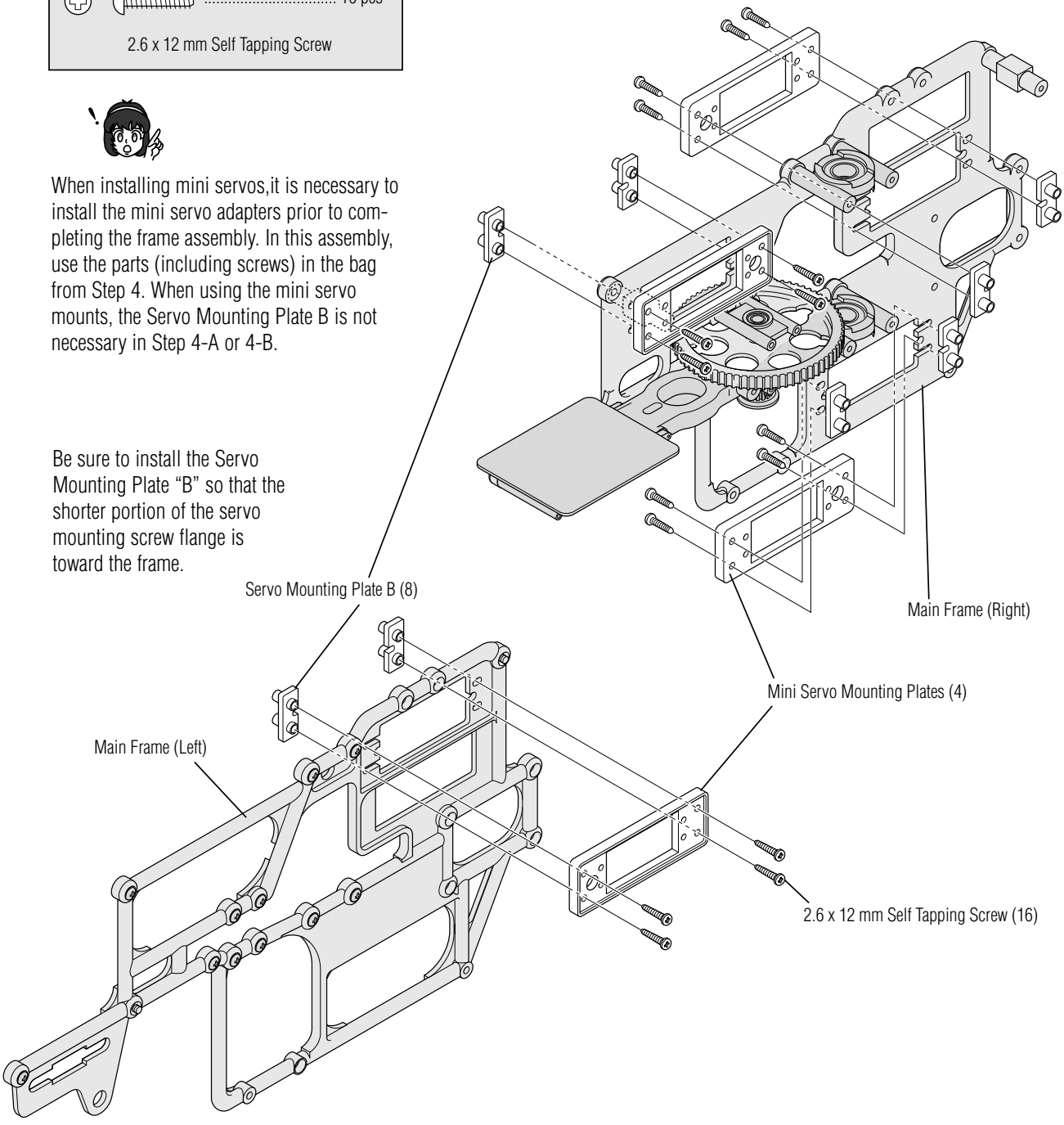
If you are using standard size servo, please proceed to Step 1-3.

16 pcs

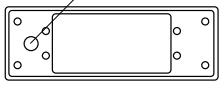
2.6 x 12 mm Self Tapping Screw

When installing mini servos,it is necessary to install the mini servo adapters prior to completing the frame assembly. In this assembly, use the parts (including screws) in the bag from Step 4. When using the mini servo mounts, the Servo Mounting Plate B is not necessary in Step 4-A or 4-B.

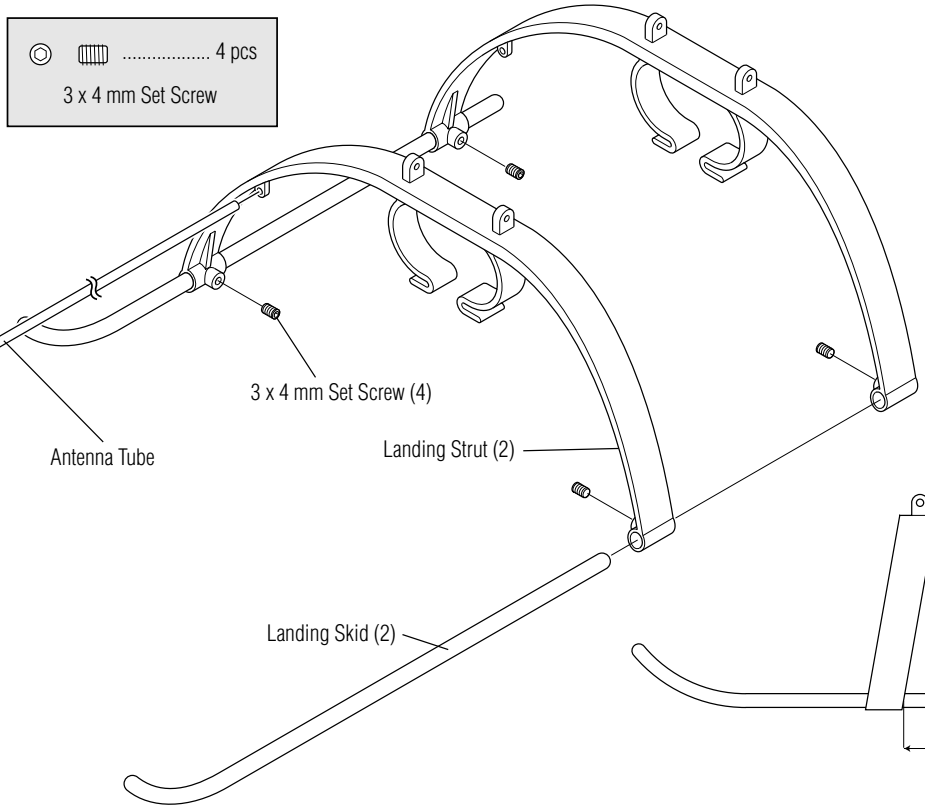
Be sure to install the Servo Mounting Plate “B” so that the shorter portion of the servo mounting screw flange is toward the frame.



Install the servo adapter so that the flat side faces toward the frame. Be sure to note the correct orientation using the 4 mm hole as a guide when installing.



1-3 Landing Gear Assembly



Do not over tighten the four 3 x 4 mm set screws as it can damage the landing struts.

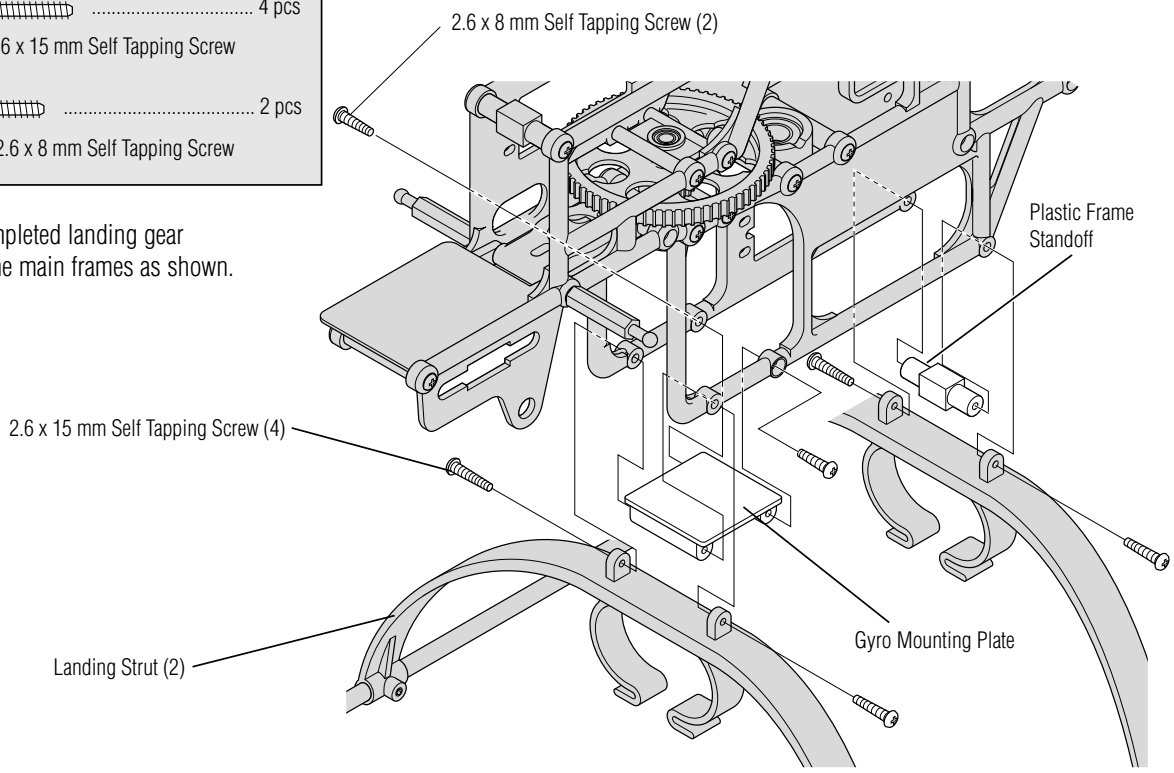
Refer to the diagram below for proper positioning when assembling the landing gear assembly.

1-4 Landing Gear Attachment

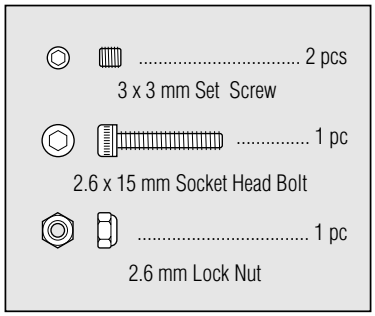
..... 4 pcs
2.6 x 15 mm Self Tapping Screw

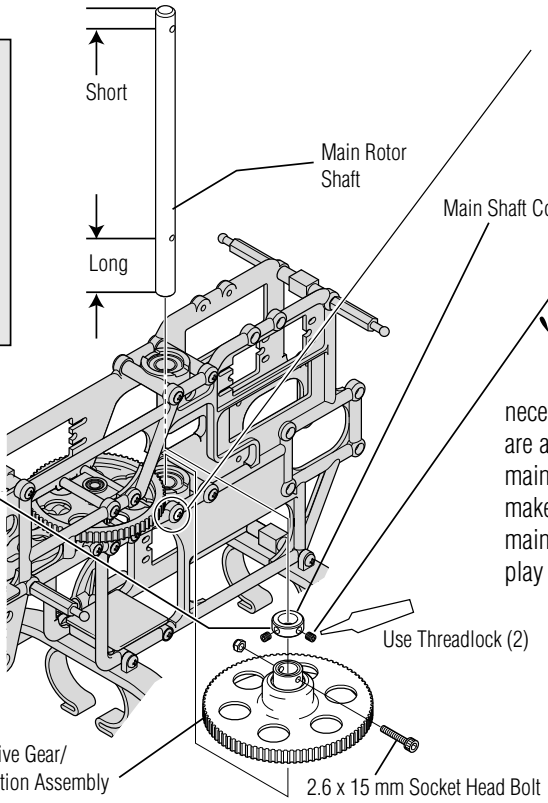
..... 2 pcs
2.6 x 8 mm Self Tapping Screw

Attach the completed landing gear assembly to the main frames as shown.



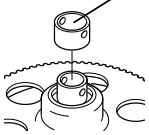
2-1 Main Drive Gear Assembly Installation



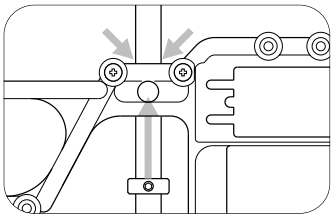


If it is difficult to insert the main drive gear assembly, loosen the 4 screws in the lower main shaft bearing block and push the block down slightly. Retighten the screws when completed.

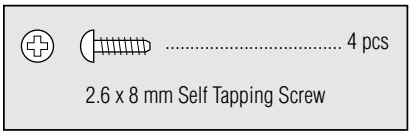
Lift the main shaft collar upwards and secure to the main shaft using the 2 set screws. It will be necessary to align these set screws so that they are accessible through the hole in the side of the main frame. While securing the set screws, make sure that you are pushing down on the main rotor shaft so that there will be no up/down play in the main shaft once the collar is secured.



Mount the autorotation collar on to the autorotation assembly hub so that the holes are aligned properly. Please note the correct direction of the collar during assembly.



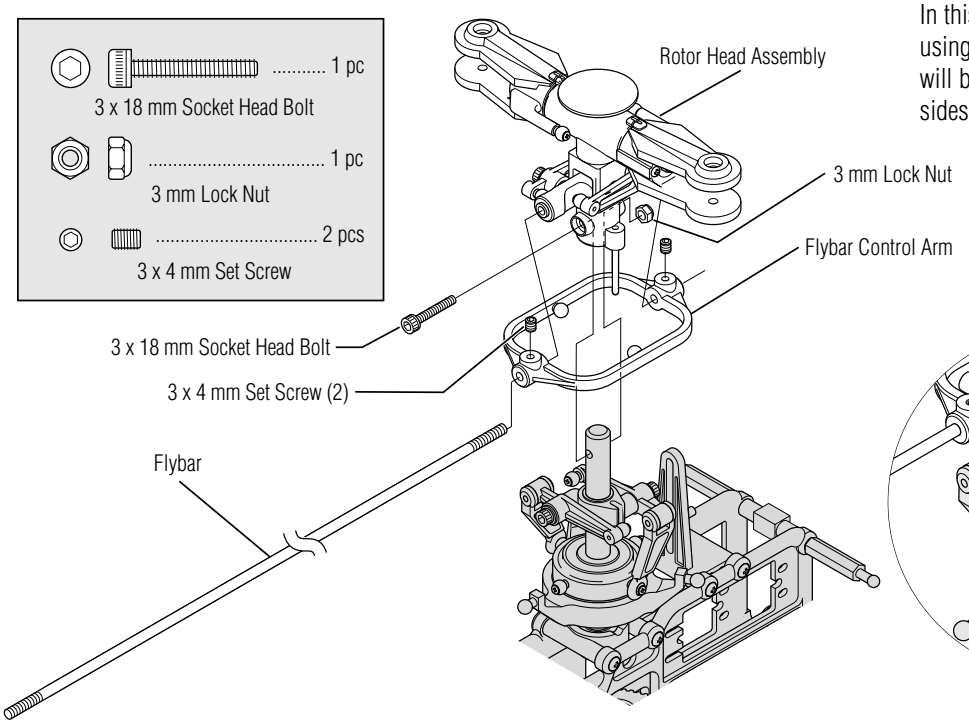
2-2 Swashplate and Washout Assembly Installation



Slide the swashplate assembly and the washout assembly onto the main rotor shaft. Next, install the antirotation plate so that the long pin located on the lower swashplate ring engages into the grove of the plate as shown.

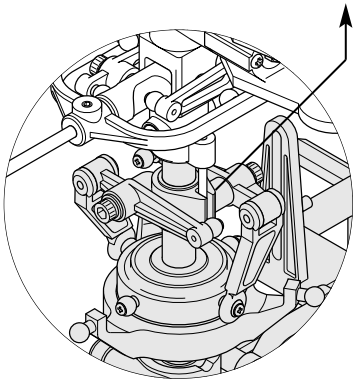
Attach the 2 washout links to the top of the swashplate ring as shown in the diagram to the right.

2-3 Rotor Head Installation



In this step, secure the flybar temporarily using the 3 x 4 mm set screws. The flybar will be adjusted in Step 2-5 so that both sides of the flybar are of equal length.

Be sure that the antirotation pin located at the bottom of the main rotor head fits into the slot of the washout base.



2-4 Flybar Paddle Installation

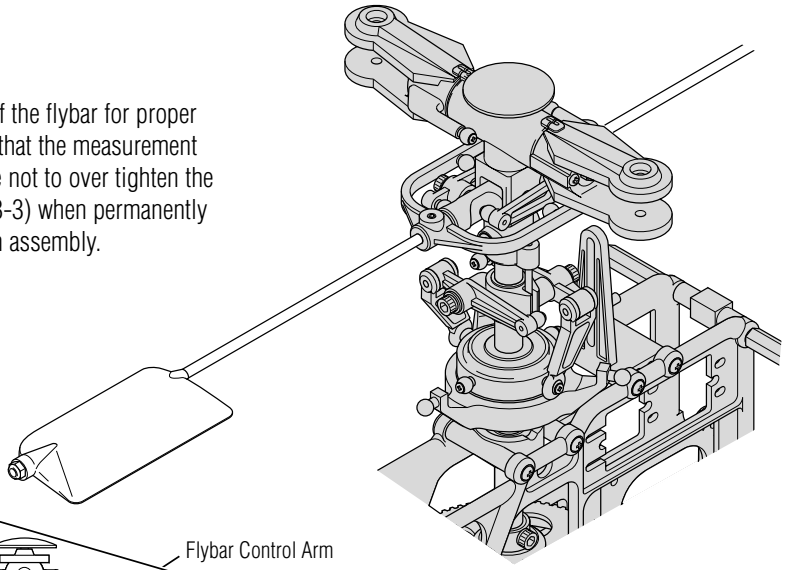
Be sure to note the correct direction of the flybar paddle as shown in the diagram. When correctly installed, the words “JR Propo” should face upward.

It is very important to insure that the 2 flybar paddles are parallel to each other, as well as to the flybar control arm assembly.

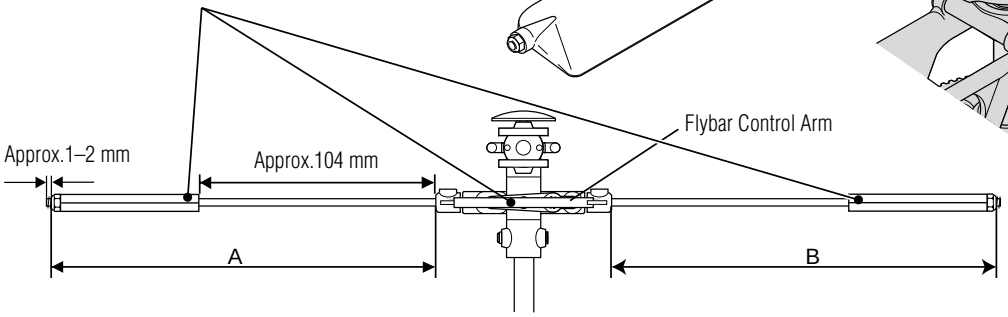
Insert the flybar paddle 80 mm onto the flybar, then secure with the 3 mm lock nuts (2) provided.

2-5 Flybar Adjustment

Refer to the diagram below to adjust the position of the flybar for proper centering. Center the flybar in the seesaw shaft so that the measurement of positions A and B are exactly the same. Be sure not to over tighten the set screw, 3 x 4 mm (temporarily secured in Step 3-3) when permanently securing, as it could damage the flybar control arm assembly.



Flybar paddles and flybar control arm should be parallel at this time.

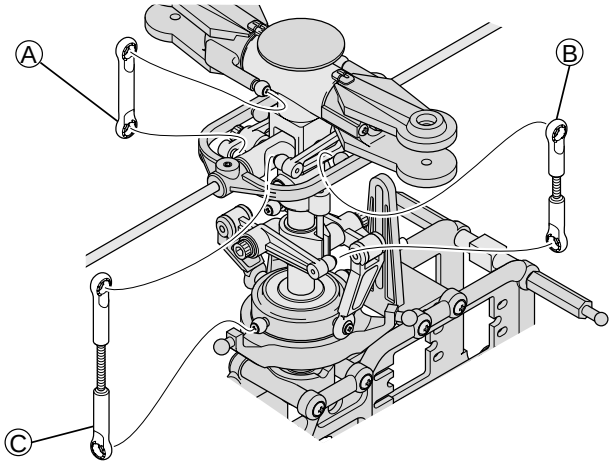


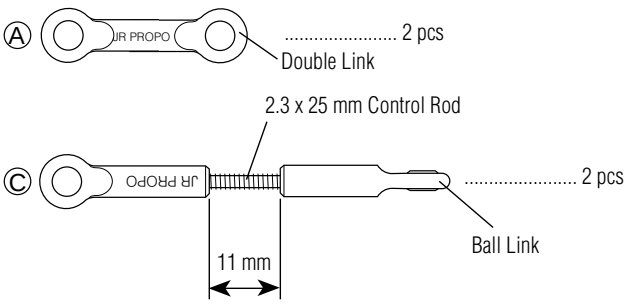
Check to insure that 2 flybar paddles and flybar control arms are all parallel to each other as shown.

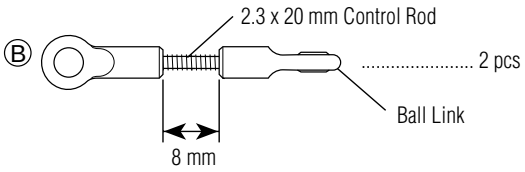
2-6 Control Rod Installation

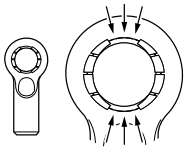
Thread the universal links onto the threaded rods to the correct lengths as shown in diagrams A, B and C. Please check to insure the correct direction of the universal links as shown in the diagram, so that the letters "JR PROPO" face the correct direction as shown. Next, install the control rods as shown so that the letters "JR PROPO" are facing outward.

Test the movement of the universal links to be sure that they move freely, without a large amount of resistance or play. If the links move tightly, it will be necessary to modify the universal link with the optional JR ball link sizing tool. This procedure is very important to insure the best flight performance.



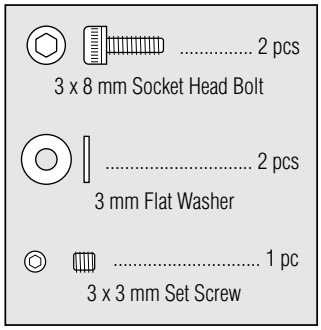




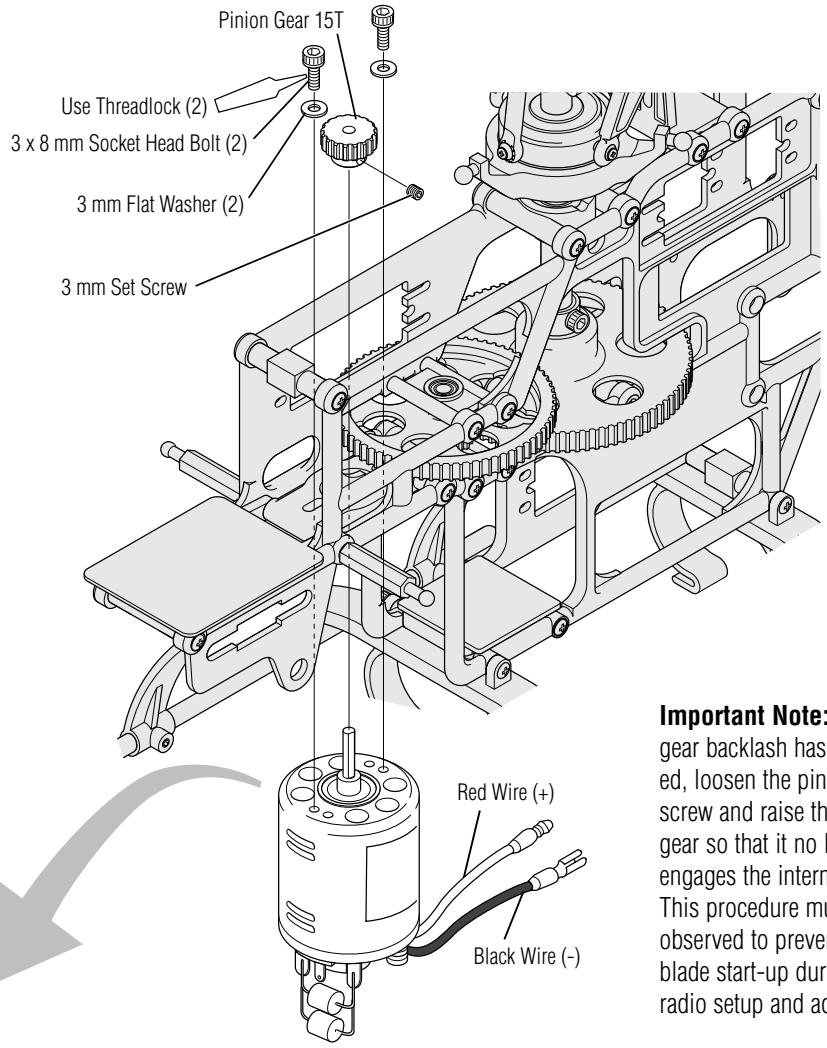


Universal Link S (short) has gaps at the edge on one side only. Install these links so this side faces the joint ball.

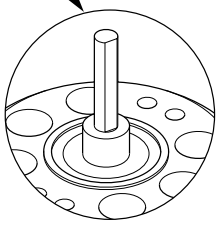
2-7 Motor Installation



Adjust the gear backlash before securing the 3 x 8 mm socket head bolt.

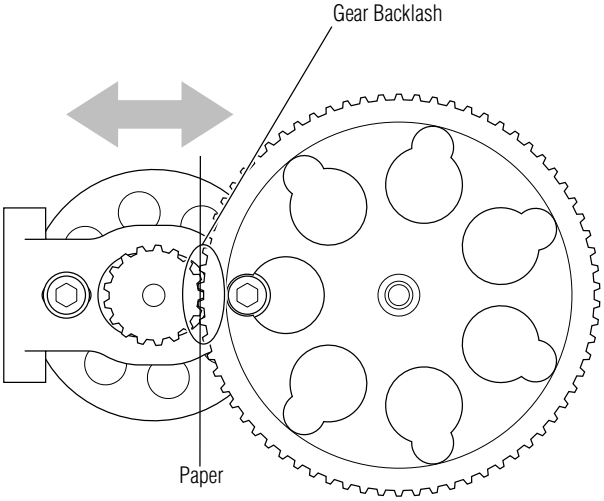


When securing the pinion gear, be sure that the 3 x 3 mm set screw engages the flat spot of the motor shaft.



Important Note: Once the gear backlash has been adjusted, loosen the pinion gear set screw and raise the pinion gear so that it no longer engages the intermediate gear. This procedure must be observed to prevent accidental blade start-up during initial radio setup and adjustment.

When installing the motor, it will be necessary to pass the socket head bolt through the hole on the intermediate gear. Next, adjust the gear backlash and secure the bolts completely using Threadlock.



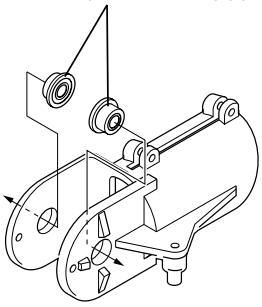
Gear Backlash Adjustment: For smooth operation and performance, it is necessary to adjust the gear backlash properly. Excess gear backlash can cause premature gear wear and damage. Insufficient gear backlash can cause vibration, as well as overheating of the motor and speed controller. Adjust the gear backlash by placing one piece of paper between the gears to set the distance. When the bolts are secure, remove the paper and test the gear backlash to insure that there is a slight amount of free movement between the gears.

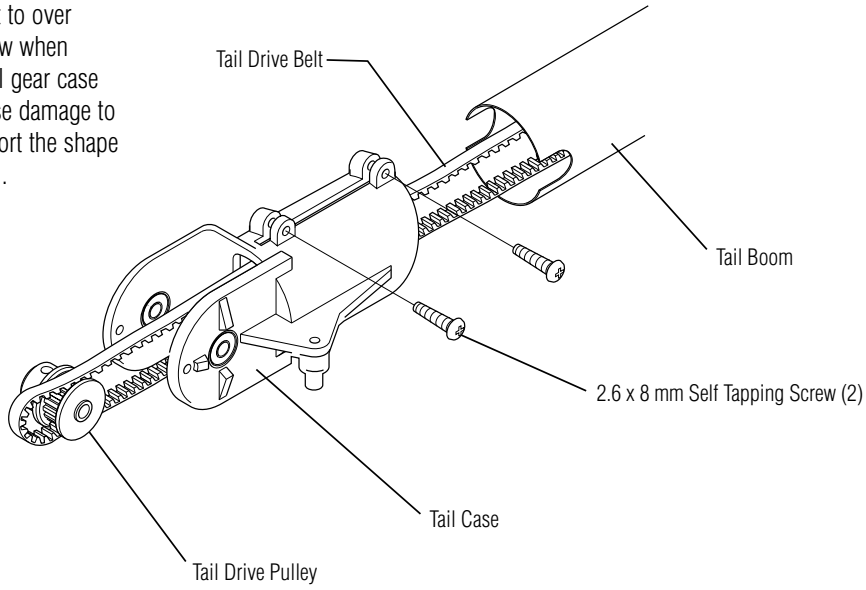
3-1 Tail Gear Case Assembly

..... 2 pcs
2.6 x 8 mm Self Taping Screw

Use caution not to over tighten the screw when securing the tail gear case as it could cause damage to the case or distort the shape of the tail boom.

Be sure to note the correct orientation of the tail boom so the slotted side is toward the tail gear case. Insert the tail boom fully into the tail gear case before tightening.

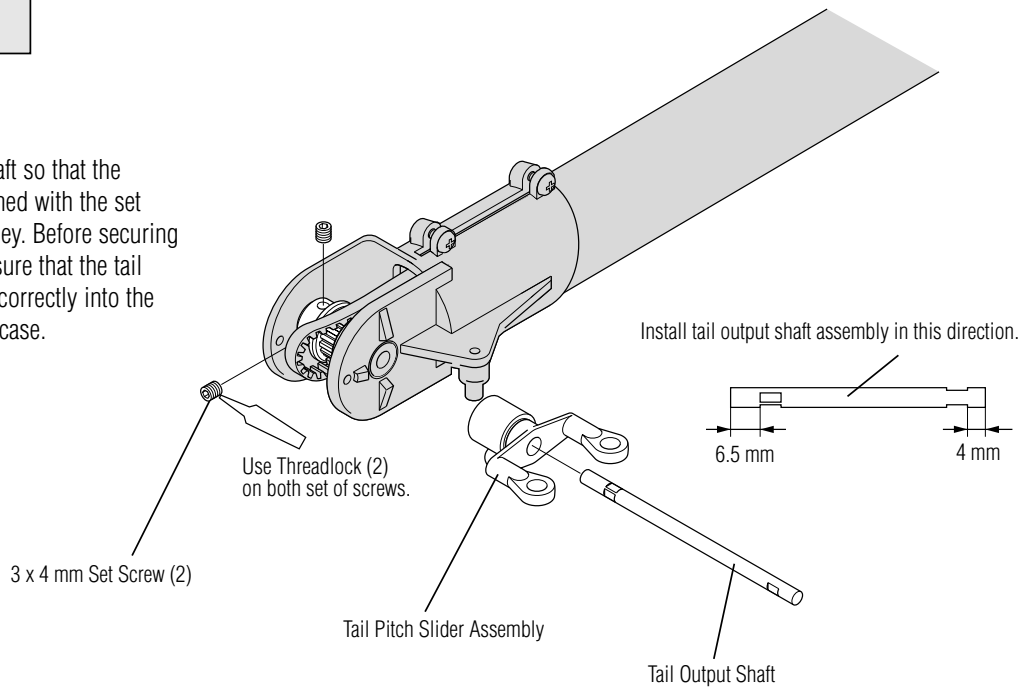




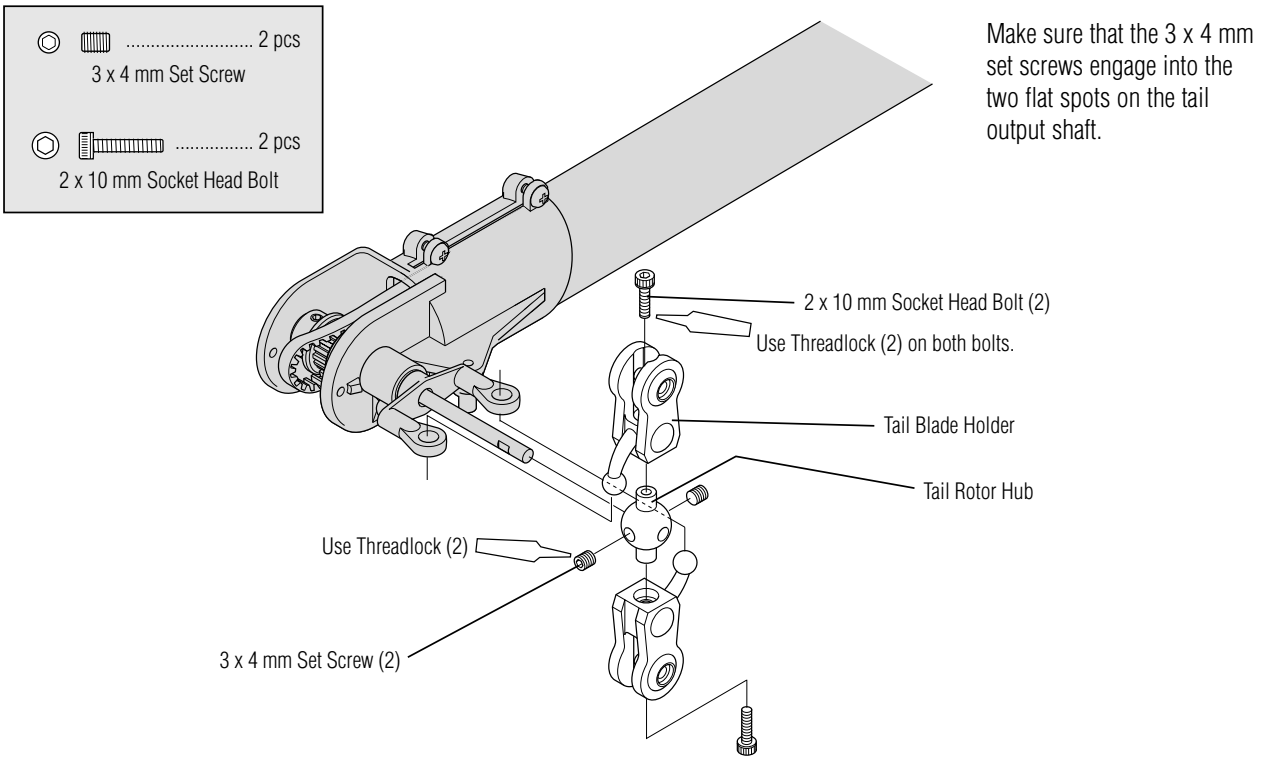
3-2 Tail Output Shaft/Pitch Slider Installation

..... 2 pcs
3 x 4 mm Set Screw

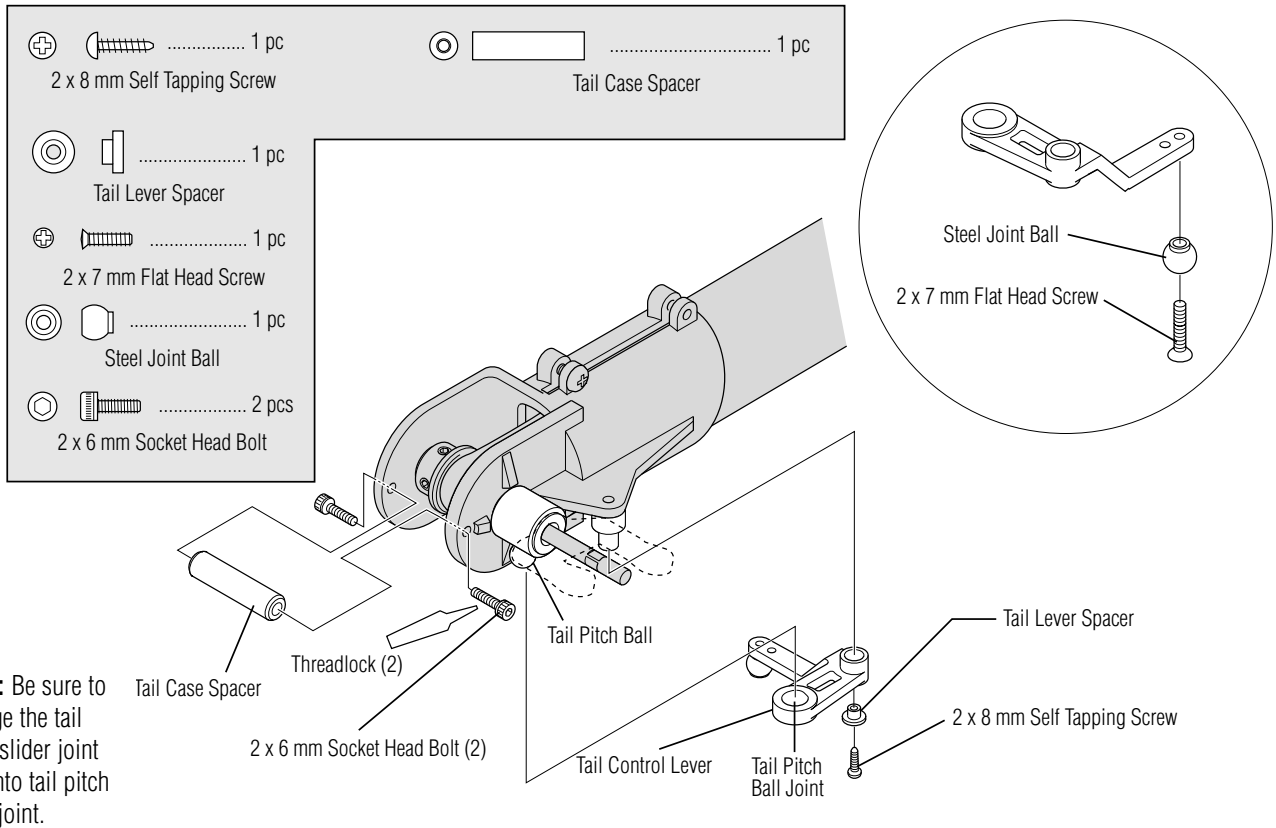
Position the tail output shaft so that the two 90° flat spots are aligned with the set screws in the tail case pulley. Before securing the set screws, please be sure that the tail output shaft is positioned correctly into the 2 bearings of the tail gear case.



3-3 Tail Rotor Assembly Installation

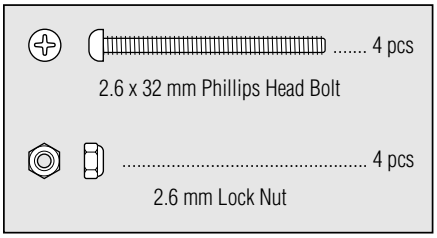


3-4 Tail Pitch Control Lever Installation

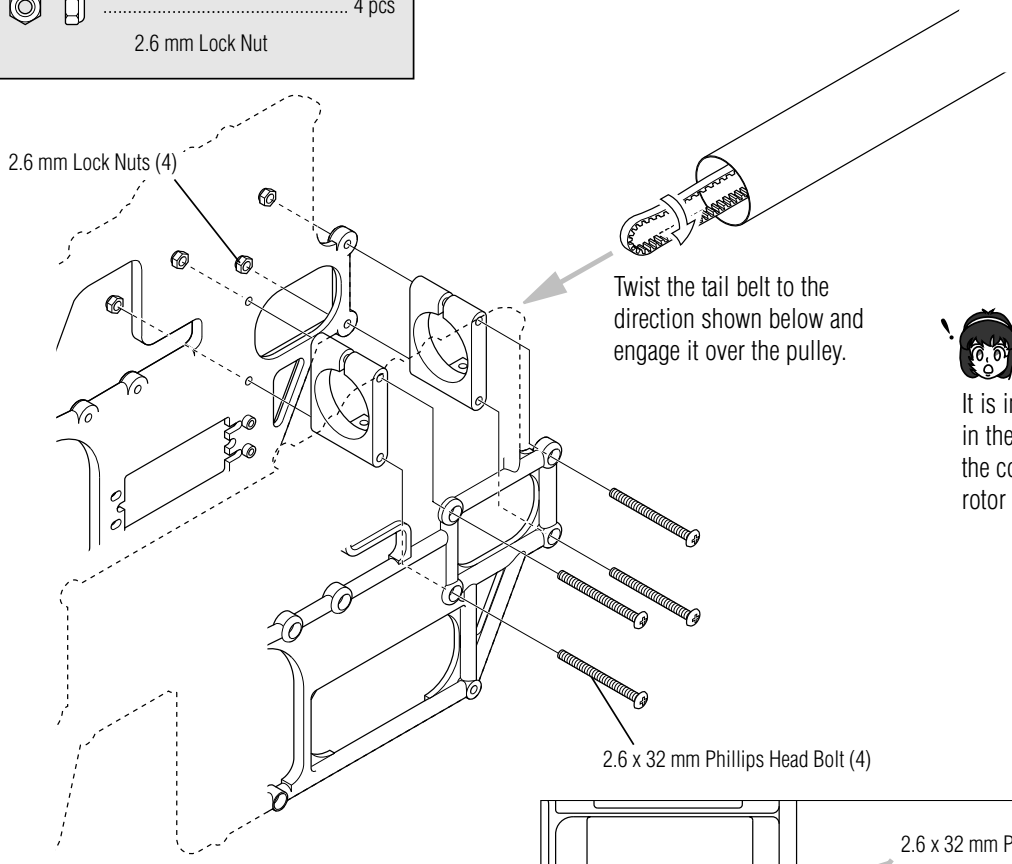


Note: Be sure to engage the tail pitch slider joint ball into tail pitch lever joint.

3-5 Tail Boom Assembly Installation

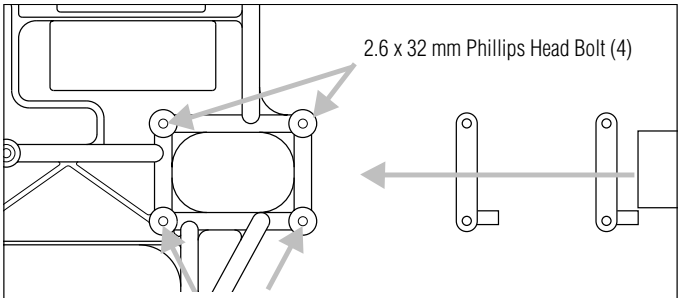


Slide the tail boom through the tail boom carrier and engage the tail drive belt over the front pulley. Next, set the belt tension as shown below.

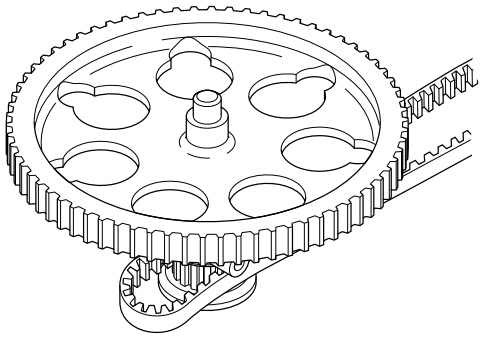


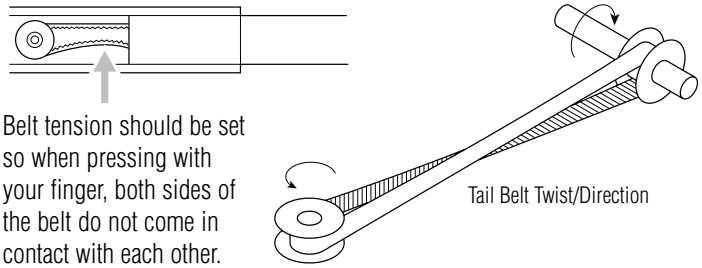
Twist the tail belt to the direction shown below and engage it over the pulley.

It is important to install the belt in the proper position to insure the correct rotation of the tail rotor blades during flight.



Tighten bolts after the belt tension has been set. Check to insure that the tail rotor output shaft is level before tightning.

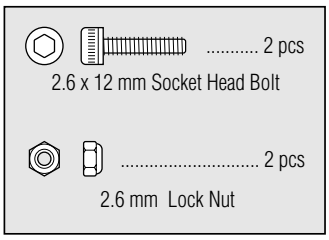


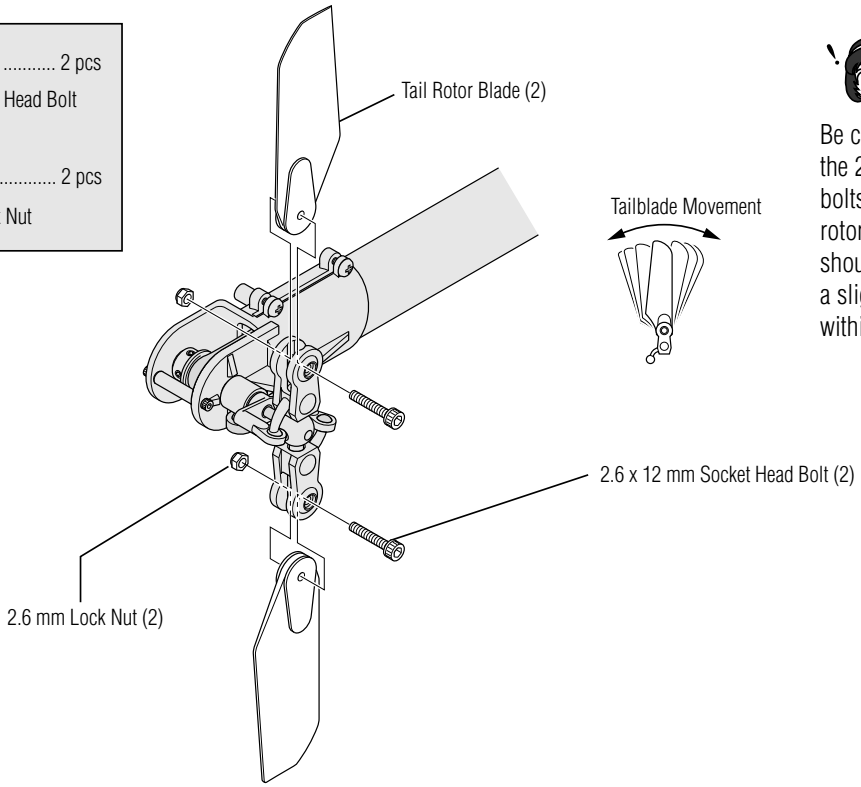


Belt tension should be set so when pressing with your finger, both sides of the belt do not come in contact with each other.

Tail Belt Twist/Direction

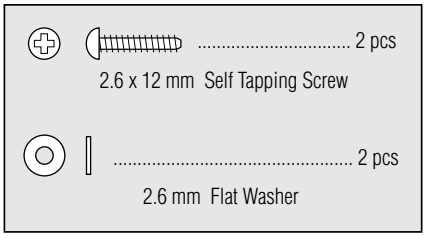
3-6 Tail Rotor Blade Installation

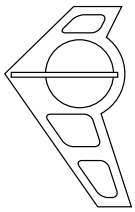


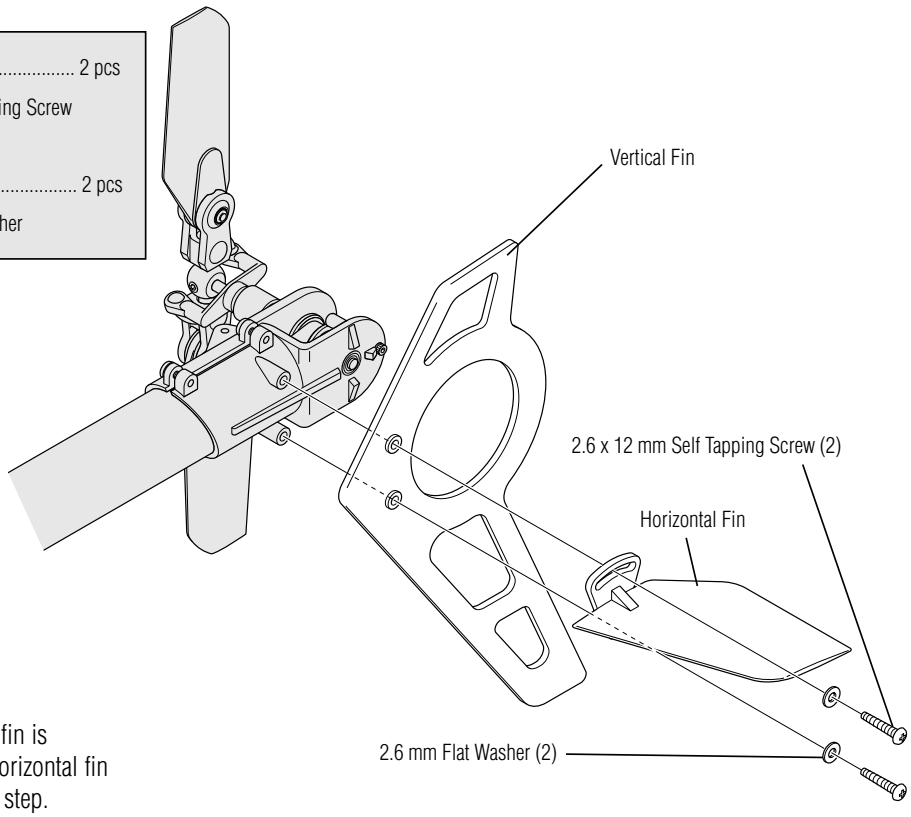


Be careful not to over tighten the 2.6 x 12 mm socket head bolts when attaching the tail rotor blades. The tailblades should be able to move with a slight amount of resistance within the tail blade holders.

3-7 Vertical/Horizontal Fin Installation





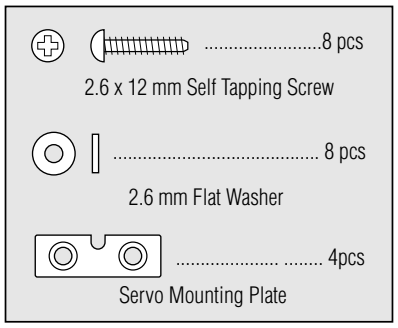


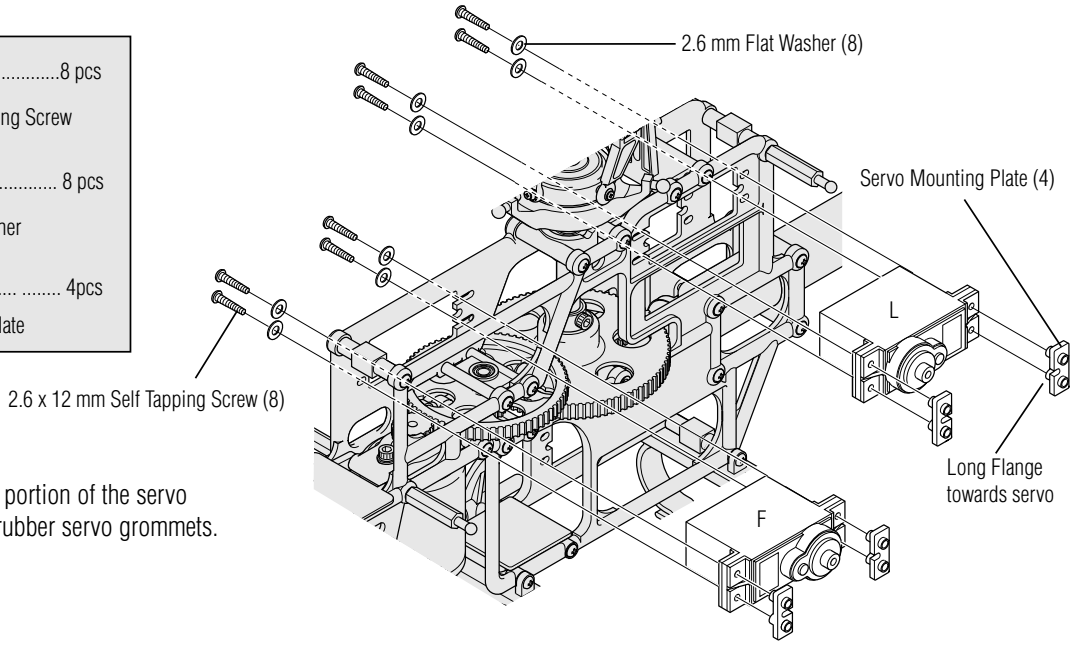
Although the angle of the horizontal fin is adjustable, it is suggested that the horizontal fin be installed horizontally (flat) in this step.

Servo Installation and Linkage Suggestions

- Use caution not to overtighten the servo mounting screws. The servos should be able to be moved slightly within the grommets so that they have a slight amount of vibration absorption.
- Note the correct direction of the servo output shaft as shown in the diagrams. If the servos are installed in the incorrect direction, the linkages will not connect properly.
- Check to insure that all control rods have been adjusted to the proper lengths as shown in the manual.
- Install the receiver, gyro, and speed controller using double-sided servo tape as suggested. Please make sure that the cases of these components do not come in direct contact with other parts of the model.
- Bundle all wires neatly using nylon ties as recommended. Check to make sure that they cannot become tangled in the gearing or moving control system parts of the model.

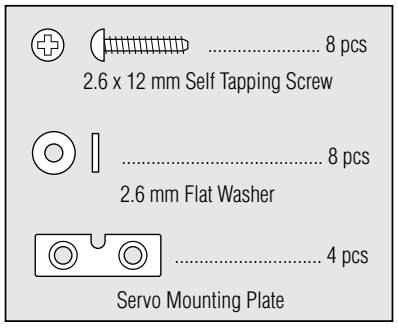
4-1 Aileron/Elevator Servo Installation (Standard Servos)

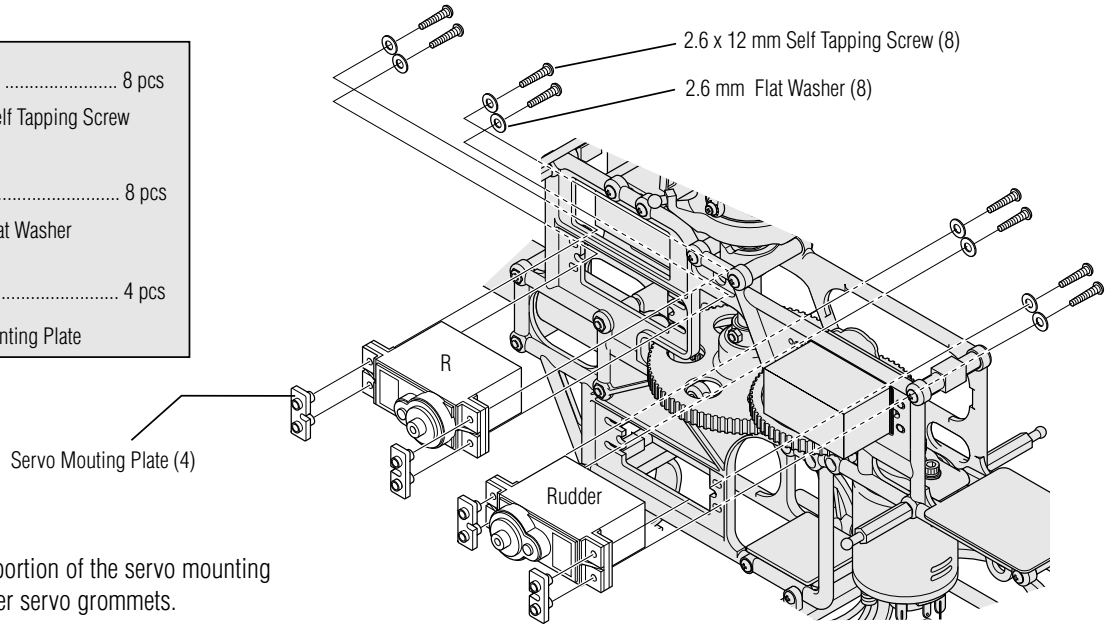




Note: Fit the long flanged portion of the servo mounting plate B into the rubber servo grommets.

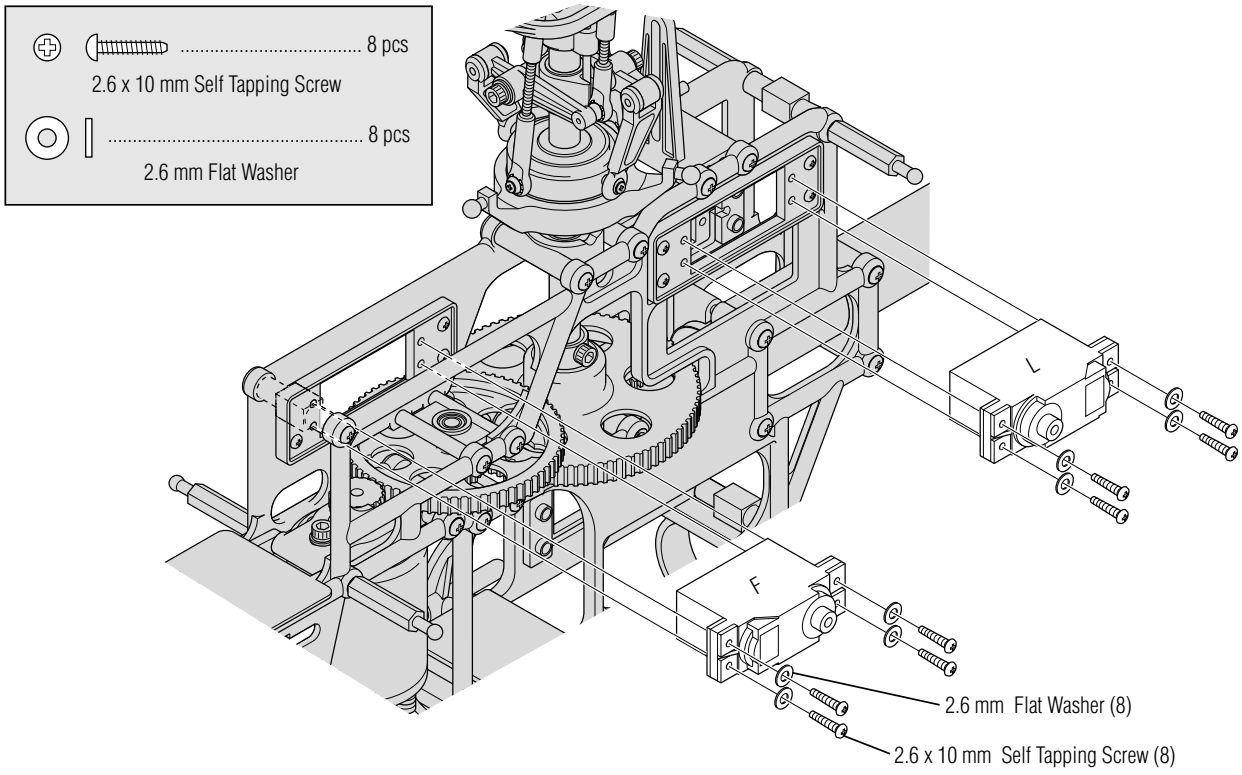
4-2 Pitch/Rudder Servo Installation (Standard Servos)



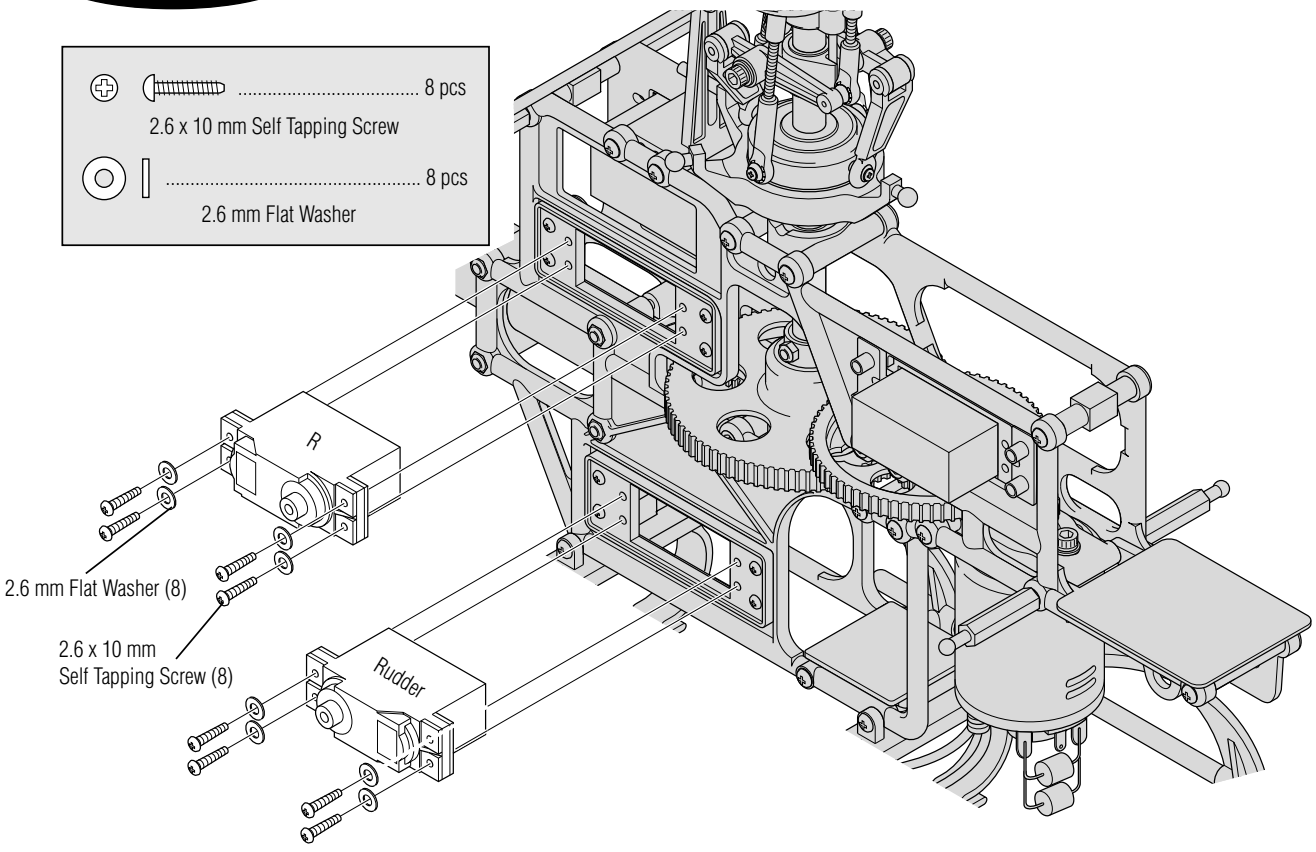


Fit the long flanged portion of the servo mounting plate B into the rubber servo grommets.

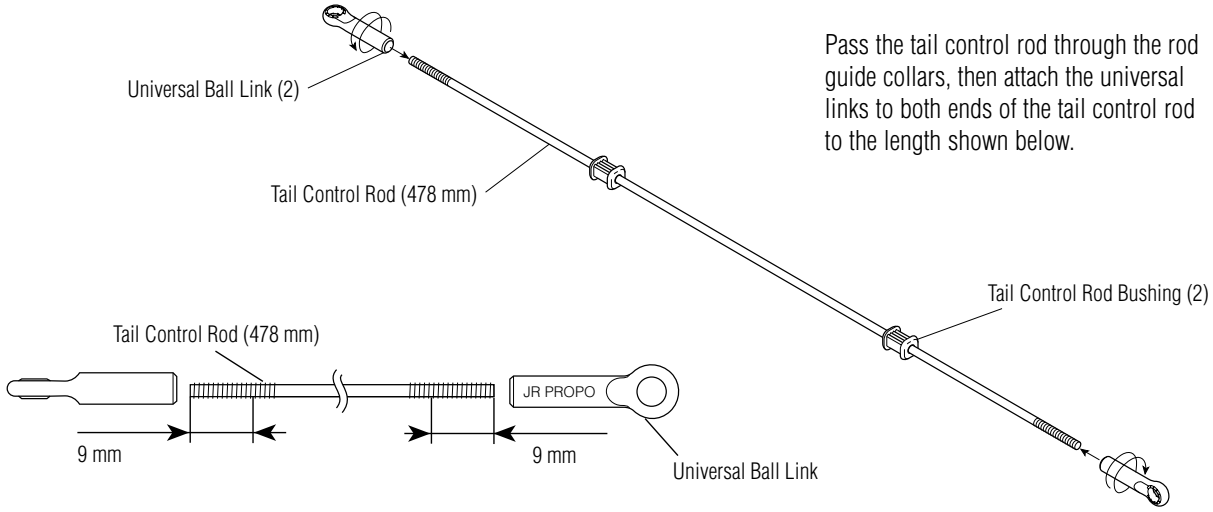
4-A Aileron/Elevator Servo Installation (Mini Servo)



4-B Pitch/Rudder Servo Installation (Mini Servo)

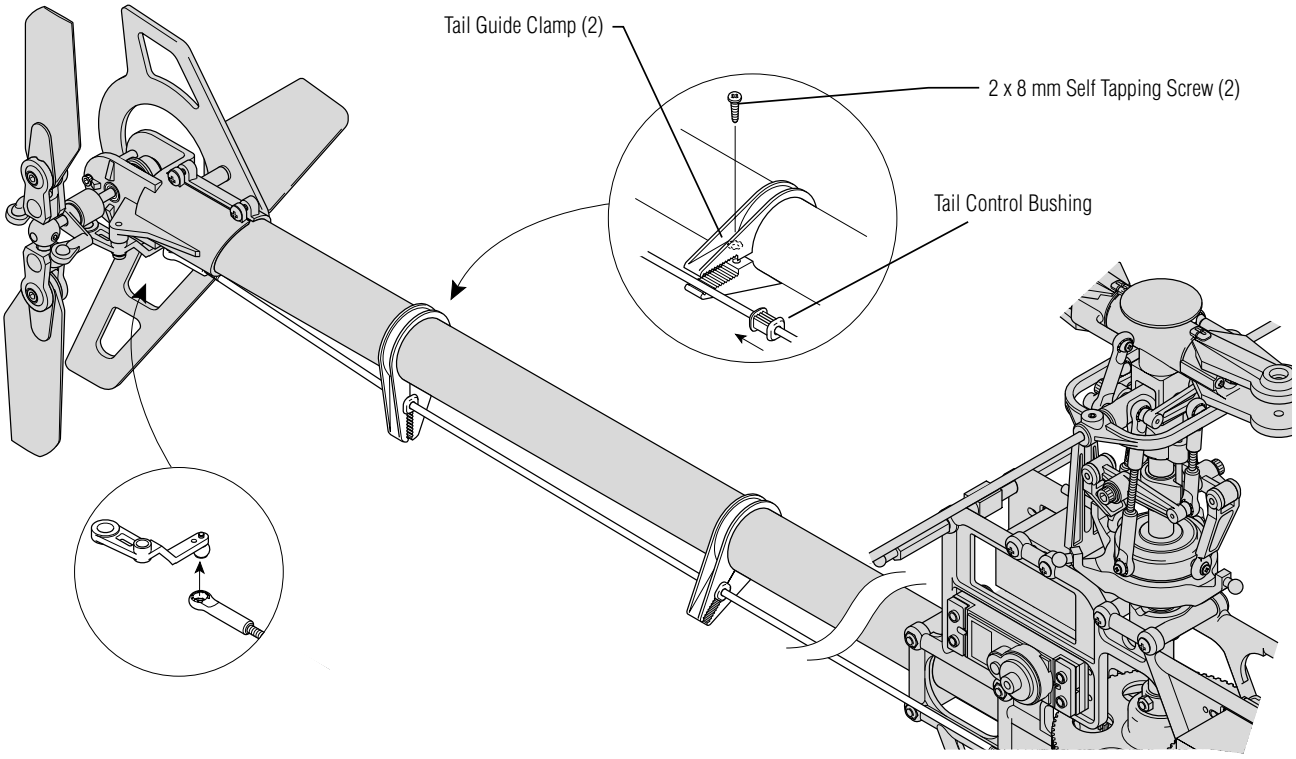


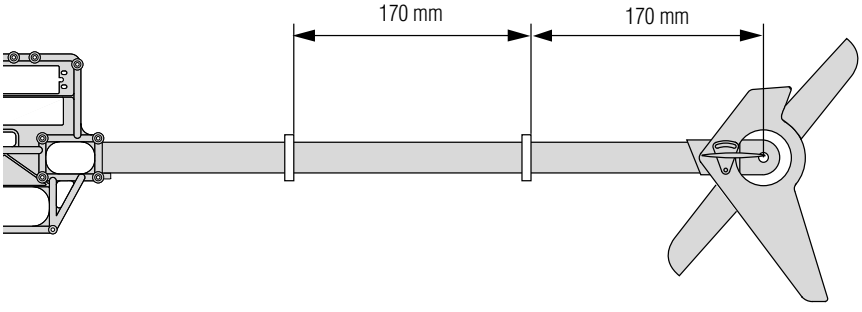
4-3 Tail Pitch Control Rod Assembly



Pass the tail control rod through the rod guide collars, then attach the universal links to both ends of the tail control rod to the length shown below.

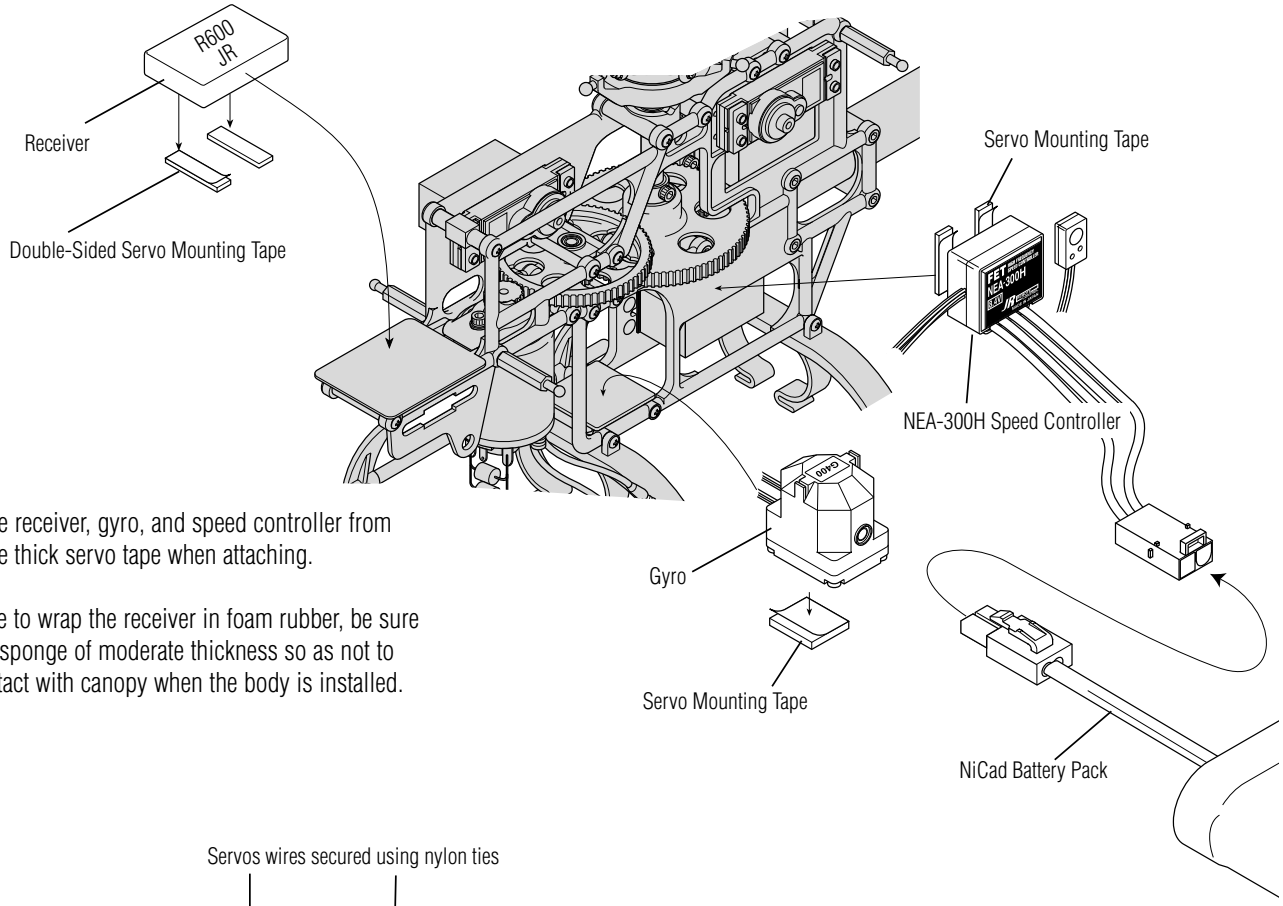
4-4 Tail Control Rod Installation





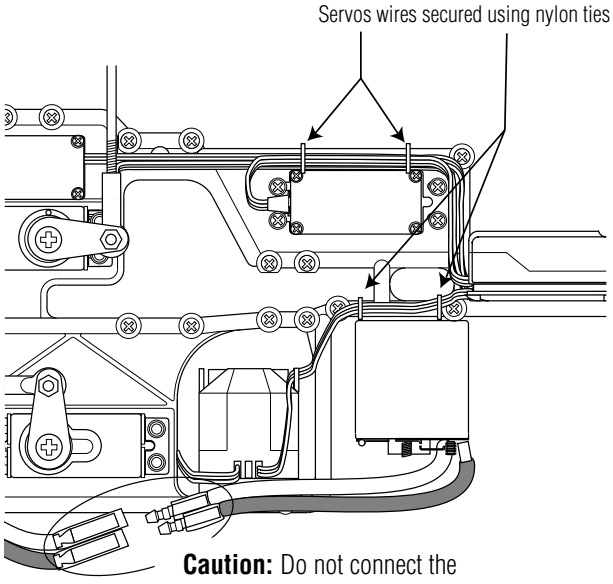
Adjust the space and the angle of the tail guide clamps so that the tail control rod will move freely. Refer to the diagram for the correct spacing dimensions.

4-5 Receiver/Gyro/Speed Controller Installation

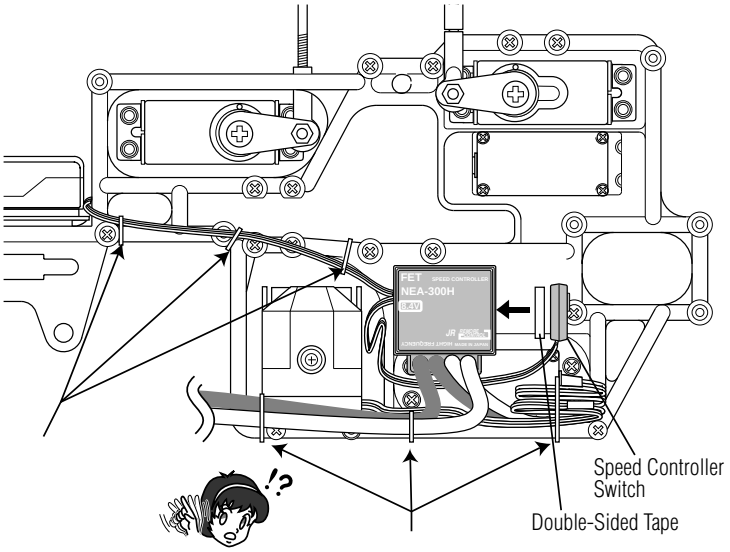


To protect the receiver, gyro, and speed controller from vibration, use thick servo tape when attaching.

If you choose to wrap the receiver in foam rubber, be sure to wrap it in sponge of moderate thickness so as not to come in contact with canopy when the body is installed.



Caution: Do not connect the motor connectors at this time.



Very Important: In this step, the battery is connected temporarily. **Do not** connect motor or speed controller at this time as the model could start suddenly if the direction of the throttle servo travel is incorrect. This could be very dangerous.

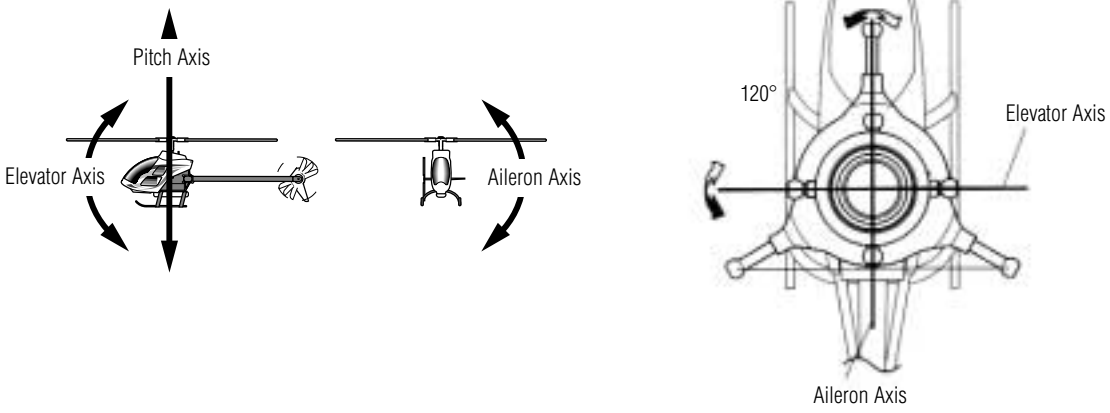
Install the speed controller switch using double-sided adhesive tape (not included) directly to the side of the speed controller as shown in the diagram. Be sure that the switch or the cords cannot come into contact with the drive gear system. Secure firmly with nylon ties (included.) Check to insure other wiring cannot come in contact with the corner of the frame or drive gear system.

120 3-SERVO CCPM SWASHPLATE MIXING

The JR 120° CCPM or Cyclic/Collective Pitch Mixing system offers the user a control system that can accomplish the same control inputs as the one servo standard system, but with increased precision and reduced complexity.

As with the one servo system, the JR CCPM system utilizes three servos for the three main controls: aileron (roll), elevator(pitch), and collective. The CCPM lower swashplate ring is designed with only three control balls, spaced at 120° from each other, hence the 120° CCPM designation. Although the control balls are not at 90° as in the standard system, the aileron (roll) axis is still parallel to the main mechanics of the helicopter, and the elevator (pitch) axis still functions at 90° to the mechanics as does the one servo system. Please refer to the diagram below for clarification.

The main difference in the way that these two systems operate is that unlike the one servo system where the three servos work completely independent from each other, the CCPM systems work as a team to achieve the same control inputs. For example, if an aileron (roll) input is given, two servos work together to move the swashplate left and right. If an elevator (pitch) input is given, all three servos work together to move the swashplate fore and aft. For collective, it's also the strength of three servos that will move the swashplate up and down the main rotor shaft. With two or three servos working at the same time during any given control input, servo torque is maximized and servo centering is also increased. In addition to these benefits, CCPM achieves these control responses without the need for complex mechanical mixing systems that require many more control rods and parts to set up.



JR 120° 3 Servo CCPM Control System

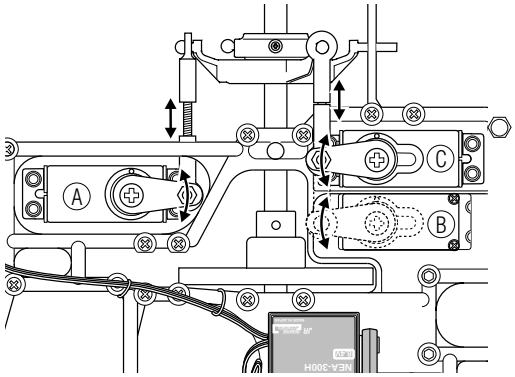
This amazing CCPM control is achieved through special CCPM swashplate mixing that is preprogrammed into many of today's popular radio systems. Since the 120° CCPM function is preprogrammed, CCPM is no more complicated to set up than a conventional one servo standard system. When you factor in the reduced parts count and easy programming, CCPM is actually easier to set up and operate than many conventional systems.

For JR radio owners, please refer to the radio information contained at the front of this manual or on the following page to determine if your radio system has the CCPM function. For other brands of radio systems, please contact the radio manufacturer for CCPM information. Please note that it is not possible to program a non-CCPM radio system for CCPM operation.

The JR 120° three servo CCPM relies on the radio's special CCPM swashplate mixing, rather than a conventional mechanical mixer that is utilized to achieve the same results. The radio's 120° 3-servo CCPM function automatically mixes the three servos to provide the correct mixing inputs for aileron (roll), elevator (pitch) and collective. The following is an example of how each control input affects the servo's movement:

1. COLLECTIVE

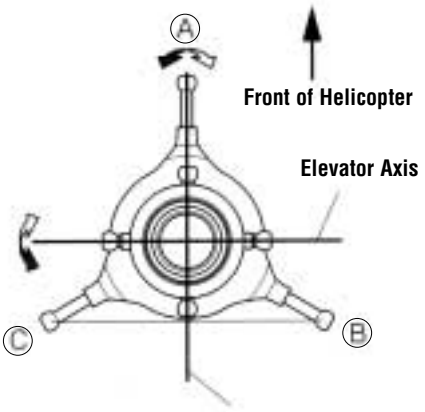
When a collective pitch input is given, all three servos (A, B, and C) move together in the same direction, at equal amounts, to raise and lower the swashplate while keeping the swashplate level. During this function, all three servos travel at the same value (100%) so that the swashplate can remain level during the increase and decrease in pitch. As mentioned, this mixing of the three servos is achieved through the radio's CCPM program.



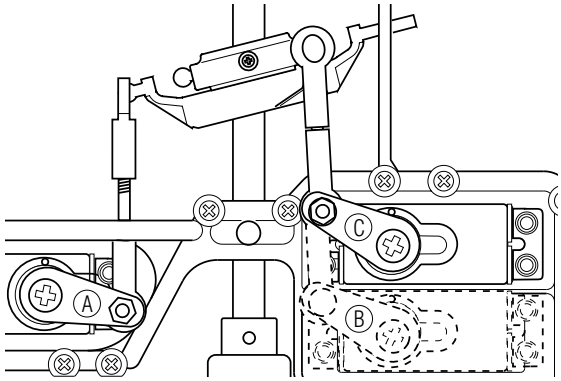
① **Collective Movement**

2. ELEVATOR (PITCH)

When an elevator input is given, all three servos must move to tilt the swashplate fore and aft, but their directions vary. The two rear servos (B and C) move together in the same direction, while the front servo (A) moves in the opposite direction. For example, when an up elevator (back cyclic) command is given, the two rear servos (B and C) will move downward, while the front servo (A) moves upward so that the swashplate will tilt aft. During this function, the front servo (A) travels at 100%, while the two rear servos (B and C) travel at 50% (1/2 the travel value) of the front servo. This difference in travel is necessary due to the fact that the position of the front control ball is two times the distance of the two rear control ball position as measured from the center of the swashplate. This mixing of the three servos is also achieved through the radio's CCPM program.



JR 120° CCPM Control System

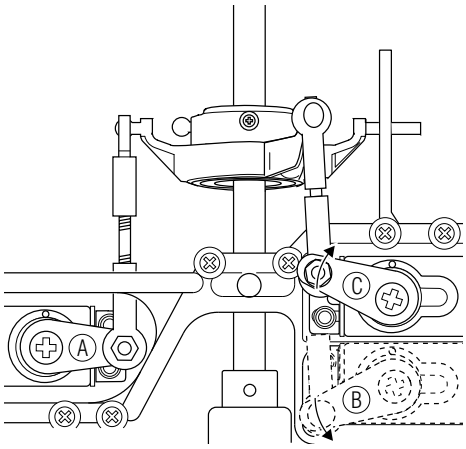


② **Elevator Movement**

3. AILERON (ROLL)

When an aileron (roll) input is given, the two rear servos (B and C) travel in opposite directions, while the front servo (A) remains motionless. For example, when a left aileron (roll) command is given, the left rear servo (C) will move downward, while the right rear servo (B) will move upward to tilt the swashplate to the left. As mentioned, the front servo (A) will remain motionless. The travel value for each of the two rear servos is 100%.

Please refer to the diagram at the right for clarification.



③ **Aileron Movement**

RADIO SYSTEM REQUIREMENTS (NOT INCLUDED):

6-channel or greater R/C helicopter system with 120° CCPM function
5 servos
Gyro

CCPM-Ready JR Radio Systems
Most current JR heli radio systems [XP652, X-3810, X-3810A.D.T., PCM-10, PCM-10S, PCM-10S World Champion Model, PCM-10X] are equipped with 120° CCPM electronics for use with the Voyager CCPM machines.

*Please note that some 3810 systems need to have the CCPM function activated.


XP652


10X


X-3810A.D.T.

CCPM SOFTWARE ACTIVATION AND INITIAL ADJUSTMENT

1. JR XP652 SYSTEMS

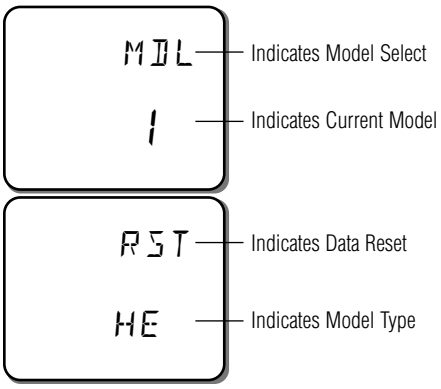
The following activation and setup procedure should be used for all JR XP652 systems. Please note that the XF622 and XP642 6 channel systems do not have the required CCPM software.

Prior to activating the CCPM function, it is first suggested that the data reset function be performed to reset the desired model number to be used back to the factory default settings.

Caution: Prior to performing the data reset function, it will be necessary to select the desired model number to be used.

A) Model Selection

Press the *Mode* and *Channel* keys simultaneously while turning the power switch on to enter the system mode. Next, press the *Channel* key until "MDL" (model select) appears on the screen and choose the desired model number to be used.

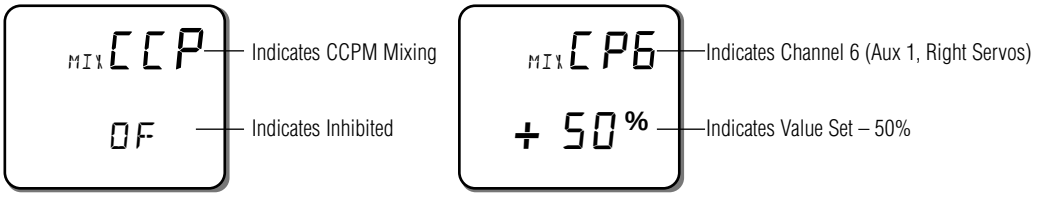


B) Data Reset

Press the *Mode* key until "RST" (data Reset) appears on the screen. Press the + and - keys simultaneously to reset the current model. A high-pitched beep will indicate that the reset was successful. Press the *Mode* and *Channel* keys simultaneously to exit the system mode.

C) CCPM Activation

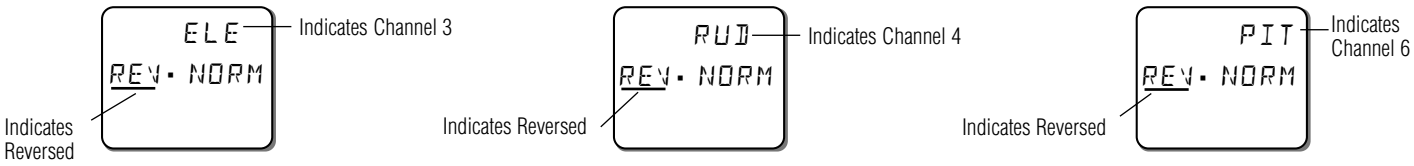
With the power switch still on, press the *Mode* and *Channel* keys simultaneously to enter the function mode. Press the *Mode* key until mix "CCP" (CCPM mixing) appears on the screen. Press the + or - keys to activate the CCPM function. *Mix Cp2* should appear on the screen. Next, press the *Channel* key until "MIX CP6" appears on the screen. It will be necessary to change the value of CP2, CP3, and Cp6 (Channel 6, Aux1) using the - key as shown below.



D) Servo Reversing

Press the *Mode* key until the servo reversing screen appears on the screen. Next, reverse the elevator (ELE), rudder (RUD) and pitch (PIT) channels by pressing the *Channel* key to select the desired channel, and then the + or - keys to set the servo direction.

	REV	NORM
THR		●
AIL		●
ELE	●	
RUD	●	
GER		●
PIT	●	



CCPM SOFTWARE ACTIVATION AND INITIAL ADJUSTMENT (CONTINUED)

E) Travel Adjust

Press the *Mode* key until "TRV ADJ" (travel Adjust) appears on the screen and adjust the travel values as shown by pressing the channel key to select the desired channel, and then the + or - key to set the desired travel value. Please note that the control stick must be moved to adjust the desired left/right, up/down positions. Press the *Mode* and *Channel* keys simultaneously or turn the power switch off to exit the function mode.

Standard Servos

	+	-
THR	100	100
AIL	100	100
ELE	100	100
RUD	70	70
GER	100	100
PIT	100	100

Digital/Super Servos

	+	-
THR	100	100
AIL	120	120
ELE	120	120
RUD	85	85
GER	100	100
PIT	100	100

Note: The travel values shown for the rudder function are for use with Piezo gyros, like the JR NEJ-400, or NEJ-450 type gyros. If a conventional mechanical type gyro is used (JR 120, 130, etc.), then the travel values of the rudder will need to be changed to approximately 100%.

2. JR X-3810/X-3810A.D.T. SYSTEMS

The following activation and setup procedure should be used for all JR X-3810 and X-3810A.D.T. systems.

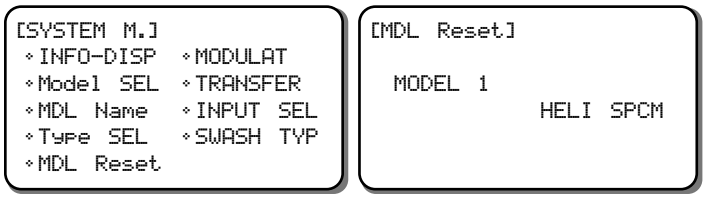
Note: Some early X-3810 systems will require the activation of the CCPM software. It's easy to identify if your system has the CCPM function activated by identifying if the "SWASH TYP" function appears in the system mode as shown in Section A below. Please refer to Section A to access the system mode.

Prior to activating the CCPM function, it is first suggested that the data reset function be performed to reset the desired model number to be used back to the factory default settings.

Caution: Prior to performing the data reset function, it will be necessary to select the desired model number to be used.

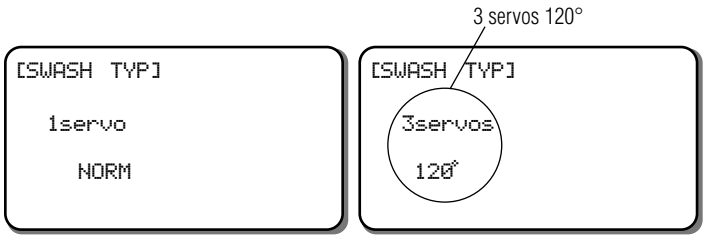
A) Modal Selecte/Data Reset

Press the *Up* and *Down* keys simultaneously while turning the power switch on to enter the system mode. Next, press the *Up* or *Down* keys to move the cursor to the model select function. Press the *Up* and *Down* keys simultaneously to enter the model select function. Select the desired model number to be used, then press the *Clear* key to reset the current model to the factory default settings. Press the *Up* and *Down* keys simultaneously to exit the model select function.



B) CCPM Activation

Press the *Up* or *Down* keys to move the cursor to the swash type function, then press the *Up* and *Down* keys simultaneously to access the swashplate type function.



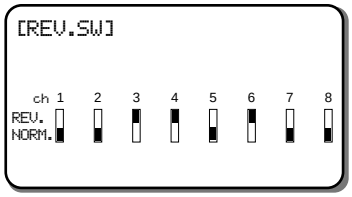
Press the *Up* or *Down* keys until "3 servo 120°" appears on the screen. Press the *Up* and *Down* keys simultaneously two times to exit the swashplate type function and the system mode.

C) CCPM Settings

Turn the power switch on, then press the *Up* and *Down* keys simultaneously to enter the function mode. Press the *Up* key until "Swash Mix" appears on the screen. Once this has been completed, it will be necessary to change the value of the aileron, elevator, and pitch functions from the factory default setting using the + and - keys.

D) Servo Reversing

Press the *Up* key until "Rev. Sw." (Servo Reversing) appears on the screen. Next, reverse channels 3, 4, and 6 by moving the cursor with the *Channel* key, then pressing the + or - keys.

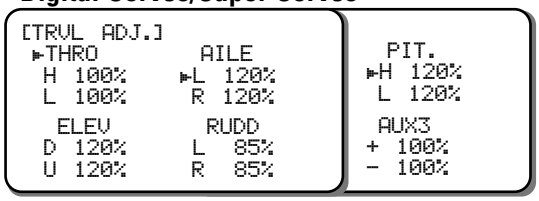


	REV	NORM
THR		●
AIL		●
ELE	●	
RUD	●	
GER		●
PIT	●	

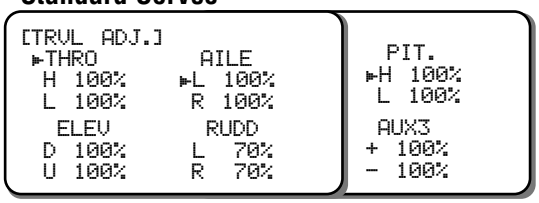
E) Travel Adjustment

Press the *Up* key until "TRVL. ADJ." (travel adjust) appears on the screen. Adjust the values as shown using the channel key to move the cursor, and the + and - keys to set the value. Press the *Sel* key to access the pitch channel values and set as indicated. Please note that the required travel values will vary based on the type of servo selected. Please also note that the throttle travel values may vary based on the type of engine used. This value can be fine tuned once the throttle linkage has been installed.

Digital Servos/Super Servos



Standard Servos



Note: The travel values shown for the rudder function are for use with Piezo type gyros, like the JR NEJ-400 or NEJ-450 type gyros. If a conventional mechanical type gyro is used (JR 120, 130, etc), then the travel values of the rudder channel will need to be reduced to approximately 100%.

3. JR 10 SERIES SYSTEMS

The following activation and setup procedure should be used for all JR PCM10, 10S, 10SX, 10SxII, and 10X systems.

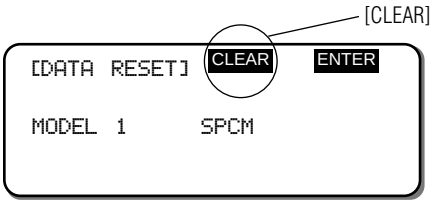
Prior to activating the CCPM function, it is first suggested that a data reset function be performed to reset the desired model number to be used back to the factory default settings.

Caution: Prior to performing the data reset function, it will be necessary to select the desired model number to be used. Access the model select function (code 84) and select the desired model to be used.

SETUP PROCEDURE

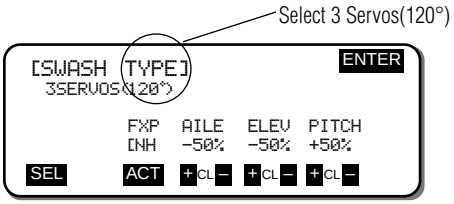
A) Data Reset

Access the data reset function (code 28) once the correct model number has been established. Next, press the *Clear* key to reset the current model. Press the *Enter* key to exit the data reset function.



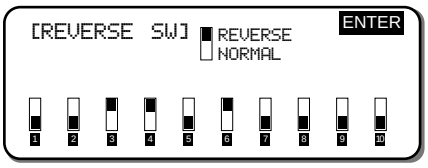
B) CCPM Activation

Access the swash type function (code 65). Next, press the *SEL* key until "3 servos (120°)" appear on the screen. Once this is complete, it will be necessary to change the value of the aileron, elevator, and pitch function from the factory default settings using the + and - keys below the pitch value. Press *Enter* to exit the swash type function.



C) Servo Reversing

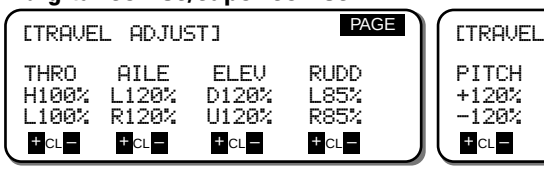
Access the servo reversing function (code 11). Next, reverse channels 1, 2, and 4 by pressing the desired channel number. The screen should appear as shown. Press *Enter* to exit the servo reversing function.



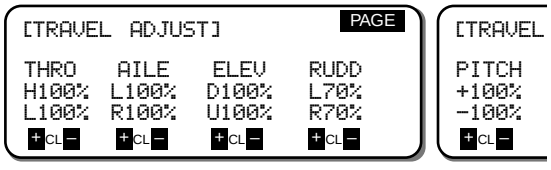
D) Travel Adjust

Access the travel adjust function (code 12) and adjust the servo travel values as shown. Please note that the required travel values will vary based on the type of servo selected. Press *Enter* to exit the travel adjust function.

digital servos/super servos



Standard servos



Note: The travel values shown for the rudder function are for use with Piezo type gyros, like the JR NEJ-400, or NEJ-450 type gyros. If a conventional mechanical type gyro is used (JR 120, 130 etc.), then the travel value of the rudder channel will need to be reduced to approximately 100%.

IMPORTANT CCPM PROGRAMMING DOS AND DON'TS

A. TRAVEL ADJUST

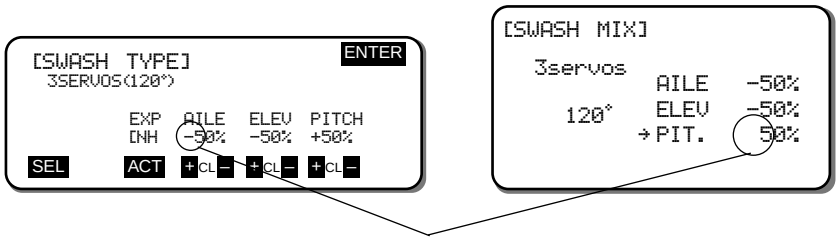
It is extremely important that the travel adjustment values for the three CCPM servos (aileron, elevator, Aux 1) be initially set to exactly the same travel value. If the travel value is not similar for each servo, it will create unwanted pitching and rolling of the swashplate during collective pitch inputs. The travel values for each servo will be adjusted in Step 5.5 and Step 5.6 to remove any minor pitch and roll coupling during pitch, roll, and collective movements.

Minor travel value adjustments are necessary due to slight variations in servo travel and centering. Although the three servos may appear to travel at the same amounts in each direction, in reality the servos can vary slightly. This variation is more common in analog type servos. If JR's new digital servos are used, the travel adjustment values will generally not need to be altered.

B. SERVO REVERSING

It is also extremely important that the servo reversing directions for the three CCPM servos (aileron, elevator, Aux 1) be set as indicated in the previous radio programming steps. If one or more servos is not set to the correct direction, the CCPM function will be out of synchronization, and the three control functions (Aileron, Elevator, Collective) will not move properly. In the event that a control surface is working in the wrong direction, the control function can only be reversed by changing the desired CCPM value for that function from a + to a - value or vise versa.

Example: If when you increase the collective pitch, the pitch of the main blades actually decreases, it will be necessary to access the CCPM function and change the travel value for this function from + to -, or - to +. This will reverse the direction of the collective pitch function without affecting the movement of the aileron and elevator functions.



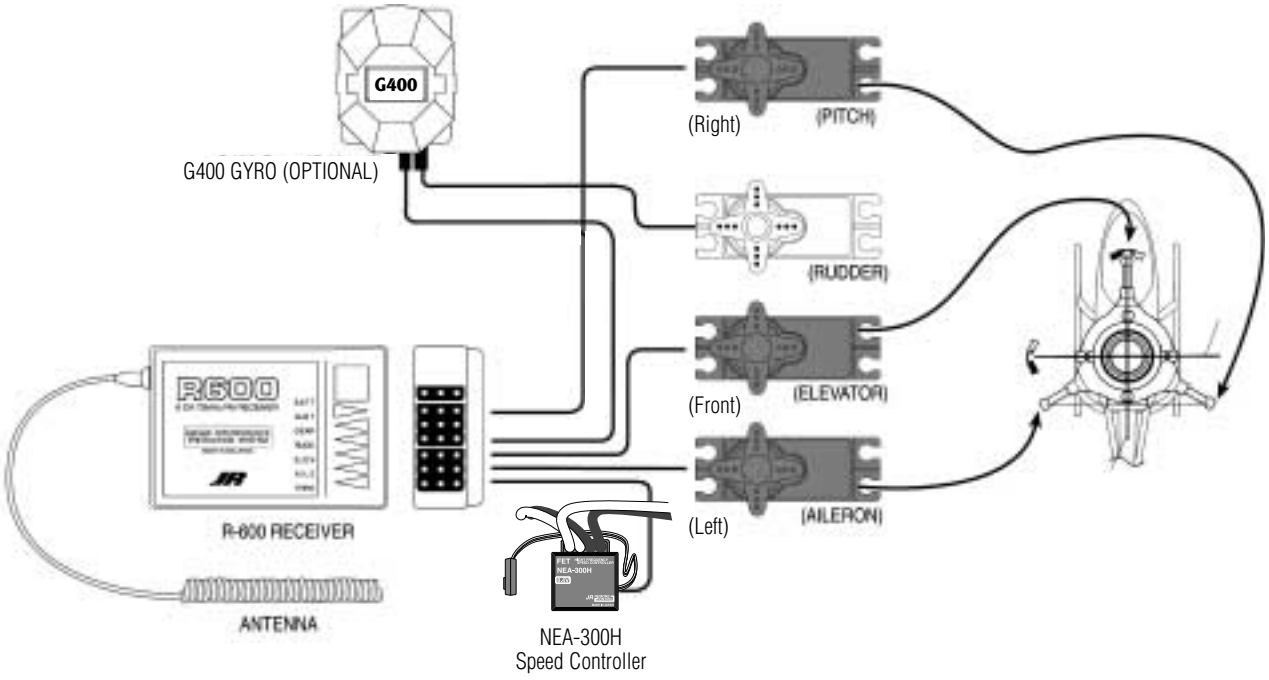
To reverse the direction of a CCPM control function, it's neccessary to change the value from + to –, or – to + as needed.

C. CCPM SERVO CONNECTIONS

The JR 120° CCPM system requires the use of three servos to operate, aileron, elevator, and Aux 1(Pitch). The labeling of these servos can become quite confusing because with the CCPM function; the three servos no longer work independently, but rather as a team, and their functions are now combined. For this reason, we will refer to the three servos in the following manner:

Aileron Servo: We will refer to this servo as the "Left" servo. The channel number for this servo when using a JR radio is CH2.
Elevator Servo: We will refer to this servo as the "Front" servo. The channel number for this servo when using a JR radio is CH3.
Aux 1 (Pitch) Servo: We will refer to this servo as the "Right" servo. The channel number for this servo when using a JR radio is CH6.

Please refer to the CCPM connections chart below for clarification. For non-JR radios, please consult your radio instructions for proper connection.



SPEED CONTROLLER SETUP

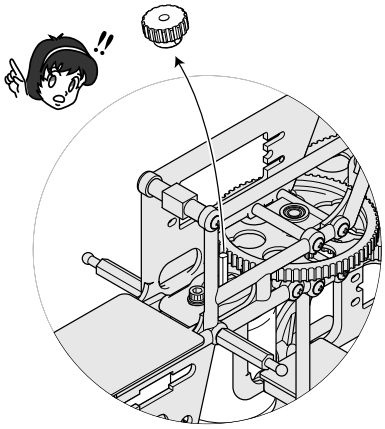
Please refer to the instructions below for proper speed controller adjustment.

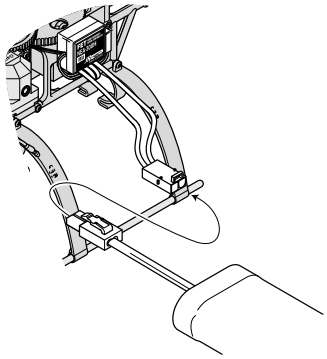
Important: Prior to connecting the NiCad batteries, please check to insure that the motor pinion gear does not engage the intermediate gear. Once the speed controller valves have been set, connect the motor leads to the speed controller.

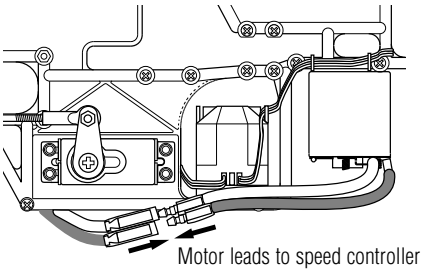
After the speed controller has been adjusted as shown below, verify that the motor is completely stopped with the throttle stick in the low position.

Once this has been established, disconnect the NiCad battery pack.

Do not reset the motor pinion at this time. This will be be done after all radio adjustments have been made.

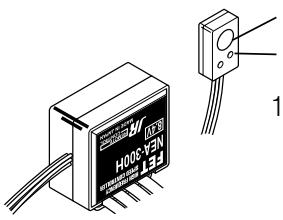






Motor leads to speed controller

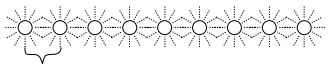
Make sure to raise the pinion gear installed in Step 2-7 as the motor can/will rotate at this time. When this procedure is finished, remove the motor and battery connector for precaution.



1) Connect the power supply and press the *Power* button to light the LED. Keep pressing the button until the light is off. After that, the light blinks slowly.

2) Set the throttle stick to the lowest position and the throttle trim to the neutral position. Press the *Power* button once to blink the LED twice. This indicates that motor is off.

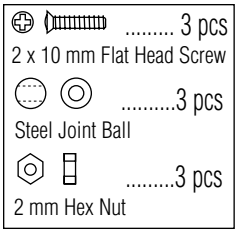
3) Set the stick to the highest position. Press the *Power* button once. The LED will be on followed by a quick blink.



4) When the settings are done, keep pressing the *Power* button until the LED is off. Then turn the power supply off.

Once this has been completed, disconnect the battery pack from the speed controller. Disconnect the motor leads at this time.

5-1 Servo Arm Preparation and Installation



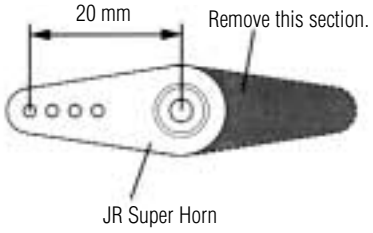
It will be necessary to prepare three servo arms as shown in the diagram below. Prior to assembling the servo arms, the servos should be centered as indicated below, and the servo arms test fitted to the servo to insure that the arms will attach to the servo as indicated. Since the JR servo arm spline uses an odd number of teeth, it is sometimes possible to rotate the servo arm 180° to achieve a more correct positioning.

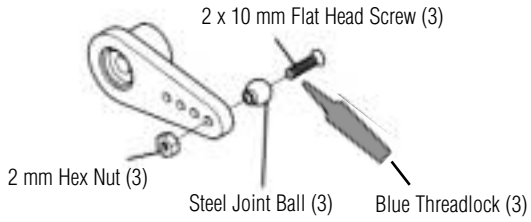
Once the best direction for the servo arm has been decided, mark the servo arm with the servo it is to be connected to (F, R, or L), as well as the side of the servo arm that needs to be removed.

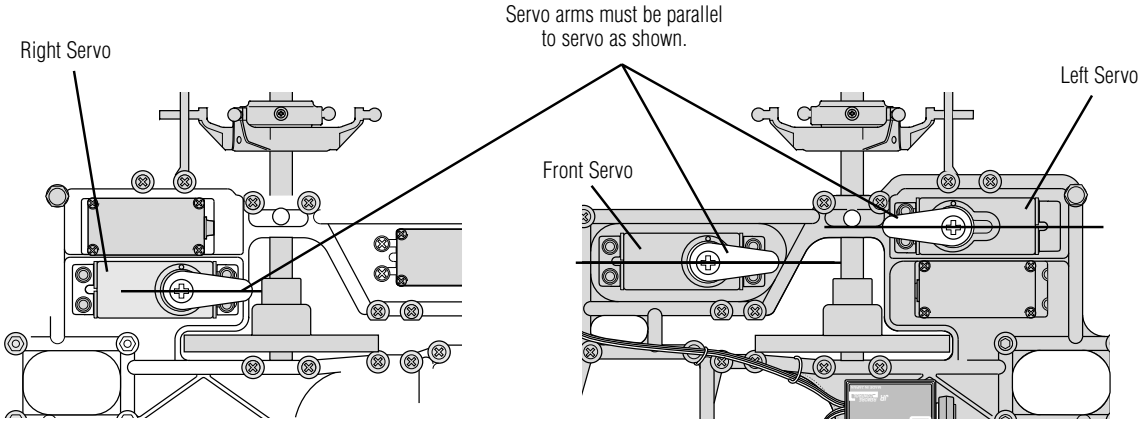
It is **very** important that a heavy-duty type servo arm be used with the control ball location placed at exactly 20 mm as shown. For JR radio users, we recommend the JR Super Horn for this use. If a control ball position other than the specified 20 mm is used, this will create an adverse affect as to the travel of the swashplate, as well as unwanted control differential and interaction.

Note: Prior to attaching the servo arm to the servo, it will be necessary to first turn on the radio system to center each of the three CCPM servos. It is important that the radio's collective pitch stick be set at the center position. If your radio is equipped with a hover pitch knob, please check to make sure that this knob is also in the center position at this time.

Connect the three servo arms to the three CCPM servos as shown. It is important that the servo arms be positioned parallel to the servos as shown. If the servo arm is not parallel as shown, minor centering adjustments can be made using the radio's sub-trim function. Please refer to Section 5-2 for more information.





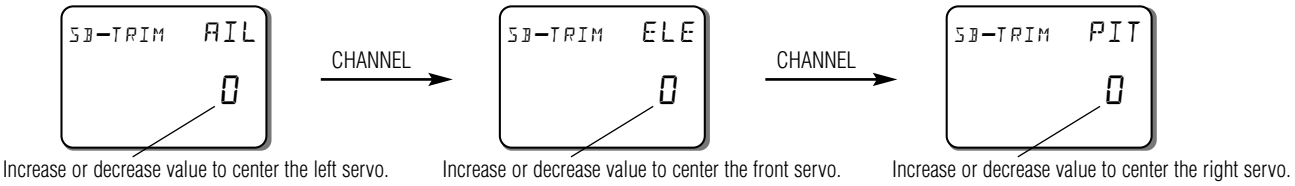


5-2 CCPM Servo Centering with the Sub-Trim Function

It may be necessary to make minor servo centering adjustments with the use of the sub-trim function to achieve the desired servo arm positions. Please refer to your particular radio's section as listed below or consult your radio instruction manual for more information.

1. XP652 SYSTEM

1) With the radio power switch on, press the *Mode* and *Channel* keys simultaneously to enter the function mode.
2) Press the *Mode* key until "SB-trim" (sub-trim) appears on the screen.
3) Adjust the left (aileron), right (Aux 1), and front (elevator) servos as needed until the servo arm is exactly parallel to the servo as shown when the collective stick is in the center position. It will be necessary to press the *Channel* key to access the necessary channels to be adjusted.
4) Press the *Mode* and *Channel* keys simultaneously to exit the function mode.



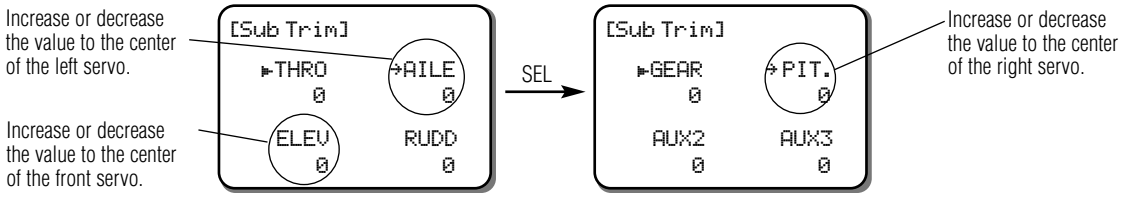
Increase or decrease value to center the left servo.

Increase or decrease value to center the front servo.

Increase or decrease value to center the right servo.

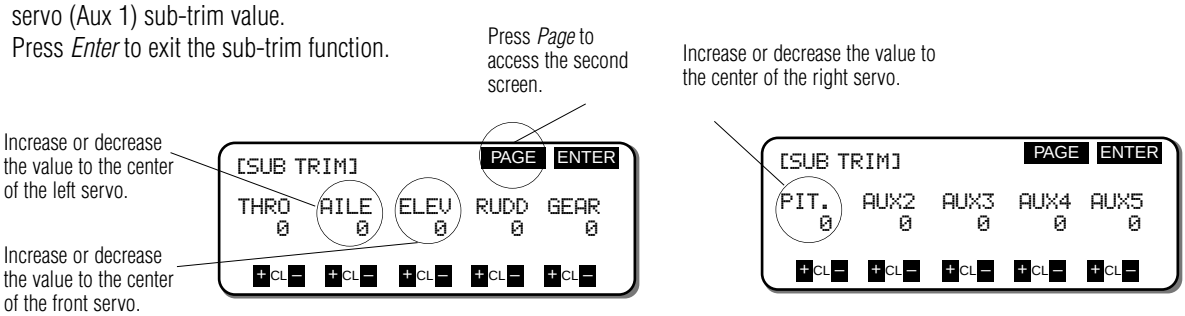
2. X-3810, X-3810A.D.T.

1) With the radio power switch on, press the *Up* and *Down* keys simultaneously to enter the function mode.
2) Press the *Up* key until "Sub Trim" appears on the screen.
3) Adjust the left (aileron), right (Aux 1), and front (elevator) servos as needed until the servo arm is exactly parallel to the servo as shown when the collective stick is in the center position. It will be necessary to press the *SEL* key once to access the right servo (Aux 1) sub-trim.
4) Press the *Up* and *Down* keys simultaneously to exit the function mode.



3. JR PCM10, 10S, 10SX, 10SXII, 10X SYSTEMS

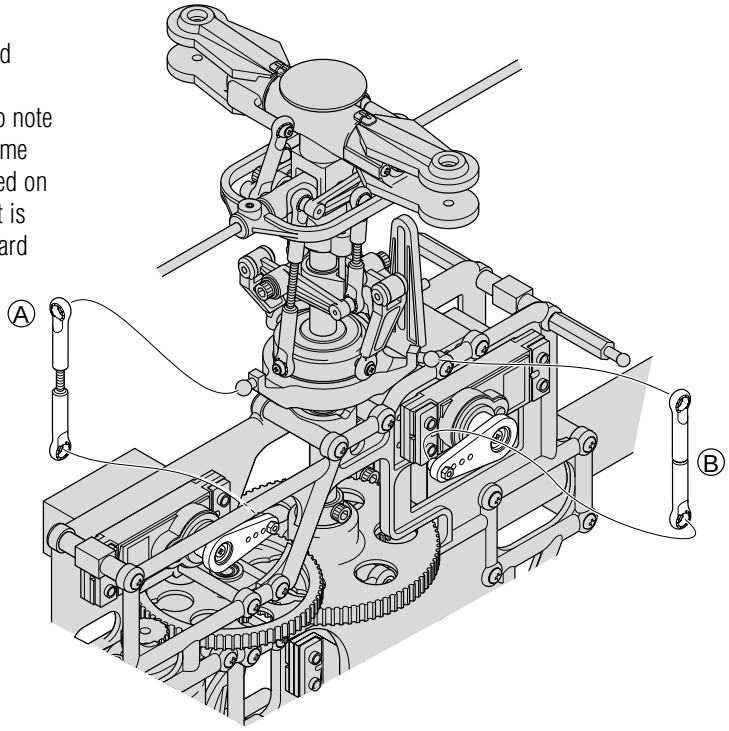
1) Enter the sub-trim function (code 15).
2) Adjust the left (aileron), right (Aux 1) and front (elevator) servos as needed until the servo arm is exactly parallel to the servo as shown when the collective stick is in the center position. It will be necessary to press the *Page* button to access the right servo (Aux 1) sub-trim value.
3) Press *Enter* to exit the sub-trim function.



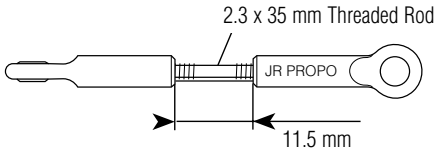
5-3 CCPM Linkage Connection

Assemble and adjust the three CCPM servo linkages as shown below. It is important that the exact distances specified below be maintained for each linkage as this is critical to the alignment and neutral position of the swashplate. Please also note the direction of the ball links as shown by the “JR Propo” name imprinted on each ball link. The “JR Propo” name is imprinted on the front of each ball link. When attaching the control rods, it is important to make sure that the “JR Propo” name faces outward as the links are attached to the control balls.

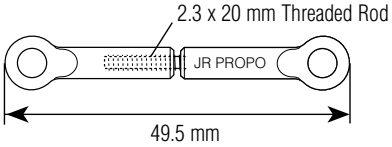
Please also note that when attaching control linkages B and C, it will be necessary to rotate the link that attaches to the swashplate slightly so that it is parallel to the rear mounting surface of the ball link. This will allow the control linkage to rotate slightly on the two control balls. It is also recommended that the JR ball link sizing tool be used to size the ball links for a proper fit prior to attachment.

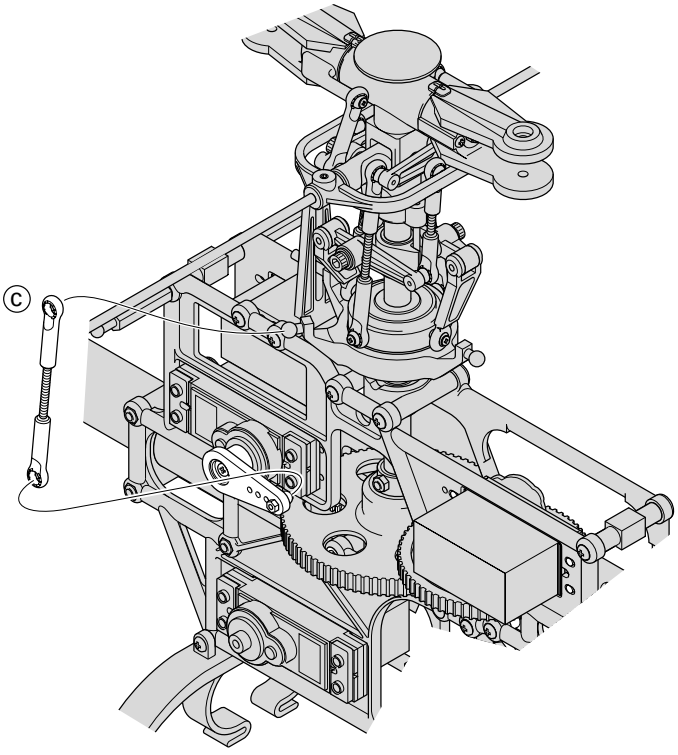


Ⓐ Front Servo to Swashplate Linkage

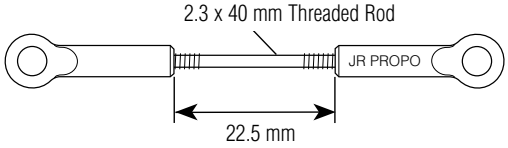


Ⓑ Left Servo to Swashplate Linkage





Ⓒ Right Servo to Swashplate Lonkage



5-4 Checking the Swashplate for Level

After the three control linkages have been attached to the swashplate, it will be necessary to check the swashplate to insure that it is level. To do this, turn on the radio system and place the collective stick in the center position as before. Next, check to make sure that all trim levers and knobs are also in their center position.

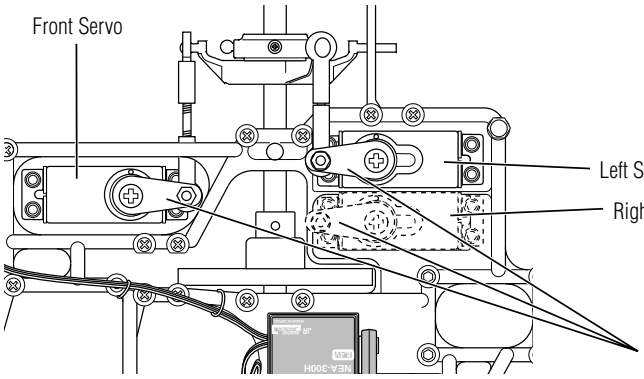
Check to insure that the servo arms are parallel to the servos as adjusted in the previous step. If the servos are not parallel, please refer to the sub-trim section on page 35 and readjust as necessary.

Once it's determined that the servo arms are parallel to the servos as required, it will now be necessary to check the swashplate to insure that it is also level or neutral in this position. It is suggested that the swashplate first be checked from the rear of the model to insure that it's level from left to right. If the swashplate is not level as compared to the frame of the model, adjust either the left or right servo control rod as needed. To determine which rod needs adjustment, it may be helpful to view the swashplate from the left and right side view of the model to determine which side is high or low.

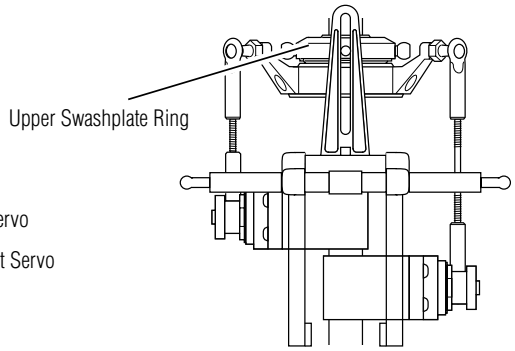
Once this left to right adjustment is completed, it will now be necessary to check the fore/aft position of the swashplate to insure that it is also level on this axis. If the swashplate is not level in the fore/aft axis, it is suggested that the adjustment be made to the front servo control linkage as needed.

If you are unsure as to which linkage needs adjustment or are having difficulty obtaining the correct adjustment, please check the length of each control rod to insure that it is adjusted to the correct length as outlined in Step 5-3.

Note: If care was taken in the linkage assembly in Step 5-3, little or no adjustment should be required in this step. Only minor adjustments should be made to the lengths of the control linkages at this time. Any major adjustments indicates either incorrect linkage lengths or incorrect servo arm positioning. If the control linkage lengths are altered from the recommended lengths more that one or two turns, this will have a great effect on the range and settings of the collective pitch in later steps.



Left Side View



Rear View

Make sure the servo arms are parallel when the swashplate is level; adjust the three servos linkages as needed.

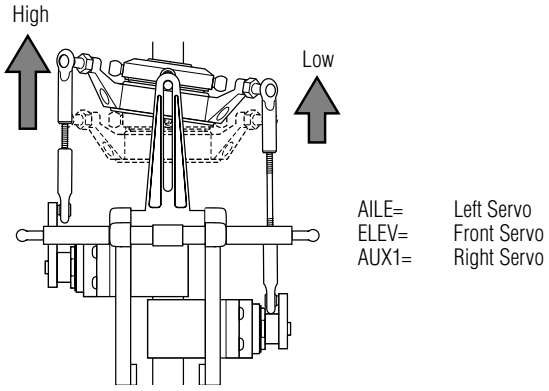
5-5 Pitch-to-Aileron Mixing Adjustment with Travel Adjust

It is very possible that the travel of each servo varies slightly, which can cause the swashplate to be tilted to the left or right when the collective is moved to the extreme high and low pitch positions. This condition is generally more common when standard type servos are used. If JR digital servos are used, the adjustment required is generally very small, if any. These variations in travel can be corrected by altering the travel value of each servo slightly through the travel adjustment function.

To check the pitch-to-aileron mixing, it will first be necessary to position the collective stick in the center position as in the previous steps. Next, move the collective stick from the center position to the high pitch position while viewing the swashplate from the rear of the model as shown in the diagram below. While moving the swashplate, look for any tendency for the swashplate to roll to the left or right as it reaches the high pitch position. Repeat this procedure several times to be sure that your observations are correct. If no rolling tendency is found, it will now be necessary to repeat this procedure from the center collective stick position to full low pitch. If no rolling tendency is found, proceed to step 5-6.

In our example, we have shown that the swashplate has been tilted to the right as the collective has been increased to full pitch. This would indicate that the left servo's maximum travel is greater than the right servo's maximum travel.

Note: Before moving the throttle stick, please make sure that the motor wires have been disconnected.



View is shown from the rear of the model. Notice how the swashplate has tilted to the right as the collective has moved from center to full high pitch position.

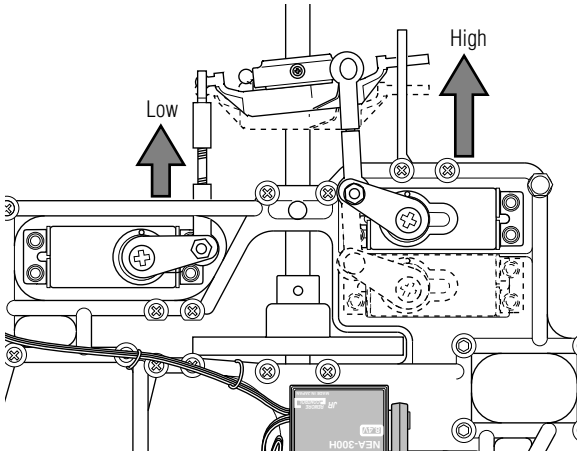
In this condition, we suggest that the travel value for the left servo be reduced slightly (5–10%). Repeat the procedure above if the same condition occurs, but to a lesser degree. The travel value of the right servo should be increased slightly and retested. In most cases, it will require only the adjustment of the left or right servo to correct this situation.

5-6 Pitch-to-Elevator Mixing Adjustment with Travel Adjust

The total travel of each servo can vary slightly, which can also cause the swashplate to be tilted fore and aft when the collective is moved to the extreme high and low pitch positions. This situation can also be corrected if necessary through the use of the travel adjustment function.

To check pitch-to-elevator mixing, it will first be necessary to position the collective stick in the center position as in the previous steps. Next, move the collective stick from the center to the high pitch position while viewing the swashplate from the left side of the model. While moving the swashplate, look for any tendencies for the swashplate to tilt fore or aft as it reaches the high pitch positions. Repeat this procedure several times to be sure that your observations are correct. If no fore or aft tilting tendencies are found, it will now be necessary to repeat this procedure from the center collective stick position to full low pitch. If no tilting tendency is found, proceed to the next step.

In our example, we have shown that the swashplate has tilted forward as the collective has been increased to full high pitch. This would indicate that the front servo's maximum travel is less than that of the two rear servos (left and right).



View is shown from the left side of the model. Notice how the swashplate has tilted forward as the collective has moved from the center to the full high pitch position.

In this condition, we suggest that the travel value for the front servo be increased slightly (5–10%). Repeat the above procedure and increase the value as needed until the tilting tendency is eliminated. For information on the travel adjustment function, please refer to your radio's instruction manual for details. Once this condition has been corrected, repeat this procedure for the center to low collective pitch position and adjust as needed.

Note: It is very important that during this step, only the travel value for the front servo (elevator) be adjusted to correct any pitch-to-elevator tendencies. If the travel value of the left or right servo changes, this will affect the pitch-to-aileron tendencies corrected in the previous step. If you feel that readjustment of the left and right servo travel is necessary, then it is suggested that the travel for each servo be increased or decreased at the same amount and the pitch-to-aileron procedure be retested.

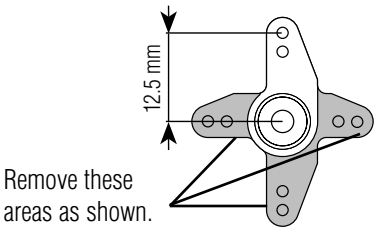
Note: Always disconnected the NiCad battery pack when the model is not in use.

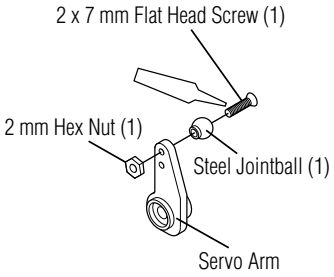
5-7 Tail Rotor Linkage Connection/Adjustment

2 x 7 mm Flat Head Screw	1 pc
Steel Jointball	1 pc
2 mm Hex Nut	1 pc

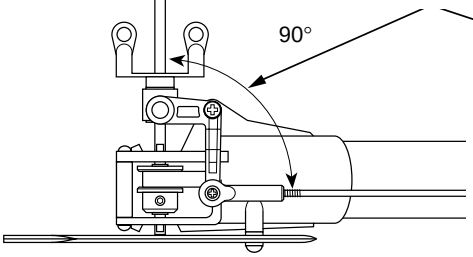
Install the servo arm so that the linkage rod and the servo arm are at 90 degrees. (Refer to the diagram shown below.) If the desired angle cannot be achieved, use the sub-trim function of your radio for fine tuning.

Note: Be sure to remove the excess servo horn as shown.





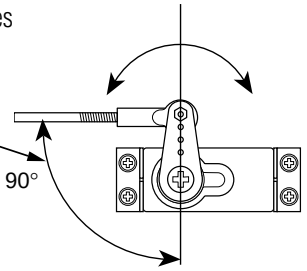
Adjust the length of the tail control rod by rotating the universal link until both of them are at 90 degrees as shown below.



Tail case lever is 90°.

Secure the servo horn using the servo horn screw.

Connect the tail control rod (installed in Step 4-4) to the rudder servo.

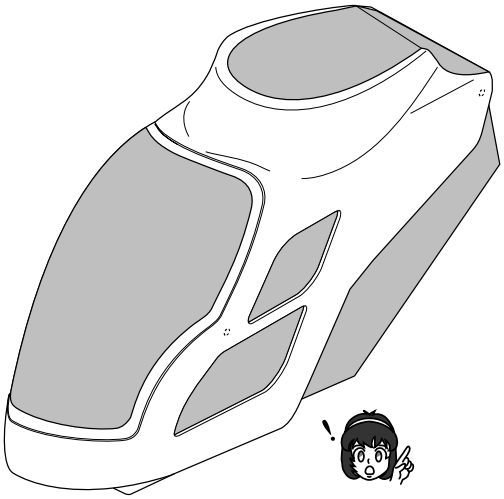


Servo arm is 90°.

Check to insure the tail control rod can slide through the tail control rod guides smoothly before connecting it to the servo. If resistance is felt, rotate the tail control rod guide slightly until the control rod slides smoothly.

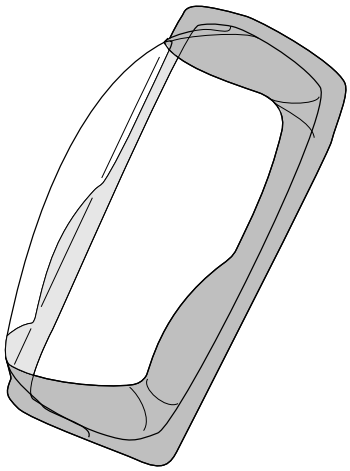
6-1 Trimming the Body/Canopy

Body



It will be necessary to remove the shaded areas shown on the body using an X•Acto knife or rotary tool.

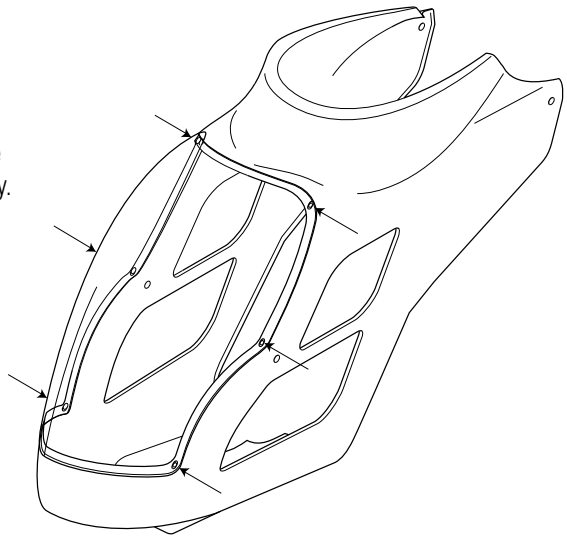
Canopy



Trim away the shaded portion of the canopy area using scissors (Lexan® scissors preferred).

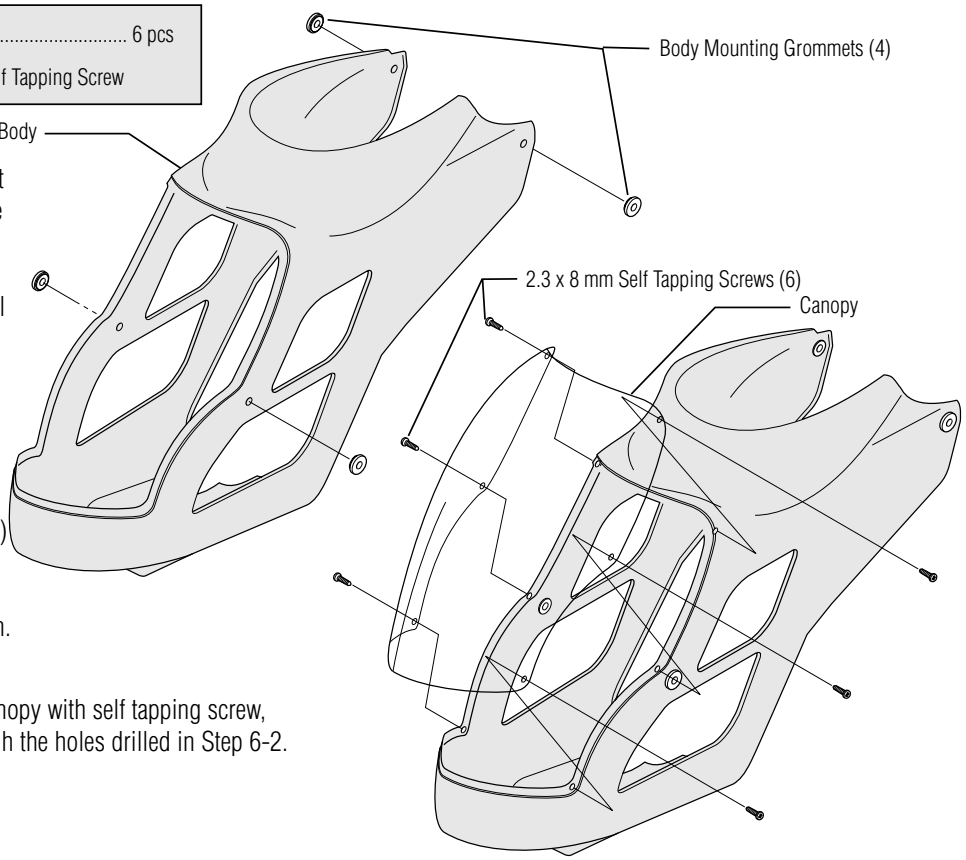
6-2 Canopy Attachment

Test fit the canopy to the body before drilling the mounting holes by taping the canopy to the body. Trim the canopy as needed.



Drill the 6 mounting holes in the body/canopy.

6-3 Body Mounting/Decal Attachment



It is suggested that the body decals be applied at this time. Use rubbing alcohol to clean oil from the body before decal attachment.

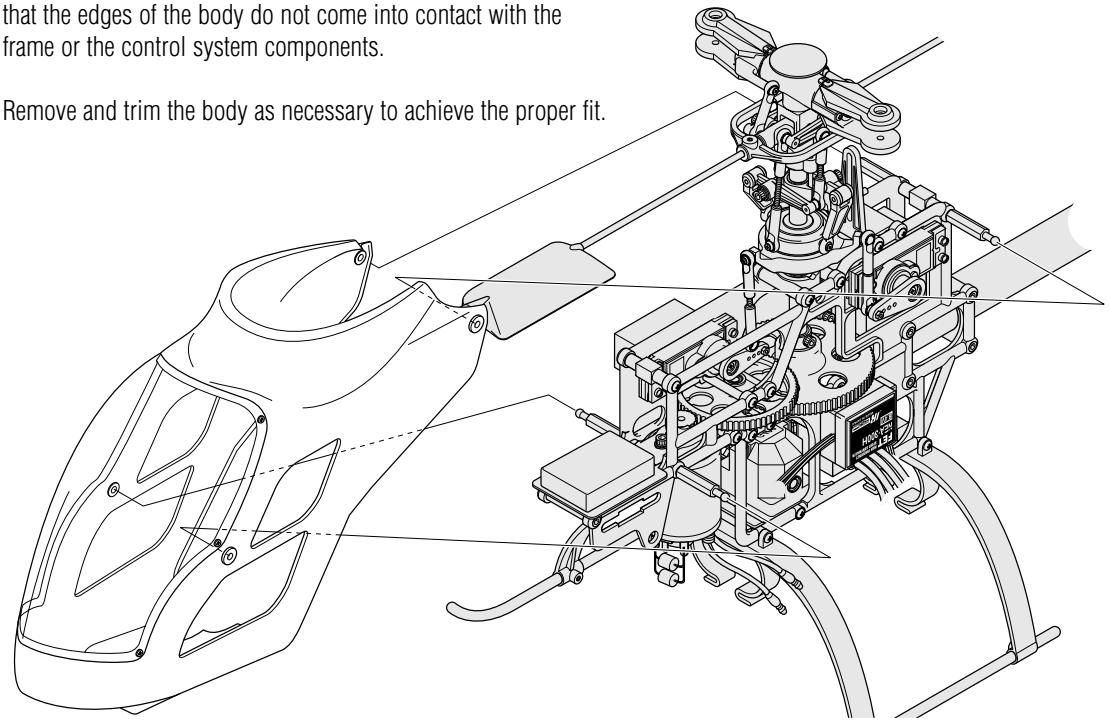
Drill the 4 mounting holes (6 mm in diameter) in the body and insert the rubber grommet as shown.

Attach the canopy with self tapping screw, 2.3 x 8 mm through the holes drilled in Step 6-2.

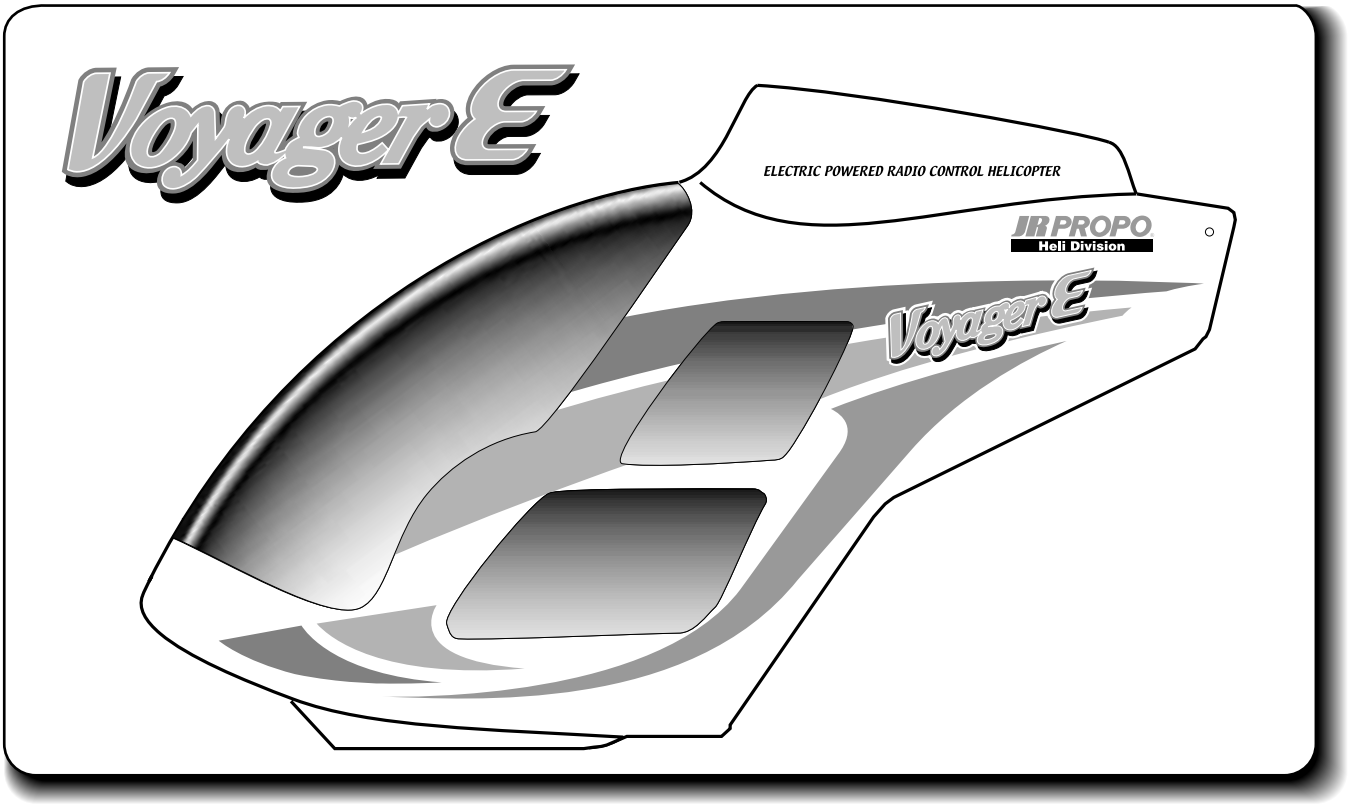
6-4 Body Attachment/Final Trimming

Test fit the completed body set to the helicopter. Check to insure that the edges of the body do not come into contact with the frame or the control system components.

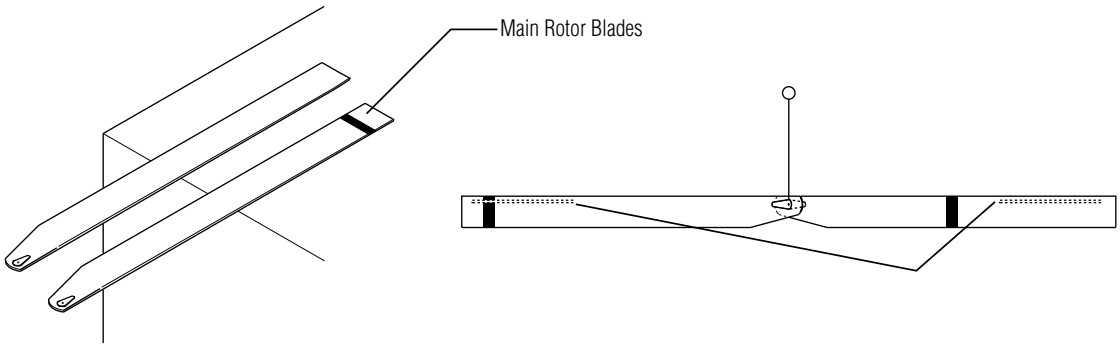
Remove and trim the body as necessary to achieve the proper fit.



DECAL PLACEMENT



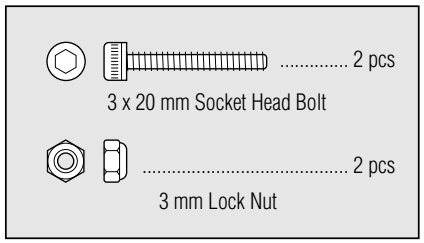
6-5 Main Rotor Blade Balancing

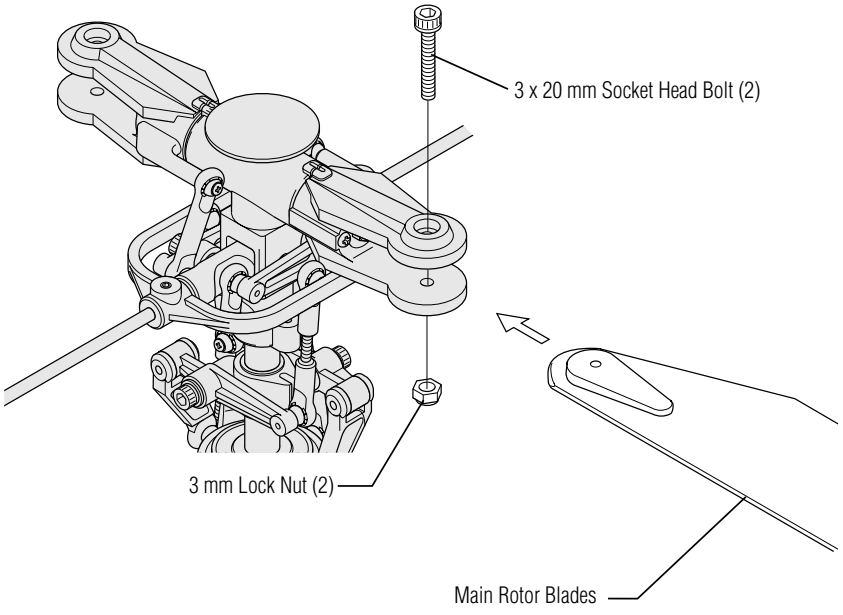


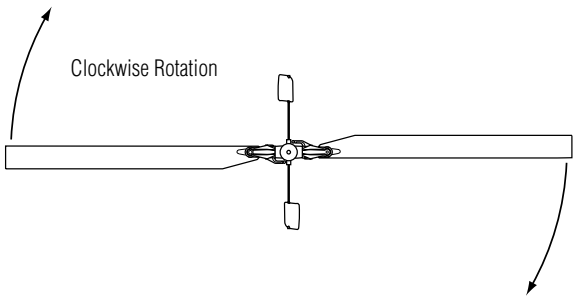
Spanwise C.G. Balancing
Place each rotor blade on a sharp edge of a table as shown and adjust so each rotor blade "teeters" on the edge of the table. If the blades are correctly balanced, they should be at an equal distance to the edge of the table. If they are not, apply tape to the center of the light or short blade until equal distance can be achieved.

Final Static Balancing
To static balance the main rotor blades, either attach each blade to a "seesaw" type blade balancer or bolt each of the two blades together through the blade mounting holes shown and suspend this unit between two drinking glasses. Add blade tracking tape (from decal sheet) to the tip of the light or high blade until they each become level to the table surface.

6-6 Main Rotor Blade Attachment

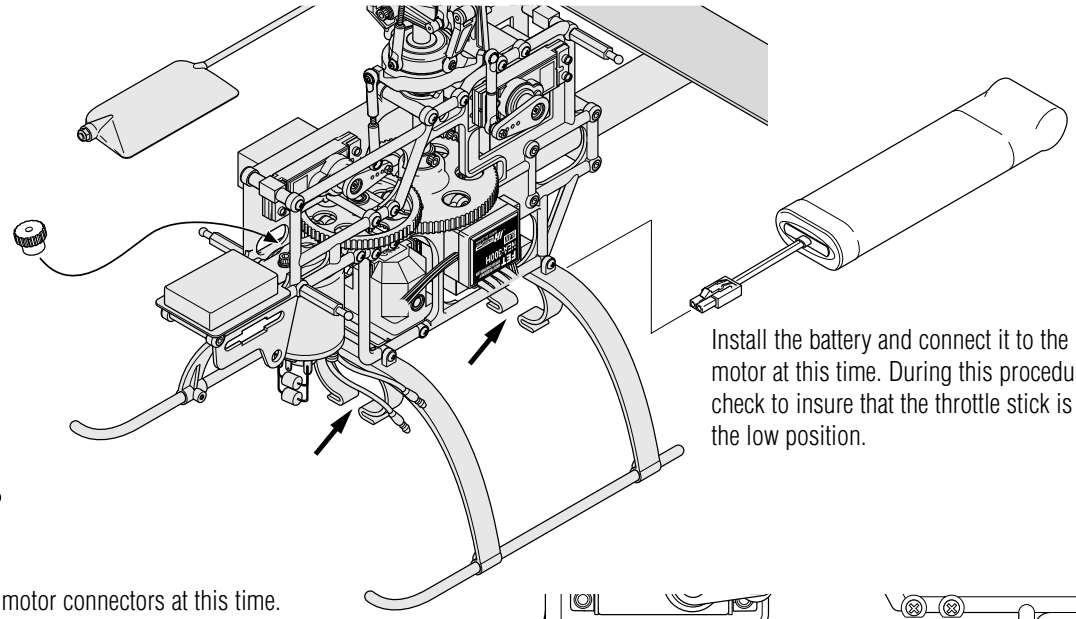






Firmly secure the main rotor blades to the rotor head as shown above. Be certain to note the proper direction of the rotor blades when assembling (clockwise rotation). Main blades should be tightened so they can pivot when moderate pressure is applied. Do not allow the main blades to swing freely within the main blade holders.

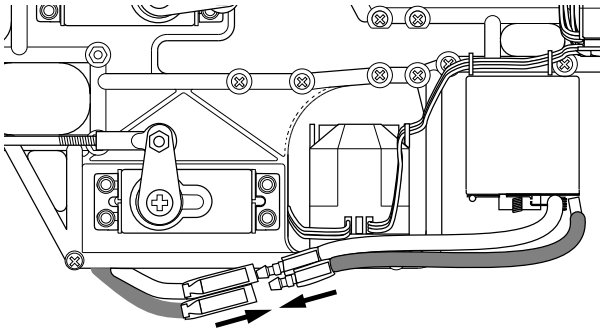
MOTOR CONNECTION/BATTERY INSTALLATION



Install the battery and connect it to the motor at this time. During this procedure, check to insure that the throttle stick is in the low position.

Connect the motor connectors at this time. When connecting, please make sure that you connect the red to red and black to black.

It is recommended that you look over each step again and make sure all the screws are secured firmly. From now on, be careful not to turn on the motor switch as it could cause unexpected accidents.



Motor Connectors

FINAL SERVO ADJUSTMENT AND RADIO SETUP

Now that the radio system is completely installed into the helicopter, it is necessary to check and adjust the following:

1. SERVO DIRECTION (SERVO REVERSING)

Check to insure that all servos have been set to the correct direction as shown on page 24.

2. DUAL RATES

It is suggested that for initial flights the dual rate function values be set as follows:

0 Position (low rate): 60%
1 Position (high rate): 100%

3. EXPONENTIAL SETTINGS

It is suggested that the exponential rate settings remain in the 0 value position until the initial test flights. After initial flights, adjust the exponential values to achieve the desired control feel.

4. SUB-TRIM SETTINGS

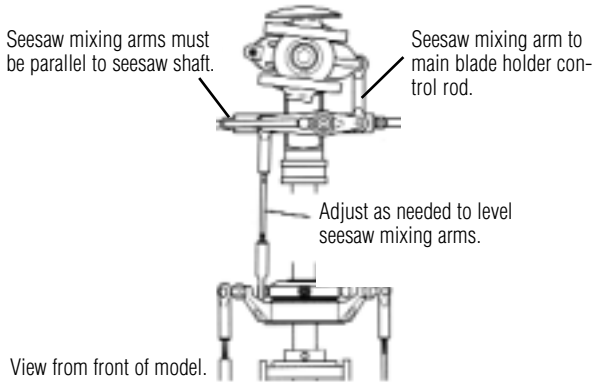
It is suggested that the correct neutral settings be achieved without the use of the sub-trim feature. If sub-trim is used for final flight adjustments, it is suggested that the sub-trim values not exceed 10. If the sub-trim values are greater, readjust the control linkages and reset the sub-trims to 0.

5. PITCH/THROTTLE CURVE ADJUSTMENT

It is very important that the throttle and pitch curves are adjusted properly to achieve the best performance from your helicopter. When properly adjusted, the main rotor rpm should remain consistent throughout all maneuvers and throttle stick positions. A constant rpm will also help to improve the effectiveness and accuracy of the tail rotor and gyro systems.

A. PITCH CURVE ADJUSTMENT

It will now be necessary to adjust the main rotor blade pitch to match the settings shown in the chart. A main rotor blade pitch gauge (sold separately) will be necessary for this procedure. Prior to setting the main rotor blade pitch, it will be necessary to first set the required blade pitch at 1/2 (center) stick. Turn the system on and set the collective pitch stick to the center position as in previous steps. If all linkages are properly adjusted, the swashplate/rotor head system should appear as shown in the diagram below. Please note that at the center pitch position, the seesaw mixing arms located on the rotor head are parallel (level) to the seesaw shaft/flybar assembly.

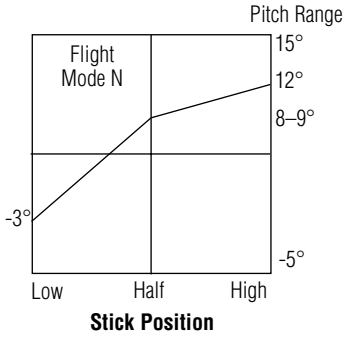


Pitch Range Settings

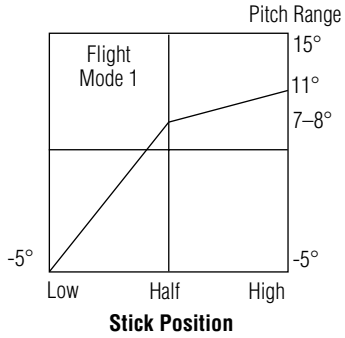
Flight Mode	Application	Low Pitch (Low Stick)	Hovering Pitch (Half Stick)	High Pitch (High Stick)
N	Hovering	-3°	8–9°	12°
I	Stunt & Aerobatic Flight	-5°	7–8°	11°
H	AutoRotation	-3°	5°	15°

Pitch Curve Settings

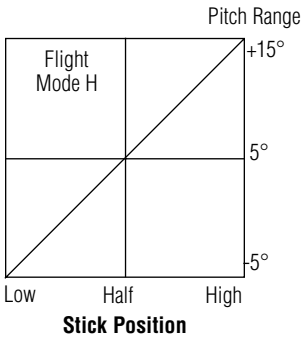
Hovering (Linear Curve)



Stunt & Aerobatic Flight



Autorotation



If your seesaw mixing arms are not level as shown, adjust the 2 seesaw arm to swashplate control rods as needed.

Once the position of the seesaw mixing arms have been established, attach a main rotor pitch gauge (sold separately) to one rotor blade and check the current pitch setting. The current pitch should be approximately 8 to 9°. If the pitch is slightly less or more, this can be adjusted later through the radio's pitch curve function. Attach the pitch gauge to the second main rotor blade and match the pitch at this time.

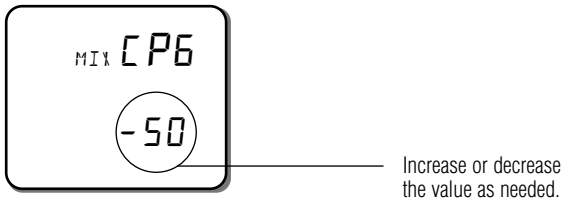
It will now be necessary to establish the maximum pitch value required for your application prior to adjustment. For example, if you are a beginning pilot, then your maximum negative pitch will be -5, and your maximum positive pitch will be +15. The maximum pitch range that you will require will be +15.

The maximum pitch range mentioned above must be established through the use of the pitch travel value in the CCPM function. As mentioned previously, do not try to establish the maximum pitch curve values through adjustment of the travel adjustment function, as this will alter the pitch-to-aileron and pitch-to-elevator travel values established in Steps 5-5 and 5-6. Please refer to the CCPM activation section (pages 26–30) for information on how to access the CCPM function.

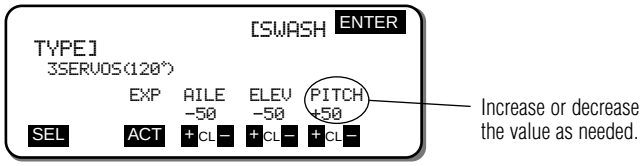
Once the CCPM function has been activated, set the maximum positive pitch settings as mentioned above. Since the CCPM function does not allow for independent travel settings for positive and negative pitch, it will be necessary to establish the maximum positive pitch, since this is generally the largest degree of pitch in the pitch range. Once the maximum positive pitch range is set, the maximum negative pitch range can be reduced as needed through the pitch curve function.

Set the main rotor pitch gauge to the desired maximum pitch setting, then increase or decrease the CCPM pitch travel (labeled Pitch or Ch6) as needed until this pitch setting is achieved.

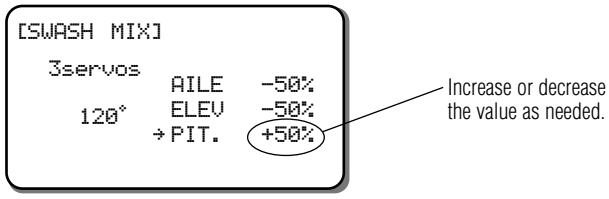
XP652 System



PCM 10 Series



X-3810 System

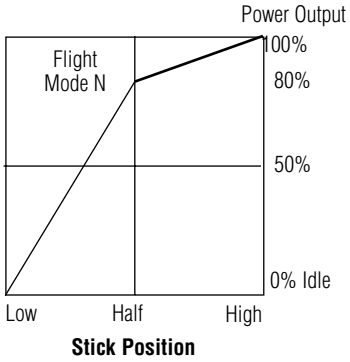


Once this procedure has been completed, the positive and negative pitch settings for each flight mode can be adjusted through the radio's pitch curve function. Please refer to your radio's instruction manual for more information.

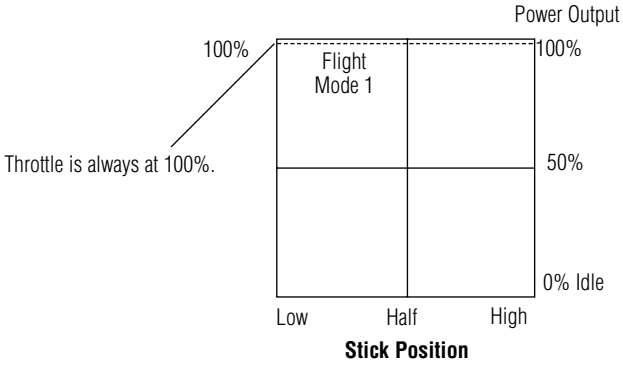
B. THROTTLE CURVE SETTINGS

Below are several examples of possible throttle curves during various flight conditions. Since throttle curves can vary, it will be necessary to fine tune and adjust these values during test flights to achieve a constant main rotor rpm.

Hovering (Linear Curve)



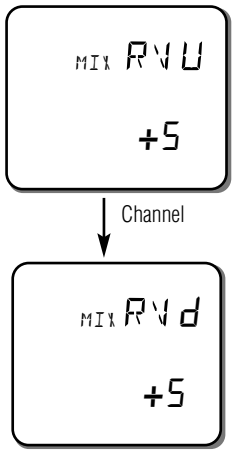
Stunt & Aerobatic Flight



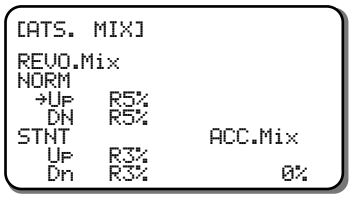
REVOLUTION MIXING

It will be necessary to adjust the revolution mixing to properly compensate for the torque of the engine during all flight conditions (except autorotation). Since there are many variables that can alter the value of the revolution mixing, it will be necessary to fine tune this function during test flights. The following values are shown only as a starting point toward achieving proper compensation:

XP652 with NEJ400, NEJ450 Gyros

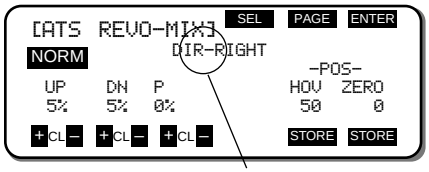


X-3810 with NEJ400 and NEJ450 Gyros



Make sure that the direction is set to R (right)

PCM 10 Series radio with NEJ400 and NEJ450 Gyros



Make certain that the compensation direction is set to "Right."

GYRO GAIN ADJUSTMENT FOR JR G400 GYRO

It will be necessary to adjust the "gain" or compensation of the gyro to create the correct amount of "holding power" necessary for a solid neutral tail rotor. The intent of the gyro is to compensate for abrupt movements or wind direction changes, working in conjunction with the revolution mixing function.

For hovering, it is recommended that you start with the gyro gain at approximately 80°, and continue to increase slightly until the tail of the helicopter "hunts," then reduce the value slightly.

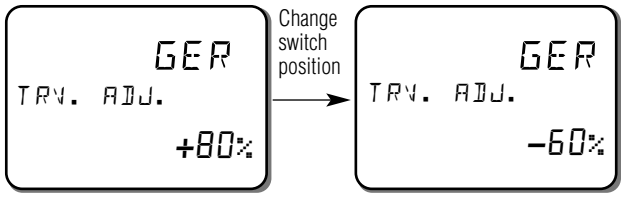
This function is used to compensate for the reaction torque which can not be controlled by Revolution Mixing. In case of G400 gyro, adjustment can be achieved with the volume knob located on the gyro. Turn the knob fully counter clockwise, then clockwise so that the knob will be at 40% to 50% of the full stroke. It will be necessary to fine tune during test flights and it is recommended the gyro gain be set higher for more stable rudder. Increase the value until the tail of the helicopter "hunts," then reduce the vales slightly.

GYRO GAIN VALVES FOR REMOTE GAIN GYROS

This same adjustment will also be necessary to achieve proper forward flight. Generally, the gyro gain for forward flight will be approximately 10–20% less than that of the established hover gain due to aerodynamic forces present in forward flight.

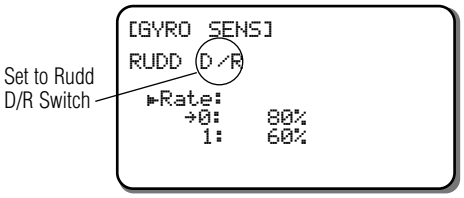
If you're using a dual rate gyro, adjust the gain so that you're using "higher" gain setting for hover and the "lower" gain setting for forward flight. It will also be necessary to confirm the direction the gyro compensates when the body of the helicopter is rotated.

XP652 with NEJ450 and other remote gain gyros

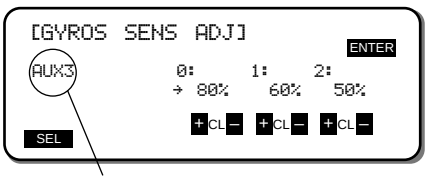


Please refer to your radio's instructions for more information.

X-3810 with NEJ450 and other remote gain gyros



PCM 10 Series radio with NEJ450 and other remote gain gyros



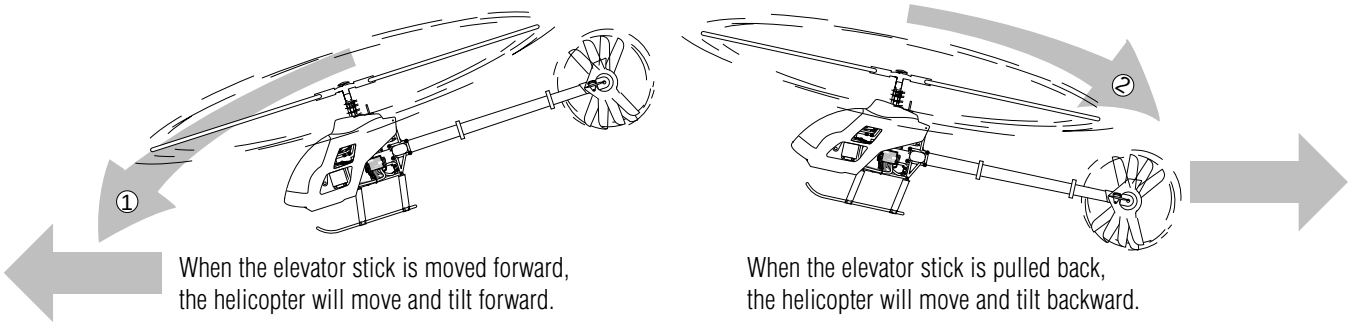
Press SEL to select AUX3 or AUTO GAIN Function

To do this, turn the radio system on and suspend the helicopter by the main rotor head. Next, move the rudder stick to the right and watch the direction that the tail rotor servo arm travels. Now while watching the tail rotor servo arm, rotate the body of the helicopter counterclockwise. The servo arm should move in the same direction as when the rudder stick was moved to the left. If the arm moves in the opposite direction, reverse the gyro and re-test.

RADIO SYSTEM OPERATION/HELICOPTER CONTROL MOVEMENTS

Following is a brief explanation about the relation of radio's stick operation to helicopter movements. It is suggested that this basic operation be first understood prior to flying.

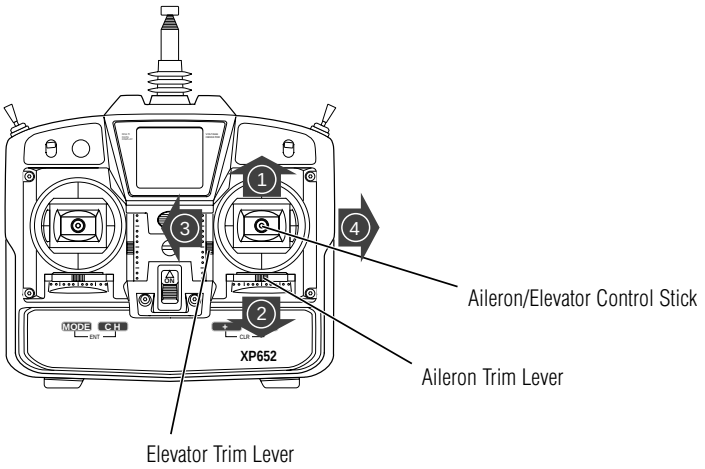
ELEVATOR



When the elevator stick is moved forward, the helicopter will move and tilt forward.

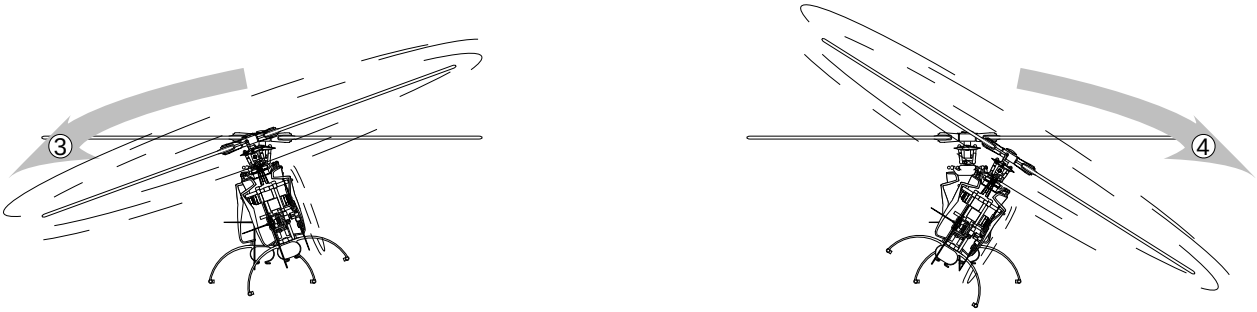
When the elevator stick is pulled back, the helicopter will move and tilt backward.

Mode 2 Transmitter Shown



AILERON

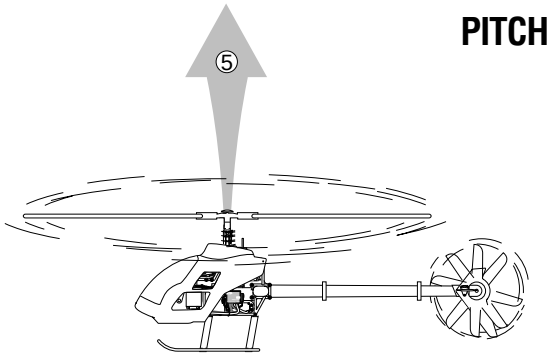
View from Rear of Model



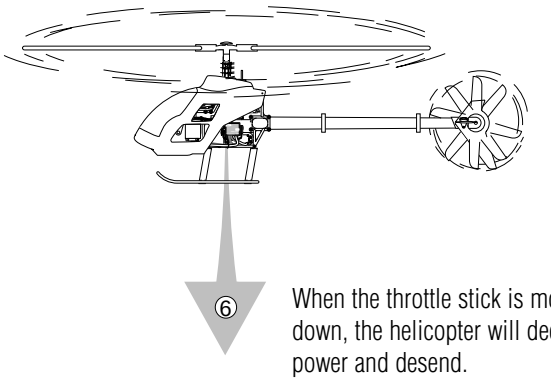
When the aileron stick is moved to the left, the helicopter will move and tilt the left.

When the aileron stick is moved to the right, the helicopter will move and tilt the right.

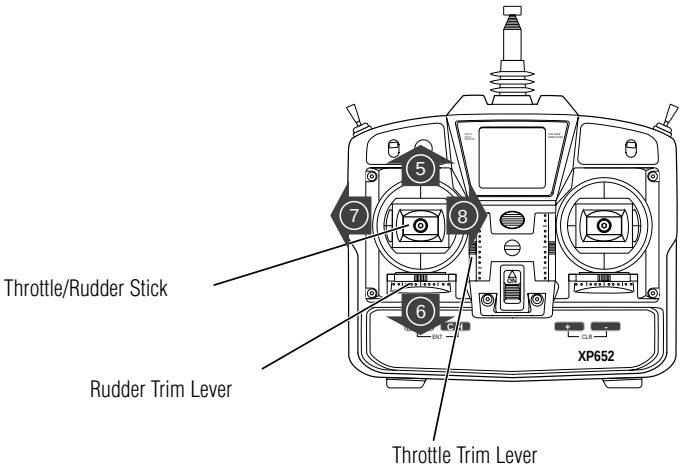
PITCH / THROTTLE



When the throttle stick is moved up,
the helicopter will increase power and rise.

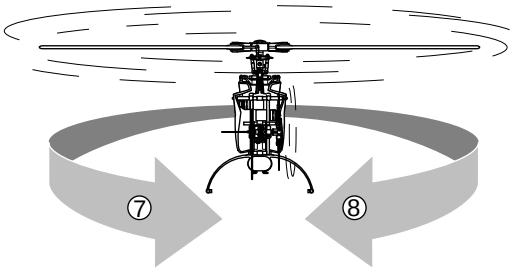


When the throttle stick is moved down, the helicopter will decrease power and desend.



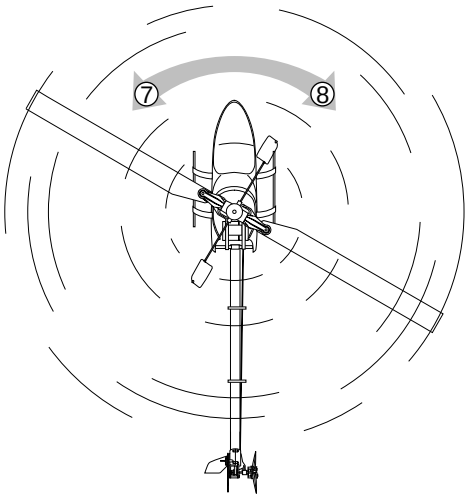
Rudder

View from Rear of Model



When the rudder stick is moved to the left,
the helicopter will move to the left (counter clockwise).

View from Top of Model



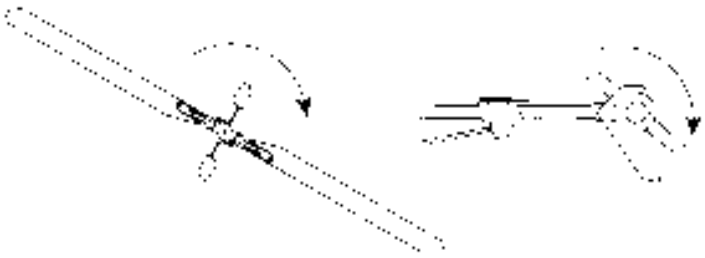
When the rudder stick is moved to the right, the nose of the helicopter will move to the right (clockwise).

FINAL PREFLIGHT CHECK

Once all assemblies have been completed, please review the following suggestions before attempting initial flights.

- Review the instruction book and confirm that all assembly steps have been completed thoroughly.
- Check to verify that the tail rotor assembly rotates in the correct direction (see the diagram below).
- Check to insure that all servos are operating smoothly and in the correct direction. Also verify that there is no binding in the control rods and that each servo horn is secured with a servo horn mounting screw.
- Verify that the gyro is operational and compensating in the correct direction (see page 48 for details).
- Make sure that both the transmitter and receiver have been fully charged (refer to your radio system instructions for proper charging procedures).

Correct Main/Tail Rotation direction



Rotate the main rotor counterclockwise (backward) and note the rotation direction of the tail rotor.

BLADE TRACKING ADJUSTMENT

Blade tracking is an adjustment to the main rotor blade pitch that must be accomplished during the initial test flights. Although the blade pitch angle in each blade may appear equal, it is still possible for a set of main rotor blades to run "out of track," making adjustment necessary.

Main rotor blades that are out of track with one another can cause vibration, instability, and a loss of power due to additional drag.

On the initial flight, it will be necessary to increase the blade speed to just before lift-off rpm and view the rotor disc at eye level from a safe distance (approximately 15 to 20 feet) away from the models.

Note which blade is running low (by colored tracking tape) and increase the pitch of the low blade one turn of the ball link at a time until each blade runs in track (on the same plane).

Please refer to the diagrams below to identify the different tracking situations, as well as several methods to mark each rotor blade for tracking identification.

BLADE TRACKING IDENTIFICATION

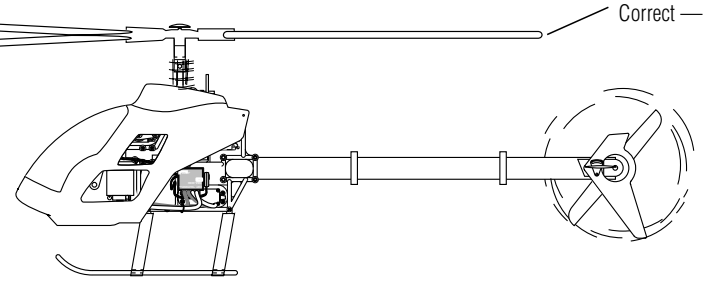
Out of Track

Incorrect

Adjustment is Necessary

In Track

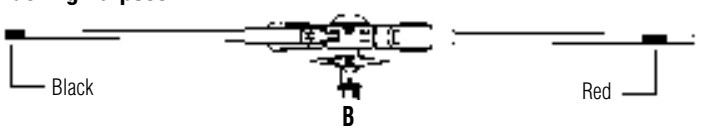
Correct — Adjustment is **NOT** Necessary



Caution: Be sure to maintain a safe distance from the helicopter (15 to 20 feet) when tracking main rotor blades.

Blade Labeling for Tracking Purpose

A



B

A: Use two different blade-tracking tape colors (e.g., black and red) at the tip of each main rotor blade.

B: Use the same color blade tracking tape located at different positions on each rotor blade. Tracking tape is generally provided on the included decal sheet.

Note: Adding blade-tracking tape to the rotor blades at this stage will make it necessary to restatic balance the main rotor blades.

TAIL ROTOR BELT

Periodically check the tension on the tail drive belt (as shown in Step 3-5, page 17) to insure that it has sufficient tension for proper engagement. It is especially important to check this after initial test flights.

CHECK ALL NUTS AND BOLTS

A helicopter is subject to vibration during flight. It is important to check that all screws, nuts and bolts are properly secured after each day of flying. It is also suggested that you perform a "quick" inspection between each initial test flight for approximately the first 6 to 10 flights.

CHECK BALL LINK WEAR

Check to insure that all universal links fit freely but securely to the control balls. If there is excessive play noted, replace the universal link in question.

BATTERY MAINTENANCE

Check that your batteries are properly mounted and charged. The most frequent cause of crashes (aside from pilot error) is battery failure or disconnection. Be certain that your batteries are fully charged prior to each flight.

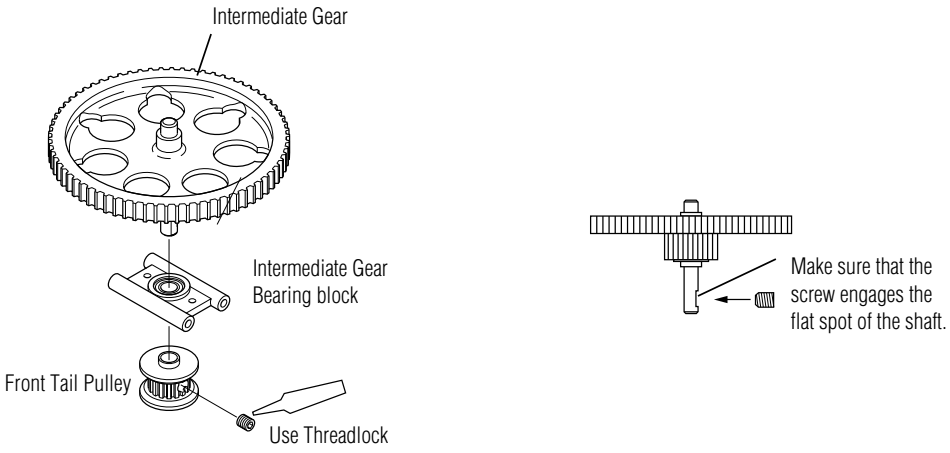
CLEANING / INSPECTION

At the end of each flight or flying session this is a good time to inspect all parts for tightness or fatigue. Remember, a clean, well-maintained helicopter will provide you with many hours of trouble-free flight.

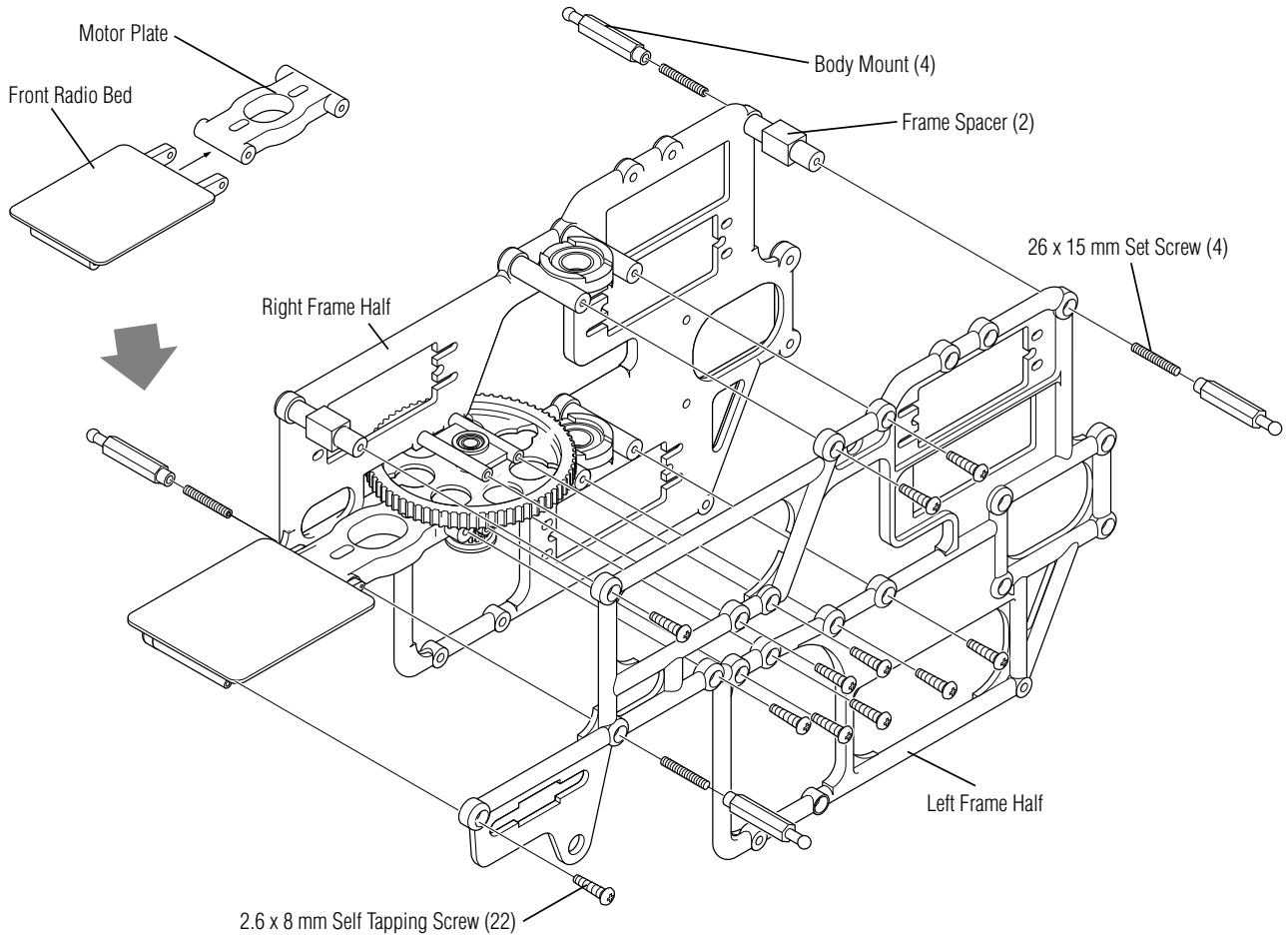
PREASSEMBLED COMPONENTS

The following parts included in this kit are preassembled. When repair or maintenance is necessary, refer to the diagrams below for disassembly or reassembly.

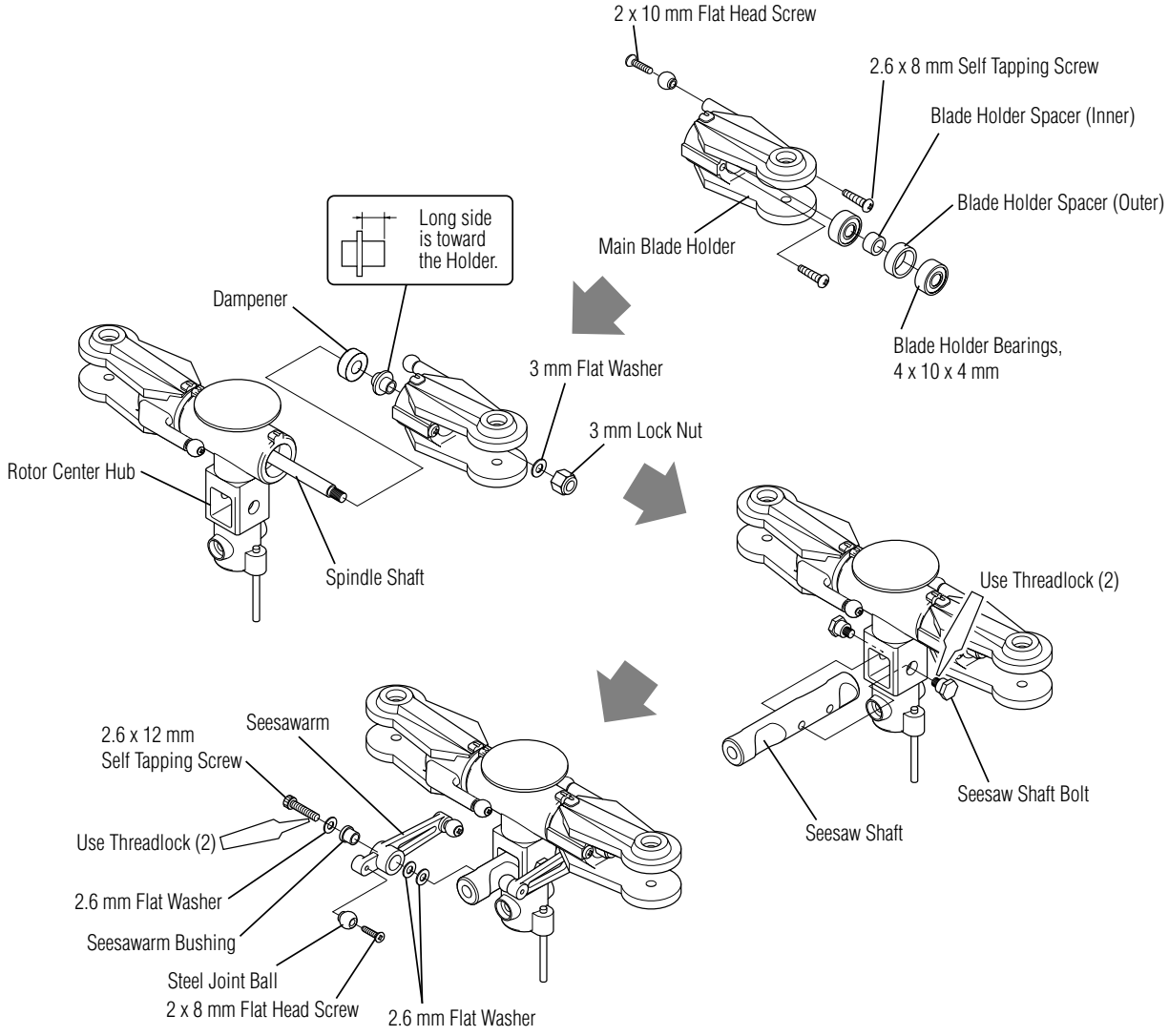
INTERMEDIATE GEAR ASSEMBLY



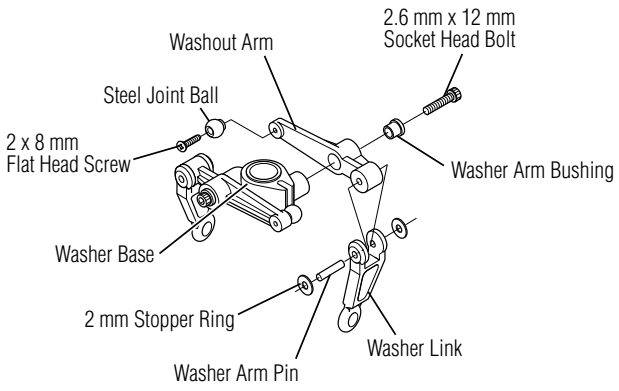
MAIN FRAME ASSEMBLY



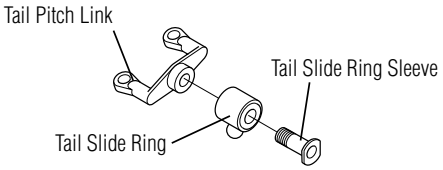
ROTOR HEAD ASSEMBLY



WASHOUT ASSEMBLY



TAIL PITCH PLATE ASSEMBLY



Modulation S-PCM • Z-PCM • PPM (FM)

Model Number 1

Model Name Voyager E CCPM Initial Setup

CHANNEL	THR (1)	AIL (2)	ELE (3)	RUD (4)	GER (5)	PITCH (6)
* REVERSE SW	(NORM) • REV	(NORM) • REV	NORM • (REV)	NORM • (REV)	(NORM) • REV	NORM • (REV)
SUB-TRIM	Adjust as needed					
TRAVEL ADJUST (TRV ADJ.)	Refer to the CCPM section of this manual for proper settings					
FAIL-SAFE (S-PCM)						

FAIL-SAFE TIME (Z-PCM)	

D/R SW	Factory Pre-Set

Gear SW	Factory Pre-Set

THRO HOLD (HLD)	(ON) OF	POSITION
		± Adjust for Engine Off

REVO-MIX (RV)	+	UP (U)	Refer to Revolution Mixing Section of manual for proper settings
	–	DOWN (D)	
HOLD RUDD OFFSET (OFFSET HLD)			±

STUNT TRIM		ON • OFF
AIL (2) + –	ELE (3) + –	RUD (4) + –
Adjust Stunt Trim values as needed		

		AILE (AI)	ELEV (EL)
DUAL RATE • EXP	POS 0 D/R	60%	60%
	POS 0 EXP	%	%
	POS 1 D/R	100%	100%
	POS 1 EXP	%	%

		L	2	H
THRO CURVE TLN, T2N, THN,	N	0%	80%	100%
TLS, T2S	S	100%	100%	
PITCH CURVE PLN, P2N, PHN,	N	-3° Pitch	7–8° Pitch	12° Pitch
PLS, P2S, PHS,	S	-5° Pitch	-6° Pitch	11° Pitch
PLH, P2H, PHH	H	-5° Pitch	5° Pitch	15° Pitch

CCPM MIXING		(ON) • OFF
AIL (2) + (–) 50%	ELE (3) + (–) 50%	Pitch (6) (+) – 50%

		CHANNEL MASTER SLAVE	MIX SWITCH	OFFSET	+GAIN	-GAIN
PROG. MIX	A	→	ON • F1 • F0 • H			

TRIM OFFSET	

X-3810 HELI DATA SHEET VOYAGER E CCPM INITIAL SETUP

Modulation S-PCM • Z-PCM • PPM (FM)

Model Number 1

Model Name Voyager E CCPM Initial Setup

			AILE	ELEV	RUDD
DUAL-RATE • EXP	0	D/R	60%	60%	60%
		EXP	Adjust as needed		
	1	D/R	100%	100%	100%
		EXP	Adjust as needed		

AUTO D/R (POS. 1)	ST1	INH • (ACT)
	ST2	INH • ACT
	ST2	INH • ACT

INPUT SEL	AUX2	HOLD SW• PIT.TRIM•INH
	GEAR	ACT • INH

	THRO	AILE	ELEV	RUDD	GEAR	PIT	AUX2	AUX3
REVERSE SW	(NORM) • REV	(NORM) • REV	NORM • (REV)	NORM • (REV)	(NORM) • REV	NORM • (REV)	(NORM) • REV	(NORM) • REV
SUB TRIM	Adjust as needed							
TRAVEL ADJUST	Refer to the CCPM section of this manual for proper settings.`							
FAIL SAFE (SPCM)								

		EXP	L	1	2	3	H
THROTTLE CURVE	N	OFF•ON	0%	%	80%	%	100%
	1	OFF•ON	100%	%	100%	%	100%
	2	OFF•ON	Optional				
PITCH CURVE	N	OFF•ON	-3° pitch	%	7–8° pitch	%	12° pitch
	1	OFF•ON	-5° pitch	%	5–6° pitch	%	11° pitch
	2	OFF•ON	%	%	%	%	%
	H	OFF•ON	-5° pitch	%	5° pitch	%	15° pitch

GYRO SENS	INH • RUDD D/R • (AUTO)	0	%	Refer to Gyro Gain section for settings.
		1	%	
		NORM	0	
		STNT	1	
		HOLD	0	
		INVT	1	

THRO HOLD	INH • (ACT)	POS	Set for Engine Off

REVO MIX	NORMAL	UP	Refer to Revolution Mixing section of this manual for proper settings.	%
		DOWN		%
	STUNT	UP		%
		DOWN		%
ACC MIX				%

		CHANNEL	SW	EXP	L	1	2	3	H
PROGRAM MIX	MIX1	▸		OFF-ON					
	MIX2	▸		OFF-ON					
				+POS		-POS		OFFSET	
	MIX3	▸			%		%		

Swash Type	1 Servo Norm 2 Servo 180° (3 Servo 120°) 4 Servo 90°			
	Aile	Elev	Pit	
Exp Act•(INH)	± 50%	± 50%	(+) 50%	

10X HELI DATA SHEET VOYAGER E CCPM INITIAL SETUP

Modulation S-PCM • Z-PCM • PPM (FM) **Model Number** 1 **Model Name** Voyager E CCPM Initial Setup

	THRO	AILE	ELEV	RUDD	GEAR	PITCH	AUX2	AUX3	AUX4	AUX5
REVERSE SW	R (N)	R (N)	(R) N	(R) N	R (N)	(R) N	R (N)	R (N)	R (N)	R (N)
TRAVEL ADJUST (12)	Refer to the CCPM section of this manual for proper settings									
SUB-TRIM (15)	Adjust as needed									
TRIM RATE (83)	%									

			AILE	ELEV	RUDD
D/R EXP (13)	0	D/R	60%	60%	60%
		EXP	Adjust as needed		
		TYPE			
	1	D/R	100%	100%	100%
		EXP	Adjust as needed		
		TYPE			
	2	D/R	Optional		
		EXP			
		TYPE			
AUTO D/R (23)	ST-1	INH•(ACT)	0 • (1) • 2	0 • (1) • 2	0 • (1) • 2
	ST-2	INH•ACT	0 • 1 • 2	0 • 1 • 2	0 • 1 • 2
	ST-3	INH•ACT	0 • 1 • 2	0 • 1 • 2	0 • 1 • 2
	ST-4	INH•ACT	0 • 1 • 2	0 • 1 • 2	0 • 1 • 2
	HOLD	INH•(ACT)	0 • (1) • 2	0 • (1) • 2	0 • (1) • 2

THROTTLE HOLD (16)	HOLD SW	INH• (HOLD) GEAR	
	POS	Adjust for Engine Off	
	AUTO CUT	(INH)•ACT	
		POS	
	Delay	1/4 (1/2) 3/4 1	

FUNCTION SELECT (17)	FLIGHT EXTRA	(INH) GEAR AILE	
	GEAR SW	(INH) GEAR HOLD	
	AUX2 SW	(INH)•ACT	
	PIT. LEVER	LOW	(INH)•ACT
		HI	(INH)•ACT
	ADT STUNT	INH•(ACT)	

GYRO SENS (44)	INH • AUX 3 • AUTO	0	Refer to the Gyro Gain section of this manual for proper settings.					
		1						
		2						
		NR	S1	S2	S3	S4	HD	
		0	1				1	

			CHANNEL MASTER	→ SLAVE	TRIM	SW	OFFSET		+GAIN	–GAIN
PROGRAM MIX (51) - (58)	1	INH • ACT		→	OFF • ON	NR•S1•S2•S3•S4 HD•AX2•GER				
	2	INH • ACT		→	OFF • ON	NR•S1•S2•S3•S4 HD•AX2•GER				
	3	INH • ACT		→	OFF • ON	NR•S1•S2•S3•S4 HD•AX2•GER				
	4	INH • ACT		→	OFF • ON	NR•S1•S2•S3•S4 HD•AX2•GER				

							EXP		L	1	2	3	4	5	6	H
PROGRAM MIX (51) - (58)	5	INH • ACT		→	OFF • ON	NR•S1•S2•S3•S4 HD•AX2•GER	OFF • ON	IN	0							100
								OUT								
	6	INH • ACT		→	OFF • ON	NR•S1•S2•S3•S4 HD•AX2•GER	OFF • ON	IN	0							100
								OUT								
	7	INH • ACT		→	OFF • ON	NR•S1•S2•S3•S4 HD•AX2•GER	OFF • ON	IN	0							100
								OUT								
	8	INH • ACT		→	OFF • ON	NR•S1•S2•S3•S4 HD•AX2•GER	OFF • ON	IN	0							100
								OUT								

		EXP		L	1	2	3	4	5	6	H
THRO CURVE (18) TH,TRIM=SLOW HOV.T=CENTER	N	OFF • (ON)	IN	0							100
			OUT	0	50%	50%	50%	50%	50%	50%	100
			HOV.SEL	——	HOV	HOV	HOV	HOV	HOV	HOV	——
	1	OFF • (ON)	IN	0							100
			OUT	100%	100%	100%	100%	100%	100%	100%	100
	2	OFF • ON	IN	0							100
			OUT								
	3	OFF • ON	IN	0							100
			OUT								
	4	OFF • ON	IN	0							100
			OUT								
PITCH CURVE (68) P,TRIM=CENTER HOV.P=CENTER	N	OFF • (ON)	IN	0							100
			OUT	-3°Pitch			7–8°Pitch				12°Pitch
			HOV.SEL	——	HOV	HOV	HOV	HOV	HOV	HOV	——
	1	OFF • (ON)	IN	0							100
			OUT	-5°Pitch			5–6°Pitch				11°Pitch
	2	OFF • ON	IN	0							100
			OUT								
	3	OFF • ON	IN	0							100
			OUT								
	4	OFF • ON	IN	0							100
			OUT								
	HOLD	OFF • (ON)	IN	0							100
			OUT	-3°Pitch			5°Pitch				15°Pitch

TAIL ROTOR CURVE (47)	N	NOR	IN	L	1	2	3	4	5	6	H
		ORG	OUT								
	1	NOR	IN	0	Refer to Revolution Mixing Section of this manual for proper settings						100
		ORG	OUT								
	2	NOR	IN	0							100
		ORG	OUT								
	3	NOR	IN	0							100
		ORG	OUT								
	4	NOR	IN	0							100
		ORG	OUT								
MIX RATE		1/1 • 1/2 • 1/4 • 1/10									

TRIM OFFSET (82)	HV.T	HV.P	LO.P	HI.P

Rudder→Throttle 4→1 MIX (41)	R	%
	L	%
MODE SELECTION	NR • S1 • S2 • S3 • S4 • AX2	

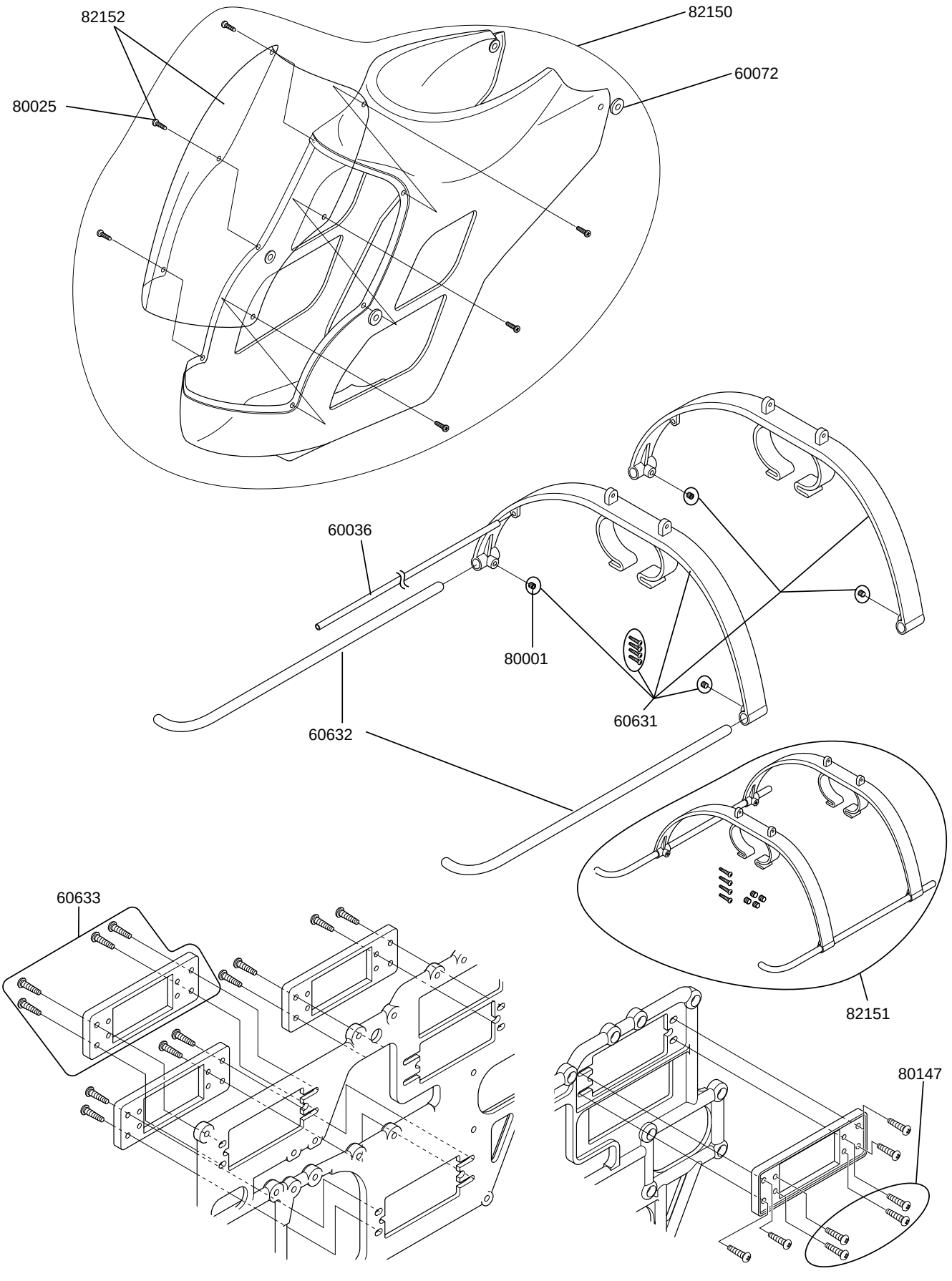
FAIL-SAFE (77)	Z	MODE	HOLD • 1.0s • 0.5s • 0.25s
		MEMORY	
	S	MEMORY	

Aileron→Throttle 2→1 MIX (41)	R	%
	L	%
MODE SELECTION	NR • S1 • S2 • S3 • S4 • AX2	

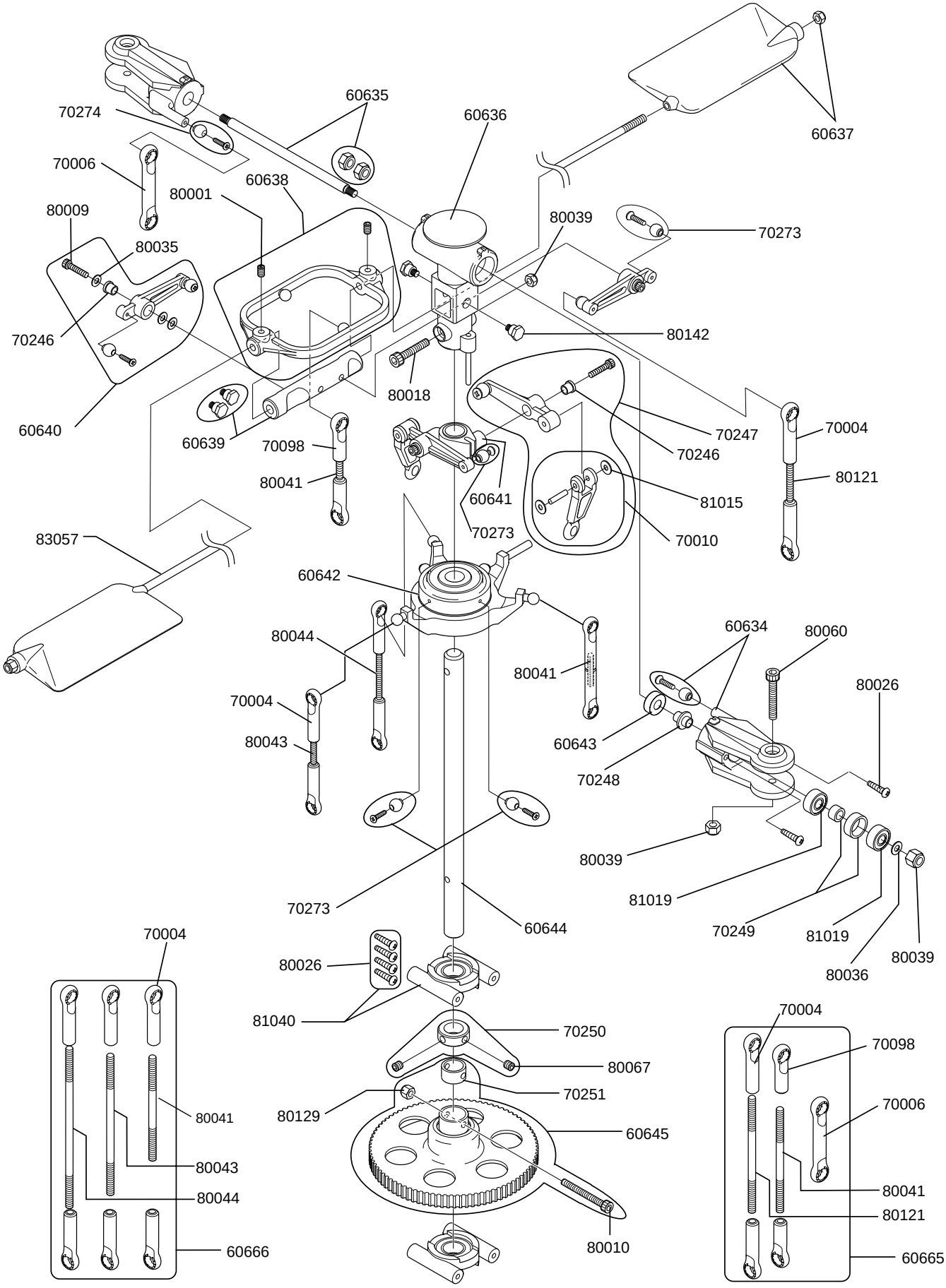
SWASHPLATE MIXING TYPE (65)	1 SERVO • (3SERVO - 120°CCPM) • 3SERVO - 140°CCPM					
	1SERVO	ELE → AIL	D	%		
			U	%		
		AIL → ELE	L	%		
			R	%		
	SWITCH	NR • S1 • S2 • S3 • S4 • HD				
3 SERVO 120° CCPM	AIL	(-50%)	ELE	(-50%)	PIT	(+50%)
3 SERVO 140° CCPM	AIL	%	ELE	%	PIT	%

Elevator→Throttle 3→1 MIX (41)	U	
	D	
MODE SELECTION	NR • S1 • S2 • S3 • S4 • AX2	

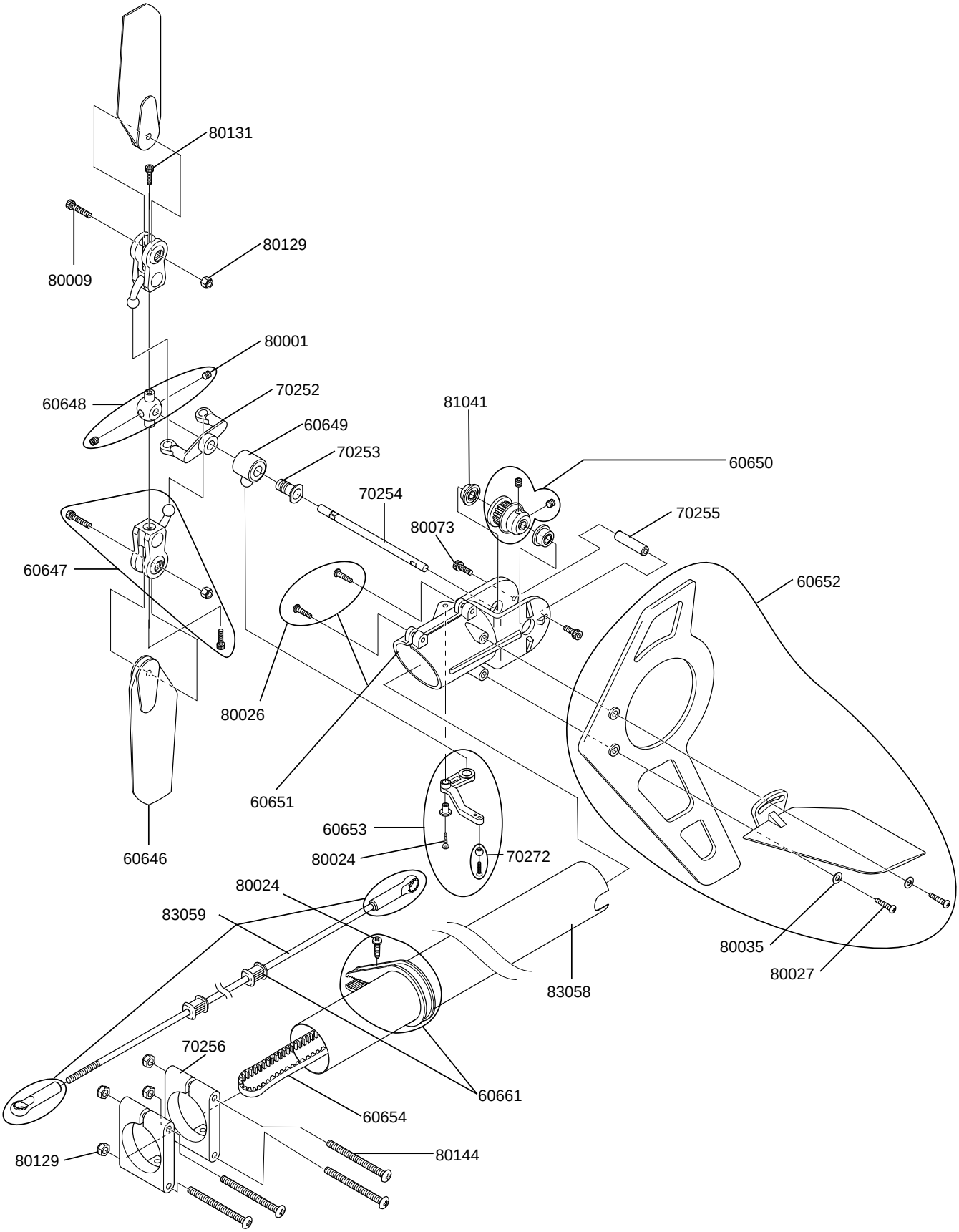
BODY SET / LANDING GEAR / SERVO PLATE ASSEMBLY



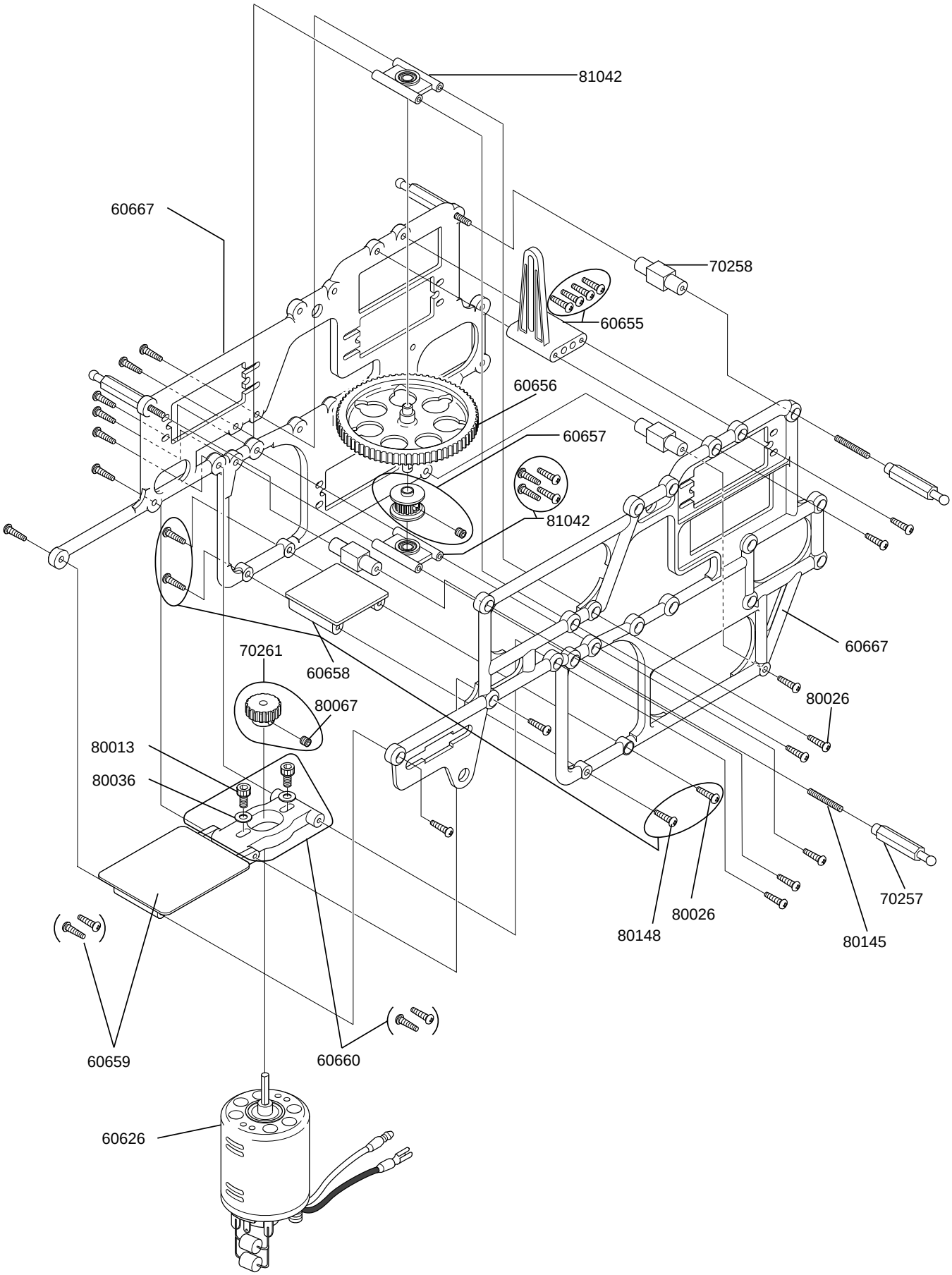
MAIN ROTOR HEAD / SWASHPLATE / WASHOUT UNIT / MAIN GEAR ASSEMBLY



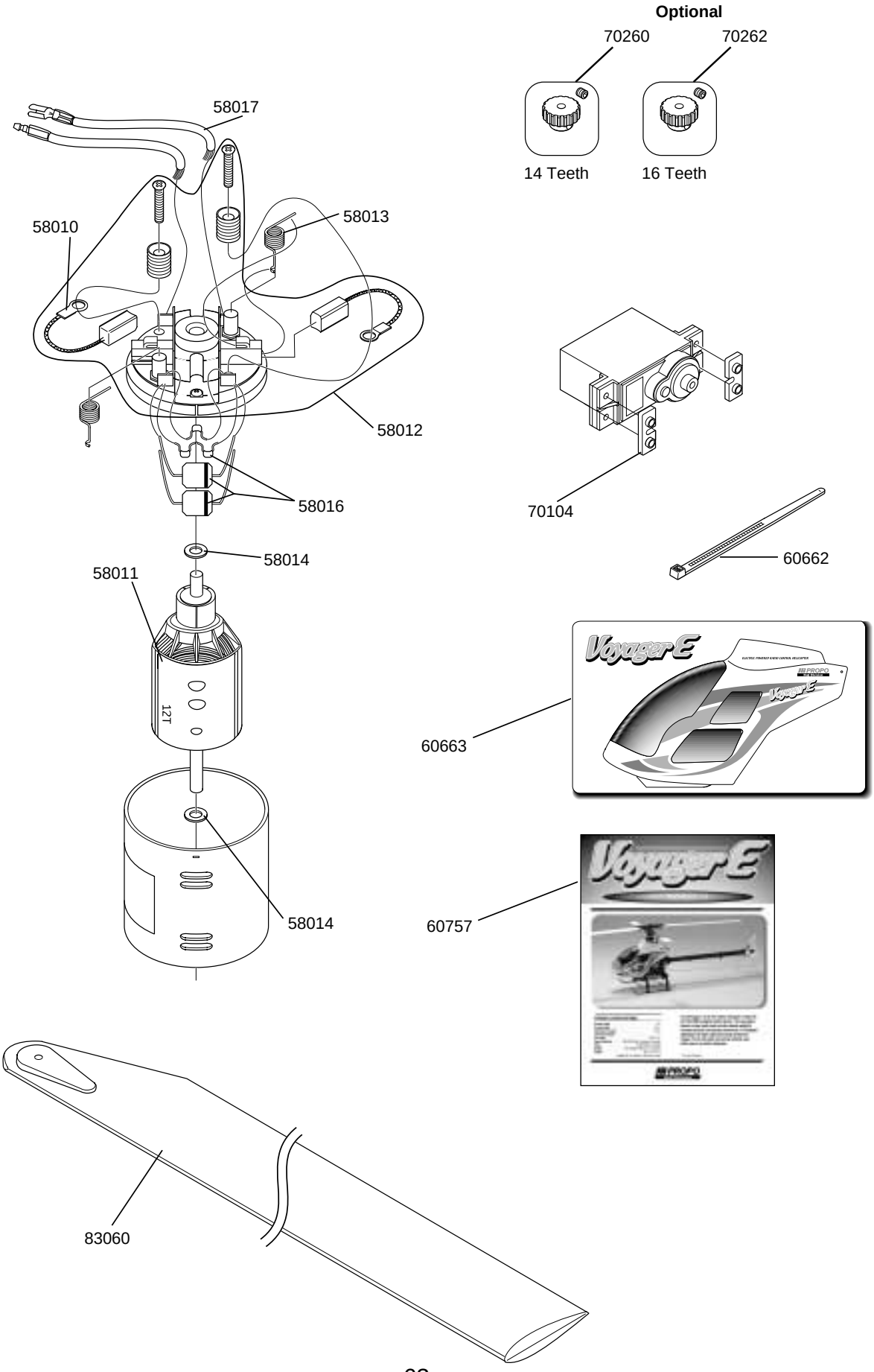
TAIL ROTOR ASSEMBLY



MAIN FRAME / MOTOR / INTERMEDIATE GEAR ASSEMBLY



MOTOR/MISCELLANEOUS PARTS ASSEMBLY



Part #	Description	Quantity	
58010	Motor Brush A		
	Motor Brush	2 pc	
58011	Armature	1 pc	For NHM-540ST
58012	Endbell Set		For NHM-540ST
	Endbell	1 pc	
	Brush A	2 pc	
58013	Brush Spring		
	Brush Spring	2 pc	
58014	Washer Set		
	Sym Washer (t0.3)	5 pc	
	Sym Washer (t0.5)	5 pc	
58016	Diode Set		
	Shotkey Diode	2 pc	
	Noise Condenser	3 pc	
58017	Lead Wire Set		
	Lead Wire (Red, Black)	1 pc each	
60036	Antenna Tube		
	Antenna Tube	3 pc	
60072	Rubber Grommet		
	Rubber Grommet	4 pc	
60625	JR Trainer Gear Set E		With Nylon Strap
	JR Trainer Gear Set E	1 set	
60626	Motor NHM-540ST		Lead Wire Installed
	Motor NHM-540ST	1 pc	
60631	Landing Strut		
	Landing Strut	2 pc	
	Set Screw, 3 x 04 mm	4 pc	
	Self Tapping Screw, 2.6 x 15 mm	4 pc	
60632	Landing Skid		
	Landing Skid	2 pc	
60633	Servo Adapter		
	Servo Adapter	4 pc	
	Self Tapping Screw, 2.6 x 12 mm	16 pc	
60634	Main Blade Grip		
	Main Blade Grip	2 pc	
	Joint Ball	2 pc	
	Flat Head Screw, 2 x 10 mm	2 pc	
60635	Spindle Shaft		
	Spindle Shaft	1 pc	
	Nylon Nut, 3 mm (t2.8)	2 pc	
60636	Main Rotor Hub		Swash Pin Installed
	Main Rotor Hub	1 pc	
60637	Flybar Paddle		
	Flybar Paddle	2 pc	
	Nylon Nut, 3 mm (t2.8)	2 pc	

Part #	Description	Quantity	
60638	Flybar Control Arm		
	Flybar Control Arm	1 pc	
	Set Screw, 3 x 4 mm	2 pc	
60639	Seesaw Assembly		
	Seesaw Assembly	1 pc	
	Seesaw Shaft Bolt	2 pc	
60640	Seesaw Arm		
	Seesaw Arm	2 pc	
	Seesaw Arm Bushing	2 pc	
	Joint Ball	4 pc	
	Flat Head Screw, 2 x 8 mm	4 pc	
	Flat Washer, 2.6 mm	6 pc	
	Socket Head Bolt, 2.6 x 12 mm	2 pc	
60641	Washout Base		
	Washout Base	1 pc	
60642	Swashplate Assembly		
	Swashplate Assembly	1 pc	
60643	Dampener		
	Dampener	2 pc	
60644	Main Rotor Shaft	1 pc	
60645	Main Drive Gear Assembly		Oneway Bearing Included
	Main Drive Gear Assembly	1 pc	
	Auto Rotation Collar	1 pc	
	Socket Head Bolt, 2.6 x 15 mm	1 pc	
	Nylon Nut, 2.6 mm	1 pc	
60646	Tail Rotor Blade		
	Tail Rotor Blade	2pc	
60647	Tail Blade Holder		With Bearings
	Tail Blade Holder	2 pc	
	Socket Head Bolt, 2.6 x 12 mm	2 pc	
	Nylon Nut, 2.6 mm	2 pc	
	Socket Head Bolt, 2 x 10 mm	2 pc	
60648	Tail Center Hub		
	Tail Center Hub	1 pc	
	Set screw, 3 x 3 mm	2 pc	
60649	Tail Slide Ring		
	Tail Slide Ring	1 pc	
60650	Tail Drive Pulley		
	Tail Drive Pulley	1 pc	
	Set Screw, 3 x 4 mm	2 pc	
60651	Tail Gear Case		
	Tail Gear Case	1 pc	
	Self Tapping Screw, 2.6 x 8 mm	2 pc	

Part #	Description	Quantity
60652	Horizontal & Vertical Fin Set	
	Vertical Fin	1 pc
	Horizontal Fin	1 pc
	Self Tapping Screw, 2.6 x 12 mm	2 pc
	Flat Washer, 2.6mm	2 pc
60653	Tail Pitch Control Lever	
	Tail Pitch Control Lever	1 pc
	Tail Lever Spacer	1 pc
	Self Tapping Screw, 2 x 8 mm	1 pc
	Joint Ball	1 pc
	Flat Head Screw, 2 x 7 mm	1 pc
60654	Tail Drive Belt	
	Tail Drive Belt	1 pc
60655	Anti-Rotation Plate	
	Anti-Rotation Plate	1 pc
	Self Tapping Screw, 2.6 x 8 mm	4 pc
60656	Intermediate Gear	
	Intermediate Gear	1 pc
60657	Front Tail Pulley	
	Front Tail Pulley	1 pc
	Set screw, 3 x 3 mm	1 pc
60658	Gyro Mount	
	Gyro Mount	1 pc
	Self-Tapping Screw, 2.6 x 15mm	2 pc
	Self-Tapping Screw, 2.6 x 8 mm	2 pc
60659	Front Radio Bed	
	Front Radio Bed	1 pc
	Self-Tapping Screw, 2.6 x 8 mm	2 pc
60660	Motor Mount	
	Motor Mount	1 pc
	Socket Head Bolt, 3 x 8 mm	2 pc
	Flat Washer, 3 mm	2 pc
	Self-Tapping Screw, 2.6 x 8 mm	2 pc
60661	Tail Guide Clamp (2pcs)	
	Tail Guide Clamp	2 pc
	Tail Control Bushing	2 pc
	Self-Tapping Screw, 2 x 8 mm	2pc
60662	Nylon Strap	
	Nylon Strap	10 pc
60663	Decal Set	
	Decal A	1 pc
60757	Assembly Instruction Manual	
	Assembly Instruction Manual	1 pc

Part #	Description	Quantity	
60665	Linkages Set K		Swashplate to Rotor Head
	Threaded Rod, 2.3 x 20 mm	2 pc	
	Threaded Rod, 2.3 x 25 mm	2 pc	
	Universal Link	4 pc	
	Universal Link S	4 pc	
	Double Link A	2 pc	
60666	Linkages Set L		Servo to Swashplate
	Threaded Rod, 2.3 x 20 mm	1 pc	
	Threaded Rod, 2.3 x 35 mm	1 pc	
	Threaded Rod, 2.3 x 40 mm	1 pc	
	Universal Link	6 pc	
60667	Main Frame Set		
	Main Frame L,R	1 pc each	
70004	Universal Link		
	Universal Link	10 pc	
70006	Double Link A		
	Double Link A	4 pc	
70010	Washout Link		
	Washout Link	2 pc	
	Washout Link Pin	2 pc	
	CA Stopper Ring, 2 mm	4 pc	
70098	Universal Link S		
	Universal Link S	5 pc	
70104	Servo Mounting Plate B		
	Servo Mounting Plate B	10 pc	
70246	Seesaw Arm Bushing		
	Seesaw Arm Bushing	2 pc	
70247	Washout Arm		
	Washout Arm	2 pc	
	Washout Arm Bushing	2 pc	
	Socket Head Bolt, 2.6 x 12 mm	2 pc	
	Washout Link	2 pc	
	Washout Link Pin	2 pc	
	CA Stopper Ring, 2 mm	4 pc	
	Joint Ball	2 pc	
	Flat Head Screw, 2 x 8 mm	2 pc	
70248	Grip Spacer		
	Grip Spacer	2 pc	
70249	Blade Holder Spacer		
	Blade Holder Spacer Inner	2 pc	
	Blade Holder Spacer Outer	2 pc	
70250	Main Shaft Collar		
	Main Shaft Collar	1 pc	
	Set Screw, 3 x 3 mm	2 pc	

Part #	Description	Quantity	
70251	Autorotation Collar		
	Autorotation Collar	1 pc	
70252	Tail Pitch Link		
	Tail Pitch Link	1 pc	
70253	Tail Slide Ring Sleep		
	Tail Slide Ring Sleep	1 pc	
70254	Tail Output Shaft		
	Tail Output Shaft	1 pc	
70255	Tail Case Spacer		
	Tail Case Spacer	2 pc	
70256	Tail Boom Holder		
	Tail Boom Holder	2 pc	
70257	Body Mounting Standoff, 25.5 mm		
	Body Mounting Standoff, 25.5 mm	2 pc	
70258	Plastic Main Frame Standoff, 25 mm		
	Plastic Main Frame Standoff, 25 mm	2 pc	
70260	Pinion Gear T14 Tooth		Optional (Sport Type)
	Pinion Gear T14 Tooth	1 pc	
	Set Screw, 3 x 3 mm	1 pc	
70261	Pinion Gear T15		Original (Standard Type)
	Pinion Gear T15	1 pc	
	Set Screw, 3 x 3 mm	1 pc	
70262	Pinion Gear T16		Optional (Performance Type)
	Pinion Gear T16	1 pc	
	Set Screw, 3 x 3 mm	1 pc	
70272	Joint Ball Set , 2 x 7 mm		
	Joint Ball	10 pc	
	Flat Head Screw, 2 x 7 mm	10 pc	
70273	Joint Ball Set, 2 x 8 mm		
	Joint Ball	10 pc	
	Flat Head Screw, 2 x 8 mm	10 pc	
70274	Joint Ball Set, 2 x 10 mm		
	Joint Ball	10 pc	
	Flat Head Screw, 2 x 10 mm	10 pc	
80001	Set Screw, 3 x 4 mm		
	Set Screw, 3 x 4mm	10pcs	
80009	Socket Head Bolt, 2.6 x 12 mm		
	Socket Head Bolt, 2.6 x 12 mm	10 pc	
80010	Socket Head Bolt, 2.6 x 15 mm		
	Socket Head Bolt, 2.6 x 15 mm	10 pc	
80013	Socket Head Bolt, 3 x 8 mm		
	Socket Head Bolt, 3 x 8 mm	10 pc	
80018	Socket Head Bolt, 3 x 18 mm		
	Socket Head Bolt, 3 x 18 mm	10 pc	

Part #	Description	Quantity
80024	Self-Tapping Screw, 2 x 8 mm	
	Self-Tapping Screw, 2 x 8 mm	10 pc
80025	Self-Tapping Screw, 2.3 x 08 mm	
	Self-Tapping Screw, 2.3 x 8 mm	10 pc
80026	Self-Tapping Screw, 2.6 x 8 mm	
	Self-Tapping Screw, 2.6 x 8 mm	10 pc
80027	Self-Tapping Screw, 2.6 x 12 mm	
	Self-Tapping Screw, 2.6 x 12 mm	10 pc
80035	Flat Washer, 2.6 mm	
	Flat Waser, 2.6 mm	10 pc
80036	Flat Washer, 3 mm	
	Flat Waser, 3 mm	10 pc
80039	Nylon Nut, 3mm (t2, 8)	
	Nylon Nut, 3 mm (t2, 8)	10 pc
80041	Threaded Rod, 2.3 x 20 mm	
	Threaded Rod, 2.3 x 20 mm	10 pc
80043	Threaded Rod, 2.3 x 35 mm	
	Threaded Rod, 2.3 x 35 mm	2 pc
80044	Threaded Rod, 2.3 x 40 mm	
	Threaded Rod, 2.3 x 40 mm	2 pc
80060	Socket Head Bolt, 3 x 20 mm	
	Socket Head Bolt, 3 x 20 mm	10 pc
80067	Set Screw, 3 x 3 mm	
	Set Screw, 3 x 3mm	10 pc
80073	Socket Head Bolt, 2 x 6 mm	
	Socket Head Bolt, 2 x 6 mm	10 pc
80121	Threaded Rod, 2.3 x 25 mm	
	Threaded Rod, 2.3 x 25 mm	2 pc
80129	Nylon Nut, 2.6mm	
	Nylon Nut, 2.6 mm	10 pc
80131	Socket Head Bolt, 2 x 10 mm	
	Socket Head Bolt, 2 x 10 mm	10 pc
80142	Seesaw Shaft Bolt	
	Seesaw Shaft Bolt	2 pc
80144	Self-Tapping Screw, 2.6 x 32 mm	
	Self-Tapping Screw, 2.6 x 32 mm	10 pc
80145	Set Screw, 2.6 x 15 mm	
	Set Screw, 2.6 x 15 mm	10 pc
80147	Self-Tapping Screw, 2.6 x 10 mm	
	Self-Tapping Screw, 2.6 x 10 mm	10 pc
80148	Self-Tapping Screw, 2.6 x 1 5 mm	
	Self-Tapping Screw, 2.6 x 15 mm	10 pc
81015	CA Stopper Ring, 2 mm	
	CA Stopper Ring, 2 mm	10 pc

Part #	Description	Quantity
81019	Shielded Bearing, 04 x 10 x 4	
	Shielded Bearing, 04 x 10 x 4	2 pc
81040	Plastic Bearing Block A (1680ZZ)	
	Plastic Bearing Block A (1680ZZ)	1 pc
	Self Tapping Screw, 2.6 x 8 mm	4 pc
81041	Shielded Bearing F, 03 x 07 x 3	
	Shielded Bearing F, 03 x 07 x 3	2 pc
81042	Plastic Bearing Block B (840ZZ)	
	Plastic Bearing Block B (840ZZ)	1 pc
	Self-Tapping Screw, 2.6 x 8 mm	4 pc
82150	Body Set	
	Body	1 pc
	Canopy	1 pc
	Self-Tapping Screw, 2.3 x 8 mm	6 pc
82151	Landing Gear Set	
	Landing Strut	2 pc
	Landing Skid	2 pc
	Set Screw, 3 x 4 mm	4 pc
	Self-Tapping Screw, 2.6 x 15 mm	4 pc
82152	Canopy	
	Canopy	1 pc
	Self-Tapping Screw, 2.3 x 8 mm	6 pc
83057	Flybar 440 mm	
	Flybar 440 mm	2 pc
83058	Tail Boom 503 mm	
	Tail Boom 503 mm	1 pc
83059	Tail Control Rod 478 mm	
	Tail Control Rod 478 mm	1 pc
	Universal Link	2 pc
83060	Main Rotor Blade	
	Main Rotor Blade	1 set

NOTES

JR PROPO®

Heli Division

Japan Remote Control Co., Ltd.
Heli Division