

MINIGRS FLYBARLESS SYSTEM INSTRUCTION MANUAL 使用說明書

HEGGRS01T

ALIGN



Thank you for buying ALIGN products. The MINIGRS FLYBARLESS SYSTEM is the latest technology in Rotary RC models. Please read this manual carefully before assembling and flying the MINIGRS FLYBARLESS SYSTEM. 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。

TABLE OF CONTENTS

目錄

ALIGN

INTRODUCTION 前言.....	1	TRANSMITTER USAGE AND SETTING INSTRUCTION 遙控器使用與設定說明.....	11
WARNING LABEL LEGEND 標誌代表涵義.....	1	COMPATIBLE TRANSMITTER 適用遙控器.....	11
IMPORTANT NOTES 重要聲明.....	1	SELECT H-1 SWASHPLATE TYPE 選擇H-1十字盤類型.....	12
SAFETY NOTES 安全注意事項.....	2	TRANSMITTER SETUP PARAMETERS DIAGRAM 遙控器設定表.....	12
EQUIPMENT REQUIRED FOR ASSEMBLY 自備設備.....	4	ALIGN A10 TRANSMITTER SYSTEM ALIGN A10 遙控器系統.....	12
RADIO TRANSMITTER AND ELECTRONIC EQUIPMENT REQUIRED FOR ASSEMBLY 自備遙控及電子設備.....	4	ALIGN A10 AND FUTABA S-FHSS SYSTEM ALIGN A10 與 FUTABA S-FHSS 系統.....	12
ADDITIONAL TOOLS REQUIRED FOR ASSEMBLY 自備工具.....	4	JR SYSTEM JR 系統.....	13
EQUIPMENT ILLUSTRATION 設備建議配置圖示.....	5	SPEKTRUM SYSTEM SPEKTRUM 系統.....	14
ALIGN A10 TRANSMITTER、MINIGRS FLYBARLESS SYSTEM WIRING & A6B RECEIVER WIRING ALIGN A10遙控器、A6B接收機與MINIGRS無平衡翼系統接收器 接線示意圖.....	5	FEATURES 產品特色.....	15
FUTABA TRANSMITTER、REMOTE RECEIVERS & MINIGRS FLYBARLESS SYSTEM WIRING DIAGRAM FUTABA遙控器、衛星天線與MINIGRS無平衡翼系統接收器 接線示意圖.....	5	MiniGRS FLYBARLESS SETUP INDICATORS 功能設定指示燈說明.....	16
SERVO SETTING AND ADJUSTMENT 伺服器設定與調整.....	5	SETUP PRE-CHECK 設定前注意事項.....	17
T-REX 250 PLUS T-REX 250 PLUS.....	5	CONNECTIVITY METHOD MiniGRS 接線方式.....	18
FUTABA/ALIGN A10 TRANSMITTER/SERVO 遙控器對應伺服器關係.....	5	T-REX 250 CONNECTIVITY METHOD T-REX 250 接線方式.....	18
T-REX 450 PLUS/SPORT T-REX 450 PLUS/SPORT.....	7	T-REX 450 PLUS /SPORT CONNECTIVITY METHOD T-REX 450 PLUS/SPORT接線方式.....	19
FUTABA/ALIGN A10 TRANSMITTER/SERVO 遙控器對應伺服器關係.....	7	T-REX 450 PRO/470L/500X CONNECTIVITY METHOD T-REX 450 PRO/470L/500X 接線方式.....	20
T-REX 450 PRO/470L/500X T-REX 450 PRO/470L/500X.....	8	T-REX 450 L CONNECTIVITY METHOD T-REX 450 L接線方式.....	21
FUTABA/ALIGN A10 TRANSMITTER/SERVO 遙控器對應伺服器關係.....	8	T-REX 500 PRO CONNECTIVITY METHOD T-REX 500 PRO 接線方式.....	22
T-REX 450L T-REX 450L.....	9	MODEL SELECTION 機型選擇.....	22
FUTABA/ALIGN A10 TRANSMITTER/SERVO 遙控器對應伺服器關係.....	9	MODEL DISPLAY 機型顯示.....	23
T-REX 500 PRO T-REX 500 PRO.....	10	MODEL SELECTION 選擇機型.....	23
FUTABA/ALIGN A10 TRANSMITTER/SERVO 遙控器對應伺服器關係.....	10	TRANSMITTER BINDING 遙控器對頻.....	24
		USING FUTABA S-FHSS 使用FUTABA S-FHSS.....	24
		USING A10 TRANSMITTER 使用ALIGN A10遙控器.....	25

TABLE OF CONTENTS

目錄

ALIGN

USING DSM2 SATELLITE RECEIVERS 使用DSM2 衛星天線.....	26
USING DSMX SATELLITE RECEIVERS 使用DSMX 衛星天線.....	26
FAILSAFE(LAST POSITION HOLD) 失控保護 (保留最後指令).....	28
FAILSAFE(PRE-SET POSITION HOLD) 失控保護 (回復預設值).....	28
MiniGRS SETTINGS MiniGRS設定.....	28
MiniGRS INITIALIZATION MiniGRS 開機.....	29
ENTERING MiniGRS SETUP 進入MiniGRS設定.....	29
AILERON SERVO NEUTRAL POINT SETTING 副翼伺服器中立點設定.....	30
ELEVATOR SERVO NEUTRAL POINT SETTING 升降伺服器中立點設定.....	30
PITCH SERVO NEUTRAL POINT SETTING 螺距伺服器中立點設定.....	31
RUDDER GYRO DIRECTION SETTING 尾舵無平衡翼系統修正方向設定.....	31
RUDDER LEFT TRAVEL LIMIT SETTING 尾舵左舵行程設定.....	32
RUDDER RIGHT TRAVEL LIMIT SETTING 尾舵右舵行程設定.....	32
MAIN ROTOR PITCH ADJUSTMENT 主旋翼螺距調整.....	33
COLLECTIVE PITCH ADJUSTMENT 集體螺距調整.....	34
MAX. COLLECTIVE PITCH ANGLE 最大集體螺距角度.....	34
MIN. COLLECTIVE PITCH ANGLE 最小集體螺距角度.....	34
MiniGRS INDICATOR LED MiniGRS指示燈說明.....	35
SPECIFICATIONS 產品規格.....	35
TROUBLESHOOTING 飛行中狀況排除.....	36

INTRODUCTION

前言

ALIGN




MiniGRS flybarless system are designed with goals of simple, convenient, light, and ease of adjustment. MiniGRS flybarless system equipped with the embedded brand new S-FHSS 2.4Ghz system; MiniGRS flybarless system is compatible to Futaba S-FHSS / SPEKTRUM (DSM2/DSMX) / JR DSM2. The MiniGRS flybarless system are more than just a flybarless system; it simplifies installation on small/micro sized helicopters since no receiver is needed. Even easier, more logical setting method, which allows MiniGRS flybarless system settings to be completed with only a few steps achieving even higher stability and control feel suitable for most pilots.

MiniGRS 無平衡翼系統主要是以簡單、方便、輕巧、好調整為出發點，特別納入了全新的 Futaba S-FHSS / SPEKTRUM (DSM2/DSMX) / JR DSM2系統，讓MiniGRS 無平衡翼系統不單單只是無平衡翼系統，它也具備接收機的功能，運用在小型或迷你直昇機上可以節省接收機的空間。

更為簡單、直覺的設定方式，只要幾個步驟就可以輕鬆完成MiniGRS 無平衡翼系統的調整，另外也針對亞拓T-REX 250-T-REX 500機型的飛行性能最佳化，而展現比以往更穩定、更符合絕大部分人的操控手感。簡單來說，MiniGRS 無平衡翼系統提供玩家一個更經濟、更可靠的選擇。

WARNING LABEL LEGEND

標誌代表涵義

 FORBIDDEN 禁止	Do not attempt under any circumstances. 在任何禁止的環境下，請勿嘗試操作。
 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。

IMPORTANT NOTES

重要聲明

R/C helicopters, 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. This product is 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.

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。

As the user of this product, you are solely responsible for operating it in a manner that does not endanger yourself and others or result in damage to the product or the property of others.

做為本產品的使用者，您，是唯一對於您自己操作的環境及行為負全部的責任之人。

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 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. As Align Corporation Limited has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

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。對使用者的不當使用、設定、組裝、修改、或操作不良所造成的破損或傷害，本公司無法控制及負責。任何使用、設定、組裝、修改、或操作不良所造成的破損、意外或傷害，使用者應承擔全部責任。

SAFETY NOTES

安全注意事項

ALIGN

- 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 a result of R/C aircraft models.
- Prior to every flight, carefully check rotorhead spindle shaft screws and tail blade grip screws, linkage balls and screws, ensure they are firmly secured.
- 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。
- 每趟飛行前須仔細檢查，主旋翼夾座橫軸螺絲、尾旋翼夾座螺絲，以及機身各部位球頭、螺絲，確實上膠鎖緊才能昇空飛行。



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.

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。



NOTE ON LITHIUM POLYMER BATTERIES

鋰聚電池注意事項

Lithium Polymer batteries are significantly more volatile than alkaline or Ni-Cd/Ni-MH batteries used in RC applications. All manufacturer's instructions and warnings must be followed closely. Mishandling of Li-Po batteries can result in fire. Always follow the manufacturer's instructions when disposing of Lithium Polymer batteries.

鋰聚電池跟一般在RC使用的鹼性電池、鎳鎘電池、鎳氫電池比較起來是相對危險的。請嚴格遵守鋰聚電池說明書之使用注意事項。不恰當使用鋰聚電池，可能造成火災並傷及生命財產安全，切勿大意！



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！





FORBIDDEN 禁止 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。



WARNING 警告 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 or unforeseen danger may happen. (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好手正進行飛行，因為開啟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，否則將可能造成不可預期的意外發生。（勤練電腦模擬器及老手指導是入門必要的選擇）



WARNING 警告 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. 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.

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。不可在視線範圍外飛行，降落後也請馬上關掉直昇機和遙控器電源。



CAUTION 注意 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.

直昇機主旋翼與尾旋翼運轉時會以高轉速下進行，在高轉速下的旋翼會造成自己與他人在身體上或環境上的嚴重損傷，請勿觸摸運轉中的主旋翼與尾旋翼，並保持安全距離以避免造成危險及損壞。



CAUTION 注意 KEEP AWAY FROM HEAT 遠離熱源

R/C models are made of 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、直昇機多半是以 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。



EQUIPMENT REQUIRED FOR ASSEMBLY

自備設備

ALIGN

1 RADIO TRANSMITTER AND ELECTRONIC EQUIPMENT REQUIRED FOR ASSEMBLY

自備遙控及電子設備

Suitable for below flybarless models

T-REX 250

T-REX 450 SPORT/PLUS DFC

T-REX 450 PRO/450L/470L/500X

T-REX 500

適用下列無平衡翼機型

T-REX 250

T-REX 450 SPORT/PLUS DFC

T-REX 450 PRO/450L/470L/500X

T-REX 500



Compatible to ALIGN A10 and Futaba S-FHSS

ALIGN A10 與 S-FHSS 2.4 GHz 遙控器



SPEKTRUM DSM2 / DSMX
JR DSM2 System
2.4GHz 遙控器



DSM2 / DSMX
Remote Receiver
衛星天線



2 ADDITIONAL TOOLS REQUIRED FOR ASSEMBLY

自備工具



Swashplate Leveler
十字盤調整器



AP-800 Digital Pitch Gauge
AP-800 數位螺距規



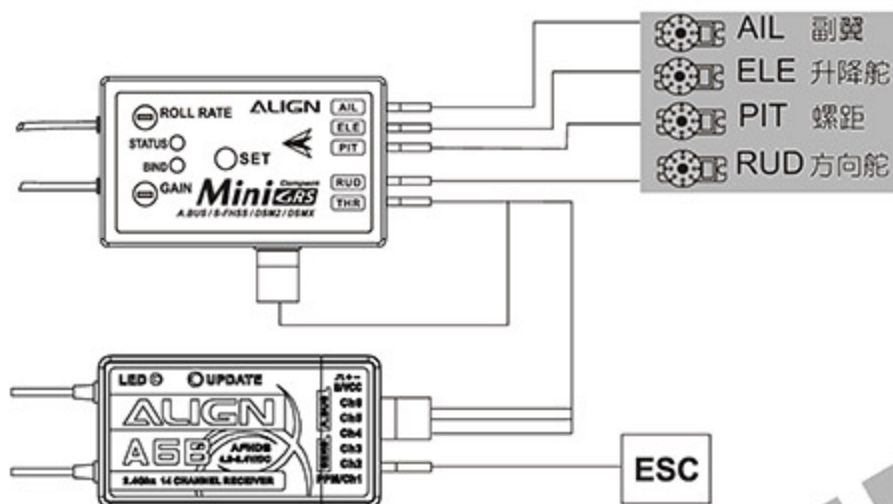
Multi-function Tester
多功能檢測計

EQUIPMENT ILLUSTRATION

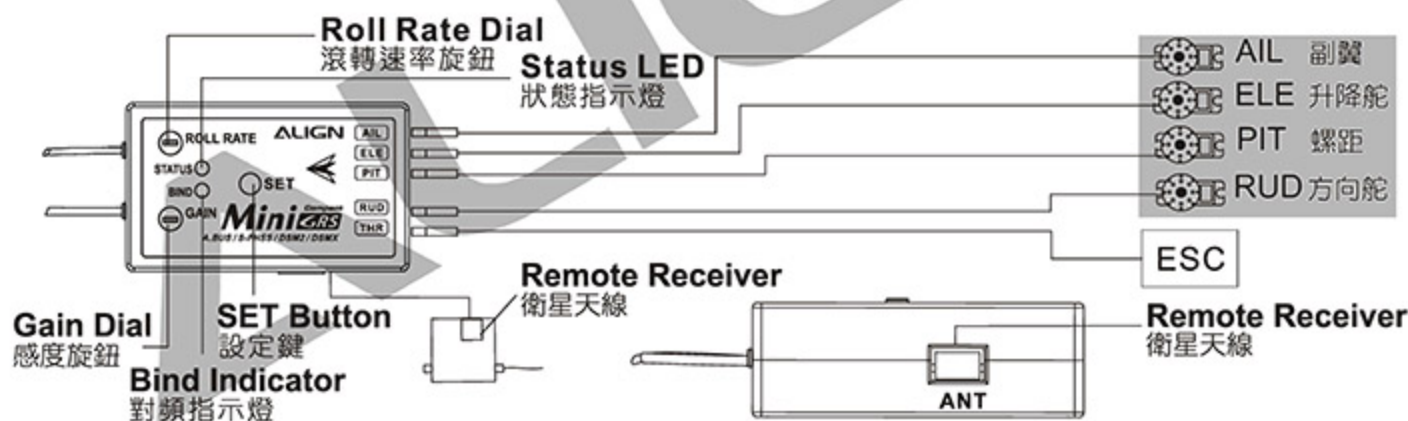
設備建議配置圖示

ALIGN

1 ALIGN A10 TRANSMITTER · MINIGRS FLYBARLESS SYSTEM WIRING & A6B RECEIVER WIRING ALIGN A10遙控器、A6B接收機與MINIGRS無平衡翼系統接收器接線示意圖



2 FUTABA TRANSMITTER · REMOTE RECEIVERS & MINIGRS FLYBARLESS SYSTEM WIRING DIAGRAM FUTABA遙控器、衛星天線與MINIGRS無平衡翼系統接收器接線示意圖



Gain rate dial is set to 50% as factory default (dial at 12 o'clock position ; 6 o'clock position for the antenna). Roll rate dial is set to minimum value (dial at 7 o'clock position). Should there be any oscillation on aileron or elevator during flight, reduce the gain by turning the dial counter-clockwise approximately 10 degrees at a time.

Should there be any drift front/rear/left/right during flight, increase the gain by turning the dial clockwise approximately 10 degrees at a time.

Roll rate dial is used to adjust the roll rate of helicopter's elevator and aileron; turning clockwise will increase roll rate, with faster elevator and aileron response; turning counter-clockwise will decrease roll rate, with slower elevator and aileron response. We recommend novice pilots to fly with lower roll rate.

感度旋鈕出廠設定值為50%(旋鈕指向12點鐘方向、天線位置為6點鐘方向)，滾轉速度旋鈕出廠設定值為最小(旋鈕指向7點鐘方向)，飛行時若機體有左右或前後抖動，表示感度偏高，請逆時針調整感度旋鈕，以每次調整約10度方式，調整至適當位置。

飛行時若機體有左右或前後飄移時，表示感度偏低，請順時針調高感度旋鈕，以每次10度方式調整至適當位置。

滾轉速率旋鈕為調整直昇機升降、副翼滾轉速率，往順時針調大滾轉速率，升降與副翼反應會變快，往逆時針調低滾轉速率，升降與副翼反應會變慢，初階入門者建議把滾轉速率調低飛行。

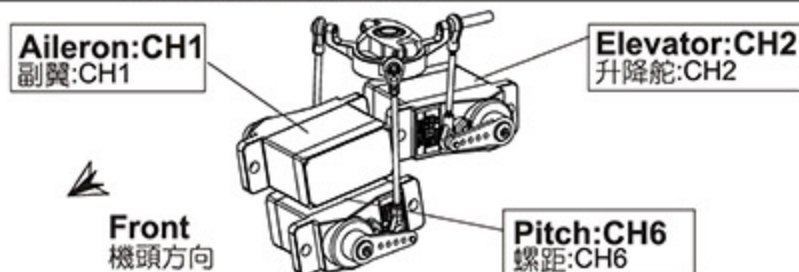
SERVO SETTING AND ADJUSTMENT

伺服器設定與調整

ALIGN

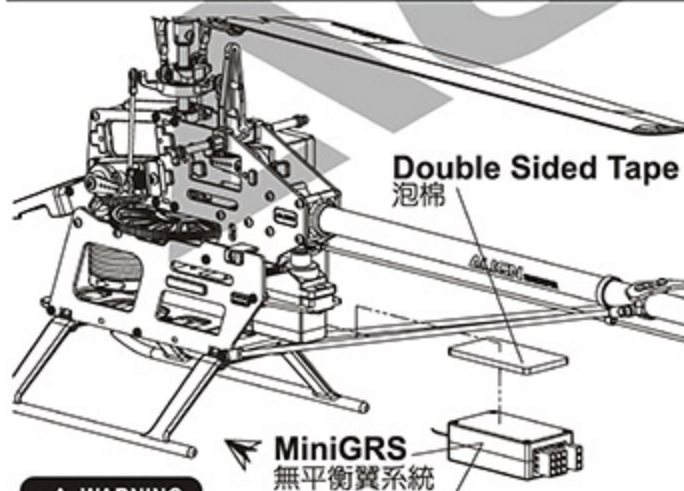
1 T-REX 250 PLUS T-REX 250 PLUS

1 FUTABA/ALIGN A10 TRANSMITTER/SERVO FUTABA/ALIGN A10 遙控器對應伺服器關係



CAUTION 注意

- Servo can only be installed in this orientation when MiniGRS is used: with head point forward, right forward is aileron (CH1), left forward is pitch (CH6), mid-rear is elevator (CH2). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
 - Swashplate type setting on the transmitter should be set to H1 traditional swashplate type. If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS model setting is set to T-REX 250.
1. 使用MiniGRS伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼(CH1)；左前為螺距(CH6)；右後為升降(CH2)。CH1、CH6不可換。如果沒依照圖示連結，直昇機動作會不正確。
2. 遙控器十字盤設定，必須選擇H1傳統十字盤模式。依照圖示安裝完畢，如果十字盤動作不正確，請檢查MiniGRS機型設定是否為T-REX250。



WARNING 警告

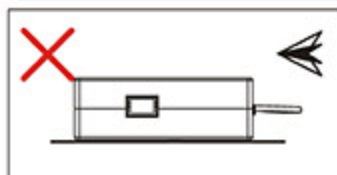
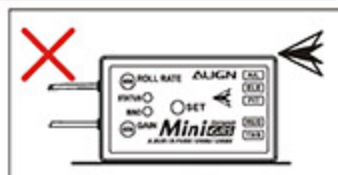
- MiniGRS can only be installed face down, with antenna point towards front of the helicopter.
 - Incorrect installation will cause incorrect compensation of the helicopter swashplate. Flying with incorrect installation will result in crash.
1. MiniGRS的安裝方式只有一種，必須為面板朝下且天線朝向機頭方向。
2. 安裝錯誤會造成直昇機十字盤修正錯誤，強行飛行會有墜機的危險。

WARNING 警告

MiniGRS must face down, antenna point forward.
MiniGRS 面板必須朝下，天線朝前安裝

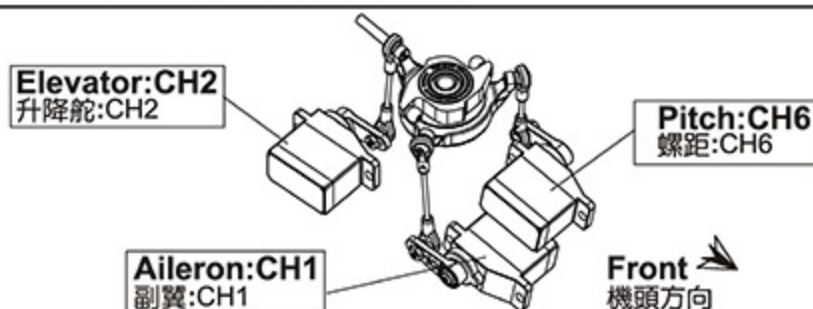
WARNING 警告

Check if the screws are firmly tightened before flight.
飛行前再次確認螺絲是否鎖固。



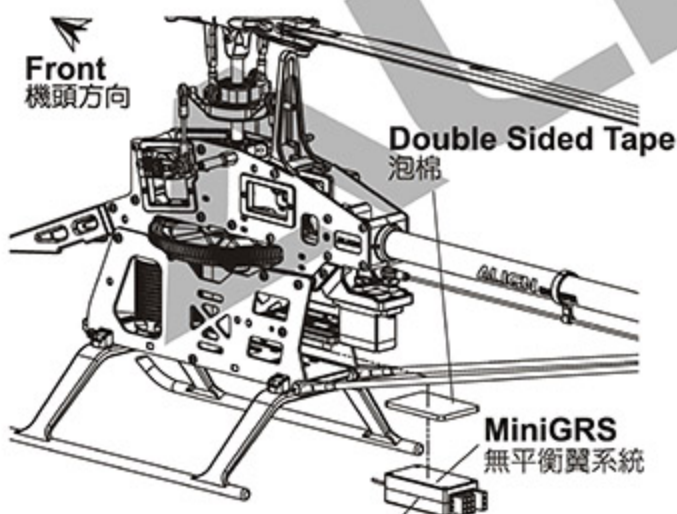
1 FUTABA/ALIGN A10 TRANSMITTER/SERVO

FUTABA/ALIGN A10 遙控器對應伺服器關係



注意

- Servo can only be installed in this orientation when MiniGRS is used: with head point forward, right forward is aileron (CH1), left forward is pitch (CH6), mid-rear is elevator (CH2). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
 - Swashplate type setting on the transmitter should be set to H1 traditional swashplate type. If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS model setting is set to T-REX 450 Sport/PLUS DFC.
1. 使用 MiniGRS 伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼(CH1)；左前為螺距(CH6)；右後為升降(CH2)。CH1、CH6不可換。如果沒依照圖示連結，直昇機動作會不正確。
2. 遙控器十字盤設定，必須選擇H1傳統十字盤模式。依照圖示安裝完畢，如果十字盤動作不正確，請檢查MiniGRS機型設定是否為T-REX450 SPORT /PLUS DFC。



警告

- MiniGRS can only be installed face down, with antenna point towards front of the helicopter.
 - Incorrect installation will cause incorrect compensation of the helicopter swashplate. Flying with incorrect installation will result in crash.
1. MiniGRS 的安裝方式只有一種，必須為面板朝下且天線朝向機頭方向。
2. 安裝錯誤會造成直昇機十字盤修正錯誤，強行飛行會有墜機的危險。



警告

MiniGRS must face down, antenna point forward.

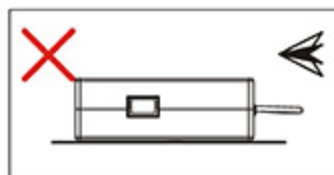
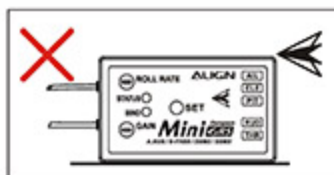
MiniGRS 面板必須朝下，天線朝前安裝



警告

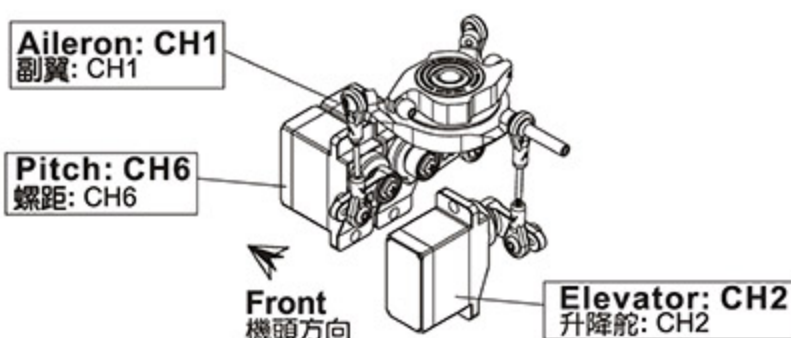
Check if the screws are firmly tightened before flight.

飛行前再次確認螺絲是否鎖固。



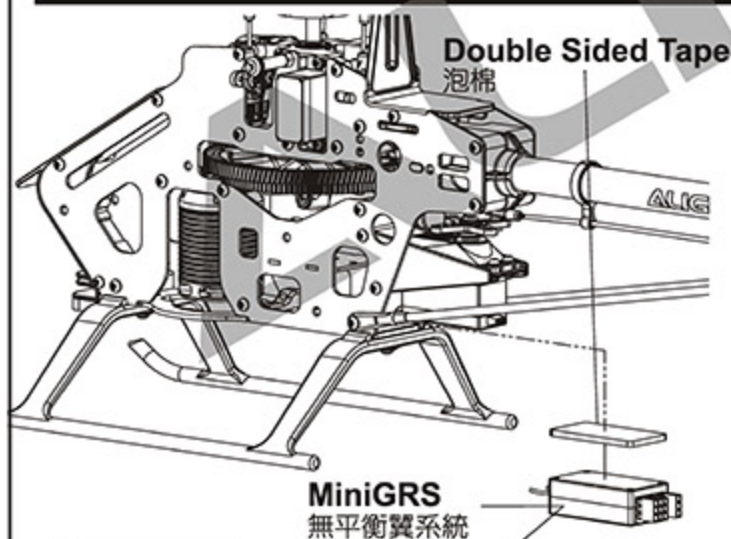
1 FUTABA/ALIGN A10 TRANSMITTER/SERVO

FUTABA/ALIGN A10 遙控器對應伺服器關係



CAUTION
注意

- Servo can only be installed in this orientation when MiniGRS is used: with head point forward, right forward is aileron (CH1), left forward is pitch (CH6), mid-rear is elevator (CH2). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
 - Swashplate type setting on the transmitter should be set to H1 traditional swashplate type. If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS model setting is set to T-REX 450 PRO/470L/500X.
1. 使用 MiniGRS 伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼 (CH1)；左前為螺距 (CH6)；左後為升降 (CH2)。CH1、CH6 不可換。如果沒依照圖示連結，直昇機動作會不正確。
2. 遙控器十字盤設定，必須選擇 H1 傳統十字盤模式。依照圖示安裝完畢，如果十字盤動作不正確，請檢查 MiniGRS 機型設定是否為 T-REX450 PRO/470L/500X。



WARNING
警告

- MiniGRS can only be installed face down, with antenna point towards front of the helicopter.
 - Incorrect installation will cause incorrect compensation of the helicopter swashplate. Flying with incorrect installation will result in crash.
1. MiniGRS 的安裝方式只有一種，必須為面板朝下且天線朝向機頭方向。
2. 安裝錯誤會造成直昇機十字盤修正錯誤，強行飛行會有墜機的危險。



WARNING
警告

MiniGRS must face down, antenna point forward.

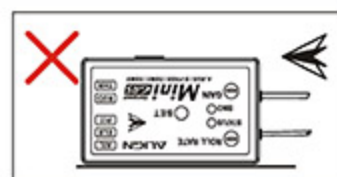
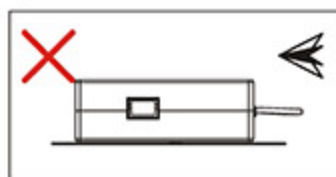
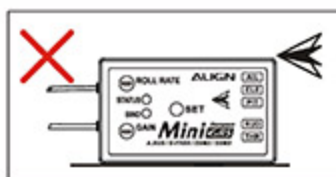
MiniGRS 面板必須朝下，天線朝前安裝



WARNING
警告

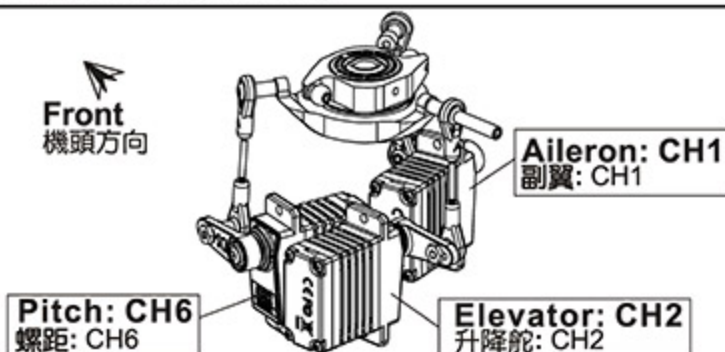
Check if the screws are firmly tightened before flight.

飛行前再次確認螺絲是否鎖固。

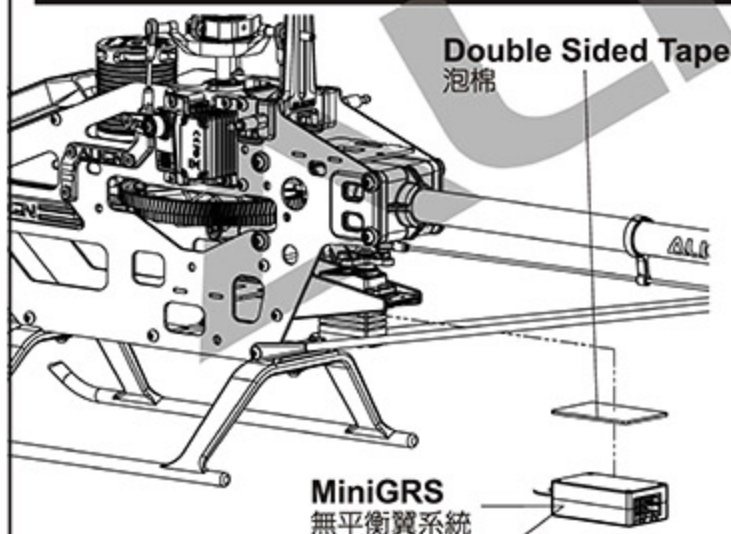


1 FUTABA/ALIGN A10 TRANSMITTER/SERVO

FUTABA/ALIGN A10 遙控器對應伺服器關係

CAUTION
注意

- Servo can only be installed in this orientation when MiniGRS Flybarless System is used: with head point forward, right forward is aileron (CH1), left forward is pitch (CH6), mid-rear is elevator (CH2). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
 - Swashplate type setting on the transmitter should be set to H-1 traditional swashplate type. If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS Flybarless System model setting is set to T-REX 450L.
1. 使用 MiniGRS 無平衡翼系統伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼(CH1)；左前為螺距(CH6)；右後為升降(CH2)。CH1、CH6 不可換。如果沒依照圖示連結，直昇機動作會不正確。
2. 遙控器十字盤設定，必須選擇 H-1 傳統十字盤模式。依照圖示安裝完畢，如果十字盤動作不正確，請檢查 MiniGRS 無平衡翼系統機型設定是否為 T-REX450L。

WARNING
警告

- MiniGRS can only be installed face down, with antenna point towards front of the helicopter.
 - Incorrect installation will cause incorrect compensation of the helicopter swashplate. Flying with incorrect installation will result in crash.
1. MiniGRS 的安裝方式只有一種，必須為面板朝下且天線朝向機頭方向。
2. 安裝錯誤會造成直昇機十字盤修正錯誤，強行飛行會有墜機的危險。

WARNING
警告

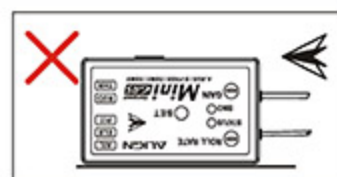
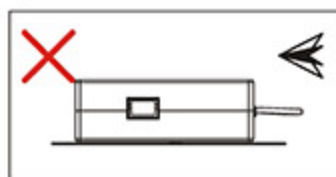
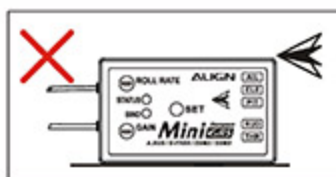
MiniGRS must face down, antenna point forward.

MiniGRS 面板必須朝下，天線朝前安裝

WARNING
警告

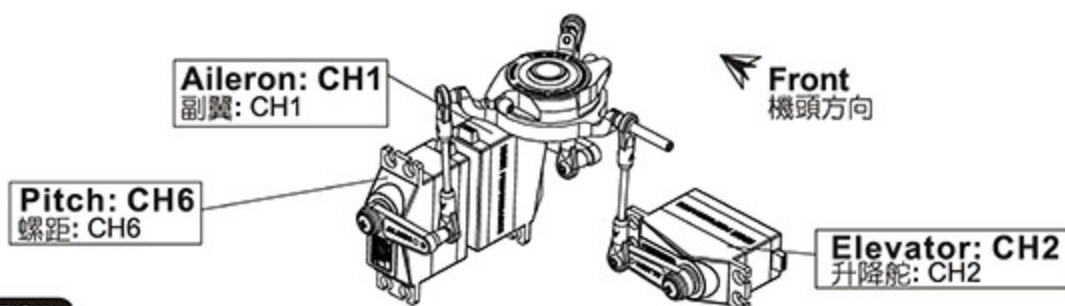
Check if the screws are firmly tightened before flight.

飛行前再次確認螺絲是否鎖固。



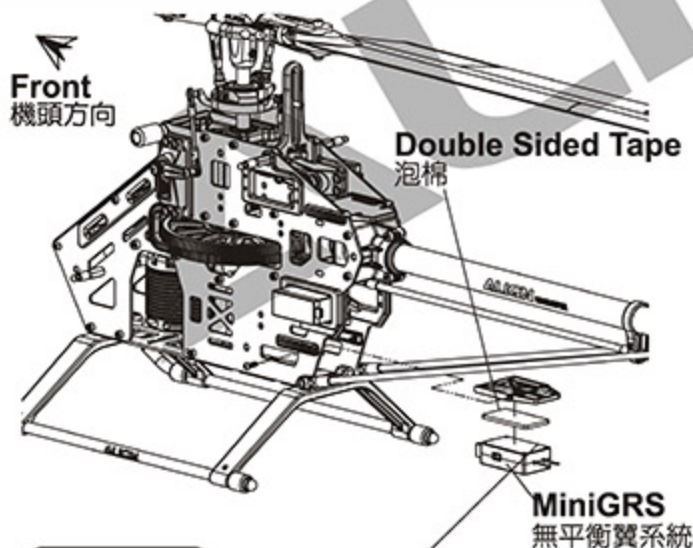
1 FUTABA/ALIGN A10 TRANSMITTER/SERVO

FUTABA/ALIGN A10 遙控器對應伺服器關係



CAUTION 注意

- Servo can only be installed in this orientation when MiniGRS is used: with head point forward, right forward is aileron (CH2), left forward is pitch (CH6), mid-rear is elevator (CH3). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
 - Swashplate type setting on the transmitter should be set to H1 traditional swashplate type. If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS model setting is set to T-REX 500 PRO.
1. 使用 MiniGRS 伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼(CH1)；左前為螺距(CH6)；右後為升降(CH2)。CH1、CH6不可換。如果沒依照圖示連結，直昇機動作會不正確。
2. 遙控器十字盤設定，必須選擇H1傳統十字盤模式。依照圖示安裝完畢，如果十字盤動作不正確，請檢查MiniGRS機型設定是否為T-REX500 PRO。



WARNING 警告

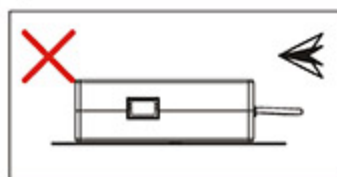
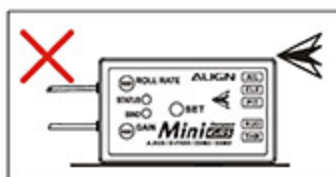
- MiniGRS can only be installed face down, with antenna point towards front of the helicopter.
 - Incorrect installation will cause incorrect compensation of the helicopter swashplate. Flying with incorrect installation will result in crash.
1. MiniGRS 的安裝方式只有一種，必須為面板朝下且天線朝向機頭方向。
2. 安裝錯誤會造成直昇機十字盤修正錯誤，強行飛行會有墜機的危險。

WARNING 警告

MiniGRS must face down, antenna point forward.
MiniGRS 面板必須朝下，天線朝前安裝

WARNING 警告

Check if the screws are firmly tightened before flight.
飛行前再次確認螺絲是否鎖固。



TRANSMITTER USAGE AND SETTING INSTRUCTION

遙控器使用與設定說明

ALIGN

1 COMPATIBLE TRANSMITTER

適用遙控器

The MiniGRS Flybarless System in the T-REX 450LP ARTF contains a built in S-FHSS 2.4 GHz receiver, support Spektrum DSM2/DSMX/JR DSM2 satellite receiver, and is compatible only with similar S-FHSS' s transmitter. Please follow the instruction below to bind your radio to the MiniGRS Flybarless System.

MiniGRS 無平衡翼系統，支援亞拓A10遙控器，此外內建S-FHSS 2.4 GHz系統接收，可以搭配S-FHSS SPEKTRUM DSM2/ DSMX與JR DSM2衛星天線跟遙控器使用。您可以依照下列說明來與MiniGRS無平衡翼系統對頻。



Use ALIGN A10(A6B) transmitter
使用 ALIGN A10(A6B)遙控器



Using FUTABA S-FHSS 2.4GHz transmitter、
Spektrum DSM2/DSMX and JR DSM2 Radio's
Satellite Receivers

使用 FUTABA S-FHSS 2.4GHz系統、Spektrum DSM2/DSMX
、JR DSM2 衛星天線遙控器

2 SELECT H-1 SWASHPLATE TYPE

選擇H-1十字盤類型



MiniGRS Flybarless System supports H-1 type swashplate layout. Set the swashplate mode to H-1 in the transmitter's setting. ALIGN A10(A6B)transmitter select "VARIABLE PITCH". If swashplate type is not setup properly, the control movement will not be correct, making the helicopter unflyable.

MiniGRS無平衡翼系統支援H-1十字盤。請將遙控器的十字盤選項，設定為H-1十字盤類型；ALIGN A10遙控器請選擇"VARIABLE PITCH"。若十字盤選擇錯誤，會造成直昇機動作不正確無法飛行。

3 TRANSMITTER SETUP PARAMETERS DIAGRAM

遙控器設定表

Relative MiniGRS parameters setting information is provided for customers to fairly simple use and operate on the unit. The parameters in diagram below is suitable for beginners and general 3D flying, but can be adjusted to suit personal flying preference.

為了方便玩家更容易使用MiniGRS，以下提供使用MiniGRS遙控器的相關參數與設定。下表參數適用初學基礎飛行以及一般3D飛行使用，您也可以依照個人飛行習慣來調整遙控器參數。

1 ALIGN A10 TRANSMITTER SYSTEM

ALIGN A10 遙控器系統

	AIL 副翼	ELE 升降	THR 油門	RUD 尾舵	GYRO 感度	PIT 螺距			
Servo Reverse 伺服器正反轉	Normal 正向	Reverse 反向	Normal 正向	Normal 正向	Normal 正向	Reverse 反向			
D / R 雙重比率	▲ 100 % ▼ 100 %	▲ 100 % ▼ 100 %		▲ 100 % ▼ 100 %					
EXP 動作曲線	▲ -30 % ▼ -20 %	▲ -30 % ▼ -20 %		▲ 0 % ▼ 0 %					
End Point Adjust 伺服器行程量	▲ 100 %	▲ 100 %	▲ 100 %	▲ 100 %	▲ 100 %	250 PLUS	450 PLUS	450 PRO	500 PRO
	▼ 100 %	▼ 100 %	▼ 100 %	▼ 100 %	▼ 100 %	▲ 60% ▼ 60%	▲ 70% ▼ 70%	▲ 70% ▼ 70%	▲ 70% ▼ 70%

Swash type 十字盤類型	VARIABLE PITCH				
Gyro gain 尾舵感度	Normal Flight / 一般飛行		3D Flight / 3D飛行		
	250 PLUS	450 PLUS	250 PLUS	450 PLUS	
	78% (AVCS)	78% (AVCS)	75% (AVCS)	75% (AVCS)	
	450 PRO	500 PRO	450 PRO	500 PRO	
	78% (AVCS)	78% (AVCS)	75% (AVCS)	75% (AVCS)	
Normal Throttle Curves 一般飛行油門曲線	P1 0 %	P2 65 %	P3 65 %	P4 65 %	P5 65 %
Normal Pitch Curves 一般飛行螺距曲線	P1 40 %	P2 55 %	P3 65 %	P4 75 %	P5 100 %
IDLE-UP Throttle Curves 3D飛行油門曲線	P1 90 %	P2 90 %	P3 90 %	P4 90 %	P5 90 %
IDLE-UP Pitch Curves 3D飛行螺距曲線	P1 0 %	P2 25 %	P3 50 %	P4 75 %	P5 100 %

2 FUTABA S-FHSS SYSTEM

FUTABA S-FHSS 系統

	AIL 副翼	ELE 升降	THR 油門	RUD 尾舵	GYRO 感度	PIT 螺距			
Servo Reverse 伺服器正反轉	Normal 正向	Normal 正向	Reverse 反向	Normal 正向	Normal 正向	Normal 正向			
D / R 雙重比率	▲ 100 % ▼ 100 %	▲ 100 % ▼ 100 %		▲ 100 % ▼ 100 %					
EXP 動作曲線	▲ -30 % ▼ -30 %	▲ -30 % ▼ -30 %		▲ -15 % ▼ -15 %					
End Point Adjust 伺服器行程量	▲ 100 %	▲ 100 %	▲ 100 %	▲ 100 %	▲ 100 %	250 PLUS	450 PLUS	450 PRO	500 PRO
	▼ 100 %	▼ 100 %	▼ 100 %	▼ 100 %	▼ 100 %	▲ 50% ▼ 50%	▲ 60% ▼ 60%	▲ 60% ▼ 60%	▲ 60% ▼ 60%

Swash type 十字盤類型	H-1				
Gyro gain 尾舵感度	Normal flight / 一般飛行			3D flight / 3D飛行	
	250 PLUS	450 PLUS	250 PLUS	450 PLUS	
	45%(AVCS)	45%(AVCS)	40%(AVCS)	40%(AVCS)	
	450 PRO	500 PRO	450 PRO	500 PRO	
45%(AVCS)	45%(AVCS)	40%(AVCS)	40%(AVCS)		
Normal Throttle Curves 一般飛行油門曲線	P1	P2	P3	P4	P5
	0 %	44 %	65 %	85 %	100 %
Normal Pitch Curves 一般飛行螺距曲線	P1	P2	P3	P4	P5
	44 %	52 %	74 %	84 %	93 %
IDLE-UP Throttle Curves 3D飛行油門曲線	P1	P2	P3	P4	P5
	90 %	90 %	90 %	90 %	90 %
IDLE-UP Pitch Curves 3D飛行螺距曲線	P1	P2	P3	P4	P5
	0 %	25 %	50 %	75 %	100 %

3 JR SYSTEM JR 系統

	THR 油門	AIL 副翼	ELE 升降	RUD 尾舵	GYRO 感度	PIT 螺距			
Servo Reverse 伺服器正反轉	Normal 正向	Reverse 反向	Reverse 反向	Reverse 反向	Normal 正向	Reverse 反向			
D / R 雙重比率		▲ 100 % ▼ 100 %	▲ 100 % ▼ 100 %	▲ 100 % ▼ 100 %					
EXP 動作曲線		▲ 30 % ▼ 30 %	▲ 30 % ▼ 30 %	▲ 15 % ▼ 15 %					
End Point Adjust 伺服器行程量	▲ 100 %	▲ 100 %	▲ 100 %	▲ 100 %	▲ 100 %	250 PLUS	450 PLUS	450 PRO	500 PRO
	▼ 100 %	▼ 100 %	▼ 100 %	▼ 100 %	▼ 100 %	▲ 60% ▼ 60%	▲ 70% ▼ 70%	▲ 70% ▼ 70%	▲ 70% ▼ 70%

Swash type 十字盤類型	H-1				
Gyro gain 尾舵感度	Normal flight / 一般飛行			3D flight / 3D飛行	
	250 PLUS	450 PLUS	250 PLUS	450 PLUS	
	75%(AVCS)	75%(AVCS)	70%(AVCS)	70%(AVCS)	
	450 PRO	500 PRO	450 PRO	500 PRO	
75%(AVCS)	75%(AVCS)	70%(AVCS)	70%(AVCS)		
Normal Throttle Curves 一般飛行油門曲線	P1	P2	P3	P4	P5
	0 %	42 %	65 %	78 %	100 %
Normal Pitch Curves 一般飛行螺距曲線	P1	P2	P3	P4	P5
	44 %	52 %	74 %	84 %	93 %
IDLE-UP Throttle Curves 3D飛行油門曲線	P1	P2	P3	P4	P5
	90 %	90 %	90 %	90 %	90 %
IDLE-UP Pitch Curves 3D飛行螺距曲線	P1	P2	P3	P4	P5
	0 %	25 %	50 %	75 %	100 %



These are the standard channel mapping when satellite receivers are used.
(1) THR (2) AIL (3) ELE (4) RUD (5) GAIN (6) PIT

使用衛星天線時，內部通道已指定為：(1) THR (2) AIL (3) ELE (4) RUD (5) GAIN
(6) PIT

4 SPEKTRUM SYSTEM

SPEKTRUM 系統

	THR 油門	AIL 副翼	ELE 升降	RUD 尾舵	GYRO 感度	PIT 螺距			
Servo Reverse 伺服器正反轉	Normal 正向	Reverse 反向	Reverse 反向	Reverse 反向	Normal 正向	Reverse 反向			
D/R 雙重比率		▲ 100 % ▼ 100 %	▲ 100 % ▼ 100 %	▲ 100 % ▼ 100 %					
EXP 動作曲線		▲ 30 % ▼ 30 %	▲ 30 % ▼ 30 %	▲ 15 % ▼ 15 %					
End Point Adjust 伺服器行程量	▲ 100 %	▲ 100 %	▲ 100 %	▲ 100 %	▲ 100 %	250 PLUS	450 PLUS	450 PRO	500 PRO
	▼ 100 %	▼ 100 %	▼ 100 %	▼ 100 %	▼ 100 %	▲ 60% ▼ 60%	▲ 70% ▼ 70%	▲ 70% ▼ 70%	▲ 70% ▼ 70%

Swash type 十字盤類型	H-1					
Gyro gain 尾舵感度	Normal flight / 一般飛行			3D flight / 3D飛行		
	250 PLUS	450 PLUS	250 PLUS	450 PLUS		
	55%(AVCS)		55%(AVCS)	50%(AVCS)	50%(AVCS)	
	450 PRO	500 PRO	450 PRO	500 PRO		
	55%(AVCS)		55%(AVCS)	50%(AVCS)	50%(AVCS)	
Normal Throttle Curves 一般飛行油門曲線	P1	P2	P3	P4	P5	
	0 %	42 %	65 %	78 %	100 %	
Normal Pitch Curves 一般飛行螺距曲線	P1	P2	P3	P4	P5	
	44 %	52 %	74 %	84 %	93 %	
IDLE-UP Throttle Curves 3D飛行油門曲線	P1	P2	P3	P4	P5	
	90 %	90 %	90 %	90 %	90 %	
IDLE-UP Pitch Curves 3D飛行螺距曲線	P1	P2	P3	P4	P5	
	0 %	25 %	50 %	75 %	100 %	



These are the standard channel mapping when satellite receivers are used.
(1) THR (2) AIL (3) ELE (4) RUD (5) GAIN (6) PIT

使用衛星天線時，內部通道已指定為：(1) THR (2) AIL (3) ELE (4) RUD (5) GAIN
(6) PIT



Rudder Gain Value with the difference between different size of helicopter, generally speaking, observe the heli not to exist any hunting action on the tail (rapidly tilt the heli to the left/right), increase the Gain Value until right before hunting occurs, so that must be adjusted it through the actual conditions of helicopter.

尾舵感度大小會隨著直昇機的不同而有所差異，一般而言，在不產生追蹤現象(尾部出現左、右搖擺的情況)的前提下感度值越高越好，所以必須透過實際飛行的狀況來進行調整。

FEATURES

產品特色

ALIGN**3Axis**

3-axis gyroscopic flybarless system to simulate the stability of mechanical flybar system, yet at the same time achieving agile 3D performance.

3軸無平衡翼系統無平衡翼系統，可模擬有平衡翼系統的穩定性，更有靈活的3D性能。

MEMS

Utilizes MEMS gyro sensors, which feature small footprint, high reliability, and excellent stability.

採用MEMS (Micro Electro Mechanical Systems) 微機電系統技術感測器，具有體積小，可靠性高，穩定性佳的優點。

12bit

Sensor with 12 bit ultra high resolution, resulting in highly precise controls.

感測器12位元，超高解析度，控制細膩精準。

S-FHSS

Supports Futaba S-FHSS 2.4Ghz transmission protocol.

支援Futaba S-FHSS 2.4GHz 傳輸系統。

Supports ALIGN A10 Radio Control System.

支援ALIGN A10 遙控器。

Supports Spektrum and JR satellite receivers.

支援SPEKTRUM與JR衛星天線。

Easy

Simplistic setup process without the need of external devices. Setup is done through 6 steps and 2 sensitivity adjustments.

設定簡單不需額外的介面，只需六個步驟、兩個感度調整即可完成所有設定。

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。

Designed specifically for T-REX 250、T-REX 450、T-REX 470 and T-REX 500, contains optimal flight parameters, no adjustments is needed out of the box to achieve superior flight performance.

針對T-REX 250、T-REX 450、T-REX 470、T-REX 500設計，內建最佳飛行參數，不需調整即有優異性能表現。

3.5V~8.4V

Capable to operate between 3.5V to 8.4V, compatible with high voltage servos.

適用電壓3.5V~8.4V，支援高電壓伺服器。

10g

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。

RoHS

RoHS certified.

符合RoHS限用規章。

1

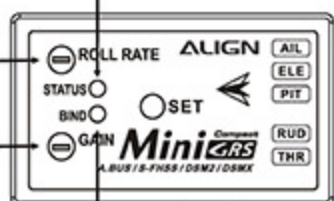
MiniGRS FLYBARLESS SETUP INDICATORS

功能設定指示燈說明

FLYBARLESS SYSTEM SETUP MODE 無平衡翼系統設定模式

Flash 1 time: Aileron neutral point
Flash 2 times: Elevator neutral point
Flash 3 times: Pitch neutral point
Flash 4 times: Rudder neutral point
Flash 5 times: Rudder left travel limit setting
Flash 6 times: Rudder right travel limit setting

閃爍頻率一次：副翼伺服器中立點設定
閃爍頻率二次：升降伺服器中立點設定
閃爍頻率三次：螺距伺服器中立點設定
閃爍頻率四次：尾舵無平衡翼系統正反向設定
閃爍頻率五次：尾舵左舵行程設定
閃爍頻率六次：尾舵右舵行程設定



BIND LED 對頻燈號

STEADY LIT GREEN LED : Radio binding successfully
FLASHING GREEN LED : Radio binding failed
STEADY LIT RED LED : No signal detected

綠燈恆亮：對頻成功
綠燈閃爍：對頻失敗
紅燈恆亮：無發射訊號

ROLL RATE ADJUSTMENT DIAL 滾轉速率調整鈕

Roll rate dial is used to adjust the roll rate of helicopter's elevator and aileron; turning clockwise will increase roll rate, with faster elevator and aileron response; turning counter-clockwise will decrease roll rate, with slower elevator and aileron response. We recommend novice pilots to fly with lower roll rate.

滾轉速率旋鈕為調整直昇機升降、副翼滾轉速率，往順時針調大滾轉速率，升降與副翼反應會變快，往逆時針調低滾轉速率，升降與副翼反應會變慢，初階入門者建議把滾轉速率調低飛行。



GAIN ADJUSTMENT DIAL 感度調整旋鈕

Should there be any oscillation on aileron or elevator during flight, reduce the gain by turning the dial counter-clockwise approximately 10 degrees at a time.
Should there be any drift front/rear/left/right during flight, increase the gain by turning the dial clockwise approximately 10 degrees at a time.

飛行時若機體有左右或前後抖動，表示感度偏高，請逆時針調整感度旋鈕，以每次調整約10度方式，調整至適當位置。飛行時若機體有左右或前後飄移時，表示感度偏低，請順時針調高感度旋鈕，以每次10度方式調整至適當位置。



1. During pre-flight check, please ensure MiniGRS is securely mounted, and there are sufficient battery in the transmitter.
 2. There is a key to mount MiniGRS on the T-REX 250 and T-REX 450 helicopters. Do not alter the mounting direction, otherwise incorrect compensation may result in danger of crashing.
MiniGRS installed on T-REX 250 and T-REX 450: MiniGRS must face down, antenna point towards front of the helicopter. MiniGRS installed on T-REX 500: MiniGRS must face down, antenna point towards tail of the helicopter.
 3. After MiniGRS has bounded with transmitter, please ensure MiniGRS power indicator is lit correctly, and that swashplate and rudder is compensating the correct direction.
 4. To ensure proper initialization of MiniGRS, please keep the helicopter stationary during power up, do not move any transmitter sticks.
 5. Please ensure the swashplate setting in transmitter is set to H-1 prior to making any setting changes.
 6. While setting neutral position of servos, all steps must be completed before power is turned off, otherwise servos neutral setting will fail. To ensure optimal flight performance, please ensure swashplate is level during swashplate neutral setting.
 7. Adjustment of elevator and aileron roll rate must be done with the dials on MiniGRS, do not adjust elevator and aileron travel end points on transmitter. On the other hand, rudder speed is adjusted through rudder end points.
 8. To achieve optimal flight performance, pitch(CH6) and rudder (CH4)travel can be adjusted on the transmitter, but do not adjust elevator and aileron end points on transmitter.
 9. Elevator and Aileron gyro gain must be adjusted through the dials on MiniGRS unit. Rudder gyro gain is adjusted through transmitter's GYRO SENS function.
 10. To ensure optimal signal reception, MiniGRS antennas should be at least 1/2 inch away from conductive material, and should not be bent excessively. Try to keep the transmitter close to MiniGRS during binding. Should it unintentionally bind to another transmitter, just perform binding process again.
1. 在每次飛行之前，請確認MiniGRS是否固定良好，並且檢查發射器電力是否足夠。
 2. MiniGRS安裝在直昇機上的方式只有一種，請勿任意更改安裝方向，以免修正錯誤造成危險。
T-REX250、T-REX 450：必須面板朝下，天線朝前；T-REX 500：必須面板朝下，天線朝機尾方向。
 3. 發射器和MiniGRS完成對頻後，請確認MiniGRS開機燈號以及十字盤和尾舵的修正是否正確。
 4. 開機時請保持直昇機靜止，且不要動發射器任何搖桿，以免MiniGRS初始化錯誤。
 5. 在進入所有設定之前，請確認發射器的十字盤類型須為H-1模式。
 6. 在設定伺服機中立點位置時，必須把全部步驟完成才可將電源關閉，否則設定值將不被記憶。設定伺服機中立點位置時請將十字盤調成水平以獲得最佳飛行性能。
 7. 調整升降及副翼的滾轉速率時只能用MiniGRS上的旋鈕來調整，不可利用發射器上的升降和副翼行程選項來調整。調整尾舵速率時則必須利用發射器上的尾舵行程來調整。
 8. 為獲得最佳飛行性能，可以調整發射器上的螺距(CH6)以及尾舵(CH4)的行程，但不可調整發射器上的升降和副翼行程。
 9. 升降及副翼的陀螺感度必須用MiniGRS上的旋鈕調整，尾舵的陀螺感度請利用發射器的GYRO SENS選項來調整。
 10. MiniGRS的天線位置應遠離導電材料至少半英吋的距離，且不要過度彎曲，以獲得最佳的射頻信號。發射器和MiniGRS對頻時，請盡量靠近。若對到別組發射器時，重新對頻即可。

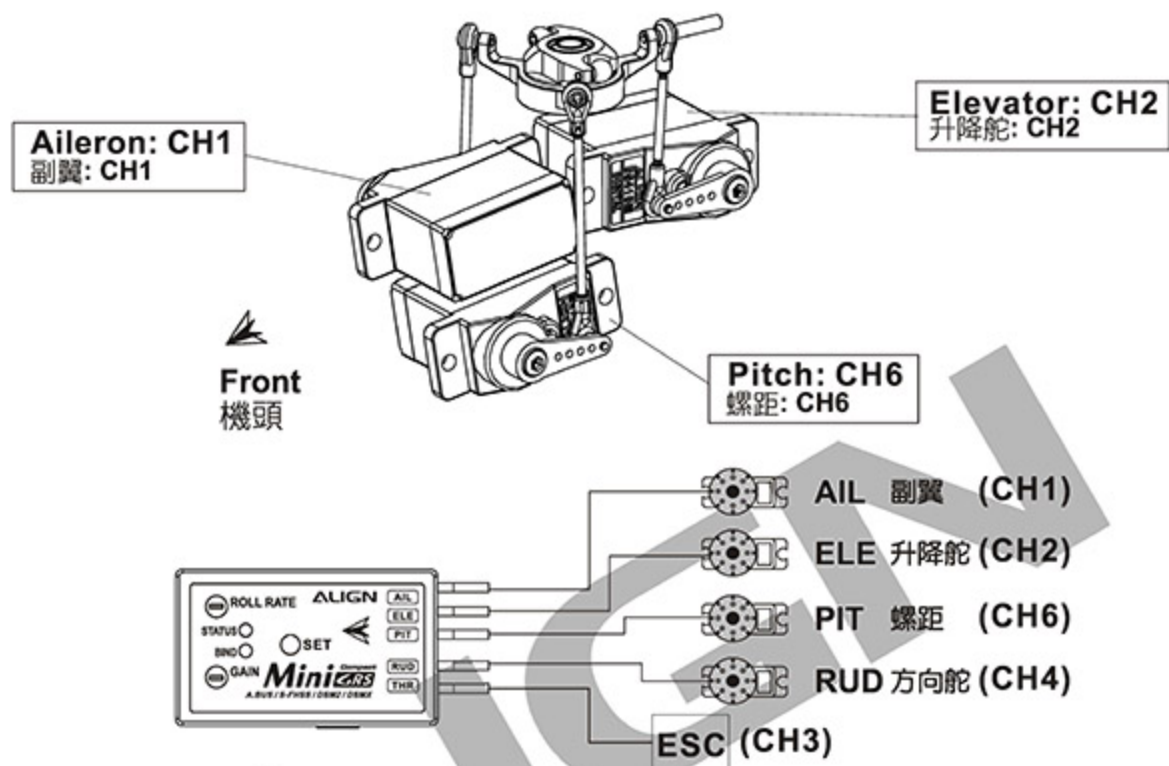
3

CONNECTIVITY METHOD

MiniGRS 接線方式

1 T-REX 250 CONNECTIVITY METHOD

T-REX 250 接線方式

CAUTION
注意

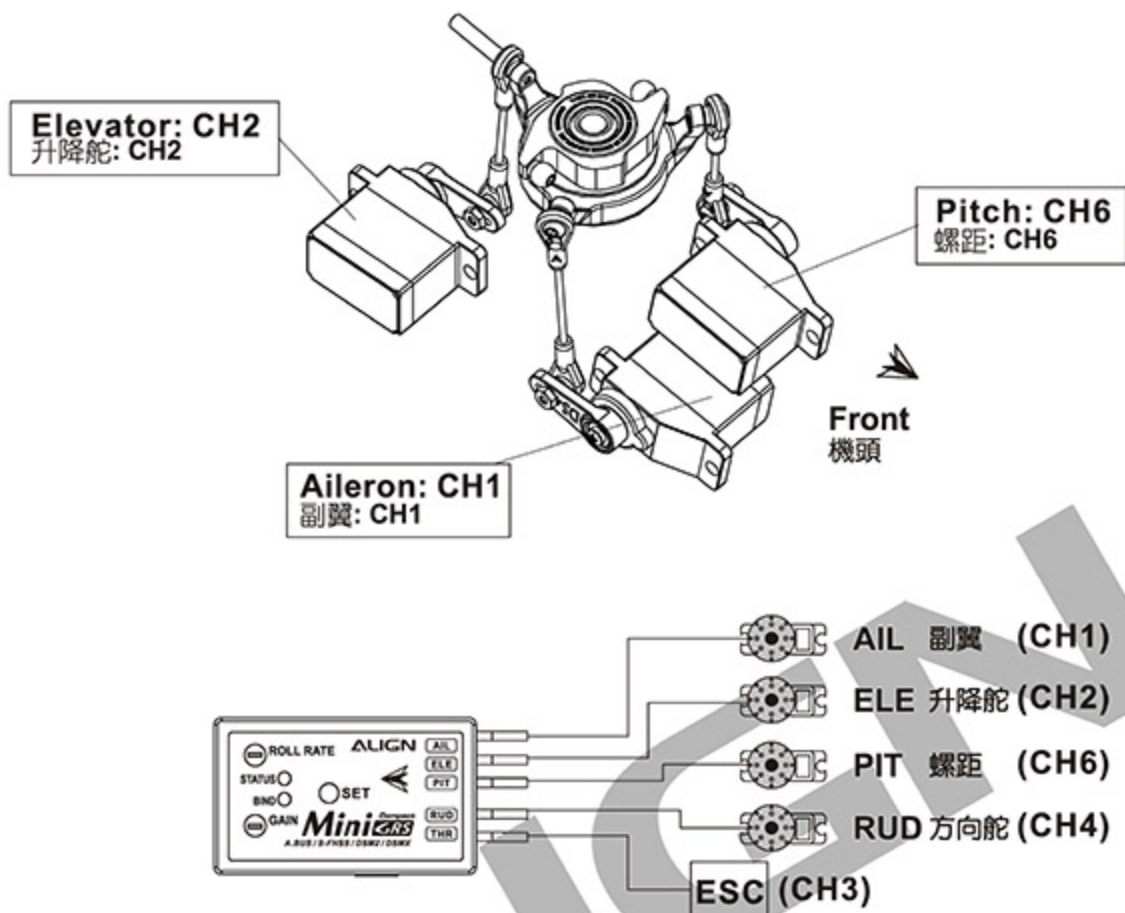
Please ensure the swashplate setting in transmitter is set to H-1 prior to making any setting changes.

請確認發射器的十字盤類型須為 H-1 模式。

- Servo can only be installed in this orientation when MiniGRS is used: with head point forward, right forward is aileron (CH1), left forward is pitch (CH6), right-rear is elevator (CH2). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
 - Swashplate type setting on the transmitter should be set to H1 traditional swashplate type.
 - If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS model setting is set to T-REX 250.
 - To avoid damages to system, digital servos must be used for swashplate. Recommend servo specification: speed of 0.09s/60 degrees or faster; torque 2.2kg or higher.
- 使用 MiniGRS 伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼(CH1)；左前為螺距(CH6)；右後為升降(CH2)。CH1、CH6不可換。如果沒依照圖示連結，直昇機動作會不正確。
 - 遙控器十字盤類型，必須選擇 H1 十字盤模式。
 - 依照圖式安裝完畢，如果十字盤動作不正確，請檢查 MiniGRS 機型設定是否為 T-REX 250。
 - 十字盤必須安裝數位伺服器，否則會造成損壞。
建議規格：速度 0.09 秒 / 60 度以內；扭力 2.2kg 以上。

2 T-REX 450 PLUS/SPORT CONNECTIVITY METHOD

T-REX 450 PLUS/SPORT 接線方式



注意

Please ensure the swashplate setting in transmitter is set to H-1 prior to making any setting changes.

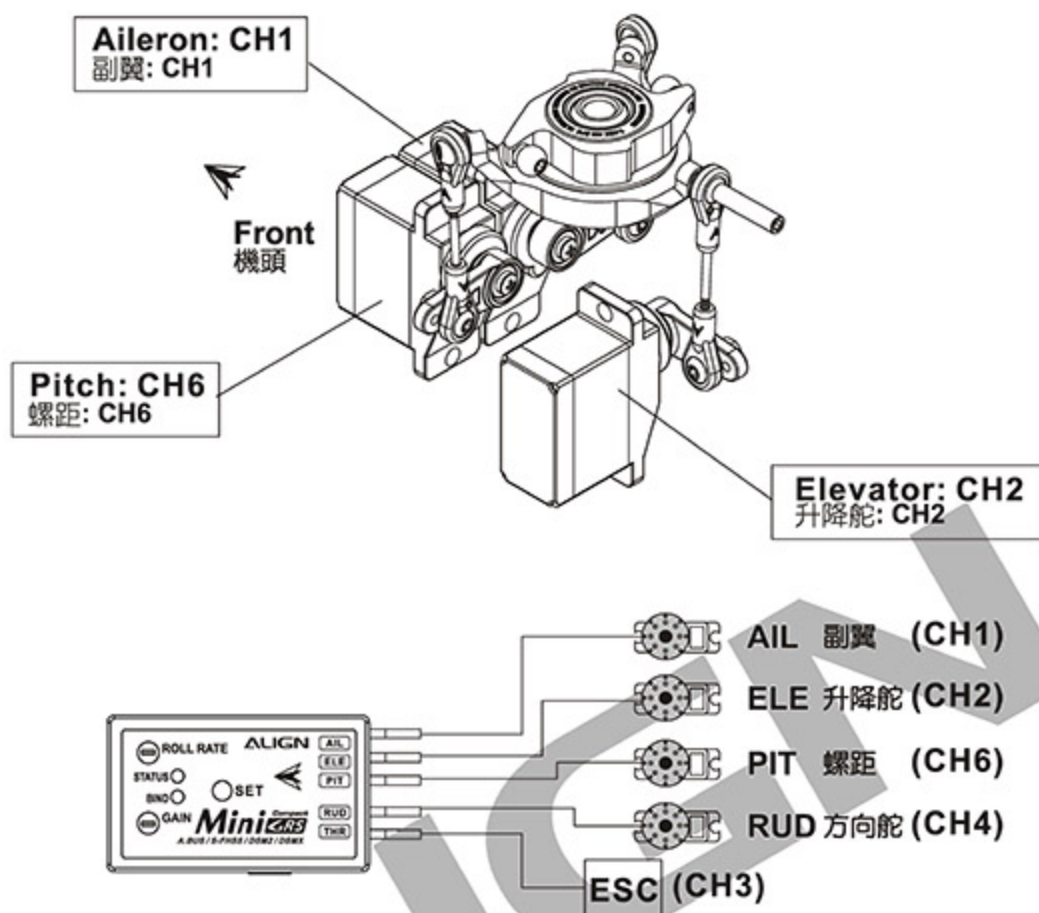
請確認發射器的十字盤類型須為H-1模式。

1. Servo can only be installed in this orientation when MiniGRS is used: with head point forward, right forward is aileron (CH1), left forward is pitch (CH6), right-rear is elevator (CH2). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
2. Swashplate type setting on the transmitter should be set to H1 traditional swashplate type.
3. If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS model setting is set to T-REX 450 Sport/PLUS DFC.
4. To avoid damages to system, digital servos must be used for swashplate. Recommend servo specification: speed of 0.11s/60 degrees or faster; torque 4.6kg or higher.

1. 使用 MiniGRS 伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼(CH1)；左前為螺距(CH6)；右後為升降(CH2)。CH1、CH6不可換。如果沒依照圖示連結，直昇機動作會不正確。
2. 遙控器十字盤類型，必須選擇H1十字盤模式。
3. 依照圖式安裝完畢，如果十字盤動作不正確，請檢查 MiniGRS 機型設定是否為 T-REX450 SPORT /PLUS DFC。
4. 十字盤必須安裝數位伺服器，否則會造成損壞。
建議規格：速度 0.11 秒 /60 度以內；扭力 4.6kg 以上。

3 T-REX 450 PRO/470L/500X CONNECTIVITY METHOD

T-REX 450 PRO/470L/500X 接線方式



Please ensure the swashplate setting in transmitter is set to H-1 prior to making any setting changes.

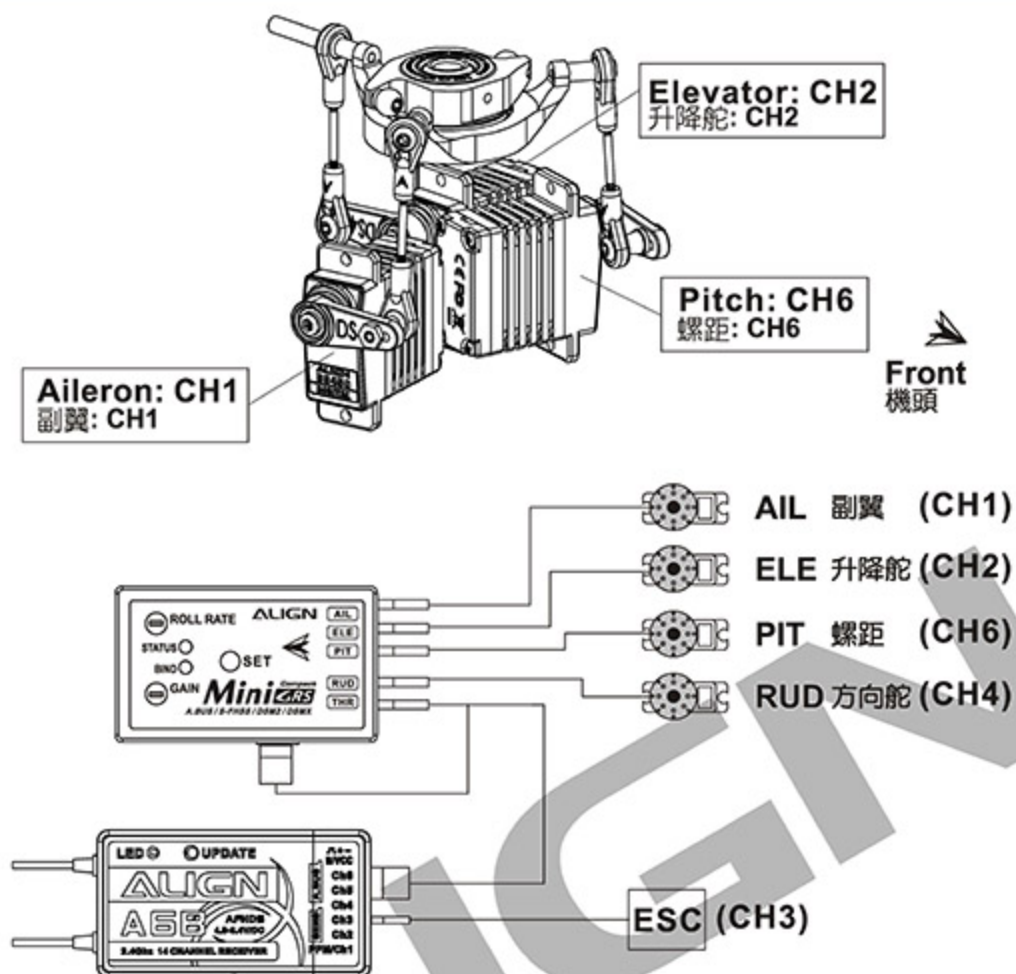
請確認發射器的十字盤類型須為H-1模式。

1. Servo can only be installed in this orientation when MiniGRS is used: with head point forward, right forward is aileron (CH1), left forward is pitch (CH6), left-rear is elevator (CH2). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
2. Swashplate type setting on the transmitter should be set to H1 traditional swashplate type.
3. If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS model setting is set to T-REX 450 PRO/470L/500X.
4. To avoid damages to system, digital servos must be used for swashplate. Recommend servo specification: speed of 0.09s/60 degrees or faster; torque 2.2kg or higher.

1. 使用 MiniGRS 伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼(CH1)；左前為螺距(CH6)；左後為升降(CH2)。CH1、CH6不可換。如果沒依照圖示連結，直昇機動作會不正確。
2. 遙控器十字盤類型，必須選擇H1十字盤模式。
3. 依照圖式安裝完畢，如果十字盤動作不正確，請檢查MiniGRS機型設定是否為T-REX450 PRO/470L/500X。
4. 十字盤必須安裝數位伺服器，否則會造成損壞。
建議規格：速度0.09秒/60度以內；扭力2.2kg以上。

4 T-REX 450L CONNECTIVITY METHOD

T-REX 450L 接線方式



Front
機頭



注意

Please ensure the swashplate setting in transmitter is set to H-1 prior to making any setting changes.

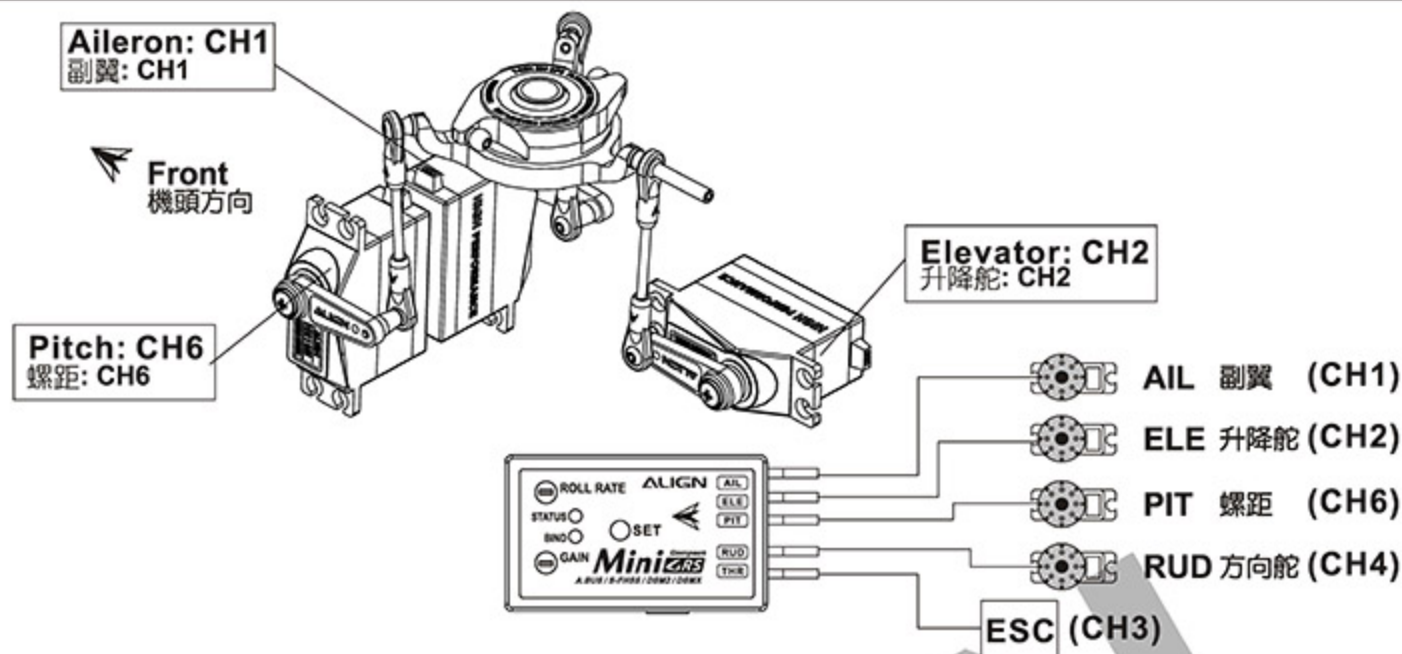
請確認發射器的十字盤類型須為 H-1 模式。

1. Servo can only be installed in this orientation when MiniGRS Flybarless System is used: with head point forward, right forward is aileron (CH1), left forward is pitch (CH6), mid-rear is elevator (CH2). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
2. Swashplate type setting on the transmitter should be set to H1 traditional swashplate type.
3. If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS Flybarless System model setting is set to T-REX 450L.
4. To avoid damages to system, digital servos must be used for swashplate. Recommend servo specification: speed of 0.09s/60 degrees or faster; torque 2.2kg or higher.

1. 使用 MiniGRS 無平衡翼系統 伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼 (CH1)；左前為螺距 (CH6)；中後為升降 (CH2)。CH1、CH6 不可換。如果沒依照圖示連結，直昇機動作會不正確。
2. 遙控器十字盤類型，必須選擇 H1 十字盤模式。
3. 依照圖式安裝完畢，如果十字盤動作不正確，請檢查 MiniGRS 無平衡翼系統機型設定是否為 T-REX450L。
4. 十字盤必須安裝數位伺服器，否則會造成損壞。
建議規格：速度 0.09 秒 /60 度以內；扭力 2.2kg 以上。

5 T-REX 500 PRO CONNECTIVITY METHOD

T-REX 500 PRO 接線方式



注意

Please ensure the swashplate setting in transmitter is set to H-1 prior to making any setting changes.

請確認發射器的十字盤類型須為 H-1 模式。

1. Servo can only be installed in this orientation when MiniGRS is used: with head point forward, right forward is aileron (CH1), left forward is pitch (CH6), right-rear is elevator (CH2). CH1 and CH6 cannot be interchanged, otherwise helicopter will not function correctly.
2. Swashplate type setting on the transmitter should be set to H1 traditional swashplate type.
3. If swashplate movement is incorrect after assembly per instruction, please double check to see if MiniGRS model setting is set to T-REX 500 PRO.
4. To avoid damages to system, digital servos must be used for swashplate. Recommend servo specification: speed of 0.11s/60 degrees or faster; torque 4.6kg or higher.

1. 使用 MiniGRS 伺服器的安裝方式只有一種。當機頭朝前時，右前為副翼(CH1)；左前為螺距(CH6)；右後為升降(CH2)。CH1、CH6不可換。如果沒依照圖示連結，直昇機動作會不正確。
2. 遙控器十字盤類型，必須選擇 H1 十字盤模式。
3. 依照圖式安裝完畢，如果十字盤動作不正確，請檢查 MiniGRS 機型設定是否為 T-REX500 PRO。
4. 十字盤必須安裝數位伺服器，否則會造成損壞。
建議規格：速度 0.11 秒 / 60 度以內；扭力 4.6kg 以上。

4 MODEL SELECTION

機型選擇

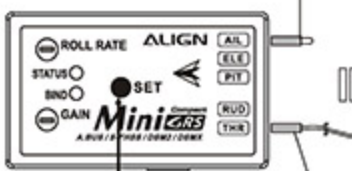
MiniGRS is a flybarless stabilization system designed specifically for Align's smaller helicopters, with integrated basic setup parameters for T-REX 250、T-REX 450 SPORT/PLUS DFC、T-REX 450 PRO/470L/500X、T-REX 450L、T-REX 500 PRO. The MiniGRS unit bundled with T-REX 450 PLUS DFC comes already configured for the specific helicopter. Follow the steps below to reconfigure the helicopter type.

MiniGRS 是特別針對亞拓小型直昇機設計的無平衡翼系統，內建 T-REX 250、T-REX 450 SPORT/PLUS DFC、T-REX 450 PRO/470L/500X、T-REX 450L、T-REX 500 PRO 機型的基本參數設定，並為此上述機型專用的無平衡翼系統，可以參照下列方式來做機型更改。

1 MODEL DISPLAY

機型顯示

Binding Plug
對頻金鑰




4.8V~6.0V power input
輸入4.8V~6.0V 電源

Hold The Set Button.
按SET鍵不放

Insert binding plug into AIL port, press and hold SET, then insert 4.8~6.0V power into RUD of THR port.

對頻金鑰接上 AIL 端，按著 SET 鍵不放。
接著從 RUD 或 THR 端送入 4.8V~6.0V 電源。

1. Red LED lit
亮紅燈




2. Release SET button
放開SET鍵

When STATUS LED is lit steady red, release SET button and MiniGRS will display current model.

當 STATUS 燈呈現紅燈恆亮後，放開 SET 鍵 MiniGRS 就會開始顯示目前機型。

Status LED indicator for the existing model.
STATUS 燈號顯示目前的機型




STATUS LED flashes RED once, 250
STATUS LED flashes RED twice, 450SPORT / PLUS
STATUS LED flashes RED thrice, 450PRO 470L/500X
STATUS LED flashes RED four times, 500

STATUS紅燈閃爍頻率1次，250
STATUS紅燈閃爍頻率2次，450 SPORT / PLUS
STATUS紅燈閃爍頻率3次，450 PRO/470L/500X
STATUS紅燈閃爍頻率4次，500。

2 MODEL SELECTION

選擇機型

Choose heli model and hold the set button
選擇機型後，按SET鍵不放




T-REX 450

Pull out the binding plug, connect to the channel corresponding to the model.
AIL : T-REX 250
ELE: T-REX 450 SPORT / PLUS
PIT : T-REX 450 PRO / 470L / 500X / 450L
RUD : T-REX 500

將對頻金鑰拔下，接到對應機型的頻道上。
AIL : T-REX 250
ELE: T-REX 450 SPORT / PLUS
PIT : T-REX 450 PRO / 470L / 500X / 450L
RUD : T-REX 500

1. Flash alternately in red and green, model changing
紅、綠交錯閃爍，更改機型中




2. Release The Set Button
放開SET鍵

When STATUS and BIND LED's flash alternately in red and green, release the SET button.

選擇好機型後按 SET 鍵不放，當 STATUS 與 BIND 燈紅、綠交錯閃爍，表示更改機型設定完成，設定完成後就可放開 SET 鍵。

Status LED indicator for the existing model.
STATUS 燈號顯示目前的機型



STATUS LED flashes RED once, 250
STATUS LED flashes RED twice, 450SPORT/PLUS
STATUS LED flashes RED thrice, 450PRO/470L/500X
STATUS LED flashes RED four times, 500

STATUS紅燈閃爍頻率1次，250
STATUS紅燈閃爍頻率2次，450 SPORT / PLUS
STATUS紅燈閃爍頻率3次，450 PRO/470L/500X
STATUS紅燈閃爍頻率4次，500

STATUS LED will flash to indicate the selected model type. Pull out power and binding plugs to complete setting.
此時 STATUS 燈就會呈現所選機型的燈號，最後拔掉電源與對頻金鑰就完成設定。

5

TRANSMITTER BINDING

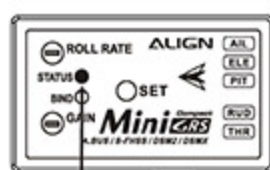
遙控器對頻

1 USING FUTABA S-FHSS 使用FUTABA S-FHSS

STEP 1

Turn on transmitter, connect MiniGRS to power source. If signal is detected, BIND LED will flash green, otherwise it will flash red. If transmitter is turned on, but BIND is still steady red, then power cycle MiniGRS so it will restart transmitter signal search.

打開遙控器，將MiniGRS接上電源後，若偵測到遙控器訊號，但未完成對頻BIND燈號會綠燈閃爍。若已開啟發射器，但BIND燈為紅燈恆亮，請將MiniGRS重新給電源，重新尋找遙控器訊號。



STEADY LIT GREEN LED : Radio binding successfully
FLASHING GREEN LED : Radio binding failed
STEADY LIT RED LED : No signal detected

綠燈恆亮：對頻成功
綠燈閃爍：對頻失敗
紅燈恆亮：無發射訊號

CAUTION 注意

If the LED status appears steady lit green, it mean the binding is successfully. Please skip Step 2.

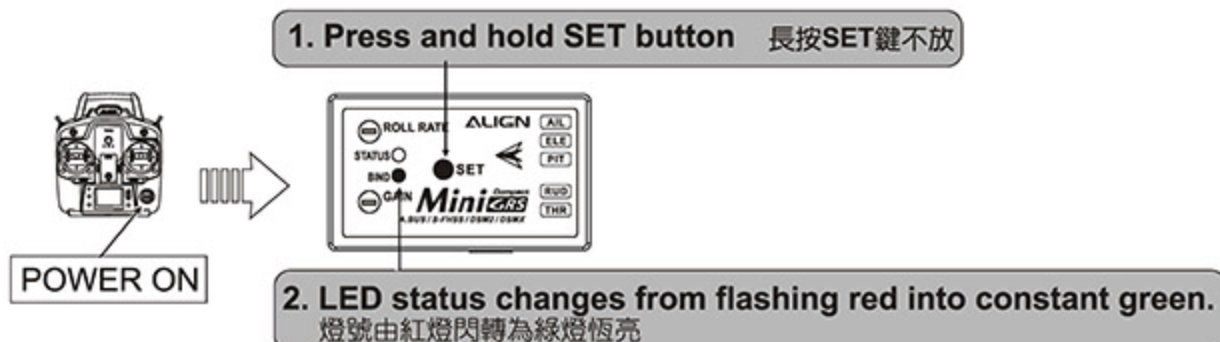
If the LED status appears flashing green or steady lit red, it means the binding is failed. Please proceed Step 2 for rebind.

若燈號為綠燈恆亮，代表對頻成功，不須進行步驟2重新對頻；
若燈號為綠燈閃爍或紅燈恆亮，代表對頻失敗，則進行步驟2重新對頻。

STEP 2

Press and hold SET button, at this time BIND LED will be flashing red, hold the SET button until BIND LED shows steady green, then release SET button to complete binding.

按著SET鍵不放，此時BIND燈號會紅燈閃爍，直到BIND燈號顯示綠燈恆亮後，放開SET鍵即完成對頻。

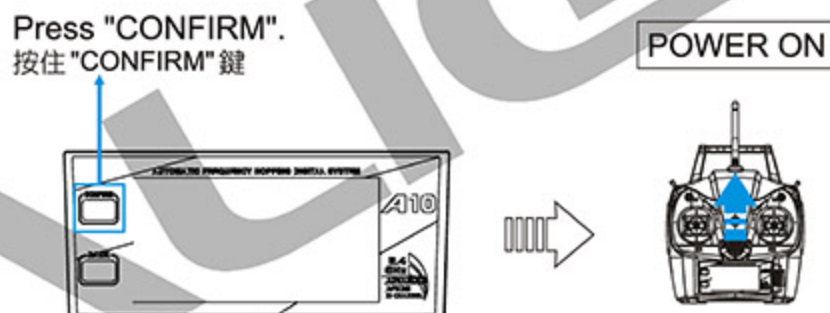


2 USING ALIGN A10 TRANSMITTER 使用 ALIGN A10 遙控器

STEP 1

Turn on transmitter while simultaneously pressing "CONFIRM" button to enter the bind process.

按住 ALIGN A10 遙控器的 "CONFIRM" 鍵不動，然後開啟遙控器電源，進入對頻模式。



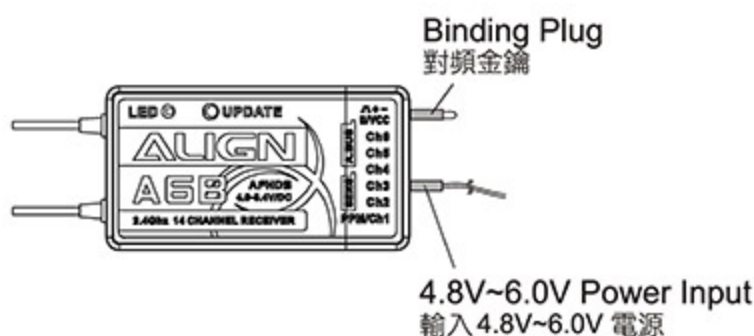
STEP 2

1. Connect the Binding Plug on ALIGN A6B B/VCC port.

2. Supply power to A6B receiver. LED light will flash and start binding, then solid light after completed binding. Remove Binding Plug to finish binding process.

1. 先將對頻金鑰接到 ALIGN A6B 接收機上的 B/VCC。

2. 接收機供給電源，A6B 接收機上的 LED 燈號會快閃進入對頻，對頻完成後 LED 會呈現恆亮。移除對頻金鑰即完成對頻。



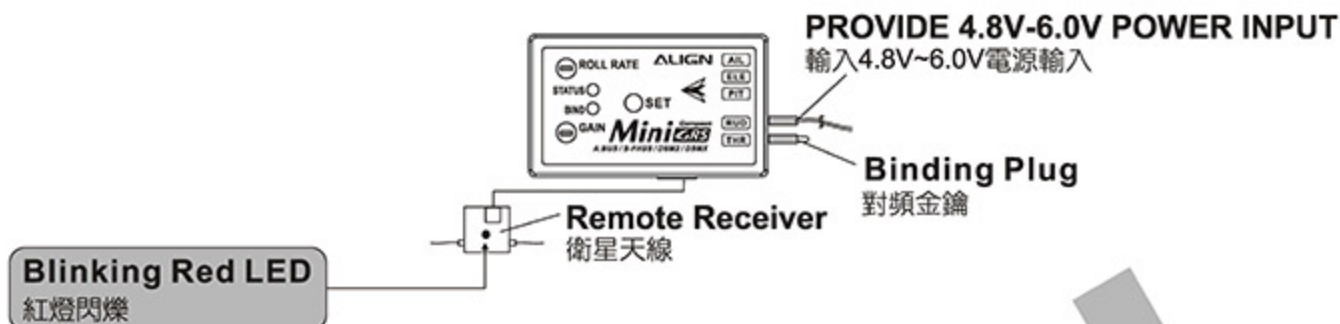
3 USING DSM2 SATELLITE RECEIVERS

使用DSM2 衛星天線

STEP 1

1. Plug the satellite receiver into ANT port, and the binding plug on THR channel.
2. After feeding 5-6V power through RUD or any other channels, BIND LED will turn steady red, while satellite LED flashes red.

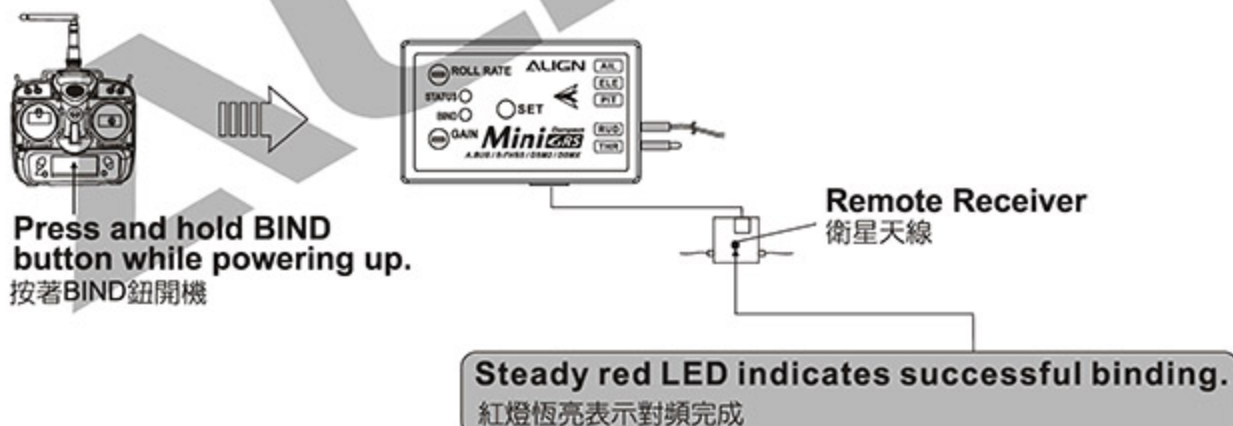
1. 先將衛星天線接到ANT插槽，並且把對頻線接在THR通道。
2. 由RUD或其於通道供給5~6V電源後，此時BIND燈為紅燈恆亮，衛星天線為紅燈閃爍。



STEP 2

1. Press and hold the BIND button on Spektrum/JR transmitter, power on the transmitter, wait for transmitter to display iniding "Binding," then release BIND button.
2. When satellite receiver LED shows steady lit RED, remove the binding plug from THR channel.
3. When STATUS and BIND LEDs turn into steady green, this indicates binding complete and MiniGRS initialized successfully. The system is ready for use.

1. 壓住SPEKTRUM/JR發射器的BIND按鈕後，打開發射器電源，直到發射器面板上顯示Binding字樣，在放開BIND。
2. 等到衛星天線為紅燈恆亮後，將接在THR通道的對頻線移除。
3. 等到STATUS和BIND燈為綠燈恆亮時，表示對頻以完成且MiniGRS開機成功，可正常執行功能。



4 USING DSMX SATELLITE RECEIVERS

使用DSMX 衛星天線

STEP 1

1. Plug the satellite receiver into ANT port, and the binding plug on THR channel.
2. Press and hold the SET button on MiniGRS, and feed 5-6V power through RUD or any other channels, BIND LED will turn steady red, while satellite LED flashes red.

1. 先將衛星天線接到ANT插槽，並且把對頻線接在THR通道。
2. 按著MiniGRS的SET鍵後，再由RUD或其於通道供給5~6V電源，此時BIND燈為紅燈恆亮，衛星天線為紅燈閃爍。

Press and hold BIND button while powering up.

按住SET鍵不放，然後輸入電源

PROVIDE 4.8V-6.0V POWER INPUT

輸入4.8V~6.0V電源輸入

Blinking Red LED

紅燈閃爍

Remote Receiver

衛星天線

Binding Plug

對頻金鑰

STEP 2

1. Press and hold the BIND button on Spektrum transmitter, power on the transmitter, wait for transmitter to display "Binding," then release BIND button.
 2. When satellite receiver LED shows steady lit RED, remove the binding plug from THR channel.
 3. When STATUS and BIND LEDs turn into steady green, this indicates binding complete and MiniGRS initialized successfully. The system is ready for use.
1. 壓住SPEKTRUM/JR發射器的BIND按鈕後，打開發射器電源，直到發射器面板上顯示Binding字樣，在放開BIND。
 2. 等到衛星天線為紅燈恆亮後，將接在THR通道的對頻線移除。
 3. 等到STATUS和BIND燈為綠燈恆亮時，表示對頻以完成且MiniGRS開機成功，可正常執行功能。



Press and hold BIND button while powering up.

按著BIND鈕開機



Remote Receiver

衛星天線

Steady red LED indicates successful binding.

紅燈恆亮表示對頻完成

CAUTION 注意

1. If both Spektrum and Futaba transmitters are powered up (both have previously bound to MRS), and a satellite receiver is connected to MiniGRS, the MiniGRS will select Spektrum system after power up. If no satellite receivers are connected, MiniGRS will select Futaba system.
 2. If a satellite receiver is connected to MiniGRS, and only Futaba transmitter is powered up, MiniGRS will select Futaba system after power up. If Spektrum transmitter is powered up afterwards, MiniGRS will not switch over to Spektrum system.
 3. On the other hand, if Spektrum transmitter is powered up and MiniGRS has already selected Spektrum system, subsequent power up of Futaba transmitter will not cause MiniGRS to switch over to Futaba system.
1. 如果Spektrum發射器和Futaba發射器都在開啟狀態(先前都已經和MRS對頻)，且MiniGRS有接衛星天線，若此時將MiniGRS開機，MiniGRS會選擇Spektrum系統。如果沒有接衛星天線，MiniGRS會選擇Futaba系統。
 2. 如果MiniGRS有接衛星天線，且只有Futaba發射器先開啟，若此時將MiniGRS開機，MiniGRS會選擇Futaba系統。即便後來再將Spektrum發射器開啟，MiniGRS也不會轉到Spektrum系統上。
 3. 反之，若Spektrum發射器先開啟，MiniGRS選擇Spektrum系統後，即便再將Futaba發射器開啟，MiniGRS也不會轉到Futaba系統上。

FAILSAFE (LAST POSITION HOLD)

失控保護 (保留最後指令)

When helicopter lost connectivity with your radio under this setting, all channels will hold at the last command position, except throttle channel which goes to a preset position.

1. Push throttle stick to the desired fail safe position.
2. Please refer to P.24 binding method, and perform radio binding steps.
3. After successful binding, do not power off the MiniGRS, unplug the binding plug and allow MiniGRS to enter initializing process. The last position hold function will be active after the MiniGRS initializes.
4. Test Method: Power off transmitter. The throttle channel should move to preset position, while all other channels should hold in their last position.

在此模式下，若您的直昇機與遙控器失連，除油門頻道為預設位置，其餘頻道皆為最後指令位置。

1. 將油門搖桿放置於您所需要的預設安全位置
2. 依照24頁的對頻方式，執行與遙控器的對頻動作。
3. 與遙控器完成對頻動作後，不要關閉MiniGRS電源，先將對頻接頭拔除，MiniGRS會進入開機狀態，待MiniGRS開機完成後，即完成保留最後指令設定。
4. 測試方法：將遙控器關機，除了油門頻道為預設安全位置外，其餘頻道都為失連前的最後指令位置。

FAILSAFE (PRE-SET POSITION HOLD)

失控保護 (回復預設值)

When helicopter lost connectivity with your radio under this setting, all channels will move to the pre-set position.

1. Please refer to P.24 binding method, and power up the MiniGRS. After the rapid flash of satellite's LEDs, Pull the binding plug off.
2. Power up radio transmitter, and perform radio binding steps. After radio is bound, LED on the satellite antennas will end the rapid flash, following by slower flash.
3. Move the transmitter sticks to the desired failsafe position while the LED is flashing in slower mode.
4. Satellite antenna's LED will lit up after 5 seconds, and MiniGRS goes through initializing process. The failsafe position will be set after the MiniGRS initializes.
5. Test Method: Power off transmitter, and all channels should move to the pre-set failsafe position.

在此模式下，若您的直昇機與遙控器失連，所有頻道為預設安全位置。

1. 依照24頁的對頻方式，先開啟MiniGRS電源，待衛星天線上LED快速閃爍後，將對頻接頭拔除。
2. 開啟遙控器電源，執行與遙控器的對頻動作，對頻完成瞬間衛星天線上LED會由快速閃爍狀態熄滅，之後再亮起改為慢速閃爍。
3. 在慢速閃爍狀態時，將遙控器上的所有搖桿放置於您所需要的預設安全位置。
4. 5秒後衛星天線LED燈為恆亮，MiniGRS進入開機狀態，待MiniGRS開機完成後，即完成失控保護設定。
5. 測試方法：將遙控器關機，所有頻道為預設安全位置。

6

MiniGRS SETTINGS

MiniGRS 設定



In order for the settings to stick, all 6 setting parameters for MiniGRS must be completed followed with a press of SET button, regardless if any changes are made for each settings.

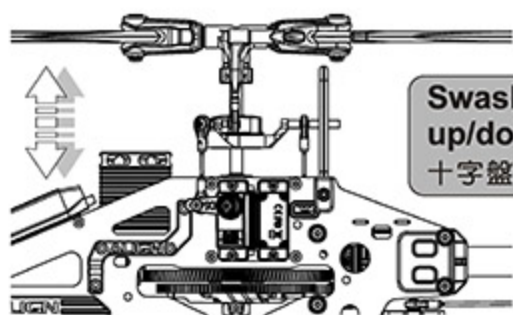
MiniGRS的六項設定，不論有無更動，皆須逐一完成，並按下SET鍵退出設定，否則MiniGRS將不會記憶設定。

1 MiniGRS INITIALIZATION

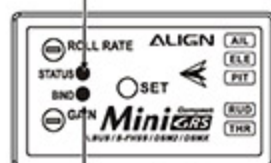
MiniGRS開機

Connect power, if transmitter binding is successful, BIND LED will light solid green; otherwise it will flash green. At this time, STATUS LED lights green indicates successful power up, steady green means rudder is in heading lock mode; steady red means rudder is in non-heading lock mode. Swashplate will jump up and down 3 times after power up.

接上電源，若和遙控器對頻成功後，BIND 燈為綠燈恆亮，否則綠燈閃爍。此時 STATUS 燈亮起代表開機成功，綠燈恆亮，代表尾舵為鎖定。紅燈恆亮，代表尾舵為非鎖定。開機完成時，十字盤會跳三下。



Swashplate jumps up/down 3times
十字盤跳三下



Status LED steady lit
狀態燈恆亮

Binding Green LED steady lit
對頻燈綠燈恆亮

2 ENTERING MiniGRS SETUP

進入MiniGRS設定

Power up transmitter, connect power to MiniGRS. When STATUS and BIND LEDs are light steady green, SET button is used to enter setup mode.

先打開遙控器，將MiniGRS接上電源後，當STATUS和BIND燈號為綠燈恆亮時，表示開機完成，此時按SET鍵一次即可進入設定。

After system initializes, press SET once to enter MiniGRS setup mode. While in setup mode, STATUS LED will flash a number of times indicating the current setting selection. Press SET button to skip to next setting selection. MiniGRS must complete all 6 setting selections before the settings are memorized.

開機完成後，按SET鍵一次就會進入MiniGRS設定。進入設定後STATUS燈會以閃爍次數代表所進入的設定選項。接續按SET鍵就會跳往下個設定選項，MiniGRS必須完成6項設定才會記憶設定內容。

- Flash 1 time: Aileron neutral point
- Flash 2 times: Elevator neutral point
- Flash 3 times: Pitch neutral point
- Flash 4 times: Rudder neutral point
- Flash 5 times: Rudder left travel limit setting
- Flash 6 times: Rudder right travel limit setting

- 閃爍頻率一次：副翼伺服器中立點設定
- 閃爍頻率二次：升降伺服器中立點設定
- 閃爍頻率三次：螺距伺服器中立點設定
- 閃爍頻率四次：尾舵無平衡翼系統正反向設定
- 閃爍頻率五次：尾舵左舵行程設定
- 閃爍頻率六次：尾舵右舵行程設定



Press SET button to enter Setup
按SET鍵進入設定

Throttle Stick Fixed Position

油門搖桿固定

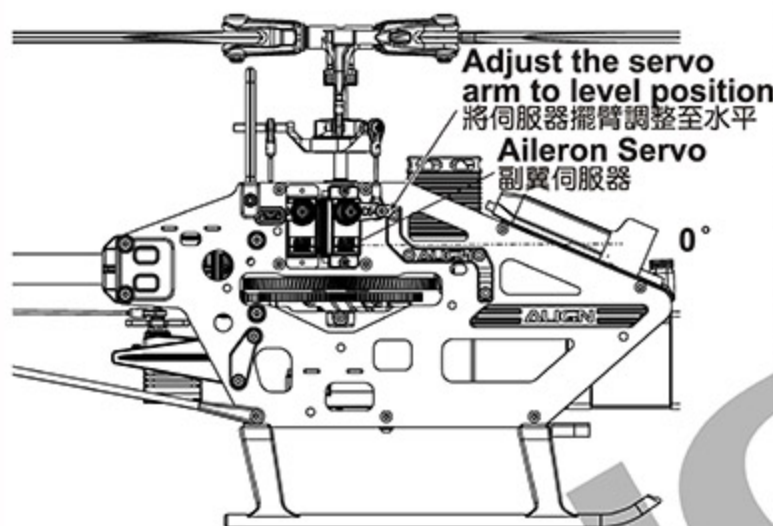




1. Disconnect motor to ESC to prevent accidental startup during setup.
 2. The throttle stick must remain in center position during setup (or Switch HOLD), pitch curve must be at 50% position and remain fixed.
1. 設定前先拔除馬達線，避免設定中使馬達運轉造成危險。
 2. 設定時油門搖桿需置於中間，螺距曲線 50% 輸出的位置 (或切入 HOLD 模式)，不可再移動。

AILERON SERVO NEUTRAL POINT SETTING

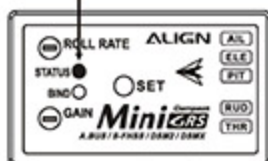
副翼伺服器中立點設定



Momentarily press SET button first time, if STATUS LED flashes once continuously and BIND LED is off, this indicates you are in neutral setting mode of servo 1. At this time you can use RUD on transmitter to trim the neutral position of servo 1. After completing this setting it will proceed into next step.

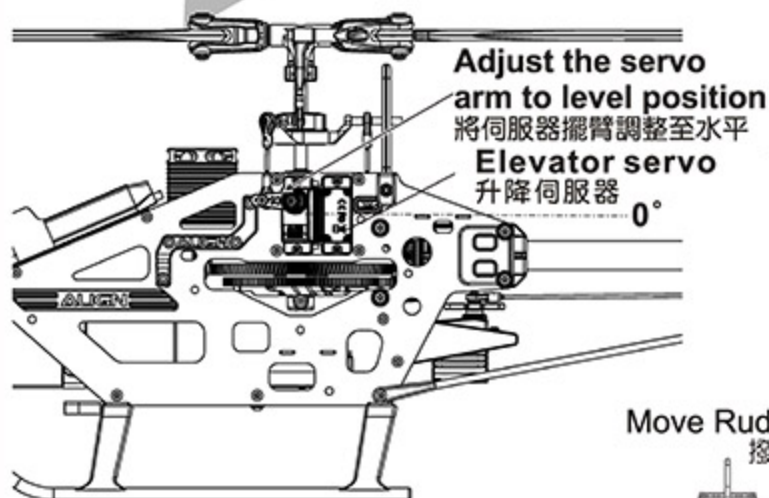
進入 MiniGRS 設定的第一個設定為副翼伺服器中立點設定，STATUS 燈為持續閃爍綠燈一次且 BIND 燈號為恆暗。此時可用遙控器尾舵搖桿微調副翼伺服器中立點位置，完成後進入下個步驟。

Flash Green Once
閃爍綠燈一次



ELEVATOR SERVO NEUTRAL POINT SETTING

升降伺服器中立點設定



Momentarily press SET button second time, if STATUS LED flashes twice continuously and BIND LED is off, this indicates you are in neutral setting mode of servo 2. At this time you can use RUD on transmitter to trim the neutral position of servo 2. After completing this setting it will proceed into next step.

接著按 SET 鍵一次進入升降伺服器中立點設定，STATUS 燈號為持續閃爍綠燈二次且 BIND 燈號為恆暗。此時可用遙控器尾舵搖桿微調升降伺服器中立點位置，設定完成後進入下個步驟。

Move Rudder Stick to Adjust
撥動尾舵調整



Flash Green Twice
閃爍綠燈二次

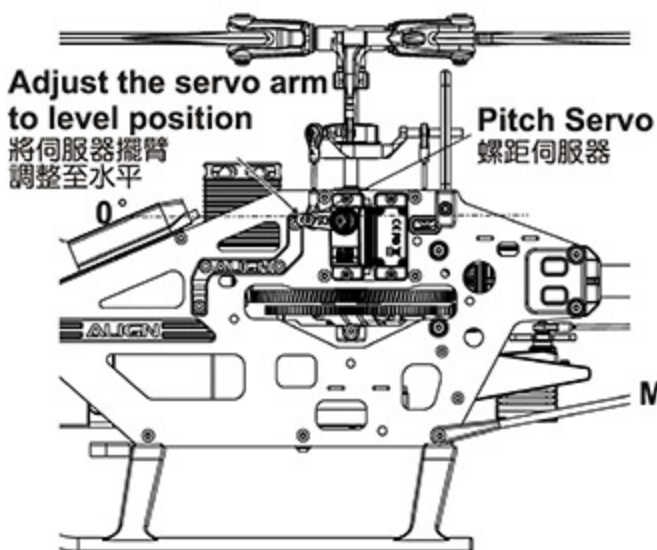


PITCH SERVO NEUTRAL POINT SETTING

螺距伺服器中立點設定

Momentarily press SET button third time, if STATUS LED flashes three times continuously and BIND LED is off, this indicates you are in neutral setting mode of servo 3. At this time you can use RUD on transmitter to trim the neutral position of servo 3. After completing this setting it will proceed into next step.

接著按SET鍵一次進入螺距伺服器中立點設定，STATUS燈號為持續閃爍綠燈三次且BIND燈號為恆暗。此時可用遙控器尾舵搖桿微調螺距伺服器中立點位置，設定完成後進入下個步驟。



Adjust aileron, elevator, and pitch servos' neutral point so that servo arms and swashplate remain horizontal (with throttle stick at 50% position). How level your swashplate is will directly affect how well the flight characteristic of MiniGRS is.

調整副翼、升降、螺距伺服器中立點，使伺服器擺臂與十字盤皆保持水平位置（此時油門搖桿須置於50%位置），十字盤的水平與否將會直接影響MiniGRS的飛行表現與穩定性。

Move Rudder Stick to Adjust
撥動尾舵調整



Flash Green Thrice
閃爍綠燈三次

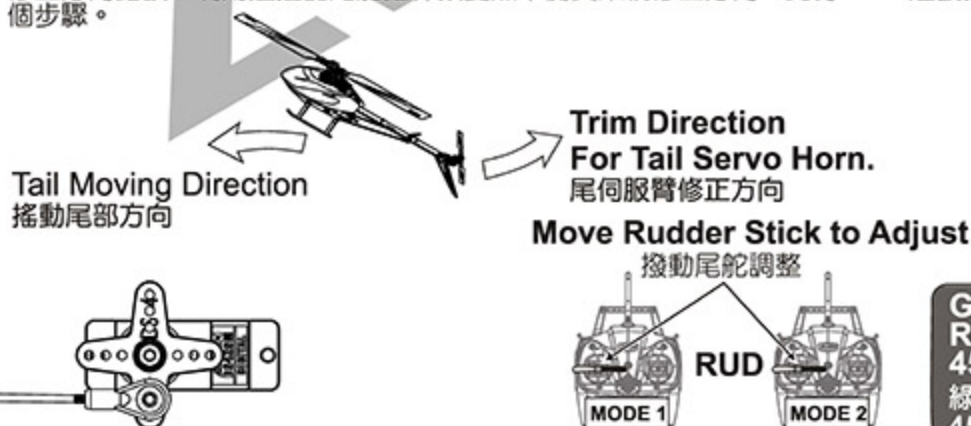


RUDDER GYRO DIRECTION SETTING

尾舵無平衡翼系統修正方向設定

Momentarily press SET button fourth time, if STATUS LED flashes four times continuously and BIND LED is steady lit green, this indicates you are in rudder compensation direction setting mode. If compensation direction is correct, then skip this step. If compensation direction is reversed, use RUD on transmitter to reverse the direction, and BIND LED will change to steady lit red. After completing this setting it will proceed into next step.

接著按SET鍵一次進入尾舵無平衡翼系統修正方向設定，STATUS燈號為持續閃爍綠燈四次且BIND燈號為綠燈恆亮。修正方向錯誤，利用遙控器尾舵搖桿改變無平衡翼系統修正方向，此時BIND燈號改變為紅燈恆亮，設定完成後進入下個步驟。



Flash Green 4 Times
閃爍綠燈四次



Green LED : normal direction
Red LED : reverse direction
450 PLUS DFC is green light
綠燈：正向 紅燈：反向
450 PLUS DFC 為綠燈



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

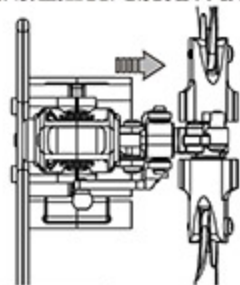
尾舵無平衡翼系統修正方向確認：當手搖直昇機尾部朝逆時鐘方向移動時，尾舵伺服臂應往逆時鐘修正，修正錯誤時，撥動尾舵搖桿改變尾舵無平衡翼系統修正方向。

RUDDER LEFT TRAVEL LIMIT SETTING

尾舵左舵行程設定

Momentarily press SET button fifth time, if STATUS LED flashes five times continuously and BIND LED is off, this indicates you are in left rudder end point adjustment mode. At this time rudder will drift to one side. Use RUD on transmitter to set the maximum end point on left side. After completing this setting it will proceed into next step.

接著按 SET 鍵一次進入尾舵左舵行程設定，STATUS 燈號為持續閃爍綠燈五次且 BIND 燈號為恆暗。此時尾舵會偏向單邊，利用遙控器尾舵搖桿設定尾舵伺服器向左最大的行程，設定完成後進入下個步驟。

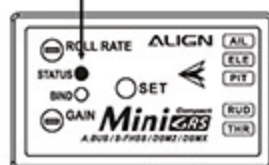


Move Rudder Stick to Adjust

撥動尾舵調整



Flash Green 5 Times 閃爍綠燈五次



CAUTION
注意

Adjust the rudder travel limit to the maximum without mechanical binding will result in better rudder gyro compensation effect.

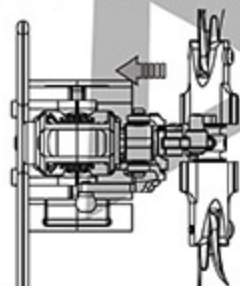
在機構不干涉的情形下，設定較大的尾舵行程可使尾舵無平衡翼系統有較好的修正反應。

RUDDER RIGHT TRAVEL LIMIT SETTING

尾舵右舵行程設定

Momentarily press SET button sixth time, if STATUS LED flashes six times continuously and BIND LED is off, this indicates you are in right rudder end point adjustment mode. At this time rudder will drift to one side. Use RUD on transmitter to set the maximum end point on right side. After completing this setting it will proceed into next step.

再按 SET 鍵一次進入尾舵右舵行程設定，STATUS 燈號為持續閃爍綠燈六次且 BIND 燈號為恆暗。此時尾舵會偏單邊，利用遙控器尾舵搖桿設定尾舵伺服器向右最大的行程，設定完成後按 SET 鍵完成 MiniGRS 設定。



Move Rudder Stick to Adjust

撥動尾舵調整



Flash Green 6 Times 閃爍綠燈六次



CAUTION
注意

Adjust the rudder travel limit to the maximum without mechanical binding will result in better rudder gyro compensation effect.

在機構不干涉的情形下，設定較大的尾舵行程可使尾舵無平衡翼系統有較好的修正反應。



CAUTION
注意

In order for the settings to stick, all 6 setting parameters for MiniGRS must be completed followed with a press of SET button, regardless if any changes are made for each settings.

MiniGRS 的六項設定，不論有無更動，皆須逐一完成，並按下 SET 鍵退出設定，否則 MiniGRS 將不會記憶設定。

7

MAIN ROTOR PITCH ADJUSTMENT

主旋翼螺距調整

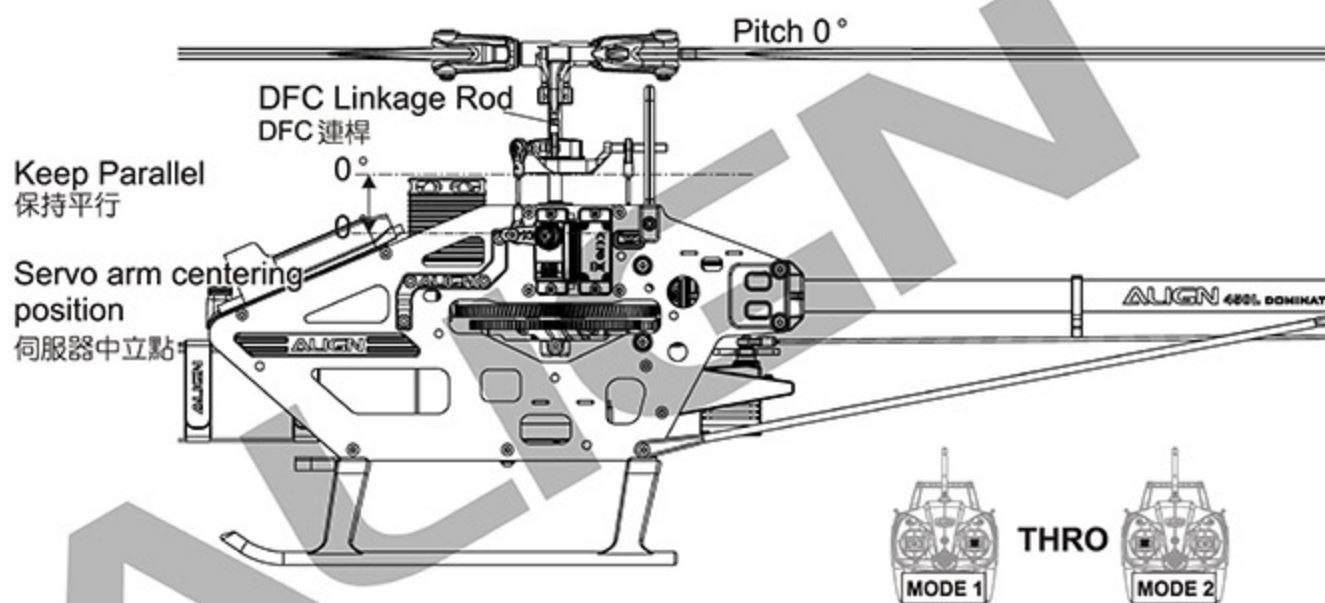
1. Press SET button to enter MiniGRS setup mode. This setting will eliminate any swashplate interaction which may affect pitch precision.
 2. Move throttle stick to enter, pitch curve at 50% position. Pitch should be at 0 degrees during this setting.
 3. If servo arms and swashplate is already level at 0 degrees, but main rotor blades pitch is not at 0 degree, please adjust the length of DFC linkage rods to achieve 0 degrees pitch.
1. 按 SET 鍵進入 MiniGRS 設定，此時會關閉 MiniGRS 的無平衡翼系統，以避免對十字盤的修正而影響螺距的量測。
 2. 將油門搖桿置中，螺距曲線 50% 輸出位置，請調整主旋翼螺距為 0 度。
 3. 如果伺服器擺臂及十字盤已經是水平 0 度，但主旋翼螺距不為 0 度時，請調整 DFC 連桿長度使螺距為 0 度。



CAUTION
注意

Disconnect motor from ESC prior to setup.

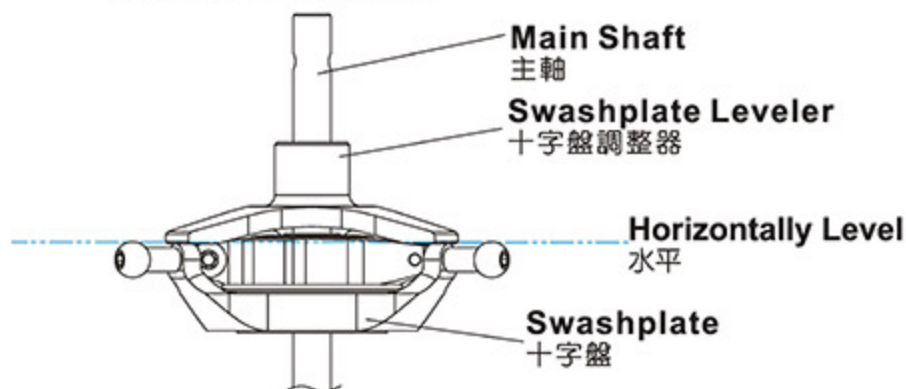
設定前，請先將馬達線拔除。



CAUTION
注意

Before setting up the MiniGRS FBL system, please use a swashplate leveler to level out the swashplate to make sure the swashplate is leveled to ensure MiniGRS provides the best performance.

使用 MiniGRS 無平衡系統，請務必使用十字盤調整器校正十字盤，確保十字盤達到水平狀態，這樣才能確保 MiniGRS 飛行性能達到最佳效果。



8

COLLECTIVE PITCH ADJUSTMENT

集體螺距調整

The collective pitch for MiniGRS must be adjusted in radio's EPA (End Point) function.

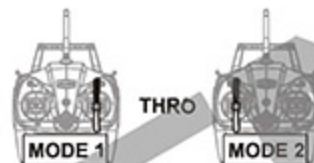
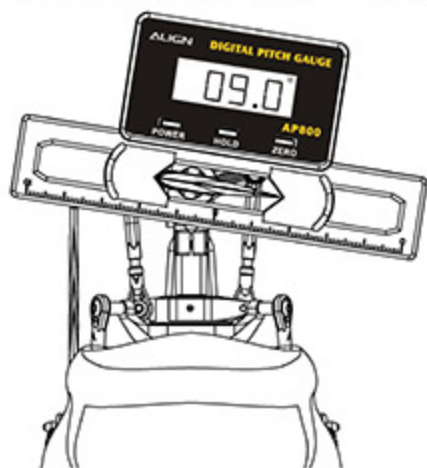
MiniGRS 集體螺距必須從遙控器 CH6 通道的 EPA (END POINT) 功能中調整。

1 MAX. COLLECTIVE PITCH ANGLE

最大集體螺距角度

Push the throttle stick to the maximum, adjust maximum collective pitch value through radio's EPA function on CH6.

將遙控器油門遙桿推至最高，使用 EPA 功能調整 CH6 通道的最大集體螺距角度。



END POINTS	
CH1	100% 100%
CH2	100% 100%
CH3	100% 100%
CH4	100% 100%
CH5	100% 100%
CH6	70% 70%



Disconnect motor from ESC prior to setup.

設定前，請先將馬達線拔除。

2 MIN. COLLECTIVE PITCH ANGLE

最小集體螺距角度

Push the throttle stick to the minimum, adjust minimum collective pitch value through radio's EPA function on CH6.

將遙控器油門遙桿推至最低，使用 EPA 功能調整 CH6 通道的最小集體螺距角度。



END POINTS	
CH1	100% 100%
CH2	100% 100%
CH3	100% 100%
CH4	100% 100%
CH5	100% 100%
CH6	70% 70%











Disconnect motor from ESC prior to setup.

設定前，請先將馬達線拔除。

MiniGRS INDICATOR LED

MiniGRS 指示燈說明

ALIGN

<p>STATUS</p> <p>BIND</p>	<p>STATUS constant green STATUS 綠燈恆亮</p> 	<p>STATUS constant red STATUS 紅燈恆亮</p> 	<p>STATUS off STATUS 不亮</p> 
 <p>BIND constant green BIND 綠燈恆亮</p>	<p>Successful initialization and radio bounded, rudder in heading lock mode. 完成對頻且開機成功，尾舵為鎖定狀態</p>	<p>Successful initialization and radio bounded, rudder in non-heading lock mode. 完成對頻且開機成功，尾舵為非鎖定狀態</p>	<p>—————</p>
 <p>BIND flashing green BIND 綠燈閃爍</p>	<p>Revert back to original transmitter signal that was lost during usage, rudder is in head locking mode, and detected other transition signals. 使用過程中失去原本發射器訊號，尾舵為鎖定狀態，且偵測到其它發射訊號</p>	<p>Revert back to original transmitter signal that was lost during usage, rudder is in non-head locking mode, and detected other transition signals. 使用過程中失去原本發射器訊號，尾舵為非鎖定狀態，且偵測到其它發射訊號</p>	<p>MiniGRS detects radio signal, but is not bound to the radio. MiniGRS 偵測到發射器訊號，但未完成對頻</p>
 <p>BIND constant red BIND 紅燈恆亮</p>	<p>Successful initialization but radio binding failed, rudder in heading lock mode. MiniGRS 對頻失敗，但開機成功，尾舵為鎖定</p>	<p>Successful initialization but radio binding failed, rudder in non-heading lock mode. MiniGRS 對頻失敗，但開機成功，尾舵為非鎖定</p>	<p>No signal detected from radio, please check if transmitter is powered on. MiniGRS 未偵測到發射器訊號，請確認發射器是否開啟</p>
 <p>BIND flashing red BIND 紅燈閃爍</p>	<p>—————</p>	<p>—————</p>	<p>Signal detected from radio, and set button was pressed for binding. MiniGRS 偵測到發射器訊號，且使用者正按SET鍵對頻中</p>
 <p>BIND off BIND 不亮</p>	<p>—————</p>	<p>—————</p>	<p>No power connecting to MiniGRS MiniGRS 未連接電源</p>

1 SPECIFICATIONS

產品規格

Operating voltage range	操作電壓範圍	DC 3.5 ~ 8.4V
Operating current consumption	工作電流	<100mA @ 4.8V
Rotational detection rate	側滾及前滾角速度範圍	± 300°/sec
Rudder yaw detection rate	尾舵角速度範圍	± 600°/sec
Sensor resolution	感測器解析度	12位元(12 BIT)
Operating temperature	操作溫度	-20°C ~ 65°C
Operating humidity	操作濕度	0% ~ 95%
Swashplate support	支援十字盤類型	Mode H-1
Receiver support	支援發射機類型	ALIGN A.BUS、FUTABA S-FHSS、DSM2 / DSMX

TROUBLESHOOTING

飛行中狀況排除

ALIGN

	Problem 狀況	Cause 原因	Solution 對策
Blade Tracking 雙槳平衡	Tracking is Off 雙槳	DFC linkage rods are not even length DFC 連桿長度調整不平均	Adjust length of pitch linkage rods (A) 調整 DFC 連桿頭長度
Hover 停懸	Head speed 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 head speed should be around 2800RPM. 調整連桿頭調低 Pitch 約 + 4~5 度 (停懸時主旋翼需為約 2800RPM)
		Hovering throttle curve is too low 停懸點油門曲線過低	Increase throttle curve at hovering point on transmitter (around 65%) 調高停懸點油門曲線 (約 65%)
	Head speed 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. 調整連桿頭調高 Pitch 約 + 4~5 度
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
		Rudder gyro gain too low 尾舵無平衡翼系統感度偏低	Increase rudder gyro gain 增加尾舵無平衡翼系統感度
	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 high 尾舵無平衡翼系統感度偏高	Reduce rudder gyro gain 降低尾舵無平衡翼系統感度
Oscillation during flight 飛行抖動	Helicopter oscillates forward/backward/left/right while performing cyclic maneuvers. 升降舵或副翼打舵動作時，機體前後左右抖動	Swashplate gyro gain is slightly too high. 十字盤無平衡翼系統感度偏高，產生追蹤現象	Turn the gain dial on MiniGRS counterclockwise, 10 degrees at a time until oscillation is eliminated. 逆時針調整 MiniGRS 上的感度調整旋鈕，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
Drifting during flight 飛行飄移	pitching up or aileron drift during forward flight 直線飛行機頭上揚或副翼飄移	Swashplate gyro gain is slightly too low 十字盤陀螺感度偏低	Turn the gain dial on MiniGRS clockwise 10 degrees at a time until drifting is eliminated. 順時針調整 MiniGRS 上的感度調整旋鈕，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	Adjust MiniGRS roll rate dial clockwise. 順時針調整 MiniGRS 滾轉速率旋鈕
	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	Adjust MiniGRS roll rate dial counter. 逆時針調整 MiniGRS 滾轉速率旋鈕

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。

Thank you for purchasing and supporting ALIGN products.

The Align Team is dedicated to you by innovating and developing new RC Helicopters, Multicopters, and FPV Racing Quads. We strive to provide a more diversified experience for our customers. Visit our website at www.align.com.tw for latest news, information, and updates about our extensive line of products for the RC enthusiasts.

Good Flying!

再次感謝您對亞拓系列商品的喜愛與支持，您的肯定是對我們最大的認同。

亞拓團隊秉持創新研發的精神，開發遙控直昇機／多軸飛行機／穿越機系列商品，提供給您體驗更多樣化的飛行樂趣。您可以透過下列連結，隨時瞭解亞拓的最新動態，以及各項訊息分享。

祝福您有一個愉快的飛行體驗。



ALIGN Flight Safety 亞拓飛行安全宣導

<http://www.align.com.tw/flysafe-en/>



ALIGN T-REX Helicopter 亞拓遙控直昇機

<http://www.align.com.tw/helicopter-en/>



ALIGN Multicopter 亞拓多軸飛行機

<http://www.align.com.tw/multicopter-en/>



ALIGN FPV Racing Quad 亞拓穿越機

<http://www.align.com.tw/multicopter-en/mr25/>



ALIGN Website 亞拓官網

<http://www.align.com.tw>



ALIGN Shopping Cart 亞拓購物車

<http://shop.align.com.tw/index.php?language=en>



ALIGN Quick Finder 亞拓零件快速購

<http://shop.align.com.tw/partfinder.php?language=en>



ALIGN FaceBook

<https://www.facebook.com/Align-Corporation-194493419543/?ref=mf>



ALIGN Instagram

<https://instagram.com/aligncorporation/>



ALIGN YouTube

https://www.youtube.com/channel/UCaPj_K5DNo7HSmP1eytUvMQ



ALIGN Youku

<http://i.youku.com/u/UMTQ0NjEwNjczNg==>

ALIGN

www.align.com.
www.a
www.align.com
www.align
www.align.com.tw
www.align.com.tw

ALIGN