

TREX 700 Nitro

INSTRUCTION MANUAL

使用說明書

KX018008T

ALIGN

Programmable

3G

Flybarless System

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3Axis SMM 12bit Easy Energy Stable 3G T-REX 250-700 300Hz 3V-8.4V 25g RoHS

Thank you for buying ALIGN products. The **T-REX 700N 3G** is the latest technology in Rotary RC models. Please read this manual carefully before assembling and flying the new **T-REX 700N 3G** helicopter. We recommend that you keep this manual for future reference regarding tuning and maintenance.

承蒙閣下選用亞拓遙控世界系列產品，謹表謝意。進入遙控世界之前必須告訴您許多相關的知識與注意事項，以確保您能夠在學習的過程中較得心應手。在開始操作之前，請務必詳閱本說明書，相信一定能夠給您帶來相當大的幫助，也請您妥善保管這本說明書，以作為日後參考。

Thank you for buying ALIGN Products. The T-REX 700N 3G Helicopter is designed as an easy to use, full featured Helicopter R/C model capable of all forms of rotary flight. Please read the manual carefully before assembling the model, and follow all precautions and recommendations located within the manual. Be sure to retain the manual for future reference, routine maintenance, and tuning.

The T-REX 700N 3G is a new product developed by ALIGN. It provides flying stability for beginners, full aerobatic capability for advanced fliers, and unsurpassed reliability for customer support.

感謝您選購亞拓產品，為了讓您容易方便的使用 T-REX 700N 3G 直昇機、請您詳細的閱讀完這本說明書之後再進行組裝以及操作這台直昇機，同時請您妥善的保存這本說明書，作為日後進行調整以及維修的參考。

T-REX 700N 3G 是由亞拓自行研發的新產品，不論你是需求飛行穩定性的初學者或是追求性能的飛行愛好者，T-REX 700N 3G 將是你最佳的選擇。

THE MEANING OF SYMBOLS 標誌代表涵義

 WARNING 警告	Mishandling due to failure to follow these instructions may result in damage or injury. 因為疏忽這些操作說明，而使用錯誤可能造成財產損失或嚴重傷害。
 CAUTION 注意	Mishandling due to failure to follow these instructions may result in danger. 因為疏忽這些操作說明，而使用錯誤可能造成危險。
 FORBIDDEN 禁止	Do not attempt under any circumstances. 在任何禁止的環境下，請勿嘗試操作。

IMPORTANT NOTES 重要聲明

R/C helicopters, including the T-REX 700N 3G are not toys. R/C helicopter utilize various high-tech products and technologies to provide superior performance. Improper use of this product can result in serious injury or even death. Please read this manual carefully before using and make sure to be conscious of your own personal safety and the safety of others and your environment when operating all ALIGN products.

Manufacturer and seller assume no liability for the operation or the use of this product. Intended for use only by adults with experience flying remote control helicopters at a legal flying field. After the sale of this product we cannot maintain any control over its operation or usage.

T-REX 700N 3G 遙控直昇機並非玩具，它是結合了許多高科技產品所設計出來的休閒用品，所以商品的使用不當或不熟悉都可能造成嚴重傷害甚至死亡，使用之前請務必詳讀本說明書，勿輕忽並注意自身安全。

注意！任何遙控直昇機的使用，製造商和經銷商是無法對使用者於零件使用的損耗異常或組裝不當所發生之意外負任何責任，本產品是提供給有操作過模型直昇機經驗的成人或有相當技術的人員在旁指導於當地合法遙控飛行場飛行，以確保安全無虞下操作使用，產品售出後本公司將不負任何操作和使用控制上的任何性能與安全責任。

We recommend that you obtain the assistance of an experienced pilot before attempting to fly our products for the first time. A local expert is the best way to properly assemble, setup, and fly your model for the first time. The Helicopter requires a certain degree of skill to operate, and is a consumer item. Any damage or dissatisfaction as a result of accidents or modifications are not covered by any warrantee and cannot be returned for repair or replacement. Please contact our distributors for free technical consultation and parts at discounted rates when you experience problems during operation or maintenance.

模型商品屬於需高操作技術且為消耗性之商品，如經拆裝使用後，會造成不等情況零件損耗，任何使用情況所造成商品不良或不滿意，將無法於保固條件內更換新品或退貨，如遇有使用操作維修問題，本公司全省分公司或代理商將提供技術指導、特價零件供應服務。

2. SAFETY NOTES 安全注意事項



Fly only in safe areas, away from other people. Do not operate R/C aircraft within the vicinity of homes or crowds of people. R/C aircraft are prone to accidents, failures, and crashes due to a variety of reasons including, lack of maintenance, pilot error, and radio interference. Pilots are responsible for their actions and damage or injury occurring during the operation or as of a result of R/C aircraft models.

遙控模型飛機、直昇機屬高危險性商品，飛行時務必遠離人群，人為組裝不當或機件損壞、電子控制設備不良，以及操控上的不熟悉、都有可能導致飛行失控損傷等不可預期的意外，請飛行者務必注意飛行安全，並需了解自負疏忽所造成任何意外之責任。



LOCATE AN APPROPRIATE LOCATION 遠離障礙物及人群

R/C helicopters fly at high speed, thus posing a certain degree of potential danger. Choose a legal flying field consisting of flat, smooth ground without obstacles.

Do not fly near buildings, high voltage cables, or trees to ensure the safety of yourself, others and your model.

For the first practice, please choose a legal flying field and can use a training skid to fly for reducing the damage. Do not fly your model in inclement weather, such as rain, wind, snow or darkness.

直昇機飛行時具有一定的速度，相對的也潛在著危險性，場地的選擇也相對的重要，請需遵守當地法規到合法遙控飛行場地飛行。

必須注意周遭有沒有人、高樓、建築物、高壓電線、樹木等等，避免操控的不當造成自己與他人財產的損壞。

初次練習時，務必選擇在空曠合法專屬飛行場地並適當搭配練習架練習飛行，這對飛行失誤所造成的損傷將會大幅的降低。請勿在下雨、打雷等惡劣天候下操作，以確保本身及機體的安全。



PREVENT MOISTURE 遠離潮濕環境

R/C models are composed of many precision electrical components.

It is critical to keep the model and associated equipment away from moisture and other contaminants. The introduction or exposure to water or moisture in any form can cause the model to malfunction resulting in loss of use, or a crash. Do not operate or expose to rain or moisture.

直昇機內部也是由許多精密的電子零組件組成，所以必須絕對的防止潮濕或水氣，避免在浴室或雨天時使用，防止水氣進入機身內部而導致機件及電子零件故障而引發不可預期的意外！



PROPER OPERATION 勿不當使用本產品

Please use the replacement of parts on the manual to ensure the safety of instructors.

This product is for R/C model, so do not use for other purpose.

請勿自行改造加工，任何的升級改裝或維修，請使用亞拓產品目錄中的零件，以確保結構的安全。請確認於產品限界內操作，請勿過載使用，並勿用於安全、法令外其它非法用途。



OBTAIN THE ASSISTANCE OF AN EXPERIENCED PILOT 避免獨自操控

Before turning on your model and transmitter, check to make sure no one else is operating on the same frequency. Frequency interference can cause your model, or other models to crash.

The guidance provided by an experienced pilot will be invaluable for the assembly, tuning, trimming, and actual first flight.

(Recommend you to practice with computer-based flight simulator.)

至飛行場飛行前，需確認是否有相同頻率的同好正進行飛行，因為開啓相同頻率的發射機將導致自己與他人立即干擾等意外危險。

遙控飛機操控技巧在學習初期有著一定的難度，要盡量避免獨自操作飛行，需有經驗的人士在旁指導，才可以操控飛行。(勤練電腦模擬器及老手指導是入門必要的選擇)



SAFE OPERATION 安全操作

Operate this unit within your ability. Do not fly under tired condition and improper operation may cause in danger.

請於自己能力內及需要一定技術範圍內操作這台直昇機，過於疲勞、精神不佳或不當操作，意外發生風險將可能會提高。



ALWAYS BE AWARE OF THE ROTATING BLADES 遠離運轉中零件

During the operation of the helicopter, the main rotor and tail rotor will be spinning at a high rate of speed. The blades are capable of inflicting serious bodily injury and damage to the environment. Be conscious of your actions, and careful to keep your face, eyes, hands, and loose clothing away from the blades. Always fly the model a safe distance from yourself and others, as well as surrounding objects. Never take your eyes off the model or leave it unattended while it is turned on. Immediately turn off the model and transmitter when you have landed the model.

當直昇機主旋翼與尾旋翼運轉時，切勿觸摸並遠離任何物件，以避免造成危險及損壞。



KEEP AWAY FROM HEAT 遠離熱源

R/C models are made up various forms of plastic. Plastic is very susceptible to damage or deformation due to extreme heat and cold climate. Make sure not to store the model near any source of heat such as an oven, or heater. It is best to store the model indoors, in a climate-controlled, room temperature environment.


遙控飛機多半是以 PA 纖維或聚乙烯、電子商品為主要材質，因此要盡量遠離熱源、日曬，以避免因高溫而變形甚至熔毀損壞的可能。











3. EQUIPMENT REQUIRED FOR ASSEMBLY 自備設備

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RADIO TRANSMITTER AND ELECTRONIC EQUIPMENT REQUIRED FOR ASSEMBLY 自備遙控及電子設備

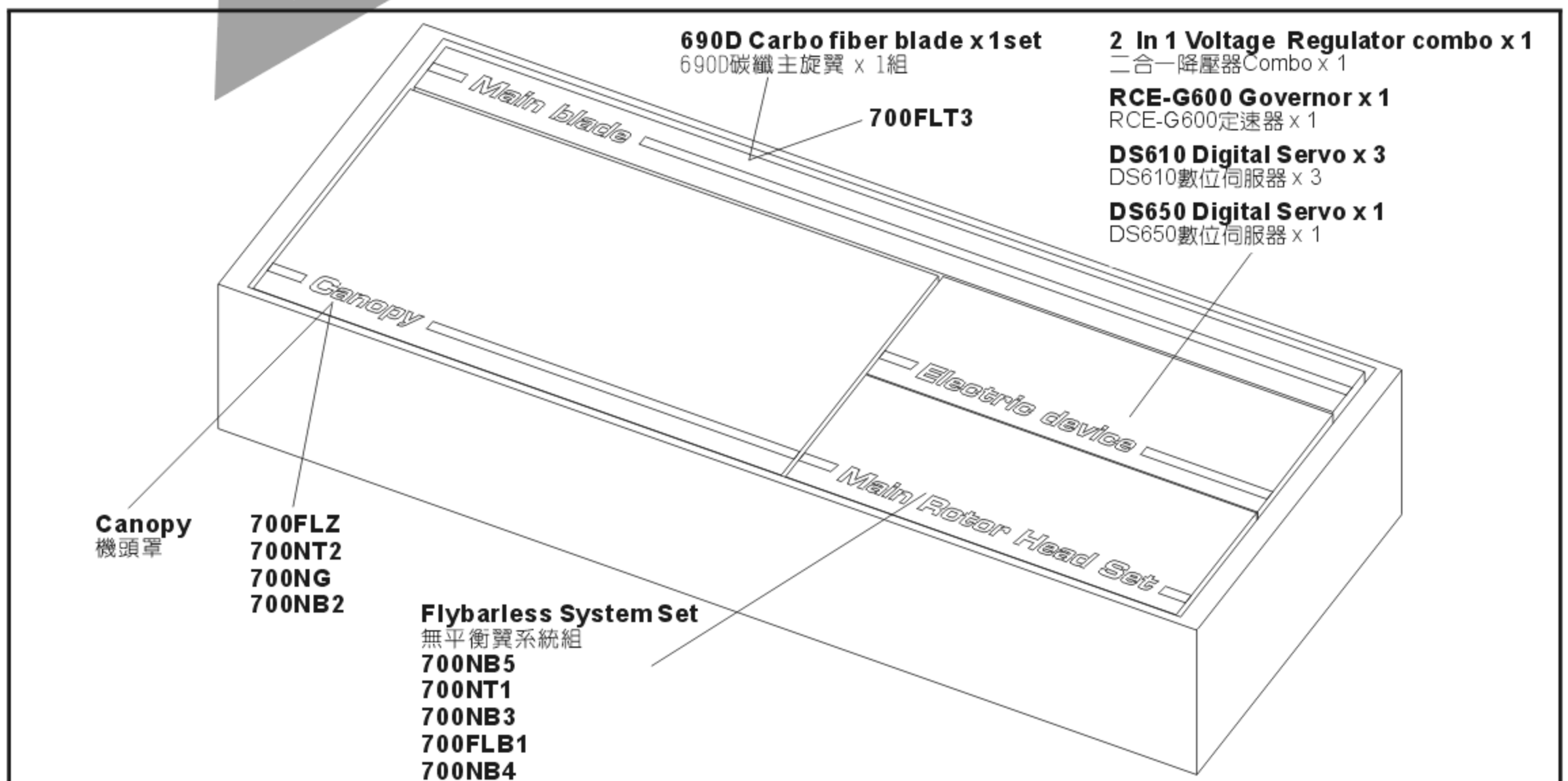
 <p>Transmitter (7-channel or more, helicopter system) 發射機 (七動以上直昇機模式遙控器)</p>	 <p>Receiver (7-channel or more) 接收機 (七動以上)</p>	 <p>Standard-size-throttle servo (minimum speed 0.10 sec/60°, torque 3kg.cm or higher) 油門用標準伺服器 x 1pc (速度: 0.10秒/60度以內, 扭力: 3kg.cm以上)</p>	 <p>Engine Starter x 1pc 啟動器 x 1</p>
 <p>Dial Pitch Gauge x 1pc 旋轉式螺距規 x 1</p>	 <p>Fuel Pump x 1pc 加油器 x 1</p>	 <p>Engine Fuel x 1pc 引擎燃油 x 1</p>	 <p>90 Muffler x 1pc 90高效加速管 x 1</p>
 <p>ALIGN 91H Engine 91H引擎</p> <p style="text-align: center;">or</p>  <p>ALIGN 91HP Engine 91HP引擎</p>			

ADDITIONAL TOOLS REQUIRED FOR ASSEMBLY 自備工具

 <p>Scissors 剪刀</p>	 <p>Cutter Knife 刀子</p>	 <p>Diagonal Cutting Pliers 斜口鉗</p>	 <p>Needle Nose Pliers 尖嘴鉗</p>
 <p>Oil 潤滑油</p>	 <p>CA 瞬間膠</p>	 <p>Hexagon Screw Driver 六角螺絲起子 3mm/2.5mm/2mm/1.5mm</p>	 <p>Phillips Screw Driver 十字螺絲起子 φ 3.0 / φ 1.8mm</p>

4. PACKAGE ILLUSTRATION 包裝說明

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CAREFULLY INSPECT BEFORE REAL FLIGHT 實機飛行前請嚴格執行飛行前檢查義務

- ☆ Before flying, please check to make sure no one else is operating on the same frequency for the safety.
- ☆ Before flight, please check if the batteries of transmitter and receiver are enough for the flight.
- ☆ Before turn on the transmitter, please check if the throttle stick is in the lowest position. IDLE switch is OFF.
- ☆ When turn off the unit, please follow the power on/off procedure. Power ON- Please turn on the transmitter first, and then turn on receiver. Power OFF- Please turn off the receiver first and then turn off the transmitter. Improper procedure may cause out of control, so please to have this correct habit.
- ☆ Before operation, check every movement is smooth and directions are correct. Carefully inspect servos for interference and broken gear.
- ☆ Check for missing or loose screws and nuts. See if there is any cracked and incomplete assembly of parts. Carefully check main rotor blades and rotor holders. Broken and premature failures of parts possibly cause resulting in a dangerous situation.
- ☆ Check all ball links to avoid excess play and replace as needed. Failure to do so will result in poor flight stability.
- ☆ Check the battery and power plug are fastened. Vibration and violent flight may cause the plug loose and result out of control.
- ★ 每次飛行前應先確認所使用的頻率是否會干擾他人，以確保你自身與他人的安全。
- ★ 每次飛行前確定您發射機與接收機電池的電量是在足夠飛行的狀態。
- ★ 開機前確認油門搖桿是否位於最低點，熄火降落開關，定速開關(IDLE)是否於關閉位置。
- ★ 關機時必須遵守電源開關機的程序，開機時應先開啓發射機後，再開啓接收機電源；關機時應先關閉接收機後，再關閉發射機電源。不正確的開關程序可能會造失控的現象，影響自身與他人的安全，請養成正確的習慣。
- ★ 開機請先確定直昇機的各個動作是否順暢，及方向是否正確，並檢查伺服器的動作是否有干涉或崩齒的情形，使用故障的伺服器將導致不可預期的危險。
- ★ 飛行前確認沒有缺少或鬆脫的螺絲與螺帽，確認沒有組裝不完整或損毀的零件，仔細檢查主旋翼是否有損壞，特別是接近主旋翼夾座的部位。損或組裝不完整的零件不僅影響飛行，更會造成不可預期的危險。注意：對損耗、有裂痕零件更新及定期保養檢查的重要性。
- ★ 檢查所有的連桿頭是否有鬆脫的情形，過鬆的連桿頭應先更新，否則將造成直昇機無法操控的危險。
- ★ 確認電池及電源接頭是否固定牢靠，飛行中的震動或激烈的飛行，可能造成電源接頭鬆脫而造成失控的危險。

Standard Equipment 標準配備

 700NCA	 700NB	 700FLB1	 700NB2	 700NB3	 700NB4	 700NB5
 700NG	 700NT1	 700NT2	 700FLT3	 700FLZ	 690D Carbon Fiber Blades x 1set 690D碳纖主旋翼 x 1組	
 RCE-G600 Governor RCE-G600定速器		 2 In 1 Voltage Regulator Combo 二合一降壓器Combo		 DS610 Digital Servo x 3 DS650 Digital Servo x 1 DS610數位伺服器 x 3 DS650數位伺服器 x 1		 Flybarless System FL760 700無平衡翼系統組

When you see the marks as below, please use glue or grease to ensure flying safety.

標有以下符號之組裝步驟，請配合上膠或上油，以確保使用之可靠度。

- CA** : Apply CA Glue to fix.
- R48** : Apply Anaerobics Retainer to fix.
- T43** : Apply Thread Lock to fix.
- OIL** : Add Grease.
- CA : 使用瞬間膠固定
- R48 : 使用金屬管狀固定缺氧膠固定
- T43 : 使用螺絲膠
- OIL : 添加潤滑油



Grease
潤滑油



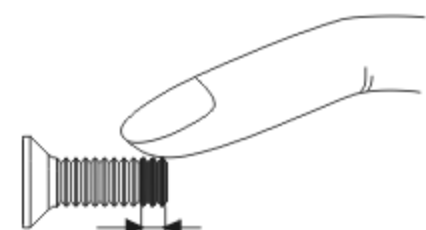
R48
綠色



T43
藍色



CA
Self-furnished
瞬間膠(自備)



T43 Glue width : approx. 1mm
T43上膠寬度約1mm

R48 metal tubular adhesive (eg. Bearings). T43 thread lock, apply a small amount on screws or metal parts and wipe surplus off. When disassembling, recommend to heat the metal joint about 15 Seconds. (NOTE : Keep plastic parts away from heat.)

R48 為強力金屬管狀(如軸承)接著劑，T43為螺絲膠，膠合螺絲或金屬內外徑請務必少量使用，必要時請用手去除多餘膠量，欲拆卸時可於金屬接合部位熱烤約15秒。(注意！塑膠件避免接近熱源)

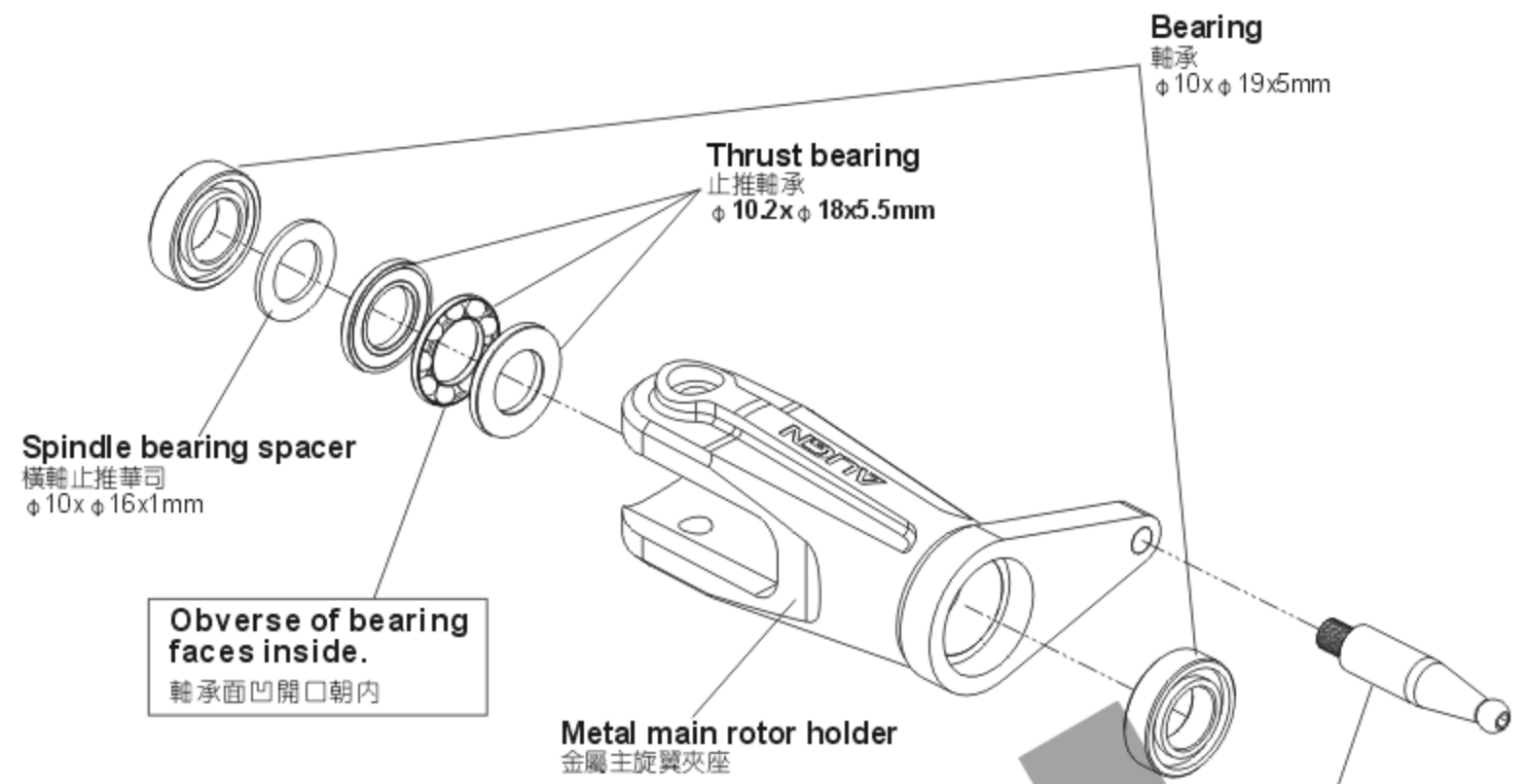
When assembling ball links, make sure the "A" character faces outside.

各項塑膠製連桿頭扣接時，A字請朝外。

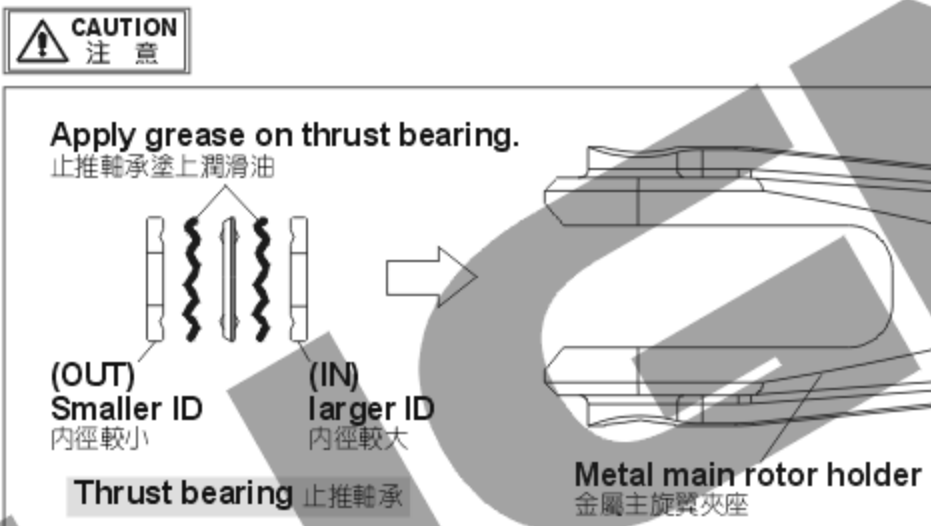
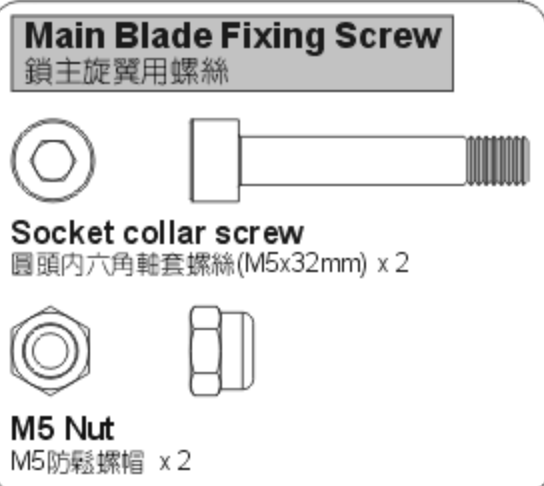
700FLH1



Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)



700FLH1A

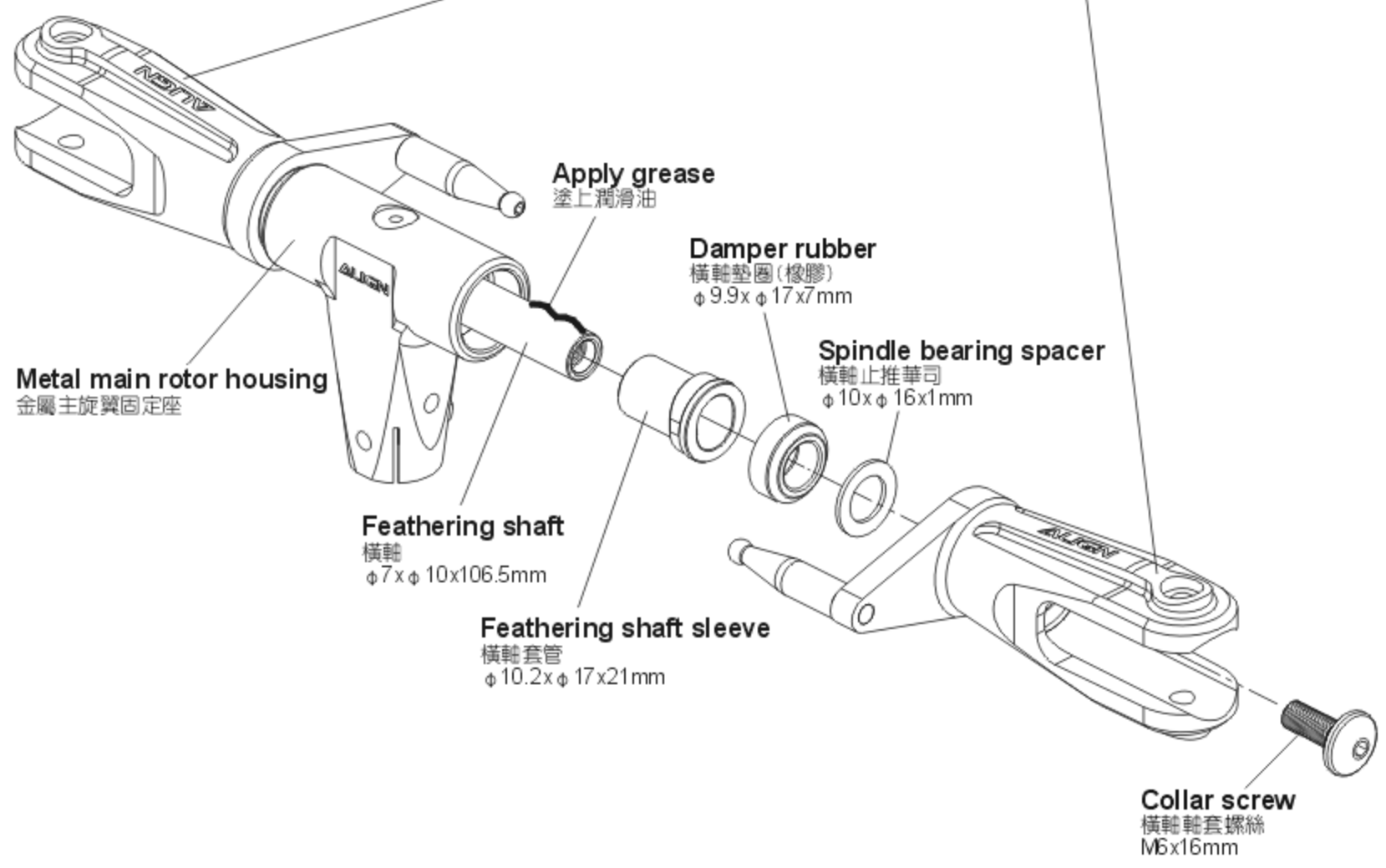


CAUTION 注意

Already assembled by Factory.
Before flying, please check if the screws are fixed with glue.
原裝組裝完成品，每一次飛行前請先確認螺絲是否已上膠不會鬆動。








700FLH1

ALIGN 字樣朝上



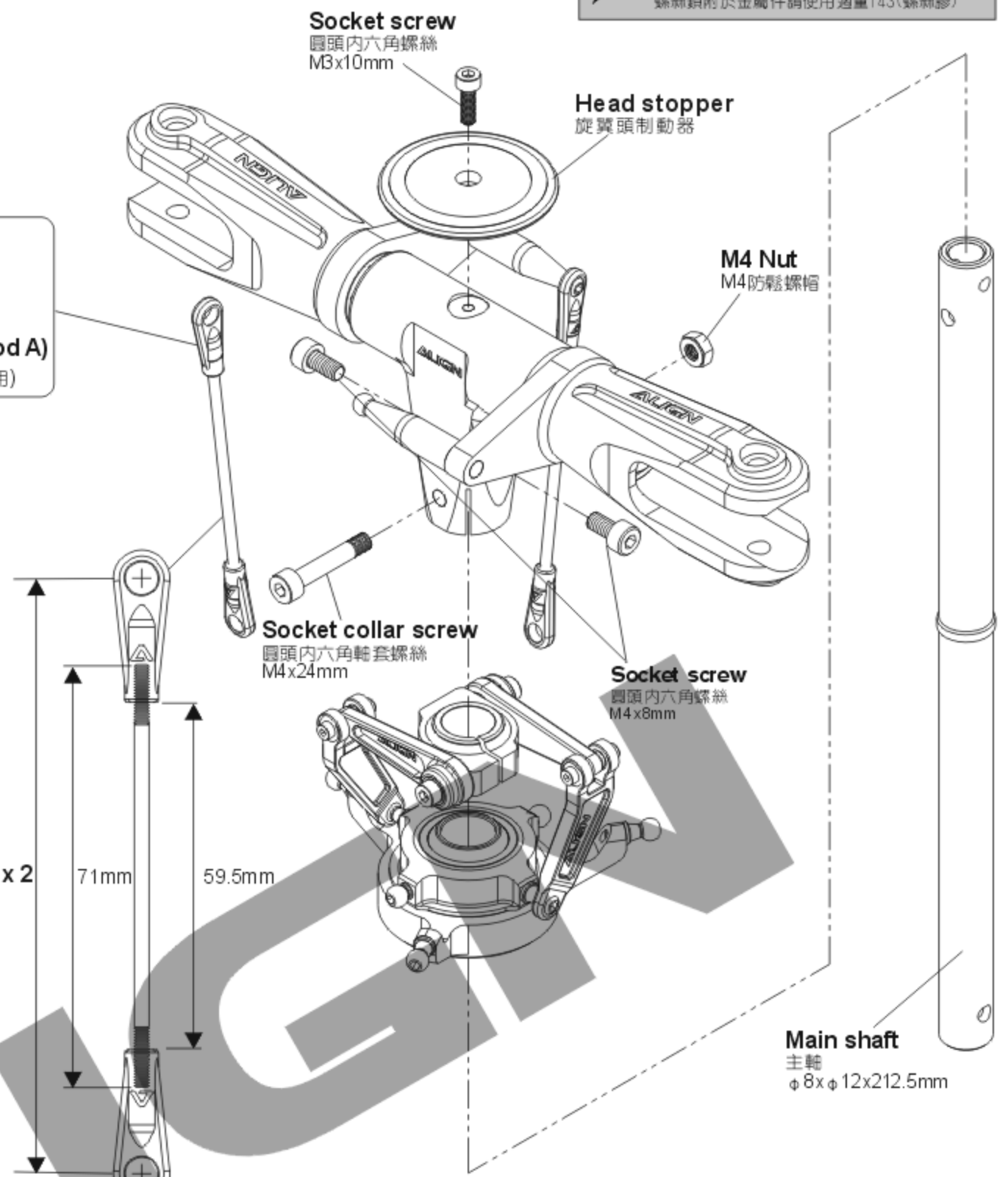
700FLH1

Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)






-  **Bearing**
轉承(φ3xφ7x3mm) x 4
-  **Bearing**
轉承(φ2xφ5x2.3mm) x 4
-  **Socket screw**
圓頭內六角螺絲(M2x5mm) x 4
-  **Socket screw**
圓頭內六角螺絲(M3x14mm) x 1
-  **Socket screw**
圓頭內六角螺絲(M3x20mm) x 1
-  **Washer**
華司(φ3xφ4.8x0.3mm) x 2
-  **Collar**
擺臂轉承襯套(φ3xφ4.8x1.5mm) x 2

-  **Ball Links x4**
(use with link rod A)
連桿頭 x4 (連桿A專用)

- Linkage rod(A)**
Approx. 92.5mm x 2
連桿(A)約92.5mm x 2



700FLH1A

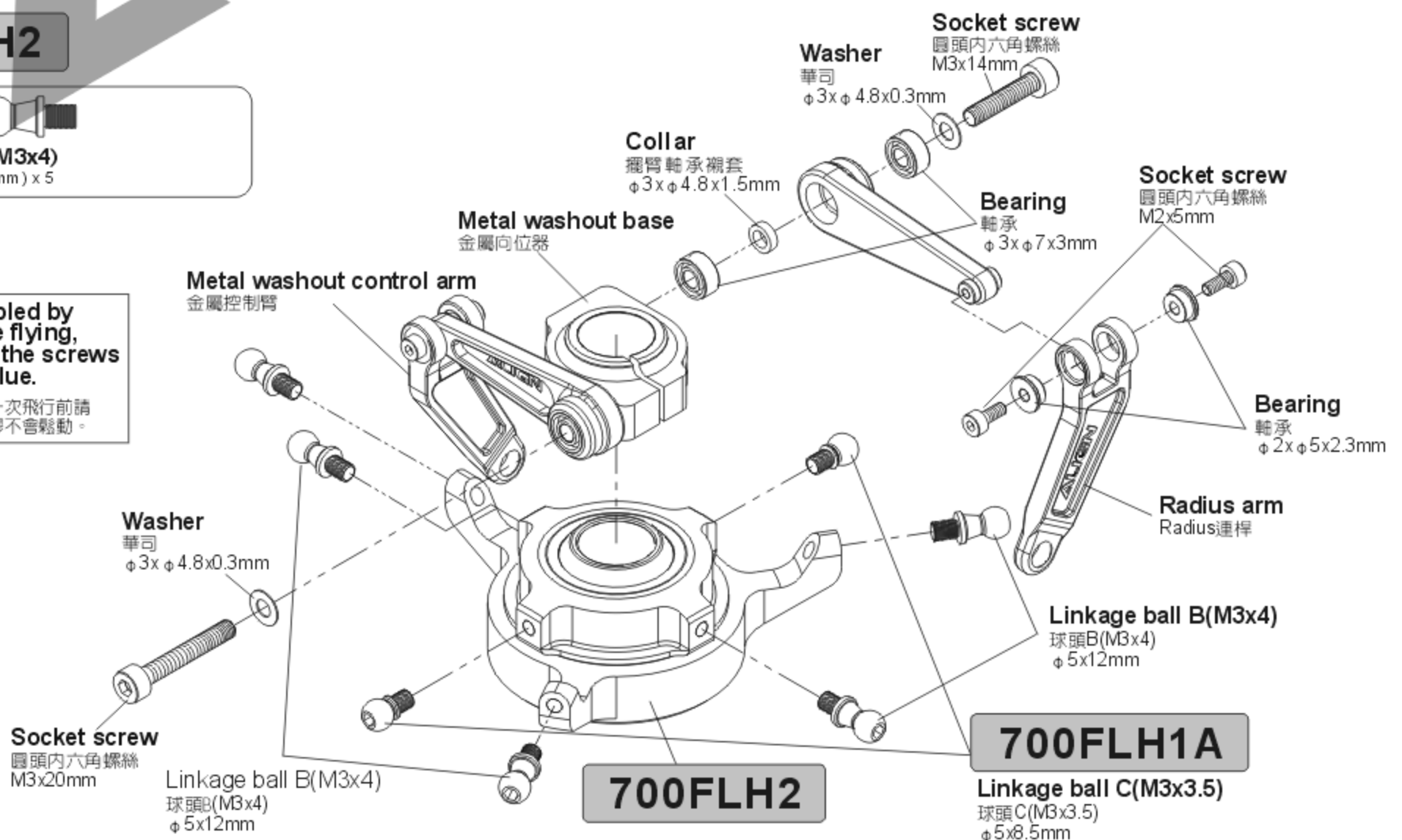
-  **Linkage ball C(M3x3.5)**
球頭C(M3x3.5)(φ5x8.5mm) x 2
-  **Socket screw**
圓頭內六角螺絲(M3x10mm) x 1
-  **Socket screw**
圓頭內六角螺絲(M4x8mm) x 2
-  **M4 Nut**
M4防鬆螺帽 x 1
-  **Socket collar screw**
圓頭內六角轉套螺絲(M4x24mm) x 1

700FLH2

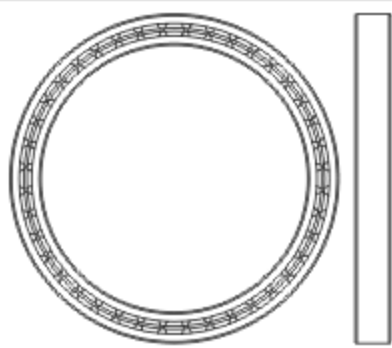
-  **Linkage ball B(M3x4)**
球頭B(M3x4)(φ5x12mm) x 5

CAUTION
注意

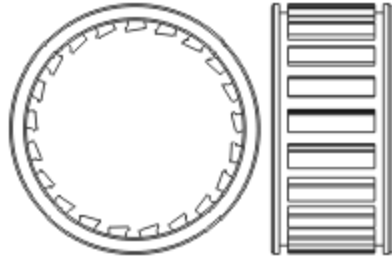
Already assembled by Factory. Before flying, please check if the screws are fixed with glue.
原裝組裝完成品。每一次飛行前請先確認螺絲是否已上膠不會鬆動。



700NB3



Bearing
軸承(φ15xφ21x4mm) x 2



One-way bearing
單向軸承(φ15xφ23x11mm) x 1



Socket screw
圓頭內六角螺絲(M2.5x8mm) x 6



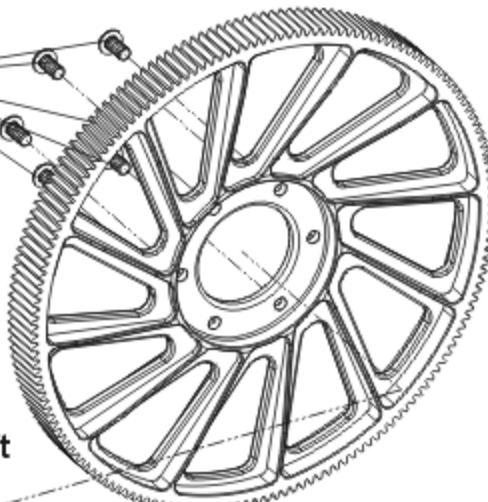
Socket button head screw
半圓頭內六角螺絲(M3x6mm) x 6

Socket button head screw
半圓頭內六角螺絲
M3x6mm

One-way bearing shaft
單向軸承套
φ12xφ15x41.5mm

One-way bearing cover
單向軸承上蓋
φ21xφ15.8x26mm

Bearing
軸承
φ15xφ21x4mm



Main drive gear
主齒盤
164T

One-way bearing collar
單向軸承外環
φ6xφ23x11.6mm

One-way bearing
單向軸承
φ15xφ23x11mm

One-way bearing mount
單向軸承下座
φ21xφ6.5x33.1mm

Apply grease
塗上潤滑油

Autorotation tail drive gear
尾驅動主齒
150T



CAUTION 注意
Already assembled by Factory. Before flying, please check if the screws are fixed with glue.

原裝組裝完成品，每一次飛行前請先確認螺絲是否已上膠不會鬆動。

Please note the direction of bearing.
請注意軸承方向

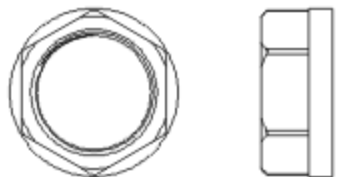
Before tightening the screw, please rotate the bearing and check the concentricity of the bearing. Then apply some glue evenly on the screw and tighten it firmly, to avoid the bearing stuck or heavy load at one side and cause slip.

上緊螺絲前請試轉動確認軸承同心度良好後，才能將螺絲平均上膠鎖緊，以避免造成卡死或單向重負載可能產生的打滑。

700NB4A



M4 Set screw
M4止洩螺絲(M4x4mm) x 2



Clutch nut
離合器齒輪螺帽(φ14x6mm) x 1



Bearing
軸承(φ5xφ13x4mm) x 2



Bearing
軸承(φ10xφ19x5mm) x 2

M3 Nut
M3防鬆螺帽

Socket screw
圓頭內六角螺絲
M3x8mm

Hex mounting bolt
六角機身鋁柱
φ2.5x60.5mm

Clutch gear
離合器齒輪
φ7xφ15.4x40.9mm

Clutch bell
離合器鐘
φ51xφ56x20.5mm

M4 Set screw
M4止洩螺絲
M4x4mm

Bearing
軸承
φ5xφ13x4mm

Starter coupling
八角啟動頭
φ8xφ10x18mm

M4 Set screw
M4止洩螺絲
M4x4mm

Clutch nut
離合器齒輪螺帽
φ14x6mm

Bearing
軸承
φ10xφ19x5mm

Socket screw
圓頭內六角螺絲
M3x8mm

Clutch bearing block
離合器軸承座

M3 Nut
M3防鬆螺帽

RCE G-600 Magnet(Governor sensor)
RCE G-600定速器感應磁鐵

The side with a mark on the magnet is the north pole
作記號面為N極

700NB4B



Socket screw
圓頭內六角螺絲(M3x8mm) x 2



M3 Nut
M3防鬆螺帽 x 2

Clutch liner
離合器來令片
1x9x158mm

Already assembled by factory, please note to check again.
已組裝完成，請務必自行再確認。

Bearing
軸承
φ5xφ13x4mm

Clutch/Start shaft
啟動軸
φ5xφ12x82mm

700NB1A



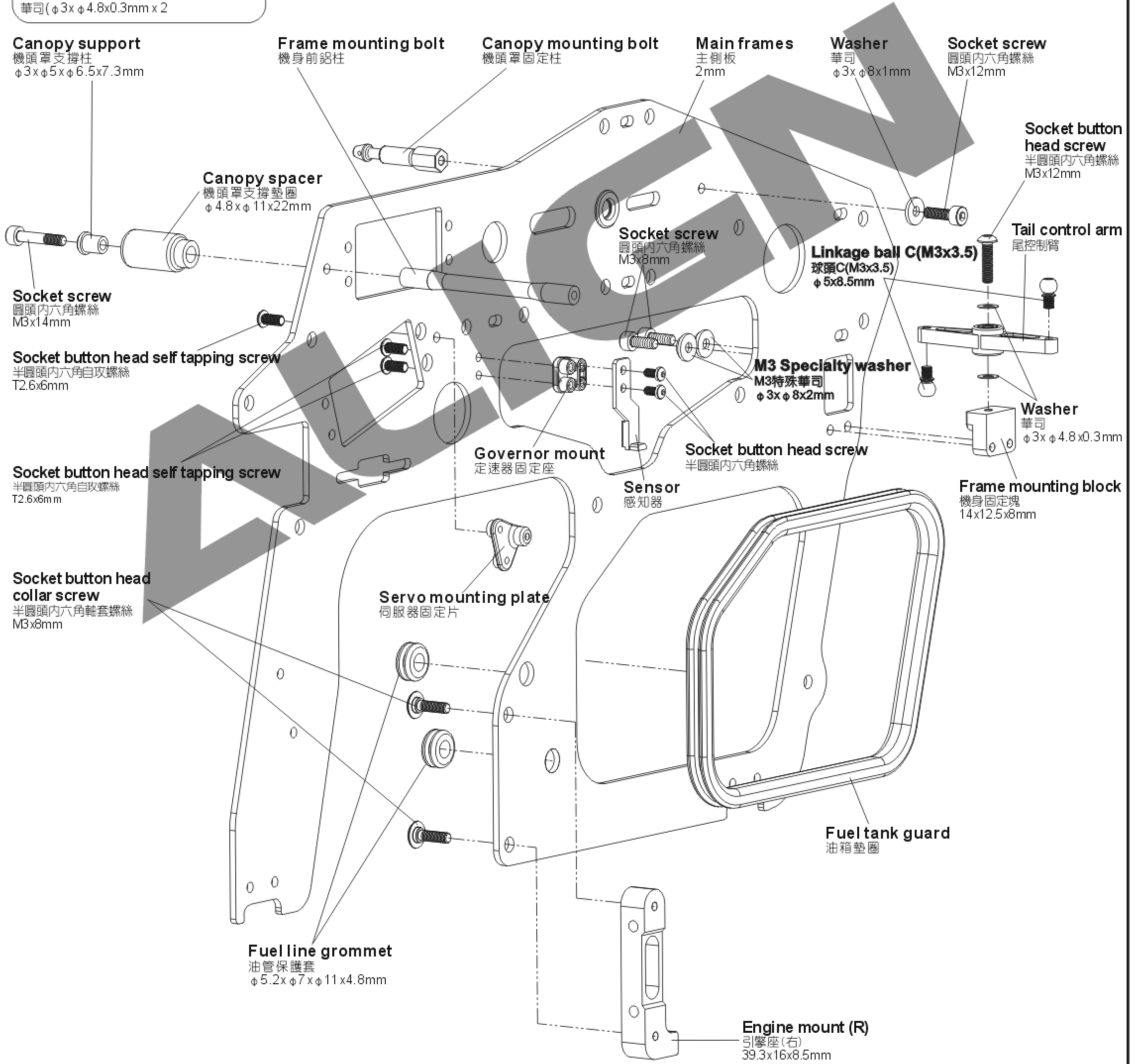
700NB5A



700FLB1



Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)



700FLB1



Socket screw
圓頭內六角螺絲(M3x14mm) x 1



Socket button head collar screw
半圓頭內六角轉套螺絲(M3x8mm) x 8

700NB1A



Socket button head collar screw
半圓頭內六角轉套螺絲(M3x8mm) x 12

700NB5A



Socket button head self tapping screw
半圓頭內六角自攻螺絲(T2.6x6mm) x 1



Socket screw
圓頭內六角螺絲(M3x12mm) x 1



M3 Set screw
M3止洩螺絲(M3x15mm) x 2

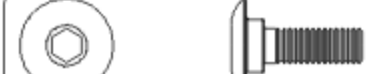


Socket button head collar screw
半圓頭內六角轉套螺絲(M3x8mm) x 6

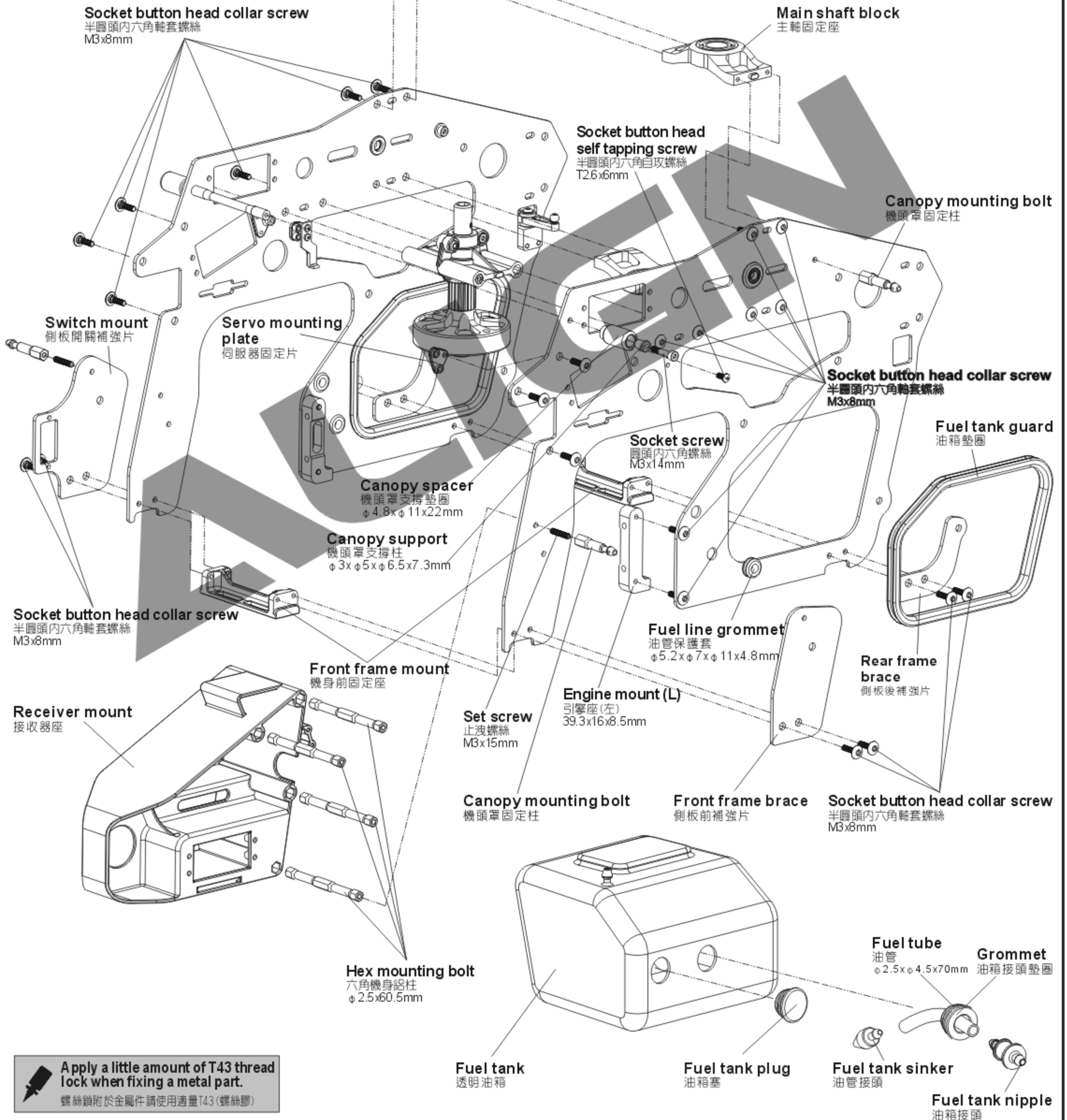


Washer
華司(φ3xφ8x1mm) x 1

700NB4B



Socket button head collar screw
半圓頭內六角轉套螺絲(M3x8mm) x 4



Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)

700NB4A



Socket screw
圓頭內六角螺絲 (M3x12mm) x 2



Socket head spring screw
圓頭內六角彈簧螺絲 (M4x8mm) x 2



Socket button head screw
半圓頭內六角螺絲 (M4x5mm) x 4

700NB4B



Socket button head collar screw
半圓頭內六角軸套螺絲 (M3x8mm) x 4

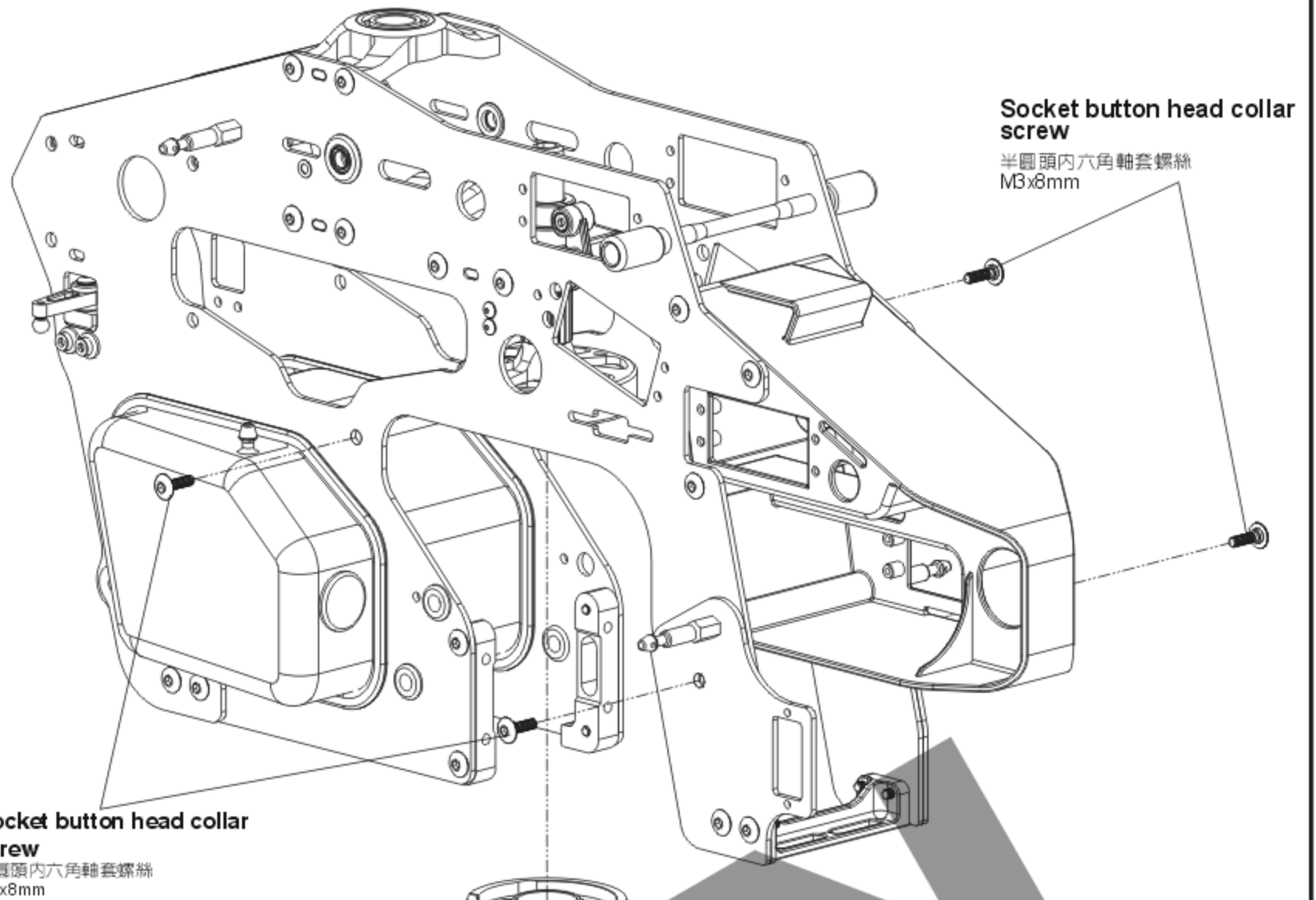
700NB1A



Socket screw
圓頭內六角螺絲 (M4x16mm) x 4

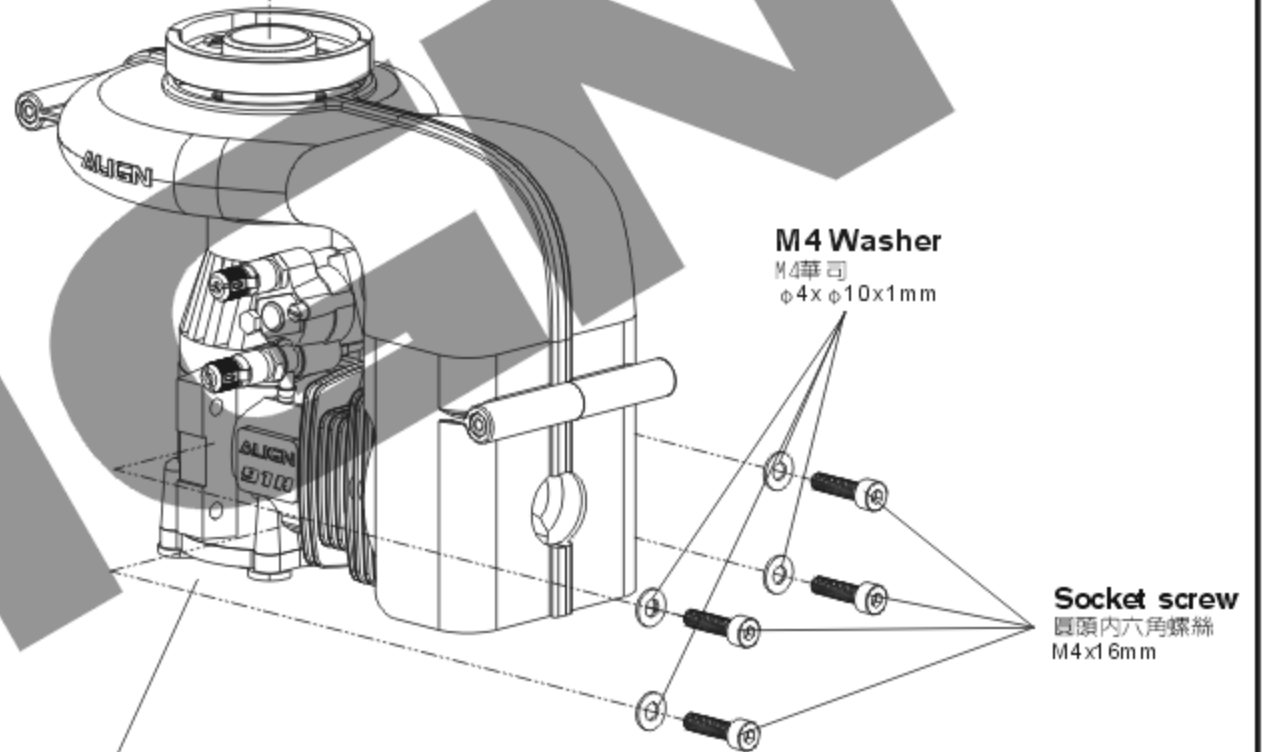


M4 Washer
M4華司 (φ4xφ10x1mm) x 4



Socket button head collar screw
半圓頭內六角軸套螺絲
M3x8mm

Socket button head collar screw
半圓頭內六角軸套螺絲
M3x8mm



M4 Washer
M4華司
φ4xφ10x1mm

Socket screw
圓頭內六角螺絲
M4x16mm

Socket head spring screw
圓頭內六角彈簧螺絲
M4x8mm

Engine fan cover (R)
引擎風扇蓋 (右)

Socket screw
圓頭內六角螺絲
M3x12mm

Engine fan
引擎風扇

Socket button head screw
半圓頭內六角螺絲
M4x5mm

91 Engine
91引擎

Option equipment
另購

Clutch
離合器
φ22xφ48x16mm

Nut (supplied with engine)
引擎隨附螺帽

Engine fan mount
引擎風扇座

Hex mounting bolt
六角機身鋁柱

Washer (supplied with engine)
引擎隨附華司

Engine fan cover (L)
引擎風扇蓋 (左)

Clutch
離合器
φ22xφ48x16mm

Engine fan mount
引擎風扇座

Engine fan
引擎風扇

Socket screw
圓頭內六角螺絲
M3x12mm

91 Engine
91引擎

Option equipment
另購

Option equipment
另購

After install the engine into the model, please loosen the fixing screw and adjust the carburetor and the engine are at an angle of 90° (Vertical).

引擎裝入機體後請鬆開固定螺絲將化油器調成與引擎垂直。

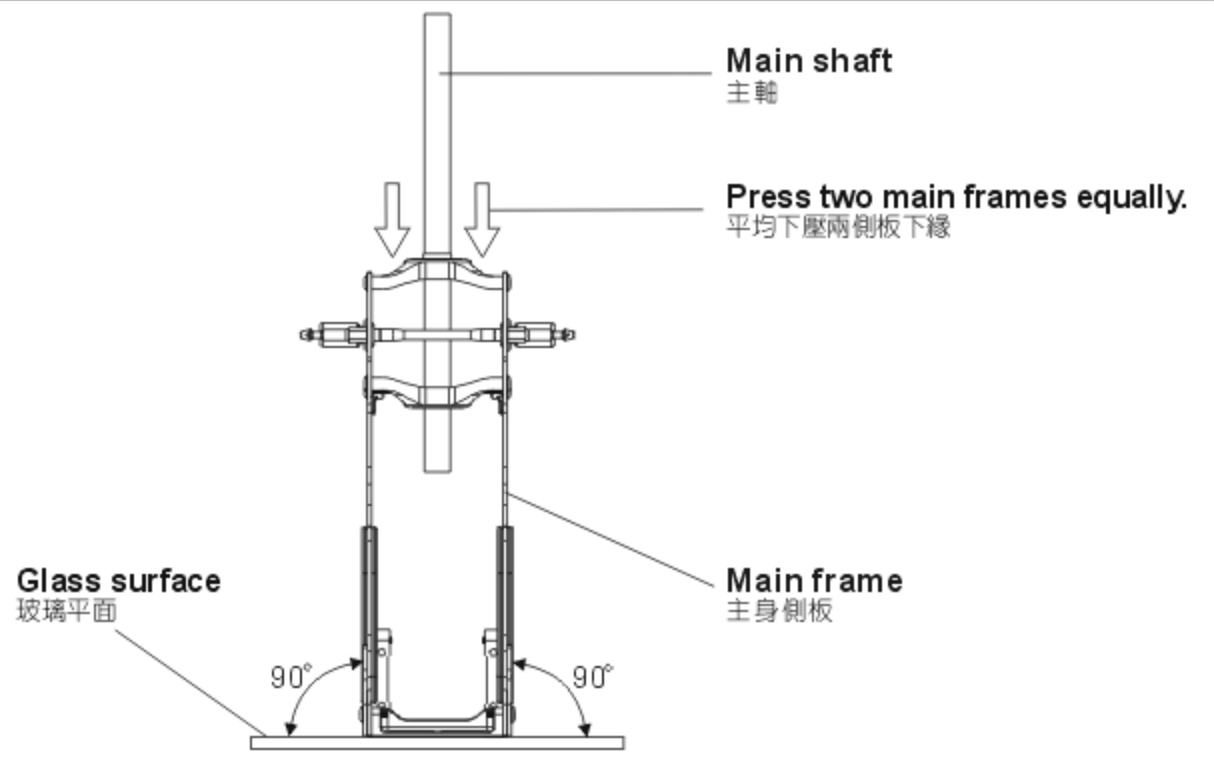
Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43 (螺絲膠)

Main frame assembly point :

First do not fully tighten the screws of main frames and put two bearings through the main shaft to check if the movements are smooth. The bottom bracket must be firmly touched the level table top(glass surface) : please keep the smooth movements on main shaft and level bottom bracket, then slowly tighten the screws. This assembly can help for the power and flight performance.

機身側板組立重點：

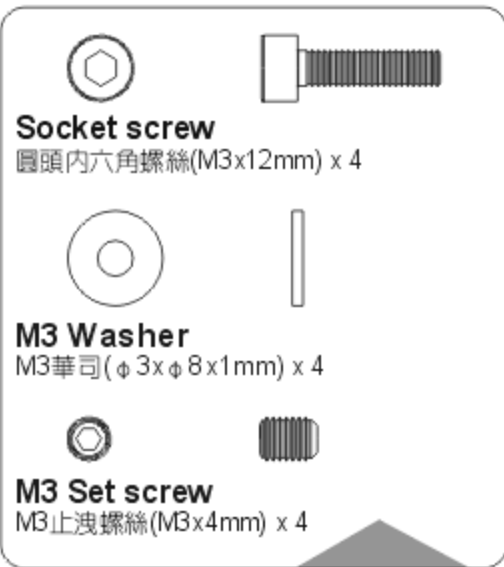
側板螺絲先不完全鎖緊，放入主軸貫穿二顆軸承確認上下移動必需滑順，主體底板必須與水平桌面（玻璃平面）踏實緊貼：請保持主軸滑順與底板平行桌面後慢慢鎖緊螺絲。正確側板的組裝對動力與飛行性能有顯著幫助。



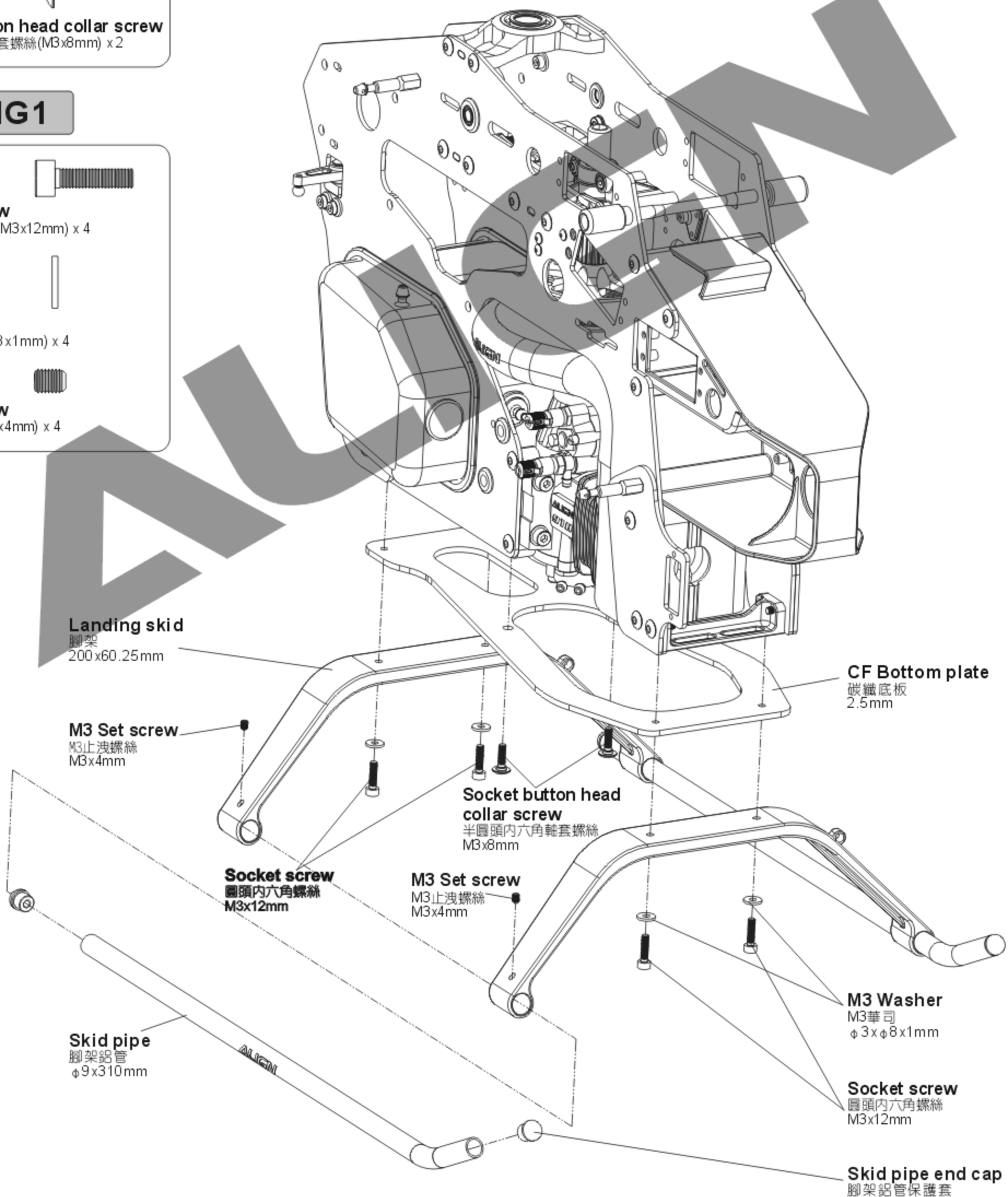
700NB1A



700NG1



Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)



700NZ5

Linkage ball C(M2x5)
球頭C(M2x5)($\phi 5 \times 10\text{mm}$) x 5

Socket button head self tapping screw
半圓頭內六角自攻螺絲(T2.6x14mm) x 12

M2 Nut
M2螺帽 x 5

700NB5A

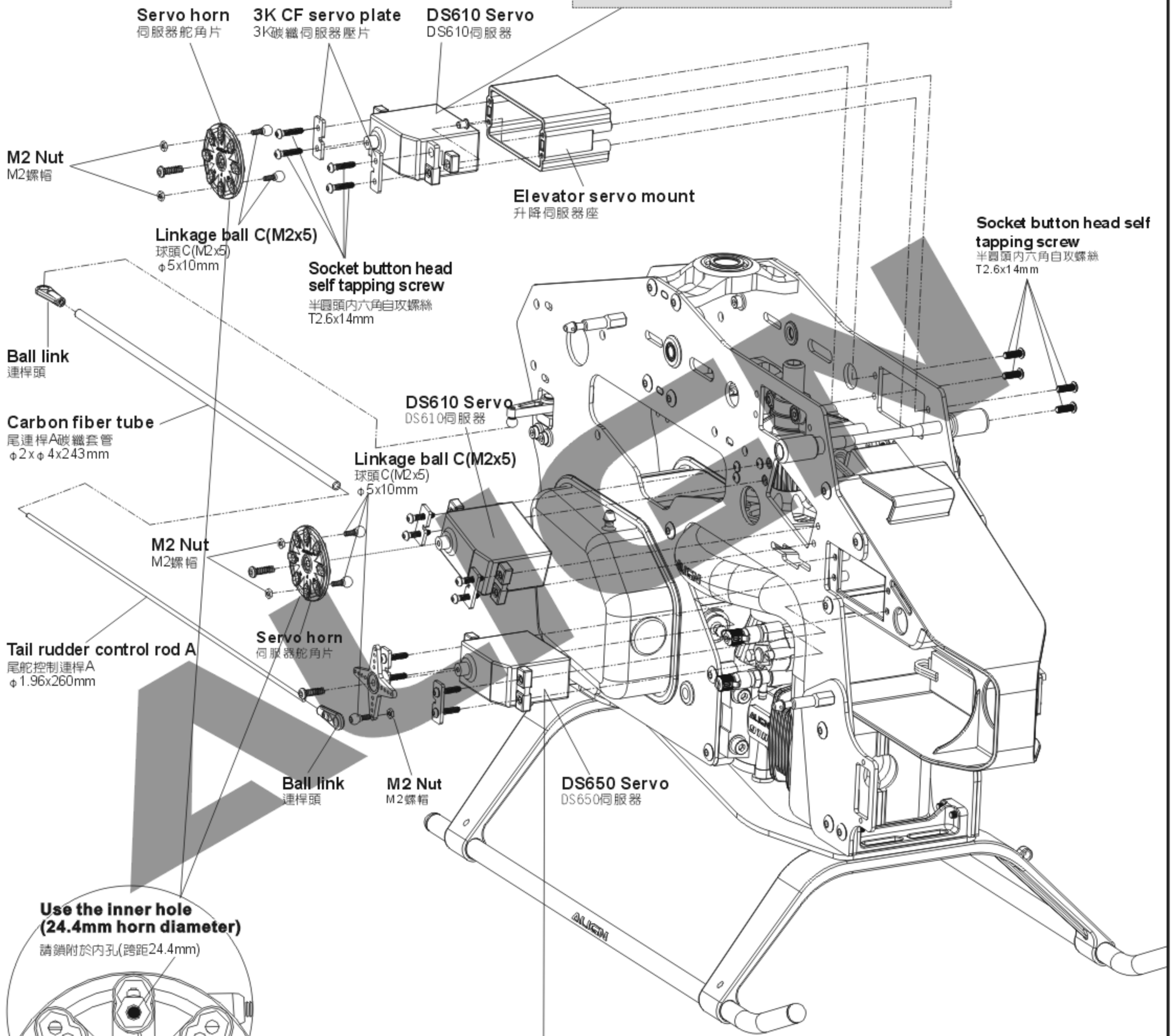
Socket button head self tapping screw
半圓頭內六角自攻螺絲(T2.6x14mm) x 4

700NT3BA

Ball link
連桿頭 x 2

Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)

DS610 Digital Servo :
1. 1520 μs standard band / 1520 μs 寬頻系統
2. Stall torque/輸出扭力 : 9.6kg.cm(4.8V)
12.0kg.cm(6.0V)
3. Motion speed/動作速度 : 0.10sec/60° (4.8V)
0.08sec/60° (6.0V)
4. Dimension/尺寸 : 40.3 x 20.1 x 36mm
5. Weight/重量 : 52.2g



F servo horns :
Compatible with Align DS6xx series and Futaba servos.
F伺服器舵角片 : 適用於亞拓DS6系列伺服器及Futaba伺服器。

DS650 Digital Servo :
1. 1520 μs standard band / 1520 μs 寬頻系統
2. Stall torque/輸出扭力 : 4.0kg.cm(4.8V)
5.0kg.cm(6.0V)
3. Motion speed/動作速度 : 0.058sec/60° (4.8V)
0.048sec/60° (6.0V)
4. Dimension/尺寸 : 40.3 x 20.1 x 36mm
5. Weight/重量 : 56g

700NZ5

- 

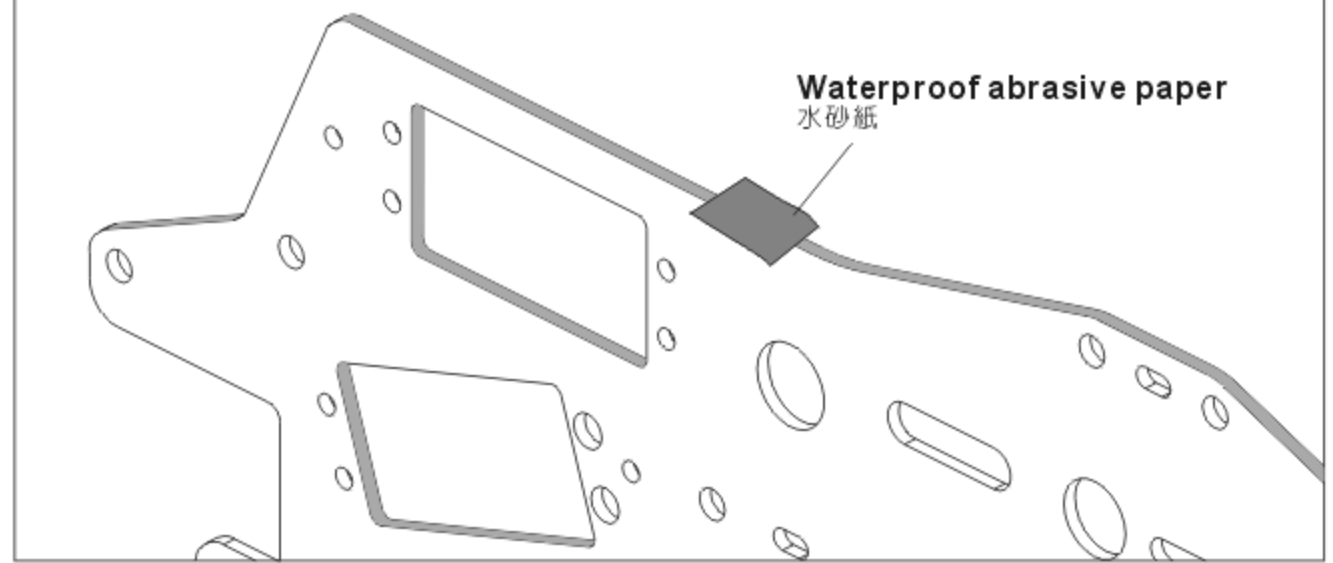

Linkage ball C(M2x5)
球頭C(M2x5)(ϕ 5x10mm) x 4
- 


Socket button head self tapping screw
半圓頭內六角自攻螺絲(T2.6x14mm) x 8
- 


M2 Nut
M2螺帽 x 4

Recommend sanding the marked position as below illustration with a waterproof abrasive paper(#800-1000) to avoid the wires of electric parts to be cut.

建議於下圖色塊標示處，使用#800-1000水砂紙打磨，可防止電子設備電線被割破。



DS610 Digital Servo :

1. 1520 μ s standard band / 1520 μ s 寬頻系統
2. Stall torque/輸出扭力 : 9.6kg.cm(4.8V)
12.0kg.cm(6.0V)
3. Motion speed/動作速度 : 0.10sec/60° (4.8V)
0.08sec/60° (6.0V)
4. Dimension/尺寸 : 40.3 x 20.1 x 36mm
5. Weight/重量 : 52.2g

Use the inner hole (24.4mm horn diameter)
請鎖附於內孔(跨距24.4mm)



DS610 Servo
DS610伺服器

3K CF servo plate
3K碳纖伺服器壓片

Servo horn
伺服器舵角片

M2 Nut
M2螺帽

Linkage ball C(M2x5)
球頭C(M2x5)
 ϕ 5x10mm

Servo
伺服器

Socket button head self tapping screw
半圓頭內六角自攻螺絲
T2.6x14mm

Linkage ball C(M2x5)
球頭C(M2x5)
 ϕ 5x10mm

M2 Nut
M2螺帽

 **Apply a little amount of T43 thread lock when fixing a metal part.**
螺絲鎖附於金屬件請使用適量T43(螺絲膠)

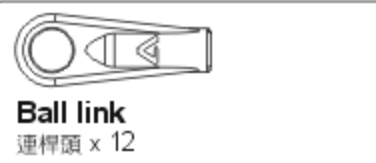
700FLB1



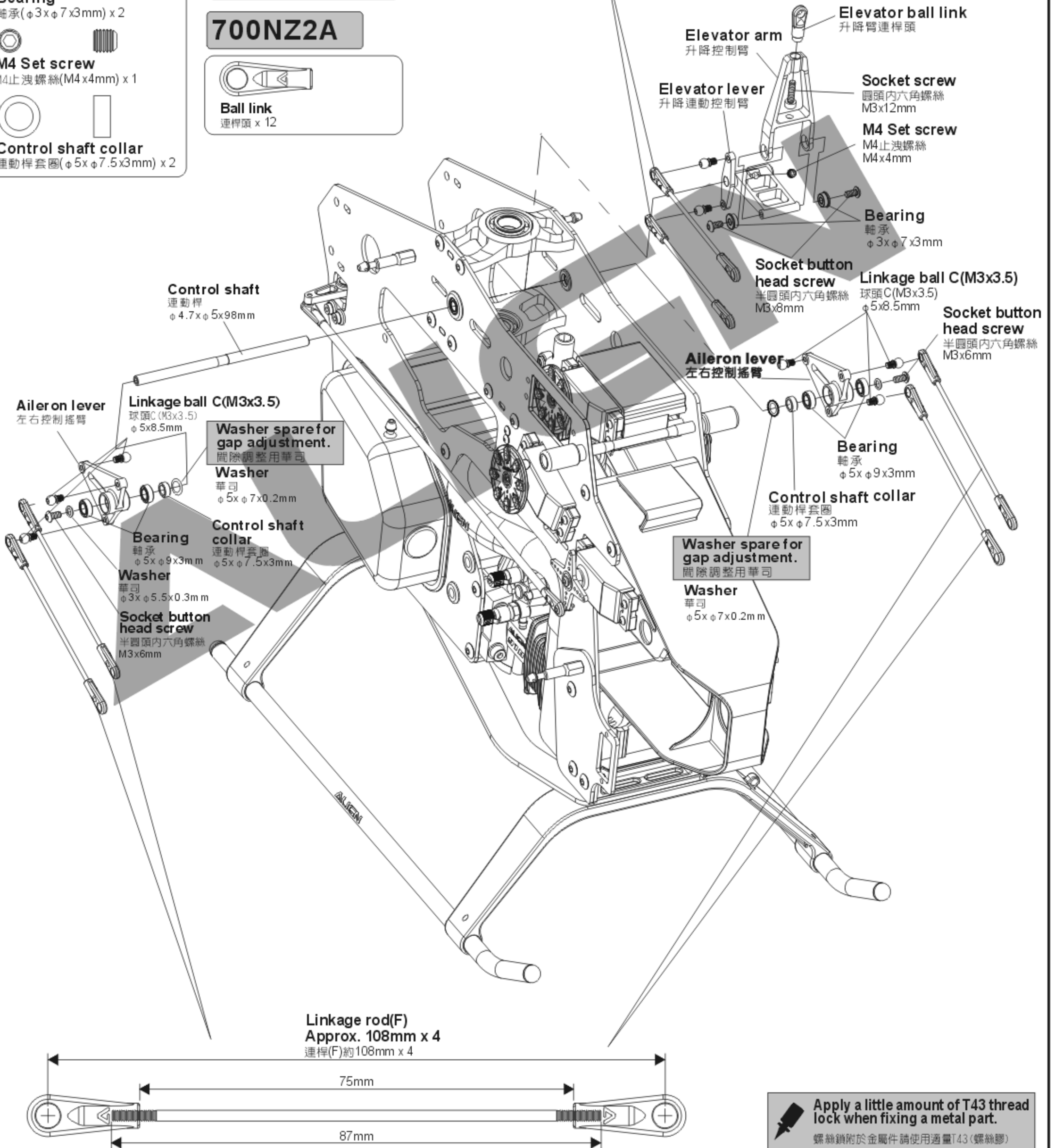
700NB1A



700NZ2A



700NZ2

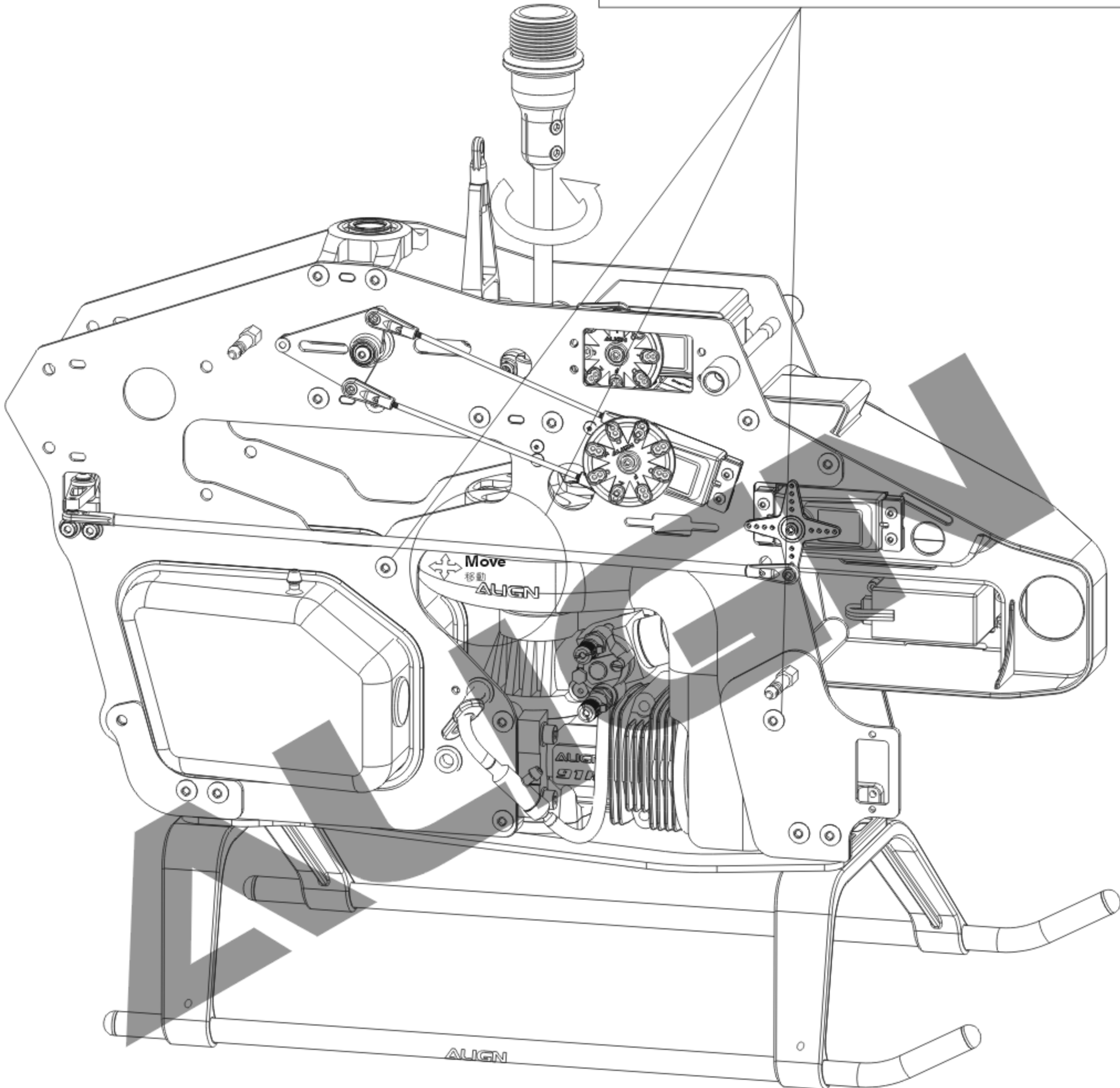


Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)

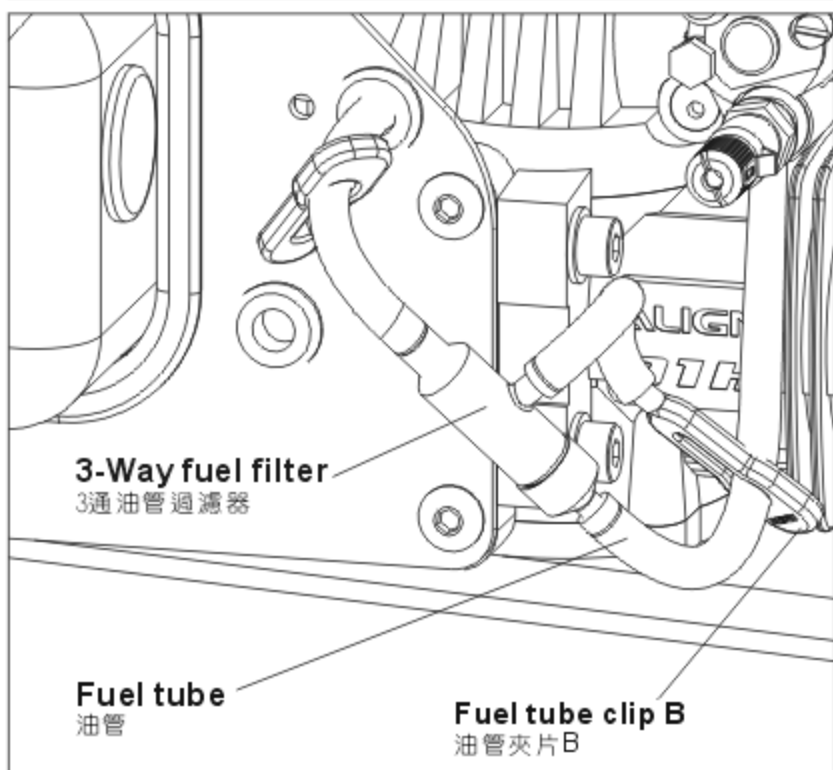
Fan cover fixing Tip
風扇罩固定要領

Before fixing the engine fan cover, please use a starter to rotate the fan and move the fan cover. This is to make sure no any interference, and then secure the fan cover with a fixing screw.

鎖緊固定引擎散熱風罩前，請先使用啟動棒轉動風扇，並移動風扇罩，確認在風扇無碰觸風扇罩後才鎖緊風扇罩固定螺絲。



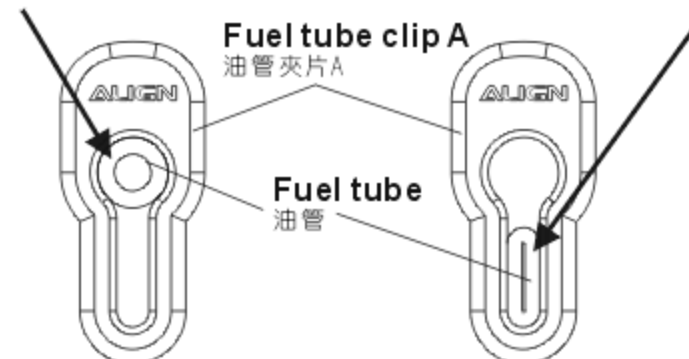
FUEL TUBE CLIP B ILLUSTRATION 油管夾片B使用說明



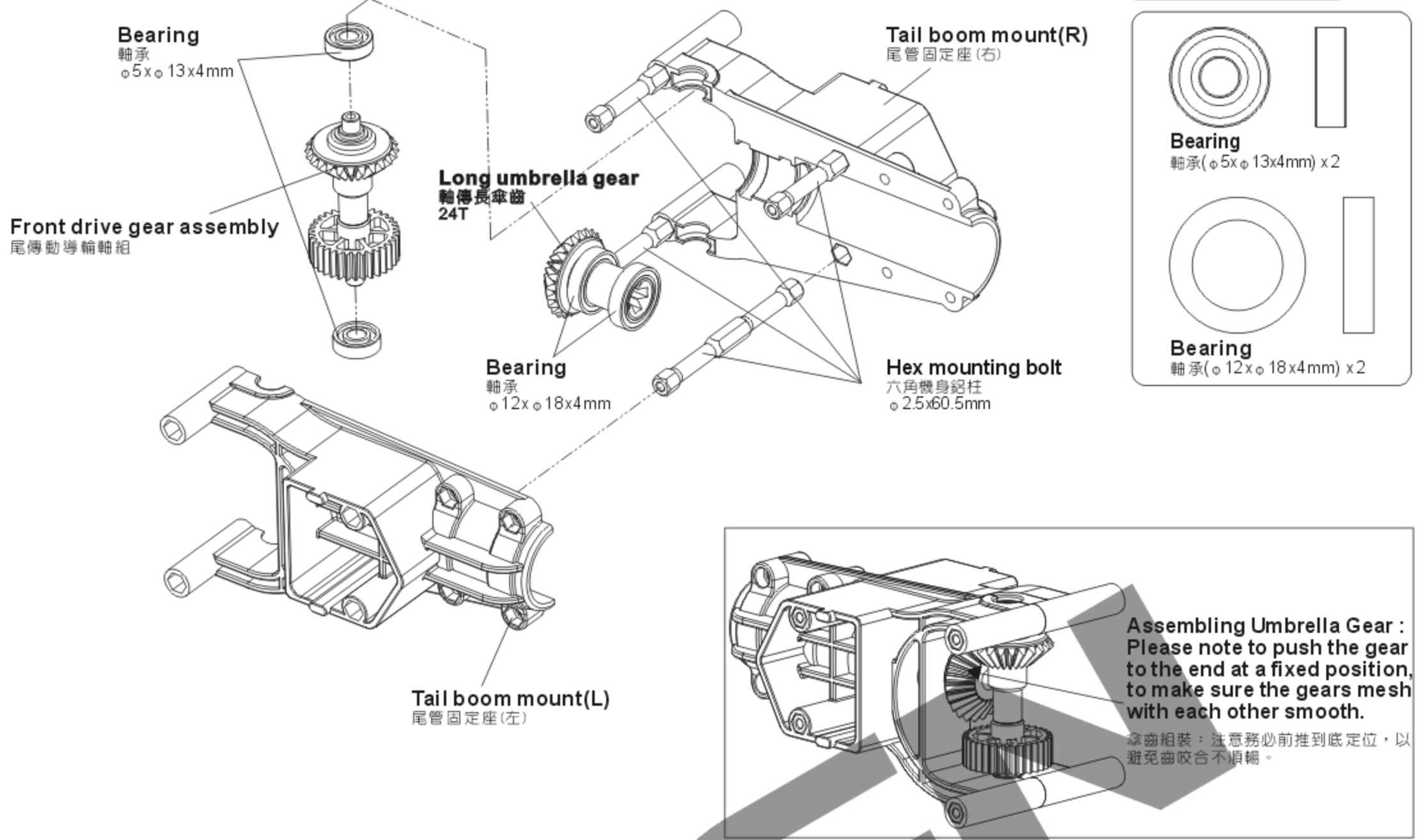
FUEL TUBE CLIP ILLUSTRATION 油管夾片使用方法

Engine start : Unlock to refuel.
引擎啟動：開啓油料供給

Engine Stop : Lock to stop refueling.
引擎熄火：關閉油料供給

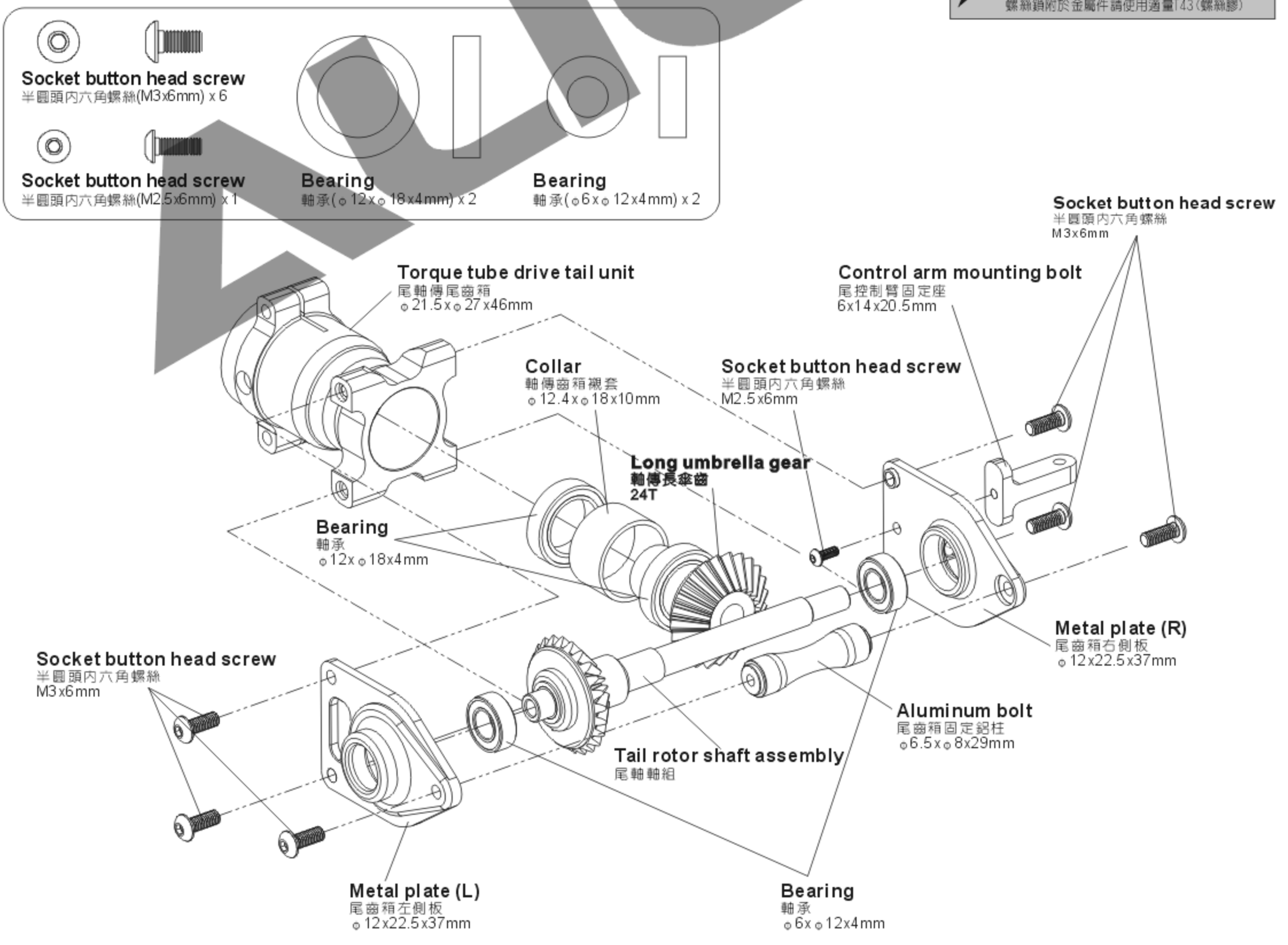


700NT1

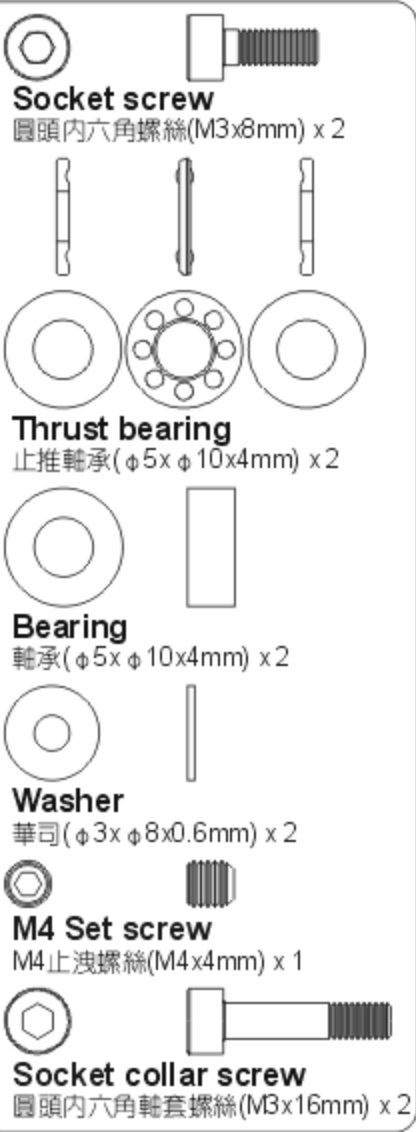


700NT2A

Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)



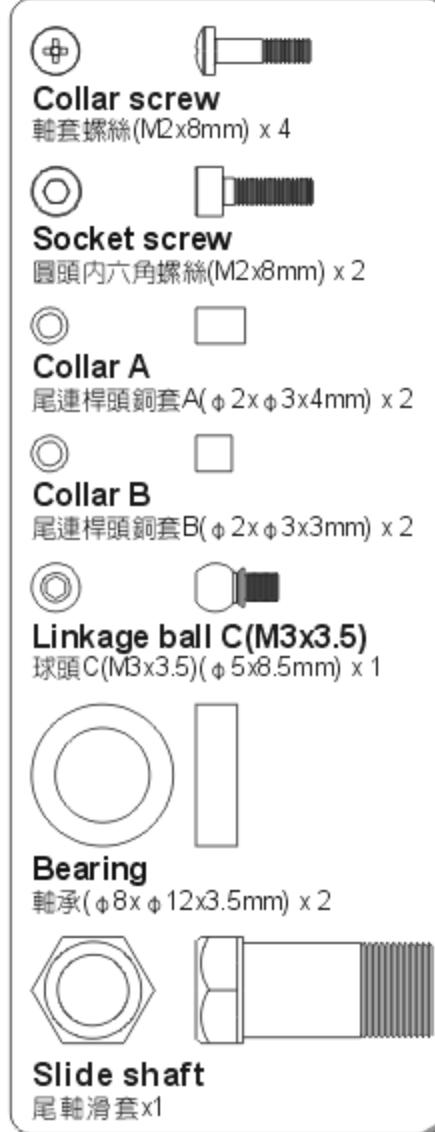
700NT2F



700NT2C



700NT2D

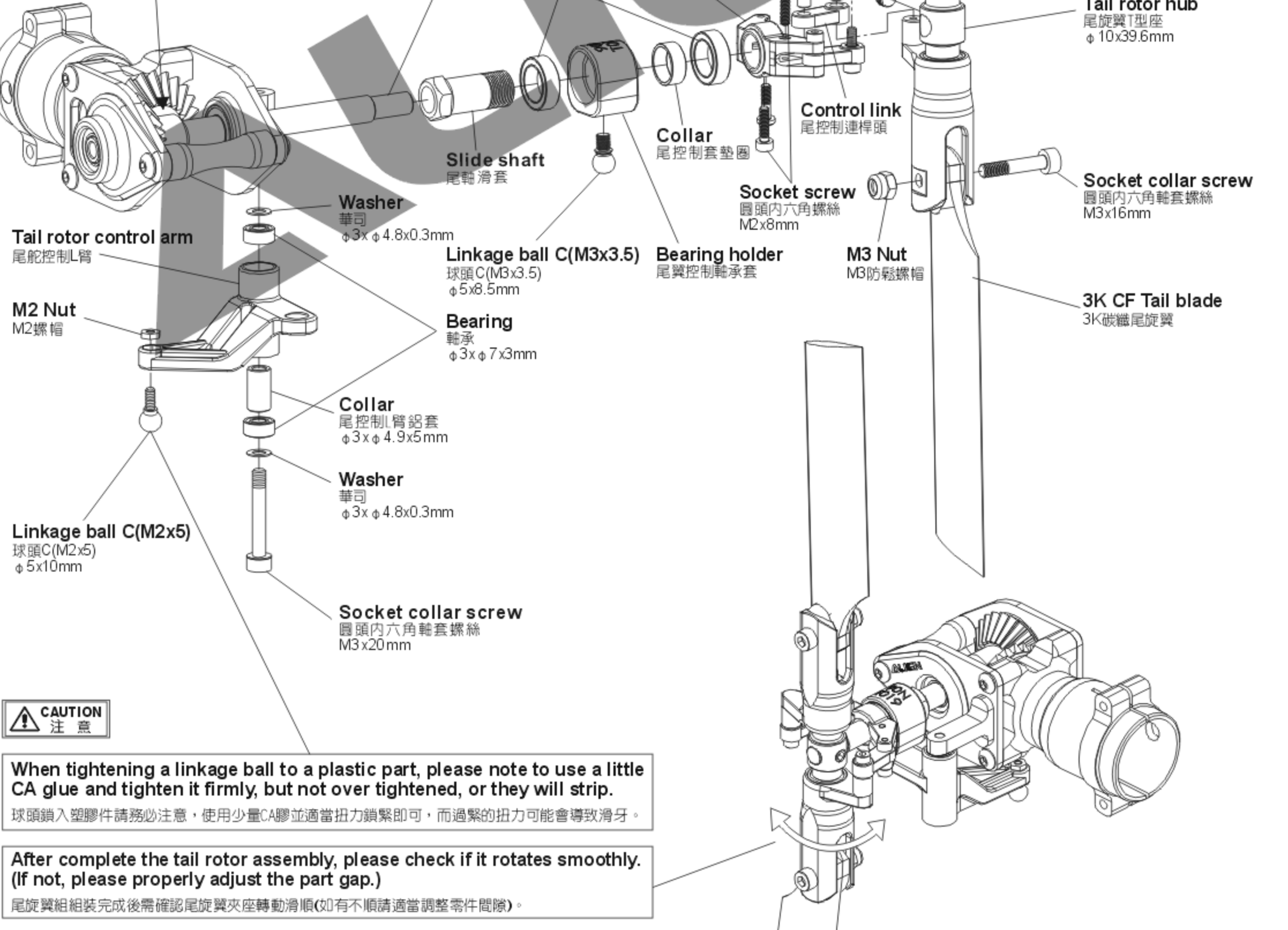


Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)

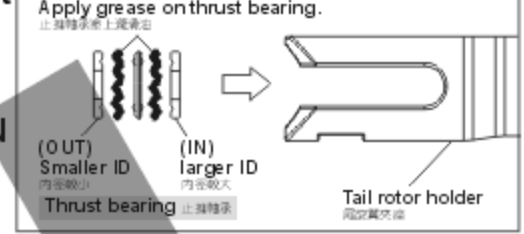
CAUTION
注意

Aim tail rotor hub at the concave of tail rotor shaft and fix it, please apply a little glue on the set screw.
尾旋翼T型座瞄準尾橫軸的凹刻並鎖上，請確認止洩螺絲上膠。

Assembling Umbrella Gear : Please note to push the gear to the end at a fixed position, to make sure the gears mesh with each other smooth.
傘齒組裝：注意務必前推到底定位，以避免齒咬合不順暢。



CAUTION
注意



CAUTION
注意

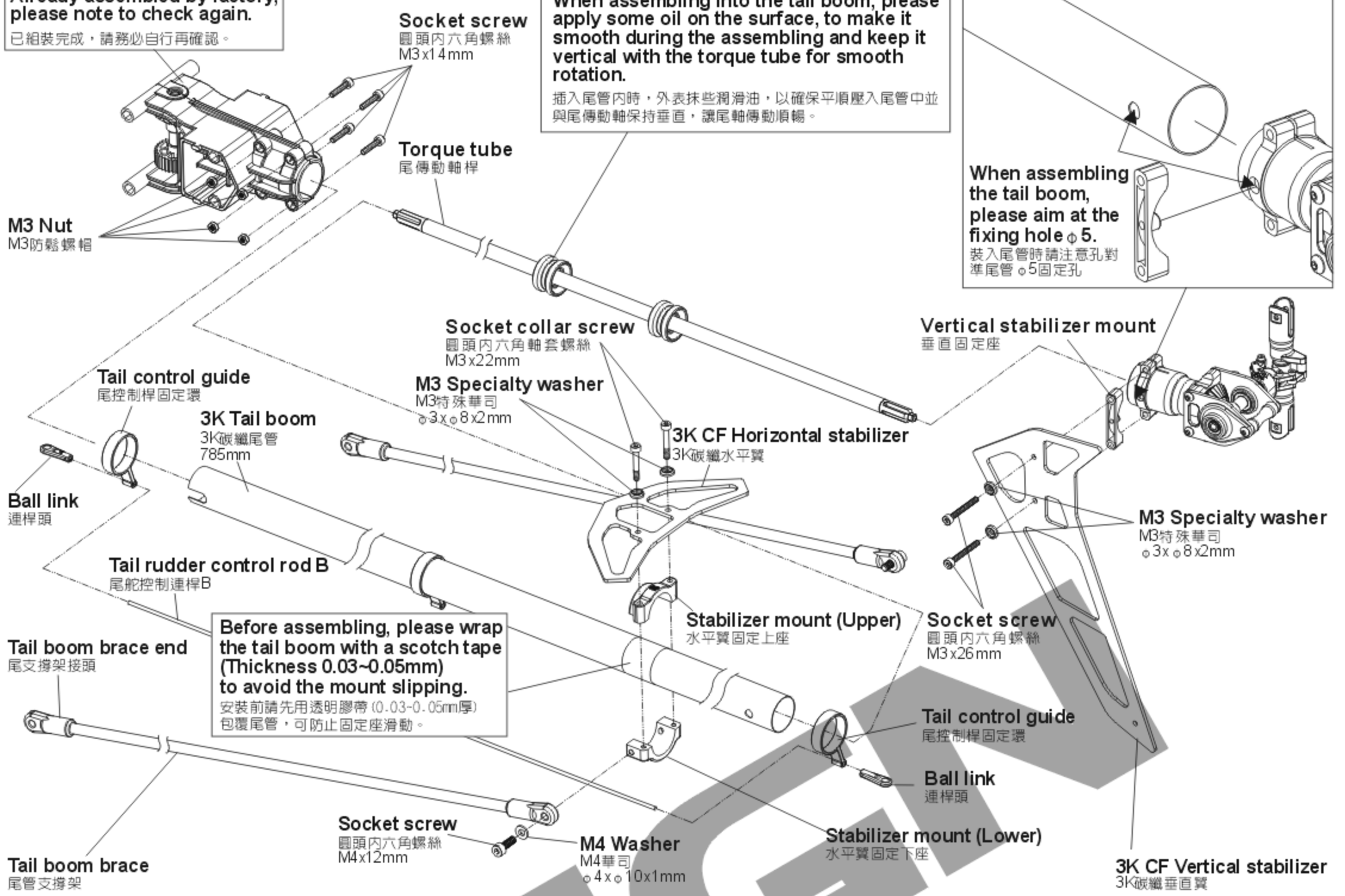
When tightening a linkage ball to a plastic part, please note to use a little CA glue and tighten it firmly, but not over tightened, or they will strip.
球頭鎖入塑膠件請務必注意，使用少量CA膠並適當扭力鎖緊即可，而過緊的扭力可能會導致滑牙。

After complete the tail rotor assembly, please check if it rotates smoothly. (If not, please properly adjust the part gap.)
尾旋翼組裝完成後需確認尾旋翼夾座轉動滑順(如有不順請適當調整零件間隙)。

Already assembled by factory, please note to check again.
已組裝完成，請務必自行再確認。

When assembling into the tail boom, please apply some oil on the surface, to make it smooth during the assembling and keep it vertical with the torque tube for smooth rotation.
插入尾管內時，外表抹些潤滑油，以確保平順壓入尾管中並與尾傳動軸保持垂直，讓尾軸傳動順暢。

When assembling the tail boom, please aim at the fixing hole $\phi 5$.
裝入尾管時請注意孔對準尾管 $\phi 5$ 固定孔。



700NT1A

- Socket screw**
圓頭內六角螺絲(M3x14mm) x 4
- M3 Nut**
M3防鬆螺帽 x 4

700NT2A

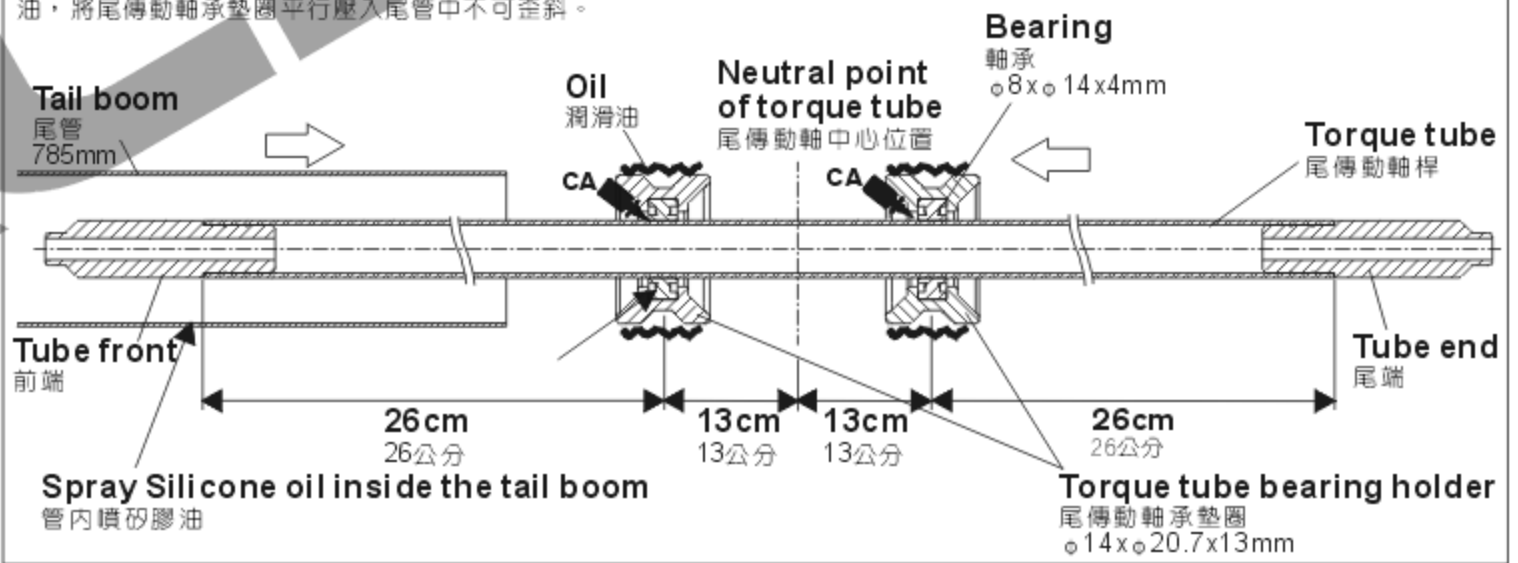
- Socket screw**
圓頭內六角螺絲(M3x26mm) x 2
- M3 Specialty washer**
M3特殊華司($\phi 3 \times \phi 8 \times 2\text{mm}$) x 2

700NT2EA

- Socket screw**
圓頭內六角螺絲(M4x12mm) x 2
- Socket collar screw**
圓頭內六角軸套螺絲(M3x22mm) x 2
- M3 Specialty washer**
M3特殊華司($\phi 3 \times \phi 8 \times 2\text{mm}$) x 2
- M4 Washer**
M4華司($\phi 4 \times \phi 10 \times 1\text{mm}$) x 2

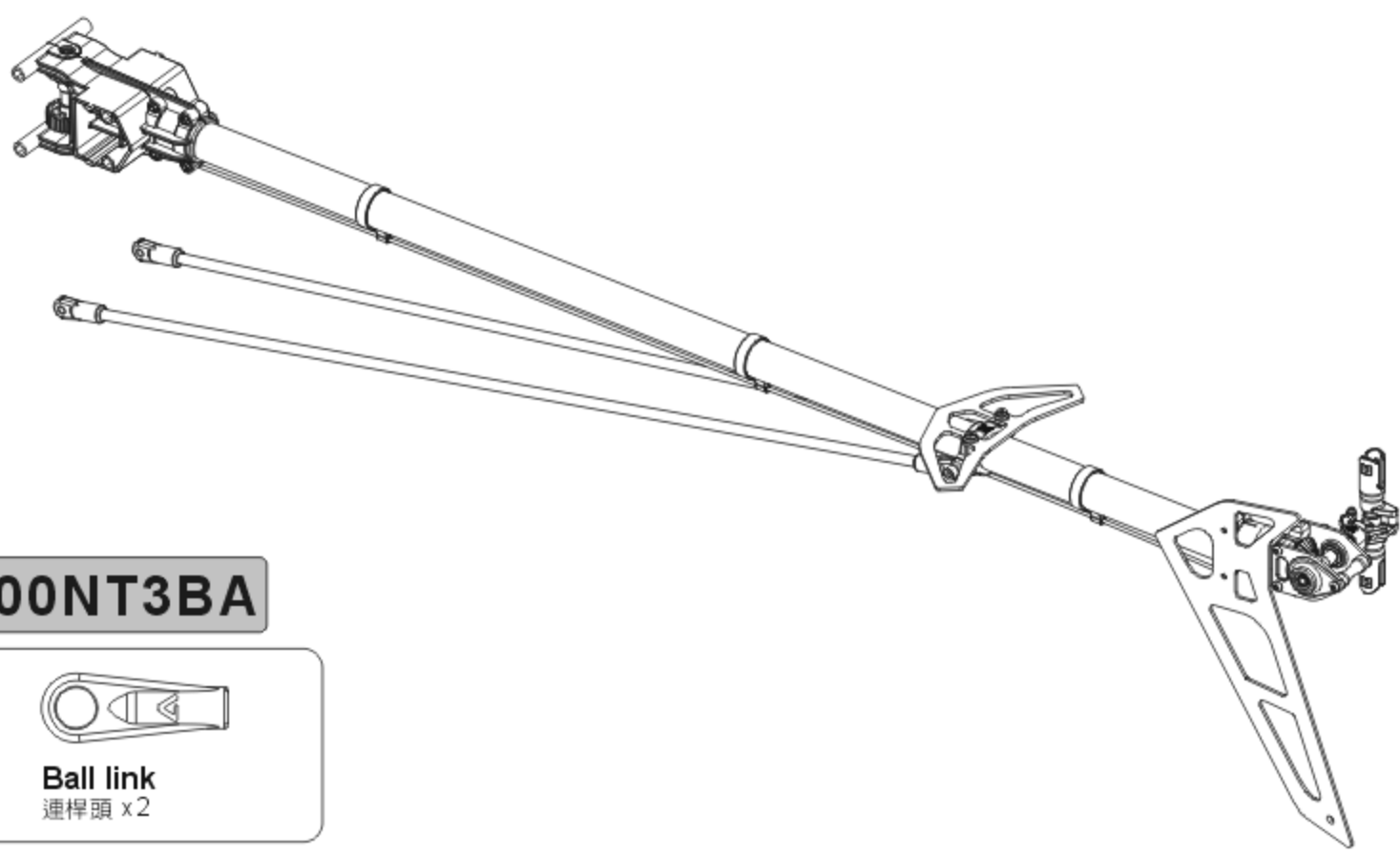
Tip to fix the torque tube 傳動軸軸承固定位要領

Please apply some CA glue to fix bearing on the torque tube, avoid CA glue adhering to the dust cover or it may cause the bearing stuck. When assembling into the tail boom, please apply some oil on the bearing holder and press the holder into the tail boom horizontally.
請以少量CA將軸承固定於尾傳動軸上，避免CA沾到軸承的防塵蓋而導致軸承卡死，插入尾管內時，尾傳動軸承墊圈外表抹些潤滑油，將尾傳動軸承墊圈平行壓入尾管中不可歪斜。



700NT3BA

- Ball link**
連桿頭 x 2



700NT1A



Socket button head collar screw

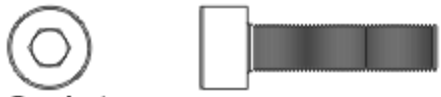
半圓頭內六角軸套螺絲(M3x10mm) x 8



Socket screw

圓頭內六角螺絲(M4x8mm) x 1

700FLB1



Socket screw

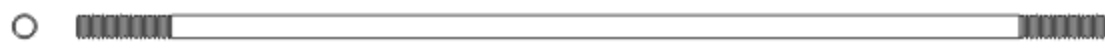
圓頭內六角螺絲(M4x16mm) x 2



M4 Washer

M4華司(φ4xφ10x1mm) x 2

700NZ2



Throttle linkage rod

油門連桿(φ1.96x87mm) x 1

700NZ2A



Ball link

連桿頭 x 2

Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)

Please assemble the G linkage rods inside the servo horns to avoid any interference caused by the canopy.
G連桿請裝於伺服臂內側確保動作時不碰觸機頭罩

Socket button head collar screw
半圓頭內六角軸套螺絲
M3x8mm

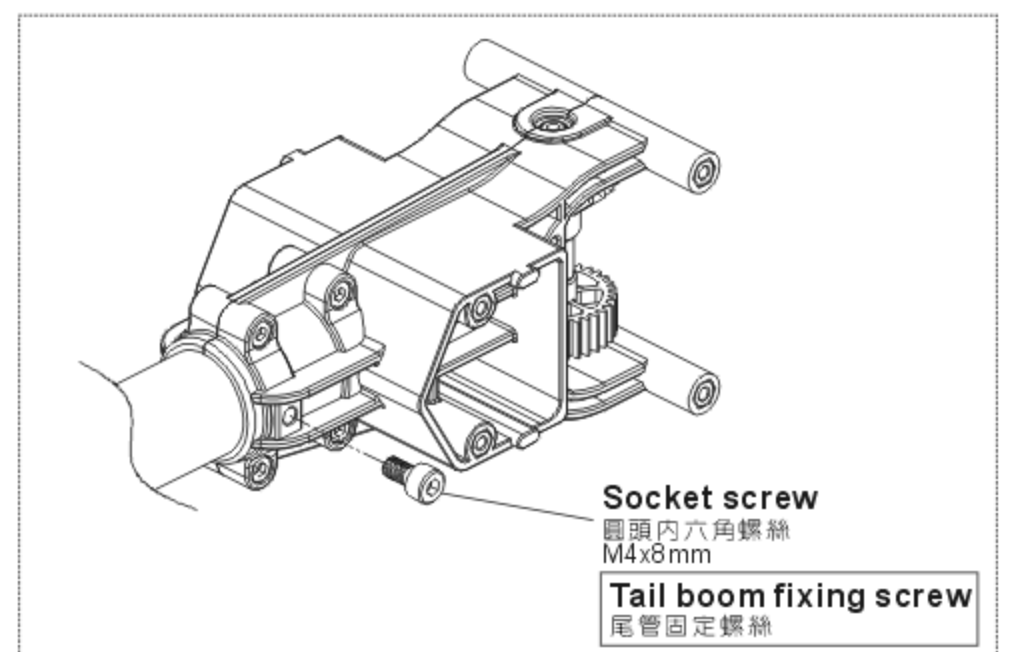
Frame mounting bolt
機身後鋁柱

M4 Washer
M4華司
φ4xφ10x1mm

Socket screw
圓頭內六角螺絲
M4x16mm

Socket button head collar screw
半圓頭內六角軸套螺絲
M3x10mm

Throttle linkage rod
Approx. 108mm x 1
油門連桿約108mm x 1



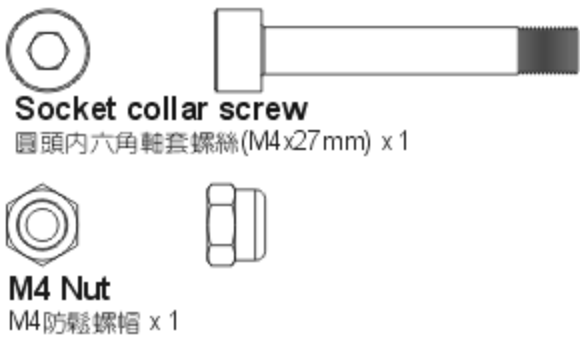
Socket screw
圓頭內六角螺絲
M4x8mm

Tail boom fixing screw
尾管固定螺絲

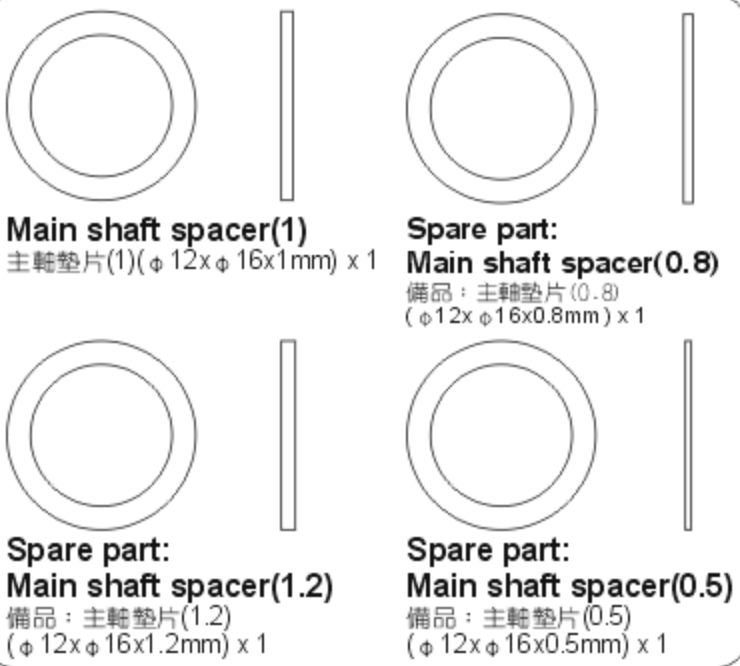


CAUTION
注意
When tightening a screw to a plastic part, please tighten it firmly, but not over tightened, or they will strip.
螺絲鎖入塑膠件請務必注意，適當扭力鎖緊即可，而過緊的扭力可能會導致滑牙。

700NB3



700FLH2



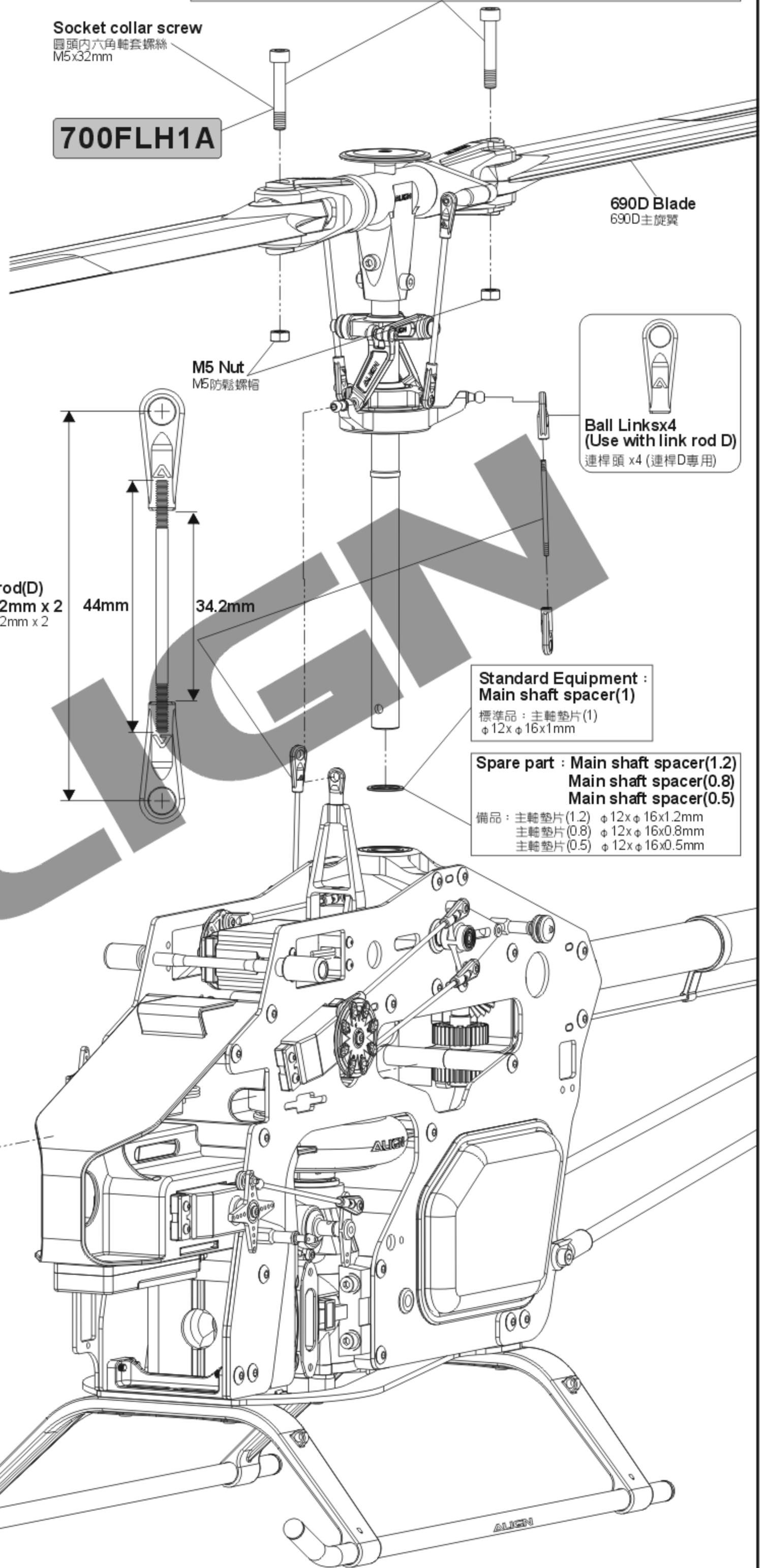
700NZ2A



700NZ2



When tightening the main blade fixing screw, please tighten it firmly, but not over tighten, or it may cause the damage of main blade holder and result in danger.
鎖緊主旋翼螺絲須注意適當緊度即可，過緊可能導致主旋翼夾座受損，飛行意外發生。

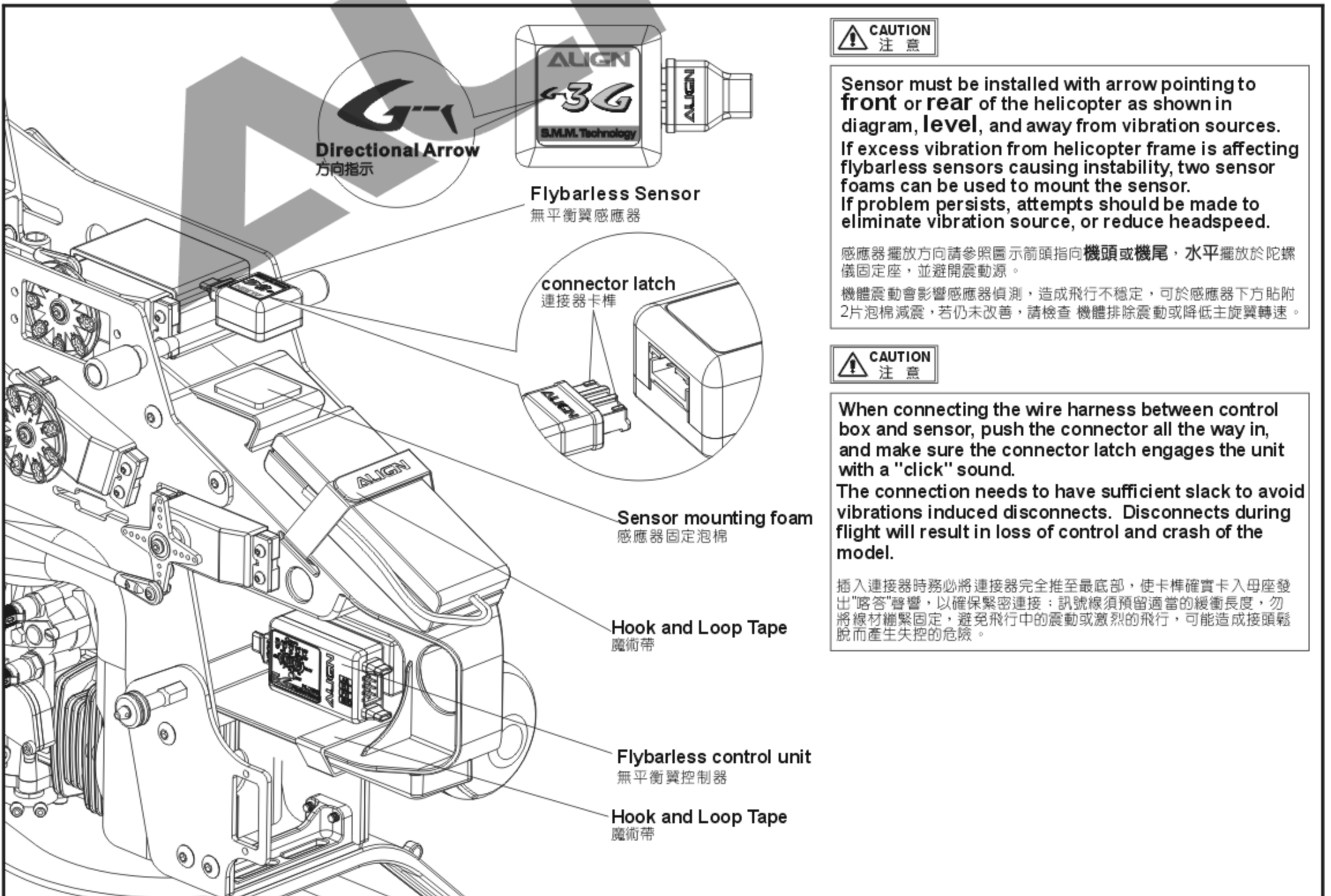
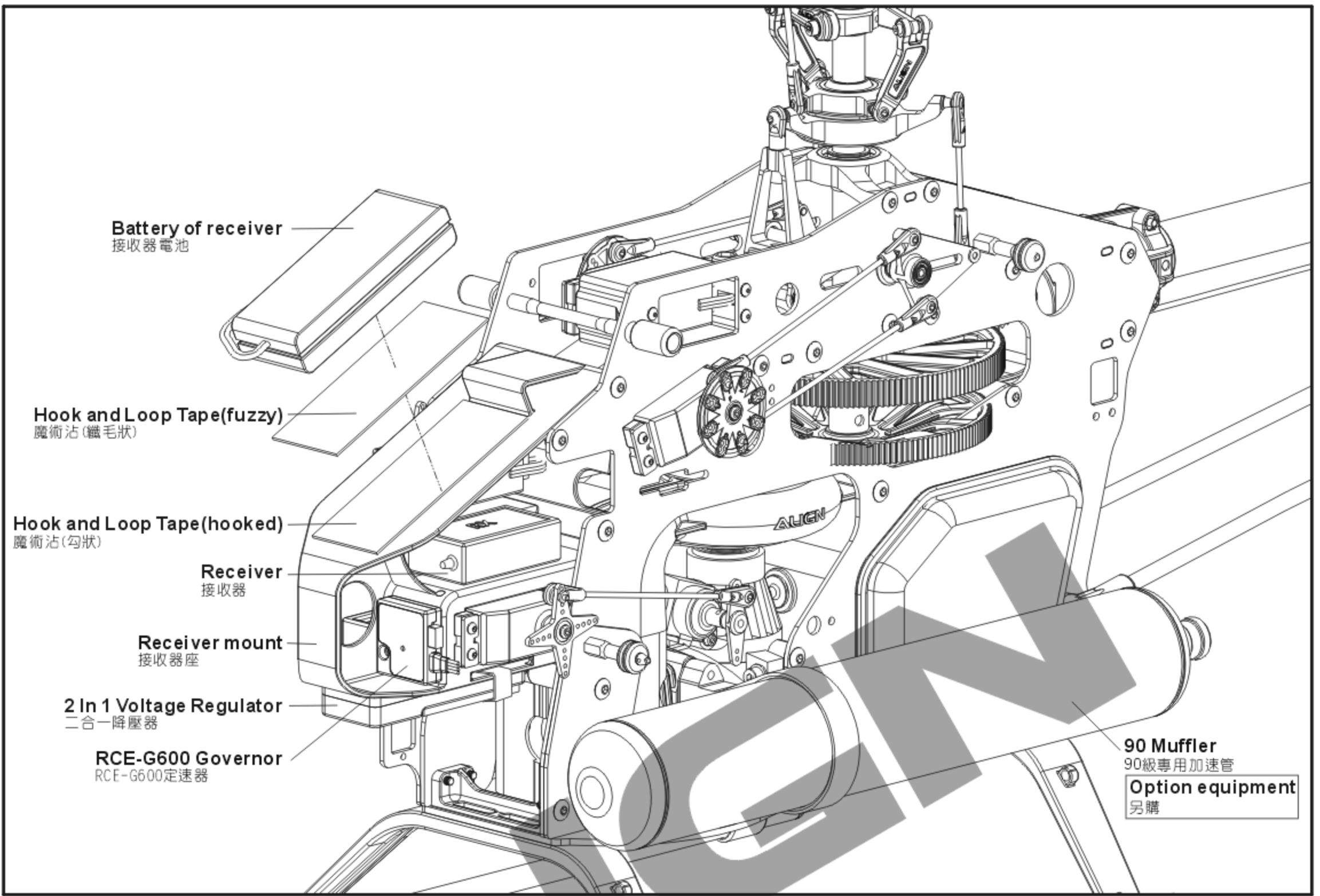


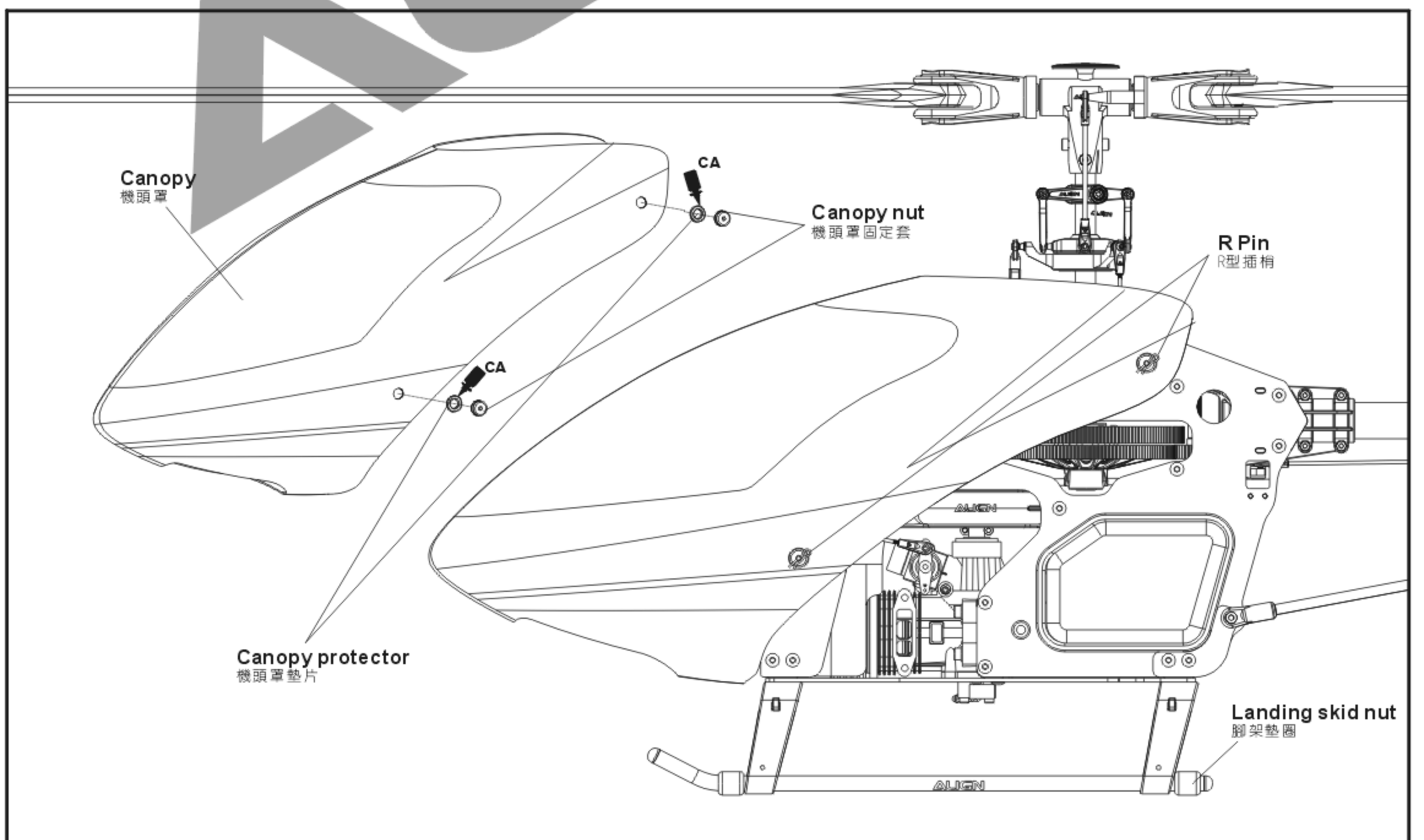
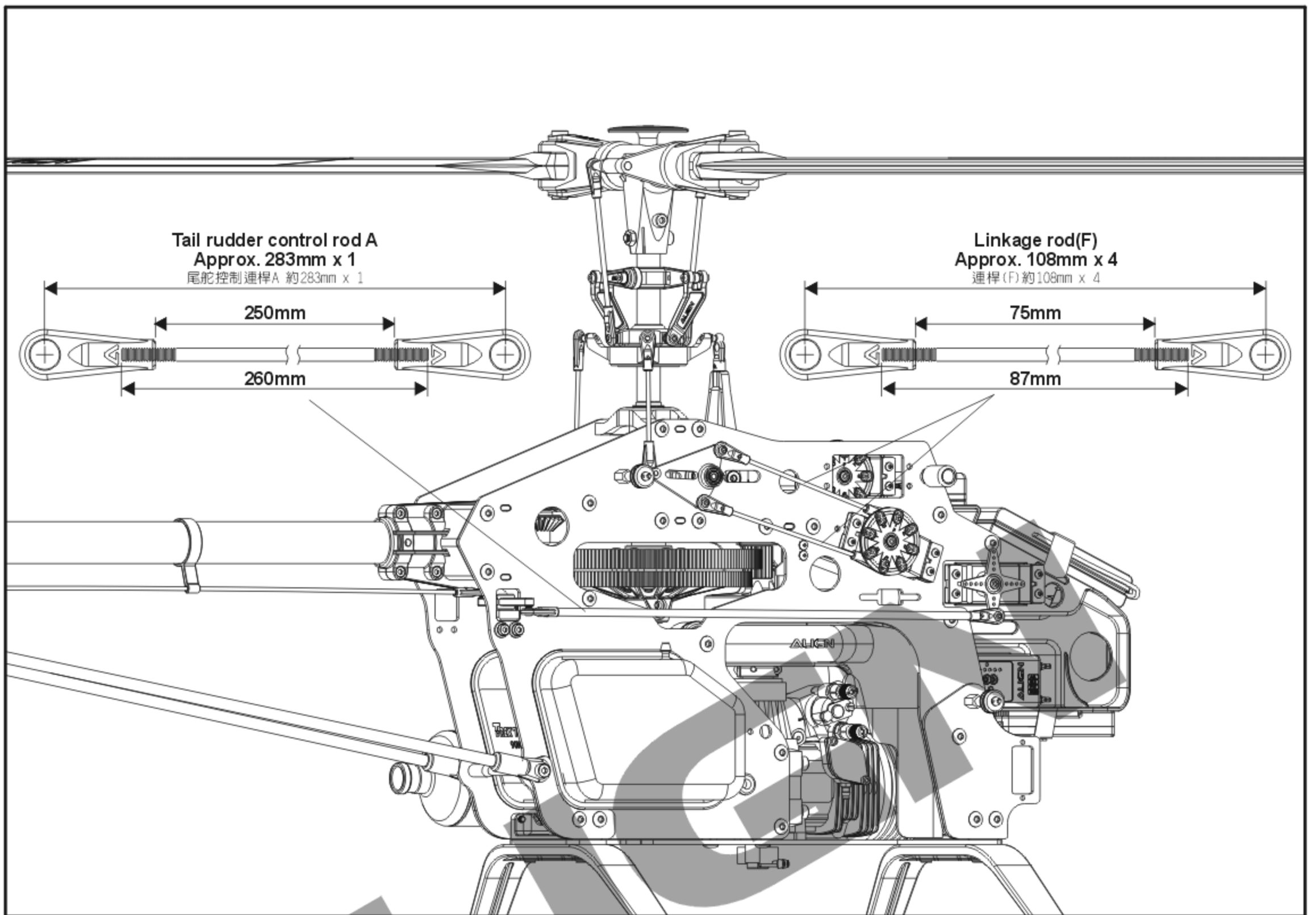
Main drive gear set
主齒輪組

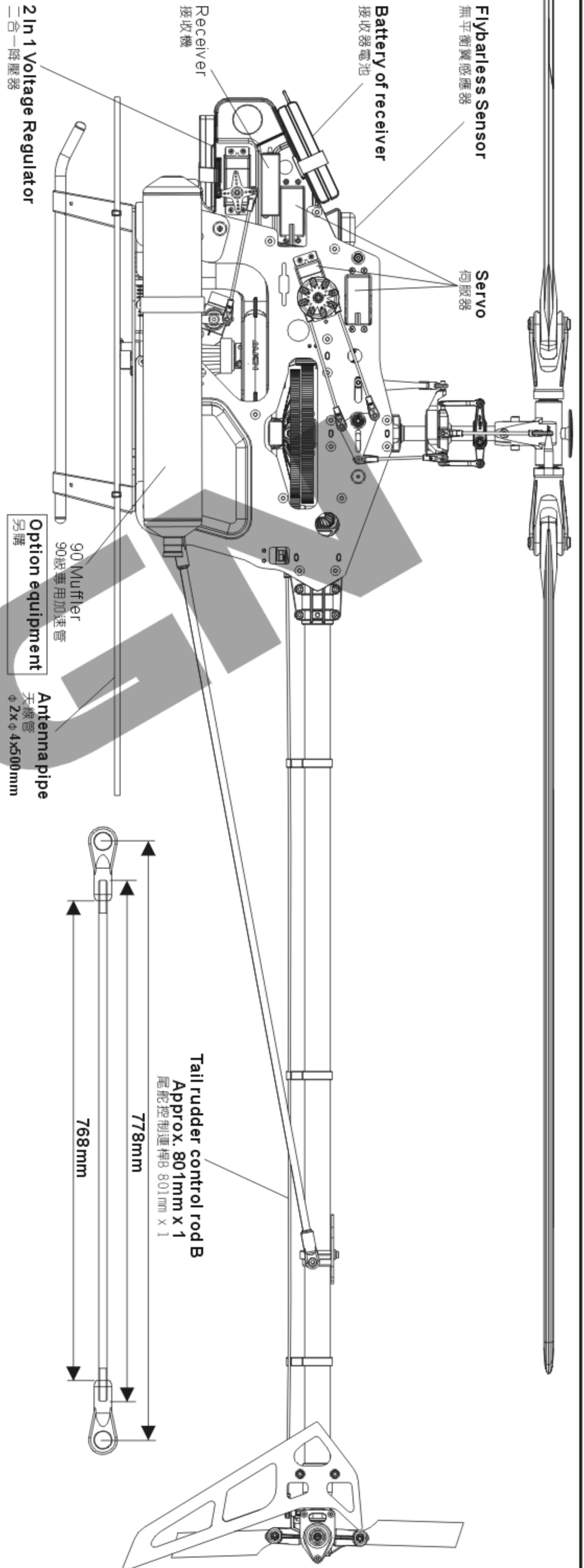
M4 Nut
M4防鬆螺帽

Socket screw
圓頭內六角軸套螺絲
M4x27mm

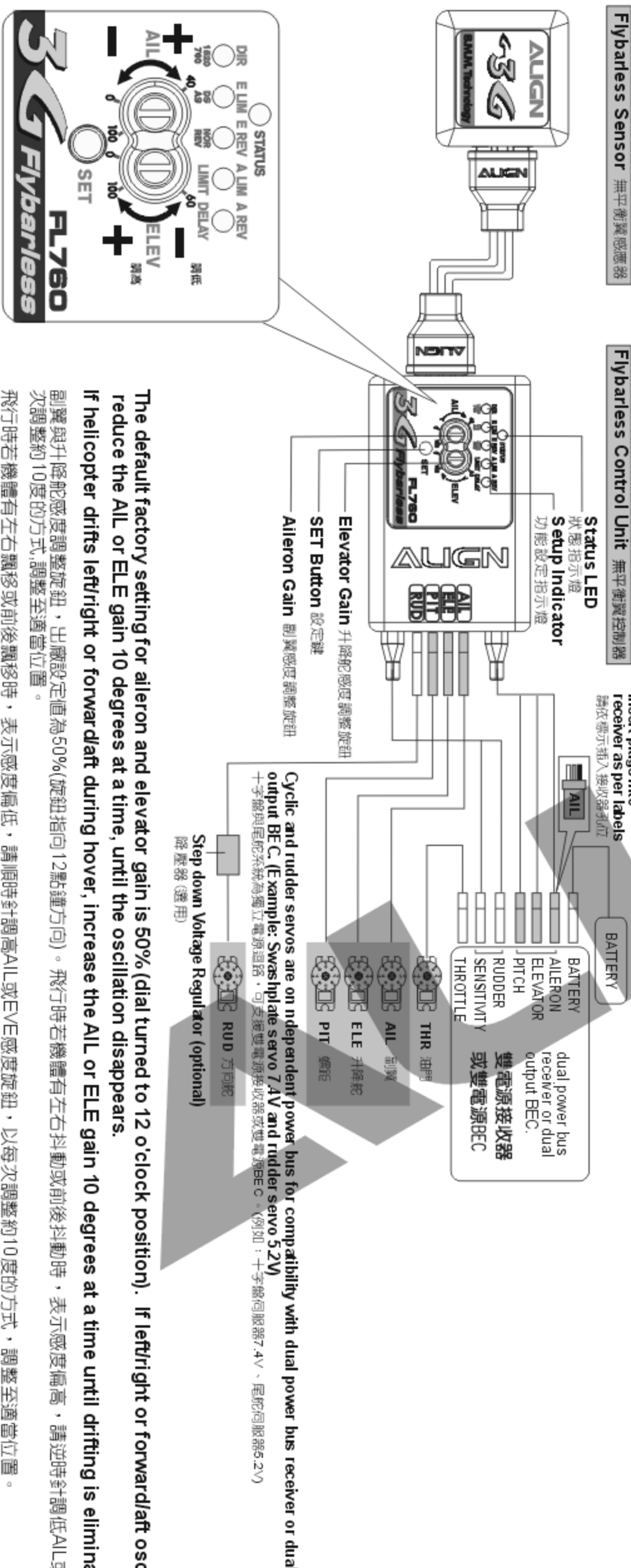
Apply a little amount of T43 thread lock when fixing a metal part.
螺絲鎖附於金屬件請使用適量T43(螺絲膠)







PARTS IDENTIFICATION AND CONNECTION ILLUSTRATION 各部位名稱與接線示意圖



The default factory setting for aileron and elevator gain is 50% (dial turned to 12 o'clock position). If left/right or forward/aft oscillation is noticed, reduce the ALL or ELE gain 10 degrees at a time, until the oscillation disappears.

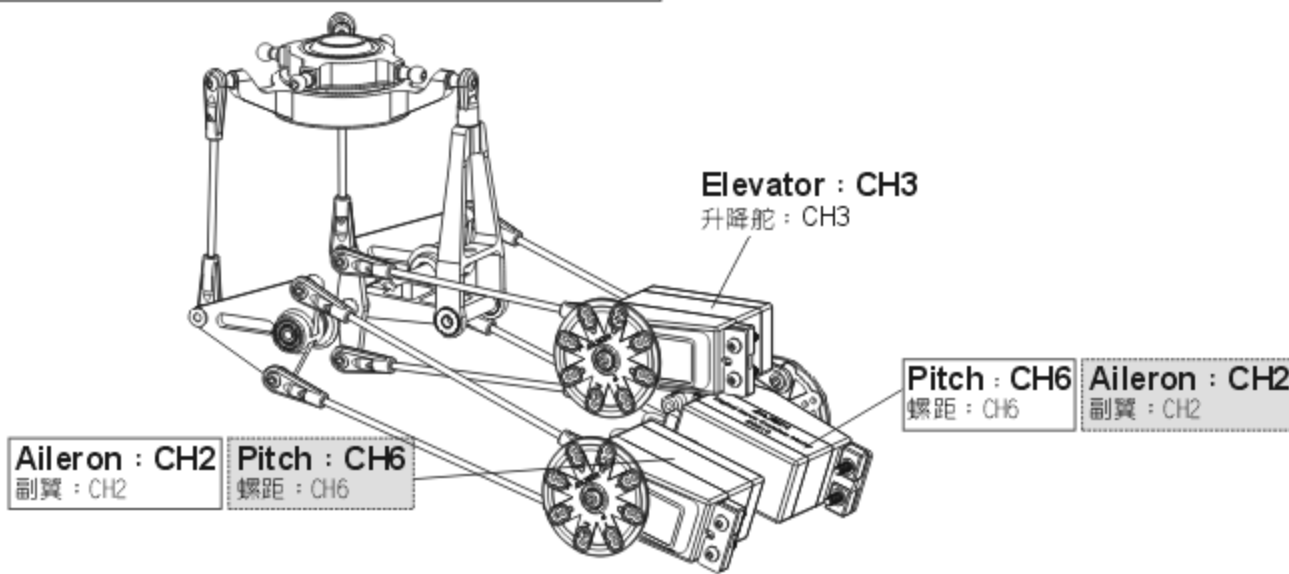
If helicopter drifts left/right or forward/aft during hover, increase the ALL or ELE gain 10 degrees at a time until drifting is eliminated.

副翼與升降舵感度調整旋鈕，出廠設定值為50%(旋鈕指向12點鐘方向)。飛行時若機體有左右抖動或前後抖動時，表示感度偏高，請逆時針調低ALL或ELE感度旋鈕，以每次調整約10度的方式，調整至適當位置。

飛行時若機體有左右飄移或前後飄移時，表示感度偏低，請順時針調高ALL或ELE感度旋鈕，以每次調整約10度的方式，調整至適當位置。

To set this option is to turn on the transmitter and connect to BEC power.
此項設定只要開啓發射器，接上BEC電源即可進行操作。

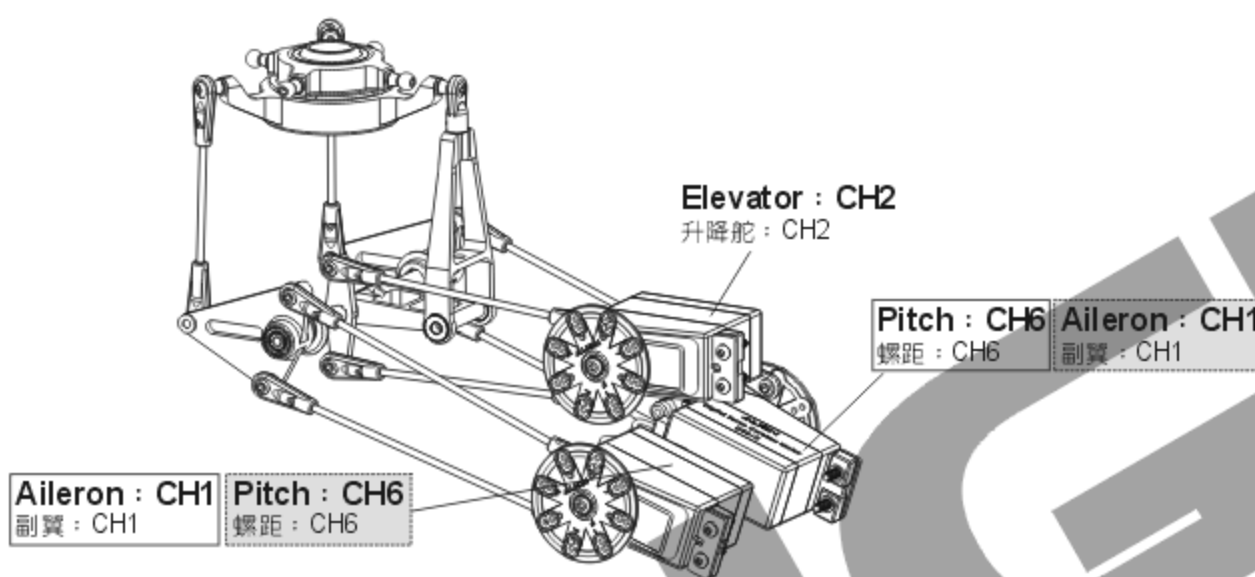
JR Transmitter/Servo JR遙控器對應伺服器關係



Positions of CH2 · CH6 are exchangeable, After assembling as photo (Note: Set the transmitter under CCPM 120 degrees mode), pull throttle stick (pitch) upward. If one swashplate servo (or two servos) moves downward, adjust reverse switch (REV) on the transmitter to make it moves upward. If three servo move downward, adjust the travel value (+-) of SWASH CH6 on the transmitter to make them move upward. When the actions of Aileron and Elevator are opposite, adjust travel values of SWASH CH2 and Ch3.

CH2 · CH6可互換配置，依圖連結後(注意：遙控器須設定於CCPM 120°十字盤模式)，將油門搖桿(Pitch)往上推，若十字盤伺服器有1個或2個往下移時，請調整遙控器的反轉開關(REV)使伺服器往上，若3個伺服器同時往下移時，請調整遙控器 SWASH CH6行程量的正負值，使伺服器同時往上平移，副翼與前後動作相反時，同樣調整 SWASH CH2、CH3 行程量正負值。

FUTABA/HITEC Transmitter/Servo FUTABA/HITEC遙控器對應伺服器關係



Positions of CH1 · CH6 are exchangeable, After assembling as photo (Note: Set the transmitter under CCPM 120 degrees mode), pull throttle stick (pitch) upward. If one swashplate servo (or two servos) moves downward, adjust reverse switch (REV) on the transmitter to make it moves upward. If three servo move downward, adjust the travel value (+-) of SWASH CH6 on the transmitter to make them move upward. When the actions of Aileron and Elevator are opposite, adjust travel values of SWASH CH1 and Ch2.

CH1 · CH6可互換配置，依圖連結後(注意：遙控器須設定於CCPM 120°十字盤模式)，將油門搖桿(Pitch)往上推，若十字盤伺服器有1個或2個往下移時，請調整遙控器的反轉開關(REV)使伺服器往上，若3個伺服器同時往下移時，請調整遙控器 SWASH CH6行程量的正負值，使伺服器同時往上平移，副翼與前後動作相反時，同樣調整 SWASH CH1、CH2 行程量正負值。

12.AJUSTMENTS FOR GYRO AND TAIL NEUTRAL SETTING 陀螺儀與尾翼中立點設定調整

Recommend to choose Head Lock type for Gyro and turn off Revolution mixing(RVMX) mode on the transmitter, then set the gain switch on the transmitter and the gyro to Head lock mode. The gain setting is about 70%, and after transmitter setting, connect to BEC power to work on tail neutral setting.

Note : When turn on BEC power, please do not touch tail rudder stick and the helicopter. Then wait for 3 seconds, make tail servo arm and tail servo at a right angle(90 degrees), tail pitch assembly must be correctly fixed about in the middle of the travel of tail rotor shaft for standard neutral setting.

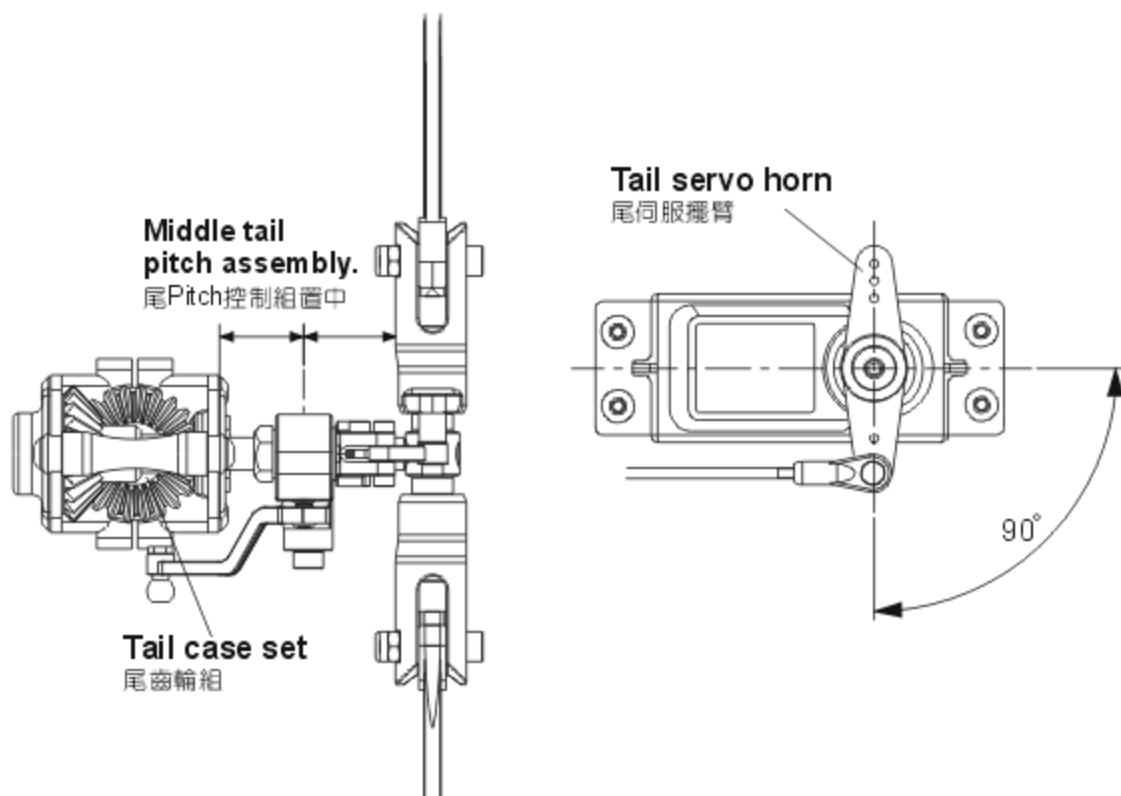
陀螺儀選擇，建議選用鎖定式陀螺儀，其發射器內陀螺儀設定請關閉根軸混控模式，並將發射器上的感度開關與陀螺儀切至鎖定模式，感度設約 70% 左右，發射器設定完成後接上BEC接收電源，即可進行尾中立點設置。

注意：當啓動BEC電源時請勿撥動尾舵搖桿或碰觸機體，待3秒陀螺儀鎖定後尾伺服器需與尾伺服器約成 90°，尾旋翼控制組須正確置於尾橫軸行程約中間位置，即為標準尾中立點設定。

TAIL NEUTRAL SETTING 尾中立點設定

After setting Head Lock mode, correct setting position of tail servo and tail pitch assembly is as photo. If the tail pitch assembly is not at the neutral position, please adjust the length of rudder control rod to trim.

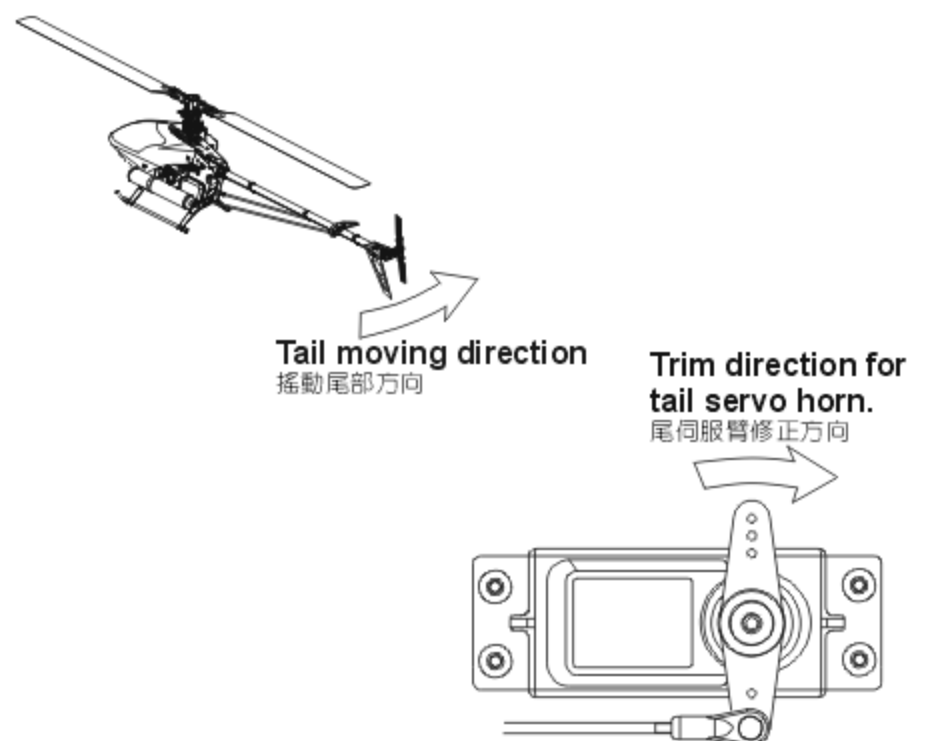
陀螺儀鎖定後尾伺服器與尾 Pitch控制組正確擺置位置。若尾 Pitch控制組未置中時請調整尾控制連桿的長度來修正。



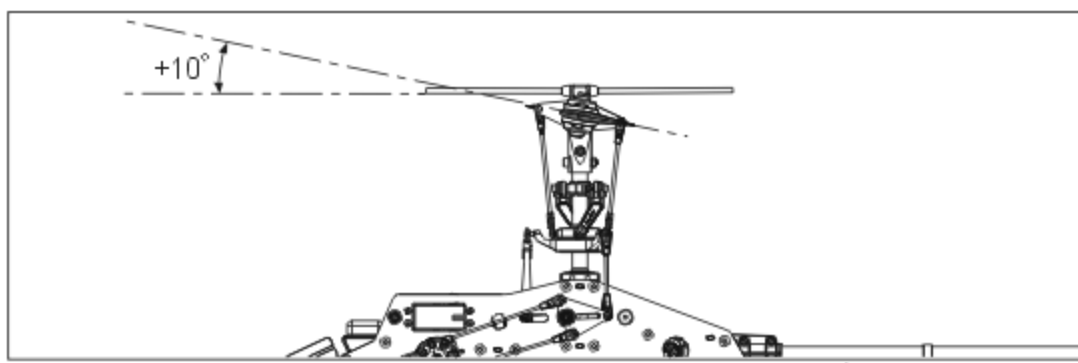
HEAD LOCK DIRECTION SETTING OF GYRO 陀螺儀鎖定方向設定

To check the head lock direction of gyro is to move the tail counterclockwise and the tail servo horn will be trimmed clockwise. If it trims in the reverse direction, please switch the gyro to "REVERSE".

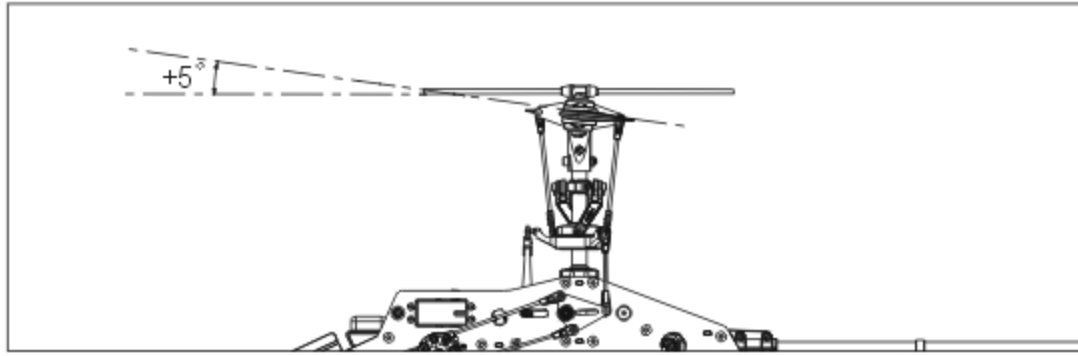
陀螺儀鎖定方向確認，當手搖尾部反時鐘擺動，尾伺服器臂應順時鐘修正，反向時請切換陀螺儀上"鎖定反向"開關修正。



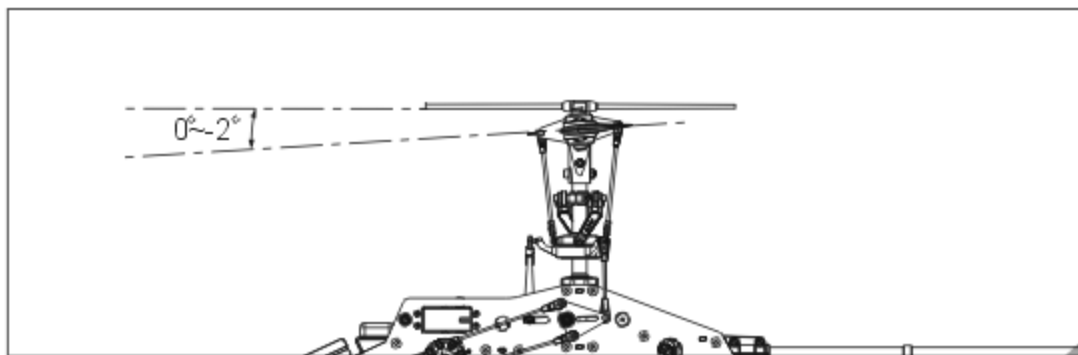
GENERAL FLIGHT 一般飛行模式



Stick position at high/Throttle 100%/Pitch +10°
搖桿高速/油門100%/Pitch+10°



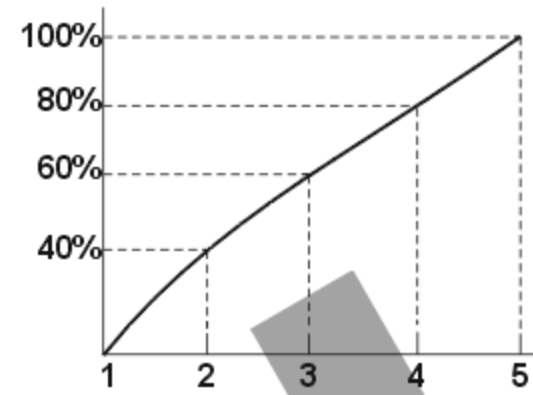
Stick position at Hovering/Throttle 60%/Pitch +5°
搖桿停懸/油門60%/Pitch+5°



Stick position at low/Throttle 0%/Pitch 0°~-2°
搖桿低速/油門0%/Pitch 0°~-2°

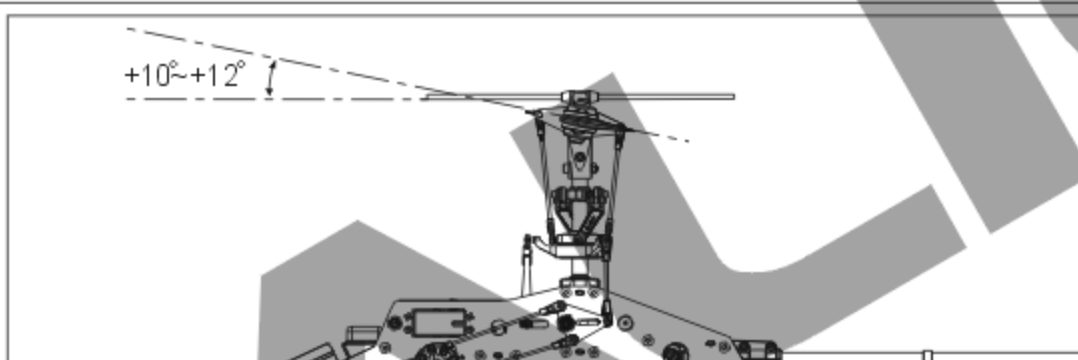
GENERAL FLIGHT
一般飛行模式

	Throttle 油門	Pitch 螺距
5	100% High speed 100% 高速	+10°
4	80%	
3	60% Hovering 60% 停懸	+5°
2	40%	
1	0% Low speed 0% 低速	0°~-2°

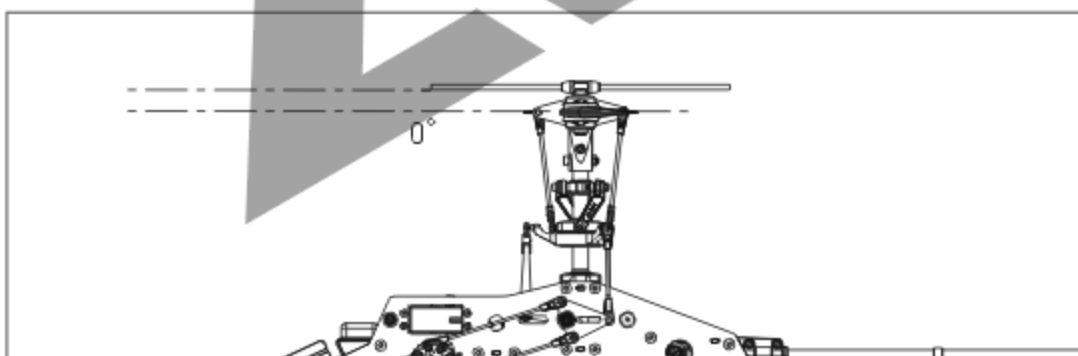


Throttle Curve (Hovering Flight)
停懸模式油門曲線

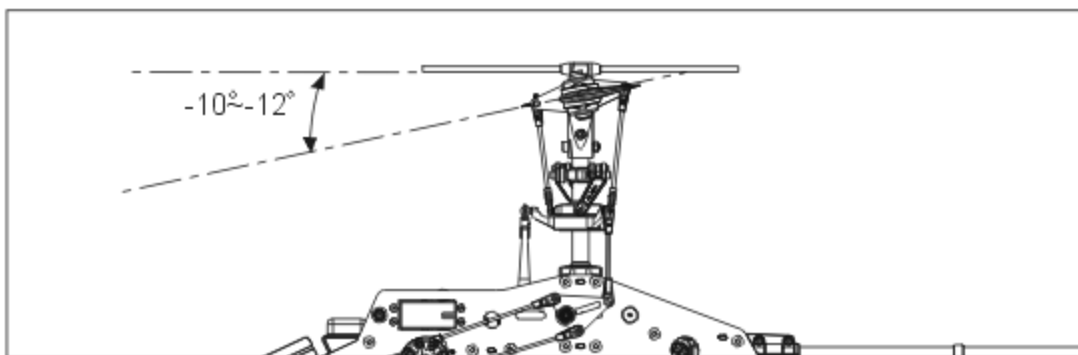
3D FLIGHT 3D特技飛行模式



Stick position at high/Throttle 100%/Pitch +10°~+12°
搖桿高速/油門100%/Pitch+10°~+12°



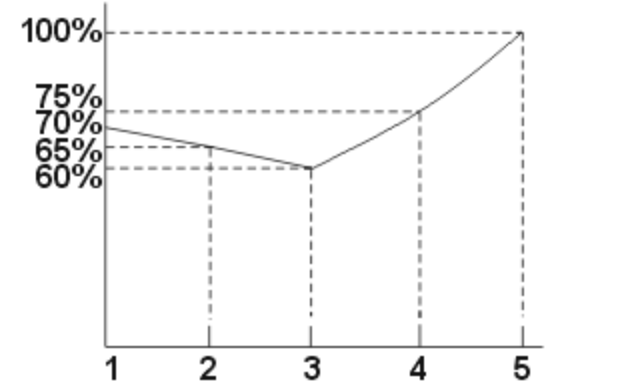
Stick position at middle/Throttle 85%/Pitch 0°
搖桿中速/油門60%~65%/Pitch 0°



Stick position at low/Throttle 100%/Pitch -10°~-12°
搖桿低速/油門100%/Pitch-10°~-12°

IDLE 1 : SPORT FLIGHT

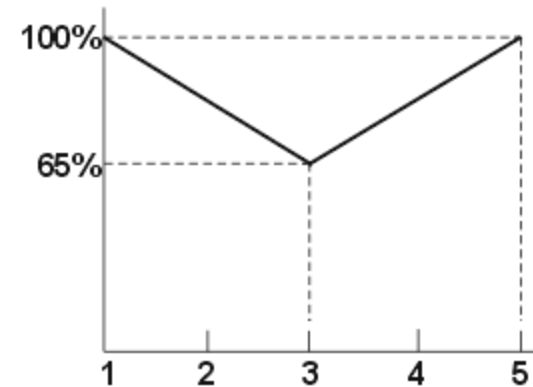
	Throttle 油門	Pitch 螺距
5	100%	+10°~+12°
4	75%	
3	60%	+5°
2	65%	
1	70%	-5°



Throttle Curve (Simple Aerobatic Flight)
空中飛行模式油門曲線

IDLE 2 : 3D FLIGHT

	Throttle 油門	Pitch 螺距
5	100% High 100% 高	+10°~+12°
3	60%~65% Middle 60%~65% 中	0°
1	100% Low 100% 低	-10°~-12°



Throttle Curve (3D Flight)
特技飛行模式油門曲線



1. Pitch range : Approx ±15 degrees.
2. Hint : Do not exceed ±14 degrees pitch range. Doing so may cause motor overload and binding of certain head components.
3. Hint : Do not tilt swashplate more than 9 degrees. Doing so may cause motor overload and binding of certain head components.

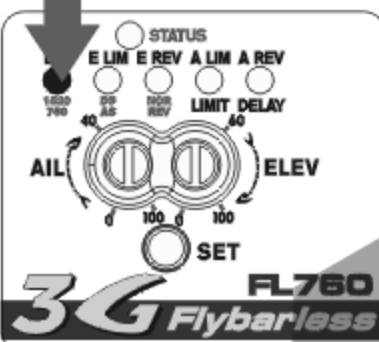
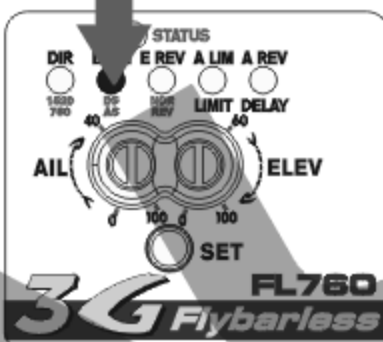
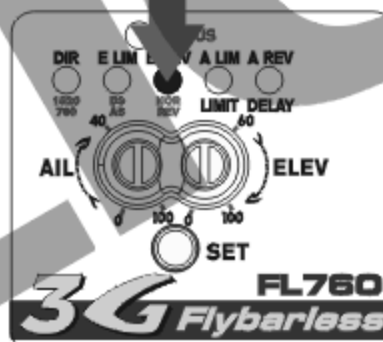
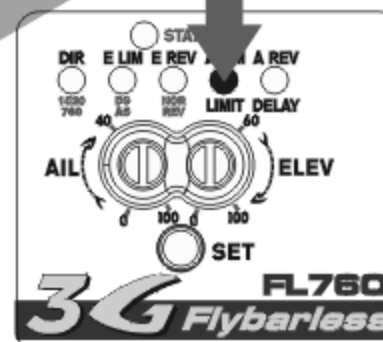
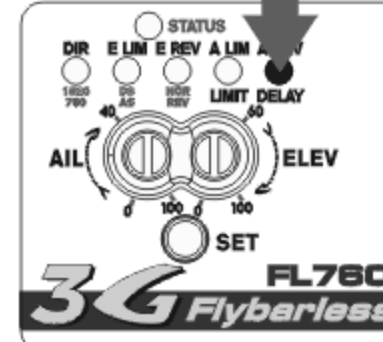
1. 螺距(Pitch)總行程約 ±15°
2. 建議：螺距設定勿超過±14°，過大螺距設定，可能導致引擎過載及旋翼頭旋轉干涉。
3. 建議：十字盤傾斜角度設定勿超過14°，過大螺距設定，可能導致引擎過載及旋翼頭旋轉干涉。

FEATURES 產品特色

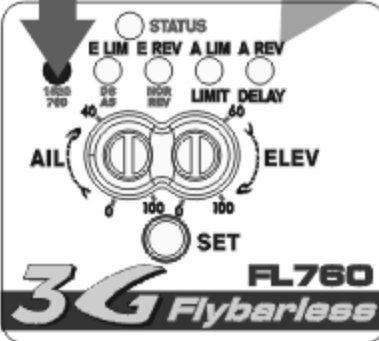
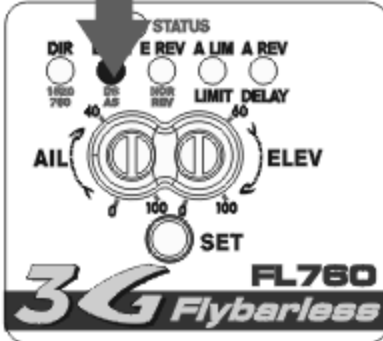
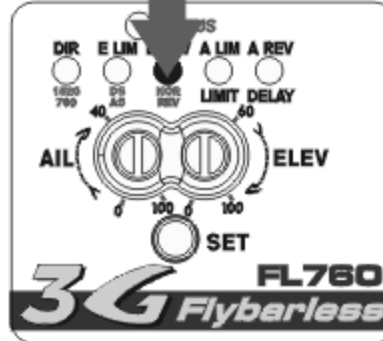
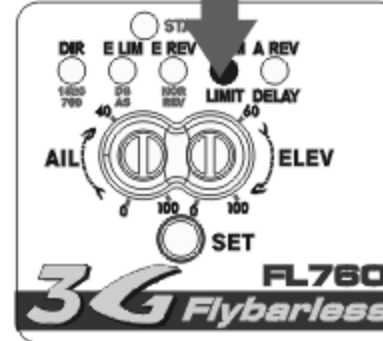
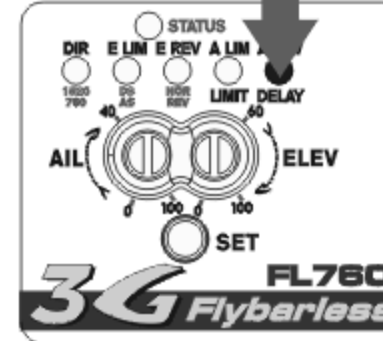
- 3Axis** **3-axis gyroscopic flybarless system to simulate the stability of mechanical flybar system, yet at the same time achieving agile 3D performance.**
3軸陀螺儀無平衡翼系統，可模擬有平衡翼系統的穩定性，更有靈活的3D性能。
- SMM** **Utilizes Silicon Micro Machine (SMM) sensors for excellent stability.**
採用S.M.M. Silicon Micro Machine技術感應器，具有極佳的穩定性。
- 12bit** **12 bit processors providing ultra high resolution, resulting in highly precise controls**
採用12位元處理器，超高解析度，控制細膩精準。
- Easy** **Software upgradable through PC interface adapter (sold separately)**
具備可升級程式化介面，可透過傳輸線更新軟體（傳輸線另購）。
- Easy** **Simplistic setup process without the need of external devices. Setup is done through 5 steps and 2 sensitivity adjustments. Rudder setup is identical to GP780 gyro, minimizing learning curve.**
設定簡單不需額外的介面，只需五個步驟、兩個感度調整即可完成所有設定，尾舵設定和GP780相同，設定輕鬆上手。
- Energy** **Flybarless system dramatically improves 3D power output and efficiency, resulting in reduced fuel or electricity consumption.**
無平衡翼系統，可大幅降低3D大動作飛行能量消耗，提供直昇機更大的動力輸出且更加節省燃油或電力。
- Stable** **Highly sensitive gyroscopic sensors combined with advanced control detection routine providing higher hovering and aerobatic stability than other flybarless system.**
高感度陀螺感測器及先進環路設計，可提供比一般平衡翼系統更佳的靜態及動態穩定性。
- Stable** **Suitable for all CCPM and mechanical mixing system.**
適用於任何比例之對稱式三伺服器CCPM系統及傳統十字盤系統。
- T-REX 250-700** **Compatible with helicopter of all sizes from T-Rex 250 to T-Rex 700.**
3G Flybarless電子設備相容迷你型直昇機至大型直昇機T-REX250~T-REX700。
- 300Hz** **Innovative pitch gauge as an aid to facilitate pitch adjustments.**
創新設計的螺距量測器，藉以模擬有平衡翼系統之螺距量測。
- 300Hz** **High frame rate signal output for faster and higher precision servo response.**
高頻數位輸出訊號，使伺服器的反應更加精準、迅速。
- 3V-8.4V** **Capable to operate between 3V to 8.4V, compatible with high voltage servos.**
適用電壓3V~8.4V，支援高電壓伺服器。
- 25g** **Small footprint, light weight, minimalists and reliable design.**
體積小、重量輕，構造簡單可靠，提供操控者高性能的飛行樂趣。

3G FLYBARLESS SETUP INDICATORS 功能設定指示燈說明

Flybarless system setup mode 無平衡翼系統設定模式：

DIR	E.LIM	E.REV	A.LIM	A.REV
				
Direct mode bypassing gyro, for mechanical travel and neutral point setup. 機械行程與中立點設定	Collective mixing type recognition and elevator endpoint settings 混控辨識及升降舵行程設定	Elevator reverse settings 升降舵正反向設定	Aileron endpoints settings 副翼行程設定	Aileron reverse settings 副翼正反向設定

Rudder gyro setup mode 尾舵陀螺儀設定模式：

1520/760	DS/AS	NOR/REV	LIMIT	DELAY
				
Servo frame rate settings (1520 μs and 760 μs) 寬頻1520 μs及窄頻760 μs伺服器設定	Digital/Analog servo settings 數位及類比伺服器設定	Rudder Servo Reverse settings 尾舵陀螺儀正反向設定	Rudder endpoints settings 尾舵行程設定	Rudder servo delay, and helicopter size settings 尾舵延遲量及大小直昇機模式設定

SETUP PRE-CHECK 設定前注意事項

1. Connect the receiver and servos to the flybarless control unit as per diagram found on page 23.
2. Digital servos must be used on cyclic to avoid damage to servos.
Recommended servo spec: minimum speed 0.10 sec/60, torque 12kg.cm or higher.
3. Transmitter trim tabs must be centered before entering the setup process. It can be moved after setup is complete to trim the heli.
4. 3G Flybarless contains two independent power circuits to enable the use of different voltage sources through the receiver (For example, 7.4V to the cyclic servos, 5V to the gyro and rudder servo). If there is only one 7.4V power source, a step down voltage regulator is required (available separately) to prevent rudder servo from burning out.



To prevent voltage instability, do not use step down voltage regulator if power source is already at 5V. Please consult your servo manuals and ensure proper voltage are supplied to the servos.

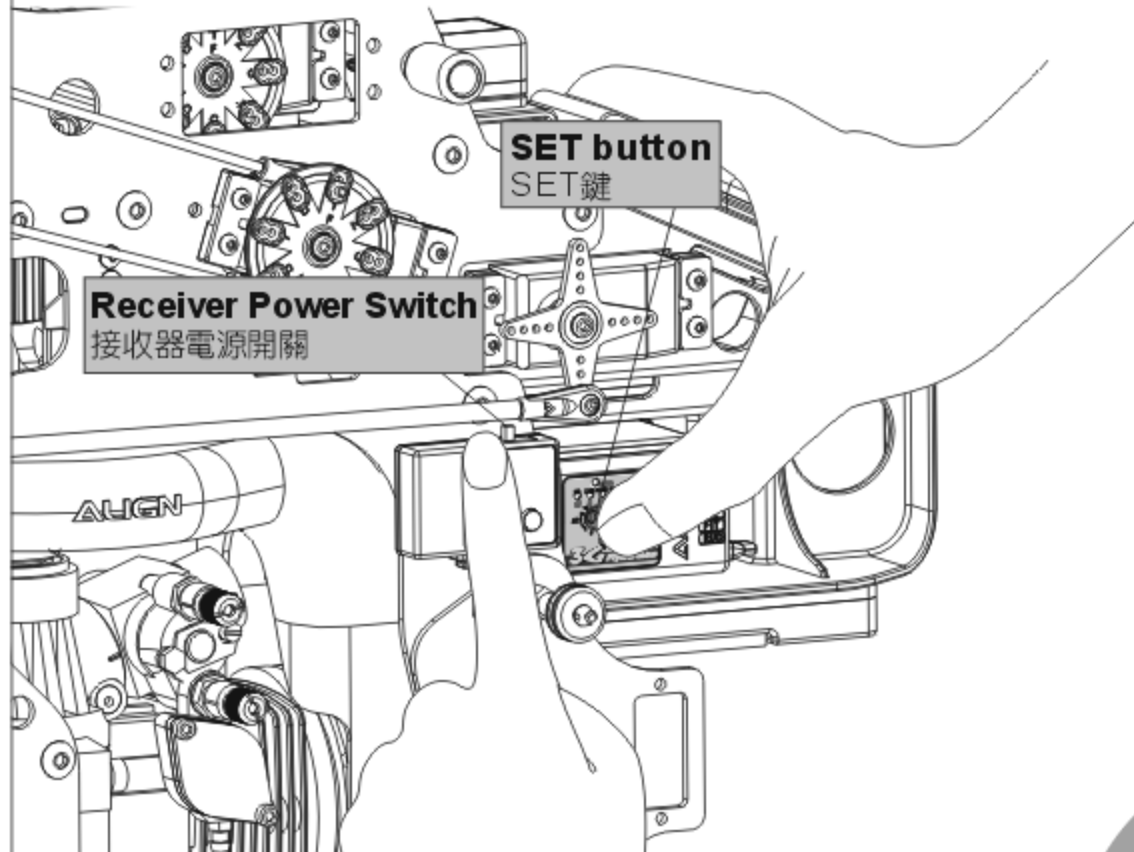
5. When the 3G flybarless system is installed for the first time, a few simple setup steps and fly tests need to be performed in the flybarless setup mode. These steps need to be performed only during initial setup, and does not need to be repeated for subsequent flights. Just power up the system normally, check the proper servo operations, and fly. The initial setup procedure only need to be repeated after software upgrade, pitch range reset, or subtrims are added in the transmitter.

- 1.將接收器及伺服器依接線示意圖連接(請參照第23頁)。
- 2.十字盤必須安裝數位伺服器,否則會造成伺服器損毀。
建議規格:速度0.10秒/60°以內;扭力12kg.cm以上。
- 3.進入設定時必須將遙控器的外微調歸零,飛行時再根據飛行狀況調整微調。
- 4.3G Flybarless的伺服器輸入電源具有兩組獨立迴路設計,可支援具有雙電源輸出的接收器分開供給不同電壓(例如:十字盤伺服器輸出7.4V/陀螺儀、尾舵伺服器輸出5V)。當接收器電源僅有7.4V,無提供獨立尾舵5V電源時,可將尾舵伺服降壓器(選購品)依接線圖之方式接上,以防止尾舵伺服器因電壓過高而燒毀。
CAUTION 注意 如原本接收器電源為5V,請勿接上尾舵伺服降壓器,以防止電壓不穩。各型號伺服器允許之工作電壓不盡相同,請依該伺服器所建議的電壓下使用。
- 5.第一次安裝3G Flybarless無平衡翼系統時,必須進入無平衡翼設定模式,進行幾項簡易的安裝設定與飛行測試,完成後即不須再進入此設定模式,只要正常開機,檢查伺服器動作正確後即可飛行;除非要更新程式、重設螺距或有更動遙控器內微調(sub trim)時,必須進入設定模式重設無平衡翼系統。

FLYBARLESS SYSTEM INITIAL SETUP STEPS 無平衡翼系統設定

1. DIR : Direct mode to bypass gyro for mechanical travel and neutral point setup

DIR機械行程與中立點設定模式



Step 1.1 : Enter the DIR settings 步驟1.1: 進入DIR設定

Press and hold the SET button while powering up the receiver. Release the button when LED 1-5 begin to cycle. The DIR green LED will light up indicating the gyro has been bypassed for neutral and mechanical travel range setup.

按下"SET"鍵不放,並將接收器電源開啓,接著LED1~5(DIR~A.REV)會循序亮起,此時即可以放開按鍵,"DIR"綠燈亮起,則進入3G Flybarless 機械行程與中立點設定模式。



If "STATUS" led flashes in red indicating error entering DIR settings, check connections to the sensor and restart the process.

若"STATUS"亮紅燈閃爍,無法進入DIR模式時,請檢查感應器訊號線連接是否確實後,重新進入DIR設定。



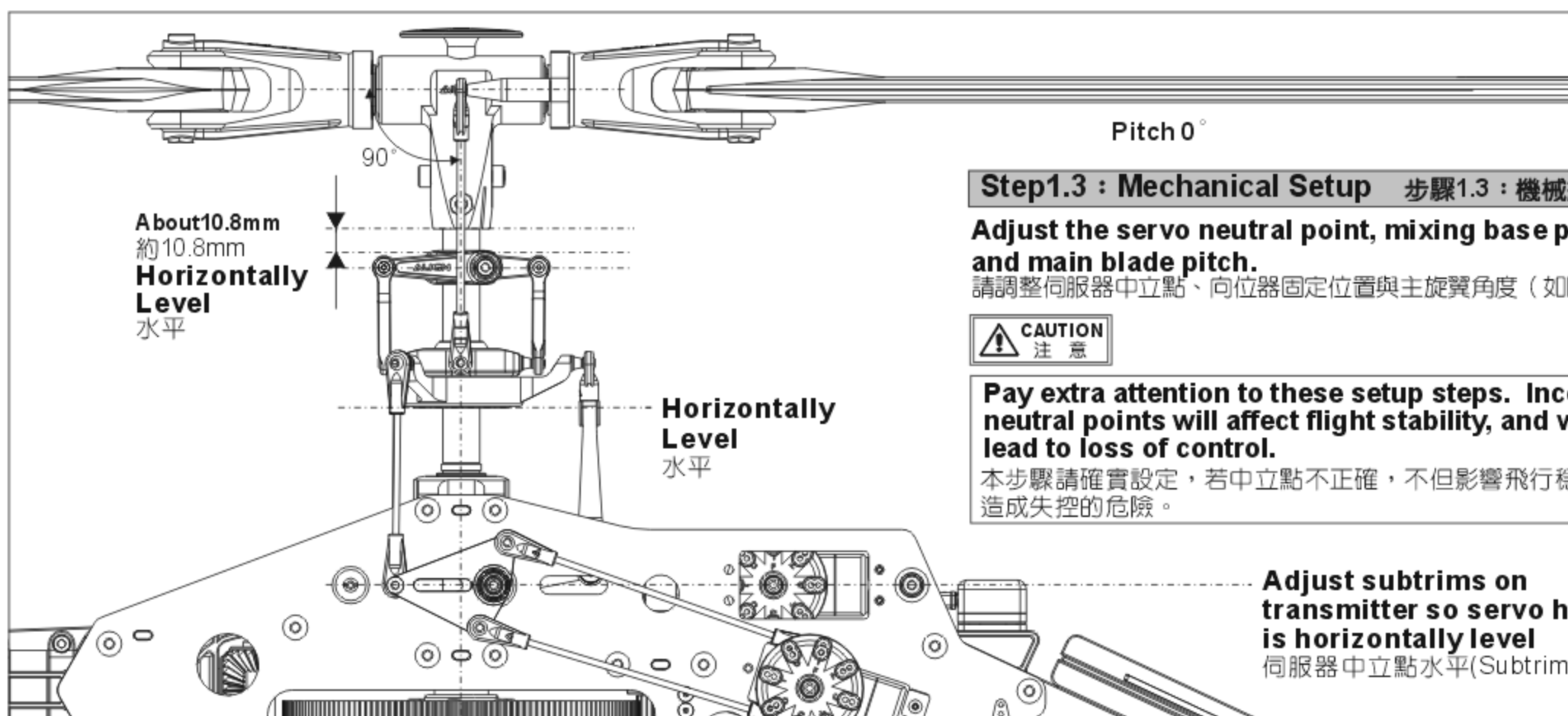
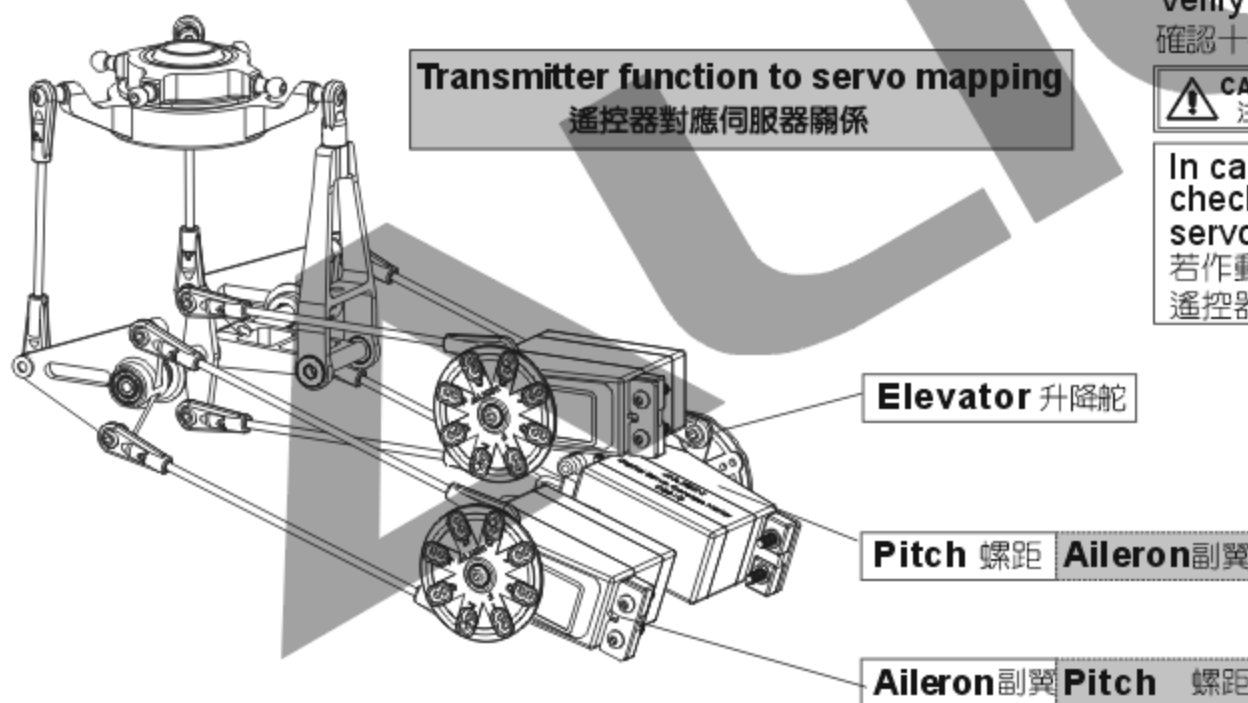
Step 1.2 : Swashplate function check 步驟2: 十字盤作動確認

Verify the correct swashplate movements for PIT, AIL, and ELE inputs. 確認十字盤作動 PIT、AIL、ELE 是否正確。



In case of incorrect servo movement or no movement at all, please check for proper connection between 3G flybarless connection to servos, as well as proper setup on transmitter.

若作動錯誤或伺服器無動作,請檢查3G Flybarless 伺服器訊號線接線以及遙控器設定是否正確。



Step 1.3 : Mechanical Setup 步驟1.3: 機械結構設定

Adjust the servo neutral point, mixing base position, and main blade pitch.

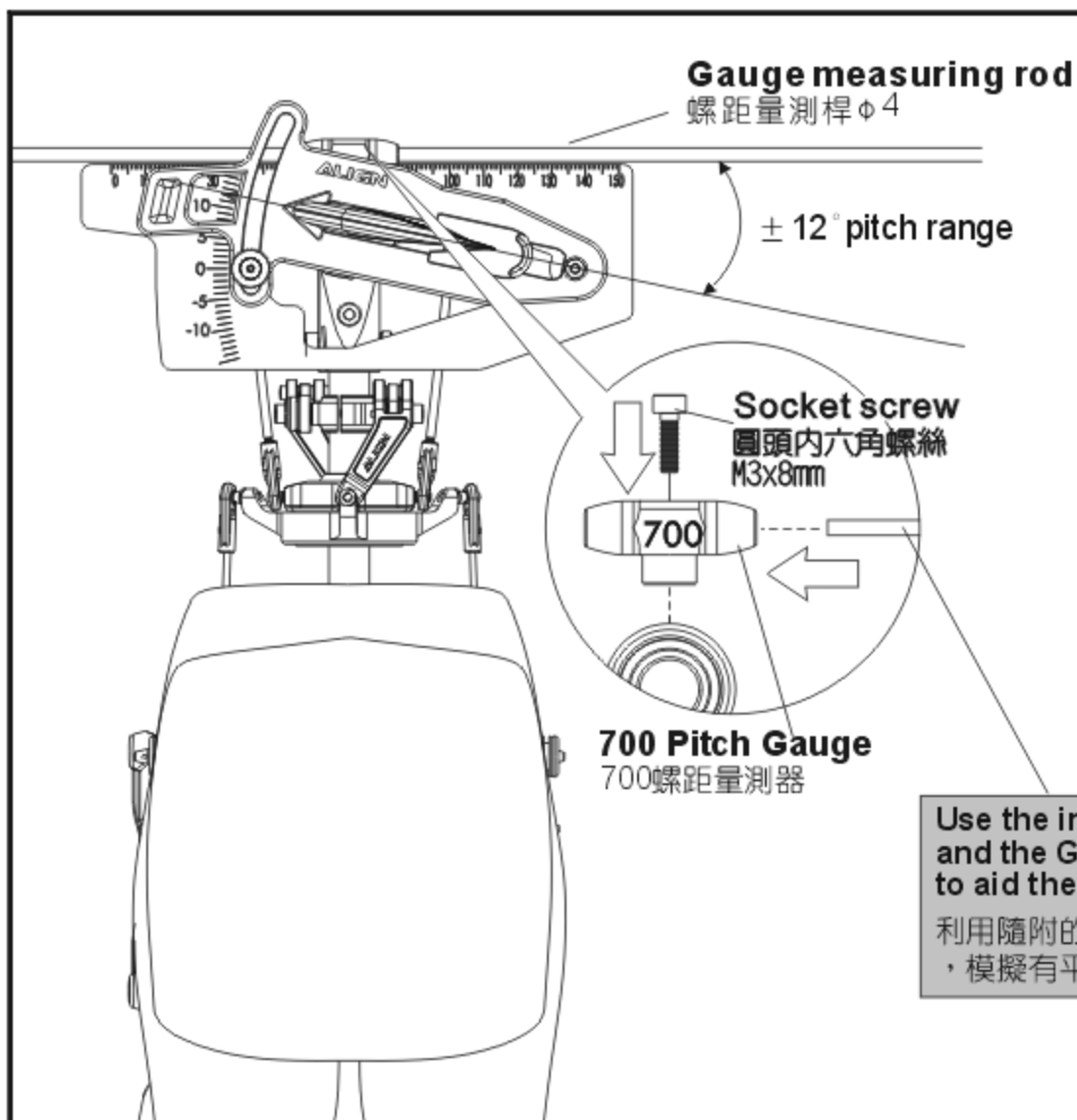
請調整伺服器中立點、向位器固定位置與主旋翼角度(如圖示)。



Pay extra attention to these setup steps. Incorrect neutral points will affect flight stability, and worse lead to loss of control.

本步驟請確實設定,若中立點不正確,不但影響飛行穩定性,更可能造成失控的危險。

Adjust subtrims on transmitter so servo horn is horizontally level 伺服器中立點水平(Subtrim)



Step 1.4 : Collective pitch setup 步驟1.4 : 主旋翼螺距(集體螺距)設定

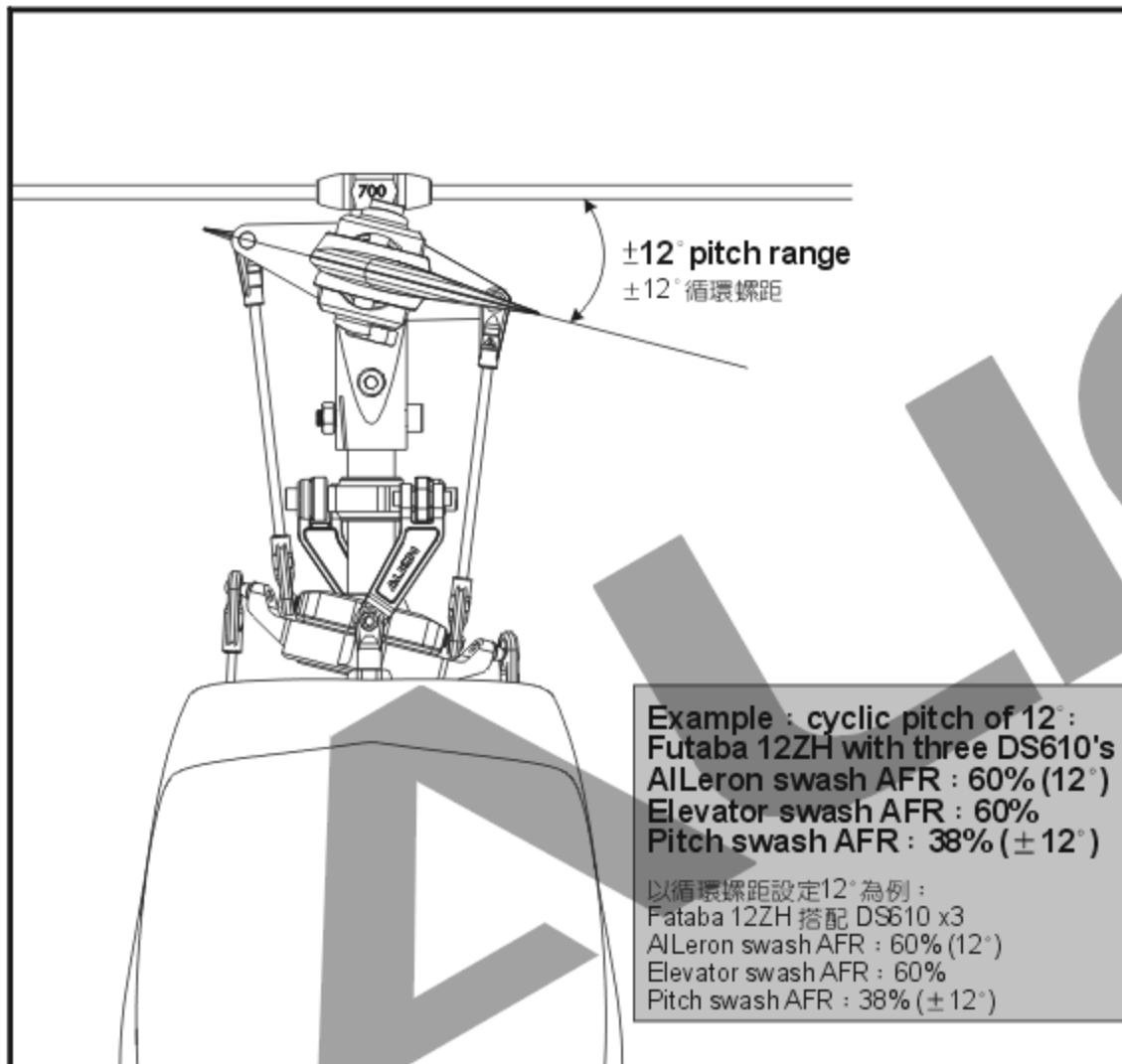
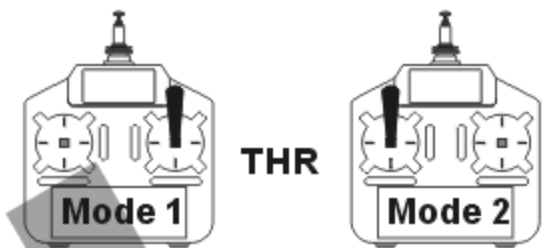
Adjust the maximum collective pitch using the transmitter's swashplate mixing function (pitch swash AFR). Recommended pitch range $\pm 12^\circ$, maximum pitch range for advanced pilot shall not exceed $\pm 14^\circ$.
建議螺距設定 $\pm 12^\circ$ ，高階使用者不超過 $\pm 14^\circ$ 為限。



Do not adjust individual servos endpoints through the servo ATV/AFR function, use only swashplate mixing adjustments. Should any changes made to the endpoints or subtrims on the transmitter in the future, the flybarless system initial setup must be performed again.

CCPM系統調整行程量時，須從遙控器Swash十字盤混控比率（Pitch swash AFR）調整，勿去調整個別伺服器的ATV行程量。爾後遙控器的內微調如有變更，必須重新進行Flybarless各項設定。

Use the included pitch gauge and the Gauge measuring rod to aid the adjustment of pitch.
利用隨附的螺距量測器與螺距量測桿，模擬有平衡翼系統之螺距量測。



Step 1.5 : Cyclic pitch setup 步驟1.5 : 循環螺距設定

Maximum cyclic pitch setup: With main blade parallel to helicopter body, move the transmitter aileron stick all the way left, and adjust the AIL mixing percentage in SWASH settings until main blade pitch are 12 to 14 degrees.

十字盤循環螺距最大角度設定：主旋翼方向與機體方向相同，油門搖桿置於主旋翼角度0度的位置不動，撥動副翼搖桿至最左，調整遙控器Swash中AIL比率，使主旋翼的攻角為原廠建議值 $\pm 12^\circ$ 。

※Recommended pitch range $\pm 12^\circ$, maximum pitch range for advanced pilot shall not exceed $\pm 14^\circ$.

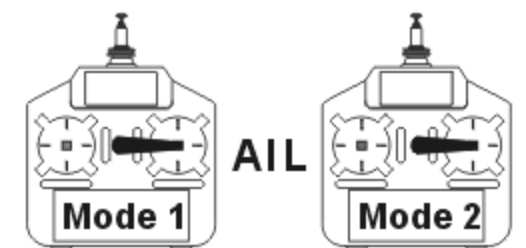
※建議一般設12度、高階使用者不超過14度為限。



Adjustments to the CCPM servos endpoints should be done through transmitter's swashplate mixing function (AIL swash AFR). Do not adjust individual servos endpoints through the servo ATV/AFR function. Should any changes made to the endpoints or subtrims on the transmitter in the future, the flybarless system initial setup must be performed again.

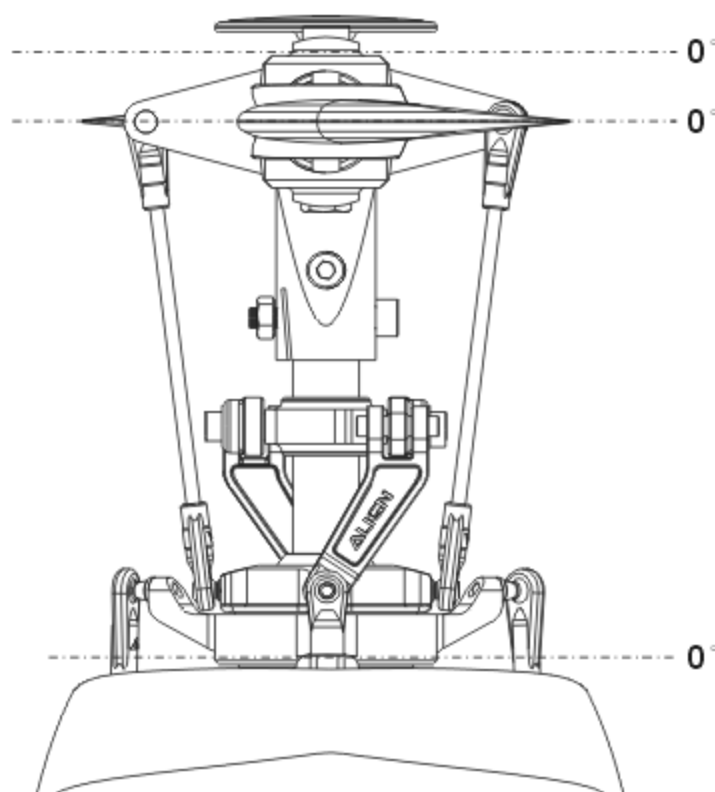
CCPM系統調整行程量時，從遙控器Swash十字盤混控比率做調整，勿去調整個別伺服器的ATV行程量。爾後遙控器內微調如有變更，必須重新進行Flybarless各項設定。

Example : cyclic pitch of 12° :
Futaba 12ZH with three DS610's
AILeron swash AFR : 60% (12°)
Elevator swash AFR : 60%
Pitch swash AFR : 38% ($\pm 12^\circ$)
以循環螺距設定 12° 為例：
Futaba 12ZH 搭配 DS610 x3
AILeron swash AFR : 60% (12°)
Elevator swash AFR : 60%
Pitch swash AFR : 38% ($\pm 12^\circ$)



2.E.LIM swashplate mixing type recognition and elevator endpoint setup :

E.LIM十字盤混控辨識及升降舵行程量設定模式：



Step 2.1 : Entering E.LIM setup mode 步驟2.1 : 進入E.LIM設定

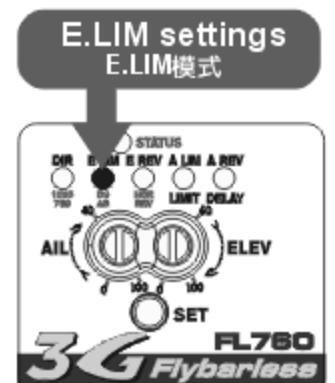
While keeping swashplate level and main pitch at zero degrees, press the SET button to register the neutral point and enter E.LIM setup mode. The E.LIM LED will lit up after DIR turns off.

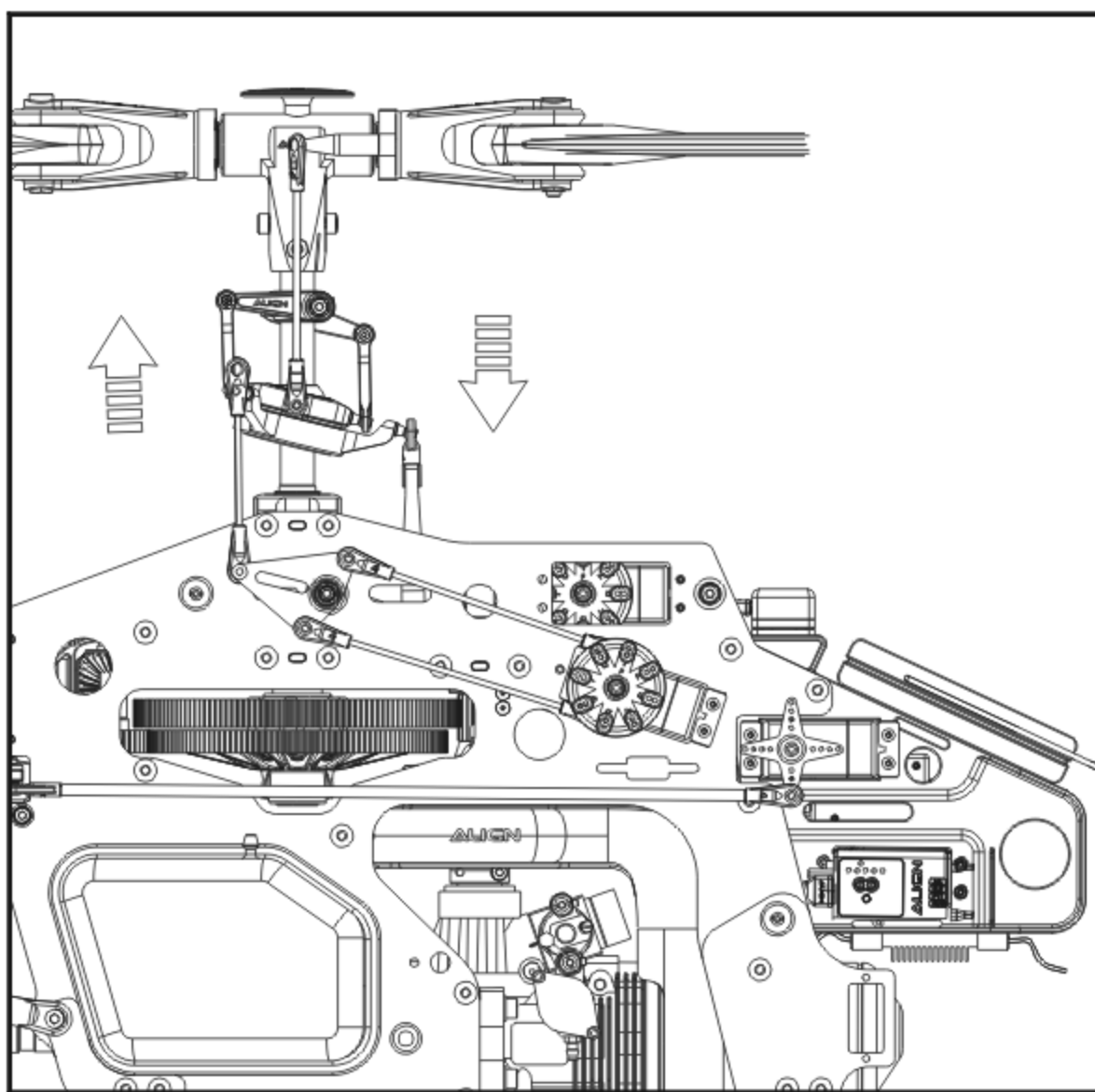
保持十字盤為水平、旋翼角度為零度的狀態下，接著按下"SET"鍵DIR燈將熄滅，E.LIM燈將會亮起，進入"E·LIM升降舵行程量"設定模式。



The throttle stick position where main pitch is 0 degree must be maintained through this setup process.

油門搖桿須置於主旋翼角度0度的位置，不可再移動。





Step 2.2 : Swashplate mixing type recognition and elevator endpoint setup

步驟 2.2 : 十字盤混控辨識與升降舵行程量設定

With all channels stationary, move the transmitter elevator stick forward, and then back to center position. This completes the swashplate mixing type recognition process. The control unit will determine the CCPM mixing ratio or traditional mechanical mixing maximum elevator endpoints.

將遙控器升降舵推至最前方(請勿動到其他舵面動作), 再將升降舵搖桿放回中間位置, 完成此模式設定。

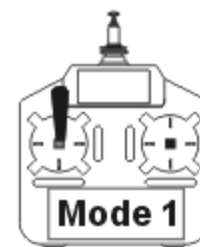
讓3G Flybarless解算CCPM混控比例或傳統十字盤模式及前後可用行程。



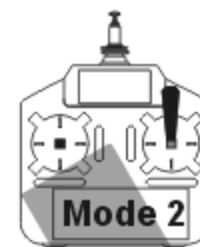
Throttle stick position where main pitch is 0 degree must be maintained through this setup process.

油門搖桿須置於主旋翼角度0度的位置, 不可再移動。

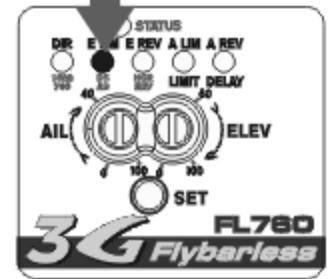
Throttle stick must be maintained
油門搖桿固定



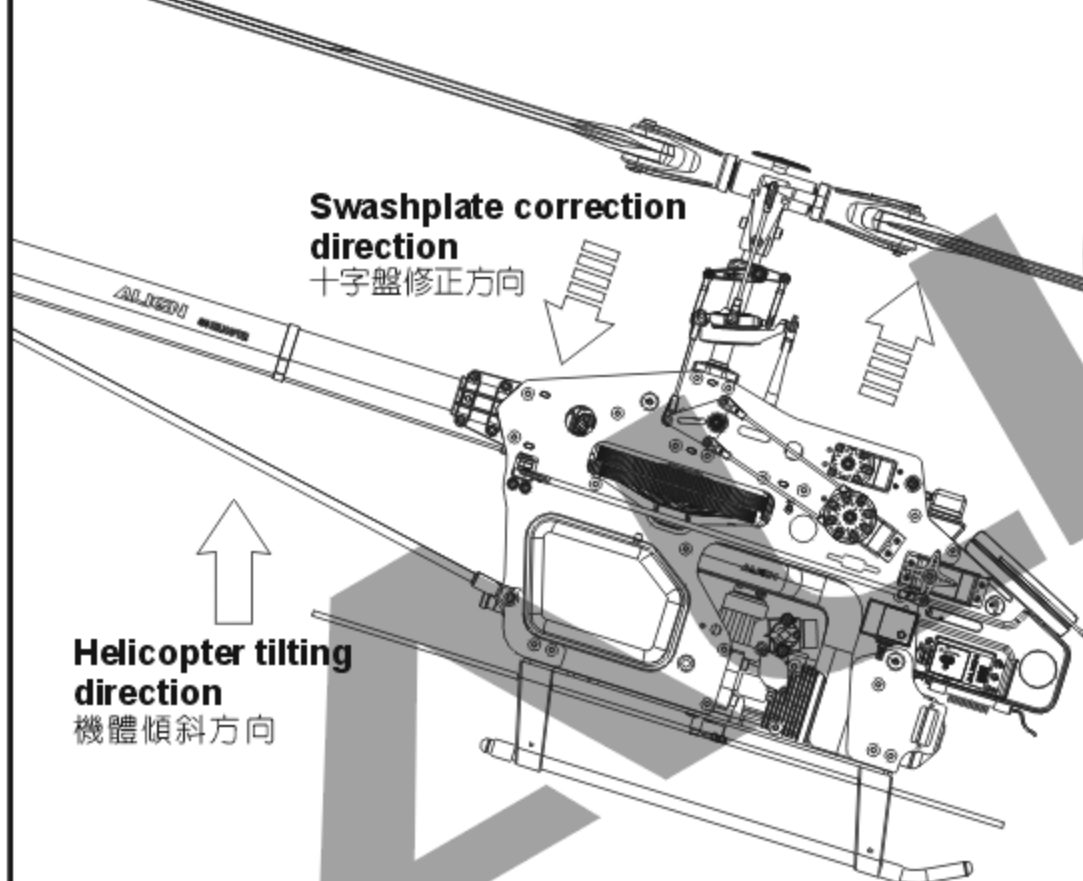
ELE



E.LIM settings
E.LIM模式



3. E.REV elevator reverse setup mode : E.REV升降舵陀螺儀正反向設定模式 :



Swashplate correction direction
十字盤修正方向

Helicopter tilting direction
機體傾斜方向

Helicopter tilting direction
機體傾斜方向

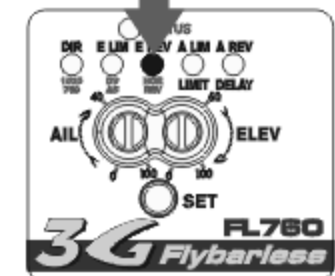
Press the SET button to enter E.REV setup mode. The E.REV LED will lit up after E.LIM turns off. This setup mode sets the elevator gyro direction

1. Tilt the helicopter forward as shown in diagram, and check if swashplate is tilting correctly toward the back.
2. If the swashplate is tilting at the wrong direction, move the transmitter elevator stick until STATUS LED changes color, and re-check the swashplate tilting direction.

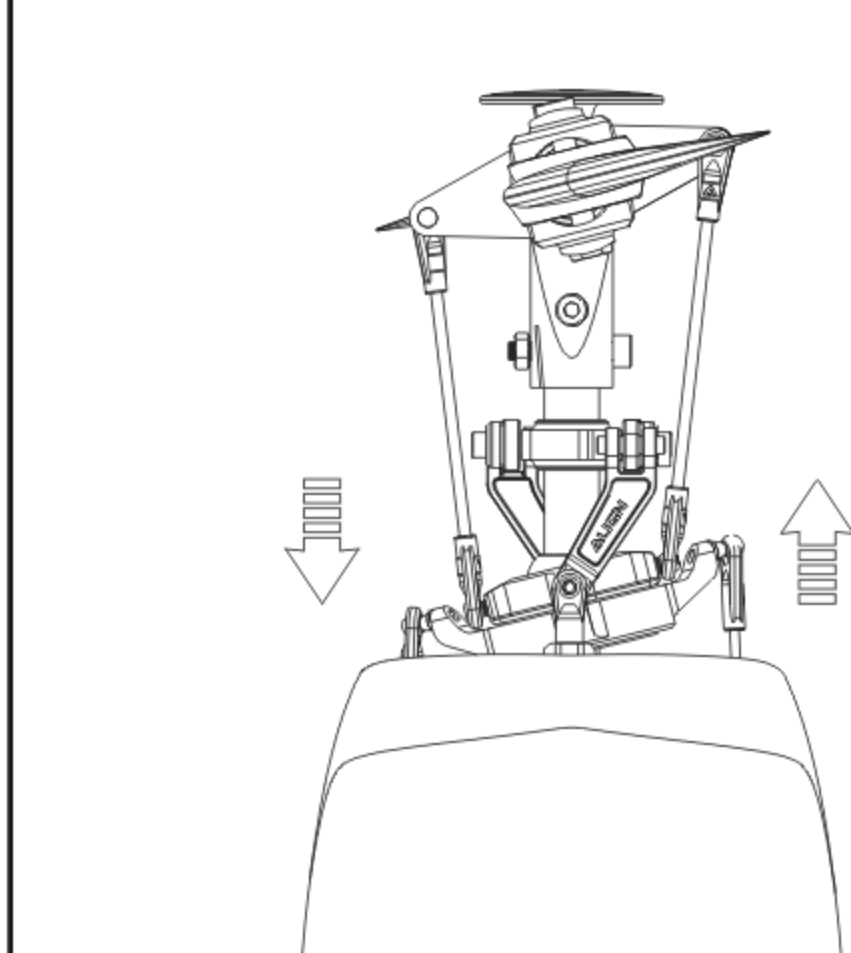
接著按下"SET"鍵, 讓設定模式進入"E.REV 升降舵陀螺儀正反向"設定模式, 此時E.LIM燈熄滅, E.REV燈亮起, 此模式設定升降舵陀螺儀修正方向。

1. 如圖示, 將機身向前傾確認十字盤的修正方向是否正確。
2. 如果十字盤方向修正錯誤, 請撥動升降舵搖桿改變STATUS燈顏色後, 再次確認十字盤修正方向是否正確。

E.REV settings
E.REV模式



4. A.LIM aileron endpoints setup : A.LIM副翼行程量設定模式 :



Press the SET button to enter A.LIM setup mode. The A.LIM LED will lit up after E.REV turns off. With all channels stationary, move the transmitter aileron stick to the right, and then back to center position. This completes the aileron endpoint setup process. The control unit will determine the maximum aileron endpoints

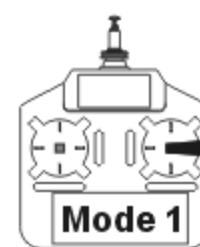
接著按下"SET"鍵, 讓設定模式進入"A.LIM副翼行程量"設定模式, 此時E.REV燈熄滅, A.LIM燈亮起。將副翼搖桿向右推到底, 完成後將搖桿置中, 完成此模式設定, 讓3G Flybarless解算副翼可用行程。



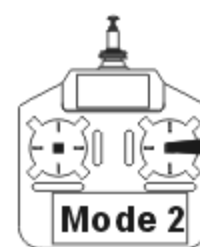
The throttle stick position where main pitch is 0 degree must be maintained through this setup process.

油門搖桿須置於主旋翼角度0度的位置, 不可再移動。

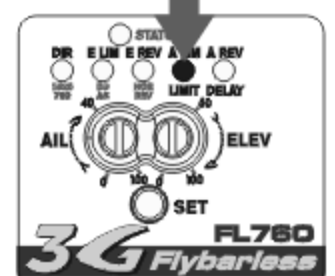
Throttle stick must be maintained
油門搖桿固定



AIL



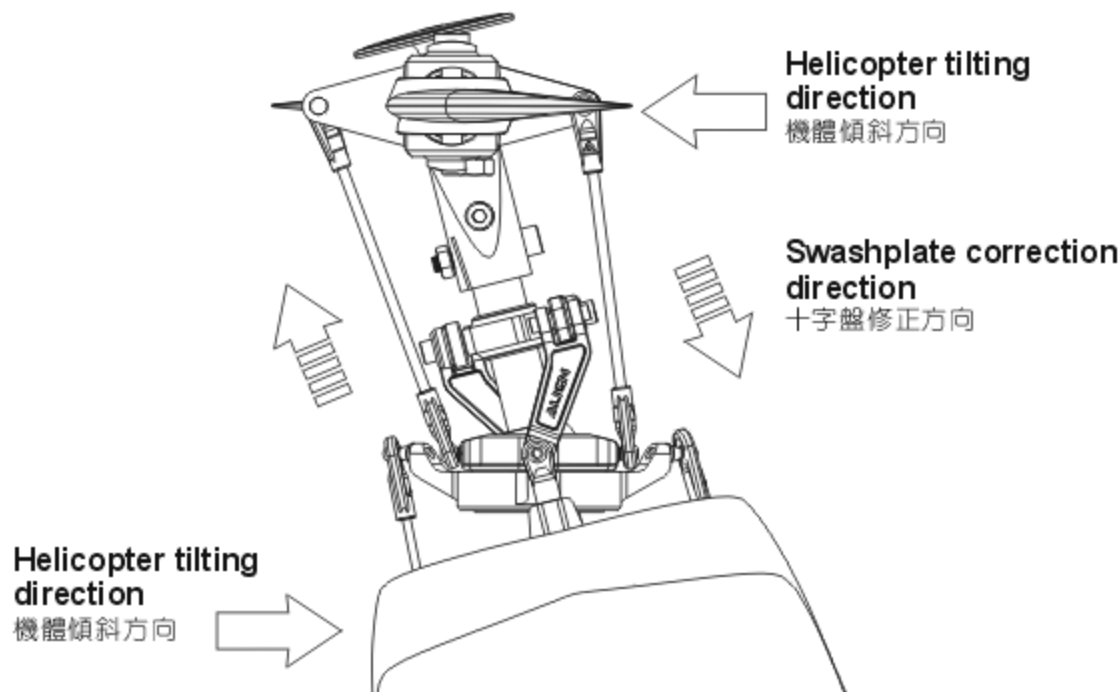
A.LIM settings
A.LIM模式



5. A.REV aileron reverse setup mode :
A.REV 副翼陀螺儀正反向設定模式 :

Press the **SET** button to enter A.REV setup mode. The A.REV LED will lit up after A.LIM turns off. Tilt the helicopter right as shown in diagram, and check if swashplate is tilting correctly toward the left. If the swashplate is tilting at the wrong direction, move the transmitter aileron stick until **STATUS** LED changes color, and re-check the swashplate tilting direction. Press the **SET** button again, and the control unit will restart with all LED's flashing. This completes the flybarless portion of the setup process.

接著按下"SET"鍵，讓設定模式進入"A.REV副翼陀螺儀正反向"設定模式，此時A.LIM燈熄滅，A.REV燈亮起。此模式設定副翼陀螺儀修正方向，如果將直昇機往右傾，3G Flybarless應將十字盤向左傾修正，如果反向，可向左或向右推動副翼搖桿，變換"STATUS"不同顏色燈號，更換陀螺儀修正方向。接著按下"SET"鍵完成無平衡翼系統設定，所有LED將閃動，重新開機。



3G Flybarless system must remain stationary during startup. Do not move the helicopter until the swashplate jumps up and down slightly 3 times, indicating the completion of initialization. (please refer to page 36 step 3)

3G Flybarless 開機時會進入初始化狀態，此時請勿移動機身，當初始化完成後，十字盤會保持水平上下小幅跳動3次，表示開機完成。(請參考第36頁 步驟3)



RUDDER GYRO SETUP 尾舵陀螺儀設定

After the system reboots, flybarless setup is completed. Now the rudder gyro needs to setup with similar procedure as Align's GP780 gyro. Push and hold the **SET** button for 2 seconds to enter the rudder gyro setup mode.

If your transmitter has the following settings, please disable it or set the value to zero.

完成開機後Flybarless部分已設定完成，接著要設定尾舵陀螺儀，所有設定如同GP780。於待機狀態下持按"SET"鍵2秒進入尾舵陀螺儀設定。如果您的遙控器有下列功能時，請設定為關閉(OFF)或數值設定為零。

- **ATS**
- **Pilot authority mixing**
- **Throttle to rudder mixing**
- **Rudder to gyro mixing**
- **Pitch to rudder mixing**
- **Revolution mixing**



3G Flybarless rudder gyro has the factory setting of 1520 μ s and DS digital servo. Double check your servospec and change the gyro setting as needed to avoid damages to the servo.

3G Flybarless 尾舵陀螺儀出廠設定值為：1520 μ s寬頻與DS數位伺服器模式，安裝時請確認您的伺服器規格，避免設定值不同而造成伺服器損壞。

1. 1520 μ s (standard) or 760 μ s (narrow band) servo frame rate setup.

1520 μ s (標準)或760 μ s (窄頻)伺服器設定

3G Flybarless system is compatible with both the 760 μ s narrow frame rate servos (such as Futaba S9256, S9251, BLS251), as well as the standard 1520 μ s frame rate servos (most others). Proper frame rate must be selected based on your servo's specifications.

To enter the setup mode : Press and hold the **SET** button for 2 seconds until **STATUS** LED flashes. The 1520/760 LED will light up indicating servo frame rate setup mode. Push the transmitter rudder stick left or right to select the frame rate. For example, if rudder is pushed to the left (or right) and **STATUS** LED turns green, the frame rate is set to 1520 μ s. To set it to 760 μ s, the rudder stick need to be pushed from the center to the opposing end 3 times for the **STATUS** LED to turn red, indicating frame rate set to 760 μ s.

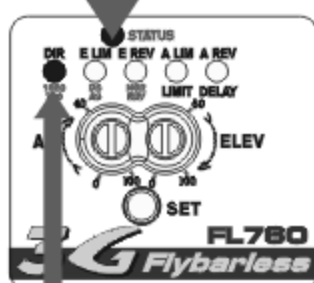
3G Flybarless panel : Each setting value is labeled on the 3G flybarless control unit with either green or red lettering, which corresponds to the **STATUS** LED color. Subsequent setup mode is entered by a single press of the **SET** button. Setup mode will exit if no activity is detected in 10 seconds.

3G Flybarless相容兩種波寬控制系統，若您使用的伺服器屬於760 μ s系統 (如Futaba S9256、S9251、BLS251)，則必須將3G Flybarless設定於760的模式，其他未標示760 μ s規格的伺服器，一般皆為1520 μ s系統，須設定為1520的模式。

進入功能設定模式：持按面板上的"SET"設定鍵約2秒，此時"STATUS"狀態指示燈會開始閃爍，且"1520/760"的功能設定指示燈會亮起，表示進入標準/窄頻伺服器選項，利用遙控器方向舵搖桿的左右方向來選擇設定值，例如方向舵搖桿往左(或右)時，"STATUS"指示燈為綠色，表示設定值為1520 μ s系統；若要設定為窄頻760 μ s系統時，必須將搖桿由中立點往相反方向連續撥動3次，使"STATUS"指示燈亮紅色，才會進入760 μ s系統。

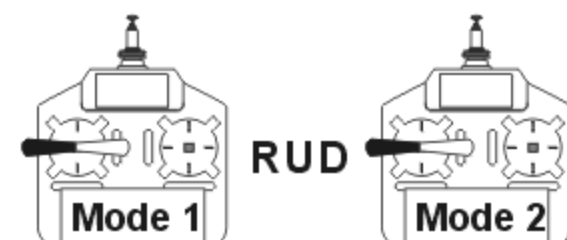
3G Flybarless的面板：標籤上已使用綠/紅色的字體提示"STATUS"燈色所代表的設定值。設定完成後按"SET"鍵一次可進入下一個設定，或是10秒內不做任何設定，系統會自動離開設定模式。

Green LED : 1520 μ s standard band
 Red LED : 760 μ s narrow band
 綠燈 : 1520 μ s寬頻伺服器
 紅燈 : 760 μ s窄頻伺服器



Standard/Narrow band mode
 寬頻/窄頻模式

Select by moving the rudder stick left and right
 左右撥動方向舵選擇



2. DS (digital) / AS (analog) servo selection

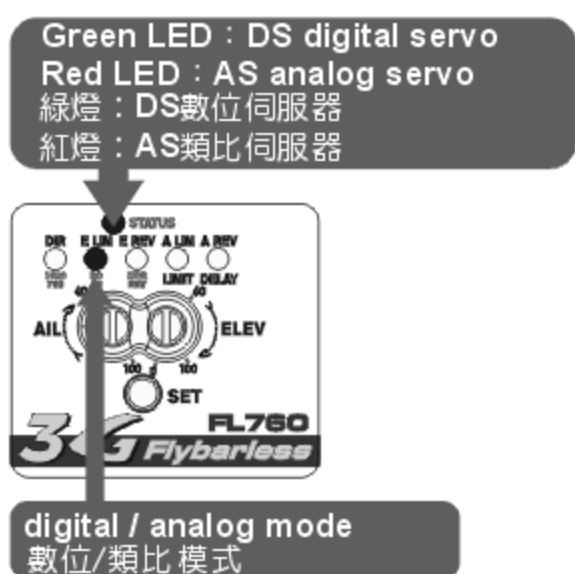
DS數位/AS類比伺服器選擇

There is a direct correlation between servos' speed to gyro's performance. Faster servos are able to execute commands from the gyro at faster and higher precision. Due to the high performance gyro sensors used in the 3G flybarless system, premium high speed digital rudder servos are mandatory for optimal tail performance. Some of the recommended rudder servos include Align DS650, DS620, DS520, DS420, Futaba S9257, S9256, S9254, S9253, or other servos with similar specifications.

Setup method : Press and hold the SET button for 2 seconds to enter the setup mode, then press the SET button to select DS/AS setup mode, as indicated by the lighting of DS/AS LED. Using the transmitter's rudder stick, select either digital servo DS mode (STATUS LED is green), or analog servo AS mode (STATUS LED is red).

伺服器動作速度攸關陀螺儀的性能，伺服器動作愈快，就能立即反應陀螺儀送出的指令，發揮快速精準的效能；由於3G Flybarless具有相當快速的反應時間與靈敏度，所以建議您搭配高速型數位伺服器，如ALIGN DS650、DS620、DS520、DS420、Futaba S9257、S9256、S9254、S9253或其他相同規格伺服器，以獲得最佳效能。

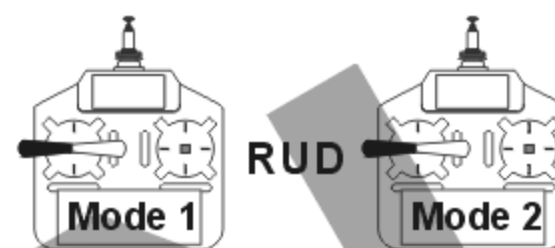
設定方式：持按"SET"鍵2秒進入功能設定模式，再按"SET"鍵選擇DS/AS選項，(DS/AS指示燈亮起)，利用方向舵搖桿選擇數位DS (STATUS為綠燈)或類比AS (STATUS為紅燈)伺服器。



Using an analog servo in DS mode will cause damages to the servo.

在DS模式下連接"AS類比伺服器"將導致伺服器燒毀。

Select by moving the rudder stick left and right
左右撥動方向舵選擇



3. Rudder servo direction check and link adjustment

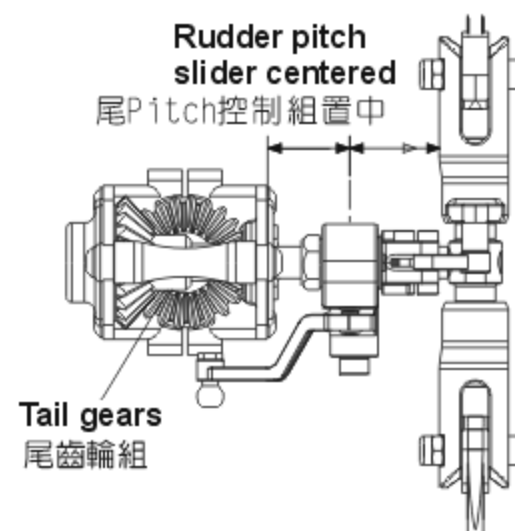
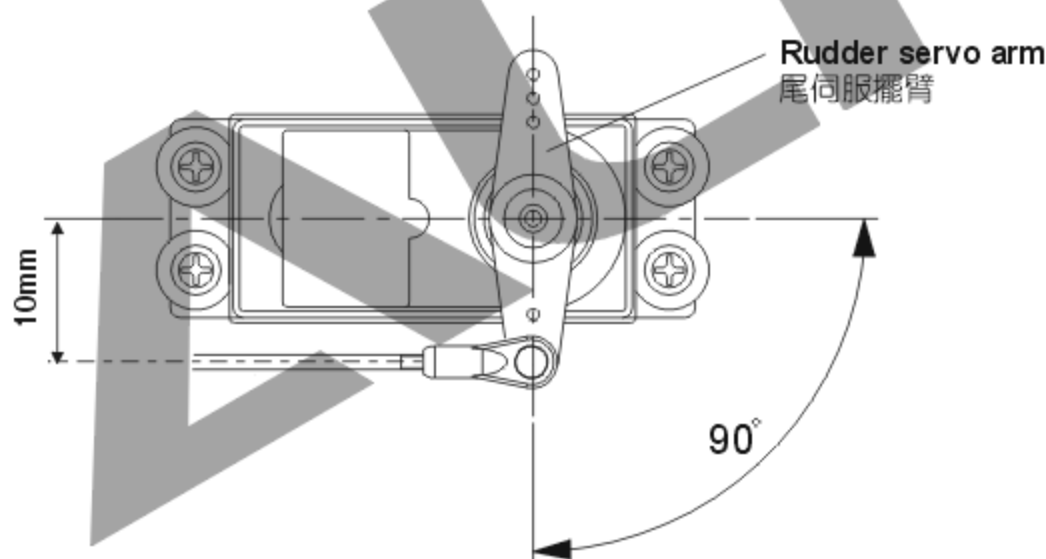
檢查尾舵伺服器正逆轉方向與調整連桿

Move the transmitter rudder stick left/right, and check for the correct direction of the rudder servo. If needed, servo reverse is done from the transmitter's REV (reverse) function.

For tail pitch adjustment, center the rudder servo by either setting the 3G flybarless to normal rate mode (non-heading lock), or press and hold the SET button for 2 seconds. With the rudder servo centered and servo horn at 90 degrees, adjust the linkage length until tail pitch slider is centered on the tail output shaft as shown in diagram.

左右撥動尾舵搖桿，確認尾舵伺服器移動的方向是否正確，若不正确請更改遙控器上的尾舵伺服器正逆轉方向。

將3G Flybarless切換成非鎖定模式或持按"SET"鍵2秒，使尾舵伺服器保持在中立點的位置上，調整伺服舵片，盡可能使尾舵連桿與伺服擺臂呈90度，接著調整連桿長度使尾Pitch控制組置中。



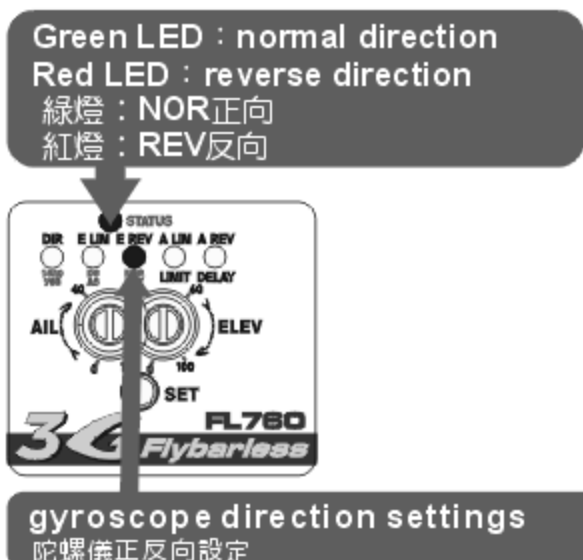
4. Gyro NOR/REV setting

NOR/REV陀螺儀正反向開關設定

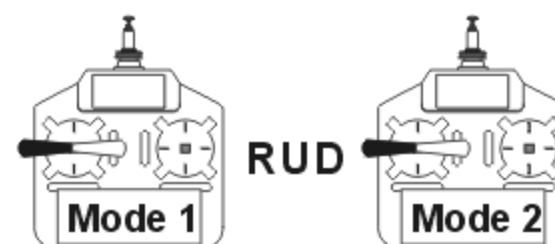
Lift up the helicopter by hand, and turn it to the left (yaw). Check if the rudder servo is applying correct compensation to the right. If reversed, set the NOR/REV setting as follow.

Setup method : Press and hold the SET button for 2 seconds to enter the setup mode, then press the SET button to select NOR/REV setup mode, as indicated by the lighting of NOR/REV LED. Using the transmitter's rudder stick, select either NOR (STATUS LED is green), or REV (STATUS LED is red).

提起直昇機，將機頭往左擺動，若尾舵伺服器的擺動方向與遙控器的方向舵搖桿打右舵同方向時，表示陀螺儀的動作方向設定正確，若不正确時請更改正反向設定。
設定方式：持按"SET"鍵2秒進入功能設定模式，選擇NOR /REV選項，以方向舵選擇NOR (STATUS為綠燈)或REV (STATUS為紅燈)。



Select by moving the rudder stick left and right
左右撥動方向舵選擇

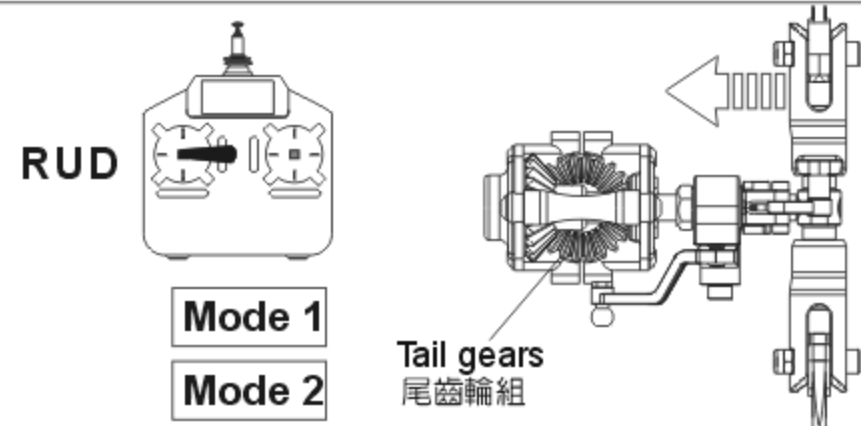
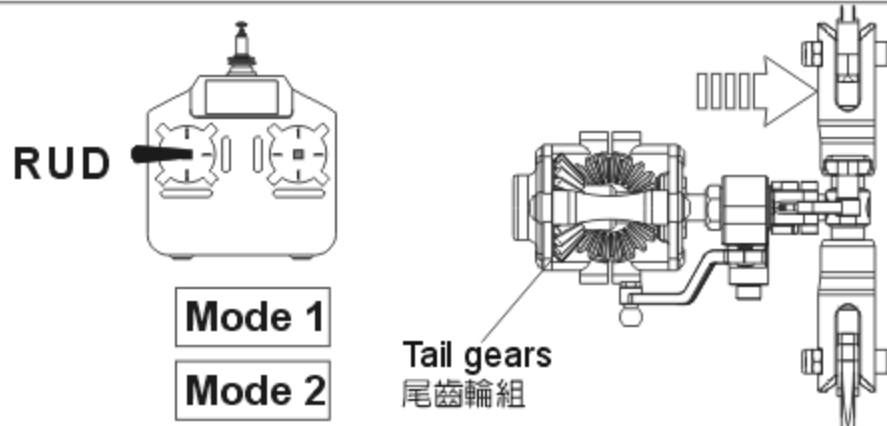


5. LIMIT rudder servo endpoint setting

LIMIT尾舵伺服器行程量調整

Press and hold the SET button for 2 seconds to enter the setup mode, then press the SET button repeatedly to select LIMIT setup mode, as indicated by the lighting of LIMIT LED. Push the transmitter rudder stick left until tail pitch slider reaches the end, then center the rudder stick and wait 2 seconds for the STATUS LED to flash red. Then push the rudder stick right until tail pitch slider reaches the end, then center the rudder stick and wait 2 seconds for the STATUS LED to flash red. This completes the left and right endpoint limit adjustment of servo travel. Insufficient servo travel will degrade helicopter performance, while excessive travel will cause binding and damage rudder servo.

持按"SET"鍵2秒進入功能設定模式，此時尾伺服器會保持在中立點的位置上，選擇LIMIT選項，接著將方向舵搖桿慢慢的往左移動，使尾控制組達到該側的大行程限度後，將搖桿回歸中立點不動，待2秒後"STATUS"指示燈會亮紅燈閃爍，表示左側行程量已記憶；接著將尾舵搖桿向右移動至控制組最大行程限度後，再將搖桿回歸中立點不動，待2秒後"STATUS"指示燈亮紅燈閃爍，即完成左右行程量設定，行程量不足時會影響陀螺儀與直昇機的性能，行程量過大易造成伺服器損壞。



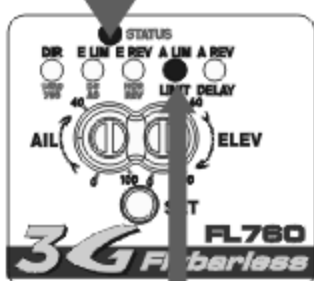
Push the transmitter rudder stick left until tail pitch slider reaches the end, then center the rudder stick and wait 2 seconds for the STATUS LED to flash red. This completes the rudder endpoint limit adjustment for the left side.

將方向舵慢慢往左撥動，使控制組達到左舵最大行程限度後，將搖桿回歸中立點不動，待2秒後"STATUS"紅燈閃爍表示左舵行程記憶量完成。

Push the rudder stick right until tail pitch slider reaches the end, then center the rudder stick and wait 2 seconds for the STATUS LED to flash red. This completes the rudder endpoint limit adjustment for the right side.

將方向舵慢慢往右撥動，使控制組達到右舵最大行程限度後，將搖桿回歸中立點不動，待2秒後"STATUS"指示燈表示右舵行程記憶量完成。

Flashing red LED indicates settings have been registered
紅燈閃爍時表示記憶完成



Endpoint limit settings
行程量設定



Rudder travel limit setting lower than 50% will not be registered. Mechanical fix (moving link ball closer to center of servo horn) is needed for excessive servo travel when LIMIT function is below 50%.

尾舵行程量設定不可低於50%，否則3G Flybarless將不予記憶，若發生行程量設定後，尾控制組仍會超過最大行程，請將尾伺服器臂的球頭向內移動，避免行程不足影響陀螺儀性能。

6. Helicopter size and DELAY settings

直昇機模式與DELAY控制延遲量調整

This setting includes two functions:

(1) For small helicopters such as T-Rex 250/450, set this setting to small helicopter (STATUS LED red). For larger helicopters such as T-Rex 500/600/700 set this setting to large helicopter (STATUS LED green).

此設定結合兩項功能：

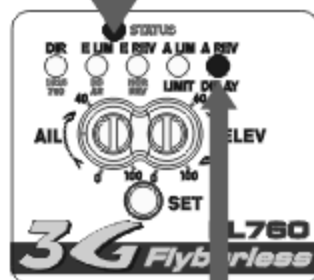
(1) 3G Flybarless支援小型/迷你型室內電直，請依您直昇機的類型選擇適合的模式，如：T-REX250/450請選擇小型/迷你型模式（設定時"STATUS"指示燈為紅色）；T-REX500/600/700請選中大型直昇機模式（設定時"STATUS"指示燈為綠色）。

Green LED: suitable for larger helicopters such as T-REX500/600/700

Red LED: suitable for smaller helicopter such as T-REX 250/450

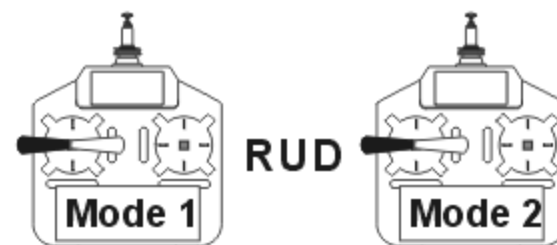
綠燈：適用T-REX500/600/700大型直昇機

紅燈：適用T-REX250/450小型直昇機



Helicopter size selection and servo delay settings
大小直昇機模式與延遲量設定

Select by moving the rudder stick left and right
左右撥動方向舵選擇



(2) The DELAY function is utilized when slower rudder servo causes tail hunting (wagging). This can be observed after a hovering pirouette comes to a stop. If tail hunting occurs, gradually increase DELAY value to eliminate it. For best performance, DELAY value should be kept as low as possible without tail hunting.

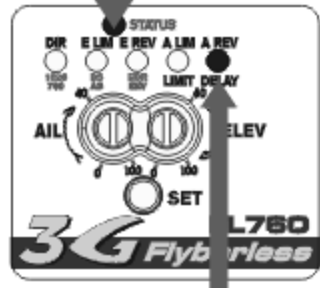
Setup method: Press and hold the SET button for 2 seconds to enter the setup mode, then press the SET button to select DELAY setup mode, as indicated by the lighting of DELAY LED. The choice of small or large helicopter is done by moving the transmitter rudder stick left or right while observing the color of the STATUS LED. For small helicopters STATUS LED will be red, and large helicopter will be green. The amount of servo delay is set by how far you push the rudder stick, followed by pushing the SET button.

(2) 使用速度較慢的尾舵伺服器較容易產生追蹤現象，當直昇機停懸時，打方向舵使直昇機快速自轉，當方向舵回到中立點使直昇機停止自轉時，此時若發生追蹤現象，請增加控制延遲的設定量，一般而言在不產生追蹤現象的原則下控制延遲的設定量愈小愈好，否則尾舵的動作會變得遲緩。

設定方式：持按"SET"鍵2秒進入功能設定模式，選擇至DELAY選項，以方向舵搖桿選擇小型/迷你型電直，

如：T-REX 250/450 (STATUS為紅燈)，或中大型直昇機如T-REX500/600/700 (STATUS為綠燈)，若要同時設定DELAY控制量時，則利用方向舵搖桿的位置來設定，搖桿由中立點推至"DELAY"燈開始閃爍時為0%，推至最大行程時控制量為100%，將搖桿推至所需的延遲量時保持不動，並按下"SET"鍵確認，即可同時設定直昇機模式與延遲量。

Green LED for T-REX700
T-REX700設定為綠燈

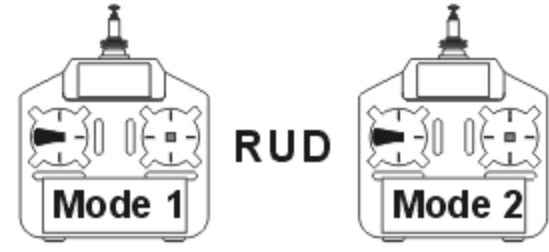


0% when DELAY LED begins flashing
DELAY燈開始閃爍時為0%

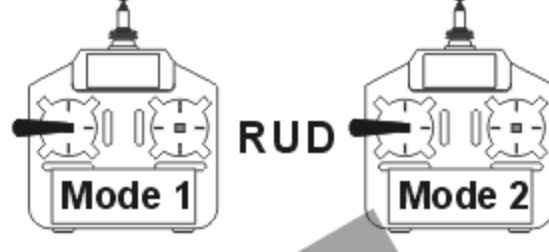
Green LED for T-REX700
T-REX700設定為綠燈



Gradually move the transmitter rudder stick until DELAY LED begins to flash, the delay value is 0% at this point.
輕推方向舵搖桿至"DELAY"燈開始閃爍時，延遲量為0%



Continue to move the rudder stick until desired delay value is needed, then press the SET button to register the setting. Maximum is 100% delay, with rudder stick pushed to the end.
方向舵推至最大行程時，延遲量為100%，將搖桿推至所需的延遲量，按下"SET"鍵確認



7. Sensitivity Adjustment 感度調整

For radio with built in gyro gain settings, gain can be adjusted directly. For example, 50%-100% setting on the radio translates to 0% - 100% gain in the heading lock mode; 50%-0% setting on the radio translates to 0%-100% gain in the normal (non-heading) lock mode.

Actual gain value differs amongstst servos and helicopters. The goal is to find the maximum gain without tail hunting. This can only be done through actual flight tests.

The recommended starting point for transmitter's gyro gain setting should be 70~80% for hovering, 60~70% for idle-up. Value should be tuned under actual flight conditions by increasing to the maximum gain without tail hunting.

一般具有陀螺儀感度設定功能的遙控器，可直接進入GYRO功能選項進行感度值的設定，設定值50%則陀螺儀的感度為0，設定值50%~100%，則陀螺儀感度值為鎖定狀態的0~100%；設定值50%~0%，則陀螺儀感度值為非鎖定狀態的0~100%。

感度值的大小會隨著伺服器與直昇機的不同而有所差異，一般而言，在不產生追蹤現象（直昇機尾部出現左右搖擺的情況）的前提下感度值愈高愈好，所以只能透過實際飛行的狀況來進行調整。

進入遙控器感度設定的選項，剛開始停懸時建議先設定在70~80%左右，Idle up飛行時設定在60~70%左右，之後再依實際飛行的狀態再行修正，如果沒有追蹤現象發生時可再調整高感度，若發生追蹤現象時，則調低感度。



For radios (IE Futaba) using 0-100% as heading lock gain scales, the recommended gain setting is 30% to 35%. For radio that uses the 50 -100% scale(such as JR and Hitec), the recommended gain setting is 70% to 75%.

鎖定感度值為0~100%的遙控器，如Futaba，建議設定在30~35%左右；鎖定感度值為50~100%的遙控器，如JR、HITEC、建議感度值設定在70~75%左右。

Specifications 產品規格

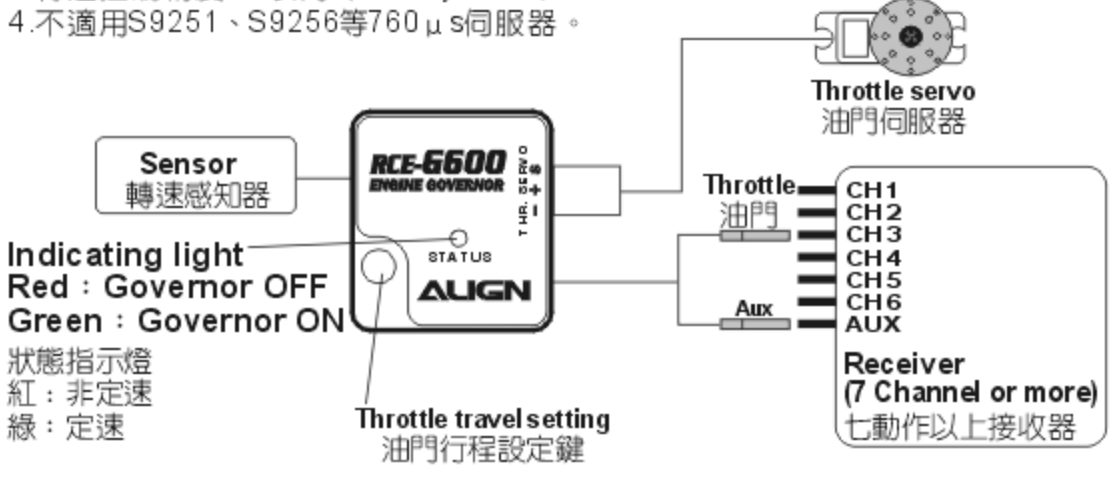
- | | | | |
|---|-----------------------------------|---------------------------|--------------------------|
| 1. Operating voltage range : DC 3~8.4V | 7. Operating humidity : 0%~95% | 1. 適用電壓 : DC 3~8.4V | 7. 操作濕度 : 0%~95%. |
| 2. Operating current consumption : <80mA @ 4.8V | 8. Dimension/Weight : | 2. 消耗電流 : <80mA @ 4.8V | 8. 尺寸/重量 |
| 3. Rotational detection rate : ±300°/sec | Control unit : 42x26.5x14.5mm/16g | 3. 偵測側滾及前滾角速度 : ±300°/sec | 控制器 : 42x26.5x14.5mm/16g |
| 4. Rudder yaw detection rate : ±500°/sec | Sensor : 22.3x21.7x14mm/9g | 4. 偵測尾舵角速度 : ±500°/sec | 感應器 : 22.3x21.7x14mm/9g |
| 5. Sensor resolution : 12bit | ●RoHS certification stamp | 5. 感應器解析度 : 12bit(12位元) | ●符合RoHS 限用規章 |
| 6. Operating temperature : -20°C~65°C | | 6. 操作溫度 : -20°C~65°C | |

15. GOVERNOR INSTRUCTION MANUAL 定速器安裝使用說明 **ALIGN**

Features 功能說明

1. Compact design, easy use, simple setting with great speed control performance.
2. Speed resolution: 0.1 RPM.
3. Speed stability accuracy : within 1% (Steady State).
4. Not apply to S9251、S9256 and other 760 μs servos.

1. 造型精巧操作簡易，不需繁雜的設定，同樣有優異的定速表現。
2. 轉速解析度0.1 RPM。
3. 轉速控制精度1%以內 (steady state)。
4. 不適用S9251、S9256等760 μs伺服器。



Indicating light
Red : Governor OFF
Green : Governor ON
狀態指示燈
紅：非定速
綠：定速

Specifications 產品規格/配件

1. Operating voltage : DC 4.5V-6V
2. Consumption current : <20mA @ 4.8V
3. Direct detection of engine rotation speed
4. Speed control range : 10500~21000RPM
5. Servo RWM output pulse width : 1~2ms, not apply to S9251, S9256, other 760 μs servos.
6. Operating temperature range : -20°C~85°C
7. Operating moisture range : 0%~95%
8. Case size (body) : 28.5x26.2x9mm
9. Signal wire length : 160mm
10. Sensor wire length : 250mm
11. Weight : 10g (including wires)
12. Accessories : Magnet x 2pcs
Screw (T2.6x6) x 2pcs
Governor mount x 1pc

1. 工作電壓 : DC 4.5V-6V。
2. 消耗電流 : <20mA @ 4.8V。
3. 直接偵測引擎轉速。
4. 定速範圍 : 10500~21000RPM。
5. 伺服器PWM輸出脈寬1~2ms，不適用 S9251、S9256等760 μs伺服器。
6. 工作溫度範圍 : -20°C~85°C。
7. 工作濕度範圍 : 0%~95%。
8. 本體外殼尺寸 : 28.5x26.2x9mm。
9. 訊號線長 : 160mm。
10. 轉速感應線長 : 250mm。
11. 重量 : 10g (含線組)。
12. 配件 : 轉速感應磁鐵x2pcs。
半圓頭內六角螺絲(T2.6x6)x2pcs。
定速器固定座x1pc。

Instruction 安裝使用說明

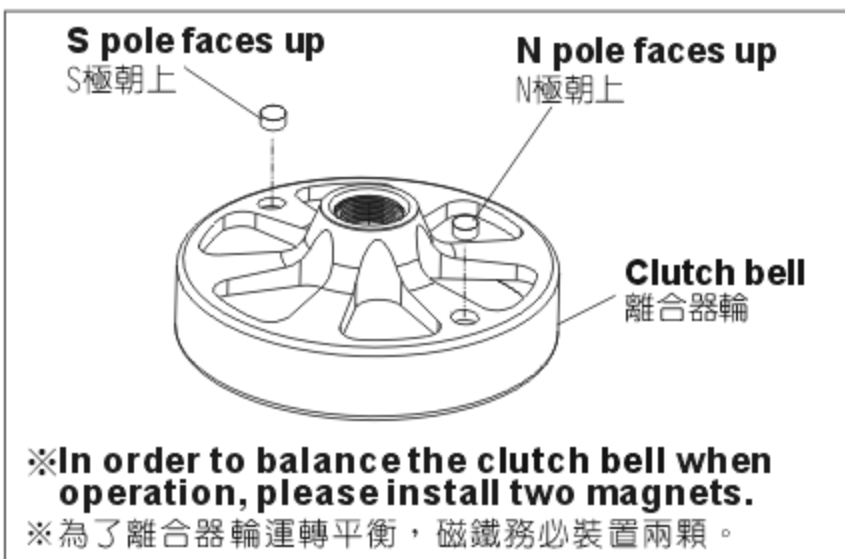


Fig.1
圖一

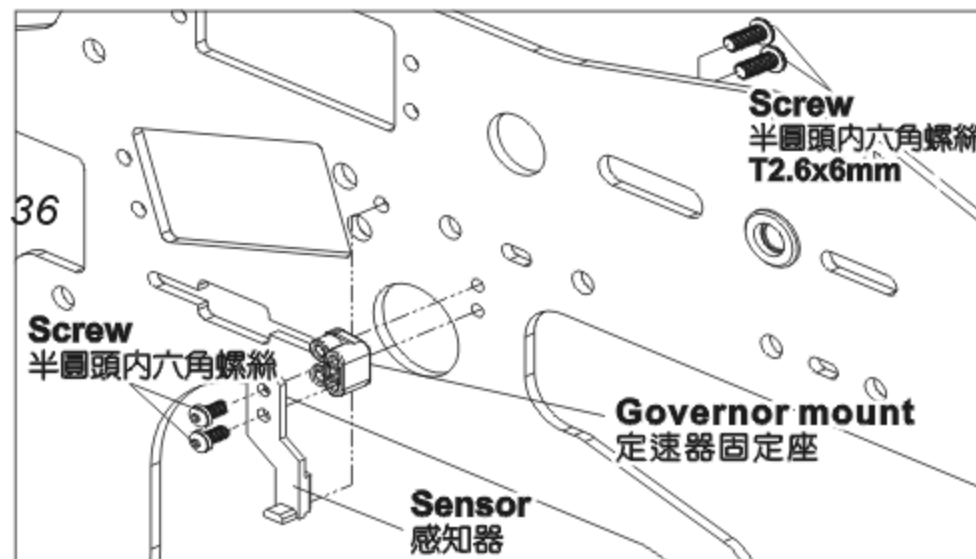


Fig.2
圖二

- See Fig. 1, first install two magnets on the mounting hole of the Clutch bell with CA glue or R48 glue, the north pole of one magnet (mark N) faces up and the north pole of the other magnet faces down.
NOTE: Magnets must be firmly secured. If the magnet falls from the engine fan during the flight, the governor will automatically cut out the speed control function.
- See Fig. 2, install the sensor on the main frame, and check if any interference caused by the clutch bell.
- Before connecting to the governor, first please check the rotation direction (clockwise/anti-clockwise) of throttle servo and travel range are correct.
- Choose an un-used switch for governor ON/OFF switch. Connect the yellow sign wire of the governor to the receiver's channel. Then connect the governor to the power and make sure that turning on the switch is for Governor ON and off is for Governor OFF. (Green LED light is governor ON mode, and Red LED light is governor OFF mode).
- When connecting the governor to the power, LED light is on. When the magnet is lapped over the sensor, the LED light will be off. (If the LED isn't off, please check the polarity of the magnet and check if the wire is well connected and check for the distance between the sensor and the magnet.)
- Adjustment of throttle travel: First place the throttle stick at the lowest position, and then turn on the transmitter. After that turn on the receiver. When the LED light is on, press "Throttle Travel Setting" button on the governor for 3 seconds. While the LED light flash, please place the throttle stick at the highest position. Then the LED light will be off and later be on again, it means the setting is completed.
NOTE: Do not run the engine before completing the throttle limit setting, to avoid the throttle travel error or servo reversion.
- When normal, the throttle curve is straight (0%/50%/100%). When Idle, the throttle curve cannot be lower than 50%. When the governor fails, it will go back to the governor OFF mode. Therefore, even though you have installed the governor, the throttle curve of transmitter must be set as regular setting.
- Two conditions-Governor will be enabled:
 - Turn on the governor switch, and LED light is green.
 - Throttle position >30% and more.
- When the governor turns on, the rotation speed of the engine is controlled by the ATV (%) which is the channel chosen on the 4th step. The following chart is ATV setting and engine rotation speed for Futaba and JR transmitters. The rotation speed of mainblade is converted according to the engine ratio of original helicopter.

- 如圖一先將轉速感應磁鐵一顆 N 極朝上(作記號的面為 N 極)，一顆 N 極朝下，以 CA 或 R48 黏著在離合器輪預留的磁鐵座上。
※注意：磁鐵須固定牢靠，若飛行中磁鐵不慎脫落，定速器將自動取消定速功能。
- 如圖二標示之位置將轉速感知器安裝於側板上，並檢查是否與離合器輪產生干涉的情形。
- 連接定速器前，先確定油門伺服器正逆轉及機械行程是否正確。
- 選一個遙控器上未使用的通道開關，作為定速與非定速的切換開關，並將定速器的黃色訊號線接到接收器上對應此開關的通道，接著將定速器接上電源後撥動此開關，以確定開關是定速模式，及關閉是非定速模式（於定速模式時定速器上的 LED 為綠燈，非定速模式 LED 為紅燈）。
- 定速器接上電源後，LED 恆亮，當磁鐵與感知器重合時，LED 會熄滅。（如 LED 未熄滅，需檢查磁鐵極性是否正確？線路連接是否正確？感知器及磁鐵距離是否正確？）。
- 油門行程的校正：先將油門置於最低點的位置，將發射機電源打開，開啓接收機電源，當 LED 亮起後按定速器上的設定鍵三秒後，此時 LED 會閃爍，接著將油門撥桿推到最高點位置，稍等 LED 會先熄滅後重新亮起，即完成設定作業。
※注意：未執行定速器油門行程設定前切勿發動引擎，以免油門行程錯誤或發生伺服器反向之情形。
- 油門曲線在 normal 時為直線（0%/50%/100%），idle 油門曲線最低點不可低於 50%，即使有安裝定速器，遙控器的油門曲線仍要依照正常的模式來設定，因為當定速器失效時會返回非定速模式。
- 定速器的啓動條件有二項：(1)定速器開關開啓，LED 亮綠燈。(2)油門位置 >30% 以上。
- 當啓動定速功能時，引擎的轉速即交由第 4 步驟所選定通道的行程量(ATV)百分比(%)來進行控制，下表為 Futaba 與 JR 遙控器 ATV 設定值與引擎轉速的對照表，主旋翼的轉速請依原廠直昇機的引擎齒比換算。

ATV	FUTABA PCM 1024Z		FUTABA T14MZ/T12FG/T12Z		JR PCM10S/9X/9X II	
	Engine speed 引擎轉速	T-REX 700N Main blade speed 8.2:1 主旋翼轉速 8.2:1	Engine speed 引擎轉速	T-REX 700N Main blade speed 8.2:1 主旋翼轉速 8.2:1	Engine speed 引擎轉速	T-REX 700N Main blade speed 8.2:1 主旋翼轉速 8.2:1
10%	10500	1280	10500	1280	10500	1280
20%	10500	1280	10500	1280	10500	1280
30%	12000	1463	10800	1317	10500	1280
40%	13700	1670	12000	1463	11200	1366
50%	15400	1878	13300	1622	12400	1512
60%	17070	2082	14550	1774	13600	1658
70%	18760	2288	15800	1927	14850	1811
80%	20410	2489	17100	2085	16000	1951
90%	21000	2560	18340	2237	17200	2098
100%	21000	2560	19700	2402	18450	2250
110%	21000	2560	20860	2544	19640	2395
120%	21000	2560	21000	2560	20760	2532
130%	21000	2560	21000	2560	21000	2560
140%	21000	2560	21000	2560	21000	2560
150%	21000	2560	21000	2560	21000	2560

- NOTE: 1. If the LED light is off, please check if the magnet is lapped over the sensor. Please turn the magnet position of clutch bell to let the LED light on.**
2. The safty RPM is up to 16000rpm for OS91 engine.

註：1. 如開機時定速器燈沒亮，有可能是磁鐵跟感知器重合，請轉動離合器輪磁鐵位置，讓指示燈亮起。
 2. OS91 引擎安全轉速上限 16000rpm。

Features 功能說明

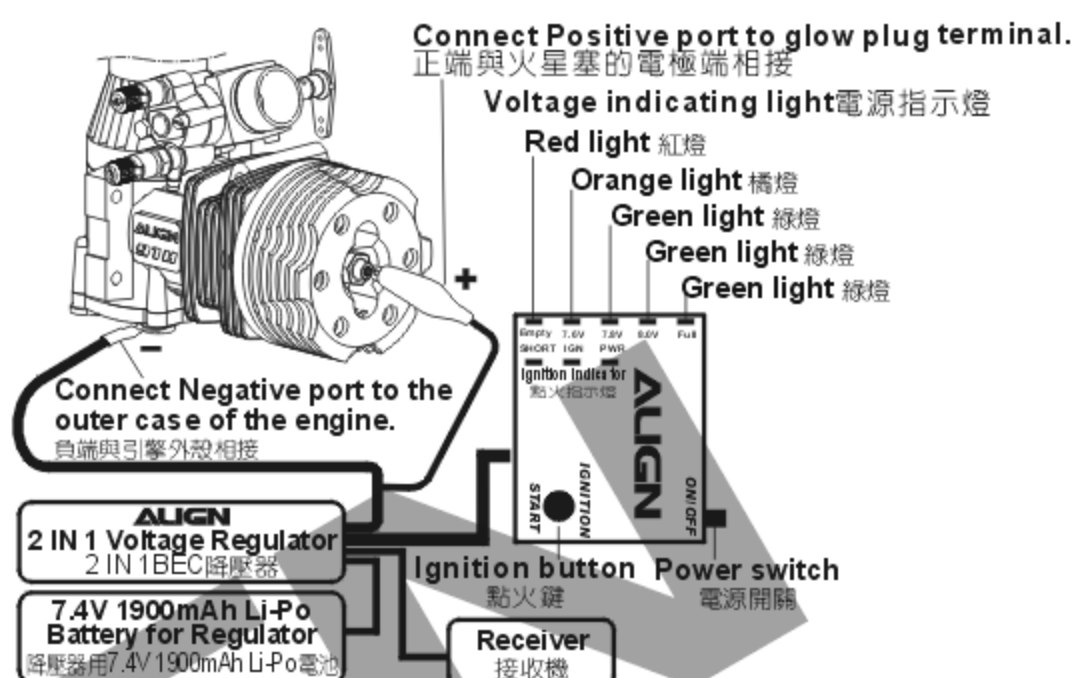
1. Due to the unique 2 in 1 design, the regulator's functions provide power to the receiver, servos, and the internal glow plug ignition system that does not require you to remove the clip lead.
2. The linear regulator design results in no interference to the receiver. The required input power may only consist of a 2 cell Li-ion or a Li-Poly battery.
3. When the integrated power switch is moved to the on position, the voltage indicating LED's and ignition indicating LED's will illuminate displaying the status of the battery voltage, and of the plug ignition function.

1. 獨特的二合一設計，除了具備(BEC)降/穩壓系統，以提供接收器與伺服器電源的功能外，還內建一組火星塞的點火裝置，省去傳統電夾插拔的麻煩。
2. 本產品採用線性設計，輸入電源為2CELL的Li-ion或Li-Poly電池，其優點為不會像交換式設計的BEC會產生干擾接收器的情形，免於摔機的恐懼。
3. 具備電源開關、電壓指示燈及點火指示燈功能，可由燈號判定電池殘量與火星塞的點火狀態。

Specifications 產品規格/配件

1. Input Voltage : DC 7.4V 2 cell Lithium or Li-Poly battery
2. Output Voltage : DC 5.8V(BEC)/ 1.5V(Glow Plug)
3. Max. Continuous Current : 6A
4. Weight : 53.5g (including wires)
5. Regulator size : 80x30x13.3mm
Control board size : 35x24x10mm

1. 輸入電壓：DC 7.4V 2CELL 鋰電
2. 輸出電壓：DC 5.8V(BEC)/ 1.5V(Glow Plug)
3. 最大連續輸出電流：6安培
4. 重量：53.5g (含線組)
5. 尺寸：降壓器80x30x13.3mm
控制板35x24x10mm

**Instruction 安裝使用說明****Receiver and Servo Voltage Regulating Functions :**

1. The Auto-detecting voltage LED's will display a series of lights when turned on. If the entire five-light array is illuminated then the battery is fully charged. When the voltage drops below 7.6V the three green lights will turn off.
USE CAUTION : Once the green lights are no longer illuminated the battery can only be safely used for a single flight. When only the single red LED is lit, **DO NOT ATTEMPT TO OPERATE THE MODEL.** The battery voltage has been drained too low, and must be recharged before its next use.
2. It is important to note that not all servos are designed to operate on 6 volts, such as Futaba servo models 9241, 9251, 9253, 9254, 9255, 9256 and other digital servo are not capable of handling 6V. Please check with the manufacturing specifications of the servo before attempting to operate. A separate 5.1V inline voltage Step-Down may be purchased and is recommended for use between the gyro and the tail servo, and any servos that are not designed to handle 6V. Please note that some servos are designed for running on 6V and may not require a voltage step-down.

接收器與伺服器電源部份：

1. 本產品具電壓指示功能，當接入充飽的電池時五顆指示燈全亮，表示電池在Full電量充足狀態下；使用中當電壓降低至7.6V時(3顆綠燈熄滅)，尚可完成單趟飛行即須對電池充電或更換新電池；而如果僅亮紅燈時表示Empty電量不足，不應該再使用囉！
2. 部份的伺服器如：Futaba 9241, 9251, 9253, 9254, 9255, 9256等，此類型的伺服器不適合於較高的電壓下操作，所以使用此類型的伺服器時請另外加裝5.1V降壓調整器於陀螺儀與尾舵伺服器間，避免伺服器損壞；規格標示准許6V輸入的伺服器則不須使用調整器。

Glow Plug Ignition System Functions :

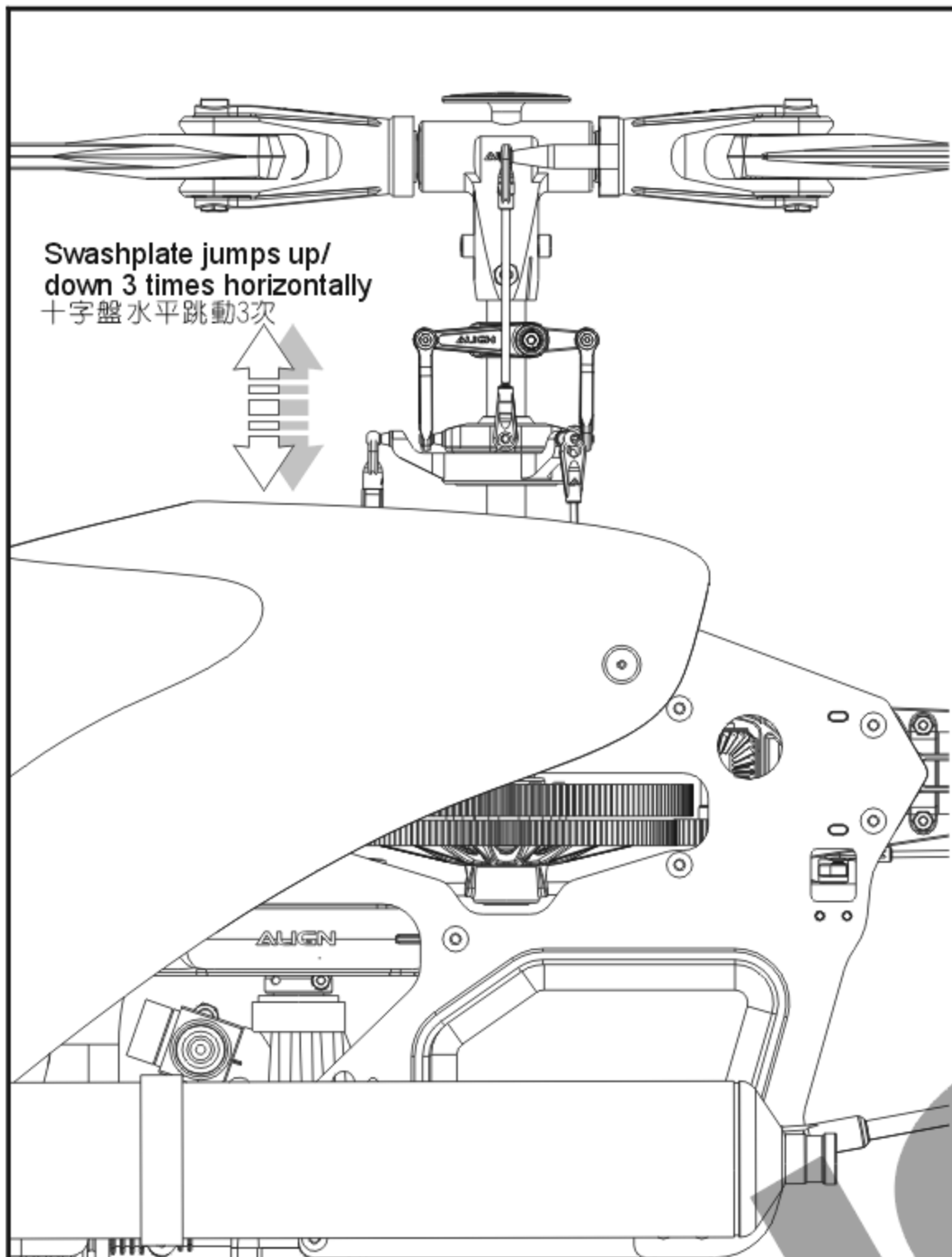
1. Start by connecting the wires using the included diagram as a reference. Once completed connect the battery and move the power switch to the on position. Depress the "START" button on the control board. The green and the orange lights will illuminate. When this happens the glow plug is being ignited for a period of 15 seconds. After 15 seconds, the control board will stop igniting the glow plug. If the engine has not yet been started, the process can be repeated by simply repressing the "START" button. The Ignition system is designed to automatically shut off once the engine starts running. To ensure that the system is operating properly, check to make sure that the orange and green lights have shut off once the engine starts running. In the event that the lights are still illuminated once the engine is running, it may be necessary to remove the lead clip from the engine.
2. If the orange light is not illuminated after pressing "START" then this means that the glow plug is not being ignited. Please check to see if the element of the glow plug has burned out, or if the lead clip is not properly connected to the glow plug.
3. If the Glow plug is short-circuited or the lead clip has contacted the outer case of the engine, the red (SHORT) light will be illuminated approx. 1 second after pressing the "START" button. If the "SHORT" light illuminates the system will automatically shut off the power to the output leads.

火星塞點火器部分：

1. 依接線示意圖完成接線後，開啓電源開關，接著按下控制電路板上的"START"鍵，此時點火指示燈的綠燈與橘燈同時亮起，表示火星塞已正常點火中，每次點火時間約為15秒，15秒後自動關閉，如需再次點火時，則再按一次"START"鍵；由於點火裝置會自動關閉，所以引擎啟動後，確認橘色、綠色指示燈於15秒後熄滅，即不須將鱷魚夾移除。
2. 若按下"START"鍵時，橘燈不亮，表示火星塞未正常點火，請檢查火星塞加熱線圈是否開路損壞，或是鱷魚夾未確實夾在火星塞電極端上。
3. 如果火星塞發生短路或是鱷魚夾(電源正端)與引擎外殼接觸時，當按下"START"鍵，紅色(SHORT)指示燈會亮起，約1秒後熄滅並隨即關閉電源輸出，請檢查火星塞是否損壞或檢查鱷魚夾是否接觸到引擎外殼。

NOTE : Please use double-sided foam tape or hook & loop tap to fix the regulator on the helicopter. Please do not tighten the wires of regulator hard to avoid the wires loose or broken caused by the vibration during the operation of the helicopter.

注意：請使用泡綿雙面膠或魔術沾將降壓器與直昇機固定，降壓器的各線組請勿繃緊固定，以免直昇機運轉時因震動造成接頭鬆脫或斷線。



Step1 步驟1

Turn on Transmitter, and then receiver power.
先開啓遙控器電源，再開啓接收器電源。

Step2 步驟2

3G Flybarless system will go through initialization process, as indicated by flashing of all LED's. Do not move the helicopter or transmitter sticks until initialization process completes.

此時3G Flybarless控制器指示燈STATUS及DIR~A.REV會閃動，請勿移動直昇機與撥動搖桿，以利陀螺儀感應器進入初始化程序。

Step3 步驟3

The completion of initialization process is indicated by the rapid up and down motion of swashplate 3 times while remaining level. Should the swashplate jumps up and down at a tilted position, the flybarless system initial setup need to be performed again. (Refer to page 27 Flybarless system initial setup)

The pitch of helicopter will remain locked until successful initialization. If the initialization process is unable to complete, with STATUS LED blinking red, Re-check all connections, and perform another reboot with helicopter remain stationary.

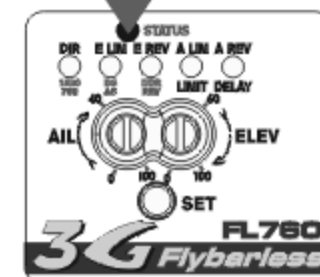
Following successful initialization process, green STATUS LED indicates rudder is in heading lock mode, while red LED indicates normal non-heading mode. (Refer to page 33 Gain Adjustment)

如左圖示，初始化完成後，十字盤會保持水平上下小幅跳動三次，表示完成開機程序；如十字盤為傾斜跳動三次，則表示設定錯誤，須進入無平衡翼系統重新設定。（參考第27頁 無平衡翼系統設定）

完成開機前直昇機螺距被固定無法動作，如果一直無法完成開機程序STATUS紅燈閃爍，請檢查開機時直昇機是否靜止或感應器訊號線未接妥，確認後重新開機。正常開機後，STATUS亮綠燈表示尾舵為鎖定模式，亮紅燈為非鎖定模式。（請參考第33頁 感度調整）

Green = rudder in heading lock mode
Red = rudder in normal mode

綠燈為尾舵鎖定模式
紅燈為尾舵非鎖定模式



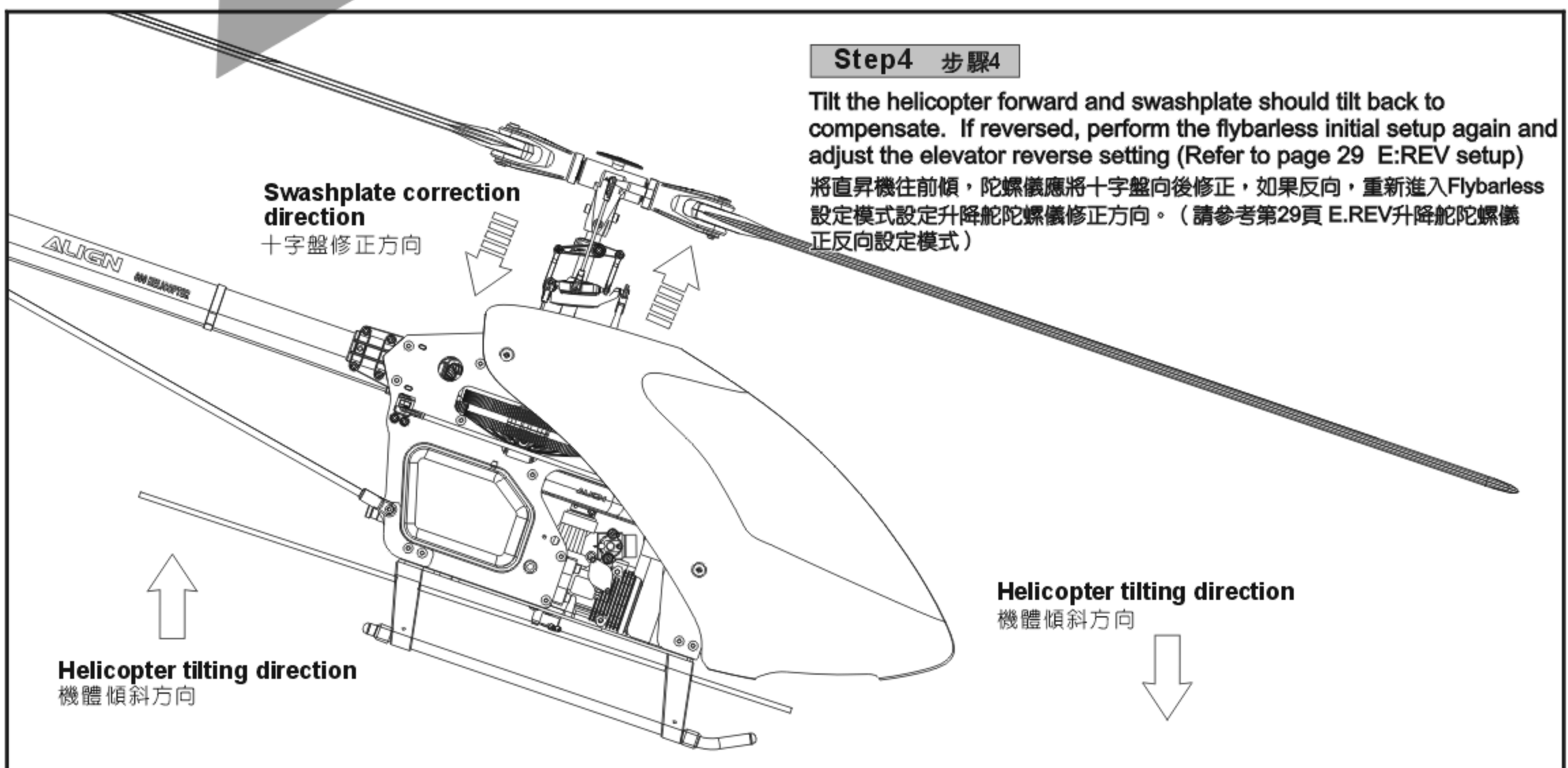
○ Swashplate jumps up and down 3 times horizontally represents successful initialization.
十字盤水平跳動三次代表正常開機

✗ Swashplate jumps up and down 3 times tilted represents setup error.
十字盤傾斜跳動三次代表設定錯誤

Step4 步驟4

Tilt the helicopter forward and swashplate should tilt back to compensate. If reversed, perform the flybarless initial setup again and adjust the elevator reverse setting (Refer to page 29 E:REV setup)

將直昇機往前傾，陀螺儀應將十字盤向後修正，如果反向，重新進入Flybarless設定模式設定升降舵陀螺儀修正方向。（參考第29頁 E.REV升降舵陀螺儀修正反向設定模式）



Helicopter tilting direction
機體傾斜方向

Swashplate correction direction
十字盤修正方向

Helicopter tilting direction
機體傾斜方向

Step5 步驟5
Tilt the helicopter to the right and swashplate should tilt left to compensate. If reversed, perform the flybarless initial setup again and adjust the aileron reverse setting (Refer to page30 A:REV setup) 將直昇機往右傾，陀螺儀應將十字盤向左修正，如果反向，重新進入Flybarless設定模式設定副翼陀螺儀修正方向。（如左圖所示：參考第30頁 A.REV副翼陀螺儀正反向設定模式）

Step6 步驟6
With throttle stick all the way up (and down), and cyclic stick all the way left/right and up/down, check for any binding on the swashplate. If binding occurs, perform the flybarless initial setup again and adjust the endpoint limits. 將油門搖桿推到最高及最低，並將搖桿左右及前後推到底，十字盤動作是否流暢，如果不是必須重新進入Flybarless設定模式裏設定行程。

Step7 步驟7
Check the center of gravity (CG) and adjust component placement until CG point is right on the main shaft of the helicopter. 檢視直昇機體重心是否適當請先調整直昇機體重心位置至主軸中心線下方位置。

Step8 步驟8
With all above steps checked, restart the system and begin flight test. 確定所有功能正常，重新開機，完成開機程序後啟動引擎進入飛行測試。

HELICOPTER CG CHECK PROCEDURE 直昇機機體重心檢視方式

With a full fuel tank, hold the helicopter as shown. Once the helicopter stops rotating, the helicopter's CG can be seen at where the head is pointing relative to the main shaft.

油箱加滿油後，將直昇機如圖示舉起，等待直昇機停止轉動後檢視機頭方向，正確重心應落在機身（主軸附近）位置。

Helicopter head should be level with main shaft, or slightly lower than the main shaft to ensure the center of gravity is maintained during flight.
機頭應與主軸中心線水平，或機頭略低主軸中心線，確保飛行重心。

18. FLIGHT ADJUSTMENT AND SETTING 飛行動作調整與設定

ALIGN

Please practice simulation flight before real flying 飛行前請事先熟練電腦模擬飛行

A safe and effective practice method is to use the transmitter flying on the computer through simulator software sold on the market. Do a simulation flight until you familiarize your fingers with the movements of the rudders, and keep practicing until the fingers move naturally.

1. Place the helicopter in a clear open field (Make sure the power OFF) and the tail of helicopter point to yourself.
2. Practice to operate the throttle stick (as below illustration) and repeat practicing "Throttle high/low", "Aileron left/right", "Rudder left/right", and "Elevator up/down".
3. The simulation flight practice is very important, please keep practicing until the fingers move naturally when you hear operation orders being call out.

在還沒瞭解直昇機各動作的操控方式前，嚴禁實機飛行，請先進行電腦模擬飛行的練習，一種最有效、最安全的練習方式，就是透過市面販售的模擬軟體，以遙控器在電腦上模擬飛行，熟悉各種方向的操控，並不斷的重複，直到手指可熟練的控制各個動作及方向。

1. 將直昇機放在空曠的地方(確認引擎為熄火狀態)，並將直昇機的機尾對準自己。
2. 練習操作遙控器的各搖桿(各動作的操作方式如下圖)，並反覆練習油門高/低、副翼左/右、升降舵前/後及方向舵左/右操作方式。
3. 模擬飛行的練習相當重要，請重複練習直到不需思索，手指能自然隨著喊出的指令移動控制。

Mode 1	Mode 2	Illustration 圖示
<p>Aileron 副翼</p>		
<p>Elevator 升降/前後</p>		
<p>Throttle 油門</p>		
<p>Rudder 方向</p>		

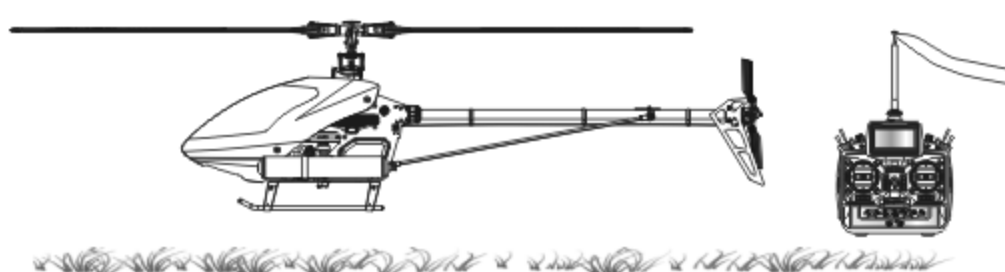
Flight adjustment and notice 飛行調整與注意



- ⊙ Check if the screws are firmly tightened.
- ⊙ Check if the transmitter and receivers are fully charged.
- ⊙ 再次確認→螺絲是否鎖固?
- ⊙ 發射器和接收器電池是否足夠。

★ When arriving at the flying field.

★ 當抵達飛行場



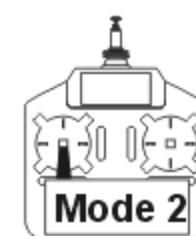
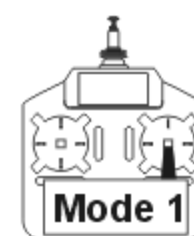
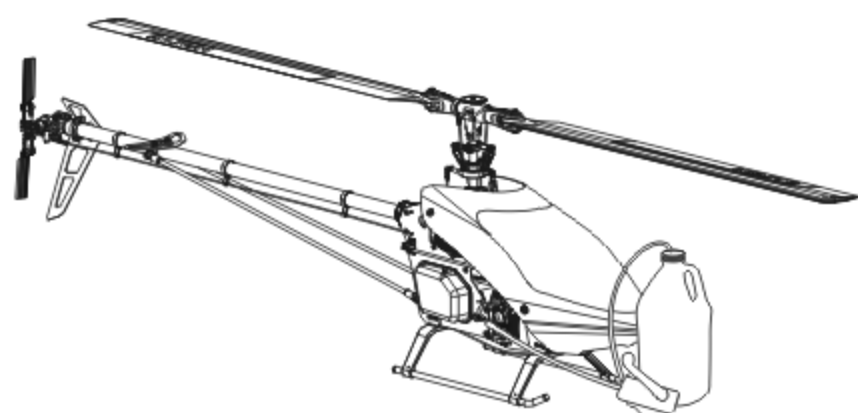
If there are other radio control aircraft at the field, make sure to check their frequencies and tell them what frequency you are using. Frequency interference can cause your model, or other models to crash and increase the risk of danger.

假使飛行場有其他遙控飛機，請確認他們的頻率，並告知他們你正在使用的頻率，相同的頻率會造成干擾導致失控和大大地增加風險。

Engine start preparation 引擎啟動事前準備

Separate the fuel tube and the joint and start to refuel. Please be careful to avoid the dust entering the tube. When the fuel tank is full, please stop refueling and reconnect the tube and the joint.

將油管與其接頭分離，並開始補給燃料。請小心避免灰塵砂粒進入管子內。當油箱已滿，請停止補給燃料並再將管子和接頭接合。



First check to make sure no one else is operating on the same frequency. Then place the throttle stick at lowest position and turn on the transmitter.

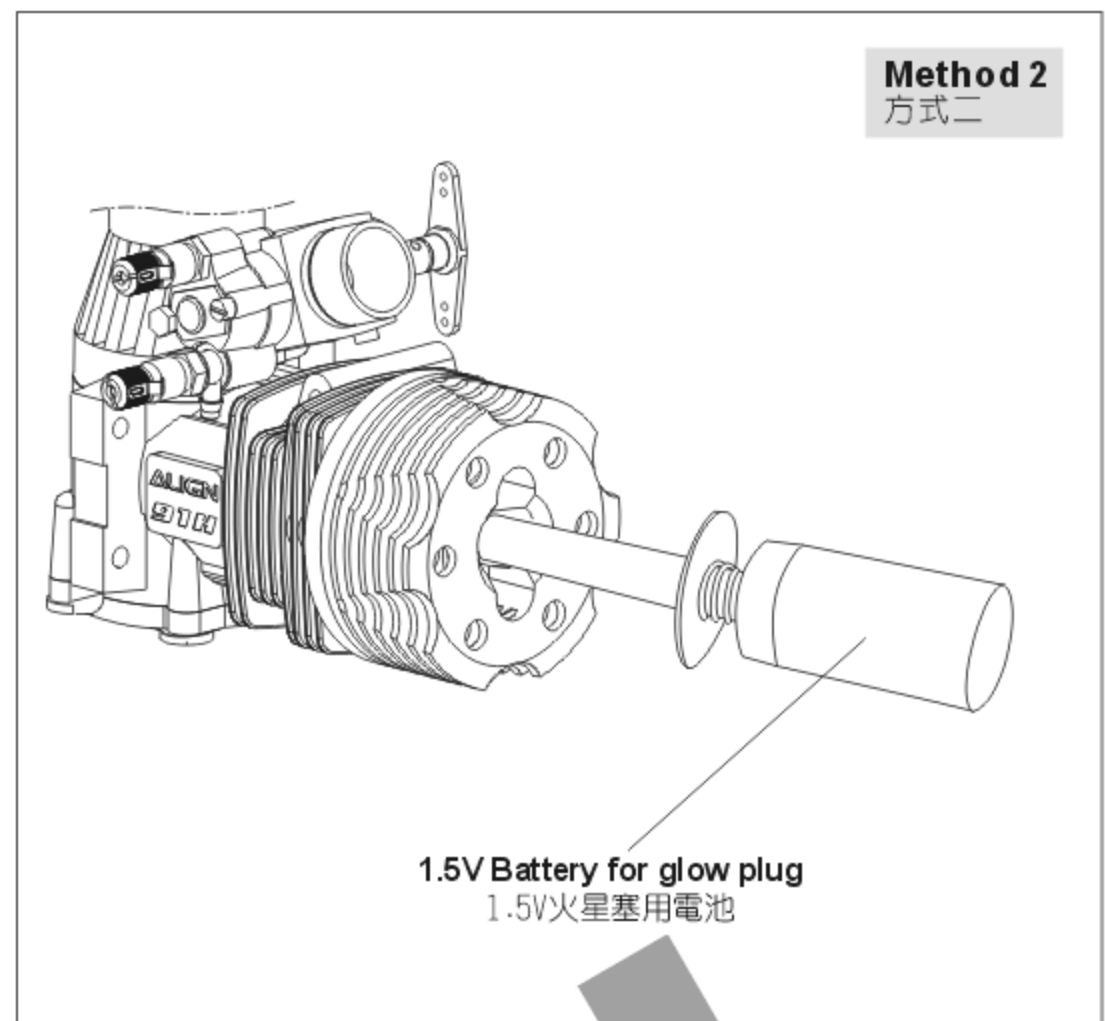
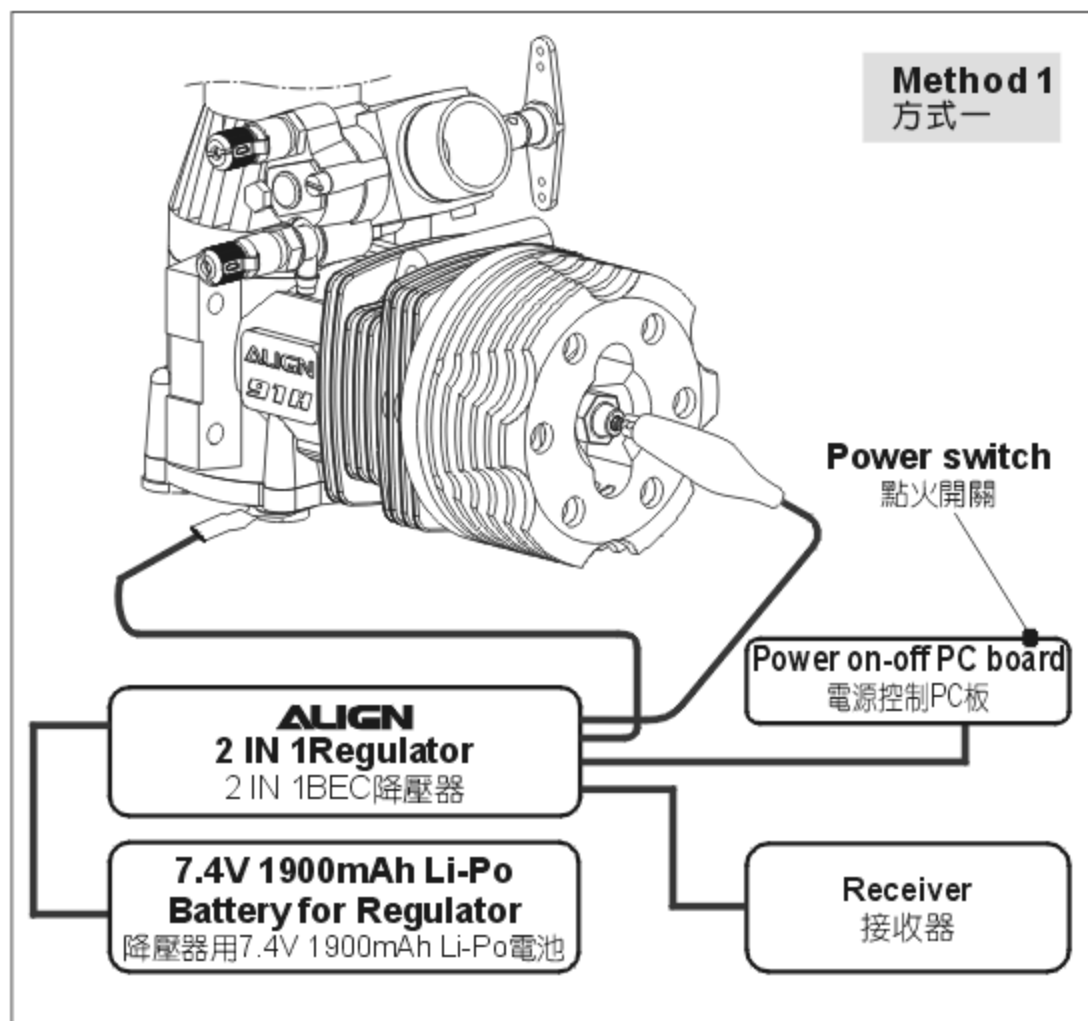
首先確認附近沒有其他相同頻率的使用，然後打開發射器將油門搖桿推到低點。



Check if the throttle stick is set at the lowest position and check if engine throttle is at low speed.

確認油門搖桿是在最低的位置，並確認引擎油門置於低速。

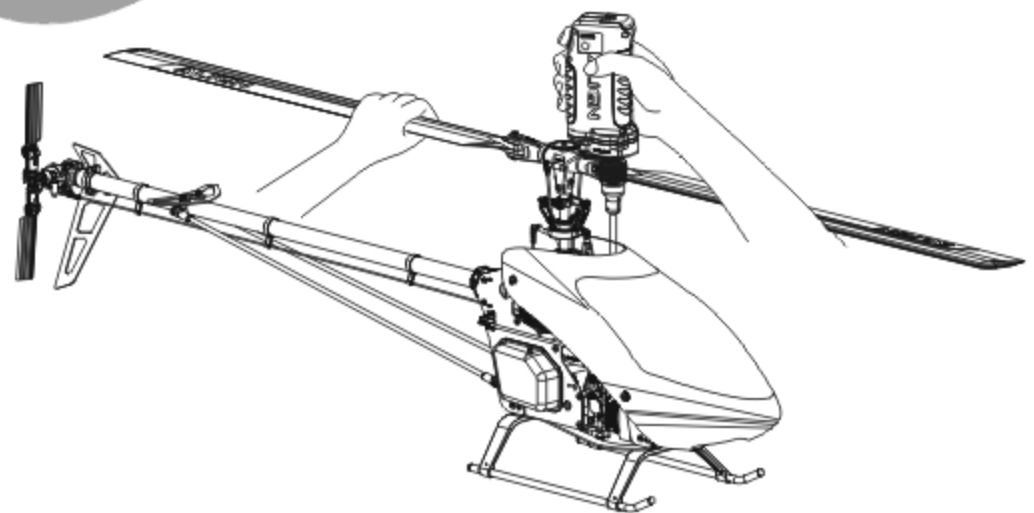
GLOW PLUG IGNITION METHOD 火星塞點火方式



ENGINE START AND STOP 引擎啟動和熄火

1. Connect the battery to the starter and check the rotation direction. Insert the starter shaft into the starter completely.
2. Tightly hold the main rotor head, and insert the starter shaft into the starter coupling. Then turn the starter to start the engine.
3. When the engine starts, stop the starter and remove it from the starter coupling. Please keep holding the main rotor head tightly.
4. Hold the main rotor head tightly, and turn off the power of glow plug or remove the power.
5. Still hold the main rotor head tightly, turn throttle trim at the lowest position, and keeping engine in lowest regular running.
6. If you want to stop the engine, please set the throttle trim (beside the throttle stick) at the lowest position. If the engine cannot stop, please put the Fuel Clip into lock position to stopping refueling.

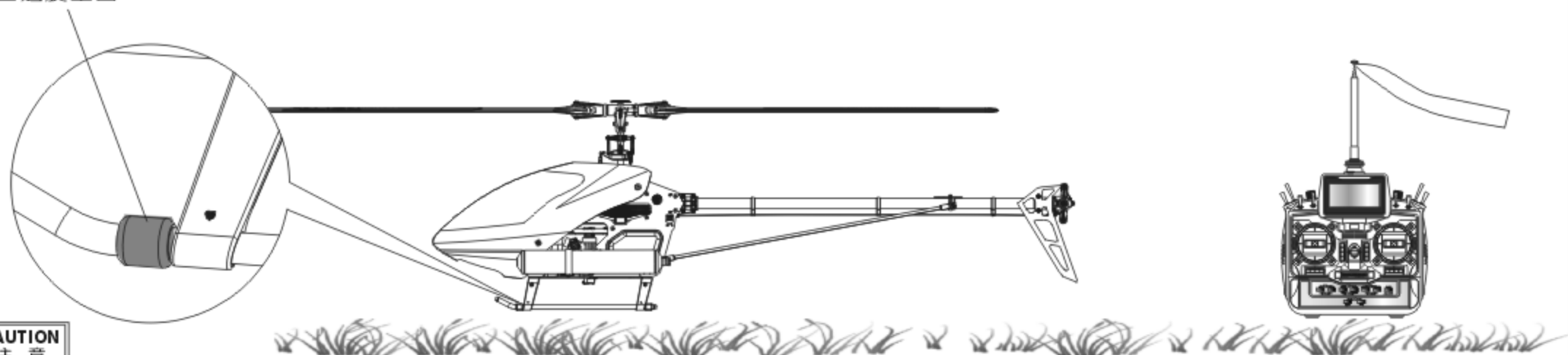
1. 將啟動電池連接到啟動器並確認其轉動方向。將啟動軸完全插入啟動器。
2. 緊緊抓住主旋翼頭部，將啟動軸插入引擎啟動頭並以啟動器啟動引擎。
3. 當引擎啟動後，停止啟動器並將啟動頭上的啟動器移開。請保持繼續緊緊抓住主旋翼頭部。
4. 仍然緊抓住主旋翼頭部，將火星塞點火電池關閉或移開。
5. 仍然緊抓住主旋翼頭部，請保持油門於最低點時，引擎能保持於低怠速下正常運轉。
6. 欲將引擎熄火時，只需將油門搖桿旁的油門微調調至最低即可；如果引擎仍無法停止，請將油管夾片推至鎖定位置，關閉油料供給。



This procedure is best performed on soft surfaces such as grass. The use of rubber skid stopper is recommended on hard surface to prevent vibration feedback from the ground to flybarless sensors, resulting in over-corrections.

將直升機置於柔軟地面上，建議硬地起飛腳架裝上避震墊圈。避免升空前腳架與過硬的地面震動太大反饋至機身上的無平衡翼感應器，影響無平衡翼系統升空前過度修正。

Rubber skid stoppers installed 裝上避震墊圈



If swashplate should tilt prior to lift off, do not try to manually trim the swashplate level. This is due to vibration feedback to the sensor, and will disappear once helicopter lifts off the ground. If manual trim is applied, helicopter will tilt immediately after liftoff.

直昇機離地前，十字盤可能因感應器受震動的反饋，使十字盤有傾斜的情形，此時請勿刻意將十字盤修正為水平狀態，此現象只要離地升空時立即解除，可平穩升空；若刻意將十字盤修正為水平時，反而會造成感應器過度修正，一離地即偏往修正方向的危險。

Main rotor adjustments 主旋翼雙槳平衡調整

1. Before adjusting, apply a red piece of tape on one blade, or paint a red stripe with a marker or paint to identify on blade.
2. Raise the throttle stick slowly and stop just before the helicopter lifts-off ground. Look at the spinning blades from the side of the helicopter.
3. Look at the path of the rotor carefully. If the two blades rotate in the same path, it does not need to adjustment. If one blade is higher or lower than the other blade, adjust the tracking immediately.

1. 調整前先在其中一支主旋翼的翼端，貼上有顏色的貼紙或畫上顏色記號，方便雙槳調整辨識。
2. 慢慢的推起油門搖桿到高點並且停止，在飛機離開地面前，從飛機側邊觀察主旋翼轉動。
3. 仔細觀察旋翼軌跡(假如兩支旋翼移動都是相同軌跡，則不需要調整;可是如果一支旋翼較高或較低產生“雙槳”的情形時，則必須立刻調整軌跡)。

- A. When rotating, the blade with higher path means the pitch too big. Please shorten pitch linkage rod (A) for regular trim.**
B. When rotating, the blade with lower path means the pitch too small. Please lengthen pitch linkage rod (A) for regular trim.

- A. 旋翼轉動時較高軌跡的主旋翼表示螺距(PITCH)過大，請調短連桿(A)修正。
B. 旋翼轉動時較低軌跡的主旋翼表示螺距(PITCH)過小，請調長連桿(A)修正。

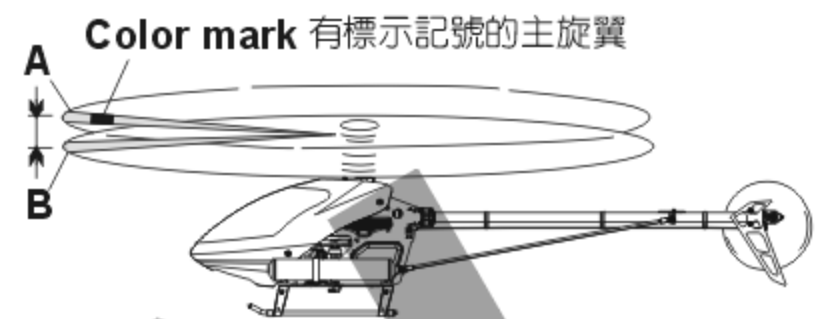


Tracking adjustment is very dangerous, so please keep away from the helicopter at a distance of at least 10m.

調整軌跡非常危險，請於距離飛機最少10公尺的距離。

Incorrect tracking may cause vibrations. Please repeat adjusting the tracking to make sure the rotor is correctly aligned. After tracking adjustment, please check the pitch angle is approx. 5° when hovering.

不正確的旋翼軌跡會導致震動，請不斷重複調整軌跡，使旋翼軌跡精準正確。在調整軌跡後，確認一下Pitch角度在停旋時應為大約5°。



FLIGHT ADJUSTMENT AND NOTICE 飛行調整與注意

- ⊙ During the operation of the helicopter, please stand approximately 10m diagonally behind the helicopter.
- ⊙ 飛行時，請站在直昇機後方10公尺。



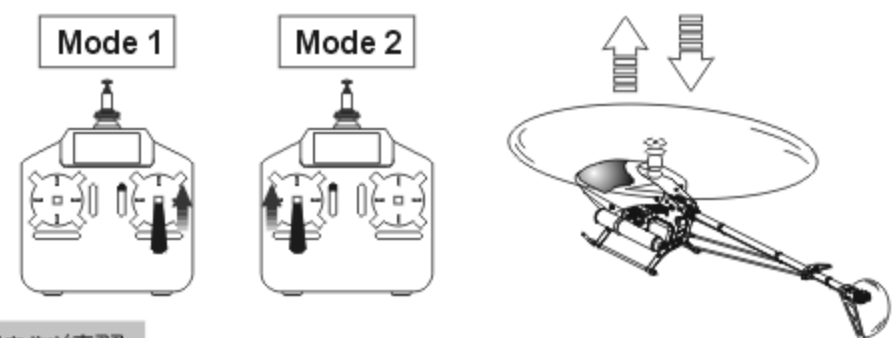
- ⊙ Make sure that no one or obstructions in the vicinity.
- ⊙ For flying safety, please carefully check if every movement and directions are correct when hovering.
- ⊙ 確認鄰近地區沒有人和障礙物。
- ⊙ 為了飛行安全，您必須先確認停懸時各項操控動作是否正常。



Do not attempt until you have some experiences with the operation of helicopter.
嚴禁無熟練操控飛行經驗者操控飛行。

STEP 1 THROTTLE CONTROL PRACTICE 油門控制練習

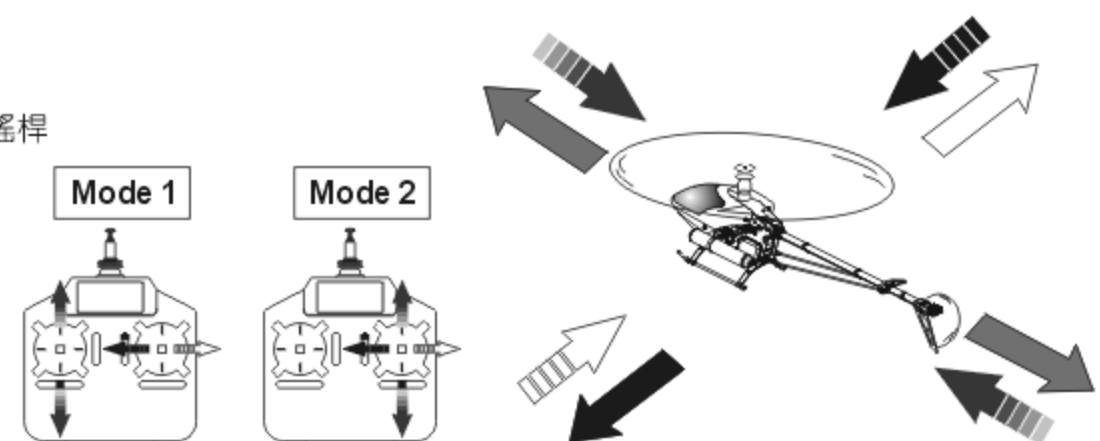
- ⊙ When the helicopter begins to lift-off the ground, slowly reduce the throttle to bring the helicopter back down. Keep practicing this action until you control the throttle smoothly.
- ⊙ 當直昇機開始離地時，慢慢降低油門將飛機降下。持續練習飛機從地面上升和下降直到你覺得油門控制很順。



STEP 2 AILERON AND ELEVATOR CONTROL PRACTICE 副翼和升降控制練習

1. Raise the throttle stick slowly.
2. Move the helicopter in any direction back, forward, left and right, slowly move the aileron and elevator sticks in the opposite direction to fly back to its original position.

1. 慢慢升起油門搖桿。
2. 使直昇機依指示：移動向後/向前/向左/向右，慢慢的反向 移動副翼和升降搖桿並將直昇機開回到原來位置。



- ⊙ If the nose of the helicopter moves, please lower the throttle stick and land the helicopter. Then move your position diagonally behind the helicopter 10m and continue practicing.
- ⊙ If the helicopter flies too far away from you, please land the helicopter and move your position behind 10m and continue practicing.
- ⊙ 當直昇機機頭偏移時，請降低油門並且降落，然後移動自己的位置到直昇機的正後方10公尺再繼續練習。
- ⊙ 假如直昇機飛離你太遠，請先降落直昇機，並到直昇機後10公尺再繼續練習。

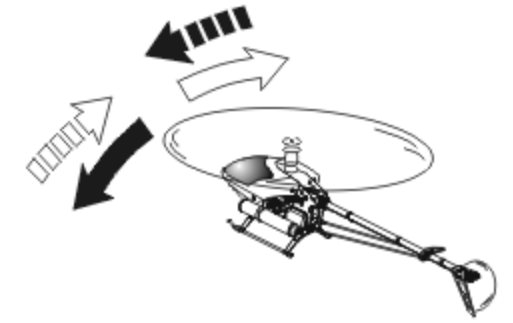
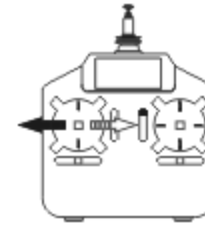
STEP 3 RUDDER CONTROL PRACTICING 方向舵操作練習

1. Slowly raise the throttle stick.

2. Move the nose of the helicopter to right or left, and then slowly move the rudder stick in the opposite direction to fly back to its original position.

1. 慢慢升起油門搖桿。

2. 將直昇機機頭移動左或右，然後慢慢反向移動方向舵搖桿並將直昇機飛回原本位置。



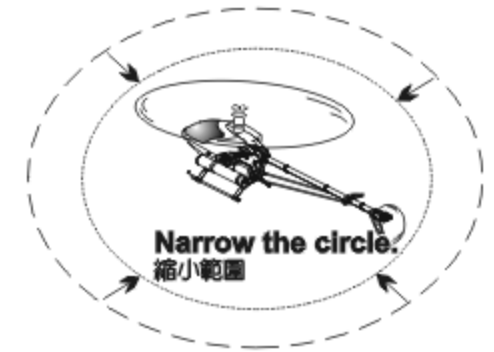
STEP 4

After you are familiar with all actions from Step1 to 3, draw a circle on the ground and practice within the circle to increase your accuracy.

◎ You can draw a smaller circle when you get more familiar with the actions.

當你覺得 step1~3 動作熟悉了，在地上畫圈圈並在這個圈圈的範圍內練習飛行，以增加你操控的準確度。

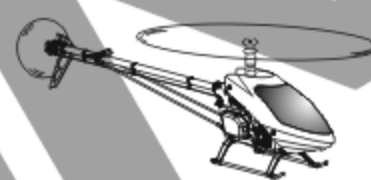
◎ 當你更加習慣操作動作，你可以畫更小的圈圈。



STEP 5 DIRECTION CHANGE AND HOVERING PRACTICE 改變直昇機方向和練習停旋

After you are familiar with Step1 to 4, stand at side of the helicopter and continue practicing Step1 to 4. Then repeat the Step1 to 4 by standing right in front of the helicopter.

當你覺得step1~4動作熟悉了，站在面對直昇機側邊並繼續練習step1~4。之後，站在直昇機機頭右邊重複步驟練習。



ADJUSTMENT OF EACH TRIM 飛行動作微調

Slowly raise the throttle stick and just as the helicopter lift-off the ground, you can use the trim to correct the action if the helicopter leans in a different direction.

慢慢升起油門搖桿，當直昇機剛剛離開地面時，若直昇機傾向不同方向，可使用微調修正動作。

1. Adjustment of rudder trim

Just before the helicopter lift-off, the nose lean left/right...

When leans right, adjust the trim to left side.

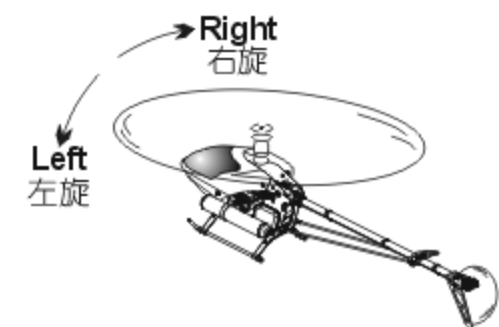
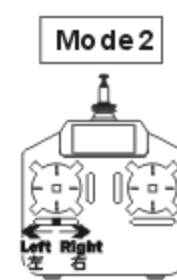
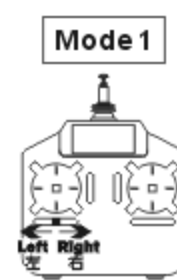
When leans left, adjust the trim to right side.

調整方向舵微調

在直昇機正要起飛時，機頭朝左/右方向偏移...

向右偏移時，微調向左調整。

向左偏移時，微調向右調整。



2. Adjustment of elevator trim

Just before the helicopter lift-off, the nose lean forward/backward...

When leans forward, adjust the trim down.

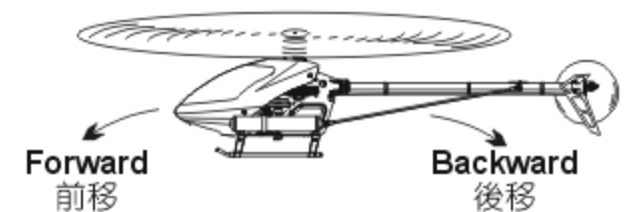
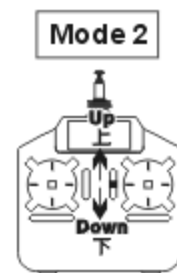
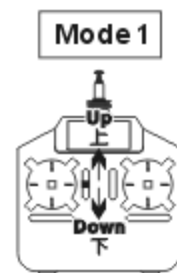
When leans backward, adjust the trim up.

調整升降舵微調

在直昇機正要起飛時，機頭朝前/後方向偏移...

向前偏移時，微調向下調整。

向後偏移時，微調向上調整。



3. Adjustment of Aileron trim

Just before the helicopter lift-off, the body lean left/right...

When leans right, adjust the trim to left side.

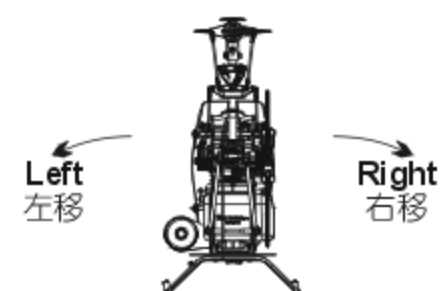
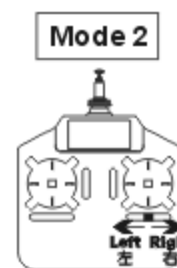
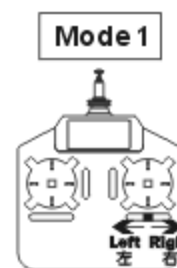
When leans left, adjust the trim to right side.

調整副翼微調

在直昇機正要起飛時，機身朝左/右方向偏移...

向右偏移時，微調向左調整。

向左偏移時，微調向右調整。



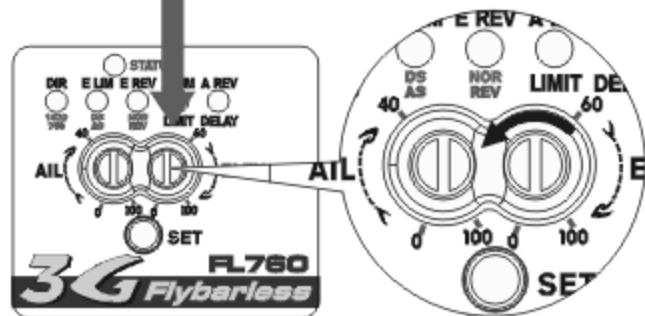
With the helicopter hovering, observe for any rapid left/right or forward/aft oscillations. If forward/aft oscillation is observed, land the helicopter, turn the ELE gain dial counterclockwise gradually, and test again. Do this until oscillation disappears.

先將直昇機以停懸飛行，觀察直昇機左右及前後是否有不正常快速抖動現象，如果前後有抖動情形，則逆時針調降升降舵感度調整旋鈕，以減少陀螺儀前後修正感度。

Set the dial to 12 o'clock position as starting point

建議初次飛行設於12點鐘方向

Elevator gain adjustment dial
升降舵感度調整旋鈕



Decrease ELE gain
調降ELE感度



Forward/back oscillation
前後晃動



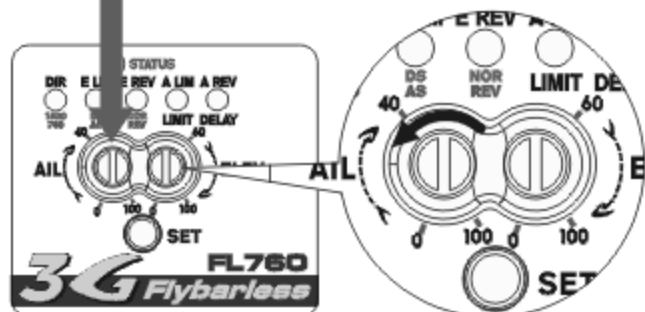
If left/right oscillation is observed, land the helicopter, turn the AIL gain dial counterclockwise gradually, and test again. Do this until oscillation disappears.

如果為左右抖動，逆時針調降副翼感度調整旋鈕，以減少陀螺儀左右修正感度。

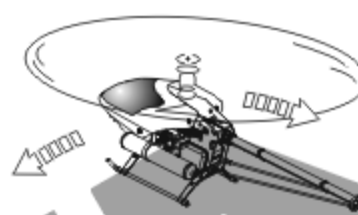
Set the dial to 12 o'clock position as starting point

建議初次飛行設於12點鐘方向

Aileron gain adjustment dial
副翼感度調整旋鈕



Decrease AIL gain
調降AIL感度



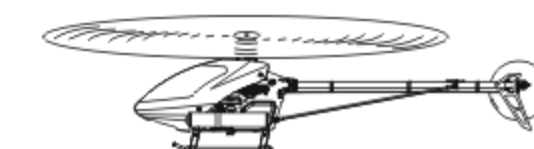
Left/right oscillation
左右晃動



FORWARD STRAIGHT LINE FLIGHT 前進直線航道飛行

Put the helicopter into fast forward flight from hovering. If similar oscillation is observed, reduce the elevator gyro gain. If the helicopter pitches up, or responds slowly, increase the elevator gyro gain. Repeat test until the oscillation is eliminated. Similar method is used for aileron gyro gain. After gyro gain adjustments are completed, the helicopter cyclic rate can be tuned using transmitter's swash AIL and ELE mixing ratio. Higher the percentage, faster the roll/flip rate. Exponential can also be added on the transmitter to soften the sensitivity for stable hover.

停懸完後可快速前進飛行，同樣的如果有不正常抖動時，請將升降舵感度調小，飛行時如果有機頭向上仰起或反應緩慢現象時，請將感度調大，重複測試將感度調整至最理想值，同樣方式可調整副翼感度旋鈕。調整完陀螺儀感度，可依據飛行習慣調整Swash AIL及ELE比率，比率調整越大，前後及左右滾轉速度越快，使用者也可依據個人經驗調整舵面EXPI以增加停旋穩定性。完成所有調整後，就可享受Flybarless所提供低速飛行的穩定性及高速時的靈活性。



Forward Flight
前進飛行



20、SETUP EXAMPLES 飛行特性設定對照表

Using Futaba 12ZH transmitter as an example 以Futaba 12ZH遙控器為例

	With emphasis on stability 穩定特性	With emphasis on agility 靈活特性
Main blade pitch Settings(Collective Pitch Settings) 主旋翼螺距設定(集體螺距設定)	Main blade pitch : 10°~12° 主旋翼螺距 : 10°~12° swash pitch : 33%~38%	Main blade pitch : 12°~14° 主旋翼螺距 : 12°~14° swash pitch : 38%~43%
Cyclic pitch settings (Adjust while in DIR mode using AIL/ELE swash AFR) 循環螺距設定(須在DIR模式下設定)	Cyclic Pitch 10° 循環螺距 10° swash Aileron : 50% Elevator : 50%	Cyclic Pitch 12° 循環螺距 12° swash Aileron : 60% Elevator : 60%
Aileron and Elevator swashplate mixing ratio settings 副翼與升降舵滾轉速率設定	swash Aileron : ≤ 50% Elevator : ≤ 50%	swash Aileron : ≤ 60% Elevator : ≤ 60%
Aileron and Elevator gyro gain settings 副翼與升降舵鎖定感度設定	12 o'clock direction(50%) 12點鐘方向(50%)	11 o'clock direction(40%) 11點鐘方向(40%)



While in DIR setup mode, the transmitter's CCPM swash mixing values for aileron and elevator represent CYCLIC pitch values. These values affect the cyclic roll rates on the aileron and elevator in flying condition. Higher values translate to faster cyclic roll rates. If cyclic roll rate is not improved with increased swash mixing values, this is due to insufficient cyclic pitch. When this happens, cyclic pitch can be increased through the flybarless setup procedure. Maximum cyclic pitch should be limited at 14 degrees.

遙控器上的CCPM十字盤混控SWASH於"DIR"模式設定循環螺距時，Aileron與Elevator比率值的大小代表循環螺距角度的大小，比率愈高循環螺距的角度愈大；而在飛行模式下Aileron與Elevator比率值的大小代表滾轉速率的大小，比率愈高滾轉速率愈快，但若比率調高仍無法提升滾轉速率時表示循環螺距不足，請進入無平衡翼系統設定模式，將循環螺距加大，但以不超過14°為限。

	Problem 狀況	Cause 原因	Solution 對策
Blade Tracking 雙槳平衡	Tracking is Off 雙槳	Pitch linkage rods are not even length PITCH連桿長度調整不平均	Adjust length of pitch linkage rods (A) 調整連桿(A)長度
Hover 停懸	Headspeed too low 主旋翼轉速偏低	Excessive pitch 主旋翼的PITCH偏高	Adjust pitch linkage rods (A) to reduce pitch by 4 to 5 degrees. Hovering headspeed should be around 1600RPM. 調整連桿(A)調低Pitch約+4~5度 (停懸時主旋翼需為約1600RPM)
		Hovering throttle curve is too low 停懸點油門曲線過低	Increase throttle curve at hovering point on transmitter (around 60%) 調高停懸點油門曲線(約60%)
	Headspeed too high 主旋翼轉速偏高	Not enough pitch 主旋翼的PITCH偏低	Adjust pitch linkage rods (A) to increase pitch by 4 to 5 degrees. Hovering headspeed should be around 1600RPM. 調整連桿(A)調高Pitch約+4~5度 (停懸時主旋翼需為約1600RPM)
		Hovering throttle curve is too high 停懸點油門曲線過高	Decrease throttle curve at hovering point on transmitter (around 60%) 調低停懸點油門曲線(約60%)
Rudder Response 尾舵反應	Drifting of tail occurs during hovering, or delay of rudder response when centering rudder stick. 停懸時尾翼向某一邊偏移，或撥動方向舵並回復到中立點時，尾翼產生延遲，無法停頓在所控制位置上。	Rudder neutral point improperly set 尾中立點設定不當	Reset rudder neutral point 重設尾中立點
	Tail oscillates (hunting, or wags) at hover or full throttle 停懸或全油門時尾翼左右來回搖擺。	Rudder gyro gain too low 尾舵陀螺儀感度偏低	Increase rudder gyro gain 增加尾舵陀螺儀感度
		Rudder gyro gain too high 尾舵陀螺儀感度偏高	Reduce rudder gyro gain 降低尾舵陀螺儀感度
Oscillation during flight 飛行抖動	Forward/aft oscillation when elevator is applied 升降舵打舵動作時，機體前後抖動	Elevator gyro gain too high. 升降舵陀螺感度偏高，產生追蹤現象	Turn the ELE gain dial on control box counterclockwise, 10 degrees at a time until oscillation is eliminated. 逆時針調整控制器上的升降舵感度調整旋鈕，以每次調整約10度的方式，調整至適當位置
	Helicopter front bobbles (nods) during forward flight. 直線飛行時，機頭點頭	Worn servo, or slack in control links 伺服器老化，控制結構有虛位	Replace servo, ball link, or linkage balls. 更換伺服器、連桿頭、球頭
	Left/right oscillation when aileron is applied 副翼打舵動作時，機體左右抖動	Aileron gyro gain too high 副翼陀螺感度偏高，產生追蹤現象	Turn the AIL gain dial on control box counterclockwise, 10 degrees at a time until oscillation is eliminated. 逆時針調整控制器上的副翼感度調整旋鈕，以每次調整約10度的方式，調整至適當位置
	Elevator input causes helicopter to drift 升降舵動作飄移	Worn servo, or slack in control links 伺服器老化，控制結構有虛位	Replace servo, ball link, or linkage balls. 更換伺服器、連桿頭、球頭
Drifting during flight 飛行飄移	Helicopter pitches up during forward flight 直線飛行機頭上揚	Elevator gyro gain too low 升降舵陀螺感度偏低	Turn the ELE gain dial on control box clockwise, 10 degrees at a time until drifting is eliminated. 順時針調整控制器上的升降舵感度調整旋鈕，以每次調整約10度的方式，調整至適當位置
	Aileron input causes helicopter to drift 副翼動作飄移	Aileron gyro gain too low 副翼陀螺感度偏低	Turn the AIL gain dial on control box clockwise, 10 degrees at a time until drifting is eliminated. 順時針調整控制器上的升降舵感度調整旋鈕，以每次調整約10度的方式，調整至適當位置
Control Response 動作反應	Slow Forward/Aft/Left/Right input response 前後左右飛行動作反應偏慢	Roll rate too low 滾轉速率偏低	Increase the swashplate AFR in ransmitter 調整遙控器內Swash AFR值，提高滾轉速率
		Roll rate still slow after swash afr adjustment, cyclic pitch too low 已經調整滾轉速率仍然滾動偏慢，循環角度偏低	Go back through the DIR setup procedure and increase the cyclic pitch. 重新進入DIR模式，設定較大的循環螺距角度
	Sensitive Forward/Aft/Left/Right input response 前後左右飛行動作反應偏快	Roll rate too high 滾轉速率偏快	Decrease the swashplate AFR in transmitter 調整遙控器內Swash AFR值，降低滾轉速率
		Roll rate still too fast after swash afr adjustment, cyclic pitch too high 已經調整滾轉速率仍然滾動偏快，循環角度偏高	Go back through the DIR setup procedure and decrease the cyclic pitch. 重新進入DIR模式，設定較小的循環螺距角度

If above solution does not resolve your issues, please check with experienced pilots or contact your Align dealer.

※在做完以上調整後，仍然無法改善情況時，應立即停止飛行並向有經驗的飛手諮詢或連絡您的經銷商。

Q&A 1 **Pitches up during fast forward flight.**
 (1) Elevator gyro gain too low, increase the elevator gain by gradually turning the ELE dial clockwise.
 (2) Elevator trim not centered. Check if helicopter is tilting backwards during hover.
 快速飛行時直昇機機頭會上揚？
 (1) ELE感度不足，請稍微將ELE感度旋鈕順時針方向調高。
 (2) ELE中立點不對，請測試停懸時，直昇機中立點是否朝後。

Q&A 2 **Insufficient gain during flight, but increasing gain results in oscillation.**
 (1) Check and resolve possible mechanical vibration from helicopter.
 (2) Use softer sensor mounting foam, or double up the stock sensor foam.
 (3) Relocate the sensor to location less prone to vibration.
 飛行時感度不足，將感度調高直昇機卻會抖動？
 (1) 檢查直昇機是否有異常震動，如果是請先修復機體。
 (2) 用材質較軟或兩片雙面膠泡棉固定三軸陀螺儀感應器。
 (3) 將感應器換裝於直昇機較不震動的位置。

Q&A 3 **Drifting during 3D maneuvers.**
 (1) Increase AIL and ELE gain by turning both dials clockwise.
 (2) Check if cyclic servos are too slow (minimum 0.1sec / 60 degrees)
 3D飛行時有飄移現象？
 (1) 將升降與副翼感度旋鈕順時針方向調高。
 (2) 檢查推動十字盤的伺服器是否過慢（建議選擇動作速度0.1sec/60度以內規格）。

Q&A 4 **Unstable hover, control inputs are too sensitive.**
 Decrease the aileron and elevator ATV (AFR) value on the transmitter. For CCPM machines, decrease swashplate mixing percentage on the transmitter. In addition, exponential can be added to aileron and elevator channels.
 停懸時不穩定，有動作過靈敏現象？
 可調低遙控器AIL及ELE的ATV (AFR) 值 (CCPM模式，請調降Swash比率)，並增加EXP的設定，以提高停懸的穩定性。

Q&A 5 **After increasing the ATV (AFR) of aileron and elevator, 3D roll rates are still not enough.**
 Go back through the DIR setup procedure and use larger cyclic pitch.
 已調高AIL及ELE的ATV (AFR)，但3D飛行的滾轉速率卻無法提高？
 重新進入DIR模式，設定較大的循環螺距角度。

Q&A 6 **Helicopter oscillates after fast forward flight or after tumbles.**
 (1) Gradually reduce both AIL and ELE gain by turning them counterclockwise, 10 degrees at a time.
 (2) Use harder head dampener.
 直昇機高速飛行或滾轉後停止時，機身會有輕微抖動現象？
 (1) 逆時針調整控制器上的升降舵感度調整旋鈕，以每次調整約10度的方式，調整至適當位置。
 (2) 主旋翼橫軸及主軸連結的橡膠過軟，請換用較硬的橡膠。

Q&A 7 **While in flybarless setup mode, unable to complete ELE/AIL endpoint and reverse settings.**
 Disable all trims/subtrims on the transmitter.
 進入Flybarless設定，無法順利完成ELE、AIL行程、ELE或AIL的REV燈號？
 未取消遙控器的內外微調。

Q&A 8 **Incorrect CCPM mixing after initial flybarless setup.**
 (1) Trim/subtrims not zeroed out on transmitter.
 (2) After any trim adjustments are done on transmitter, the initial flybarless setup procedure need to be performed again.
 完成Flybarless設定，但CCPM混控動作不正常？
 (1) 進入Flybarless設定時未將外微調歸零。
 (2) 遙控器變更內微調，未重新進行Flybarless設定。

Q&A 9 **3G flybarless system unable to power up.**
 (1) Check proper voltage source.
 (2) Check AIL/ELE/PIT connections between flybarless control unit and receiver.
 (3) Check for connection between flybarless control unit and sensor.
 3G Flybarless無法開機？
 (1) 檢查系統電源是否正常。
 (2) 檢查AIL、ELE及PIT的訊號線和接收器是否正常連接。
 (3) 檢查感應器與控制器訊號線是否正常連接。

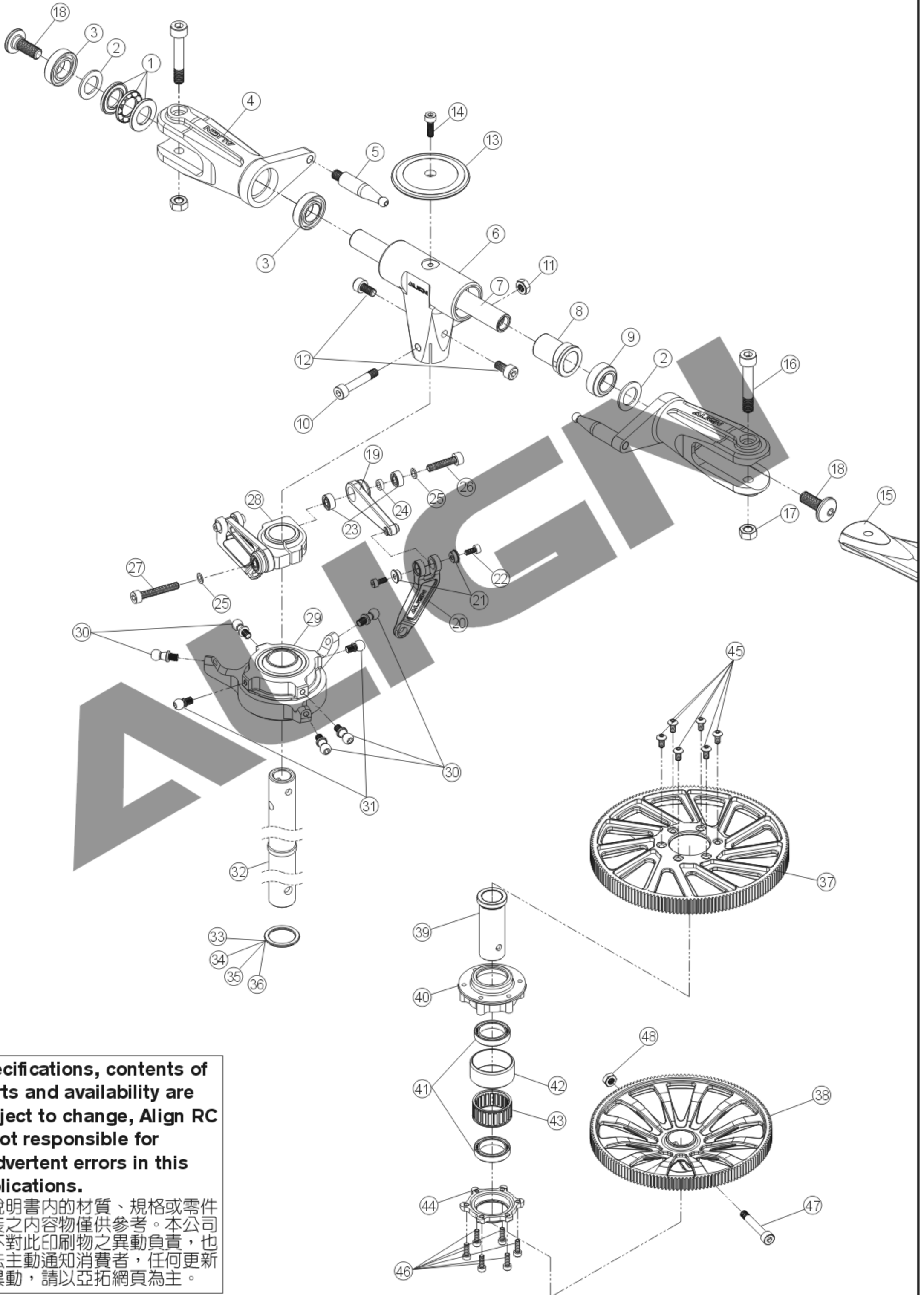
Q&A 10 **3G flybarless system powers up with LED flashing, but swashplate did not jump 3 times, pitch is locked, unable to complete the initialization process.**
 (1) Possible movement during initialization process. Make sure helicopter is absolutely stationary.
 (2) If STATUS LED flashes red, check the connection between flybarless controller and sensor.
 3G Flybarless開機後閃燈正常，十字盤未跳動，PIT被鎖定，無法順利完成開機動作？
 (1) 開機時直昇機必須完全靜止，才可順利開機。
 (2) 檢查如果STATUS紅綠燈號一直閃爍，請檢查控制器和感應器之間是否連接良好。

Q&A 11 **I noticed swashplate tilts slightly at extreme pitch due to servo interactions, should I make efforts to level it out?**
 No. Level the swashplate at 0 degrees using subtrims ONLY in DIR setup mode. (please refer to page 27 step 1.3)
 End point swashplate interactions are automatically compensated by the 3G system while in flight.
 十字盤移動到最高與最低位置時會有些微傾斜，我能嘗試將它修正調整到水平嗎？
 否。在DIR模式時利用內微調(Subtrims)將十字盤0度時調整至水平(參閱第27頁 步驟1.3)，實際飛行時，3G系統會自動修正十字盤的混控位差。

Q&A 12 **I want to trim the heli differently for different flight conditions.**
 After initial DIR setup is complete, the trim tabs on your TX can be used to trim the heli. Use your TX's flight condition functions to have multiple trim settings. Do not adjust the subtrim unless you are in the DIR setup mode!
 如何針對不同飛行模式做個別的微調設定？
 在DIR模式設定完成後，依個別飛行模式(一般/3D/F3C)，使用遙控器外微調調整停旋時的水平，非DIR模式下，不可調整內微調(Subtrims)。

Q&A 13 **What adjustments can I make on the transmitter after the DIR setup has been completed?**
 You can adjust the trim tabs, dual rates, exponential, collective pitch, and ail/elev swash AFR (for roll rate). Again do NOT adjust the subtrims unless followed by repeating of DIR setup steps.
 在離開DIR模式後，有哪些調整功能是我能使用的？
 一般開機模式下，你仍然可以使用以下幾個功能調整直升機：外微調(trim tabs)、舵面大小動(dual rates, exponential)、集體螺距(collective pitch)、升降/副翼混控速率(ail/elev swash AFR (for roll rate))。

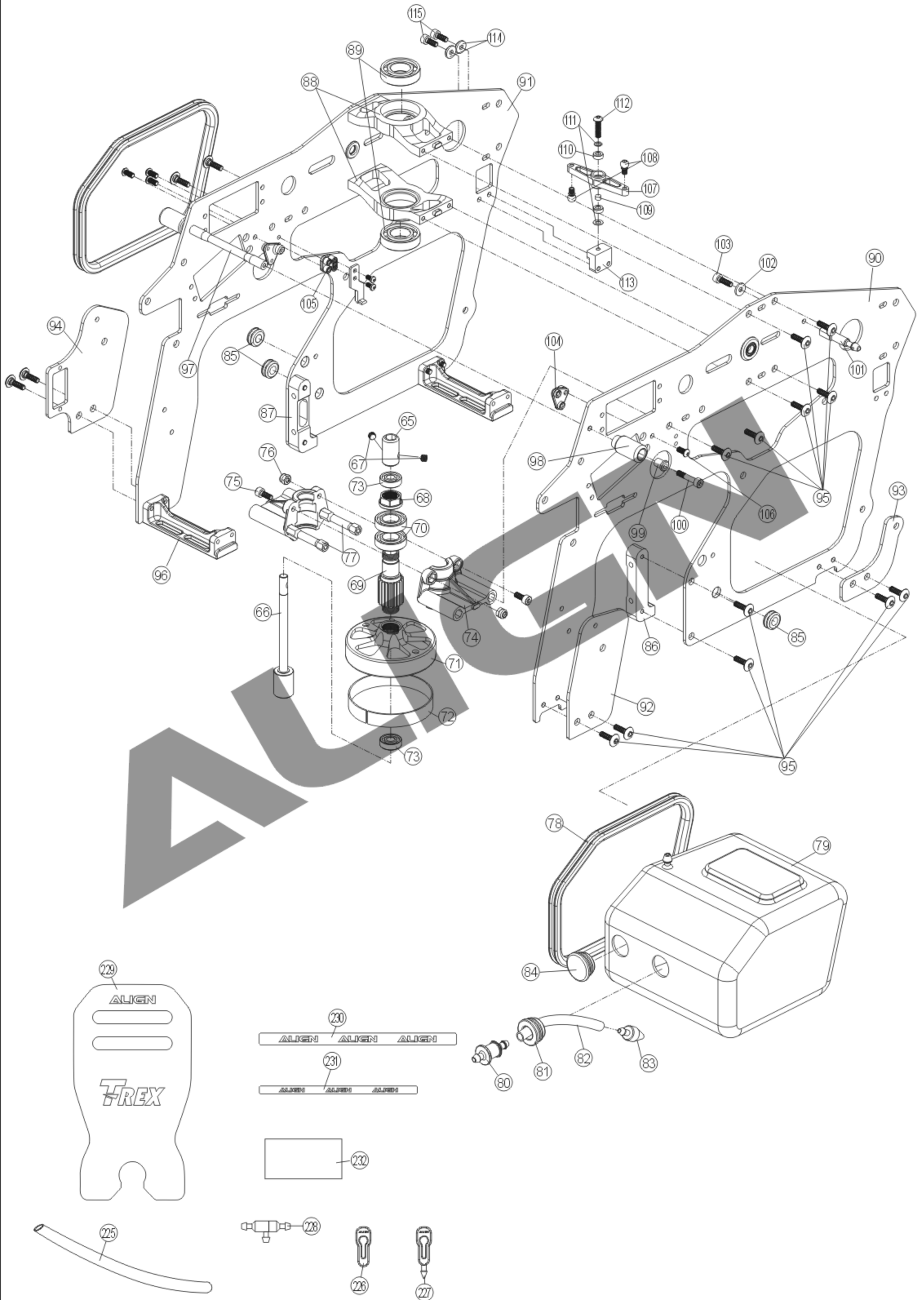
Q&A 14 **During step 5 of DIR setup mode, only aileron swash mixing was mentioned. Should I set elevator swash mixing as well?**
 No. The 3G system automatically calculates a cyclic ring based on the aileron swash mix percentage. Setting of elevator swash mix has no affect on the 3G system. Set the cyclic pitch by the aileron swash mix & just use the same value for elevator.
 在步驟五-循環螺距設定時，為何只測量副翼的角度？
 3G系統在實際飛行時，會自動給定十字盤一個限圍運行，所以在測量副翼循環螺距角度後，設定相同數值的升降循環角度即可。



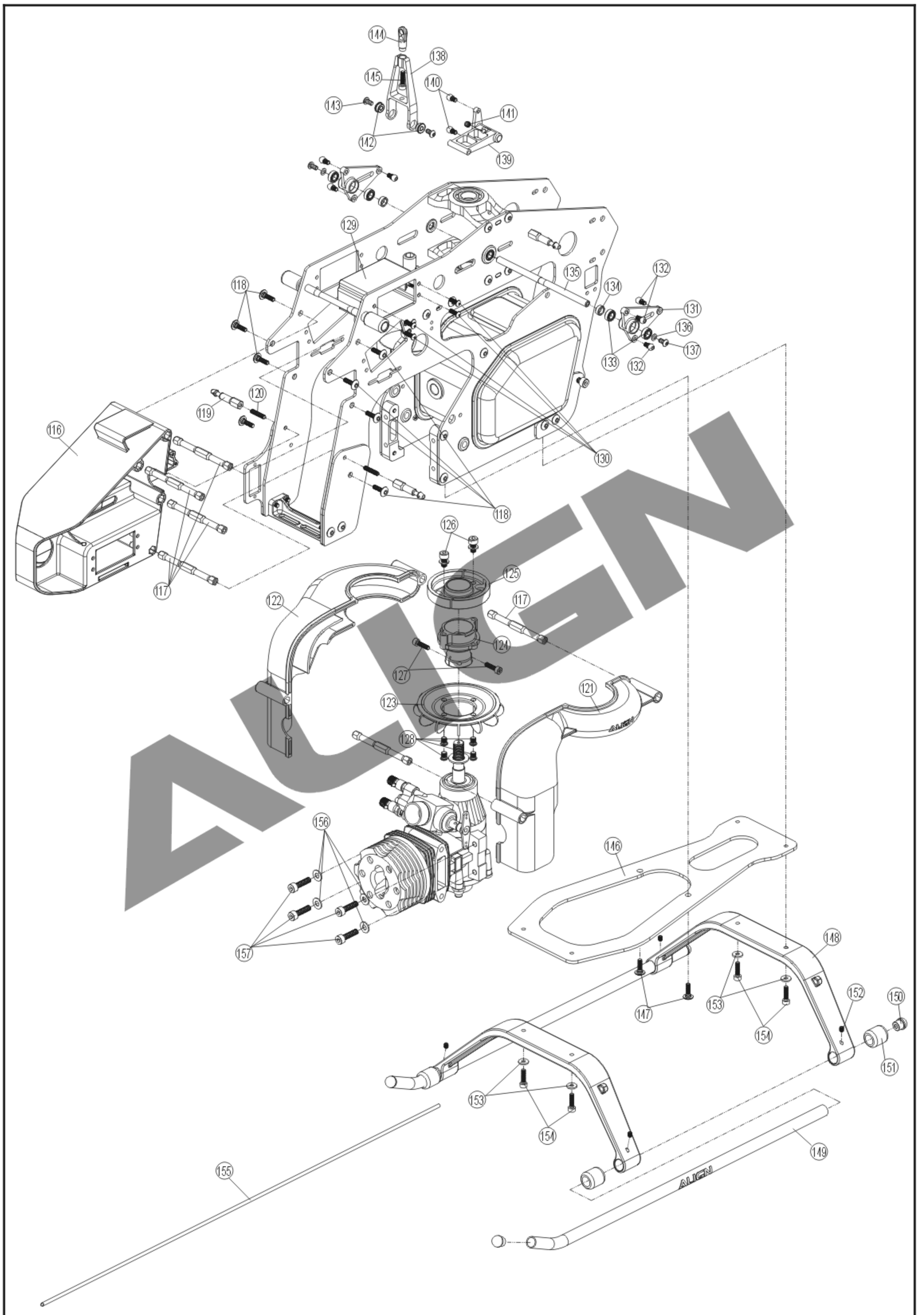
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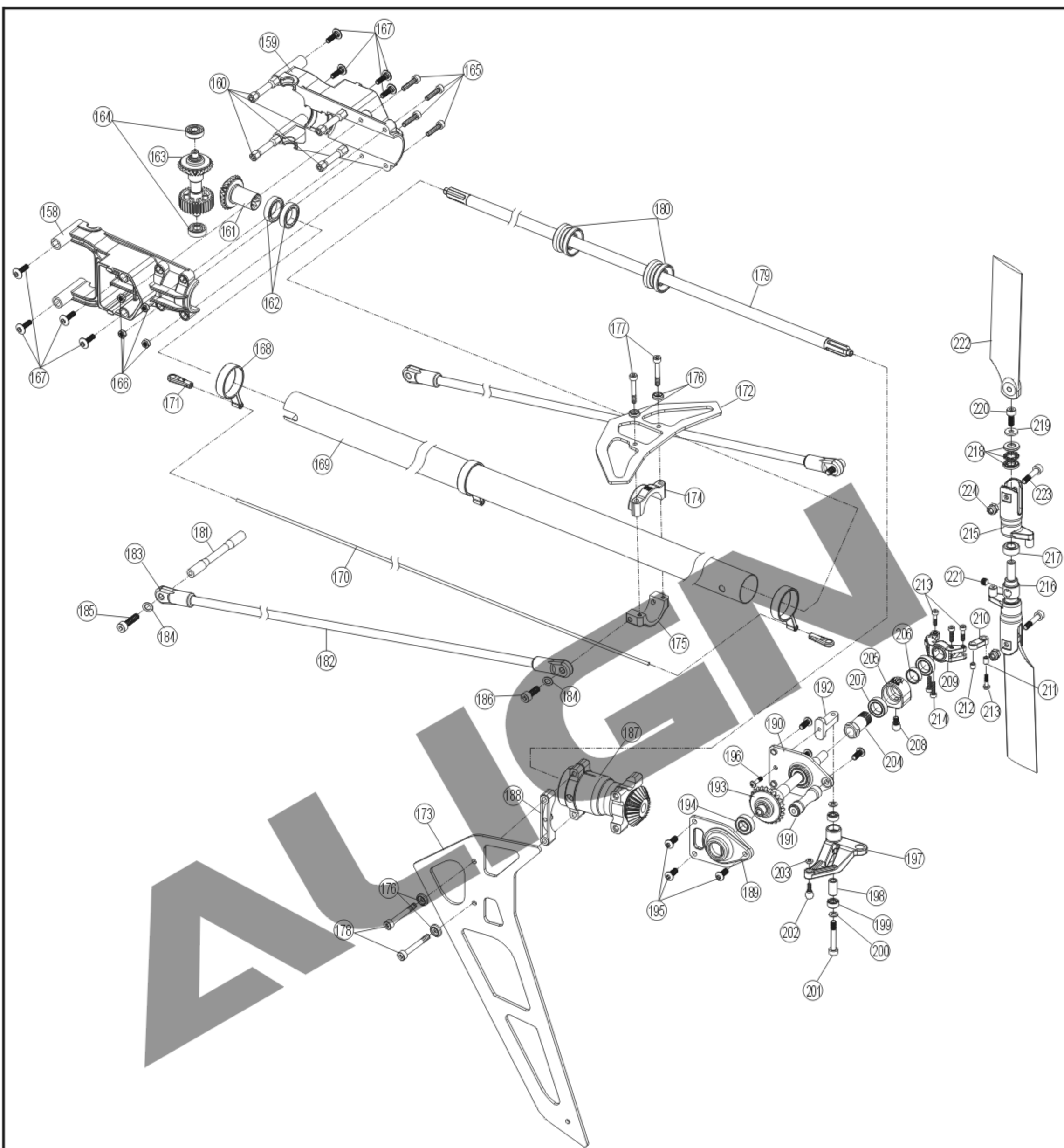
No.	Code No.	Name	Specification	Quantity	Remarks
1	HF10-18M	Thrust bearing 止推軸承	φ 10.2x φ 18x5.5mm	2	
2	90NH024	Spindle bearing spacer 橫軸止推華司	φ 10x φ 16x1mm	4	
3	50B6800ZZ-2	Bearing 軸承	φ 10x φ 19x5mm	4	
4	90NH043	Metal main rotor holder 金屬主旋翼夾座	φ 19x30x13mm	2	
5	90NZ016	Linkage ball A(M5x6) 球頭A(M5x6)	φ 5x37.1mm	2	
6	90NH042	Metal main rotor housing 金屬主旋翼固定座	φ 22x56mm	1	
7	90NH004	Feathering shaft 橫軸	φ 7x φ 10x106.5mm	1	
8	90NH005	Feathering shaft sleeve 橫軸套管	φ 10.2x φ 17x21mm	2	
9	90NH013	Damper rubber 橫軸墊圈	φ 9.9x φ 17x7mm	2	
10	90NH006	Socket collar screw 圓頭內六角軸套螺絲	M4x24mm	1	
11	N14001	M4 Nut M4防鬆螺帽	M4	1	
12	T64008	Socket screw 圓頭內六角螺絲	M4x8mm	2	
13	90NH001A	Metal head stopper 金屬旋翼頭制動器	φ 40x7.5mm	1	
14	T63010	Socket screw 圓頭內六角螺絲	M3x10mm	1	
15	KU110017	690D Caribon Fiber blade 690D碳纖維主旋翼	690mm	2	
16	T65032	Socket collar screw 圓頭內六角軸套螺絲	M5x32mm	2	
17	N10050-3	M5 Nut M5防鬆螺帽	M5	2	
18	90NZ005	Collar screw 橫軸軸套螺絲	M6x16mm	2	
19	50NH018	Metal washout control arm 金屬控制臂	33x8.8mm	2	
20	90NH015	Radius arm Radius連桿		2	
21	HFMR52ZZ-1	Bearing 軸承	φ 2x φ 5x2.3mm	4	
22	T52005	Socket screw 圓頭內六角螺絲	M2x5mm	4	
23	50H683ZZ	Bearing 軸承	φ 3x φ 7x3mm	4	
24	50H024	Collar 擺臂軸承襯套	φ 3x φ 4.8x1.5mm	2	
25	50H022-2	Washer 華司	φ 3x φ 4.8x0.3mm	2	
26	T53014-2	Socket screw 圓頭內六角螺絲	M3x14mm	1	
27	T63020-2	Socket screw 圓頭內六角螺絲	M3x20mm	1	
28	90NH044	Metal washout base 金屬向位器	φ 12x22x11mm	1	
29		CCPM Metal Swashplate 金屬CCPM十字盤組		1set	
30	90NZ002	Linkage ball B(M3x4) 球頭B(M3x4)	φ 5x12mm	5	
31	90NZ003	Linkage ball C(M3x3.5) 球頭C(M3x3.5)	φ 5x8.5mm	2	
32	90NH012	Main shaft 主軸	φ 8x φ 12x212.5mm	1	
33	90NH036	Main shaft spacer(1) 主軸墊片(1)	φ 12x φ 16x1mm	1	
34	90NH037	Main shaft spacer(1.2) 主軸墊片(1.2)	φ 12x φ 16x1.2mm	1	
35	90NH038	Main shaft spacer(0.8) 主軸墊片(0.8)	φ 12x φ 16x0.8mm	1	
36	90NH039	Main shaft spacer(0.5) 主軸墊片(0.5)	φ 12x φ 16x0.5mm	1	
37	90NB037	Main drive gear(164T) 主齒盤(164T)	164T	1	
38	90NB038	Autorotation tail drive gear(150T) 尾驅動主齒(150T)	150T	1	
39	90NB043	One-way bearing shaft 單向軸承套	φ 12x φ 15x41.5mm	2	
40	90NB040	One-way bearing cover 單向軸承上蓋	φ 21x φ 15.8x26mm	1	
41	H6702ZZ	Bearing 軸承	φ 15x φ 21x4mm	2	
42	90NB042	One-way bearing collar 單向軸承外環	φ 6x φ 23x11.6mm	1	
43	HFE423Z	One-way bearing 單向軸承	φ 15x φ 23x11mm	1	
44	90NB041	One-way bearing mount 單向軸承下蓋	φ 21x φ 6.5x33.1mm	1	
45	T53006	Socket button head screw 半圓頭內六角螺絲	M3x6mm	6	
46	T62508	Socket screw 圓頭內六角螺絲	M2.5x8mm	6	
47	T64027	Socket collar screw 圓頭內六角軸套螺絲	M4x27mm	1	
48	N14001	M4 Nut M4防鬆螺帽	M4	1	



No.	Code No.	Name	Specification	Quantity	Remarks	
65	50NB010	Starter coupling	六角啓動頭	φ 8x φ 10x18mm	1	
66	90NB022	Clutch/Start shaft	啓動軸	φ 5x φ 12x82mm	1	
67	T74004	M4 Set screw	M4止洩螺絲	M4x4mm	2	
68	90NB021	Clutch nut	離合器齒輪螺帽	φ 14x6mm	1	
69	90NB020	Clutch gear	離合器齒輪	φ 7x φ 15.4x40.9mm	1	
70	50B6800ZZ-2	Bearing	軸承	φ 10x φ 19x5mm	2	
71	90NB007	Clutch bell	離合器輪	φ 51x φ 56x20.5mm	1	
72	90NB047	Clutch liner	離合器來令片	1x9x158mm	1	
73	50NB695ZZ	Bearing	軸承	φ 5x φ 13x4mm	2	
74	90NB014	Clutch bearing block	離合器軸承座		2	
75	T63008	Socket screw	圓頭內六角螺絲	M3x8mm	2	
76	N10030	M3 Nut	M3防鬆螺帽	M3	2	
77	90NB033	Hex mounting bolt	六角機身鋁柱	φ 2.5x60.5mm	2	
78	90NB013	Fuel tank guard	油箱墊圈		2	
79	90NB012	Fuel tank	油箱		1	
80	50NB026	Fuel tank nipple	油箱接頭		1	
81	50NB030	Grommet	油箱接頭墊圈		1	
82	90NB044	Fuel tube	油管	φ 2.5x φ 4.5x70mm	1	
83	50NB027	Fuel tank sinker	油管接頭		1	
84	90NB052	Fuel tank plug	油箱塞		1	
85	50NB037	Fuel line grommet	油管保護套		3	
86	90NB026	Engine mount (L)	引擎座(左)	39.3x16x8.5mm	1	
87	90NB027	Engine mount (R)	引擎座(右)	39.3x16x8.5mm	1	
88	90NH028	Main shaft block	主軸固定座		2	
89	H6901ZZ	Bearing	軸承	φ 12x φ 24x6mm	2	
90	90NB001	Main frame(L)	主體側板(左)		1	
91	90NB001	Main frame(R)	主體側板(右)		1	
92	90NB004	Front frame brace	側板前補強片		1	
93	90NB005	Rear frame brace	側板後補強片		2	
94	90NB003	Switch mount	側板開關補強片		1	
95	T53008-3	Socket button head collar screw	半圓頭內六角軸套螺絲	M3x8mm	24	
96	90NB025	Front frame mount	機身前固定座	10.5x18x53mm	2	
97	90NB032	Frame mounting bolt	機身前鋁柱	φ 5.5x φ 4.5x61mm	1	
98	50NB039	Canopy spacer	機頭罩支撐墊圈	φ 4.8x φ 11x22mm	2	
99	50NB038	Canopy support	機頭罩支撐柱	φ 3x φ 5x φ 6.5x7.3mm	2	
100	T53014-2	Socket screw	圓頭內六角螺絲	M3x14mm	2	
101	90NB053	Canopy mounting bolt	機頭罩固定柱	φ 5x31x18mm	2	
102	W10030	M3 Washer	M3華司	φ 3x φ 8x1mm	2	
103	T63012	Socket screw	圓頭內六角螺絲	M3x12mm	2	
104	90NB015	Servo mounting plate	伺服器固定片		2	
105	90NB017	Governor mount	定速器固定座		1	
106	S92606	Socket button head self tapping screw	半圓頭內六角自攻螺絲	T2.6x6mm	4	
107	50NB053	Tail control arm	尾控制臂	47x9x8mm	1	
108	90NZ003	Linkage ball C(M3x3.5)	球頭C(M3x3.5)	φ 5x8.5mm	2	
109	50NB034	Collar	尾控制臂鋁套	φ 7x φ 15.4x40.9mm	1	
110	HMR63ZZ	Bearing	軸承	φ 3x φ 6x2.5mm	2	
111	50H022-2	Washer	華司	φ 3x φ 4.8x0.3mm	2	
112	T53012-1	Socket button head screw	半圓頭內六角螺絲	M3x12mm	1	
113	50NB019	Frame mounting block	機身固定塊	14x12.5x8mm	1	
114	50B072	M3 Specialty washer	M3特殊華司	φ 3x φ 8x2mm	2	
115	T63008	Socket screw	圓頭內六角螺絲	M3x8mm	2	
225	90NB045	Fuel tube	油管	φ 2.5x φ 5x500mm	1	
226	50NB043	Fuel tube clip A	油管夾片A	26x9.8x3mm	1	
227	50NB044	Fuel tube clip B	油管夾片B	33.5x9.8x3mm	1	
228	50NB054	Fuel filter	油管過濾器	3-Way	1	
229	50H137-2	Main blade holder	主旋翼固定架泡棉	165x90x15mm	1	
230	K10378	Hook and Loop Tape	魔術帶	15x250mm	1	
231	K10379	Hook and Loop Tape	魔術帶	10x200mm	1	
232	K10365	Hook and Loop Tape	魔術沾	54x28mm	3set	



No.	Code No.	Name	Specification	Quantity	Remarks
116	90NB006	Receiver mount 接收器座		1	
117	90NB033	Hex mounting bolt 六角機身鋁柱	φ 2.5x60.5mm	6	
118	T53008-3	Socket button head collar screw 半圓頭內六角軸套螺絲	M3x8mm	10	
119	90NB053	Canopy mounting bolt 機頭罩固定柱		2	
120	T73015	Set screw 止洩螺絲	M3x15mm	2	
121	90NB011	Engine fan cover (L) 引擎風扇蓋(左)		1	
122	90NB010	Engine fan cover (R) 引擎風扇蓋(右)		1	
123	90NB008	Engine fan 引擎風葉		1	
124	90NB009	Engine fan mount 引擎風扇座		1	
125	90NB019	Clutch 離合器	φ 22x φ 48x16mm	1	
126	T64008-1	Socket head spring screw 圓頭內六角彈簧螺絲	M4x8mm	2	
127	T63012	Socket screw 圓頭內六角螺絲	M3x12mm	2	
128	T54005	Socket button head screw 半圓頭內六角螺絲	M4x5mm	4	
129	90NB016	Elevator servo mount 升降伺服器座		1	
130	S92614	Socket button head self tapping screw 半圓頭內六角自攻螺絲	T2.6x14mm	4	
131	90NB028	Aileron lever 左右控制搖臂		2	
132	90NZ003	Linkage ball C(M3x3.5) 球頭C(M3x3.5)	φ 5x8.5mm	6	
133	50BMR95ZZ	Bearing 軸承	φ 5x φ 9x3mm	4	
134	90NB030	Control shaft collar 連動桿套圈	φ 5x φ 7.5x3mm	2	
135	90NB029	Control shaft 連動桿	φ 4.7x φ 5x98mm	1	
136	50H022	Washer 華司	φ 3x φ 5.5x0.3mm	2	
137	T53006	Socket button head screw 半圓頭內六角螺絲	M3x6mm	2	
138	90NB023	Elevator arm 升降控制臂		1	
139	90NB024	Elevator lever 升降連動控制臂		1	
140	90NZ003	Linkage ball C(M3x3.5) 球頭C(M3x3.5)	φ 5x8.5mm	2	
141	T74004	M4 Set screw M4止洩螺絲	M4x4mm	1	
142	HF683ZZ	Bearing 軸承	φ 3x φ 7x3mm	2	
143	T53008-2	Socket button head screw 半圓頭內六角螺絲	M3x8mm	2	
144	90NB034-1	Elevator ball link 升降臂連桿頭		1	
145	T63012	Socket screw 圓頭內六角螺絲	M3x12mm	1	
146	90NB035	CF Bottom plate 碳纖底板		1	
147	T53008-3	Socket button head collar screw 半圓頭內六角軸套螺絲	M3x8mm	2	
148	50F179	Landing skid 腳架	200x60.25mm	2	
149	90NF001	Skid pipe 腳架鋁管	φ 9x310mm	2	
150	50F084	Skid pipe end cap 腳架鋁管保護套		4	
151	50F130	Landing skid nut 腳架墊圈		4	
152	T73004	M3 Set screw M3止洩螺絲	M3x4mm	4	
153	W10030	M3 Washer M3華司	φ 3x φ 8x1mm	4	
154	T63012	Socket screw 圓頭內六角螺絲	M3x12mm	4	
155	50F128	Antenna pipe 天線管	φ 2x φ 3.9x500mm	1	
156	W10040	M4 Washer M4華司	φ 4x φ 10x1mm	4	
157	T64016	Socket screw 圓頭內六角螺絲	M4x16mm	4	



No.	Code No.	Name	Specification	Quantity	Remarks
158	90NT001	Tail boom mount (L)	尾管固定座(左)	1	
159	90NT002-1	Tail boom mount (R)	尾管固定座(右)	1	
160	90NB033	Hex mounting bolt	六角機身鋁柱 $\phi 2.5 \times 60.5 \text{mm}$	4	
161	90NT007	Long umbrella gear	軸傳長傘齒	1	
162	50T6701ZZ	Bearing	軸承 $\phi 12 \times \phi 18 \times 4 \text{mm}$	2	
163		Front drive gear assembly	尾傳動導輪軸組	1 set	
164	50NB695ZZ	Bearing	軸承 $\phi 5 \times \phi 13 \times 4 \text{mm}$	2	
165	T53014-2	Socket screw	圓頭內六角螺絲 M3x14mm	4	
166	N10030	M3 Nut	M3防鬆螺帽 M3	4	
167	T53008-3	Socket button head collar screw	半圓頭內六角軸套螺絲 M3x8mm	8	

No.	Code No.	Name	Specification	Quantity	Remarks
168	50T125-1	Tail control guide	尾控制桿固定環	3	
169	90NT012	Tail boom	尾管	1	
170	90NT028	Tail rudder control rod B	尾舵控制連桿B	1	
171	90NZ035	Ball link	連桿頭	2	
172	90NT024	3K CF Horizontal stabilizer	3K碳纖水平翼	1	
173	90NT023	3K CF Vertical stabilizer	3K碳纖垂直翼	1	
174	90NT025	Stabilizer mount(Upper)	水平翼固定座(上)	1	
175	90NT026	Stabilizer mount(Lower)	水平翼固定座(下)	1	
176	50B072	M3 Specialty washer	M3特殊華司	4	
177	T63022	Socket collar screw	圓頭內六角軸套螺絲	2	
178	T63026	Socket screw	圓頭內六角螺絲	2	
179		Torque tube set	尾傳動軸桿組	1	
180	50T193	Torque tube bearing holder	尾傳動軸承墊圈	2	
181	90NB031	Frame mounting bolt	機身後鋁柱	1	
182	90NT029	Tail boom brace	尾管支撐架	2	
183	90NT005	Tail boom brace end	尾管支撐架接頭	4	
184	W10040-1	M4 Washer	M4華司	4	
185	T64016	Socket screw	圓頭內六角螺絲	2	
186	T64012	Socket screw	圓頭內六角螺絲	2	
187		Torque tube drive tail unit	尾軸傳尾齒箱	1	
188	90NT011	Vertical stabilizer mount	垂直翼固定座	1	
189	90NT014	Metal plate(L)	尾齒箱左側板	1	
190	90NT015	Metal plate(R)	尾齒箱右側板	1	
191	90NT017	Aluminum bolt	尾齒箱固定鋁柱	1	
192	90NT016A	Control arm mounting bolt	尾控制臂固定座	1	
193		Tail rotor shaft assembly	尾橫軸組	1	
194	HMR126ZZ	Bearing	軸承	2	
195	T53006	Socket button head screw	半圓頭內六角螺絲	6	
196	T52506	Socket button head screw	半圓頭內六角螺絲	1	
197	90NT006	Tail rotor control arm	尾舵控制L臂	1	
198	90NT018	Collar	尾控制臂鋁套	1	
199	50H683ZZ	Bearing	軸承	2	
200	50H022-2	Washer	華司	2	
201	T63020	Socket collar screw	圓頭內六角軸套螺絲	1	
202	90NZ004	Linkage ball C(M2x5)	球頭C(M2x5)	1	
203	N10020-1	M2 Nut	M2螺帽	1	
204	90NT021	Slide shaft	尾軸滑套	1	
205	90NT019	Bearing holder	尾控制軸承套	1	
206	90NT020	Collar	尾控制套墊圈	1	
207	HMR128ZZ	Bearing	軸承	2	
208	90NZ003	Linkage ball C(M3x3.5)	球頭C(M3x3.5)	1	
209	90NT022	T type arm	尾T型控制臂	1	
210	50T105-1	Control link	尾控制連桿頭	2	
211	50T106	Collar A	尾連桿頭銅套A	2	
212	50T127	Collar B	尾連桿頭銅套B	2	
213	T12008-4	Collar screw	軸套螺絲	4	
214	T52008	Socket screw	圓頭內六角螺絲	2	
215	50NT013	Tail rotor holder	尾旋翼夾座	2	
216	50T172	Tail rotor hub	尾旋翼T型座	1	
217	50TMR105ZZ-1	Bearing	軸承	2	
218	50TF510M	Thrust bearing	止推軸承	2	
219	W10030-1	Washer	華司	2	
220	T63008	Socket screw	圓頭內六角螺絲	2	
221	T74004	M4 Set screw	M4止洩螺絲	1	
222	KU110016	3K CF Tail blade	3K碳纖尾旋翼	2	
223	T63016	Socket collar screw	圓頭內六角軸套螺絲	2	
224	N10030	M3 Nut	M3防鬆螺帽	2	



Specifications & Equipment/規格配備:

Length/機身長: 1335mm

Height/機身高: 450mm

Main Blade Length/主旋翼長: 690~710mm

Main Rotor Diameter/主旋翼直徑: 1562~1602mm

Tail Rotor Diameter/尾旋翼直徑: 281mm

Engine Pinion Gear/引擎主齒: 20T

Autorotation Tail Drive Gear/尾驅動主齒: 150T

Drive Gear Ratio/齒輪傳動比: 8.2:1:4.54(E:M:T)

Fuel Tank Capacity /油箱容量 : 630cc.

Flying Weight/全配重: Approx. 4.1kg

