Flight Modes

-- Why might you need them?
-- What you can do without them
-- How to start using them
Simple Examples for Spektrum

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Marymoor RC Club Meeting
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Transmitter evolution

Early Programmable Transmitters
Capability adds Complexity

Adding Display Space Helps Manage sooo many features

Pilot overload – just during takeoff!

1. Switch to high rates
2. Slowly increase throttle
3. Hold elevator
4. Control rudder (tail/nose wheel) to track straight
5. Pitch up after reaching takeoff speed
6. Gear up after take off
7. Flaps up when appropriate
8. Switch to lower rates
9. Maintain gentle climb with elevator, ailerons and rudder
10. Turn off gyro if needed
11. Bank to enter the pattern
12. Trim elevator and ailerons if needed

What's our Goal?

Make the pilot look good!

Help the pilot have fun

Reduce complexity and potential for errors, i.e. screw-ups

Using the simplest means necessary

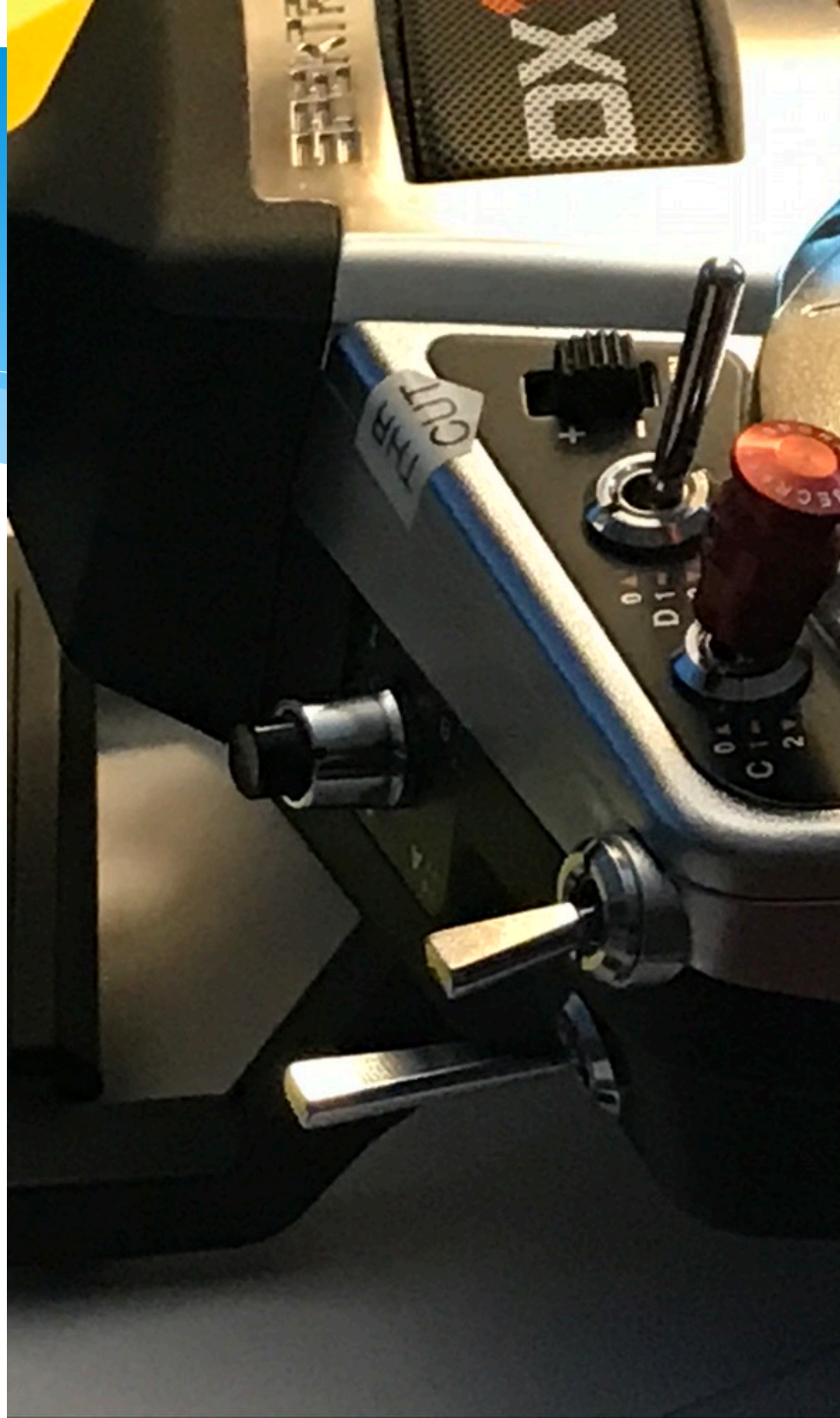
Using the Simplest Means Necessary

* Learn what you can do with switches alone to simplify control
* Then, if needed, add Flight Modes

First, Learn what you can do with Switches Alone

Without Flight Modes

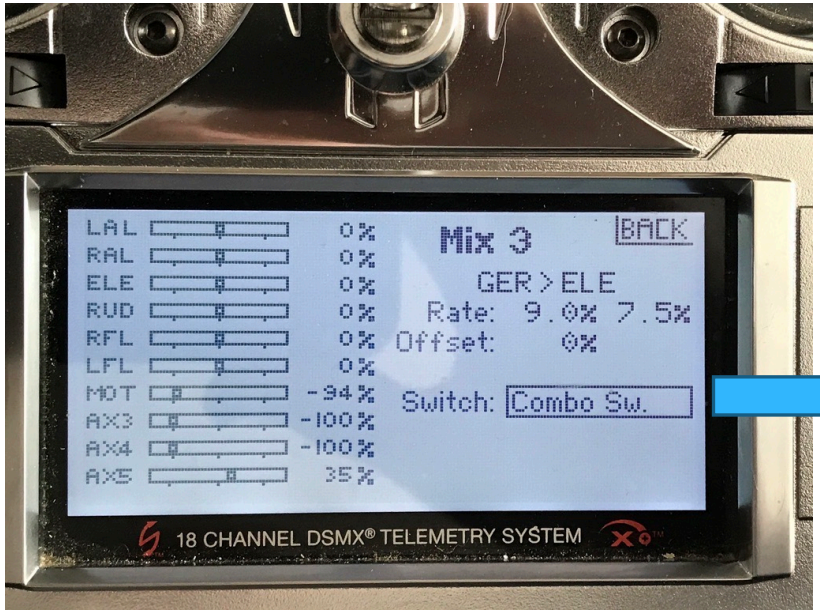
* Assign a single switch, let's say Switch B for Flaps.
* Also use Switch B, to command other things
  - Examples:
    - Rates and expo
    - Turn mixes ON or OFF
    - Etc.

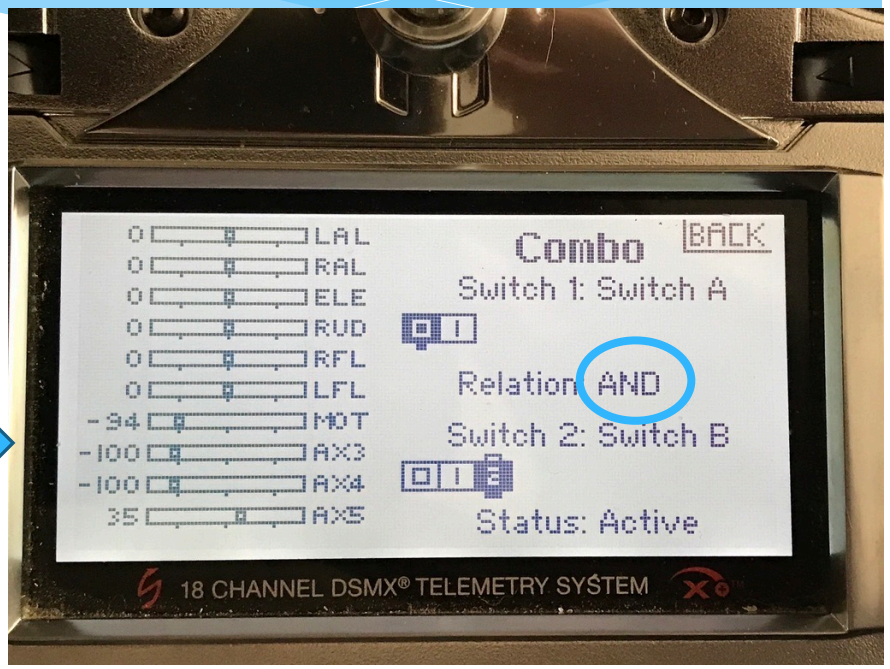


Logical Switches
Called ‘Combo Switch’ in Spektrum

This example turns on a mix when

Gear switch is Down ***AND*** Flap switch is UP





“Logical” switch feature, if your radio has it

* Switch X ***AND*** Switch Y:
  Only if Both switches are in a position will something happen
* Switch 1 ***OR*** Switch 2:
  Either switch in a position causes something to happen

Using Switches to define your Take off state
(no Flight Modes)

* Sort of a takeoff mode, but not a “flight mode” as we shall see.

* Example:

  Gear Down ***AND*** Takeoff Flaps

* Assign the same Logical Switch State to other things such as:
  * Desired rates and expo
  * Rudder Gyro ON
  * Mixes OFF or ON as desired

Using Switches to define your Cruise state

(no Flight Modes)

* You could decide that
  Flaps UP ***AND*** Gear UP
  means the aircraft is in ‘cruise’.

* By assigning some things to this Logical switch state, you could have a sort of ‘cruise’ mode.

* Examples
  * Mid rates
  * normal gyro gains, or rudder gyro off

Switches for Aerobatics

Assigning all your rates to one switch

* High Rates for 3D maneuvers
* Low rates for “pattern” maneuvers
* Special rate combinations like hi rate on elev and rudder and low rate on ailerons for a Lomcevok.

Another example:

* On same switch as flaps up

  Rudder --> aileron & elevator mixes for knife edge

Using Switches to define your Landing state
(no Flight Modes)

Assign all these to Mid flaps or Landing flaps switch positions:

- Ailerons slightly up for a little wash-out to avoid tip stall (flap to aileron mix)
- Lower idle setting
  (a higher idle setting for engine is sometimes used in 'cruise' to reduce engine failures)
- Gyro gains as desired
- Aileron to rudder mix ON
- Landing lights ON

What's a Flight Mode, or Condition?

Terminology:

* "Flight Mode: Spektrum, JR, FRSky,
* "Condition": Futaba
* Words mean the same thing in effect, but are set up in different ways

Turned ON by a switch state

Defined in programming

The Best Part!

* Trims are remembered in each Flight Mode and the configuration associated with it
* Hugely helpful during the first few flights
* Helpful later as trim changes due to pushrods and airplane structure expanding or contracting differently.

Soaring

Spektrum Sailplane model type

* Flaps are controlled by Camber Presets and Camber System instead of Flap System
* Flight Modes and clever switch assignments tie the two together
* You can set up your airplane with a Sailplane Model Type

Sailplane Example

Flight Mode >	Launch	Cruise	Thermal	Land
Flaps	5%	Up	Down 2%	Down 90 deg.
Ailerons	Down 5%	Faired	Down 2%	Up 45 deg.
Ail > Rudder Mix	Off	Off	50%	75%
Gear	Up	Up	Up	Down

Flight Modes in an Airplane

* Primary benefit: No need to re-trim for different configuration states (i.e. flaps, gear, speedbrake positions)

* Like launch, cruise, thermal in sailplanes think of Flight Modes for airplanes as different flying tasks
  * takeoff, cruise, aerobatics, approach and landing

Spektrum DX18 Manual

Yep. This is everything they say about Flight Modes.

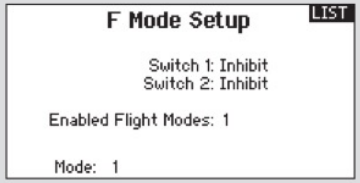
A LITTLE BIT about how the menu works

Nothing about why or how

F-Mode Setup

Use the Flight Mode Setup menu to assign switches to flight modes.

Mode	Number of Switches	Number of Flight Modes
Aircraft	2	5
Heli	3 *(including Throttle Hold)*	5 *(including Throttle Hold)*



Sailplane Flight Mode Setup

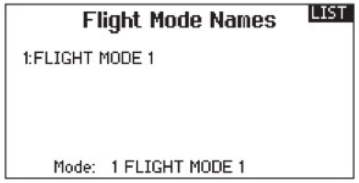
You can assign up to ten flight modes using any combination of up to three switches. You can also assign a priority switch. When the priority switch position is active, only the current flight mode is active, regardless of other switch positions.

Number of Flight Modes	2	3	3*	4	4	5
Switch 1 (number of positions)	2P	3P	2P	2P	3P	3P
Switch 2 (number of positions)			2P	3P	2P	3P
Flight Mode 1	Launch	Launch	Launch	Launch	Launch	Launch
2	Cruise	Cruise	Cruise	Cruise	Cruise	Cruise
3		Land			Land	Land
4			Thermal	Thermal	Thermal	Thermal
5				Speed		Speed

**Must be set up in a 4/5 flight mode.*

Flight Mode Name Setup

Enables you to assign custom names to the Flight Mode positions. Flight Mode names can include up to 20 characters including spaces.



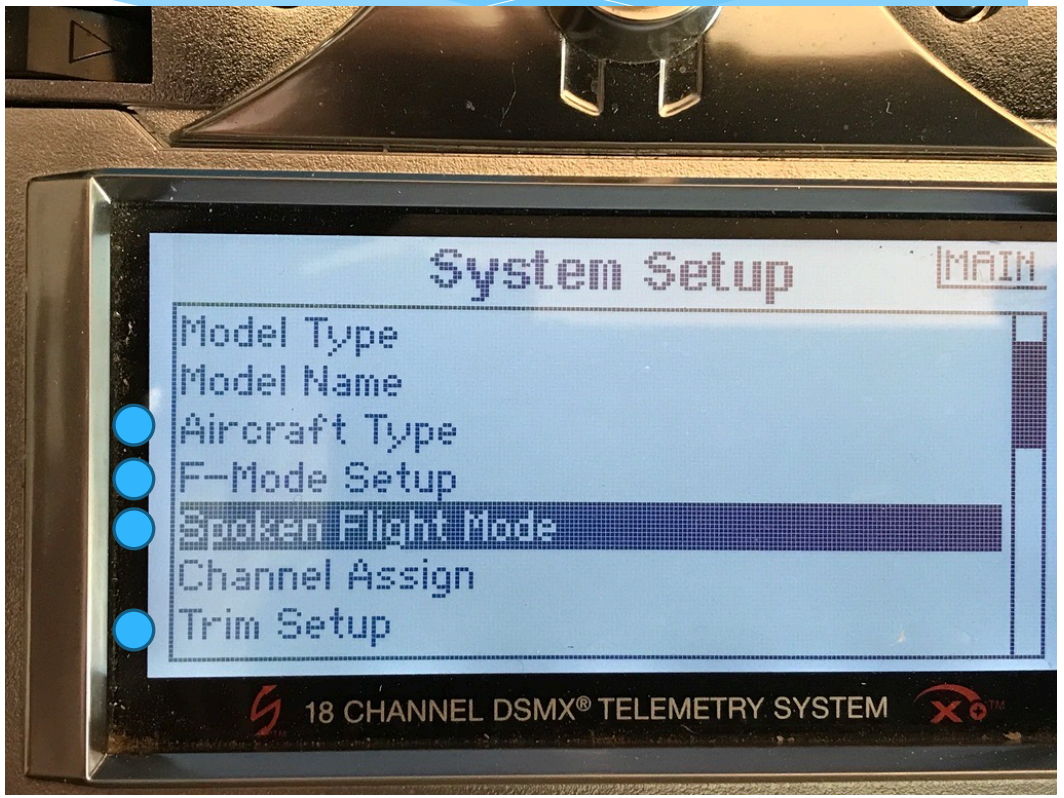
To change the Flight Mode name:

1. Scroll to the Flight Mode name you wish to change and press the scroll wheel.
2. Scroll to the character position you wish to change and press the scroll wheel once. A flashing box appears.
3. Scroll left or right until the desired character appears. Press the scroll wheel once to save the character.
4. Repeat Steps 2 and 3 until the Model Name is complete.
5. Select BACK to return to the Flight Mode Names list.

Spektrum Simple Example
3 Flight Modes for 3 Flap Settings

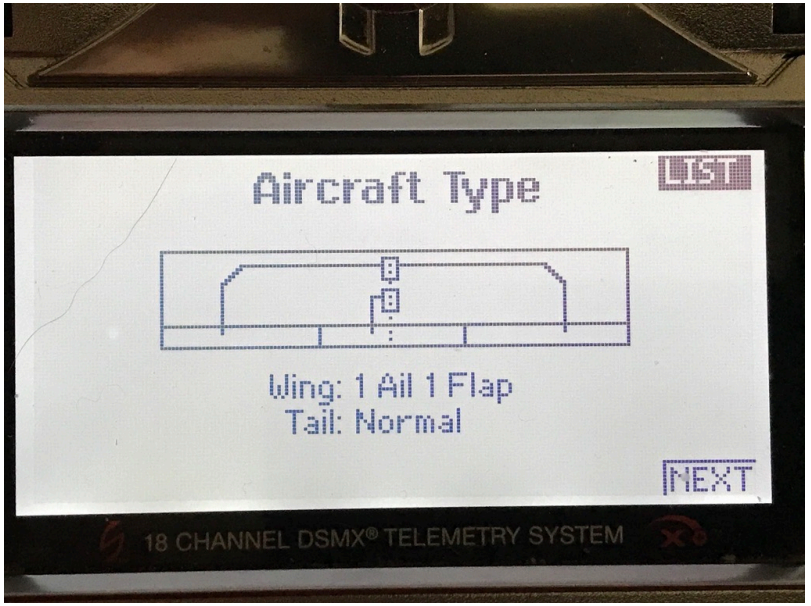
System Setup Menu

These four menus are used to set up Flight Modes

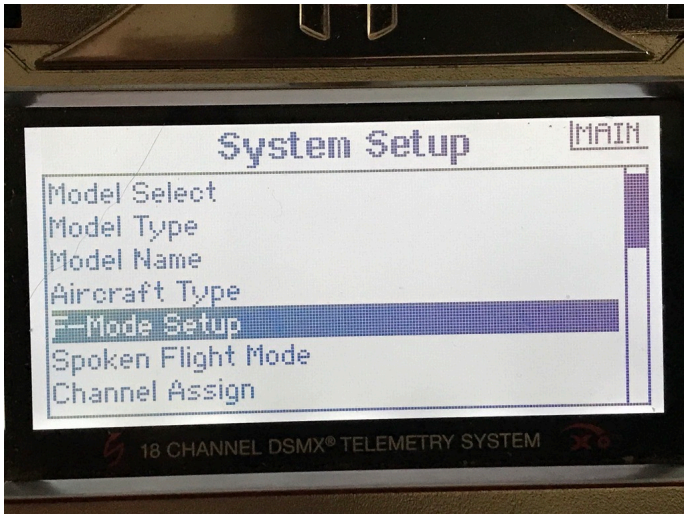


Aircraft Type Menu

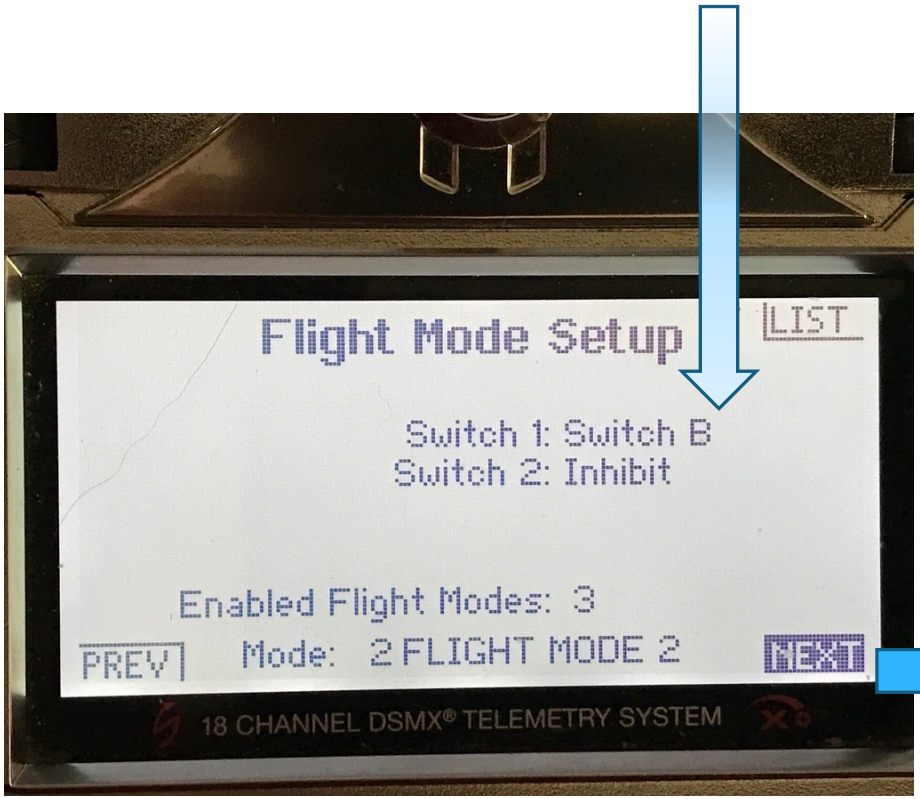
Must have flaps if the flaps switch will be used to define Flight Modes



F-Mode Setup



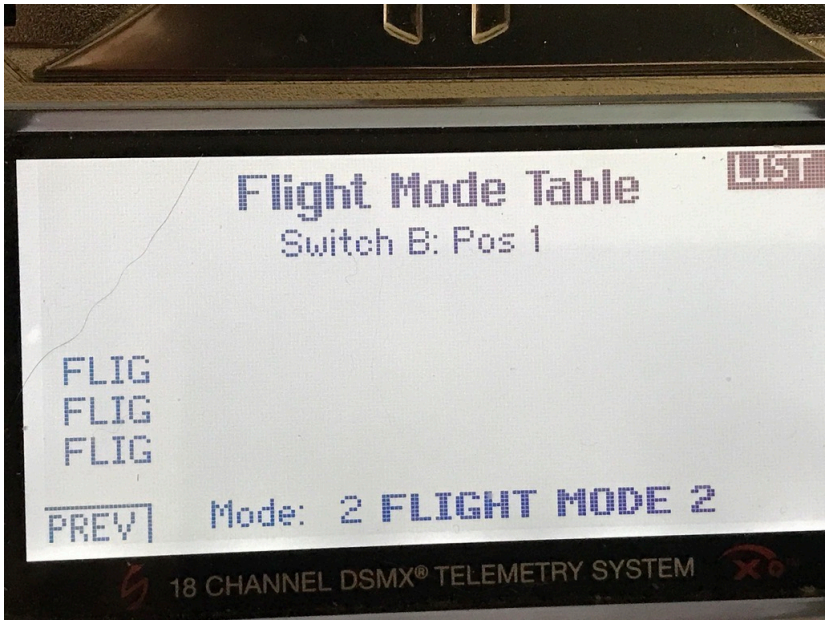
Assign Switch 1 to the 3-position switch you like to use for flaps



Flight Mode Setup – Page 2
The Flight Mode Table

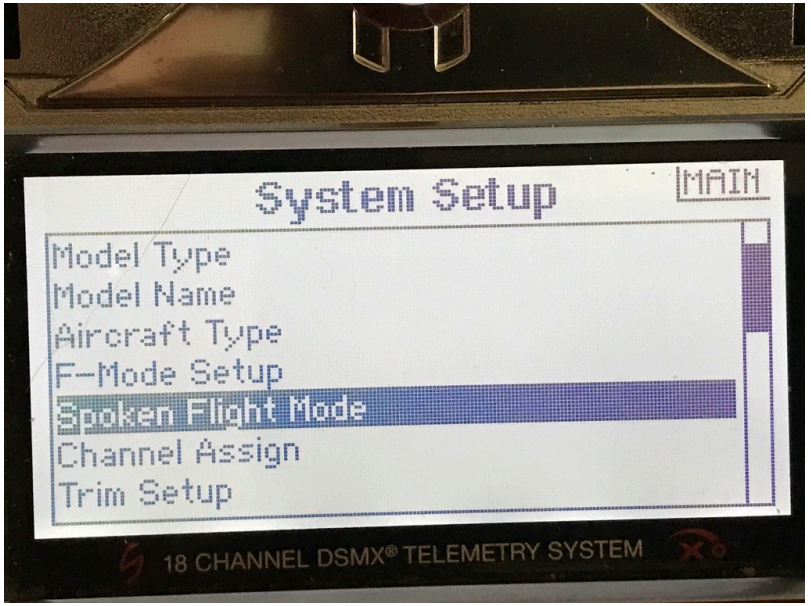
Table shows all 3 modes as **FLIG**

– the first four letters of **FLIG**HT MODE 2



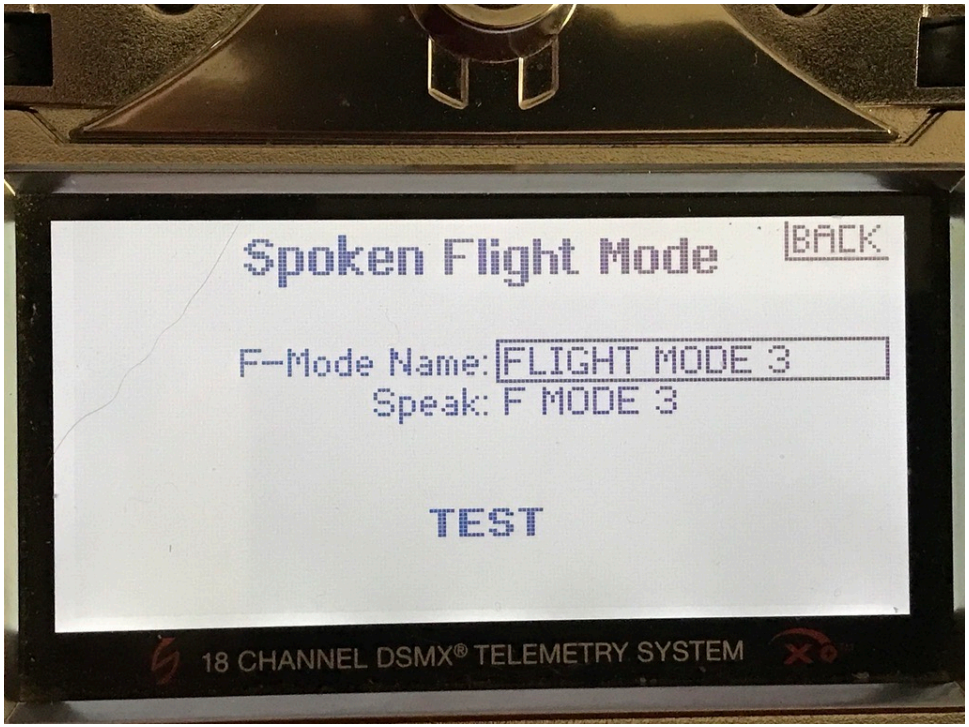
To Name the Modes

Use the
Spoken Flight Mode
Menu

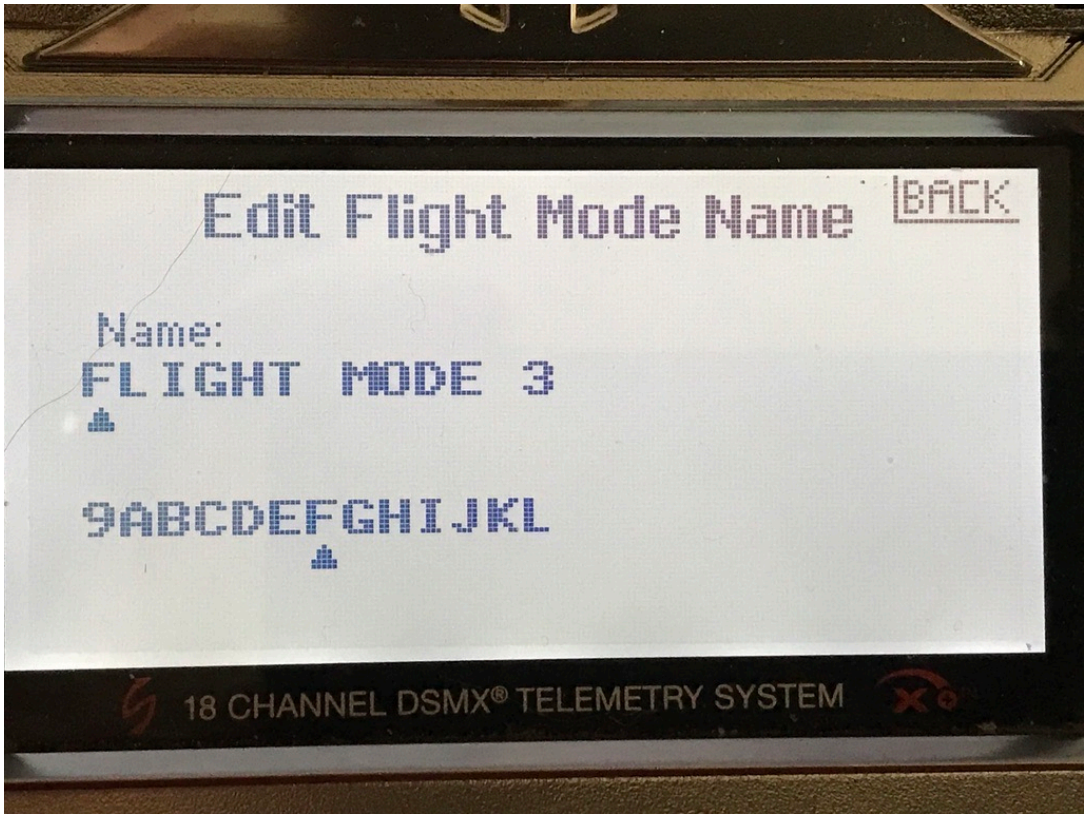


Highlight and Click to Rename

FLIGHT MODE 3 shows when Switch B (our flap switch) is UP



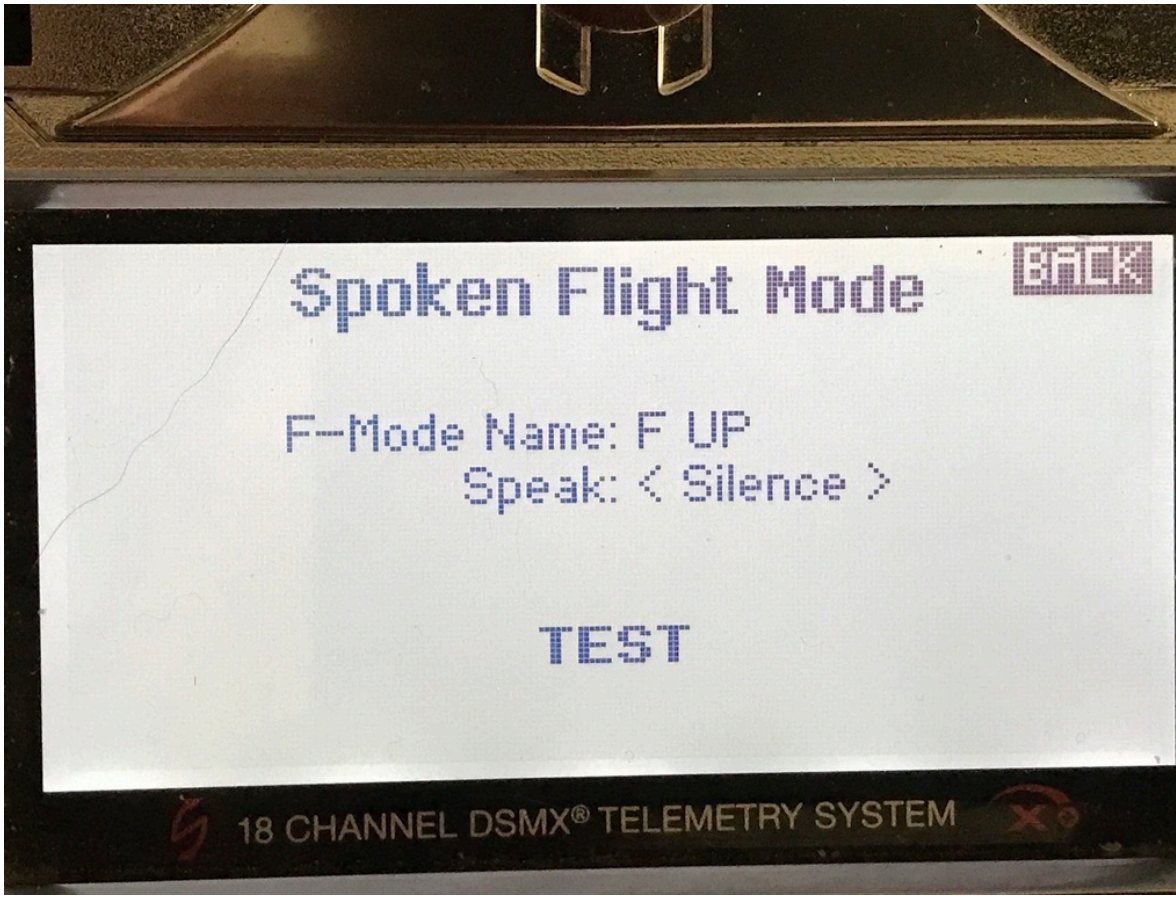
So, let’s rename it …



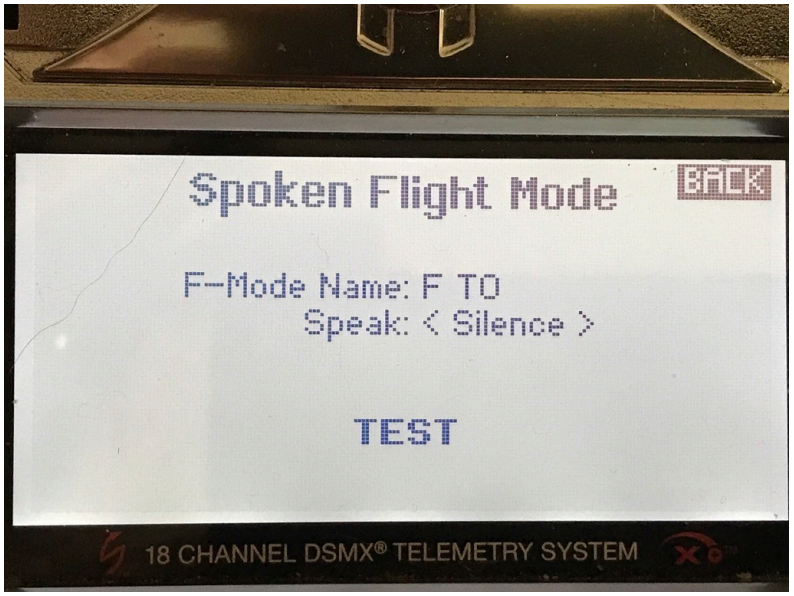
…to F UP, meaning Flaps UP

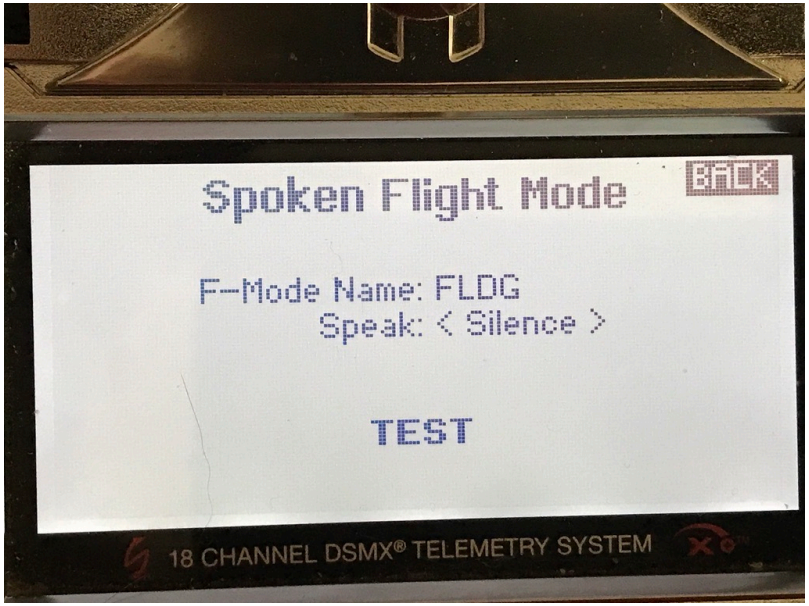
Then assign a voice if you like.

This author prefers to assign voices later using Custom Voices Menu, so set to Silence here

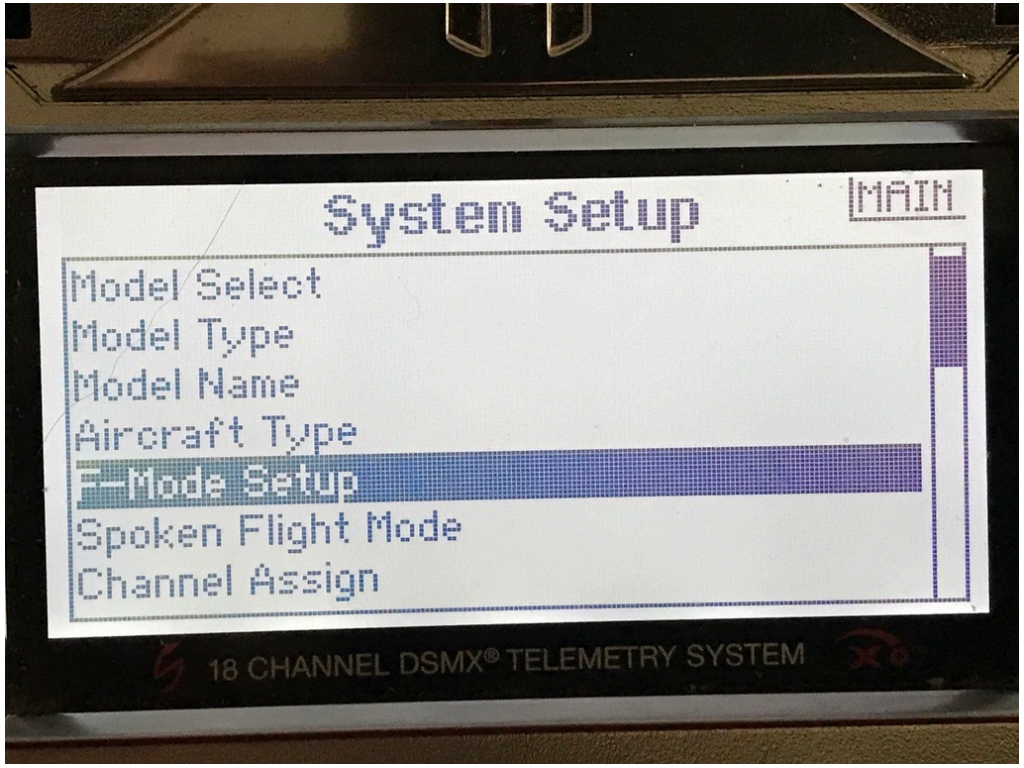


Then, move the flap switch and rename the other two Flight Modes

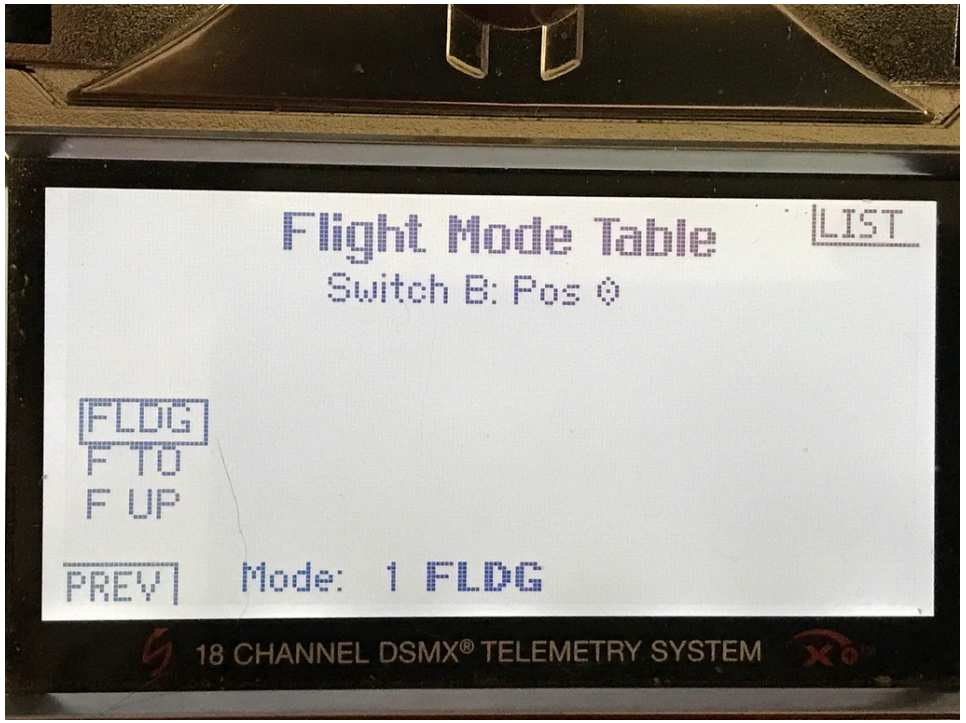


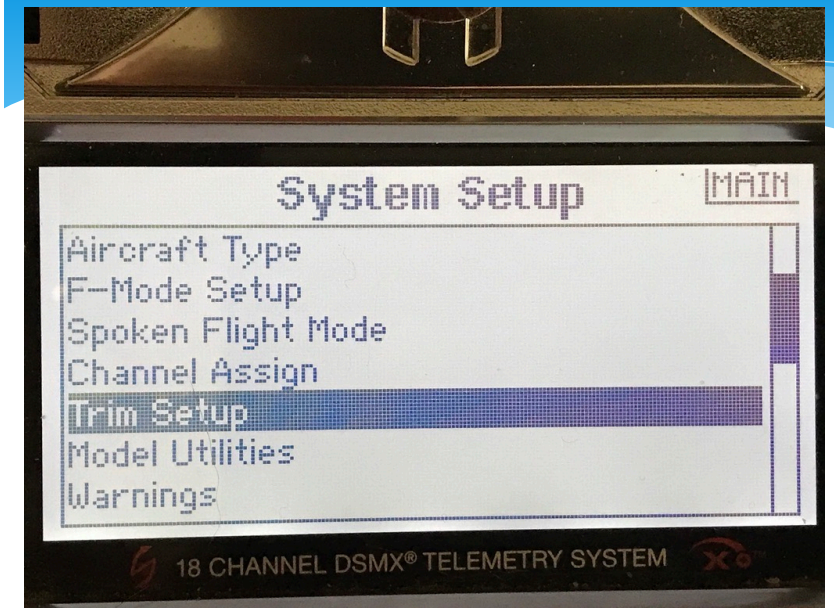


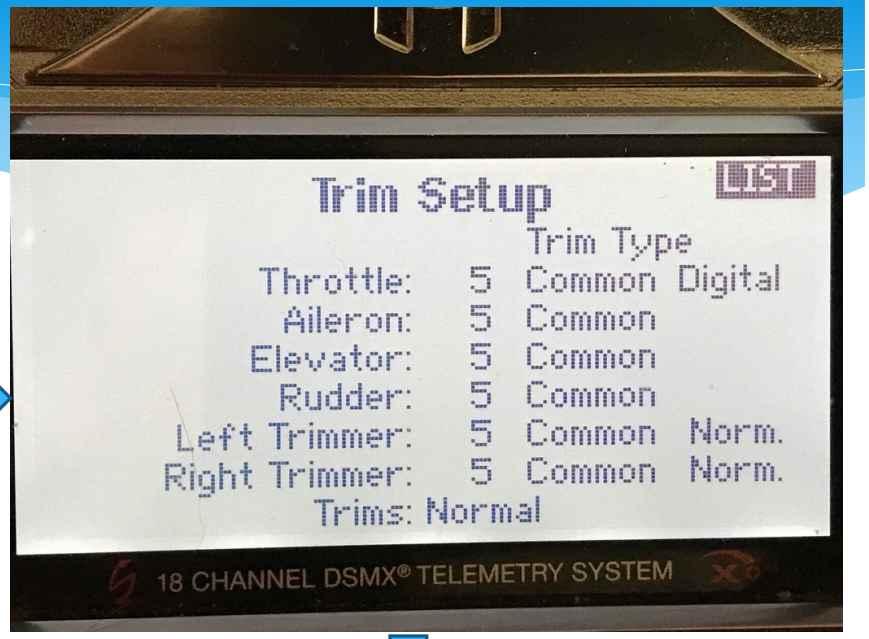
Now, we go BACK to the F-Mode Setup Page



Flight Modes now have descriptive names







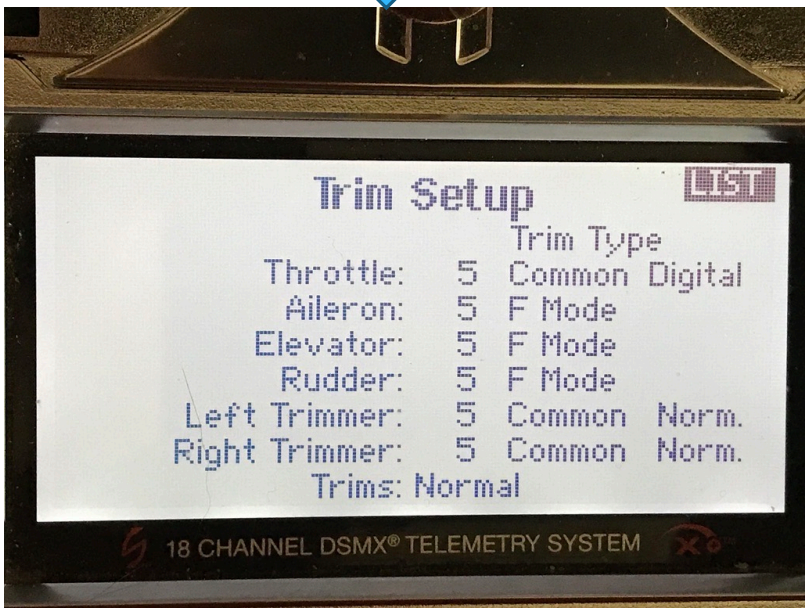
Critical Step!!

Trim Setup page:

-- change **Common** to **F-Mode** for Ail, Elev, and Rudder

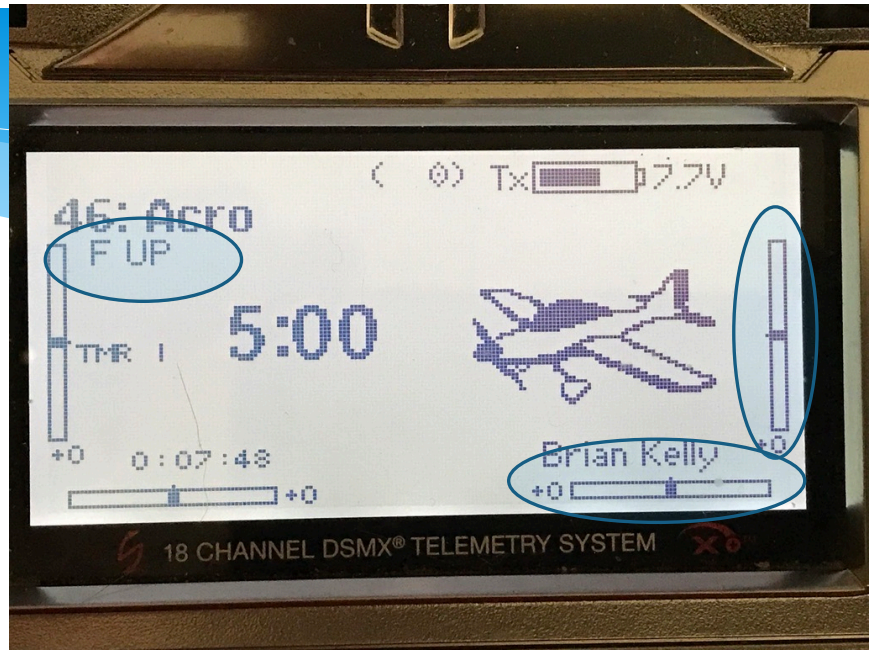
-- Common means trims will be the same for all F Modes

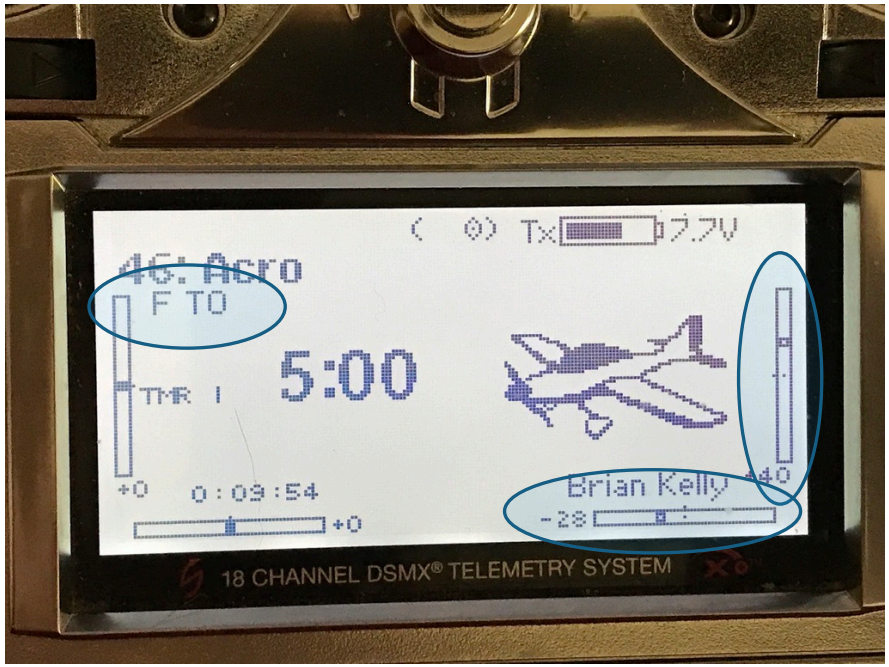
-- F Mode means the trims will be saved for EACH flight mode



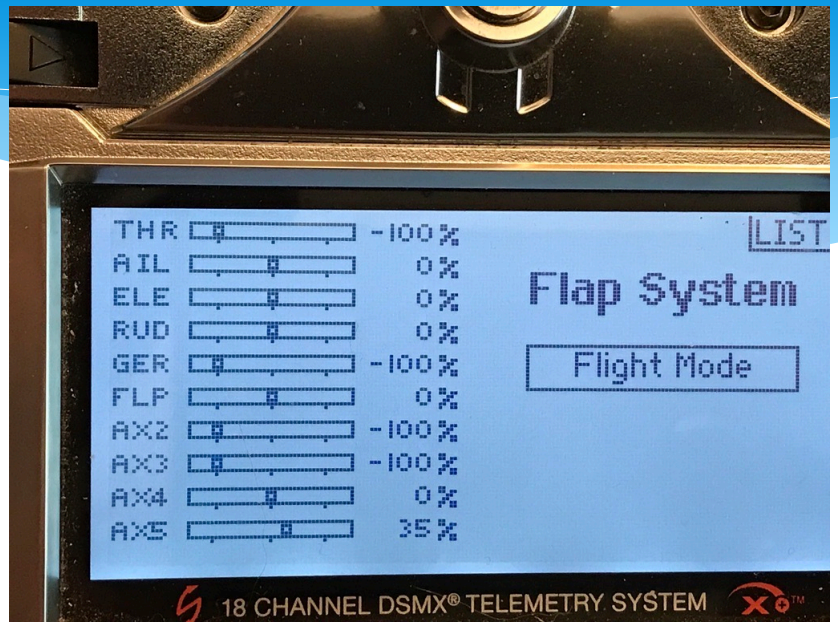
The Flight Mode name shows up on your home page

See the different saved trim states in each mode?



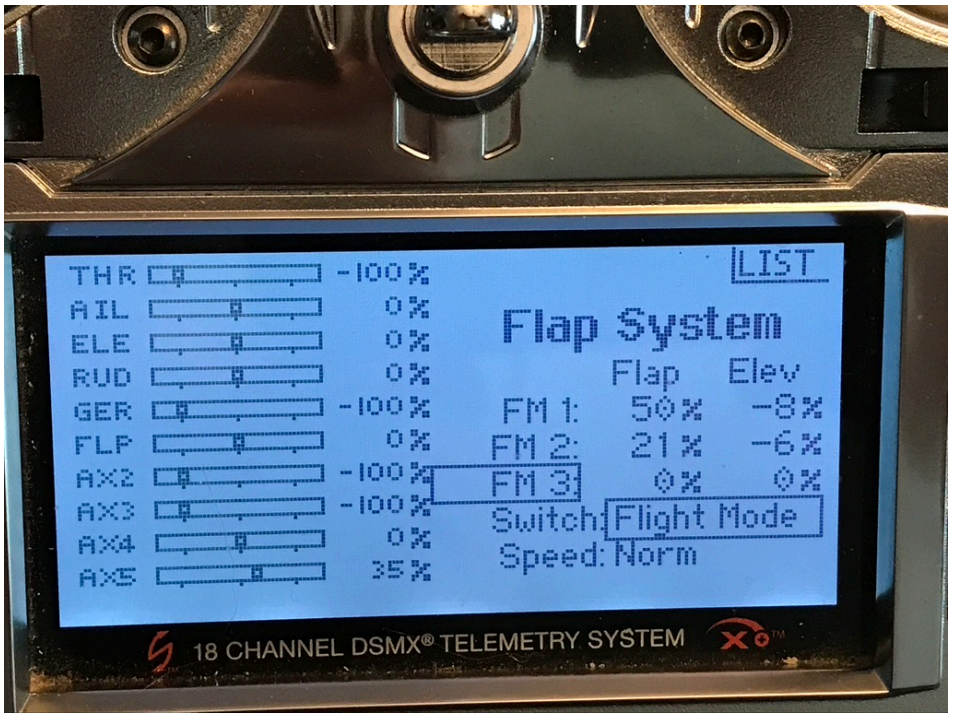


Assign Flaps function to the ***Flight Mode*** switch

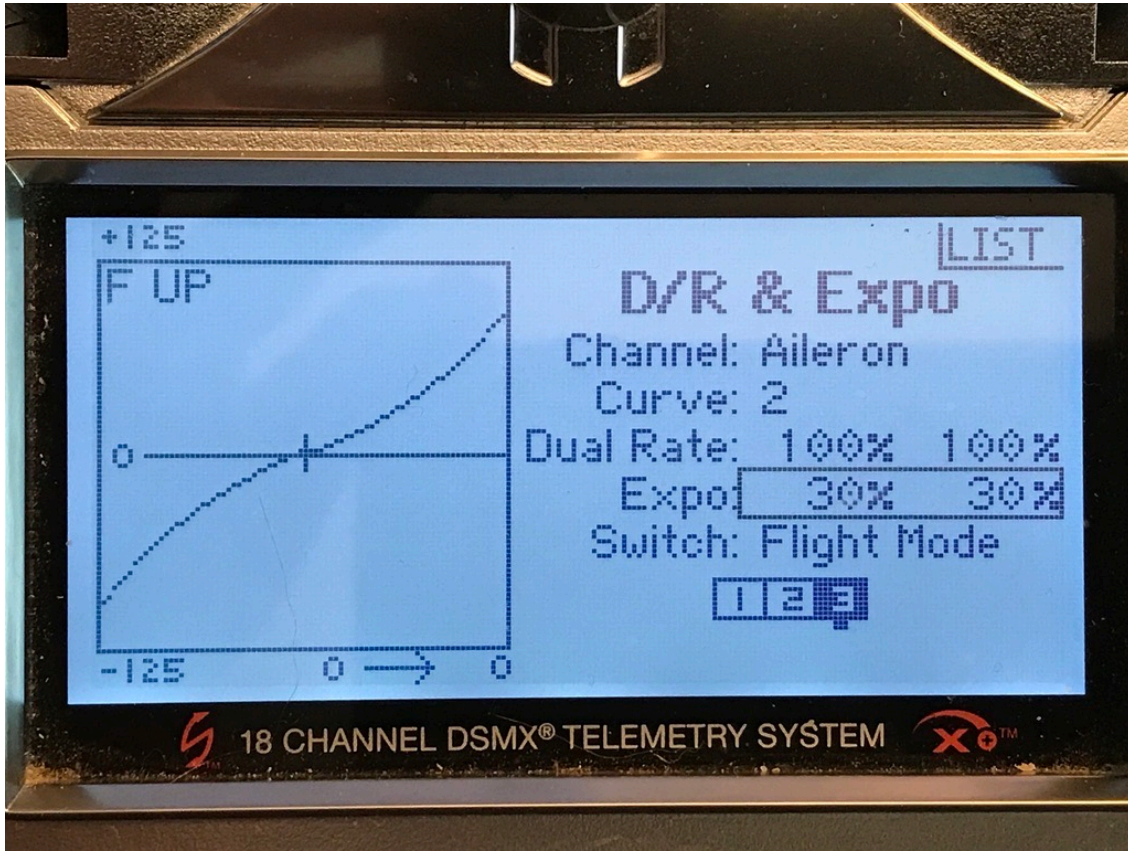


Use the elevator offsets you anticipate

Make minor trim changes later that will be saved in each ***Flight Mode***

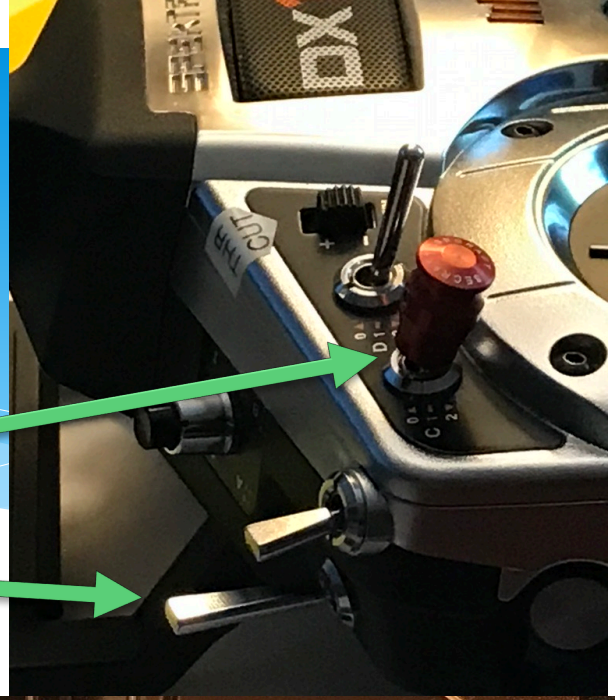


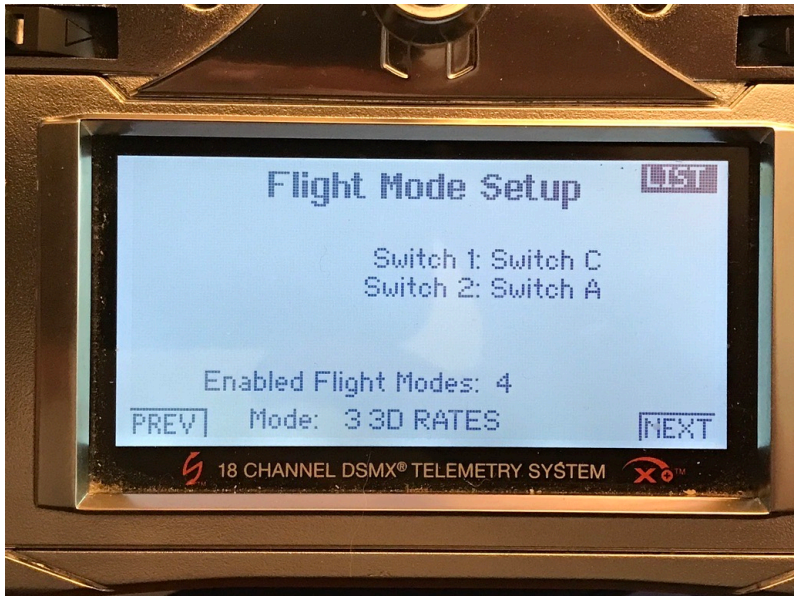
If desired, assign Rates, Mixes, or other things to the ***Flight Mode*** switch

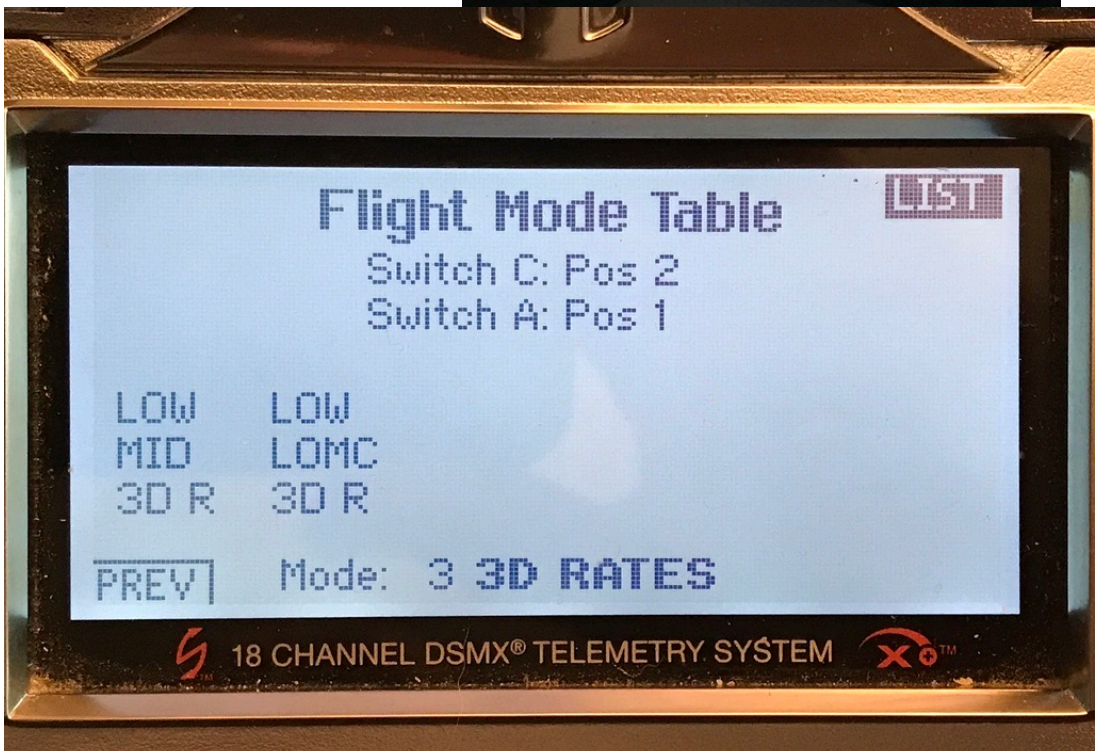


Spektrum Example using 2 Switches

* All Rate states on two switches
* Switch C, my usual rate switch
* Switch A, to add one more Flight Mode



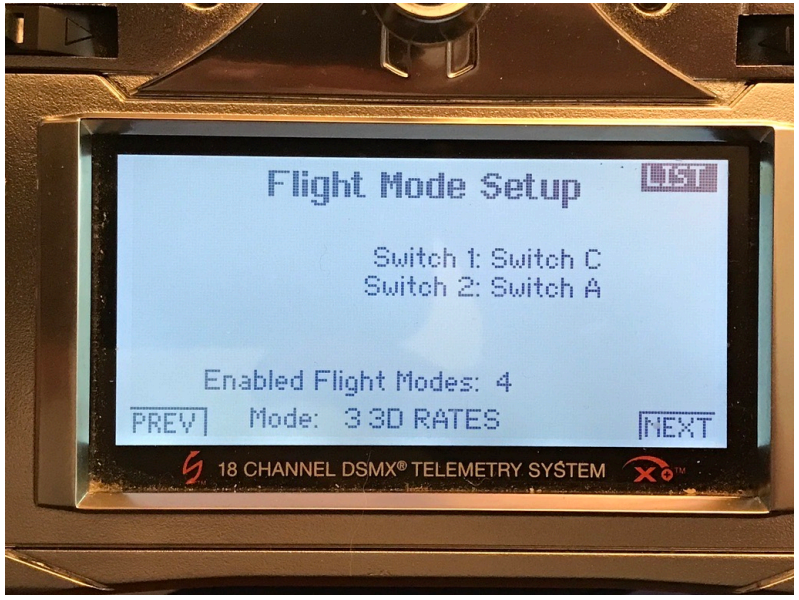


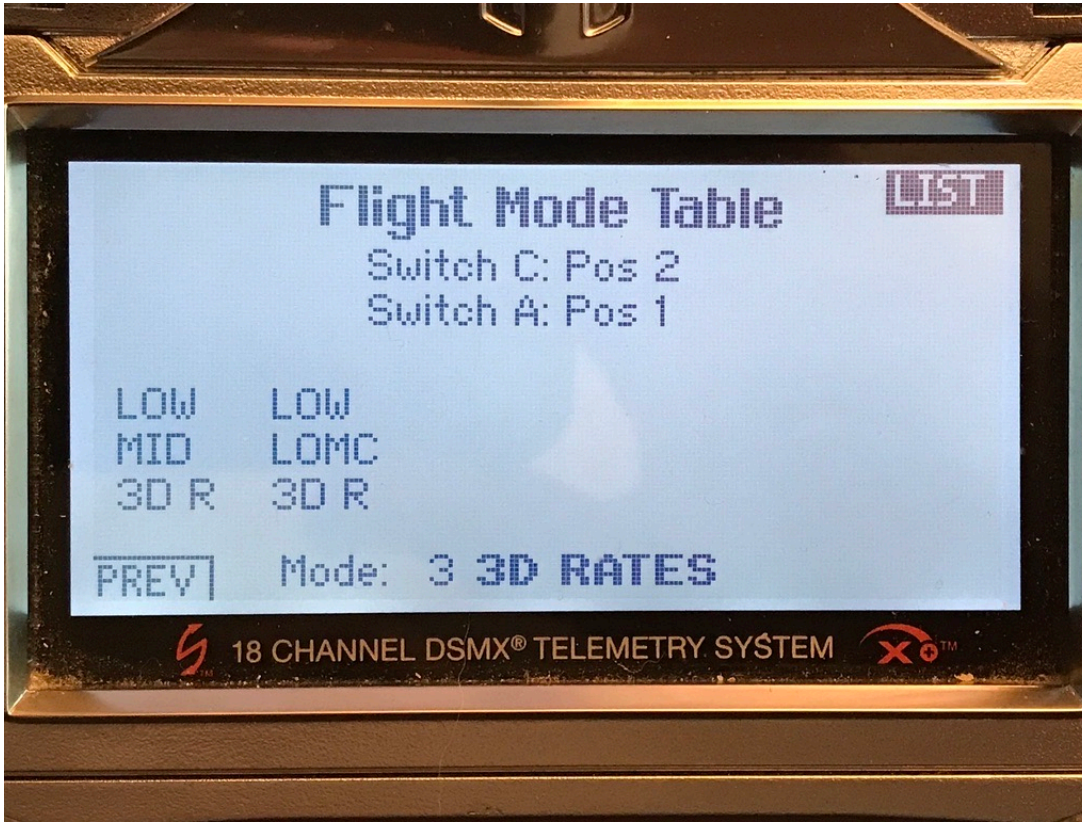


Spektrum Example using 2 Switches

* A 2-position and a 3-position switch should give 6 Flight Modes, but only 4 happen!!
* Sailplane model type gives 6 in this case, as you would expect

- New Mode is LOMC, when switch A is Up and C is in middle
- Anytime C is UP or DOWN, Flight Mode is LOW or 3D R

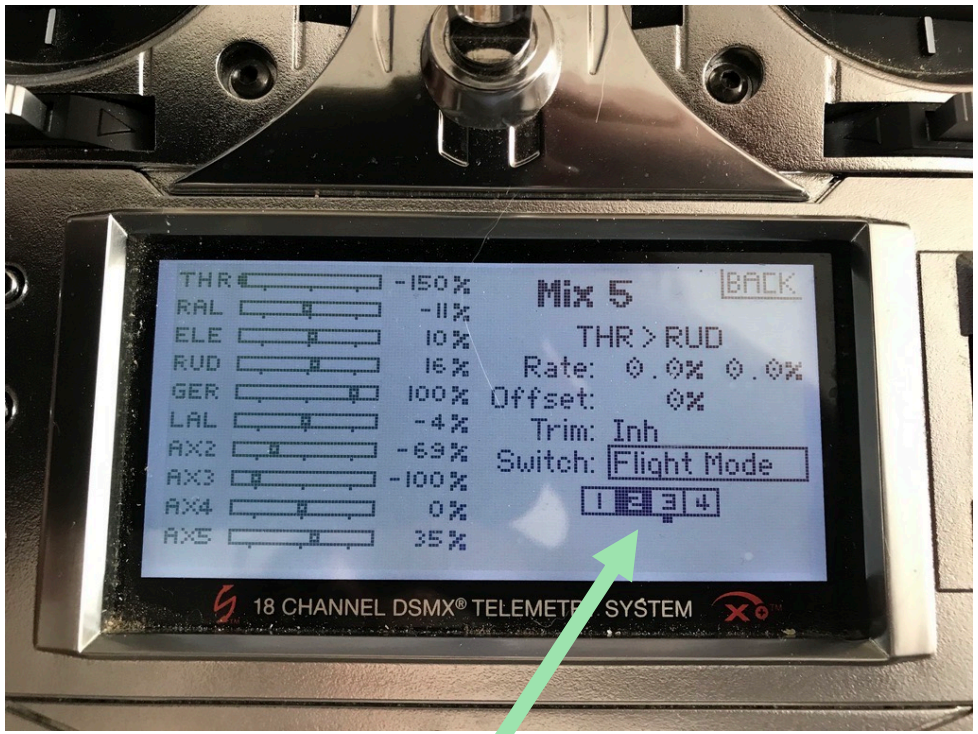




Selecting Flight Mode ‘Switch’

When selecting a switch for a mix, rates, etc,

The Flight Mode ‘switch’ will show as many states as there are modes



4 switch states, combinations of A and C

Thank You

Questions?