

FLYER 9x

Powered with er9x firmware



PARKEFLYER

THE MANUAL

Doc Rev 1.3

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If you find this firmware valuable, please support this community by making a
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http://9xforums.com/wiki/index.php/Donating_to_show_your_support

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Introduction

er9X is an alternative firmware for the Turnigy/Eurgle/FlySky/iMax 9 channel “TH9x” radio transmitter. The TH9x is fantastic hardware, but it ships from the factory with firmware that seriously limits the radios potential. What’s firmware? Firmware is the software that runs on the TH9x hardware and makes all aspects of the transmitter function.

The firmware that ships with the TH9x is buggy, ugly, limited in functionality and produces a highly annoying BEEP every time you push a button.

Fortunately, a group of like-minded programmers discovered how to write their own firmware for the TH9x. er9x is one of several firmware projects for the TH9x radio. With er9x the TH9x becomes an extremely capable transmitter that rivals the capabilities of radios costing \$1,000 or more.

About this Manual

This is a quick start guide to orient to your radio. We cover basic setup as well as the ParkeFlyer.com Model Examples we’ve pre-programmed for your controller. This manual is useful for the ParkeFlyer Flyer9x or any other 9x radio running the er9x software.

If you want to dive in and start configuring a model immediately go to the Examples Section:

Content excerpts were taken from the er9x manual. The full er9X manual is located here:

http://9xforums.com/wiki/index.php/Er9x_user_guide

Updates to this manual and ParkeFlyer Video Guides are located here:

<http://parkeflyer.com>

About ParkeFlyer

We're hobbyists, engineers and entrepreneurs who feel there is room for improvement in the RC industry.

The giants (yes we are talking Horizon Hobbies, Futaba, JR, ...) make some fantastic products, but they've dominated the industry for far too long. This domination slows innovation, limits choices and creates high prices.

Real RC innovation happens at the DIY (do it yourself) level.

Thanks to the Internet, the DIY community is connected like never before and collaborating globally, 24x7.

The RC renaissance is upon us.

Open source radio firmware, FPV (first person view) flying, advanced high-strength / lightweight materials, LiPo battery technology, high-performance brushless motors, crystal-less radios and dramatically lower prices are changing RC for the better. Many of the traditional barriers of entry are dropping and a new generation is taking over.

The challenges with DIY (for those of us with limited time) are...

- significant time investment
- specialized skills - soldering logic boards, building PCBs (printed circuit boards), ordering parts from China, etc.
- no single source for all the necessary parts
- introduces risk - typically there is no manual. Results are only as good as your skills, your tools and the components you are able to produce

ParkeFlyer's mission is to bring the latest DIY innovation to those who want to take part in the RC renaissance, but simply don't have the time to dive into DIY (and still fly).

We'll never be your RC superstore. Instead, we focus on a handful of game changing products with commonsense instructions and unparalleled support.

ParkeFlyer - FLY NOW

Visit us at: parkeflyer.com

About ER9X

ER9X is an amazing open source firmware that transforms the TH9x radio into an extremely power and feature rich RC transmitter.

Everything you'd want to know about er9x and other firmware projects for the TH9x radio can be found here.

http://9xforums.com/wiki/index.php/Main_Page

Disclaimers

er9X is provided under the GNU v2.0 License. All relevant restrictions apply including the following. In case there is a conflict, the GNU v2.0 License is overriding. This software is provided as-is in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details. In no event will the authors and/or contributors be held liable for any damages arising from the use of this software.

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By downloading this software you are agreeing to the terms specified in this page and the spirit of thereof.

Warnings!

ALWAYS use your throttle hold switch! All ParkeFlyer.com templates use the large THR HOLD switch in the rear, left hand corner of your radio. On ParkeFlyer Flyer9x radios, we've colored this switch RED for instant recognition. Most people wait to seriously slice their hands (or in some cases their stomachs) before really appreciating the use of the throttle hold switch. Don't let this be you.

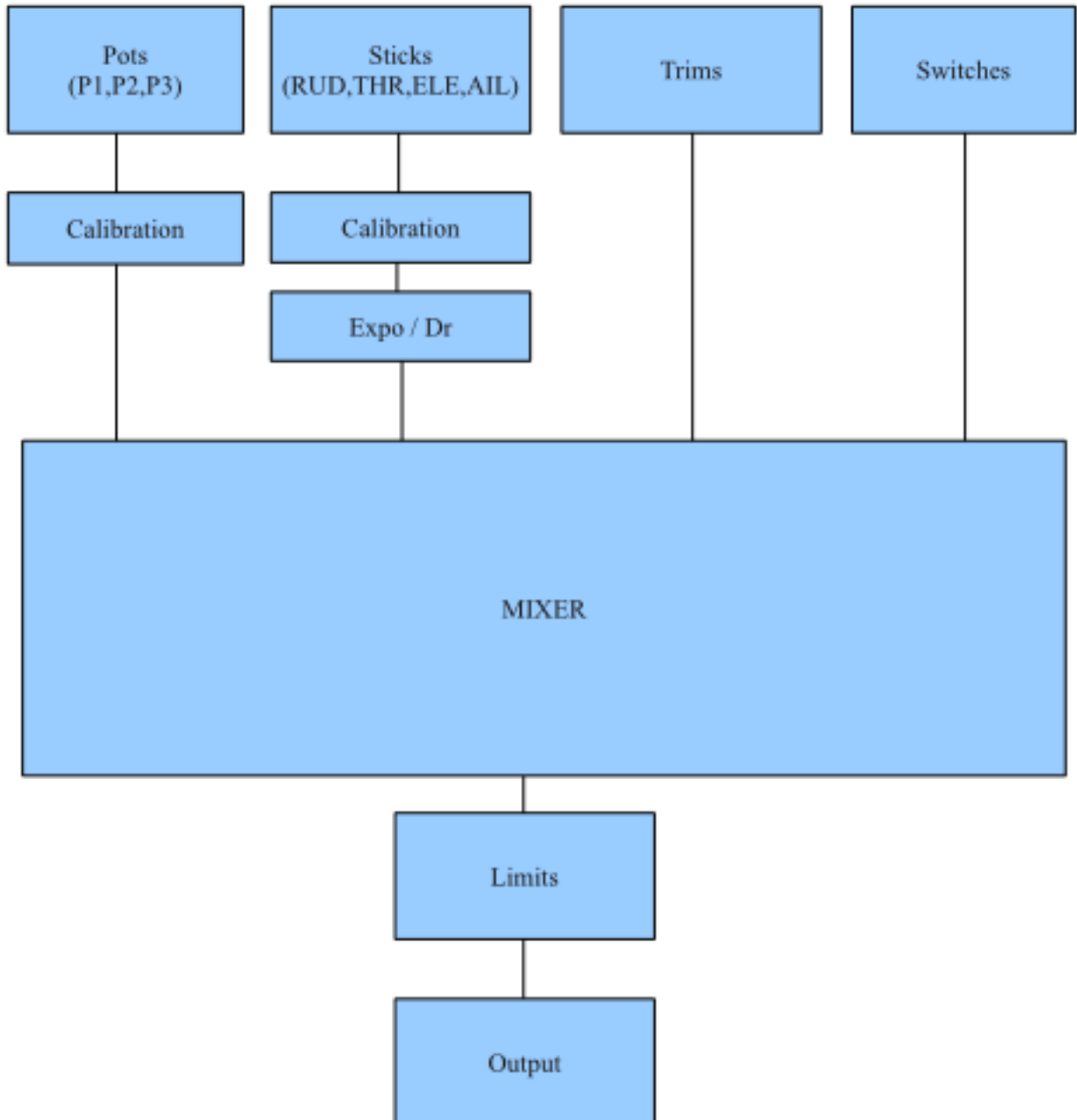
NEVER have your aircraft turned on while programming your controller. There are multiple scenarios where your throttle could be instantly turned on to full power. You don't want you airplane or helicopter instantly flying around your garage, living room or office. Trust me. It sucks and can be extremely painful.

WARNING! Deleting a model causes the memory to jump to the previous model memory in the list. Do not delete a model memory while you have a model "listening". Always shut down your receiver before deleting a model. You shouldn't be programming with the model on anyway! Don't do it!

Tour: er9X and the 9X Hardware

er9X - How it works (excerpt from the er9x manual)

Bear with me here – some flow charts coming up:



What the heck was that flowchart?

The system receives 4 types of inputs:

- Main Sticks
- Potentiometers (POTS)
- Trims
- Switches

The analog inputs (sticks and pots) go through a calibration phase. The sticks can also go through Expo and Dr filters before going to the mixer.

The mixer does it all. It directs each input to the desired output (CH1..CH16). It controls how the inputs are added. It also controls the timing of each function.

After the inputs are processed by the mixer they are directed to the relevant output channels.

The limit procedure takes over and makes sure no output goes too far. Finally the channels are encoded and sent to the RF module to take that nice little hike through the air to your model.

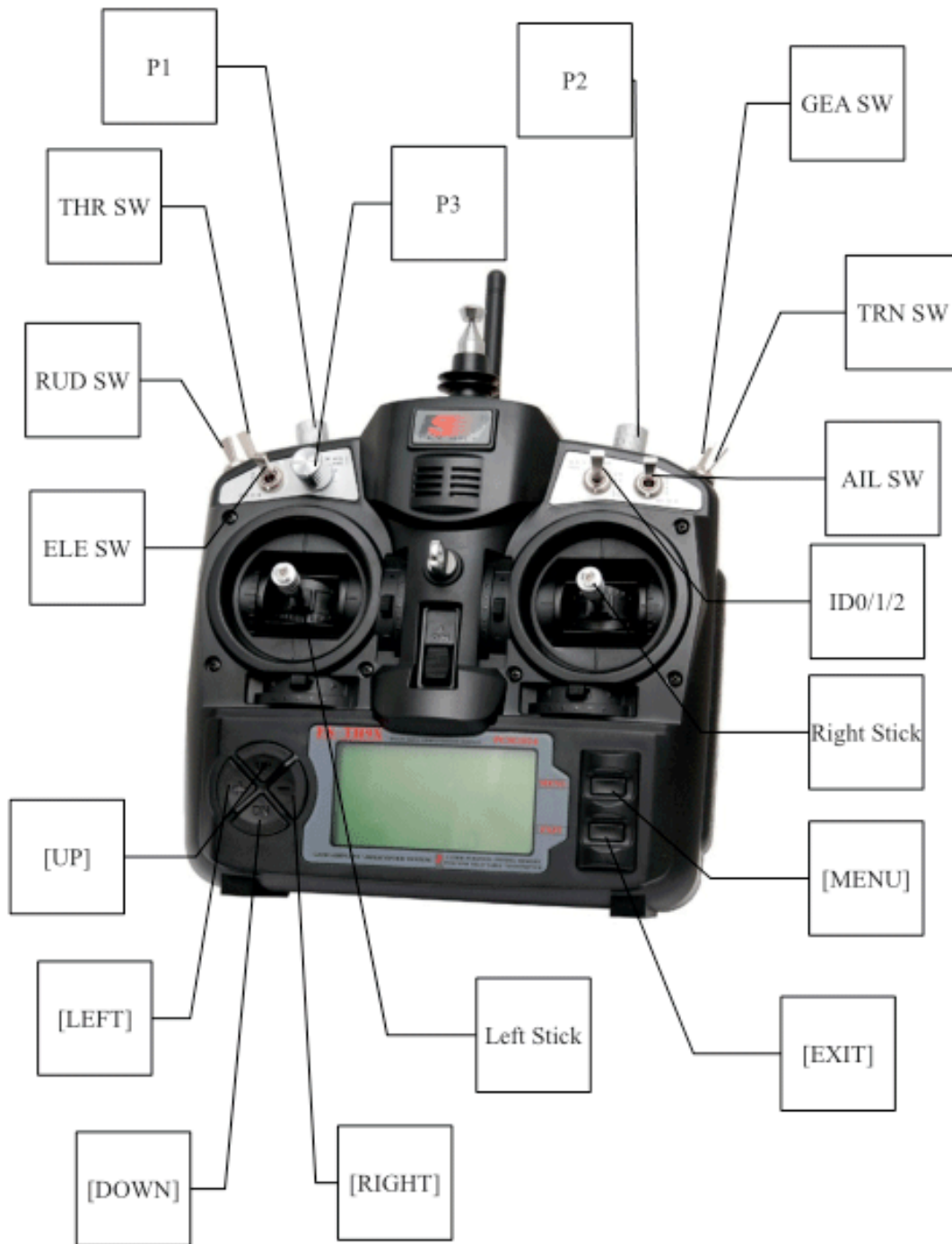
ParkeFlyer Naming Conventions

You can setup your 9x any way you like. To keep things consistent, we recommend you use the following conventions. This will enable the ParkeFlyer Flyer9x Example Models to work “out of the box”. It also matches the Gyro Gearloose conventions (which is a great resource for more sophisticated mixing and automation, see the appendix “Where to go for more information” for a link to his templates).

- Channel 1 – Ailerons – both ailerons or left flaperon - negative is “down”
- Channel 2 – Elevators – both or left elevon - negative is “down”
- Channel 3 – Throttle
- Channel 4 – Rudder
- Channel 5 – Gear
- Channel 6 – Flaps (both flaps or right flaperon) – negative is “down”
- Channel 7 – Special – Vectored Thrust Elevator - negative is “down” Right Elevon - negative is “down”
- Channel 8 – Special – Vectored Thrust Rudder - negative is “left” Canopy - negative is “Closed”

A note on servo polarity... Different brands of servos are wired with different polarity (meaning two different servos may do the exact opposite of one another when given the same control input.). You may need to “invert” or “reverse” your servos (in your model configuration) to get your servos moving in the correct direction. More on this later...

Getting to Know your Radio



Inputs

- RUD – Rudder.
- ELE – Elevator.
- THR – Throttle.
- AIL – Aileron.
- P1/P2/P3 – Pots.
- Switches:
 - THR – Throttle cut switch, don't confuse this with the THR stick. The THR switch is located on the back left side.
 - RUD – Rudder D/R (dual rate) switch.
 - ELE – Elevator D/R switch.
 - ID0, ID1, ID2 – Three position switch. These 3 define the 3-position switch. ID0 is the top position, ID1 – mid position and ID2 – bottom position.
 - AIL – Aileron D/R switch.
 - GEA – Gear switch.
 - TRN – Trainer switch. This switch is spring loaded.
 - SW1..SW6 – Custom switches. More on these later.

Note: It should be stated that every function in er9X is assignable. There are no fixed switches. You can choose the TRN switch to be throttle cut and use the triple switch to control Flaps or Flight Modes. The names are useful since they are labeled like that on the switches themselves.

Radio Setup Menu: Overview & Recommendations

General View



The main view is split into top and bottom. The top contains the following:

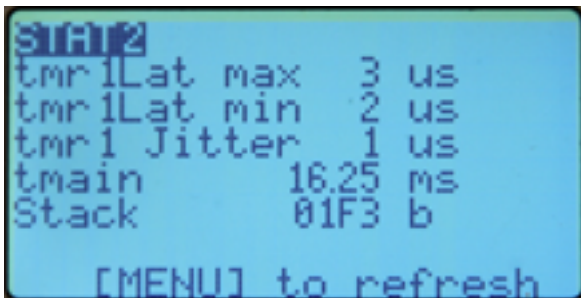
- The current model's name. (REAPER in this case)
- The battery voltage (8.0v).
- Trim increment information (Fne or fine).
- Timer and timer trigger information (TH% throttle position relative). Pressing [EXIT LONG] resets the timer.
- Throttle trim activation information.
- The bottom consists of four screens. You can flip between these with the [UP]/[DOWN] keys. The 4 screens are:
 - Value bars – these show the output values for the first 8 channels.
 - Value values – The output values for the first 8 channels.
 - Input values – Stick position and switch indicators (shown in this pic-mode2 throttle on left) bars in the middle are pot input indicators.
 - Elapsed timer – Timer that may be started, stopped [MENU] or reset to zero [MENU LONG].

Statistics Screens

From the main screen pressing [UP LONG]/[DOWN LONG] will enter the statistics screen.



The first shows some available timers and traces the throttle stick as well.



The second shows general timing of the Tx. The value “tmain” shows how long the math takes. This will increase as you add more mixers. It can be very large sometimes depending on eeprom writes. The Stack value shows the unused space, in hexadecimal, between the end of used Ram memory and the lowest point the stack has reached. You can reset the timers by pressing [MENU].

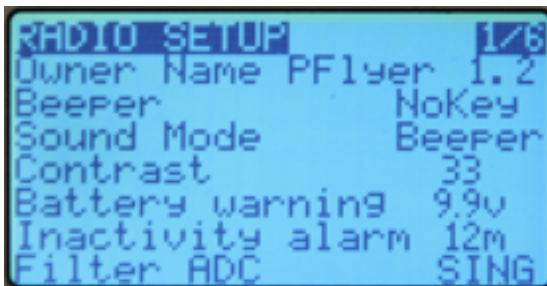
General Settings

For your convenience, all recommended settings are pre-programmed into your ParkeFlyer Flyer9x radio

From the main screen pressing [LEFT LONG] will enter the general settings menus. Here you can set up settings that will be the same regardless of chosen model. The menus are as follows:

- Radio Setup
- Trainer settings and PPM In Calibration
- Version Information
- Diagnostics
- Analog Inputs
- Calibration

Radio Setup



Use this screen to set up general functions for the Tx:

- Owner Name: The radio owner's name. You... Unless.... (hmmm...) This will also be displayed on the splash screen.
- Beeper: Sets Beeping levels
- Quiet. No beeping at all. No warning – nada. If the kids are sleeping and you must setup the model in your living room this is the mode to use. Just remember that the Tx will not even warn you when the battery is low. If you're using a Lipo watch out!
- No keys. The beeps are normal but edit keys are silent.
- xShort.
- Short
- Normal.
- Long
- xLong beeps.

Recommendation: Go with No keys to limit annoying beeps...

Contrast: The LCD's contrast. The values can be 20..45. The higher the value the darker the screen.

Battery warning: Battery voltage warning. When the connected battery's voltage drops below this voltage the Tx will beep. Though the Tx will continue to function normally it's really advisable to land as it is known that this FW was not able to fix the "zero voltage non functionality" problem of the original.

Recommendation: Set at 9.8v for the 1800 3S LiFe battery that ships with the ParkeFlyer Flyer9x

Inactivity alarm: This will set up a warning that will beep if the Tx is left unattended for the specified amount of time. The default value is 10 minutes. To turn off the Inactivity timer – set the value to zero. Also, when running on USB power, the alarm is inactive. Values can be from 1 to 250 minutes. To reset the timer simply move one of the sticks.

Recommendation: 12 minutes

Filter ADC:

- SING: Single conversion. This is the fastest conversion but base resolution is 1024.
- OSMP: Oversampling. This uses extra samples to increase resolution to 2048. Just slightly slower than SING.
- FILT: Filtered. This is in case you have excessive noise from the conversion (servo jitters). This will filter the input and prevent that noise. It will, however, increase latency by ~30msec.

Recommendation: SING

Throttle reverse: This is for all you wacky people who fly with the throttle backwards (e.i. idle is far from you and full is close to you). Though I personally don't understand how you fly like that it's a nice feature. The reverse will also reverse the throttle warning on startup and some other throttle related functions.

Recommendation: Don't do it

Minute beep: Beeps every full minute while the timer is running.

Recommendation: Useful if you don't have a low battery buzzer on your plane. You can keep track of your time without having to look down at your radio.

Countdown beep: Beeps at 30, 20, 10, 3, 2 and 1 seconds before the timer ends.
Flash on beep: Flashes the backlight on timer beeps.

Light switch: This chooses a switch which can be used to turn on a backlight if connected.

Recommendation: The standard ParkeFlyer Flyer9x has a always on backlight. This backlight uses very low voltage and is insignificant on battery usage. This feature is useful if you have the optional SmartieParts programmer installed.

Light off after: When this is not OFF any keypress will turn on the backlight and turn it off after the specified number of seconds.

Splash screen: Show the logo on radio startup. Btw, you might not know this but the splash screen can be skipped on startup by pressing any key.

Throttle warning: If ON will show a warning when throttle is not at idle when the Tx is turned on. The Tx will not output a signal until the alert is cleared.

Recommendation: Keep this on. Safety first!

Switch warning: If ON will show a warning when the switches are not at the default position when the Tx is turned on. The Tx will not output a signal until the alert is cleared.

Recommendation: Keep this on. It is good to be in a habit of starting your radio in the exact same configuration – every time.

Default Switch: When you first switch the radio on, er9x used to require that all the switches were 'OFF'. This option lets you choose a default setting with some switches 'ON' and others 'OFF' instead. T is THR switch, R is RUD switch etc. Use the left/right buttons to select a switch, and MENU to toggle.

Memory warning: If ON will show a warning when the available eeprom memory is less than 200 bytes when the Tx is turned on. The Tx will not output a signal until the alert is cleared.

Alarm warning: This will give you a “heads up” if your beeper is silent. If on and the beeper is set to '0' (Quiet) you will receive a warning on startup. This has been added after a programming session left a user flying on silent. I find it really useful!
Mode: Choose between MODE1, MODE2, MODE3 and MODE4.

Recommendation: MODE 1, if you are in Europe, MODE 2 if you are in the US

Trainer / PPM In



This menu allows the PPMIn (trainer) inputs to be configured. It enables the RAW PPM inputs to be selected to replace the sticks for training purposes. The student transmitter does not need to have the same model setup as the instructor. All the mixes on the instructors Tx will be applied to the student inputs. If, for example, you have expo on your sticks, this will be applied to the raw trainer inputs when they are selected.

The mode entry selects how the PPMIn value is used:

- off - unused
- += - add to instructor stick value
- := - replace instructor stick value

The % entry applies a weighting to the PPMIn value -100 to 100, Use -100 to reverse the input. Use values closer to 0 to reduce the students control sensitivity. The src entry selects the PPMIn channel for the function.

The sw entry selects the switch used to action the trainer operation. Multiplier 1,0 to 5,0 scale for PPMIn values The multiplier does as it's name suggests. It multiplies the

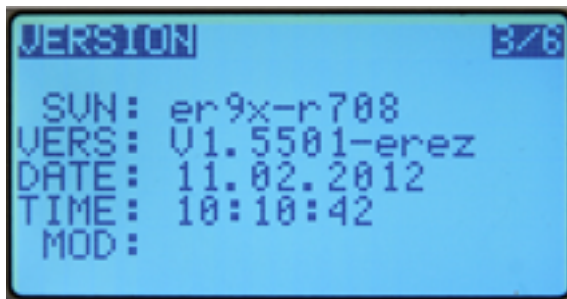
ppm Input by a set amount. Great for dealing with different tx's whose makers don't know how to encode PPM.

CAL Center calibration for first 4 PPM values This entry allows you to calibrate the mid point for the first 4 input PPM channels. Highlighting "Cal" and pressing [MENU] will calibrate the mid point for all PPM IN channels.

PPM IN is read from the signal at the trainer port of the Tx.

There is an option for each model to enable or disable the trainer input function. If you do not need the trainer function you may disable it, and use the selected switch for something else. All the PPM values are available to the mixer.

Version Info



This screen shows the version information for the current FW: SVN: The SVN name of the current revision. DATE: Compile date for the current FW. TIME: Compile time for current FW. VERS: Version number.

Since er9x is OPEN SOURCE We all to help out anyone who has problems. Please feel free to open new issues for defects and/or enhancement requests at the project's code page: <http://code.google.com/p/er9x/issues/list>

Your participation is what helps me makes the FW better (and your donations of course!).

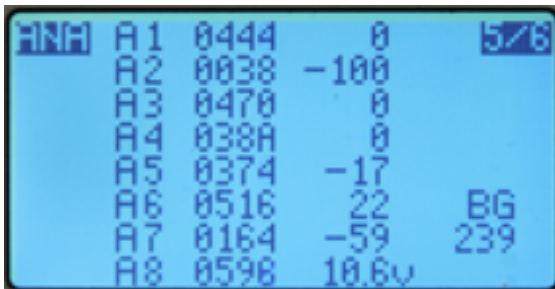
When posting an issue, please use the revision number stated in this screen when you state a problem.

Diagnostics



This menu will help you visualize the current state of the trims, keys and physical switches. Each Key/Switch/Trim is represented. When pressing a key or switch they are highlighted.

Analog Inputs and Battery Voltage Calibration



Here you can see the analog inputs in hexadecimal format to save space and annoy you at the same time.

- Values range between 0..0x3FF (0..1023).
- A1-A4 are the gimbals (sticks). A5-A7 are the pots.
- A8 is battery voltage.
-

You can press [DOWN] and highlight the battery voltage. Pressing [LEFT]/[RIGHT] will increase and decrease the value and so enable you to calibrate the battery voltage monitor.

Recommendation: It is very important that you calibrate your battery.

- Do a full charge of your battery and note the voltage level. The battery that ships with the ParkeFlyer Flyer9x is full at 10.8 volts.*
- plug your battery into your 9x*
- if the 9x reports your battery voltage as 10.8v, you are set. If not, adjust your 9x up or down until it reads 10.8v. Recheck this every month or so.*

Calibration



This screen allows you to calibrate the analog channels (A1..A7). The calibration method goes like this:

- Press [MENU]
- Set Sticks to center. (Including throttle and pots)
- Press [MENU] → (SetSpan)
- Move sticks and pots through full range.
- Press [MENU] → (Done) – Values are saved here.

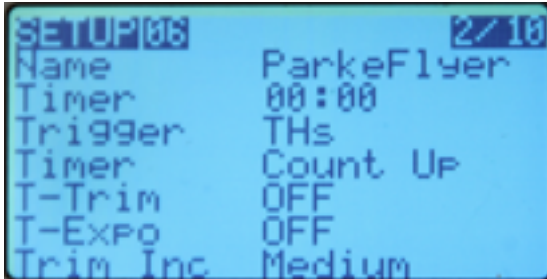
The values are calculated when you press [MENU]. They are saved when you press [MENU] to (Done).

Recommendation: ParkeFlyer Flyer9x radios come pre-calibrated. This step is not necessary. If you are building your own 9x, do this first when setting up your first model. Don't do it again unless you feel your radio isn't responding correctly. Be sure to have your knobs and sticks at their midpoints when starting.

Note: When you recalibrate you will likely need to reset all servo subtrim inputs on each of your models.

Model Setup Menu: Overview & Recommendations

Model Setup



Plenty of options here:

Name: Unsurprisingly here you edit the model's name. To edit: scroll down until the name is highlighted and press [MENU]. Once you press [MENU] only one letter will remain highlighted. To change the letter you press [UP]/[DOWN]. To move the cursor press [RIGHT]/[LEFT]. Once done, press [MENU]/[EXIT] to exit the edit.

Timer: Here you set the value for the timer. Press [RIGHT]/[LEFT] to choose between minutes and seconds. Press [MENU] and the cursor will blink. To edit use the [UP]/[DOWN]/[RIGHT]/[LEFT] buttons and [MENU]/[EXIT] when done.

Trigger: Choose what triggers the timer → (remember – by pressing [LEFT] you'll see the same values with the “!” sign. This means that the usage is inverted)

OFF – timer is off.

ABS – timer is on.

RUs/RU%/ELs/EL%/THs/TH%/ALs/AL% - chooses to activate the timer based on stick position. When a XXs is selected (THs for example) The timer starts whenever the stick is not at zero. The XX% sign is the same except the timer speed is determined by stick position. When at zero, the timer is stopped. When at full the timer goes at normal speed. When midway the timer's speed reflects the sticks position.

Switches – You can specify a switch so whenever that switch is activated the timer counts.

Momentary switches. A switch denoted with “m” (like TRNm) means “momentary”. That means that moving the switch once to the on position and back turns the timer on. Moving it on and off again turns the timer off. (difficult I know, take a sip from your coffee, relax a bit, take a break – it's not difficult once you try it out :))

Timer: Here you can choose whether the timer counts up or down.

Recommendation: Using 'THs' as the trigger starts your timer whenever your throttle is activated. This way you never forget to start it.

T-Trim: Throttle trim. This is a nifty feature for power fliers. When activated a couple of things happen. First off the center detent for the throttle trim is removed. Also the throttle's trim will now only affect the "low" side. That means you can use the trim for setting idle while full throttle remains unchanged.

T-Expo: 'nother throttle related function. This one makes the throttle stick's expo go from zero to full instead of having a center like all the others. Always the odd kid out this throttle is.

Trim Inc: Trim increments:

- Exp – Exponential. With this the trims are fine near the center and get progressively coarser farther out.
- ExFine – Extra fine – 1 step per click.
- Fine – 2 steps per click.
- Medium (my personal favorite) – 4 steps per click.
- Coarse – 8 steps per click.

Trim Sw: Neat little function this is. When in flight if this key is activated it reads the current position of the sticks and trims and copies that into the subtrims. After that it zeros the trims. This is really neat for new models when you might have a hard time taking your hands off the stick and pressing the trims. Simply hold the plane level with the sticks and press the selected trim switch. Voilà – the plane is trimmed. It's magic! No it ain't. It's er9x!!!

Recommendation: This is fantastic for dialing in trim on a first flight of the day. I use 'TRN'. Don't use this until you are comfortable flying with your new radio.

Beep Cnt: Beep Center. Here you set center warnings. The string RETA123 corresponds to: RUD, ELE, THR, AIL, P1, P2, P3. When the letter corresponding to the analog channel is highlighted the system checks for center. When the input is at center a short beep will sound enabling you to hear when the input is centered. This is useful for checking the center of the pots without looking.

Proto: encoding protocol

Recommendation: Turn this on for 'THR' and possibly P1, P2, P3. It is great to hear a short beep when you are at mid throttle. Warning: If you leave your stick exactly at mid throttle, you will hear a series of beeps that sounds like an alarm.

PPM – with ppm you can choose how many channels to encode. Anything from 4 to 16 channels. You can also change the pulse spacing. This is useful for systems which might experience jitter. On the whole it might be a good idea to leave it alone. Other protocols include Silver A/B/C and TRAC09.

Shift Sel: Shift select. POS/NEG. Select signal shift. POSitive or NEGative.

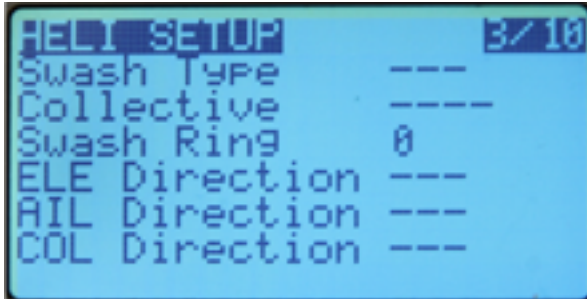
E. Limits: Extended limits. Allows limits to go to $\pm 125\%$. Please test first and make sure this does not cause unwanted mixing between channels.

Trainer: Trainer enabled. This allows you to select if the trainer inputs are used on this model.

DELETE MODEL [MENU]: Guess.... This deletes the current model. You need to press [MENU LONG] for that to happen though.

WARNING! Deleting a model causes the memory to jump to the previous model memory in the list. Do not delete a model memory while you have a model "listening". Always shut down your receiver before deleting a model.

Heli Setup



This screen is specifically designed to help you set up a CCPM heli.

Swash Type: This defines what kind of Swash plate you have on your heli:

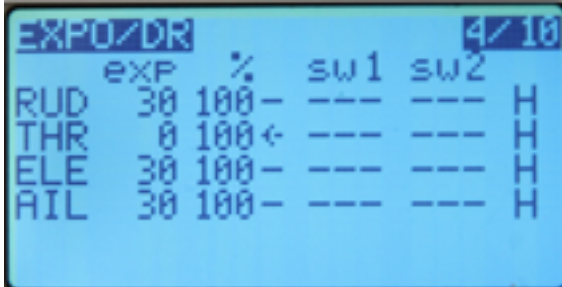
- 120: "Standard" 120° swash plate. The "pitch" servo is towards the front/back.
- 120X: Same 120° swash plate but turned 90° so the pitch servo is on one side.
- 140: 140° swash plate – again, the "pitch" servo is towards the front/back.
- 90: 90° - Basically a simple 90° setup where you have a single servo operating the pitch and two operating the roll.

Collective: This defines the collective's source. The idea being that you can create a mix with all the required curves and switches and simply plug it in here to mix with the others.

Swash Ring: As the name implies. This limits stick movement just like a physical swash ring. Notice that this only works on AIL and ELE regardless of radio mode selected.

ELE/AIL/COL Invert: These invert the direction of the input functions. Use these to make the controls move the correct way when setting up your heli.

Expo/Dr



	exp	%	sw1	sw2	
RUD	30	100-	---	---	H
THR	0	100←	---	---	H
ELE	30	100-	---	---	H
AIL	30	100-	---	---	H

This screen allows you to enter and edit Expo and D/R values for the main controls (RUD/ELE/THR/AIL).

For each control you can input values for Left/Right for both Expo and D/R. To edit expo values highlight the value in the “expo” column and press [MENU]. Once the cursor blinks you can use the [UP]/[DOWN]/[LEFT]/[RIGHT] buttons to change the value. Notice that while there is a telltale that shows you which side of travel you are adjusting:

“-”: This means both left and right values are equal. Pressing [UP]/[DOWN]/[LEFT]/[RIGHT] will change both values simultaneously.

“←”, “→”: When moving the stick you can see either of these symbols. When this symbol is visible you are only changing that side of travel.

For each control you can set 2 switches. The main switch changes between high rate/high expo and mid rate. If the main switch is “low” (e.i. mid rate) the second switch can switch between mid and low rate.

At the end of each line there's a telltale that shows you which rate you are on:

- H: High.
- M: Medium.
- L: Low.

Pressing [MENU LONG] while the cursor is on a control will take you to the Edit

Recommendation: Start with 30% expo to AIL, RUD and ELE. Some people move as high as 70%. You may find you no longer need Dual Rates if you get your expo just right.

Expo/Dr Edit Screen



In this screen you can adjust the values for that single control. You will also see a graph indicating the action of that control. These controls are set individually in this screen. If you pull down on the elevator control, it will set the expo curve or dr for down. If you push up on the elevator control it will set the expo or rate for up. This is to allow for the flexibility of setting non-semmetrical expo and rates. This is applied the same for left right on ailerons and rudder. Press [EXIT] to return to the main Expo/Dr screen.

Triple Dr Example

The "F.Mode" switch can be used as a triple rate switch for any one axis, or it can be used as a triple rate flight mode switch, controlling rates and expos for some or all of the flight axes at once. To use it as a triple rate/flight mode switch, set sw1 to "ID2" and sw2 to "ID1". If you want rudder, elevator, and aileron all assigned to this switch for flight modes, be sure to set sw1 and sw2 as above for each axis. With the switch in the up position, it will be at low rate, as indicated by the "L" at the end of the line. In the mid position, it will be mid rate, and at the down position, it will be at high rate. You can also include throttle if you'd like, to have different expo curves for each of the flight modes.

Mixer

I'm actually writing this last since it's the most important menu. If you're still awake now would be a good time to sip that coffee and wake up. You want to understand er9x? Understand the mixer and you're very nearly there.

The function of the mixer is to take the inputs, perform some function on them and route them to the output channels. Since selection is totally free you have a very flexible system which is extremely powerful and very quick to boot.

Main Screen

When you enter the screen for the first time you'll probably see a list like so:



What this is telling you is that the rudder stick's input is being routed with a weight of 100% to CH4. For the elevator CH2, throttle CH3 and aileron CH1.

Though not visible now you can also see the switch column which will tell you if a switch is assigned to the mix and also a crv (curve) column which tells you what curve is applied to that mix.

When you scroll down you'll see that sometimes the weight is being highlighted and sometimes the channel's number is underlined.

When the weight is highlighted, pressing [LEFT]/[RIGHT] will edit that value and pressing [MENU LONG] will enter the Edit Mix screen and allow you to edit that mix.

When the channel's number is underlined, pressing [MENU LONG] will *insert* a new mix for that channel and take you to the edit mix screen to *insert* it into that channel.

You can also press [MENU]. This will highlight the mix. Then you can press [UP]/[DOWN] to move or **copy** the mix.

Notice that moving or copying is decided by whether you press up or down on the first press after highlighting the mix.

If you first try to move it down it will be copied. Subsequent presses of [UP]/[DOWN] will move the copy up or down until you press [MENU] or [EXIT]. Pressing [UP] will move the mix without copying it. Again, subsequent presses of [UP]/[DOWN] will move the copy up or down until you press [MENU] or [EXIT].

If the Trainer function is enabled and active, the four values RUD, ELE, THR and AIL are changed to the PPM values selected in the TRAINER menu.

Edit Mix



In this screen you edit individual mixes.

Here are the available options for each mix:

- **Source:** This is the input for the mix. It can be the following:
 - Stick or pot: Self explanatory.
- **MAX:** The output is either 0 or the value describes in “weight”. This is controlled by the switch.
- **FULL:** Same as MAX but the value is “-weight” if the switch is off or “weight” if the switch is on. MAX and FULL can be a little confusing. Look in the examples section for, well, examples :).
- **CYC1, CYC2, CYC3:** The 3 outputs of the heli swash-plate mix. Once swash mixing is turned on (Heli menu – 3/10) these become active and hold the result of the swash mix. Generally CYC1 holds the fore/aft output and the other two do the rolling. On the 120X mode CYC1 is the odd one out.
- **PPM1..PPM8:** PPM input channels. These are fed by the ppm input or “trainer port”. You can use these to configure a buddy system or to simply extend your radio with more functions (like head tracking for you FPV guys).
- **CH1..CH16:** These are the outputs of the other mixes. You can use these to chain mixes for very complex behavior.
- **Weight:** This value multiplies the value from the input. It can be -125% to 125%.

- **Offset:** This value is added to the value from the input. It can be -125% to 125%.
- **FLTrim:** (flightmode trim) if toggled to "ON" will produce a Fm TRIMVAL in the line above it. This is where you would select the value for your flight mode trim for this channel.
- **Trim:** When this is "ON" the trim value (if exists) will be carried on through the mix. When "OFF" it is ignored.
- **Curves:**
 - **x>0:** The value of the source is carried through only if it is positive (greater than zero). Otherwise it is zero.
 - **x<0:** Same but for negative values.
 - **|x|:** The value is passed as an absolute value.
 - **f>0:** If source is positive then the output value is "+weight" otherwise it is 0.
 - **f<0:** If source is negative then the output value is "-weight" otherwise it is 0.
 - **|f|:** Output is either "+weight" or "-weight" depending on the sign of the source.
 - **c1..c16:** custom curves. These are defined in the "CURVES (6/8)" screen. You can also press [MENU] to edit the curve directly.
- **Switch:** Here you select the switch that operates the mix. If the switch is not selected then the mix is on by default.
- **Warning:** Here you can select an audible warning that will sound whenever a mix is active. (This will only work when a switch is defined). You have an option of 1, 2 or 3 beeps. The warnings will sound in succession so you can hear them individually.
- **Multpx:** This value defines how the mix will be added to the channel.
 - Add: This is the default value. With this value the mix is added to the previous values in the same channel.
 - Multiply: Use this to multiply the previous values in the same channel.
 - Replace: This value is used in conjunction with a switch. When the switch is off the value is ignored. When the switch is on the value discards the previous values and places it's own value in the channel.
- **Delay Down/Up:** Use this to delay use of this channel. Usually used with a switch. When the switch is turned "ON" or "OFF" the mixer will wait the specified number of seconds before changing the value.

- **Slow Down/Up:** Slow the rate of change in the channel. When not zero these will determine the maximum speed with which the value can change. The specified value is the number of seconds to go between -100% to 100%.
- **DELETE MIX [MENU]:** Pressing [MENU LONG] here will delete the mix and return to the main mix screen

Limits

Channel	subT	Min	Direction	Max	inv
CH1	0.0	-100	→	100	---
CH2	0.0	-100	→	100	---
CH3	0.0	-100	←	100	---
CH4	0.0	-100	→	100	---
CH5	0.0	-100	←	100	---
CH6	0.0	-100	→	100	INU
CH7	0.0	-100	→	100	---

This is probably the second most important menu. The limits operate on the output channels (as you can see from the flow chart in the introduction). In the LIMITS menu you can set the center point (subtrim), limits (both left and right) and reverse the channel's output (inv – invert).

Each channel here corresponds to a channel in your receiver. The limits you set will be used on that channel only.

Columns:

- **subT: SubTrim.** This sets the channel's center point. HINT: The values of subT can be -100 to 100 with increments of 0.1. This is done so to have excellent resolution when setting the center of each surface. You can use your stick to set the center point as well. While the subT is highlighted hold the stick so that the surface is centered. Press [MENU LONG] and the position will be recorded! It's the magic of er9x again :).
- **Min/Max:** These set the endpoints of the channel. Notice that there's a telltale that hints as to which side is active at the moment. Each limit point can range between -100% to 100%. The limits act both as gains and as absolute limits. The servo will not go beyond the limits you set here.
- **inv: Invert.** This function reverses the output of the channel.

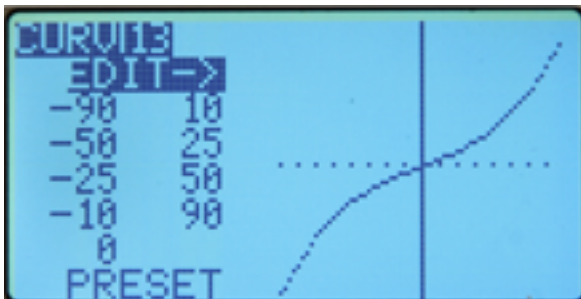
Curves



Surprisingly in this menu you set your custom curves. Curves are nifty things that can tell your servo how to move when you move your stick. In er9x there are 8 5-point curves and 8 9-point curves.

- A 5pt curve is a curve you can edit at position -100%, -50%, 0%, 50%, 100%.
- A 9pt curve is a curve you can edit at position -100%, -75%, -50%, -25%, 0%, 25%, 50%, 75%, 100%.

When you enter the menu you see a long list of zeros. Scroll down to the curve you wish to modify and press [MENU] or [RIGHT]. This will bring up the screen for editing the curve.



Depending on whether you chose a 5pt or a 9pt curve you will see 5 or 9 editable points. Scroll through the points with [UP]/[DOWN]. Change the value with [LEFT]/[RIGHT].

At the bottom you will see a “preset” entry. Pressing [LEFT]/[RIGHT] on that will populate the values with a linear curve that is a good starting point.

You can also change the curve graphically. Highlight the “EDIT->” line and press [RIGHT]. This will highlight the curve points. Pressing [UP]/[DOWN] will change the values and pressing [LEFT]/ [RIGHT] will select a different curve point.

Custom Switches



CUSTOM SWITCHES			8/10
SW1	AND	RUD	ID1
SW2	AND	RUD	ID2
SW3	----	----	0
SW4	----	----	0
SW5	----	----	0
SW6	----	----	0
SW7	----	----	0

I really like this feature.

Custom switches are not really switches at all but rather a set of logical conditions that can be used as switches.

You might have noticed that beyond the physical switches there are 6 switches called SW1..SW6. These correspond to the list you see in this screen. Once the condition defined for the switch is met it's value will be "ON".

First we define the condition. This can be $v > \text{offset}$, $v < \text{offset}$, $|v| > \text{offset}$ and $|v| < \text{offset}$, or it can be a logical condition: AND, OR, XOR, or it can be an evaluation between 2 sources.

If you've selected a regular condition you need to specify a source and an offset: The source can be a stick, a pot, a PPM input or an output channel.

An offset can be anywhere between -100 and 100. This will be the test point for the condition.

If you've selected a logical condition the switch results the condition applied to the 2 selected switches. For example: OR ID1 ID2 will be "ON" if either ID1 or ID2 is on. Cool, huh?

If you've selected an evaluation you (" $=$ ", " $>$ ", " $<$ " etc...) you need to select the 2 sources to evaluate between. For example: Switch on only if CH1 is less than RUD \rightarrow V1<V2 CH1 RUD

Example: Say you have a glow plug driver which you want to turn on when the throttle is below 10%:

- Highlight SW1
- Select the source as THR.
- Select the offset as -80 (remember -100 – 100 so 10% from idle is -80).
- Select the condition as $v < \text{ofs}$. Now you need to use a mix to run the switch. Go to the mixer menu. Select the CH8 as the channel you want the GP driver to operate on. On that channel select source as "MAX" and Switch as "SW1". Now whenever the throttle goes below 10%, CH8 will go to 100%. Cool, huh?

Safety Switches

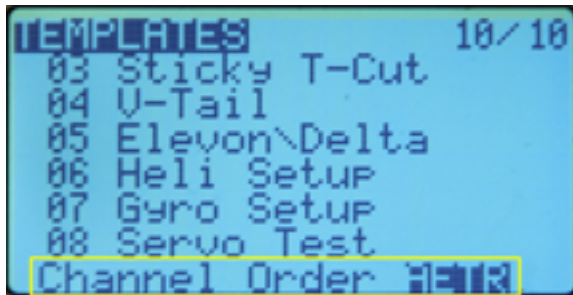


Safety switches allow you to select a switch and have it write a value for a channel that will overwrite any other value.

For example – you might want to set a switch on the channel your electric esc is placed. That way you can work on your model and not worry that a chance programming error will spin up the propellor.

This does not make your radio fool proof! You must be careful at all times. Hopefully this can add another level of safety and reduce the risks associated with this hobby.

Templates



START AT THE BOTTOM !!!! Toggle your preferred channel order BEFORE you select the desired template.

Channel order:

This will allow you to set the way the templates are written to the mixers.

AETR means AIL = 1, ELE = 2, THR = 3, RUD = 4.

RETA means RUD = 1, ELE = 2, THR = 3, AIL = 4.

(and so forth).

Recommendation: Use AETR. This is the standard we use for the ParkeFlyer Flyer9x Model Examples.

The templates are there to help you get started. When entering the screen you'll see a list of available templates. To choose a template, scroll down to it and press [MENU LONG]. This will add the template to the existing mixes.

At the bottom you'll see an option called "CLEAR MIXES [MENU]". Pressing [MENU LONG] on this will clear all the mixes leaving you with a clean slate.

WARNING!!!! WARNING!!!! WARNING!!!! selecting clear mixes menu on a live plane will make motor spin at %50 even though the throttle is all the way off!

The templates are:

- Simple 4-CH: Plain vanilla 4-ch airplane.
- T-Cut: This adds a throttle cut mix on your throttle channel.
- V-Tail.
- Elevon/Delta.
- ECCPM; A generic ECCPM mix.
- Heli Setup: This will clear your mixes and curves and setup a preliminary eCCPM heli.
- Servo Test: This will setup a servo test output on CH15. To test your servos choose the mixer's source as CH15. It will cycle slowly between -100 and 100.

Quick Start: Setting up your Model using the ParkeFlyer Flyer9x Example Models

Basic 4-Channel Airplane Example

This is the basic starting point.

Assumptions:

- Chan 1: Ailerons (both ailerons connected to one channel via a “Y” connector)
- Chan 2: Elevator(s) (if more than one, connect with a “Y” connector)
- Chan 3: Throttle
- Chan 4: Rudder(s) (if more than one, connect with a “Y” connector)

Reference the “Radio Setup” and “Model Setup” chapters of this manual for navigation tips, specific setup instructions and recommendations.

A note on servo polarity... Different brands of servos are wired with different polarity (meaning two different servos may do the exact opposite of one another when given the same control input.). You may need to “invert” or “reverse” your servos to get your servos moving in the correct direction.

Steps:

1. Turn OFF all models. You don’t want a model on during radio programming. Very bad and painful things will happen.
2. Complete the “Radio Setup Menu” chapter of this manual, if you haven’t already.
3. Calibrate your radio if you haven’t already. [Setup Menu: 6/6]. If you’ve already calibrated, don’t do this again unless you feel your radio isn’t responding correctly. Re-calibrating will likely require you to reset all of your servo sub trim settings.
4. Go to the Model Setup Menu, Choose an open slot 1-16. Select by clicking and holding [RIGHT]
5. Fill out Model Setup Menu 1/1 – model name, time, trim increment, etc.
6. Go to the Model Setup: Templates Menu 10/10. Scroll to the bottom of this menu to “Channel Order”. Select “AETR”
7. Stay in the Model Setup: Templates Menu 10/10 and highlight “01 Simple 4-Chan.” Push and hold [MENU] until the highlight flashes (you’ll hear a beep if

you have audio enabled). This template creates your basic mixes for a 4-channel airplane.

8. Repeat these same steps with “03 Sticky T-Cut” This is a very important safety feature. This mix enables the Throttle Hold switch to turn off the throttle whenever activated. It also has intelligence built in. If you disable your Throttle Hold switch while your throttle is at any setting above zero, this mix keeps your prop from turning until you’ve moved your throttle to zero and then re-engaged. By default your Throttle Hold switch is on the upper/left/back of your radio. If you don’t like this position you can change it to any other switch. That is the power of er9x.
9. If you haven’t already plugged your servos into your receiver do that now.
 - Chan 1: Ailerons
 - Chan 2: Elevator(s)
 - Chan 3: Throttle
 - Chan 4: Rudder(s)
10. Power up your 9x radio. Make sure the model you just create is selected. Turn your Throttle Hold to ON. Turn your model on. Check your Throttle Hold to confirm it is working properly.
11. Look at your Model Setup Menu: Limits 6/10. Make sure the first column of numbers are all ‘0.0’. This is where you set your positive and negative servo subtrim.
12. Look at the servo horns on each of your servos. Are they at perfect 90° angles from the body of the servo (and your control rod)? If not, unscrew your servo horns and reattach them as close to a 90° angle as possible.
13. If one or more of your servos aren’t quite at a perfect 90° angle, you want to apply subtrim until it is at perfect 90°. You do this in the Model Setup Menu: Limits 6/10 menu. Choose the servo you want to adjust and add a positive or negative number in column 1. You can use the buttons or your PIT TRIM knob to change these numbers. Click [MENU] when you are done. Do this for each servo that needs adjustment.
14. Now move each of your control sticks and confirm that your control surfaces are moving in the correct direction. If you need to invert a servo, this is also done in Model Setup Menu: Limits 6/10 menu. Go to the 5th column (farthest column to the right) and click the [MENU] button. This will toggle “INV” mode for each servo. Once you have all control surfaces moving correctly, go to the next step.
15. If your servos are reaching their maximum limit, before your stick is reaching its maximum limit, you can also set limits in the Model Setup Menu: Limits 6/10 menu. Columns 2 and 3 control these limits 0% - 100%. You can set a separate

- limit for each direction of the servo. Notice the arrow between column 3 and 4. Move the stick that corresponds with the servo. This should change the direction of the arrow. The arrow shows you which directional endpoint you are setting.
16. Setting Expo. Expo is a personal preference. Traditionally the control surface moves linearly with the control stick. 25% movement of the stick = 25% movement of the control surface. With a linear setup, the tiniest stick movements will cause your airplane to jump. By adding Expo we reduce the amount of control surface movement that occurs on the initial movement of the sticks. Expo makes the “center of the sticks” soft, while still enabling 100% control surface movement at the ends. You can get quite fancy with these curves. The amount of expo you want depends on personal preference and the characteristics of the specific airplane you are flying. Personally I like between 30% and 50% Expo on ailerons, elevator and rudder. I don't put expo on Throttle.
 17. Your airplane is now ready to fly with a good basic setup.

Flaperons Airplane Example – coming soon

Elevons Airplane Example – coming soon

6-Channel Airplane Example – coming soon

Further Information

Example Mixes

The best source of examples is the template library on

<http://9xforums.com/forum/viewforum.php?f=35>

Download the examples and have a play with them using the superb eePe or companion9x software.

Er9x Guides – WIKI

This is a fantastic resource for programing and modifying your radio. The content grows every week.

http://9xforums.com/wiki/index.php/Main_Page

Forums Support

Using er9x is not difficult - one you master the basics.

If you would like to take your radio to the next level, we would strongly suggest you join the forum on:

<http://9xforums.com/forum/>

The forum has a vibrant and friendly community that will be happy to help with pretty much any query you have.

Video Tutorials

A number of video tutorials have been put together to guide you through both simple and advanced er9x programming.

You access the videos from this page:

http://9xforums.com/wiki/index.php/Video_guides

They are well worth watching!

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