How to enable more flight modes



This is an example how to set up more flight modes for the Thunderbird. I recommend to create a new model and do all steps with it. Call the model "HaveFun" or something like that.

I this example I use the Pan Mode Switch (S2, Channel 10) to select one of the two sets of flight modes:

- Set One (S2 up or down) has "Altitude" in upper position of the flight mode switch S4, "Position hold" in the middle position and "Return to home" in the lower position.
- Set Two (S2 middle position) has "Rattitude" in upper position of the flight mode switch S4, "Stabilized" in the middle position and again "Return to home" in the lower position.

Set One is the same as GPS off/on. Set two contains more advanced flight modes. "Acro" was left off because I'm too old for this stuff.

Step 1: Channel settings at ST16

Model:Thunderbird Test				Welcome, Pilot		20:0	6 66% 📼	
Universal channel control settings								
Hardware(I	nput)			Single output monitor		Channel-Function(Output)		
.11	K1	52	B1	S4	Ch1 Thr	Ch9 A05	Ch17 A13	
		02			- Ch2 Ail	• Ch10 • A06	Ch18 A14	
.12	К2	S3	B2		Ele	• Chill • A07	Ch19 A15	
02	N2	00		Select	- Ch4 Rud	- Ch12 A08	Ch20 A16	
13	КЗ	S 4	R3		• Ch5 A01	Ch13 A09	Ch21 A17	
	110	54	5		- Ch6 A02	Ch14	Gh22 A18	
				Final output monitor (0%)	- Ch7 A03	- Ch15	Ch23	
J4	S1	S5	B4	-150 -120 -80 -60 -30 0 30 60 90 120 150 -135 -105 -75 -45 -15 15 45 75 105 135	- Ch8 A04	Ch16 Ch16	Ch24 A20	

Open channel settings and select A01.

Tap on S2 and hold it to get menu. Select "Edit" from the menu.



Set "Accumulation", Pos.0 to "Act" and -50%. Tap on Save.

Now you should get a mixed channel for flight modes:

- S2 up/down: 100% > 0 > -100%
- B2 middle: 50% > -50% > -150%

Model:Thunderbird8				Welcome, Pilot		09:32	2 75% 💷	
Universal channel control settings								
Hardware(I	nput)			Single output monitor		Channel-Function(Output)		
11	K1	62	B1	S4 S2	Ch1 Thr	Ch9 A05	Ch17 A13	
		52			Ch2 Ail	Ch10 A	Ch18 A14	
.12	К2	\$3	B2	Pan Mode Switch	Ch3 Ele	Ch11 A	Ch19 A15	
			5-	mixed to Ch 5	Rud	Ch12 A	Ch20 A16	
.13	КЗ	S 4	B3		• Ch5 A01	Ch13 A	Ch21 A17	
		54			Ch6 A02	Ch1 4 A	Gh22 A18	
				Final output monitor (100%)	- Ch7 A03	Ch15	Ch23 A19	
J4	S1	S5	B4	-150 -120 -80 -80 -30 0 30 60 90 120 150 -135 -105 -75 -45 -15 15 45 75 105 135	Ch8 A04	• Ch16 • A12	Ch24 A20	

Remark: Channel A02 (RTH channel) must still have values 0 > 0 > 150% in both positions of S2 switch. Check this!

Step 2: Assign flight modes in QGroundControl

Bind the new model to Thunderbird and connect it to QGroundControl by USB cable. Now we have more possibilities to add flight modes:

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QGroundContro	l v3.5.6			- 🗆 ×
Datei Widget				
ية 🏀 🕲	🤊 🕼 🛆 🗴	S 100.0 m .al	ltitude Entschärft	
Vehicle Setup	Flugmodi Setup			
Summary	Flug Modus Einrichtung wird ver Flight Mode Settings	wendet, um Senderschalter zu Flugmo Switch Settings	di zuzuordnen.	
Firmware	Mode channel: Channel 5	Acro switch channel	Unassigned Arm switch channel	Unassigned -
Fluggerätetyp	Flight Mode 1 Return	Landing gear switch channel	Channel 11 Kill switch channel	Unassigned -
((o)) Sensors	Flight Mode 2 Stabilized	Loiter switch channel Position Control switch channel	Unassigned Offboard switch channel Unassigned Rattitude switch channel	Unassigned
e e Radio	Flight Mode 3 Unassigned	Return switch channel	Unassigned Stabilize switch channel mapping	Unassigned -
M Flugmodi	Flight Mode 4 Position	Channel Monitor		
			2	
Power	Flight Mode 5 Rattitude	5	• 6	
Sicherheit	Flight Mode 6 Altitude	7	8	
$\left \begin{array}{c} \phi \\ \phi \end{array} \right \left \begin{array}{c} \phi \\ \phi \end{array} \right $ Tuning	Use Multi Channel Mode Selev	11 tion	012	•
Parameters				
Time			No Flight Data selected	Replay Flight Data

Go to "Settings" > "Flight modes" and assign flight modes to the mode items.

- Mode channel remains Channel 5.
- Flight mode 1 is lower position of the Flight mode switch S4, remains "Return" for both Sets.
- Flight mode 2 belongs to Set Two, middle position, will be assigned to "Stabilized".
- Flight mode 3 remains "Unassigned".
- Flight mode 4 belongs to Set One, middle position, remains "Position".
- Flight mode 5 belongs to Set Two, upper position, will be assigned to "Rattitude" *.
- Flight mode 6 belongs to Set One, upper position, will be assigned to "Altitude".

Test all switch positions carefully in flight mode settings of QGroundControl. The active switch combination is highlighted.

Mode- switch	AUX- switch	FlightMode	Status LED	Pos %	Log value
up	up	Altitude	Blue blinking	+100%	3412.0
up	down	Rattitude	White blinking	+50%	2730.0
middle	up	Position hold	Purple solid	0%	2048.0
middle	down	Stability	Blue solid	-50%	1365.0
down	up	RTH	Red blinking	-100%	683.0
down	down	RTH	Red blinking	-150%	0.0

* In newer versions of QGroundControl the flight mode "Rattitude" is no more available. But we can still assign this mode as longas it is available in our firmware. The flight mode names are represented as numbers in the parameters (enum). Rattitude is still number 9.

Go to Vehicle Setup > Parameter and select parameter set "Commander". There are parameter COM_FLTMODEx for six slots [$x = 1 \dots 6$]. You see what was already assigned. Select the slot you want to change (for above explained set this is COM_FLTMODE5) and check "Advanced Settings" and "Manual Entry". Enter "9" for Rattitude, save and done.

				QGroundControl	8
	Vehicle Setup				Save
Summary	Search:	Clear	Show modified only		Parameter Editor Cancel Save
	Standard	COM_DISARM_PRFLT	10.00 s	Time-out for auto disarm if not taking off	9 for Rattitude
Firmware	Battery Calibration	COM_DL_LOSS_T	10 s	Datalink loss time threshold	9 Reset to default
Airframe	Sensors	COM_EF_C2T	5.00 A/%	Engine Failure Current/Throttle Threshold	
	Commander	COM_EF_THROT	50.00 %	Engine Failure Throttle Threshold	Unknown: 9
(O) Sensors		COM_EF_TIME	10.0 s	Engine Failure Time Threshold	If the main switch channel is in this range the selected flight mode will be
Radio	Multicopter Position Contro	COM_FLTMODE1	Return	First flightmode slot (1000-1160)	applied.
	EKF2	COM_FLTMODE2	Stabilized	Second flightmode slot (1160-1320)	Default: -1
Flight Modes	Events	COM_FLTMODE3	Unassigned	Third flightmode slot (1320-1480)	Parameter name: COM_FLTMODE5
Power	Failure Detector	COM_FLTMODE4	Position	Fourth flightmode slot (1480-1640)	Warning: Modifying values while vehicle is in flight can lead to vehicle instability
	Geofence	COM_FLTMODE5	Unknown: 9	Fifth flightmode slot (1640-1800) Select	and possible vehicle loss. Make sure you know what you are doing and double-
Motors	GPS	COM_FLTMODE6	Altitude	Sixth flightmode slot (1800-2000)	
Safety	Land Detector	COM_FLT_PROFILE	Default	User Flight Profile	Advanced settings
		COM_HLDL_LOSS_T	120 s	High Latency Datalink loss time threshold	
PID Tuning	MAVLINK	COM_HLDL_REG_T	0 s	High Latency Datalink regain time threshold	Set RC to Param Check
Parameters	Multicopter Rate Control	COM_HOME_H_T	5.00 m	Home set horizontal threshold	
	Mixer Output	COM_HOME_V_T	10.00 m	Home set vertical threshold	
	Aulticopter Attitude Contro	COM_LOW_BAT_ACT	Return at critical leve	el Battery failsafe mode	
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Note: Test changed flight modes without propellers before you use this settings in real flight sessions. First test flights do better without camera. **Do all this on your own risk!**

Appendix

Servo values representation

ST16 [#]	Servo [µs]	Value [%]
0	900	-150
511	1000	-125
683	1100	-100
1023	1200	-75
1365	1300	-50
1535	1400	-25
2048	1500	0
2560	1600	25
2730	1700	50
3072	1800	75
3412	1900	100
3584	2000	125
4095	2100	150

Flight mode slots (related to standard servo values 900-2100µs)

Slot	Parameter	Thresholds [µs]	Value [%]
1	COM_FLTMODE1	1000-1160	-100
2	COM_FLTMODE2	1160-1320	-7550
3	COM_FLTMODE3	1320-1480	-25
4	COM_FLTMODE4	1480-1640	0
5	COM_FLTMODE5	1640-1800	50
6	COM_FLTMODE6	1800-2000	100