T1 Ranger VTOL – PNP Instruction Manual Source : Heewing Official Store at www.heewing.com

Package Content





Remove the content out of the box including the provided USB wires for the Flight Controller. Also, prepare your radio, receiver and battery.



Connect your preferred receiver to the RC-In port of the FX-405 Flight Controller. *Note the Ground, 5V & Signal line.



Uart1

Uart2

Turn on your radio and hook up battery to your T1 Ranger.

Then connect the USB cable provided to the flight controller's USB port and the other end to your PC.





Open the Mission Planner software on your pc. If you do not have one yet, visit our website for the download link here > <u>https://www.heewing.com/pages/fx-405-vtol-flight-controller</u>



On the top right of the window, select the correct COM port. *every PC has different COM number, it will be different COM number on your PC.



Then click connect



After successfully connecting to the flight controller, please ignore any errors and proceed to next step.

Note : Ardupilot automatically recognizes SBUS input, you do not need to perform receiver setup if you are using SBUS receiver. For Crossfire or ELRS receiver, please follow steps below.



<u>1. Setting up of the receiver</u>Click CONFIG on the top left of the screen



Click Full Parameter List on the left menu

Mission Planner 1.3.79 build 1.3.8375.24878 ArduPlane V4.3.5 (3c1978b2) **1** 2 1 DATE **Basic Tuning** erro Ter ÷ 0.050 ÷ -QP Extended Tuning 0.308 • 1 300 • Tataged. Standard Parane + 0.000 3 ÷ Dependent -Advanced Paraze 1 1002 0.000 -15 -100,000 $\mathrm{INT}_{\mathrm{c}}\mathrm{INT}$ Interpreter Res -U Central - Tura <u>Central</u>-Period ||7 Onboard 050 ÷. IN STREET, Imping 0.16 Upor Parame Elieb Res (s/s) ÷ 6.0 Full Parameter List tiph Min (n/s) . 0 ÷ Other Mix's Theoretics 0-1004 ÷ . Full Parameter Tree intel ($\frac{1}{2}$ Ernise Sinc . . 0 * 0.600 -Litch Despendent - 11 ÷ Builder Mi Fluxer Rea 6.0 ÷ Slashate -Sarigativ Isak Ka Mangaed a/a-1210 Fitch Re-The size 승 ÷ Pitch R 1.9838 Batil ter Der

On the Search box on the right side, type BRD_ALT_CONFIG

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QP Extended Tuning	SERVOS_REVERSED ACRO_LOCKING	0	0		ENand TReased EDudled TSrabled	Revene servs operation. Set to 0 for normal operation. Set to 1 to revene this output channel. Shalle Bittude locking when sticks are released. If set to 2 then quaternion based locking is used if the you rate controller is enabled. Quaternion based locking will a set on a set of the provided operation of the set of	•	fore to file
Standard Parana	ACRO. PITCH. RATE	190	180	deg/s	10 500	The maximum pitch rate at full slok defection in ACHO mode		Write Tarant
Advanced Parans	ACRO_ROLL_RATE	180	180	deg/s	10 500	The maximum rull rate at full stick deflection in ACHO mode		Refresh Farmer
Onboard OSD				deg/s		The maintum year rate at full stick defection in ACRO mode. If this is zero then sudder is descrip controlled by sudder stick input. This option is only available if you also net TAW_RATE_EXMALE to 1.		Corpora Parana
LATE to	AFS_ENABLE	0	0			This enables the advanced failede system. Ethis is set to zero (disable) then all the other ATS systems have no affect		
·····	AHRS_COMP_BETA					The control the time constant for the cross-over trequency used to fuse. NMICS parqued and times det UPS data to extinute gecurd velocity. Time constant a (0.15eta: A larger time constant will use GPS data lares and a small time constant will use an data lares.		All Units are in r format with no cost
Full Parameter List	AHRS_ENF_TYPE				COnducted 2 Gradule ENU2 3 Enuble ENU3 11 External Art PS	This controls which Nav EKF Kalman filter vestion is used for attitude and position estimation	•	Averation_ACCCC •
	AHRS GPS GAM					This controls how much to use the GPS to correct the attlude. This should rever be set to zero for a plane as it would result in the plane losing control in turns. For a	_	Load Prepared
PELLPERMETER	and the second state		t			pare provide the output value of 10. Minimum number of uninities visible to use GPS for which based corrections attlude correction. This defaults to 5, which is about the point at which the velocity	_	Banat to Baffellt
Planner	AMIS_GPS_WINGATS	•	•		010	numbers from a GPS become toe unreliable for accounte correction of the accoleronaters.	-	Search
					CDeabled 10ke GPS for DCW position 20ke GPS for DCM position and height	The control infrattion to use disclosioning or OFS haved exception: Far to Show the OFS work has used for exception, and only advanced and work on the Show of a book for the OFS according to its our parameters. A value of 2 mores to use of DFS for other of DFS for the OFS according to its our parameters. A value of 2 mores to use of DFS for height as well as position, but in e OCM relatedation and when determining during documents and as position.	-	Redified
	ahrijorentaton				2) 201445, 20145,	Overall load operation roletins to the devolved one-taken for the load type. The obtains fire MU and concern makings to also the load to be averated in prov which is any site 40 dogmen under. The adverter is a 20 does not under a does not an average to also the load to be averated in prov and the site of the site of the average provide the approximation of all address of the average to also the load to be average to all the site of th		
	AHRS, RP, P					This controls how fast the acceleranceurs correct the atitude		
	AHRS_TRIM_X	4.01164775	0	red	411745-0.1745	Compensates for the roll angle difference between the control board and the frame. Positive values make the vehicle roll right.		
	AHRS_TRIM_Y				-0.1745-0.1745	Corpensates for the pitch angle difference between the control loand and the hame. Positive values make the vehicle pitch-up flack.		
	AHRS_TRIM_Z	•	0	rad	411745-0.1745	Not Used		
	AHRS_WIND_MAX	0	0		0127	(This sets the maximum advantation determines between ground speed and empaned. This advant the plane to copy with a failing empand sensor. A value of own means to use the anspeed as is. See ARSPO_PERVISION and ARSPO_MARK_WIND to double empaned sensors.		
	ANNO TANK	94			10104	The control the weight the complete of CPS has on the heading. A higher value means the heading will tack the yaw source (CPS or complete) more report,		v

The corresponding parameter will be displayed



Change the "Value" from "0" to "1", then click "Write Params" to write the changes to the flight controller. Click "Ok" to confirm.



Again, on the Search box, type SERIAL6_PROTOCOL The corresponding parameter will be displayed



Change the "Value" from "0" to "23". Click "Write Params", then click "Ok".

Congratulation! You are done!



Below are the relevant parameters for your reference. Please make sure it's correct.

SBUS receiver setup	: BRD_ALT_CONFIG = 0 ;	SERIAL6_PROTOCOL = -1
CRSF/ELRS receiver setup	: BRD_ALT_CONFIG = 1 ;	SERIAL6_PROTOCOL = 23

IMPORTANT, after the above is completed, before we proceed to next step, click "Disconnect" on the top right of the screen > disconnect the USB cable from the Flight controller and the PC > disconnect the battery.

When you connect the battery again, CRSF/ELRS should be working now.



2. Radio Calibration

Turn on the radio, connect battery to your T1 Ranger, connect USB to the flight controller and your PC.

Then open Mission Planner and click Setup.



Click "Mandatory Hardward" on the top left.

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Click "Radio Calibration"



Click "Radio Calibration" as shown in the picture below



Follow the instruction as shown on the screen. Click OK.

Radio 9 999	Radio 14 880	
Radio 15 2001	Radio 16 2011	
Cal	librate Radio	
Elevons CH2 Rev Bind DSM2 Bind I	conv plul nous	×
	Ensure your transmitter is on and receiver is powered and connec Ensure your motor does not have power/no props!!!	ted
		ок
	ر	

Click OK and perform the instruction as shown. Move all your control sticks and flight modes switches to their max.

.e (rc3) 988	Reverse	Radio 8 999 Radio 9 999	Radio 13 880 Radio 14 880				
15 CHI Rev	Reverse	Radio 15 2011 Cl. Spektrum Bind Gay Bind DSM2 Bind 1	Radio 16 2011 ok when Done DSMX Bi <mark>-1 news</mark>				
			Click OK extreme p	and move all RC sti ositions so the red	icks and switches to bars hit the limits.	X their OK	

Click OK. Now observe Mission Planner recognizing your new inputs/stick values of your own radio and the changes are shown on the moving red color lines.



When you are done, click "Click when Done"





Follow the instruction shown and click OK

Radio 1519201 20 Radio 16 2011 20 11 Reverse Completed 247 Slevons CH2 Rev Ensure all your sticks are centered and throttle is down, and click ok to continue	
Eev ■ Elevons CH2 Rev Spektrum Bind Eev ■ Elevons CH2 Rev End DSM2 Bind DSM2 Bind DSM8 K Bind DSM8 K Ensure all your sticks are centered and throttle is down, and click ok to continue	
tev Elevons CH2 Rev Bind DSM2 Bind DSM8 Bind DSM8 Ensure all your sticks are centered and throttle is down, and click ok to continue	
Ensure all your sticks are centered and throttle is down, and click ok to continue	
Ensure all your sticks are centered and throttle is down, and click ok to continue	
ок ок Самариала се	

Mission Planner now display the MIN and MAX of your PWM values of your Radio. Click OK again

- Keverse		
B838adio 13	880	
88 — — — — — — — — — — — — — — — — — — —		
8 888adio 14	860	
Radio 15 1920 20 Radio 14		
111 Revenue	Radio X	
Spektrum Bind	Here are the detected radio options NOTE Channels not connected are displayed as 1500 +-2 Normal values are around 1100 1900	
Rev Elevons CH2 Rev Bind DSM2 Bind DSMX Bi	Channel:Min Max	
	CHI 958 2011 CH2 958 2011 CH3 958 2011 CH3 958 2011 CH3 959 2000 CH5 999 2000 CH7 999 2000 CH3 999 2000 CH10 999 2000 CH15 1920 2011 OK	

It will then display "Completed"



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You have completed the Ardupilot/Mission Planner setup.

3. Assembly of the plane

a. Prepare the tail boom, horizontal stabilizer, vertical stabilizer, guide wire, 2x20 screw, 2x6 screw and a Philips screwdriver.



b. Using the provided guide wire, pull the servo connector through from one end of the tail boom to the other end of the tail boom



Tips : using the U shape of the wire and clip it onto the servo connector



Gently pull the servo connector through the tail boom to the other end as shown



c. Observe the U Shape cut on the tail boom and align it to the stop inside the horizontal stabilizer mount.



d. After inserting the tail boom, ensure the U shape cut is centered and is not pushing onto any wires. If installed correctly, the hole is clearly see through and the servo wire is visible as well.



e. Align the vertical stabilizer onto the clip of the horizontal stabilizer as shown below and install it.

