

Transmitters & Receivers

Palomar Radio Control Flyers Ground School



Good Old Days vs. Modern Tech

- * 72Mhz

- * The "clothespin" system
- * Needed Crystals
- * Long Antenna
- * One Model at a Time

- * 2.4GHz

- * Frequency Hopping
- * Binding to a single aircraft's receiver
- * No interference from other transmitters
- * Multiple Models Stored
- * Functions similar to a smart phone
- * Audio Feedback
- * Mixing
- * Caution — Similar frequency as microwave ovens, pagers, cordless phones



Creating a New Model

- * Aircraft Type
 - * Powered Fixed Wing
 - * Glider/Sailplane
 - * Multirotor
 - * Helicopter
- * Configuration
 - * Wing Type, Tail Type
- * Name of the Model or Model Number

8 CHANNELS 30 MODELS 2 TYPES

Model Select

Model 1: Acro

Model 2: Voodoo 600

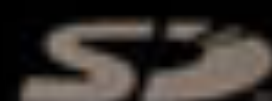
Model 3: Trex-500

Model 4: E-FLIGHT

CLEAR

BACK

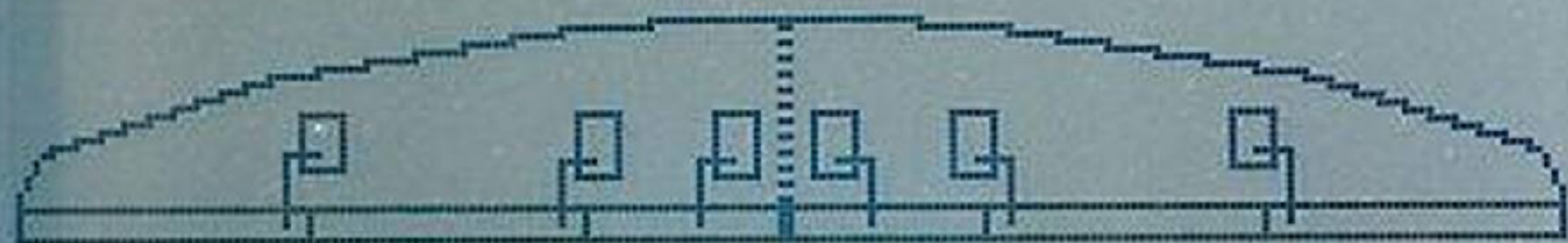
EXIT



2.4GHz DSM® SPREAD SPECTRUM TELEMETRY SYSTEM

Wing Type

LIST



Wing: 4 Ail 2 Flap
Tail: V-Tail A
Motor: Switch B



18 CHANNEL DSMX® TELEMETRY SYSTEM



Must-Have Setups

- * Kill Switch
- * Timers
- * Audio Alerts (on some radios)
- * Dual Rate & Expo Rate Switch

Dual Rates & Expo

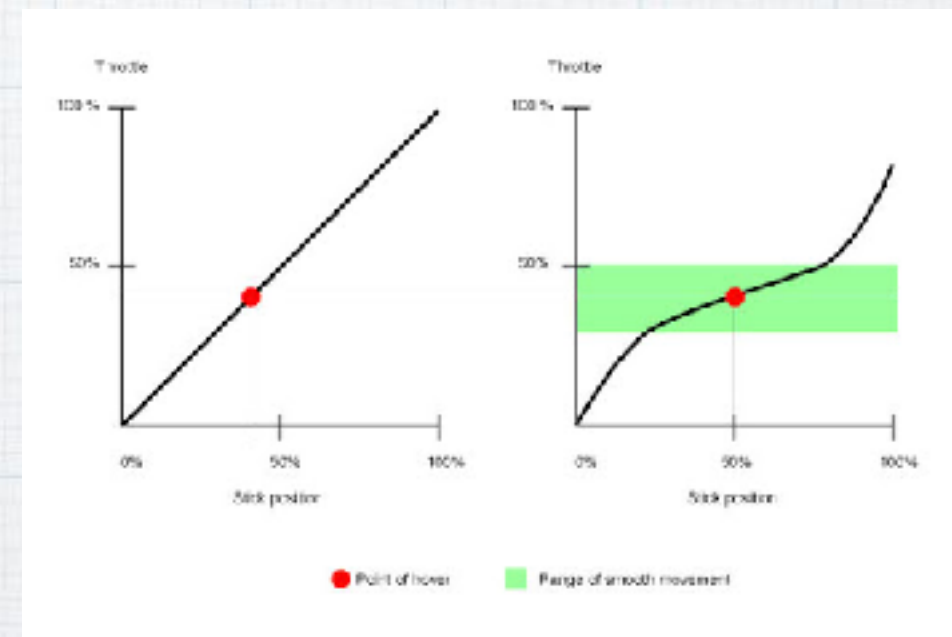
- * Rates

- * Makes flight envelope gentler or more aggressive

- * Expo

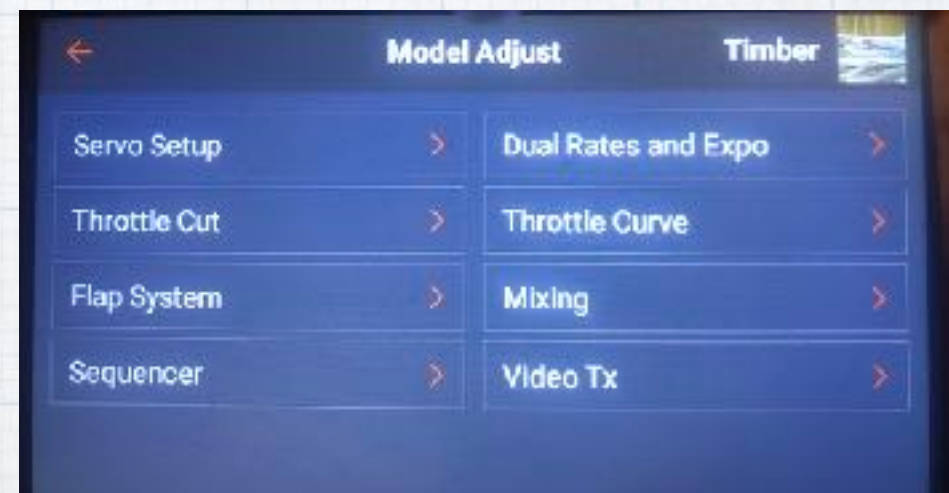
- * Linear - jerky

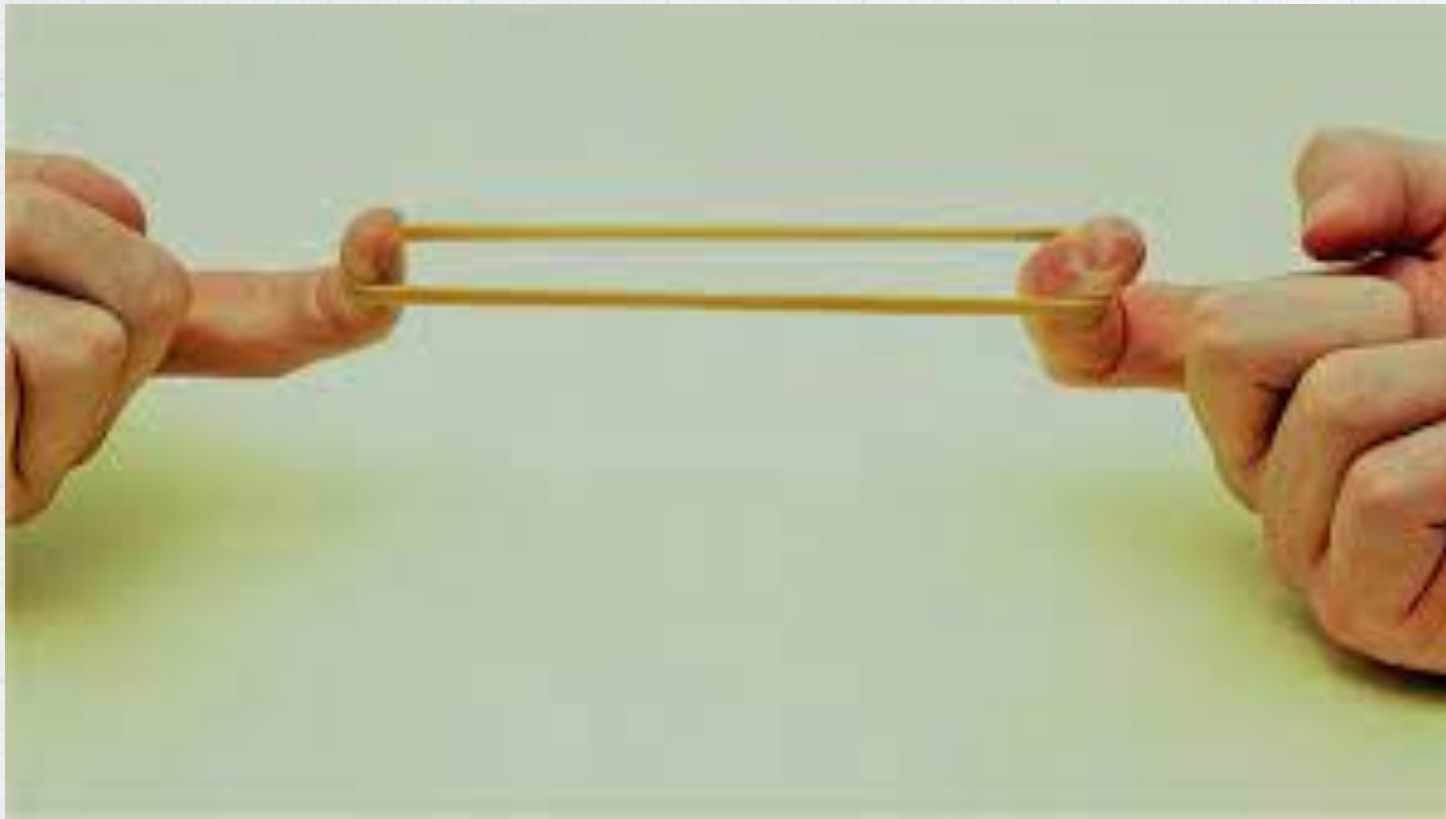
- * With Expo — Smooth



Setting Up Dual Rates & Expo

- * Model Adjust Menu
- * Follow Manufacturers Recommendations





High Expo, i.e. 75%,
Gentle motion with
low stick movement
increases with end points
on stick

Low Expo, i.e. 0%,
1:1 Proportional
to stick motion



← Model Adjust

Dual Rates and Exponentials

Timber



Switch Position: 2



Channel

Aileron ▼

Dual Rates

65%

65%

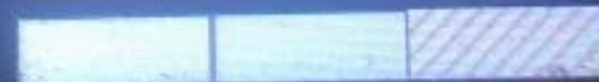
Expo

30%

30%

Switch

Switch C ▼



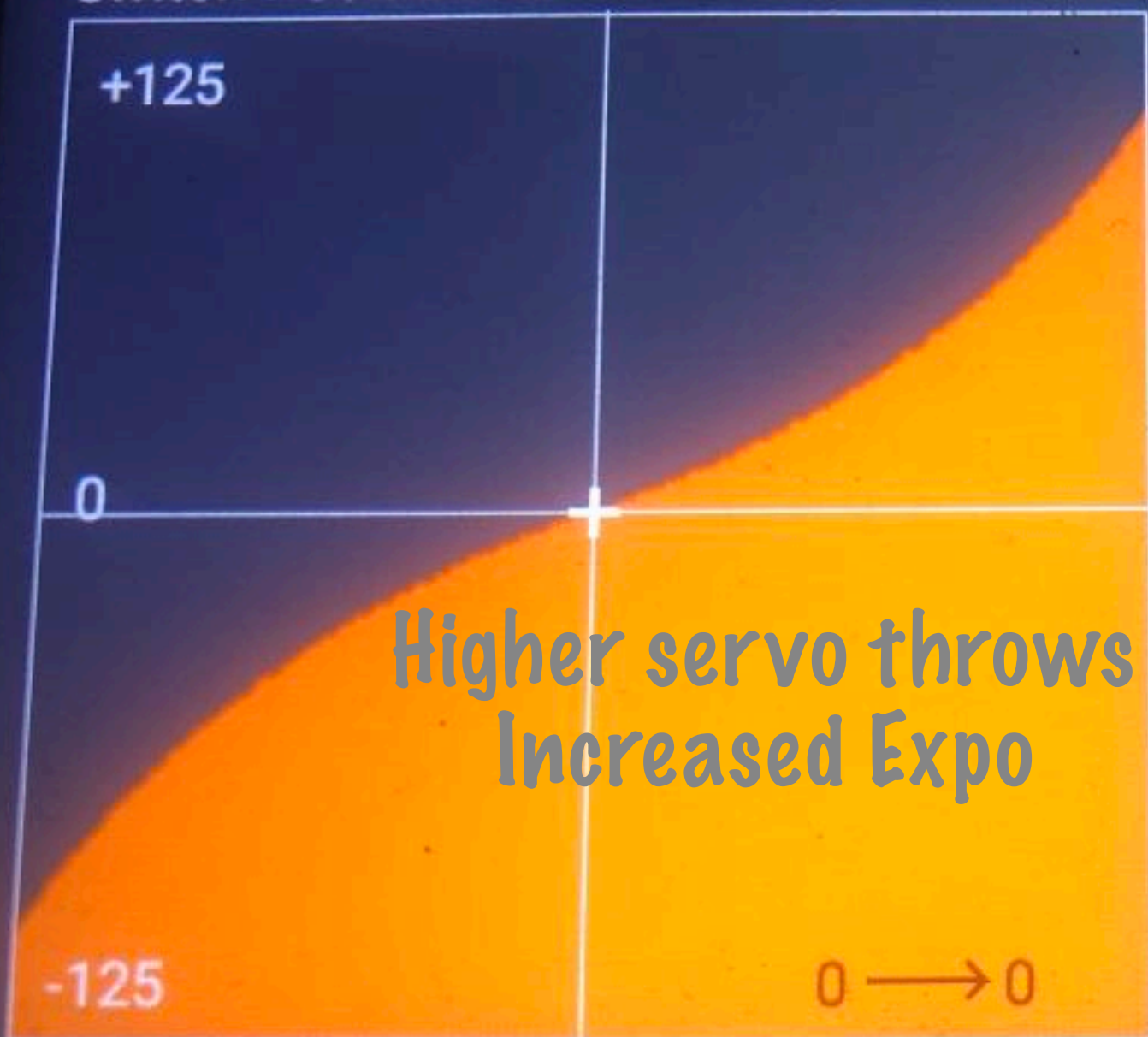
← Model Adjust

Dual Rates and Exponentials

Timber



Switch Position: 0



Channel

Aileron ▼

Dual Rates

100%

100%

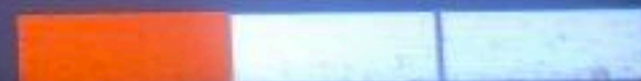
Expo

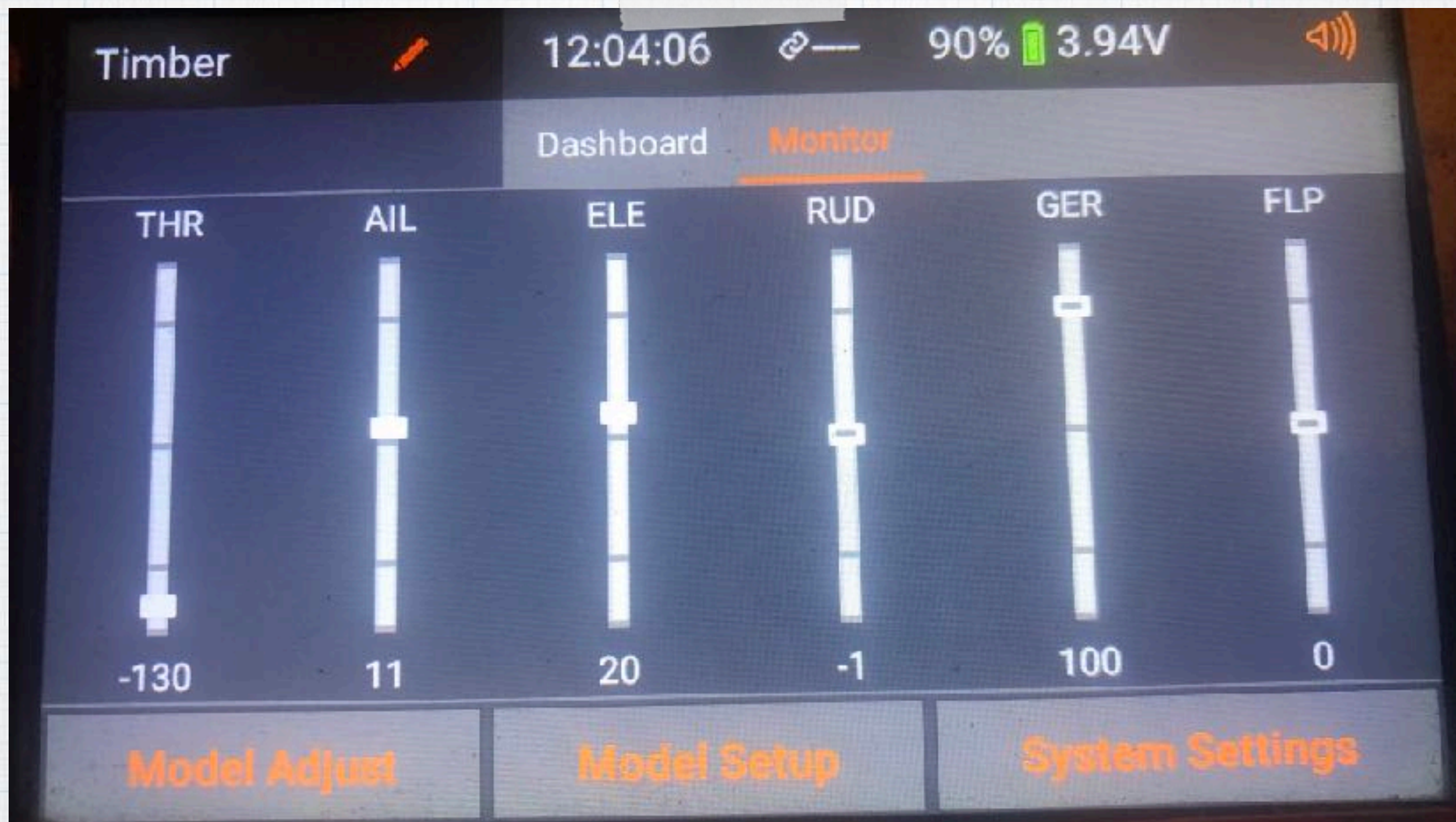
35%

35%

Switch

Switch C ▼





Monitor Screen

Check Stick and Switch Functionality

Binding

- * Remove all propellers before binding a new model
- * Most receivers have a bind plug while some receivers have a bind button
- * Insert the plug into the “battery/bind” slot or press the button before powering the aircraft
- * When the receiver flashes it is in bind mode
- * Turn on the transmitter while depressing the bind button (sometimes the trainer button) or press the bind button on newer transmitters
- * Remove the bind plug prior to disconnecting the battery
- * Test the servos/motor to see if bind was successful
- * Turn off the aircraft and turn back on to see if bind worked



Range Checking

- * Walk approximately 30 paces from aircraft after powering up
- * Put the transmitter into low power mode
- * Turn around in circles with transmitter while checking to see if servos respond properly
- * Have a buddy rotate the aircraft in all orientations while checking servo motion
- * Do both above tests with the motor turning without the propellor as motor may generate noise that can influence reception
- * If test fails, reorient the receiver in the aircraft and try again.

Start Up Sequence

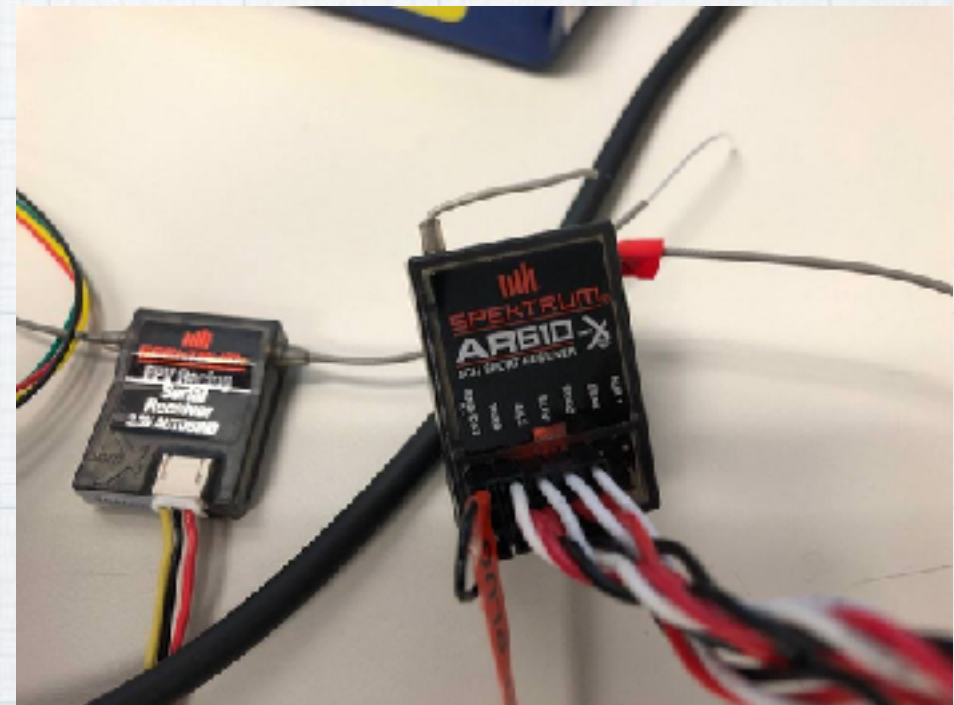
- Proper Model Selection On Transmitter
- Full Battery and/or Fuel Tank
- Transmitter on first, then aircraft receiver
- Proper control surface orientation with transmitter
 - Right aileron stick, right aileron up, etc.
- Range Check
- After flight — Aircraft off first, then transmitter

Diversity

- * Diversity allows signals from transmitter to be received when the aircraft is in different flight orientations
- * Multiple antennas on receiver allow for different signal paths
- * Antennas should be oriented 90 degrees from each other
- * Don't allow antennas to be placed near metal or carbon fiber

Satellite Receiver Orientation

- * Satellite receivers are actually true receivers that provide redundancy to main receiver
- * Satellite receiver should be placed as far from main receiver as possible
- * Orient the antenna positions 90 degrees from each other
- * Avoid metal or carbon fiber proximity



Gear

Flaps

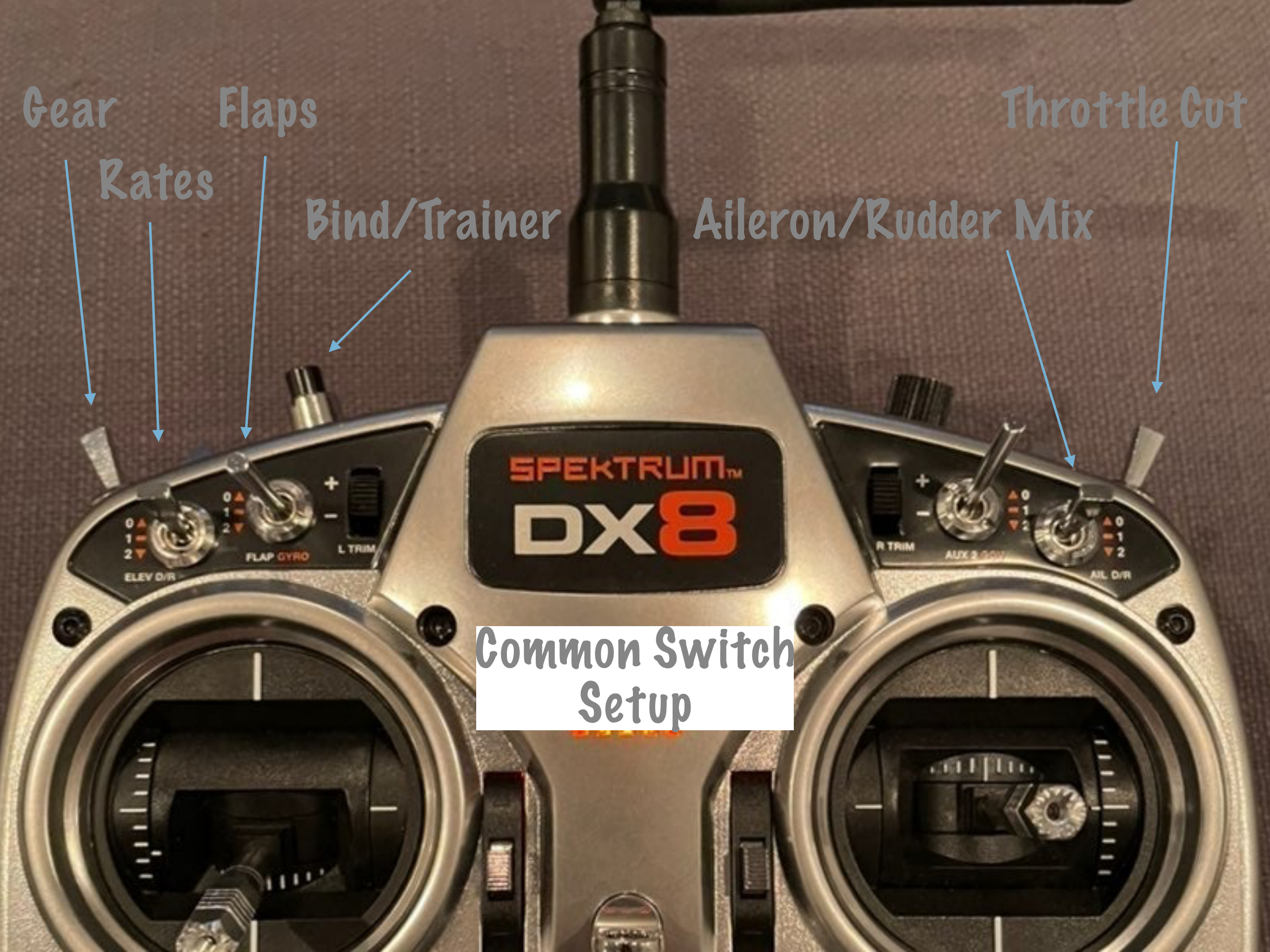
Throttle Cut

Rates

Bind/Trainer

Aileron/Rudder Mix

Common Switch
Setup



Why All the Channels?

- * Common 6 Channel Airplane Setup Includes:

- * Motor
- * Aileron
- * Elevator
- * Rudder
- * Flaps
- * Gear



Why More Than 6 Channels?

- * Sailplanes that require spoilers, crow, or other control surfaces
- * Using two channels for ailerons or elevators in high performance planes
- * Specialized Mixes

Throttle Cut Setup

- * Choose the Model Adjust menu item
- * Select Throttle Cut
- * Assign a switch (normally H — upper right corner)
- * Check operation in the Monitor screen



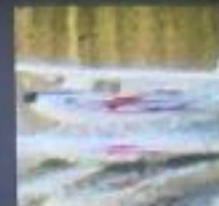
Audible Alerts

- * Many new transmitters offer Voice Alert features
- * You can set up alerts for timers, switch positions and telemetry read outs if your transmitter/receiver permits it



Model Setup

Timber



Frame Rate



Range Test



Aircraft Type



Timers



Telemetry



Trainer



Audio Events



Trim Setup



Flight Mode Setup



Channel Assign



Analog Switch Setup



Digital Switch Setup





Audio Events

Timber



Switch Change Reports



Trim Reports



Stepping Reports



Center Tone



Pre-Flight Checklist



Spoken Flight Mode



Custom Reports



Telemetry Warnings



Trainer State Reports



Model Start Alerts



System Sounds



Binding Alerts





Switch Change Report



Switch F



Switch H



Switch C



Switch D






Switch Change Report Details

Timber



Switch

Switch H 

Pos 0:

Voice 

Ready



Pos 1:

Voice 

Throttle Cut





Fail Safe

When the Unexpected Happens

Fail Safe

- * If transmitter/receiver link is lost, failsafe will hold a specific setting
- * On my planes, I program 30% throttle and a slight right-hand circle
- * If the link fails, the plane will simply do a slow circle until such time that I can recover the connection or the plane crashes, usually within sight

Fail Safe Setup

- * Put the bind plug into the receiver and plug in the battery. Receiver should be flashing
- * Remove the bind plug and keep battery plugged in. Receiver should still be flashing
- * Put your sticks into the orientation you want the aircraft to fly in if you lose communication
 - * I like 40% throttle and about 10% right aileron
- * Press the bind button on your transmitter to achieve binding
- * Make sure your prop is off and start your aircraft
- * Turn off your transmitter for a moment and see if the Fail Safe settings are invoked
- * NOTE: Not all receivers are capable of Fail Safe

Creating a “Mix”

- * You can create many ways to control your aircraft by combining different servo and/or motor functions to work together
- * Let's look at a very common mix that allows you to make coordinated turns by mixing together ailerons and rudders to turn together by just using a mix — Aileron to Rudder Mix
- * Right aileron will automatically initiate right rudder

← Model Adjust

Mixing

Timber



RUD > AIL/ELE



AIL > RUD



ELE > FLP



P-Mix 1: INH > INH : Inhibit



P-Mix 2: INH > INH : Inhibit



← Back


AIL > RUD

Timber

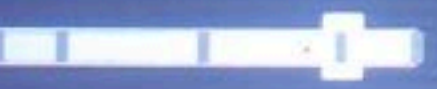



THR  -130

AIL  11

ELE  20

RUD  -1

GER  100

FLP  0

Right/Left

65%

65%

Switch

Switch F



1/2

1

2

Powering Receiver and Servos

- * ESC (Electronic Speed Control) sometimes include a BEC (Battery Eliminator Circuit) to power the receiver and servos
- * Uses motor power battery to power receiver and servos
- * OK for low power, low number of servos and light planes



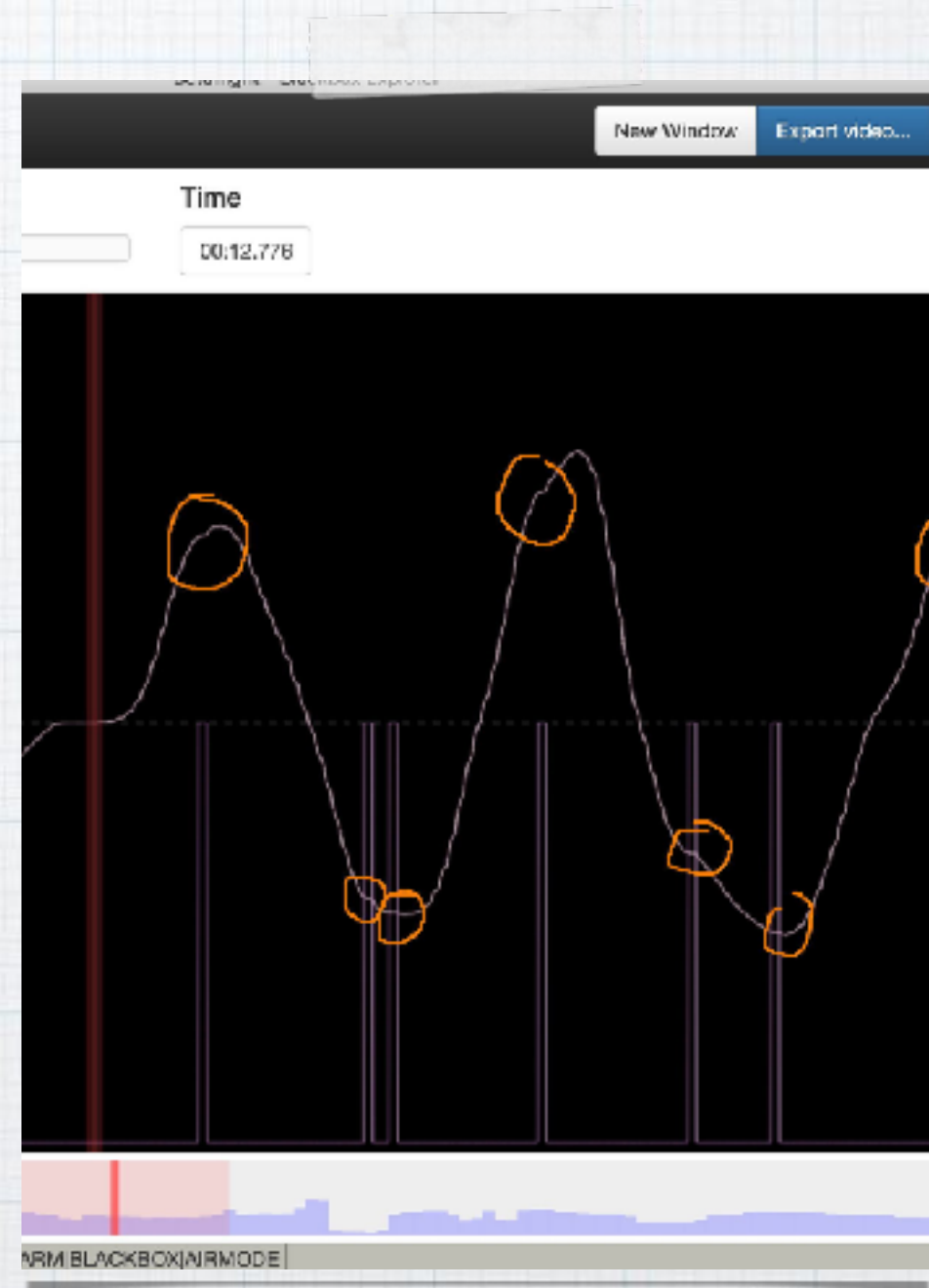
Powering Receiver and Servos with Auxiliary Battery

- * Use with larger aircraft or aircraft with more than 4 servos for power redundancy
- * Some aircraft setups utilize an emergency “fail safe” battery to maintain flight control in the event of main battery failure
- * Life batteries are an excellent choice. Low loss, long storage, no memory effect



Frame Losses and Fades

- * Many transmitters/receivers now include telemetry to assess effective communication
- * Most aircraft experience some frame losses during a flight. More than 20 frames lost is cause for concern
- * Any fades or drops demand immediate attention



Recovery From Lost Signal

- * Hold Transmitter Over Your Head
- * Move towards the plane with help from a spotter
- * Move the transmitter to different orientations
- * Keep moving the sticks to see if you regain control
- * With any luck, you will recapture control

Plane Down and Lost!

- * If your plane crashes, DO NOT turn off your transmitter
- * Move to the area that you think the aircraft went down in
- * Keep moving the sticks and listen for the sound of servos or motor to lead you to the aircraft.
- * When aircraft is found, immediately remove battery



Buddy Boxing

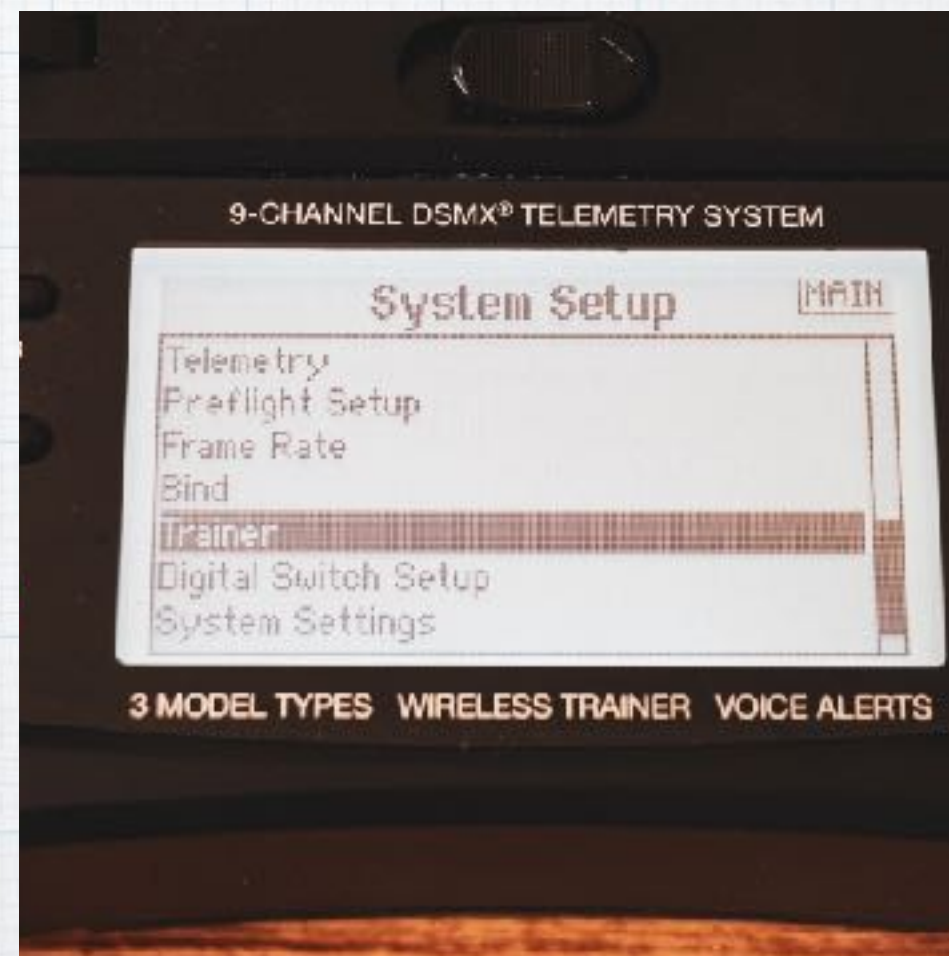
- * Wireless

- * Wired



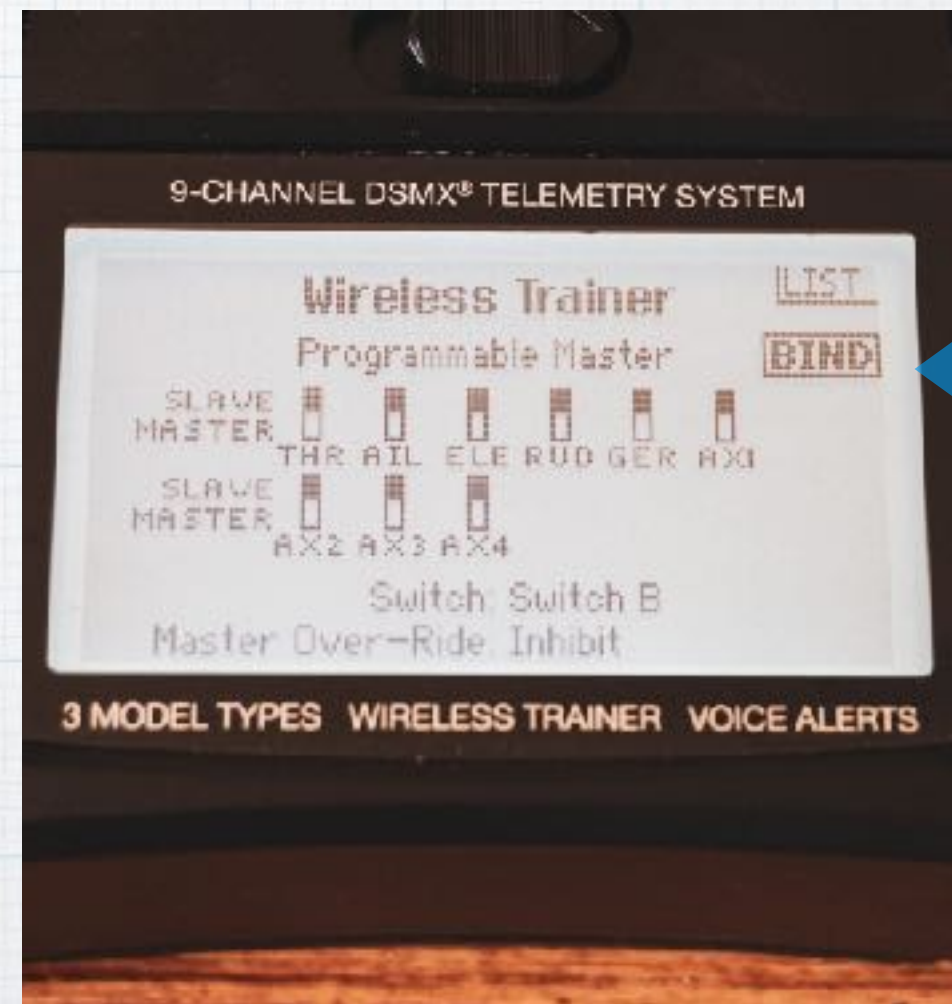
Buddy Box - Wirelessly

- * Bind the Master radio to the aircraft
- * Go to System Setup, then Trainer



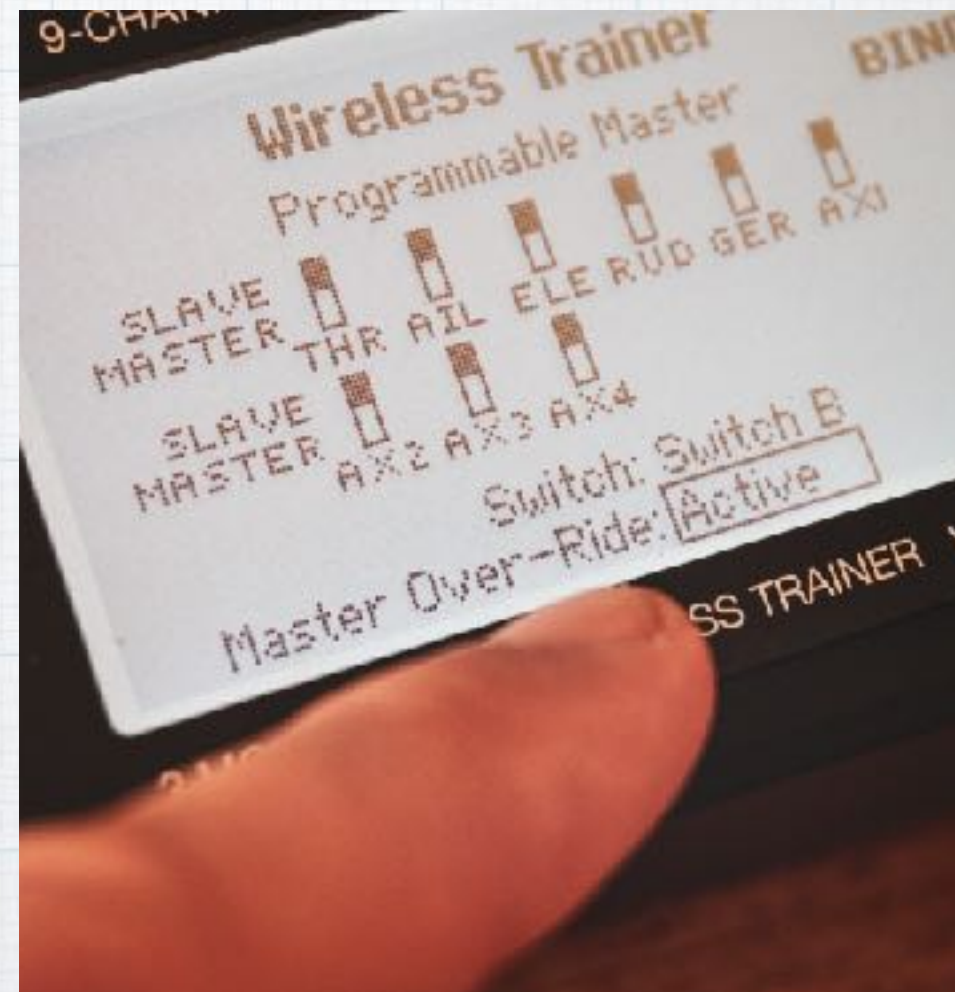
Buddy Box

- * Click on the Bind Button on the Master Transmitter's Wireless Trainer screen— NOT the aircraft bind button
- * Put Slave Transmitter in Bind Mode
- * Slave Transmitter will bind like an aircraft



Buddy Box

- * Enable student (slave) control by holding down the "Bind" button on Master or...
- * Choose "Master Over-Ride" that immediately lets Master take control when sticks are moved



References and Help

- * YouTube
- * Included Transmitter Manuals
 - * Download manuals and tips directly from the manufacturer's Web Site
- * "Rather Good Guide for Programming the Spectrum DX9"
 - * www.rathergoodguides.com
- * "Programming the DX-18 G2 for Six Servo Sailplane with Motor"
 - * www.red-sailplane.myshopify.com
- * Many club members

