

VintageTx Converted Transmitter Encoder User Manual



The VintageTx encoder is designed to retrofit vintage R/C transmitters with joysticks with mechanical trims to give programming features similar to most modern “computer” transmitters but with the retro feel and character of an older transmitter.

The display and programming switches are hidden behind the original manufacturer’s label which is held on with strong magnets.

Alternatively the display can be mounted inside the back of the transmitter if the cover is easily removable to get access.



Figure 1. Small Back-Lit LCD Display

The backlit LCD is easily visible in all lighting conditions and despite its small size is easily viewable

The converted transmitter is capable of flying most fixed wing models from vintage, single channel, trainers, sports, scale, classic F3A aerobatics, right up to 4 servo wing gliders with V-Tails.

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1 Specification

For converting vintage R/C transmitters with mechanical joystick trims (not switched trims) into a full “computer transmitter” with a LCD display, menu switches and a ppm output.

- 8 channels
- LCD 128x64 graphics display with LED backlight and 4 programming switches
- 10 model memories with 10 character model names
- Auto-trim setting on Aileron, Elevator and Rudder via a pushbutton (buddy-box switch)
- Trim memories on Aileron, Elevator, Rudder and Throttle tick-over
- Separate inputs for electrical trims as found on many sets with open gimbal sticks such as Kraft, Pro-Line etc.
- Sub trims on all output channels
- End point adjust on all output channels
- Dual Rates and Expo on Aileron, Elevator and Rudder
- Servo Reverse on all output channels
- Freely configurable output order/assignment for all channels
- 8x programmable free mixes (Pmix)
- “Servo slow” on any channel as a Pmix option, adjustable from 0 to 10 seconds
- Elevons (delta and flying wing) mix and V-tail mix
- Aileron to rudder mix (coupled aileron/rudder)
- Aileron differential mix
- Throttle Curve Mix
- Single channel compound escapement emulation with optional 2 or 3 position blip throttle and optional kick up (or down if preferred) elevator
- Single channel sequential escapement emulation with optional beeps to indicate next direction
- Up and Down timers that can run independently of each other
 - Up timer (selectable on rudder rate, throttle cut or gear switch)
 - Down timer with countdown alarm (adjustable on/off as % of throttle joystick position or rudder rate, throttle cut or gear switch)
- Operation from 6.0V to 12.0V to suit to suit 2S Lipo or Li-Ion, 2S/3S LiFe and 6S-8S NiMH. If using 2S LiFe ensure the 2.4GHz module will operate at 6.2V, their usable minimum.
- Digital voltage read-out with low battery alarm (adjustable to suit the battery used)
- Output for the existing meter with trimmer adjustments to give full scale meter at the nominal maximum battery voltage to suit most brands
- Inactivity alarm (adjustable 1-15 minutes)
- Throttle Lock with arm/reset. On power-up or when a different model memory is selected, the transmitter will output closed throttle until the joystick has been closed to reset/arm.
- Two Throttle Cut modes: Throttle Cut and Throttle Limit.
 - Throttle Cut mode operates when the switch is active
 - In Throttle Limit mode, when the switch is operated, the throttle will not go beyond point, so I/C models can be safely carried out to the patch without worry if the throttle joystick is inadvertently opened, the motor will not go past the limit.
- The throttle joystick can be “swapped” with Aux1, Aux2 or the Gear switch. This is used when flying powered gliders so that what would be the throttle joystick for a powered aircraft can be used for flaps/spoilers/crow and the motor controlled by the Aux1, Aux2 or the Gear switch, with the throttle reset/arm, throttle cut and countdown timer still working
- Alarm if the trims are not centred at start up or a different model is selected
- Tested with the following modules: FrSky™ XHT, DHT and V8HT, LemonRx™ DIY, OrangeRx™ DIY, Spektrum™ DM8, DM9 (case removed), Jumper 4IN1 Multi-protocol (case removed), Jeti TU and Futaba™ TM-7 and TM-8 (case removed).

Typical VintageTx Converted Transmitters

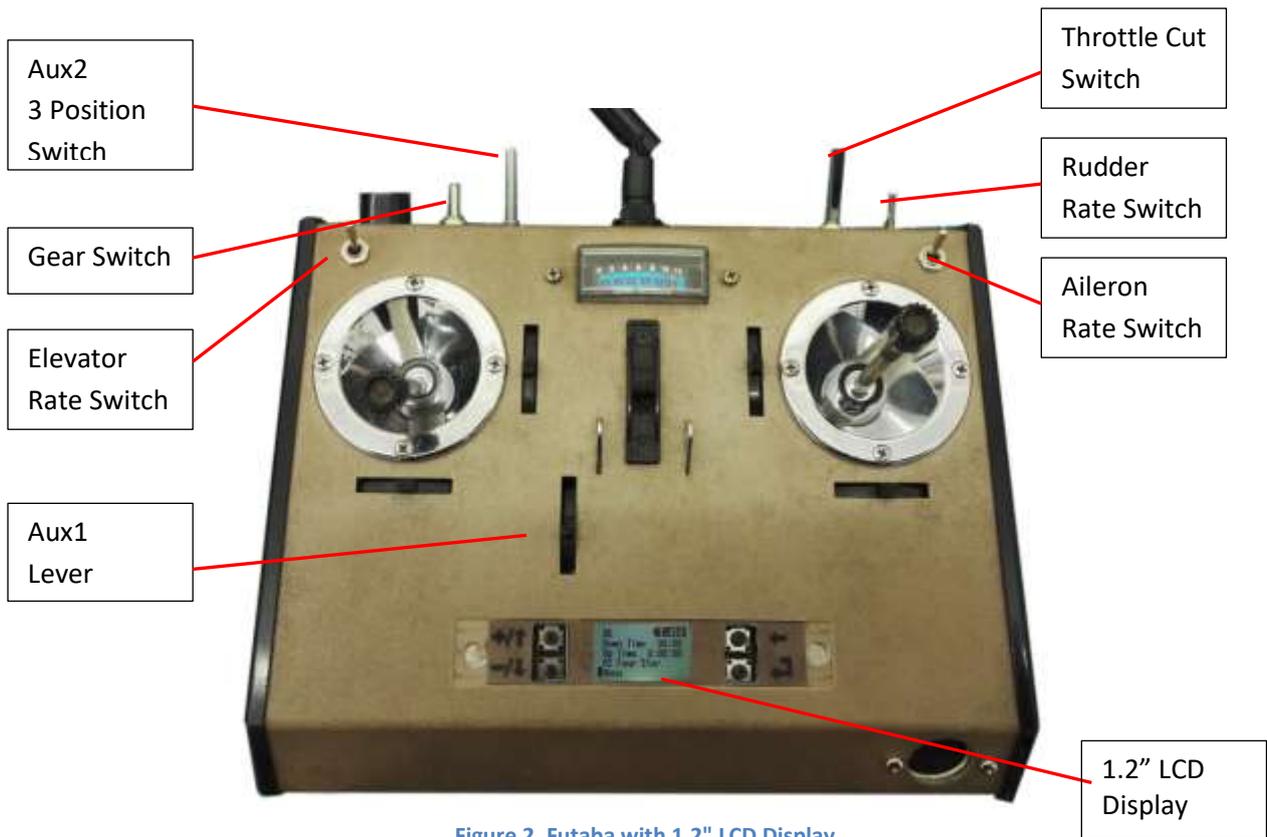


Figure 2. Futaba with 1.2" LCD Display



Figure 3. Skyleader with 1.8" LCD Display

1.1 The Rational of the VintageTx Encoder

- To be able to re-use classic transmitters from the 60's, 70's and some from the early 80's, with modern programming features and 2.4GHz modules for additional security and convenience.
- Suitable for transmitters with joysticks with mechanical trims (not suitable for digital trims) and inputs for trims with separate trim pots, used on many open gimbals sticks such as Kraft.
- A pair of compact circuit boards (control circuit board and a small LCD display and menu switches daughter board) that will easily fit the front or a single board if fitting in the rear of a transmitter
- A 128x64 LCD graphics display with backlight and four programming switches that is compact enough to hide behind the manufacturer's label. LCD displays are available in 1.2", 1.4" and 1.8" (30mm, 35mm and 45mm). The size is the viewable diagonal dimension.
- Alternatively the LCD can be mounted on the front with a bezel (available as an accessory) or in the rear of the transmitter if the back is easily removable
- The display uses a font to give 18 characters wide by 5 rows high that is still easy to read, even on the smaller displays.
- Traditional menu driven programming with enough features to make the transmitter useable as your everyday transmitter.
- Can be used with a range of RF modules. Tested with FrSky DHT, Spektrum DM8 & DM9, OrangeRx DIY and Futaba TM-7 2.4GHz modules. Also tested with Futaba 35MHz and JR 35MHz modules (so should work with 27MHz, 36MHz, 40Mhz and 72MHz modules).

1.2 VintageTx Features that are Different to Most Modern Transmitters

- As the converted transmitter will have mechanical trims, the "Trim" memory has to be easy to set, so that the mechanical trims can be kept centred (they need to be centred so they don't affect rates, expo or other mixes and give a consistent trim for all models). This facility is provided by pressing a pushbutton that copies the amount the trim/stick positions is away from neutral. After pressing the switch it should be found that the model is trimmed with the trims centred. Many transmitters have a "trainer or buddy box" switch already fitted that can be used, else a push button needs to be fitted to make use of this feature.
- If not already fitted, switches can optionally be installed for rates/expo.
- The number of auxiliary sliders, dials and switches is very limited, so there is often only a few ways to implement a mix or function. This can actually be a benefit, as it is easy to be consistent with which switches are used to control mixes and functions.
- As a retro transmitter may appeal to modellers from the earlier years of the hobby, single channel emulation is provided so that you can practice flying with a single button. It's fun!
- A "throttle cut" function is provided, but is not really necessary as the throttle trim can easily be setup to stop the engine with the throttle joystick fully closed and the trim down. It is provided principally as a safety feature to stop electric motors starting inadvertently
- A Throttle Limit is provided as an alternative that limits the throttle setting when handling.
- The throttle trim in the "trim menu" only adjusts the tick-over, not the whole throttle range

1.3 What Features are not included in the VintageTx Encoder

Rather than reading through the whole manual trying to find features that are not included, below is a list of features typically found on a modern computer transmitter that have not been implemented.

- No Helicopter Mixes.
- No flight modes (limited flight modes are possible using the various programmable Pmix).
- No dedicated 4 servo wing mixes for gliders. However 4 servo wing mixes for gliders can easily be implemented by using the 8 free mixes. See the Programming Examples section on page 104 for details.
- No trainer switch or trainer system, though a work-around is possible using an on-board dual receiver change over-module, see page 113 for details.
- No multi-point curve mixes, but a throttle curve mix is provided.
- Mixes can only be controlled by a single switch, not combinations of switches or virtual switch conditions from other proportional channels.
- Programmable values can only be set via the menu and can't be linked to an auxiliary channel to adjust in flight.
- Graphics are limited to displaying rates/expo curves and the throttle curve.
- There is no way to connect the VintageTx encoder to a PC or other computer to backup models, transfer models to another transmitter or setup the transmitter on the PC.
- There is no telemetry (though a separate FrSky telemetry display could be fitted if using a FrSky module).
- There is no voice or haptic vibration alerts, just a sounder.
- It is limited to a maximum of 8 output channels.

Even though the VintageTx encoder is missing some of the features of current top of the range sets, it has a similar feature set to many mid-range transmitters from 10 years ago and better than some current entry level sets, so is eminently useable.

2 Menu Basics

2.1 The Display

Menus are laid out in 18 characters x 5 rows and most will have a moveable cursor. Graphics are limited to square cursors, underlined values and highlighted values due to the limited size and resolution of a screen that can be hidden behind the front label of vintage transmitters.

2.2 Cursors

The cursor can be moved up/down by the cursor keys +/↑ and -/↓. The cursor can take one of three forms:

2.2.1 The Select Cursor



Figure 4. Home Menu with the “Select Cursor”

The “Select Cursor” (rectangular) selects sub-menus or other options by pressing the ↵ (enter) key. In Figure 4 above, pressing the ↵ key will open the Main Menu.

2.2.2 The Underline Cursor



Figure 5. Trim Menu with the “Underlined” Cursor

An “Underlined” cursor can be moved by the cursor keys +/↑ and -/↓ to the value to be edited/alterd. When the cursor is at the value to edit, press the ↵ to select the “Edit” cursor. In Figure 5 the cursor is lined up to edit the Aileron Trim. If the ← key is pressed, you will return to the previous menu.

If the cursor is moved down with the -/↓ and it reaches the bottom or last entry, it will either wrap around back to the top of the menu or if the menu is one of multiple menus (such as rates/expo) it will roll to the top of the next page. Similarly if the menu is at the top and the +/↑ key is pressed the cursor will either roll to the bottom of the menu or to the bottom of the second menu if it is a pair.

2.2.3 The Edit Cursor



Figure 6. Trim Menu with the “Edit Value” Cursor

The “Edit” cursor has the value to be updated highlighted (reversed text) as in Figure 6 above. It can be incremented or decreased with the cursor +/↑ or -/↓ keys. Also if the +/↑ or -/↓ keys are pressed together simultaneously the value is reset to its default value.

Once finished press either the ↵ or ← key. The cursor will return to “underlined” cursor and the cursor can be moved up/down again.

If the +/↑ or the -/↓ key is pressed and held, the cursor or the value “auto repeat” and increases or decreases without having to press the keys repeatedly.

The edited values don't get saved to EEPROM (the non-volatile storage that is saved when the power is turned off) until you press the ←key to leave the menu. If you have entered a value, but don't want to save it, turn the transmitter off. **WARNING** - do not do this with a running engine or with an electric powered aircraft with the battery connected, as if the failsafe is not set correctly the motor could start unintentionally.

3 Menus



3.1 Home Menu

The Home Menu is displayed when the transmitter is first turned on. It displays the parameters that are commonly needed for information, the transmitters’ status, battery voltage, count down and up timers and which model is selected. The cursor start position is at the Menu, but can be moved up and down with the +/↑ or the -/↓ keys to the Status/Alarm, Down Timer, Up Timer, Model Select and Menu.

3.1.1 Battery Voltage

The battery voltage is displayed in a “filled” battery symbol when the battery voltage is above the alarm level (the Alarm Voltage is set in the System Menu (see page 73 for details on settings).



If the voltage should drop below the Alarm Voltage the battery symbol will show a “battery outline”, the Status will change to “Low Batt” as in Figure 8 and the audible alarm will sound.

3.1.2 Status/Alarms.



Figure 9. Elevator Trim not Centred (Up Trim)

There are various statuses and alarm messages that can be displayed at the top left of the display on the home menu and some have an audible alarm. In order of priority (only one will be displayed):

- **Low batt.** Low Battery Voltage (alarm message and audible alarm), below the level set in the Other System menu.
- **Trims** – If Aileron, Elevator and/or Rudder trims are not centred (message and audible alarm)

If the Aileron, Elevator and/or Rudder Trims are not centred when powered up or selecting another model, an alarm message is displayed, with the control (priority A, E or R) shown with the position of the trim with a small graphical representation. In Figure 9 above the Elevator Trim is set for up elevator. Don't forget to press the "Auto Trim" switch before centring the trims, if the trims were needed for straight and level (and not inadvertently moved from centre). As the mechanical trims directly move the joystick potentiometers, moving the joysticks can inadvertently cancel the Trim alarm without actually centring the trims.

- **Inactive.** If the aileron joystick has not moved, the single channel switch has not been pressed or a menu key has not been pressed within the pre-set time (message and audible alarm)
- **Thr Lock.** If the transmitter is turned on or a new model is selected with the throttle open or the Throttle Cut has been active and the switch is put to the off position when the throttle is open.
- **Thr Cut.** Throttle Cut is active (message, the audible alarm only sounds if the throttle joystick is opened above 15%).
- **Thr. Limit.** Throttle Limit is active (, the audible alarm only sounds if the throttle joystick is opened above 15%).
- **Elapsed.** The down timer has counted down (message and audible alarm when throttle joystick not closed)
- **Swap Thr.** The throttle stick is swapped to another control (message only)
- **S/C Comp.** Single channel compound mode (message only)
- **S/C Seq.** Single channel sequential mode (message and audible indication of the next direction if sequential with sound selected)
- **OK.** This is the normal message (if single channel or swap throttle modes are not selected).

Only the status or alarm message with the highest priority will be displayed, but if there are two or more alarm or status messages, then the alarm message will be highlighted (in reversed text).

3.1.3 Audible Alarm/Sounder

As the VintageTx display will be hidden behind the manufacturers label or in the rear of the transmitter (behind the back cover), extensive use is made of the sounder to indicate various alarms or other status information such as the countdown timer.

To differentiate between the different alarms and status information, each has an individual on/off pattern as follows:

Alarms

- **Low Batt** (Low Battery Voltage): 0.22 seconds On, 1.1 seconds Off, continuous beeps
- **Trims** (Trims not Centred) : 0.22 seconds On/ Off, continuous beeps
- **Inactive**: 0.88 seconds On, 1.1 seconds Off, continuous beeps
- **Thr Lock, Thr Cut and Thr. Limit** (Throttle Lock/Cut/ Limit): 0.88 seconds On, 0.22 seconds Off, continuous beeps

Status Information

The Status information events that beep the sounder are the following:

- **Down Timer.** See page 16 for full details of the Down Timer. The Down Timer has two modes, Electric (Elec) and I/C. The Electric mode has all the below, the I/C mode only those marked:-
 - Every minute above 3 minutes: single short beep (0.2 seconds) *Both Elec and I/C
 - 3, 2 and 1 minutes: Long beep on/off for the number of minutes (0.7 seconds beep)
 - 30 and 20 seconds: on/off beeps three/two times (0.33 seconds beep)
 - 10 seconds down to zero: on/off continuous beep while the throttle is open (0.33 second beeps) *Both Elec and I/C
 - At zero seconds: Long Beep (1.9 seconds beep) *Both Electric and I/C
 - Down timer elapsed: Continuous on/off beep while the throttle is open (0.33 seconds on, 1.87 seconds off beep)
- **Up Timer.** See page 21 for details of the Up Timer.
 - Every minute: a short 0.1 seconds single beep
 - Every ten minutes: A slightly longer 0.3 seconds single beep
- **Single Channel Sequential.** See page 47 for details.
 - When right will be selected next: 0.2 seconds on, 2 seconds off
 - When left will be selected next: 2x 0.2 seconds on, 2 seconds off
- **Auto Trim switch pressed.** See page 26 for details.
 - When AutoTrim pressed and Trim memories are not to their limits: 0.1 seconds on and when one or more of the "Trim memories" are to their limits: 1.1 seconds on
- **Calibrate Joystick Gain.** See page 97 for details.
 - When the "I/P Val" menu selected and the gain potentiometer is set so that the joystick values are above 1000 then the sounder is continuous.
- **Power On.** On for 0.5 seconds to confirm it has powered up successfully.

Only one alarm will sound at a time, with the priority as above and the Status Information sounder beeps are disabled when there is an alarm condition, so there is only ever one sequence of beeps.

3.1.4 Status and Alarm Menu



Figure 10. Home with Multiple Status/Alarms

If there is more than one active status/alarm message, the one with the highest priority is displayed on the home menu (and in “reverse text” to indicate more than one message). If the cursor is moved to the status/alarm position using the +/↑ or the -/↓ keys and selected with the ↵ key, it opens the Status and Alarm menu.



Figure 11. Status and Alarm Menu

The Status and Alarm menu displays the active messages in order of priority, with a maximum of five messages.

3.1.5 Down and Up Timer Menus



Figure 12. Press the ← key for 2 secs to reset the Down Timer

There are two timers on the VintageTx, the Down Timer and the Up Timer. The timers are independent of each other and both can run concurrently and they both display to a resolution of one second.

The maximum the Down Timer can be set for is 59 minutes and 59 seconds. When it has counted down to zero, it will continue counting with a negative time to show how far it has exceeded the pre-set down time.

The maximum the Up Timer can display is 9 hours, 59 minutes, 59 seconds, at 10 hours it will then “rolls over” to 0 hours, 0 mins, 0 secs and continue counting.

The timers are not as accurate as most clocks or watches and may be up to 6 seconds fast or slow over a 24 hour period. This means they will be accurate to one second in 4 hours which is more than adequate for most modellers.

The Timers can be reset directly from the “Home Menu”. Use the +/↑ or -/↓ keys to move the cursor to the timer to be reset and press the ← key for 2 seconds to reset it. In the above Figure 12 the Down Timer will be reset when the ← key is pressed for 2 seconds.

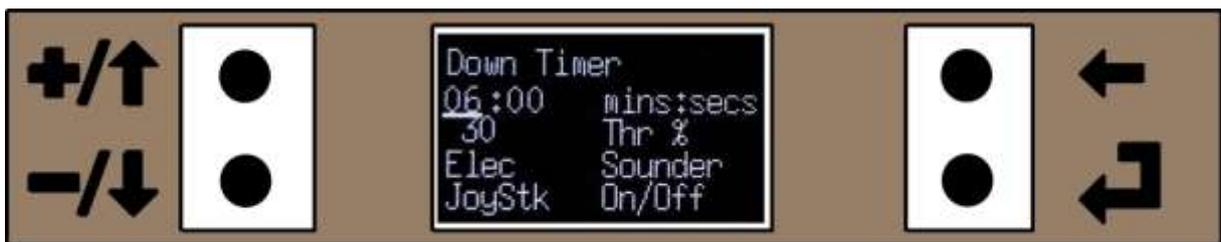


Figure 13. Down Timer Menu

3.1.5.1 Accessing the Timers Menu from the Home Menu

The “Timers” menus can only be accessed from the “Home Menu”. Use the +/↑ or -/↓ keys to move the cursor to the relevant timer and press the ↵ key as in Figure 12.

3.1.5.2 Adjusting the Minutes and Seconds of the Down Timer



Figure 14. Down Timer Adjust the Count Down Time

The down timer can be set from 59 mins : 59 secs to 0 mins : 01 secs in one second increments, but by default is set to 6 minutes when a model is reset. The minutes and seconds are set separately.

See page 11 for details of adjusting the Down Timer minutes and seconds.

3.1.5.3 Setting the Throttle Position to Control the Down Timer



Figure 15. Setting the Down Timer Joystick Position.

When the throttle joystick is controlling the down timer, with the throttle opened above the pre-set position, the timer counts down, with the throttle below this pre-set position it stops. The throttle% can be set between 0% and 100%, but is set by default to 30% when a model is reset.

To set the Throttle Joystick percentage, use the +/↑ or -/↓ keys to move the cursor to the “Thr %” (Throttle Position %) and press ↵. The cursor will be highlighted (as above in Figure 15) and the value can be set by moving the Throttle Joystick to the desired position to start/stop the timer. The joystick position as a percentage will be displayed next to the “Thr %”.

Once set to the desired position press ↵ or ← to return to return to the “underline cursor”.

3.1.5.4 Setting the Down Timer Sounder Mode



Figure 16. Changing the Down Timer Sounder mode

The down timer has an audible beep to signal how near to the end of the countdown it is. There are two “modes” Elec (electric) and I/C, though you can use I/C with electric powered models and vice versa. Electric mode has more information beeps, whereas I/C mode has minimal beeps.

Elec Mode has been designed to ensure that electric powered models can be easily flown to the timer limit without exceeding the maximum flight time, to ensure that the batteries are not damaged by over discharging. Some people may find the Elec mode too intrusive with the number of beeps and may wish to use the I/C Sounder mode even with electric powered models.

Electric Mode

- Above 3 minutes (on full minutes): One very short beep.
- Three minutes: Three long beeps.
- Two minutes: Two long beeps.
- One Minute: One long beep.
- Thirty seconds: Three short beeps.
- Twenty seconds: Two short beeps.
- Ten seconds to zero seconds: Continuous fast short beeps (if the throttle joystick is being used to control the timer, closing the throttle below the pre-set position stops the beeps).
- Zero Seconds: One very long beep to indicate the down timer has elapsed.
- Down Timer Elapsed: Continuous slow beeps to indicate the timer has over-run and elapsed (closing the throttle below the pre-set position stops the beeps). The Home Menu will also display “Elapsed” in the status to indicate the down timer has elapsed.

I/C Mode

- On full minutes: One very short beep.
- Ten seconds to until zero seconds: Continuous fast short beeps (if the throttle joystick is being used to control the timer, closing the throttle below the pre-set position stops the beeps).
- Zero Seconds: One very long beep to indicate the down timer has elapsed.

3.1.5.5 Choosing the Down Timer On/Off Control Switch or Joystick



Figure 17. Timer On/Off Control Showing the Gear Switch Selected

The Down Timer is either controlled by the user adjustable throttle % position (the normal method for electric powered models) or by a user assigned switch. It can also be inhibited so it never runs (such as for gliders).

To select the required Down Timer control, use the +/↑ or -/↓ keys to move the cursor in-line with the On/Off selection and press ↵ (as in Figure 17 above) and the cursor will be highlighted. Then use the +/↑ or -/↓ keys to scroll through the different selections (“Inh, Rud Rate, Thr Cut, Gear or JoyStk”) and press ↵ or ← to return once the required option has been selected. This will return to the “underline cursor”.

If the down timer is controlled by one of the switches, the switch position for “timer stopped” is set when the transmitter is turned on or a different model is selected, so regardless of the switch position it will not start timing until the switch is moved from its initial position when powered up or new model is selected.

You can reverse the switch operation by resetting the Down Timer when it’s running, after resetting the Down Timer will reset and be stopped. It will start timing again when the controlling switch is operated in the opposite direction.

3.1.5.6 Controlling the Up Timer



Figure 18. Timers Menu – Up Timer with the Rudder Rate Switch Selected to Operate the Up Timer

The “Up Timer” can be controlled by the Rudder Rate, Throttle Cut or Gear switches or it can be Inh (inhibited) from running.

To select what controls the Up Timer press the ↵ key to get the “edit cursor” with the option highlighted. Use the +/↑ or -/↓ keys to select either Inh, Rud Rate, Thr Cut or Gear and press ↵ or ← to return to the “underline cursor”. Note there is only one cursor position for the Up Timer menu. Using the +/↑ or -/↓ keys when the cursor can move will immediately take you to the Down Timer menu and is the expected behaviour.

Press the ← to return to the Home Menu or Menu 2 (depending on how you accessed the Timer Menus).

Similar to the Down Timer when the transmitter is turned on or a different model is selected, the Up Timer takes the initial switch position as “timer stopped”, so regardless of the switch position it will not start timing until the switch is moved from its position when powered up or different model selected.

3.1.5.7 Resetting the Up Timer

The up timer can be reset directly from the “Home Menu”. Use the +/↑ or -/↓ keys to move the cursor to the “Up Timer” and press the ← key for 2 seconds to reset it to 0:00:00.

If the Up Timer is reset when running, it will reset to 0:00:00, stop the up timer and reverses the operation of the controlling switch ie it will have to be operated in the other direction to start timing again.

If the Up Timer switch used to control the timer is changed in the menu, it will not start timing, but the switches current position will be saved as the “off” position. The Up Timer will start once the switch is operated.

3.1.6 Model Select from the Home Menu



Figure 19. Press the ↵ key to go to the model select menu

The “Model Select” menus (there are two pages, the first with models 1-5 and the second models 6-10) can be accessed directly from the “Home Menu”. Use the +/↑ or -/↓ keys to move the cursor to the line displaying the currently selected model and press the ↵ key. From here you can select the different models.



Figure 20. Model Select Menu Page 1, with Model 1 Selected

The “Model Select” menu can also be accessed from the normal menus and choosing a model is covered in the “Model Select” Menu in the Menu’s section of the manual (see page 31).

If the “Model Select” menu is selected with the trims not centred (aileron, elevator or rudder) a

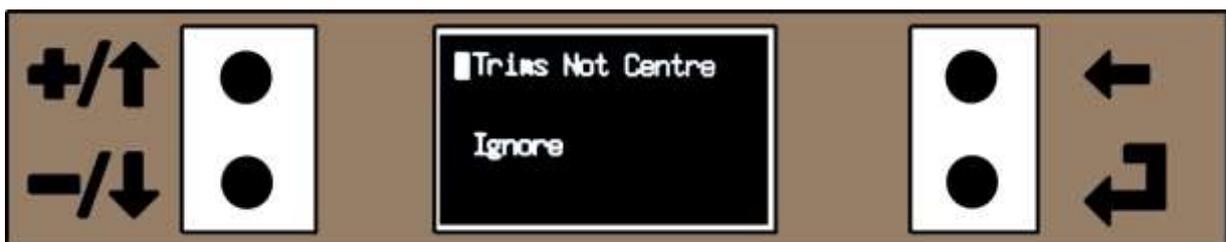


Figure 21. Warning message when the Model Select menu chosen with the trims not centre

warning message is displayed (Figure 21 below):

You can do one of three options:

1. Press the ← key to return to the Main Menu. This will indicate which trim(s) is not centred. Press the “Auto-Trim” push button so the current model is trimmed the next time it is used, then centre the trim(s) and reselect the “Model Select” menu.
2. Centre the trims and the “Model Select” menu will be enabled.
3. Use the +/↑ or -/↓ keys to move the cursor to the line displaying “Ignore” and press the ↵ key, to ignore the trims not being centred.

3.2 Main Menus 1 and 2



Figure 22. Press the ↵ key to go to the menu's

The various menus are selected by pressing the ↵ key when the cursor is beside the “Menu” on the Home Menu as in Figure 22 above.

The menus are arranged in a hierarchical manner and the menu structure is shown in Figure 23 on the following page.

Unlike many other computer transmitters where you have to press multiple keys to enter the menus, VintageTx allows you to go straight to the menus with a single press of the ↵ key from the Home Menu. However the transmitter will normally have the display and menu keys covered by the transmitters' label so can't be accidentally pressed.

Pressing the ← key will either takes you to the previous menu or stops altering a value. Multiple presses of the ← key will return you to the home menu. The only exception to this is the “Input Values Menu”. It has a delay of 2 seconds when pressing the back key. This is intentional so you have time to read the analogue value when the back key is pressed.

Most things are programmed with just one key being press at a time, with the exception of resetting a value to its default by pressing the +/↑ and -/↓ keys simultaneously.

There are two Main Menu's, that are effectively one big menu, when you scroll to the bottom of one menu, a further press of the -/↓ key will take you to the top of the other. And similarly when you are at the top of a menu and you press the +/↑ key you go to the bottom of the previous.

To get to Menu 2 either scroll down using the -/↓ key past the Pmix or scroll up using the +/↑ key past Trim. Press the ← key to return to the Home Menu.

Main Menu 2 is covered on page 73.

3.3 Menu Structure

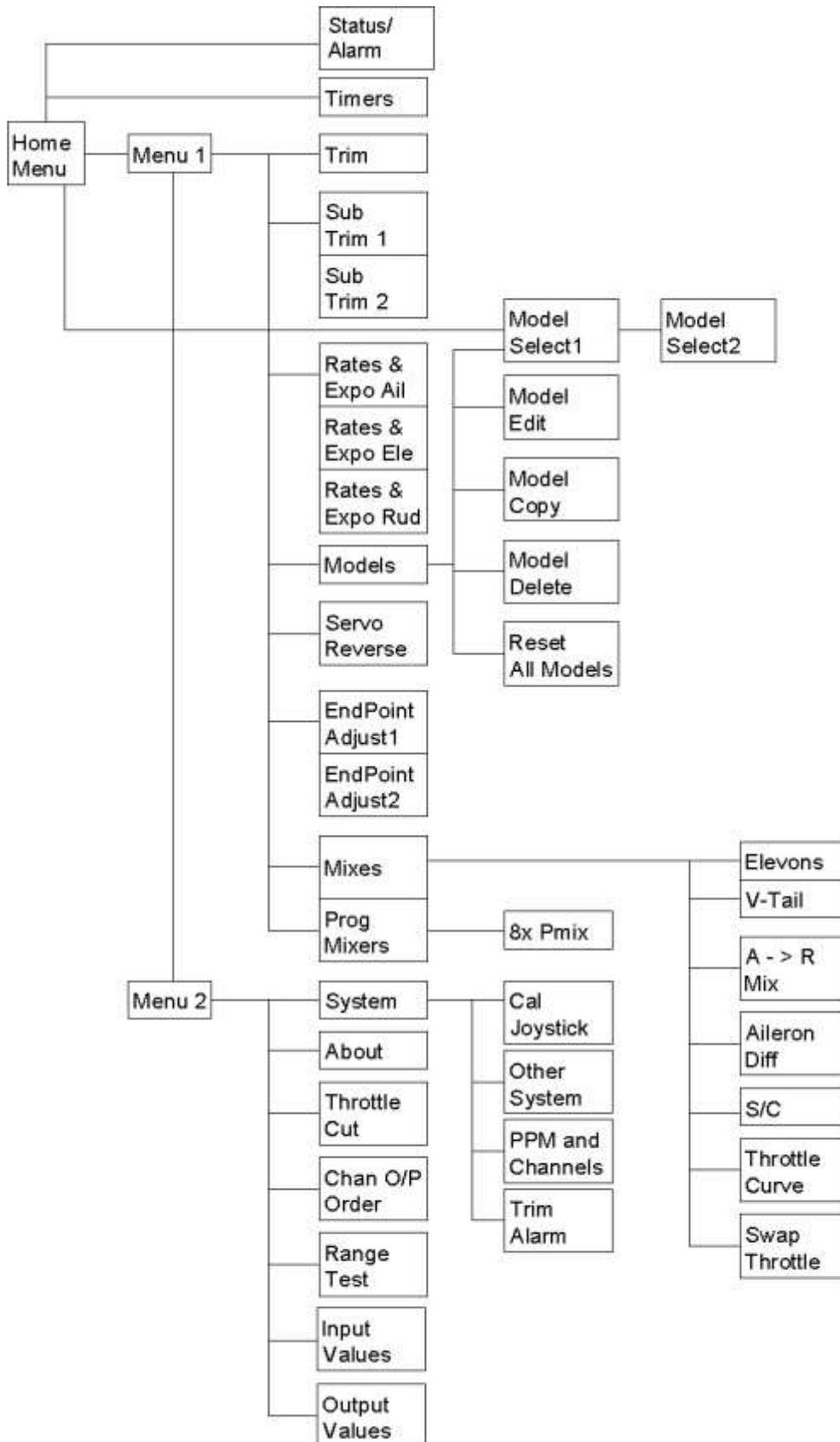


Figure 23. Menu Structure

3.4 Main Menu 1



Figure 24. Main Menu 1

Main Menu 1 allows you to select other sub-menus:

- | | |
|-----------------------------|-------------------------------|
| 1. Trim | 5. Reverse (Servo Reverse) |
| 2. Sub Trm (Sub Trim) | 6. E Point (End Point Adjust) |
| 3. Rt/Expo (Rates and Expo) | 7. Mixers |
| 4. Models | 8. Pmix (Programmable Mix) |

To select a sub-menu, use the -/↓ and/or the -/↓ keys to move the cursor to the desired sub-menu and press the ↵ key. To return to the home menu at any time, press the ← key.

3.5 Trims Menu



Figure 25. Trim Menu with trims being manually adjusted

To access the Trim menu:

Home Menu -> Main Menu 1 -> Trim Menu

See page 11 for details of adjusting values.

The trim memories are limited to +/-127. This usually gives slightly more servo travel than the physical trims. The convention is that positive values are for right trim (ailerons and rudder) or up elevator trim and negative values to give left trim (ailerons and rudder) or down elevator trim.



Figure 26. Trim Menu with cursor at the "Auto" trim switch

If the "Auto Trim" switch is in use with S/C (single channel) or has not been fitted, "Auto Trim" is available via the Trim menu. Move the cursor to the "Auto" setting (as in Figure 26). Pressing the ↵ key has the same effect as pressing the physical "Auto Trim" switch.

3.6 Notes on the VintageTx Trims



Figure 27. The Trim Menu

With a converted VintageTx transmitter, the Trims are analogue/mechanical and work in a different way to the majority of computer transmitters that have digital/switched trims. There are obviously some older computer sets such as the Futaba T6x (FF6) that have mechanical trims and work in a similar way to the VintageTx.

If you are going to use multiple models, ideally you need the trim in the centre for all models so that all models will be trimmed correctly when selected. Also rates and expo only work correctly with the trims centred (with rates at 50% the trim only has half of the effect when the rates are a 100%).



Figure 28. Switch used to automatically set the trim

3.6.1 Trim Memories

The VintageTx has Trim memories, just the same as any other computer transmitter, it is just that they can be set in a different way to transmitters with digital trims. To make it easy to keep the trims centred, if you press the “Auto Trim” switch (usually the switch which was the trainer/buddy switch if it was originally fitted, else a push button switch will need to be fitted) it automatically adds/subtracts to the trim memory setting for the value the joystick or trim is from centre/neutral (the joystick centre/neutral was set when calibrating the joysticks). After pressing the “Auto Trim” switch the trims will need to be centred (back to their neutral position). This can be done during the flight or at the end of the flight. Just remember to centre the trims after pressing the “Auto Trim” switch if done on the ground after the flight.

If the transmitter is turned on with the trims not centred, there is an audible alarm and a status message “Trims” to remind you to centre them. If the “Model Select” menu is selected with the trims not centred a warning message is displayed warning you that they are not centred. It is best to press the “Auto Trim Switch” (to save the trim positions for the current model), centre the trims and then proceed to the “Model Select” menu.

The “Auto Trim” switch adds/subtracts to the trim memory setting, it does not copy the joystick/trim position to trim memory. If after pressing the “Auto Trim” switch and re-centring the trims a small amount of trim is still needed, the switch can be pressed a second time to add/subtract the small trim adjustment.

When the “Auto Trim” switch is operated, it will normally give a short bleep (0.1 second) to indicate it has worked correctly. If however the “Auto Trim” switch is operated and one of the Trim values is to its minimum or maximum value (+/-127) it will give a long bleep (1.1 seconds) to indicate this.

If they are at the minimum or maximum, you will either have to use some sub-trim or preferably adjust the clevis on the control surface(s) to keep the trims within limits.

The “auto trim” switch is not dedicated to the trim function, it can also be used for Single Channel mode. If the switch is being used for single channel, the trims can be set via the trim menu and it is suggested that the model is test flown and trimmed before the switch is allocated to Single Channel.

3.6.2 Throttle Tick-Over "Trim"

Tick Over "trim" is different to the other trims as it only alters the throttle tick over position, not the whole range of the servo movement and doesn't affect the full throttle or closed throttle servo positions set by the E Point (End Point Adjust) see page 38.

When the joysticks are calibrated, the tick over position (throttle joystick down and trim up), is stored, it is one of the reason why it is important that the calibration instructions are followed correctly for the throttle stick.

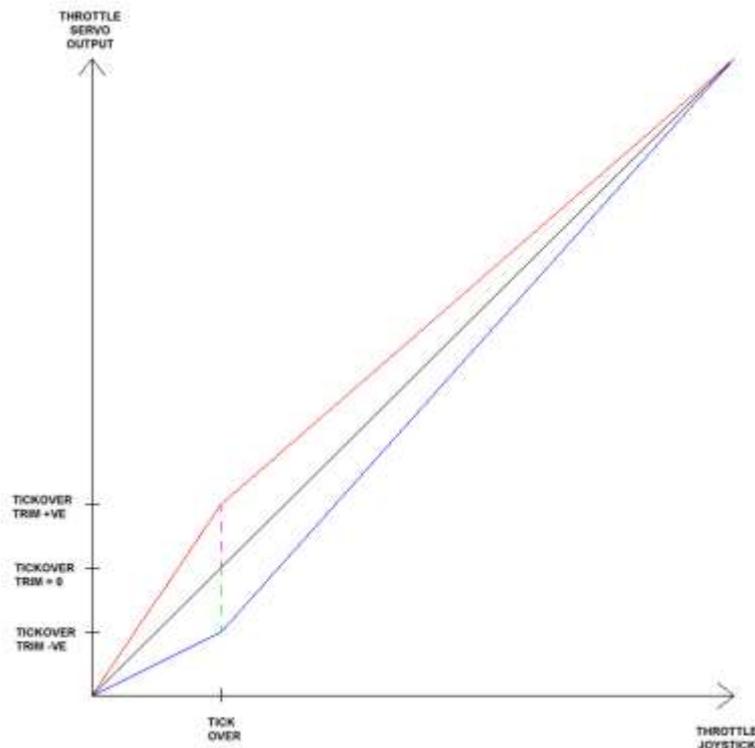


Figure 29. Effect of Tick Over "Trim" on Throttle

In Figure 29, the effect of the Tick Over "Trim" is shown in graphical form, with the red line for positive values and the blue line for negative values. It is a simple form of a three point curve, with the three joystick positions pre-set (when the joystick was calibrated) and the servo output set at the top and bottom by the End Point Adjust (see page 38) and the throttle Tick Over trim adjusts the tick over point. The Tick Over "Trim" can be adjusted in the same way as the other trims above and is limited to +/-127 that is approximately +/-10% full servo travel.

Examples of using the throttle "Tick Over Trim" together with setting up an engine are given in the "Setting up the throttle of an I/C engine" in the examples section on page 89.

3.7 Sub Trim Menu

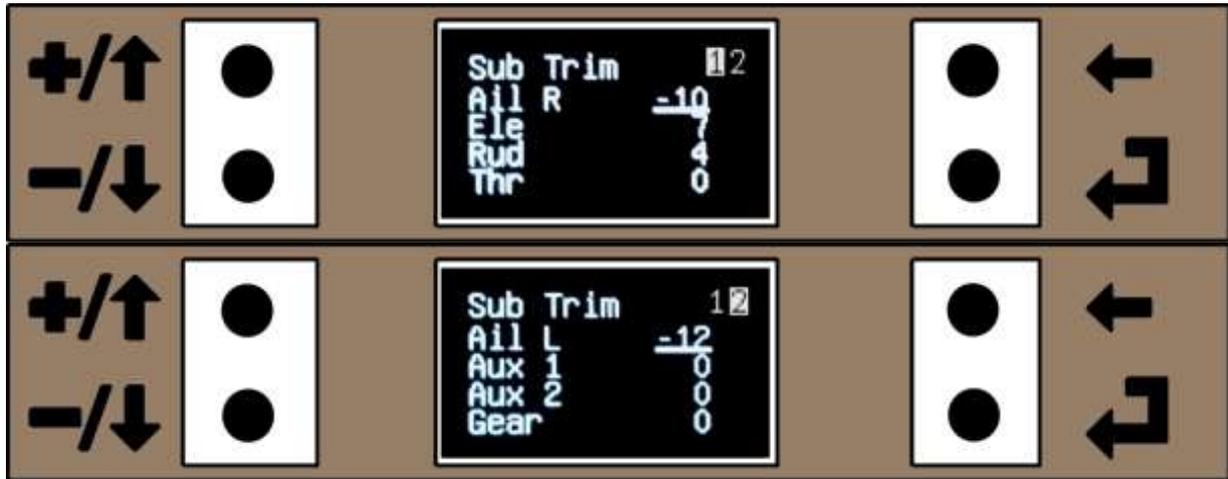


Figure 30. Sub Trim Menus 1 and 2

Sub Trim is provided for all 8 output channels. The Sub Trim menu is split over two pages, Aileron Right, Elevator, Rudder and Throttle on the first, Aileron Left, Auxiliary 1, Auxiliary 2 and Gear on the second. To access the second page scroll the cursor up or down past the first/last entry.

To access the Sub Trim menu:

Home Menu -> Main Menu 1 -> Sub Trim Menu

See page 11 for details of adjusting the Sub Trim values.

The Sub Trim memories are adjustable to +/-127, if more movement is needed adjust the clevis on the control surface. The maximum sub trim values equate to approximately 10% of full servo movement. The convention is that positive values are for right ailerons and rudder, up elevator and throttle open. The auxiliary channels and the gear have no pre-defined direction.

With an electric powered model, the throttle output with the throttle joystick closed and the trim up maybe enough to start some ESC (electronic speed controller) and motor. Therefore it is quite normal to have the "Tick Over" trim set to -127, to ensure the joystick has to be opened a few "clicks" before the motor starts.

The Trim values and the Sub-Trim values both give the same servo movement for the same value (if no mix is used to limit the trim).

Finally what is the difference between trim and sub trim? Trim is added to the joystick value, before any mixes. Sub-trim is added to the output channel after any mixes. So aileron trim affects both right aileron and left aileron, but there are sub trims for each individual aileron. Usually sub trim would be used during setup to centre the control surfaces, trim would be used to correct any out of trim while flying.

3.8 Rates and Expo Menu (Exponential)

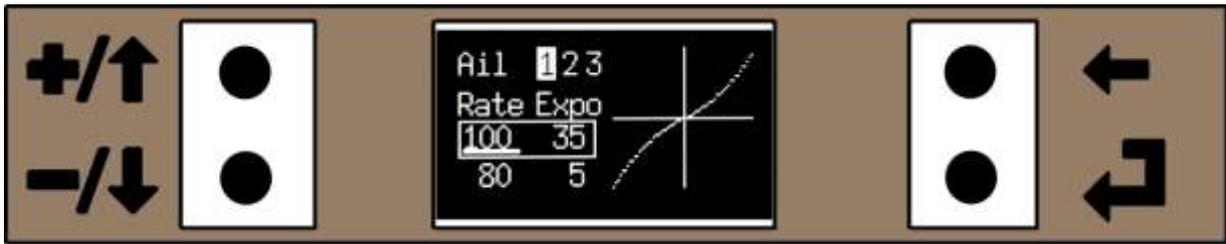


Figure 31. Rates and Expo Menu.

Rates and expo (exponential) is available for aileron, elevator and rudder. The expo follows the Spektrum/JR convention of positive values giving a softer feel around neutral and negative values making it more sensitive around neutral. Negative expo is limited to -50% to simply operation.

To access the Rates and Expo menu:

Home Menu -> Main Menu 1 -> Rates and Expo menu

The Rates and Expo menu is spread over three pages, with Aileron, Elevator and Rudder having their own page. To access the Elevator (second page) and Rudder (third page) scroll the cursor up or down past the first/last entry and the cursor will roll over onto the next page. See page 11 for details of adjusting the Rates and Expo values.

To indicate which rates/expo is selected by the rate switch, a frame is drawn around the active values. If the relevant rates/expo switch is operated the frame moves to the other set of values, which then become active. In Figure 31 above, the Aileron Rate Switch is selecting 100% rates and 35% expo, in Figure 32 below, the Aileron Rates Switch has been moved to the other position and the frame is now highlighting the other set of values that are now active, 80% Rates and 5% expo.



Figure 32. Rates and Expo Menu with the Ail Rate Switch Operated to the Other Position

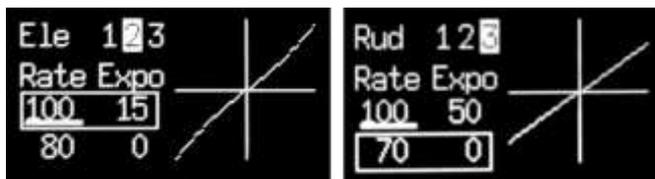


Figure 33. Elevator and Rudder Rates and Expo Menu's

The elevator and rudder Rates and Expo have similar pages with their respective switch positions shown by the frame being drawn around the active set of values.

Be aware that all the rates switches can also be used for controlling Pmix and the Rudder Rates Switch for other purposes such as the count up and down timers, so if they are being used for other functions it is probably best to have the rates and expo set the same high and low.

3.9 Models Menu



Figure 34. Models Menu

The Models menu allows you to access sub-menu's to select, edit, copy or delete a model and to reset all models (to their default values).

To open the Models menu:

Home Menu -> Main Menu 1 -> Models.

To select a Model sub-menu, move the cursor to select the option and press the ↵ key.

3.9.1 Model Select Menu (Model Memories)



Figure 35. Model Select Menu Page 1, with Model 1 Selected

There are ten model memories. The Model Select menus can be accessed either directly from the Home Menu by moving the cursor to the model currently selected and pressing ↵ key (see "Model Select from the Home Menu" on page 22).

Alternatively it can be selected from the Main Menu 1:

Home Menu -> Main Menu 1 -> Models -> Model Select.

The model currently selected is indicated with a ">" beside it. To select a different model move the cursor in line with the required model and press the ↵ key. The ">" should now be at the model that has just been selected.



Figure 36. Model Select Menu Page 2

The Model Select menu is spread over two pages, models 1-5 on the first page and models 6-10 on the second. To select the second page use the +/↑ or -/↓ keys to scroll down past “05” or scroll up past “01”. To return to the first page from the second page, scroll down past “10” or up past “06”, the two pages roll over to the other.

To return to the previous menu press the ← key (either the Home Menu or the “Models” menu).

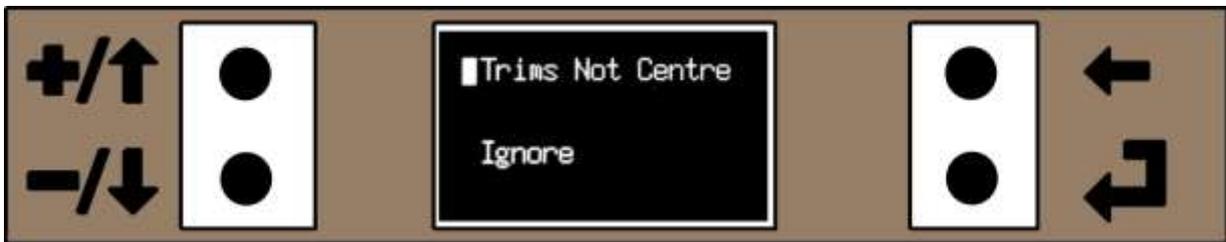


Figure 37. If Model Select menu is selected with the trims not centred you get a reminder

If the “Model Select” menu is selected with the trims not centred (aileron, elevator and/or rudder) a warning message is displayed warning you that they are not centred. If you wish to save the trim positions for the current model, press the “Auto Trim Switch” and then centre the trims. Once the trims are all centred, you will automatically proceed to the “Model Select” menu.



Figure 38. Ignore that the trims are not centred and proceed to the "Model Select" menu

Alternatively if you do not wish to save the “trims” for the current model, use the +/↑ or -/↓ keys to move the cursor the “Ignore” and press the ↵ key to proceed directly to the “Model Select” menu.

To return to the previous menu press the ← key (either the Home Menu or the “Models” menu).

3.9.2 Model Edit Menu

Each model can have a 10 character name, using capitals, lower case, numbers and/or spaces. To edit a model's name go to the model edit menu:

Home Menu -> Menu 1 -> Models -> Model Edit



Figure 39. Model Edit Menu.

The models number and name is on the top row and a “virtual keyboard” below.

When the Model Edit menu opens, you are immediately ready to enter characters. The square cursor on the “keyboard” can be moved with the use the +/↑ or -/↓ keys to the desired character and then press ↵ key. The character will be entered at the top for the model name overwriting whatever character was there and the “top cursor” will automatically increment ready for the next character to be entered. Holding the +/↑ or -/↓ keys down “auto-repeat” and will quickly move the cursor along the characters in the virtual keyboard. The cursor will wrap around, so if the cursor is highlighting “9” and the -/↓ key is pressed it goes back to “A” and vice versa.

To get a space character “ ” select the space between the “z and 0”. There is no delete key, if you want to delete a character you have to type a “space” (or other character) to overwrite it and clear the existing character.



Figure 40. Model Edit Menu with active cursor at the top

If the ← key is pressed the active cursor will move to the model name at the top (the “square cursor” highlights the character of the model name and the “underline cursor” remains at the last character selected). The “square cursor” at the top can be moved with the +/↑ or -/↓ keys, typically to go back to a character that has been mistyped. Pressing the ↵ key will return the cursor to the keyboard or pressing the ← key leaves the Model Edit menu and returns to the Model menu.

3.9.3 Model Copy Menu



Figure 41. Model Copy Menu (Model 1 copy to Model 2)

The Model Copy menu copies the currently selected model to another model memory, including its name and all settings. It is typically used when setting up a new model and it is easier to base it on an existing one, or when you wish to experiment with different mix settings, but keeping the original model and settings in case the alterations don't work out.

To copy a model, go to the model copy menu:

Home Menu -> Main Menu 1 -> Models -> Model Copy

When the Model Copy menu is opened, it displays the model to copy to the same as currently selected. Press the ↵ key to change to edit, then use the +/↑ or -/↓ keys to select to model memory to copy to and then press the ↵ or ← key. A "Confirm Copy" will appear at the bottom.



Figure 42. Confirm Copy

Use the +/↑ or -/↓ keys to move the cursor inline with the "Confirm Copy" which will become highlighted and then press the ↵ key.



Figure 43. Confirm Copy

After copying is completed, it automatically returns to the Models menu.

NOTE. Copying the model DOES NOT CHANGE THE SELECTED MODEL, if you want to use the model you have just copied, you will need to go to the Model Select menu and select it.

If you want to leave the menu without copying a model press the ← which returns to the Models menu.

3.9.4 Model Delete Menu



Figure 44. Delete Model Menu.

This deletes the current model and resets all values to default, including the name.

To delete a model's name and settings go to the model delete menu:

Home Menu -> Menu 1 -> Models -> Model Delete

Use the -/↓ key to move the cursor down to the Delete Model and then press and hold the ↵ key for 2 seconds. Once complete it returns to the Models menu.



Figure 45. Delete Menu with cursor at delete. Press ↵ key for 2 seconds to delete the selected model

If you want to leave the menu without deleting the model press the ← which returns to the Models menu.

3.9.5 Reset All Models Menu

This option resets all 10 models to the default settings including their names. It does not affect system settings, such as joystick calibration etc.



Figure 46. All Model Reset Menu

To delete all model settings and names go to the all model delete menu:

Home Menu -> Menu 1 -> Models -> All Model Delete

Move the cursor down using the -/↓ key to the “Reset” row. The message “Ent & Hold 2S” will be displayed. Press and hold the ↵ key for 2 seconds and there will be a few second delay while everything is set to default and saved to non- volatile EEPROM. Once complete it returns to the Models menu.



Figure 47. All Model Reset Menu with cursor at Reset.

Press ↵ key for 2 seconds to reset all models to their default values.

If you want to leave the menu without resetting all the models press the ← which returns to the Models menu.

3.10 Servo Reverse Menu



Figure 48. Servo Reverse Menu with right and left ailerons (AR and AL) reversed

Servo Reverse is available for all output channels.

To get to the Servo Reverse Menu:

Home Menu -> Main Menu 1 -> Reverse

Use the +/↑ or -/↓ keys to move the cursor to the channel you wish to reverse and press ↵ key to select the channel to be reversed. Pressing ↵ key again puts the channel to normal ie the ↵ key toggles the channel normal/reverse.

In Figure 48 above the cursor is at A.R (Aileron Right). Pressing the ↵ key will toggle the A.R reverse/normal (in Figure 48 the Aileron Right and Aileron Left are already reversed).

Press the ← key to return to Main Menu 1.

WARNING:

Be cautious of reversing the throttle channel if connected to an esc/electric motor as it may unexpectedly start.

Abbreviations are used for all the output channels:

- | | |
|------------------------|-----------------------|
| 1. A.R – Aileron Right | 5. A.L – Aileron Left |
| 2. Ele – Elevator | 6. Ax1 – Auxiliary 1 |
| 3. Rud – Rudder | 7. Ax2 - Auxiliary 2 |
| 4. Thr – Throttle | 8. Gr - Gear |

3.11 End Point Menu (End Point Adjust/EPA)



Figure 49. End Point Adjust Menu 1

End Point Adjust (EPA), gets called a multitude of different names by the various manufactures, such as End Point, End Point Adjust, Travel Volume, Travel Adjust etc. It is used to adjust the throw of each end the servos travel as a percentage of maximum throw from neutral. Note End Point is not an “end point limit” but a “gain”. It is possible for a Pmix (programmable mixers) to give an output that moves the servo past where you set its “maximum”

To get to the End Point menu:

Home Menu -> Main Menu 1 -> E Point (End Point).

The EPA adjustments are spread over two pages, Aileron Right, Elevator, Rudder and Throttle on the first, Aileron Left, Auxiliary 1, Auxiliary 2 and Gear on the second. To access the second page scroll the cursor past the first/last entry using the +/↑ or -/↓ keys. Press the ← to return to Main Menu 1.

The values are adjustable between 0-120% at each end of the servo’s throw, above 100% is probably only needed for 3D type aircraft where very large control throws are used. See page 11 for details of adjusting the End Point values.

To indicate which value adjusts which end of the servo travel, moving the appropriate joystick indicates which value will be adjusted with a * beside the value (up elevator and closed throttle in Figure 49).

The EPA for all control outputs except throttle, adjusts the maximum throw of each end the servos travel as a percentage of maximum throw from neutral, so can be used to set different amounts of servo travel each side of neutral eg up elevator can have more (or less) movement than down elevator or give equal amounts of movement when the linkage is not symmetrical.

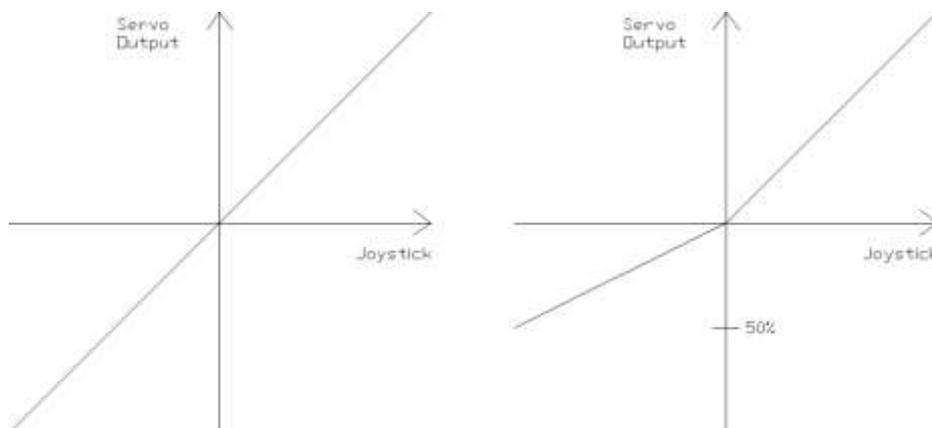


Figure 50. EPA set 100%: 100% on Left and 50%:100% on Right

3.11.1 Throttle End Point (Throttle EPA)

The End Point Adjust (EPA) for the Throttle works slightly differently to the EPA for the other output channels as it does not have a neutral/centre. It still limits the servo throw at the two ends of movement as a percentage of travel from centre, but adjusting one end has an effect the whole way through the servo range of movement. It is easier to see with the aid of a diagram.

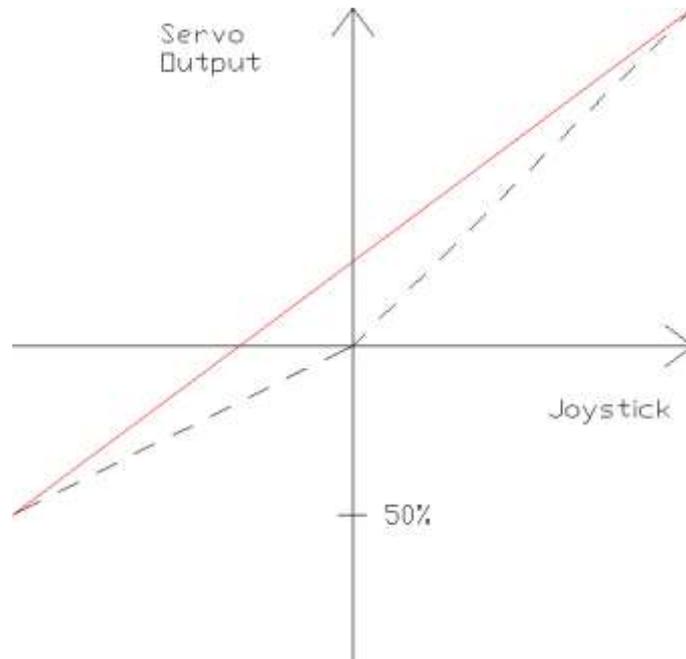


Figure 51. Throttle EPA

In Figure 51, the Lower Throttle EPA value has been set to 50% and the Upper Throttle EPA value has been left at the default 100%.

The red line represents the servo output for a given throttle joystick position. As can be seen it is a linear output between the minimum and maximum servo travel. The dashed line is what the output would be for any other output channel where it is centred on the servo neutral.

On many other brands of computer transmitters the throttle EPA is just the same as all the other channels, ie it adjusts both ends from the centre and the throttle response will be non-linear (represented by the dashed line) if the lower and upper EPA values are not equal.

The EPA for the Throttle also works in conjunction with the Tick-Over Trim to form a simple three point curve. Further to this the Throttle Curve function can also be used to further modify the slope above the tick over, see the “Throttle Curve” mix on page 51.

3.12 Mixers Menu (Select and Monitor)



Figure 52. Mixers Menu Page 1

The VintageTx has a selection of pre-defined mixers, they are accessed via the Mixers menu.

Home Menu -> Main Menu 1 -> Mixers

The Mixers menu has Elevons (flying wing and delta), V-Tail, Aileron to Rudder mix, Aileron Differential, S/C (Single Channel), Throttle Curve and Swap Throttle. To open a mix use the +/↑ or -/↓ keys to move the cursor to select the required mix and press ↵.

The Mixers menu is used to both select the mixers and also to monitor if the mixers are active. If any of the mixes are in use, they are indicated by a “>” beside them as in Figure 52 above, the Elevons and the throttle curve are in use.

3.12.1 Elevons and V-Tail



Figure 53. Elevons Mix with the mix Inh (inhibited) when first selected

There is a single combined menu for the Elevons and V-Tail Mixer, though you can access it from either the Elevons or the V-Tail options on the Main Menu 1:

Home Menu -> Main Menu 1 -> Mixers 1 -> Elevons or

Home Menu -> Main Menu 1 -> Mixers 1 -> V-Tail

The Elevon and V-Tail share their memory storage, so only one of them can be selected at a time. This shouldn't be a problem as there are not many models that require both. By definition a model with Elevons doesn't have a tail, so won't have a V-Tail.

To select either Elevons or V-Tail use the +/↑ or -/↓ keys to move the cursor to the desired mix and press the ↵ key, “>” should appear besides the selected mix (and cancel the other).

If Elevons or V-Tail are not required the Mix option should be set to Inh (Inhibit) as in Figure 53 above.

The output channels for the Elevons and V-Tail are:

Elevon Outputs: Aileron Right and Aileron Left.

V-Tail Outputs: Elevator and Rudder

As the Elevons mix is output on the Aileron Right and Aileron Left outputs, the elevator output works as normal, so can be used directly with a canard on deltas.

3.13 Elevon Mix when using a 4 Channel Receiver

If a 4 channel receiver is being used, Aileron Left (nominally Channel 5) will not be available. This is not an issue as the VintageTx channel output order is user assignable, so can be moved onto an unused output, typically what would be the elevator output channel. See ”

Ch Order Menu (Channel Output Order/ Channel Output Assignment)” on page 85 and an example of a delta with a 4 channel receiver on page 96.

3.14 Getting the V-Tail and Elevon Surfaces Moving the Correct Direction

With some transmitters the Elevons and V-Tail mixes can cause great consternation in getting both the control surfaces to move in the correct direction. However it is very straightforward to get working correctly with the VintageTx encoder as the 8 possible combinations of servo normal/reverse and which servo is plugged into which output are pre-programmed

It does not matter which elevon servo gets connected to the right and left aileron output (for flying wing/delta) or elevator/rudder outputs (for V-Tail), the correct operation will be set when the mix is being setup on the transmitter.

Using the Elevon mix (or V-Tail mix) is subtly different to most computer transmitters. With the cursor at the Mix position, press the ↵ key. The entry should get highlighted so you can edit/alter the value. There are 8 mix options Mix1 to Mix8, and INH (inhibit or off). If the Mix is INH, press the +/↑ key once to select “Mix 1” and test to see if both the control surfaces move in the correct direction. If not press the +/↑ key again to select “Mix 2”.



Figure 54. Elevon Mix, with "Mix8" selected

Again test the control surfaces. Continue using the +/↑ key to select the other “Mix” until you find the correct one to get the control surfaces both moving in the correct direction. Once working correctly press the ↵ key or the ← key so that you get the underline cursor and it can be moved up and down again.

Note, Do Not use the servo reverse as it is not needed and will just confuse setting up the Elevons or V-Tail.

3.15 Setting the Elevator to Aileron (Elevon) or Rudder (V-Tail) Ratio

The ratio of elevator to aileron for Elevons and elevator to rudder for V-Tail can also be adjusted. Only the elevator value is adjustable, the aileron value for Elevon or rudder for V-Tail automatically gets adjusted and the two percentages add to 100%. The maximum/minimum value is limited to 90:10 and 10:90 for the elevator and ailerons/rudder.

To adjust the elevator percentage, use the +/↑ or -/↓ keys to move the cursor to the Ele % and press the ↵ key. The cursor should now change to “edit” cursor and the +/↑ or -/↓ keys can be used increase/decrease the elevator %, the other value will get automatically adjusted. If the +/↑ and -/↓

keys are pressed together it will reset to 50% default. When complete press the ↵ key or the ← key. Press the ← key to return to the previous menu and save the values to EEPROM.

With some models with Elevons or V-Tail they give the movement as say 2:1 Elevator to Ailerons ratio which means the elevators have twice the movement. With the VintageTx using a % it is easy to convert. In the example add the two ratios together, $2+1=3$, so the elevator would have $2/3$ movement and to convert this to a percentage $100 * 2 / 3 = 67\%$ (rounded to the nearest percent) and the ailerons would be 33% (which is still a 2:1 ratio).

No elevon differential setting is provided. If the aircraft pitches when ailerons are applied a simple Pmix with aileron -> elevator can be used to overcome this.

Similarly, no V-Tail differential setting is provided. This can be needed if the aircraft pitches when rudder is applied. A simple Pmix with rudder -> elevator can be used to overcome this. See the examples on “Rudder to Elevator and Rudder to Aileron for Knife Edge Correction” on page 99 for details.

3.15.1 A > R (Aileron to Rudder) Mix



Figure 55. Aileron to Rudder Mix with the mix Active (on)

Aileron to rudder mix is also often called Coupled Aileron to Rudder (or CAR for short). The Aileron to Rudder mix menu is accessed from:

Home Menu -> Main Menu 1 -> Mixers -> A>R Mix.

In a similar way to the programmable Pmix (see Pmix Control on page 60), the A->R mix can be switched on/off with the selected switch displayed at the top right of the menu and the A->R on the left becomes highlighted when active. In Figure 55 above the Gear Switch is in the on position and the “Ail to Rud” mix is active indicated by it being highlighted. If the Gear Switch was in the off position the “A->R” text would go normal.

Any one of the following switch positions can be selected to control the mix:

- | | |
|--|--|
| 1. Inh (Inhibit). This turns the A>R mix off | 10. T/C Off (Throttle Cut Switch Off) |
| 2. On. This turns the A>R mix on so it is always active. | 11. Gear Switch On |
| 3. A/R On (Aileron Rates Switch On) | 12. Gear Switch Off |
| 4. A/R Off (Aileron Rates Switch Off) | 13. Ax2 A On (Aux2 Switch Position A On) |
| 5. E/R On (Elevator Rates Switch On) | 14. Ax2 B On (Aux2 Switch Position B On) |
| 6. E/R Off (Elevator Rates Switch Off) | 15. Ax2 C On (Aux2 Switch Position C On) |
| 7. R/R On (Rudder Rates Switch On) | 16. Ax2 A Off (Aux2 Switch Position A Off) |
| 8. R/R Off (Rudder Rates Switch Off) | 17. Ax2 B Off (Aux2 Switch Position B Off) |
| 9. T/C On (Throttle Cut Switch On) | 18. Ax2 C Off (Aux2 Switch Position C Off) |

Use the +/↑ or -/↓ keys (if necessary) to move the cursor to the control and press the ↵ key. The cursor should now change to “edit” cursor and the +/↑ or -/↓ keys to select what controls the mix and when complete press the ↵ key or the ← key.

The amount of aileron to mix into rudder can be varied from +/-100% ie you can mix opposite aileron to rudder if required. Again Use the +/↑ or -/↓ keys (if necessary) to move the cursor to the Mix% and press the ↵ key. The Mix% value will become highlighted and can be edited with the +/↑ or -/↓ keys. If the +/↑ and -/↓ keys are pressed together it will reset the value to the default 0%. Once complete press the ↵ key or the ← key to a moveable cursor.

Once the switch to control the mix and the mix% have been set, press the ← key to return to the previous menu and save the values to EEPROM.

3.15.2 Aileron Diff (Aileron Differential)



Figure 56. Aileron Differential

The Aileron Differential mix menu is accessed from:

Home Menu -> Main Menu 1 -> Mixers -> Ail Diff.

Aileron differential requires that each aileron has its own servo so that the movement of each can be varied independently. It can be varied from +/-100% with positive values making the down going aileron move less than the up going aileron

Example: 50% Ail Diff will make the down going aileron have half the servo travel as the up going aileron, 0% Ail Diff will give full servo travel for both up and down going ailerons and -50% Ail Diff will make the up going aileron have half the servo travel that the down going aileron servo.

It is not possible to switch Aileron Differential on or off with a transmitter switch, it can only be pre-set to the value (0 is off).

See page 11 for details of adjusting values.

Note leave the Aileron Differential set to 0% if a model has a single aileron servo, on a model with no ailerons but with rudder/elevator (with rudder control as the primary control) or if the Single Channel Mix is selected (see Page 46), as you will want equal movement right and left on the Aileron output (Ail.R).

3.15.3 Single Channel Emulation



Figure 57. Single Channel Menu Page 1

The Single Channel mix emulates older single channel transmitters with just a keying switch and the matching compound or sequential compound. See “What is single channel Control?” on page 116 for an explanation of what single channel control is.

3.15.4 Selecting Single Channel

The Single Channel Emulation mix is selected from the Mixers menu:

Home Menu -> Main Menu 1 -> Mixers -> S/C.

The Single Channel mix shares its storage with Pmix8, so only one of them can be selected at the same time. When a model is reset, Pmix8 is enabled by default, so the first time you select Single Channel, it warns you that if you have programmed Pmix8, it will be overwritten.



Figure 58. Selecting S/C when Pmix8 Already in Use

Using the +/↑ or -/↓ keys, move the cursor to the “Confirm” on the bottom line and it will be highlighted, then press the ↵ key to confirm. If you do not wish to overwrite Pmix8, press the ← key to return without selecting S/C.

3.15.5 Single Channel Menu



Figure 59. Single Channel Menu Page 1 with Compound and 3 Position Throttle Selected

The Single Channel Menu is spread over two pages. The first page lets you select either Compound Control or Sequential Control, if sequential control whether there are “beeps” (to indicate the next direction) and if Compound Control is selected whether “Blip throttle” is 2 Position (Full Throttle and Tick Over) or 3 Position (Full Throttle, Mid Throttle and Tick Over) are selected. The second page allows you to set the Rudder %, Elevator% and Mid Throttle%.

3.15.6 Selecting S/C Compound or Sequential Operation

To select either Compound or Sequential use the +/↑ or -/↓ keys to move the cursor opposite the required setting and press the ↵ key. A > should appear against the new selection and the other option de-selected.

3.15.7 Selecting Seq Beeps (Sequential Control “Beeps”)

To select Sequential Control Beeps use the +/↑ or -/↓ keys to move the cursor to the “Seq Beeps” (as in Figure 59 above) and press the ↵ key to toggle the selection on/off. Seq Beeps are only available in S/C sequential, so if S/C compound is selected, they will not be available even if “Seq Beeps” is selected.

3.15.8 Selecting No Throttle Control, 2 Position or 3 Position Throttle

Note throttle control is only available for S/C compound control. It will not be active in S/C Sequential control even if selected in the menu. The first time single channel is used, the default is for no throttle control to be selected. If throttle control is required, use the +/↑ or -/↓ keys to move the cursor to the required throttle option and press the ↵ key to toggle the selection on/off.

If you wish to change from 2 position throttle to 3 position throttle or vice versa, use the +/↑ or -/↓ keys to move the cursor to the desired throttle control selection and press the ↵ key. This will select the new option and de-select the previous option. Pressing the ↵ key will toggle the selection on/off.

If no throttle control is required and either the 2 or 3 position throttle control is already selected, then move the cursor to the throttle control highlighted with a > and press the ↵ key which will toggle the selection off.



Figure 60. Single Channel Menu Page 2

3.15.9 Setting the Rudder %

The percentage settings can be individually adjusted, use the +/↑ or -/↓ keys to move the cursor to the desired setting and press the ↵ key to highlight the value. Use the +/↑ or -/↓ keys to increase/decrease the value, or press the +/↑ and -/↓ keys together to reset to the default value. When complete press the ↵ or ← key to return to an underline cursor.

The Rud% can be set in the range +/-100%, with 0% giving no movement (so not of much use) and 100% giving full rudder movement (on the Right Aileron output) with one press right and two for left (similar to an Elmic Compact or Commander). If a negative value is set it will give one press for left and two for right (similar to some OS Minitron sets). The default value is 100% which may be too much for initial training, but it is dependent on the pilot's preference and the model.

3.15.10 Setting the Elevator%

The Ele% is limited to +/-90% with positive values giving up elevator and negative values giving down elevator. Most powered aircraft will use up elevator (hence the term Kick Up Elevator), but down elevator is often preferable on single channel gliders, especially if flown off the slope.

When the elevator is set to 0% the elevator is turned off and there is no "elevator position" in the cycle. The default value for a new model is 0%.

3.15.11 Setting the Mid Throttle %

The Mid Thr% is limited to 0 – 100%, with 0% giving tick over and 100% giving full throttle (or rather 100% of the throttle joystick position). The default value is 50%. Don't forget that with mid throttle set to 50%, this will be 50% of where the actual throttle joystick is set, not 50% of the actual total travel. The only way to get 50% actual travel is to have the throttle joystick fully open.

All of the above values are only used if the compound mix has been selected.

3.15.12 Disabling Single Channel Control

To turn the single channel mix off, select Pmix8 from Mixers page 2. You will get a warning that you are going to overwrite the S/C mix, continue and the S/C mix will be cancelled. You can then exit Pmix8 without setting anything. See "Selecting Pmix8 when Single Channel is already" on page 72.

3.15.13 How the VintageTx can be used for Single Channel Training

Single channel requires a different skill to flying models with proportional control and the VintageTx encoder is a great learning tool for a competent multi pilot to get to grips with single channel. In S/C mode the joysticks override the single channel switch once moved from centre, so if at any time things get out of hand, control can be regained by using the joysticks. You can instantly apply rudder or elevator correction with the joystick, also the throttle can be closed at any time and if closed it resets the S/C throttle position. Therefore it offers modellers, who are competent with multi-channel models, the perfect way to safely learn to fly single channel using a single channel type model fitted with rudder, elevator and throttle.

When the rudder (on the aileron channel) or elevator joystick is moved more than 17% from neutral then the single channel rudder and elevator control are cancelled and full control via the joystick is possible. This value was chosen as it is greater than what most trims can achieve, so trims will be ignored, but it cancels the S/C command as soon as possible when the joystick is moved.

You can only resume single channel control via the pushbutton once the joystick is returned to neutral and the single channel pushbutton has been released (from experience, in times of panic the pushbutton is sometimes not released).

3.15.14 What Single Channel Functions are Available

The VintageTx encoder has emulation for both sequential and compound escapements, including motor speed and kick up elevator. It uses the switch that is also used for Auto Trim and is usually the former "trainer or buddy box" switch.

On a single channel (or two or three channel) model with rudder but no aileron, it is convention to use what would normally be the aileron joystick for rudder control as it is the primary "directional" control and leave the rudder joystick unused. Therefore the rudder output for single channel is actually output on the right (and left) aileron channel. This is intended and is not a bug with the software.

The single channel pushbutton is also output on the Gear channel as a momentary signal, so that it could operate an escapement via any suitable switching device (just chose one that switches instantly as many have a distinct delay in switching On/Off which messes up the accurate timing needed).

3.15.15 Notes on S/C.

- It should be ensured that the mechanical trims are near centre when using single channel as on some sets, full trim can take you beyond the +/-17% control movement where S/C output is temporarily disabled as it is assumed that the joystick is being moved, to take back control.
- If low rates have been selected for the aileron and/or elevator joystick, it can take more joystick movement to get back control than may be expected.
- Ensure that Aileron Differential is set to zero so that there is equal movement left and right.

3.15.16 **The How Does the 2 or 3 Position Throttle Work in Compound Mode?**

For the Compound 2 or 3 Position Throttle to work, the Throttle Joystick has to be opened by the desired amount, it doesn't have to be fully open, in fact for early training it is recommended to only have the throttle opened to a setting where you would normally "cruise around". This is then the maximum throttle available "on the button" for single channel. Half throttle will literally be half way between where the throttle joystick is set and tick-over, not actual half throttle. Tick-Over will be the same as a closed throttle joystick position.

If the throttle joystick is closed, it forces the single channel throttle closed and it can't be set to a higher power until the throttle joystick is opened again.

When 2 Position Throttle has been selected and the throttle joystick is open, a quick blip of the button will alternate Fast -> Slow -> Fast.

When 3 Position Throttle has been selected and the throttle joystick is open, a quick blip of the button will go through the sequence Fast -> Mid -> Slow -> Mid -> Fast -> Mid -> Slow ad infinitum.

3.16 Throttle Curve Mix

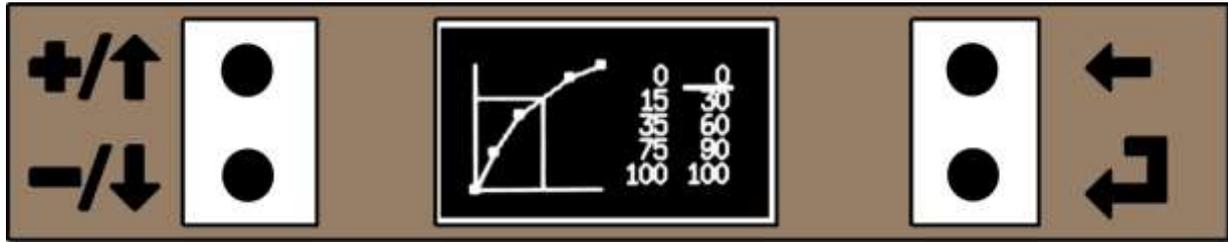


Figure 61. Throttle Curve with the Throttle Joystick Open 50%

The throttle curve is used to modify the throttle response with a user defined “curve”. It can be used for a number of applications including to make the power delivery more linear, to “skip” part of the engine's rpm range to avoid excessive vibration/resonance or used to flatten the power curve on 3D models around the throttle setting used to “hover” see “

Throttle Curve Mixes” on page 91. Note there is no way of switching the Throttle Curve on or off with a switch, it is either selected or not selected.

3.16.1 Selecting Throttle Curve Mix

The Throttle Curve mix is selected from the Mixers menu:

Home Menu -> Main Menu 1 -> Mixers -> Throttle Curve.

The Throttle Curve shares its storage with Pmix6 and Pmix7, so if Throttle Curve is selected it will overwrite any settings in Pmix6/Pmix7 ie Only the Throttle Curve or Pmix6/Pmix7 can be selected and they cannot be used at the same time.

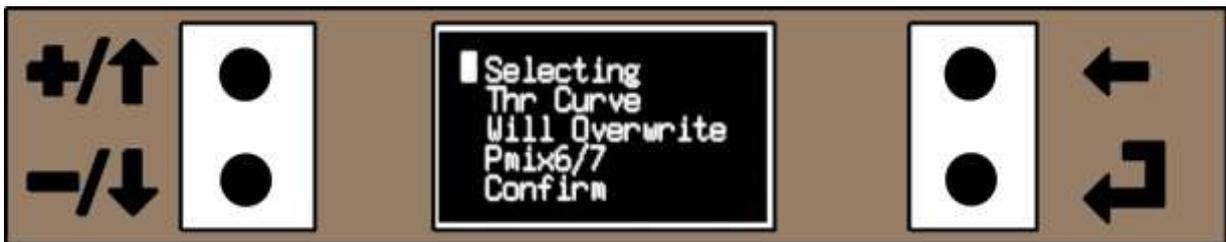


Figure 62. Selecting Throttle Curve with Warning

When a model is reset, Pmix6 and Pmix7 are enabled by default, so the first time you select Throttle Curve, it warns you that if you have programmed Pmix6 and/or Pmix7, they will be overwritten.

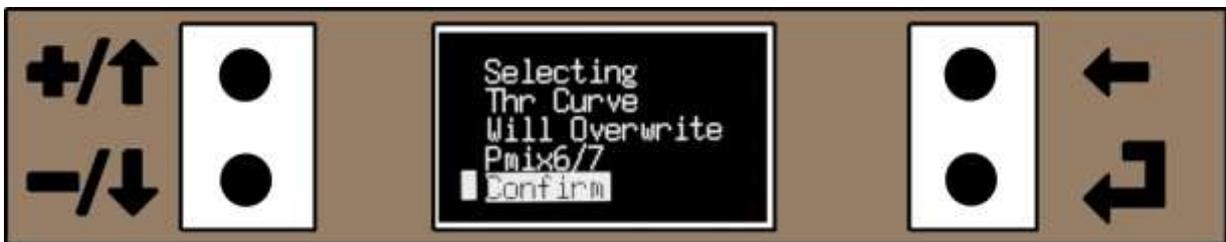


Figure 63. Select Throttle Curve Mix Confirm

Using the +/↑ or -/↓ keys, move the cursor to the “Confirm” on the bottom line and then confirm will be highlighted and press the ↵ key to confirm. If you do not wish to overwrite Pmix6 and Pmix7, press the ← key to return without selecting Throttle Curve and leaving Pmix6 and Pmix7 unaltered.

3.16.2 Adjusting the Throttle Curve

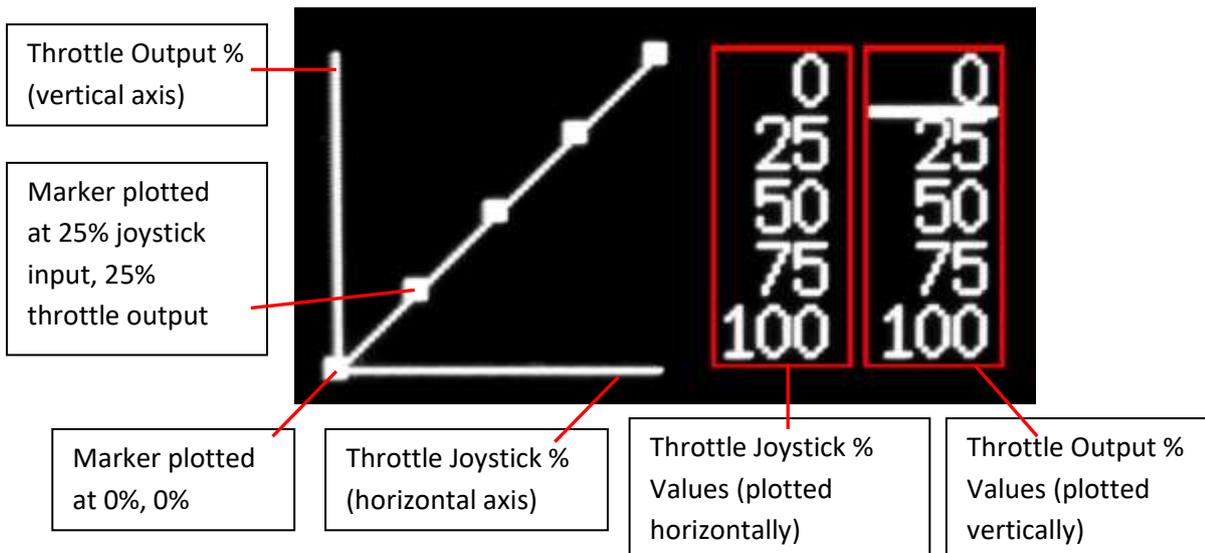


Figure 64. Throttle Curve Explanation

The Throttle Curve menu has two columns of values, the left hand column is the Throttle Joystick % and the right hand column the Throttle Output % as a percentage above tick-over (for the joystick with the throttle closed and the throttle trim up and for the output from the tick-over position to Throttle Full Open).

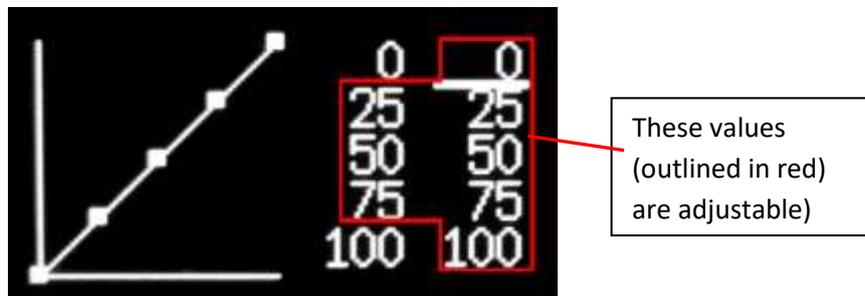


Figure 65. Throttle Curve Adjustable Values

The 0% and 100% Joystick Positions are fixed and can't be adjusted, but all other Joystick Positions and Throttle Outputs can be adjusted. The only limitation is that when adjusting the Joystick % (left hand column), a value must be between the values above and below, but is automatically limited. There is no restriction on the Throttle Output values.

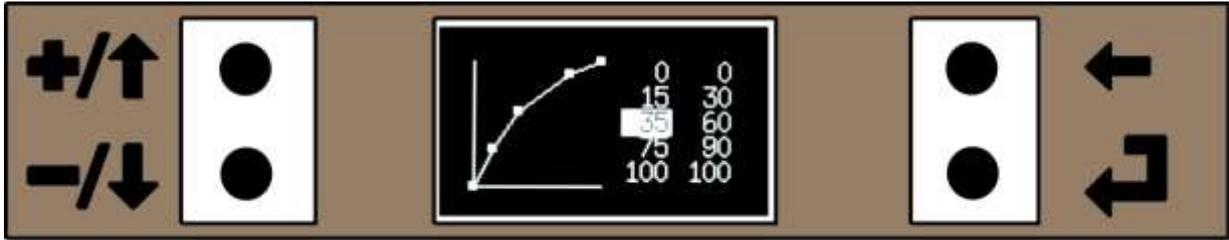


Figure 66. Throttle Curve Value being Adjusted

To adjust a value use the +/↑ or -/↓ keys to move the cursor to the value to be adjusted and press the ↵ key to get the “Edit” cursor (highlighted text). Use the +/↑ or -/↓ keys to adjust the value (or press the +/↑ and -/↓ keys together reset to the default value) and press the ↵ or ← key to return to the cursor.

In Figure 66 above, the value for the third point of the throttle joystick input is being adjusted. Its minimum value is limited to 16 (one above the second point value of 15) and maximum value is limited to 74 (one below the fourth point value 75). If you want to adjust it outside of this range then you will have to adjust the second and/or the fourth values.

3.16.3 Throttle Joystick Position Superimposed on the Throttle Curve

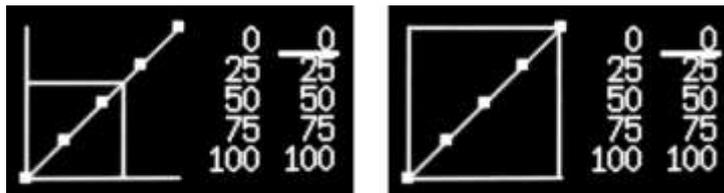


Figure 67. Throttle Joystick Opened 60% (left) and 100% (right)

When the throttle joystick is opened above tick over, its position is superimposed on the onscreen graphic and is indicated by two lines that move with the joystick from tick over to full throttle so that the values can be adjusted to get the “markers” set accurately.

There are examples of using the Throttle Curve in the “Programming Examples” section on on page 91.

3.16.4 Turning the Throttle Curve Off

If the Throttle Curve mix is no longer required the easiest was to “turn it off” is to select either Pmix6 or Pmix7 which will cancel it. Pmix6 or Pmix7 control can be left “Inh” (inhibited) so they don’t run. See “Selecting Pmix6 or Pmix7 when Throttle Curve is Already in Use” on page 71.

3.17 Swap Throttle.



Figure 68. Swap Throttle Menu.

3.17.1 Notes on the Swap Throttle Mix

Many pilots of electric powered gliders prefer to use what pilots who normally fly powered models would call the “throttle joystick” for the flaps/spoilers/crow/butterfly and have the motor on a switch or auxiliary control. There are two main reasons for this. Firstly, pilots who generally fly gliders will be more familiar with this joystick arrangement as they will normally use the “throttle joystick” for the flaps/crow breaking and this feels the most natural setup for a powered glider. Secondly, as the motor will be run at maximum speed for a short period (typically 30 or 40 seconds) and then stopped for the remainder of the flight, having the motor on a switch or auxiliary channel is just as convenient for most “power fliers”, but then you have the greater control of the flaps/crow breaking with the “throttle joystick” in the landing phase of the flight.

Why is a dedicated function to swap the throttle with another lever or switch required? You could “just swap” the motor and secondary channel (one of the auxiliary channels or the gear switch) and connect the motor esc to the secondary channel and then use the throttle channel in the various mixes and output for the flap/spoilers. This would have the major disadvantage that the “throttle arm/ throttle cut” safety feature would not work. It is also not ideal if the receiver you are using only has failsafe on the throttle channel as this would now be on the flaps/spoilers (though with the VintageTx encoder you could use the channel output order to get it in the “correct output” on the receiver.

What the “Swap Throttle” function does is swaps the throttle with the other control channel at system level. The encoder then treats the auxiliary control or gear switch (whichever has been selected by the user) as the throttle channel so that the “throttle arm/throttle cut” safety feature can still be used and are active and the Down Timer can still be set to “Joystick”. The physical “throttle joystick” is then treated as the auxiliary control or gear channel and can be used for the flaps/spoilers/crow. See setting up various model types and mix examples for further details.

The “Reverse” option is provided if the chosen auxiliary channel or gear switch may work in reverse of what is required. If the “Reverse” option is selected it reverses the auxiliary channel or gear switch operation (again at system level) before any mixers or trim. This ensures the “throttle arm/ throttle cut” safety feature and throttle tick-over trim works correctly. Do not use the “servo reverse” to get it in the correct direction as then the “throttle arm/ throttle cut” will not work correctly.

3.17.2 Using the Swap Throttle Mix



Figure 69. Swap Throttle Menu with Aux1 Selected as the Throttle and it will be Reversed

To select the Swap Throttle menu:

Home Menu -> Main Menu 1 -> Mixers 1 -> SwapThr

But before you select this menu, go to the “Servo Reverse” menu and ensure that the Throttle isn’t reversed in that menu (no check mark). If it is reversed, then put it back to normal. It is important that if the throttle control needs reversing, it is reversed in the “Swapped Throttle” menu and not the servo reverse menu.

Once the servo reverse has been checked, select the “Swapped Throttle” menu and use the +/↑ or -/↓ keys to move the cursor to the desired control and press the ↵ key. The new selection will now have the “>” beside it, indicating it is now the active mix (or “swap”).

Next check that the “new” throttle control works in the correct direction. Reiterating the above, it is important that the direction is set in this menu (Swap Throttle) and not in the “Servo Reverse” menu. If the throttle needs reversing, use the +/↑ or -/↓ keys to move the cursor to the “Reverse” and press the ↵ key. Repeated presses of the ↵ key will toggle “Reverse” on and off.

When complete press the ← key to return to the Mixers 1 menu.

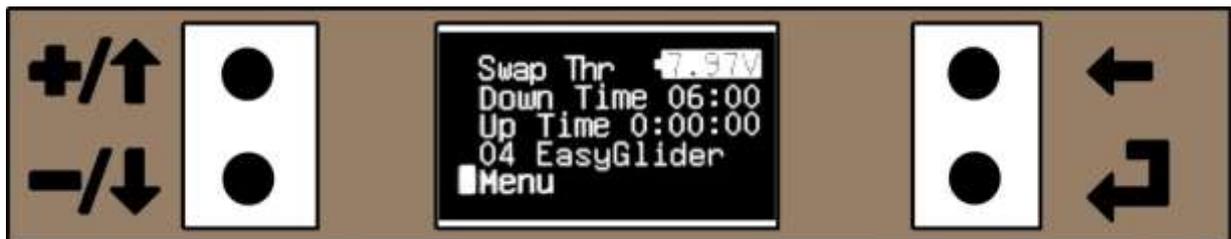


Figure 70. Home Menu when the Throttle Joystick has been Swapped with Aux1, Aux2 or the Gear Switch

When the throttle has been swapped to the Aux1, Aux2 or the Gear switch, a warning will be displayed on the Home Menu to remind you that it has been swapped.

Note that if the transmitter is either turned on or a different model is selected with the throttle swapped and the Aux1, Aux2 or Gear Switch that is controlling the throttle is not shut, the warning message on the Home Menu is “StartLock” (warning you that the throttle control is not shut) and not “Swap Thr”. No amount of moving the normal “Throttle Joystick” will clear the “StartLock” warning message as it is not controlling the throttle! You will need to put Aux1, Aux2 or the Gear Switch (whichever is controlling the throttle) into its closed position.

3.18 Pmix - Programmable Mixers

3.18.1 Pmix Order of Execution

Understanding the order of the Pmix (programmable mixes) for the VintageTx encoder are executed in is important to get correct operation of the Pmix, which makes programming more flexible and powerful. Unlike some transmitters, you can choose if the mix master channel is the “joystick value”, joystick value with rates/expo, joystick value with rates/expo and trim or is the current Pmix (programmable mix) channel value. The encoder executes the various actions, mixes and functions are sequentially executed in the following order:

1. Read joystick values
2. Scale joystick values (using calibration values) to give +/-100%
3. Swap Throttle (if active)
4. Throttle Cut/Lock and Throttle Lock (if active)
 - Values Used for “J/S” in Pmix (Joystick)
5. Expo and Rates AER (aileron, elevator, rudder)
6. S/C Mix Single Channel (if active)
 - Values Used for “RtEx” in Pmix (Rates and Expo)
7. Add Trim to AERT (aileron, elevator, rudder, throttle)
 - Values Used for “TR+E” in Pmix (Trim, Rates and Expo)
8. Aileron Differential (if active)
9. Pmix1 (if active)
10. Pmix2 (if active)
11. Pmix3 (if active)
12. Pmix4 (if active)
13. Pmix5 (if active)
14. Pmix6 (if active)
15. Pmix7 (if active)
16. Pmix8 (if active)
17. Elevons (if active)
18. V-Tail (if active)
19. Aileron to Rudder Mix (if active)
20. Throttle Cut (if active) – Applied again in case throttle has been a programmed as a slave
21. Sub-Trim (All Channels)
22. Throttle Curve
23. End Point Adjust (0 – 120% giving +/-600uS max or 0.9 to 2.1mS output)
24. Servo Reverse
25. Channel Output Order (channel assignment)
26. Convert and limit to a value between 900uS to 2100uS with 1500uS nominal centre
27. Output PPM to the RF module (2.4GHz or 27MHz, 35MHz, 40MHz, 72MHz module etc)

The VintageTx encoder works sequentially through each step and the output from each Pmix is added to the channel before the next Pmix is executed. Pmix1 is executed first, Pmix2 next and so on, with Pmix8 last (if the mixes are active). Therefore the order you program the Pmix’s in can be significant and is important to get correct.

3.19 Programmable Mixers - Pmix 1 to Pmix 8 Selection and Monitoring

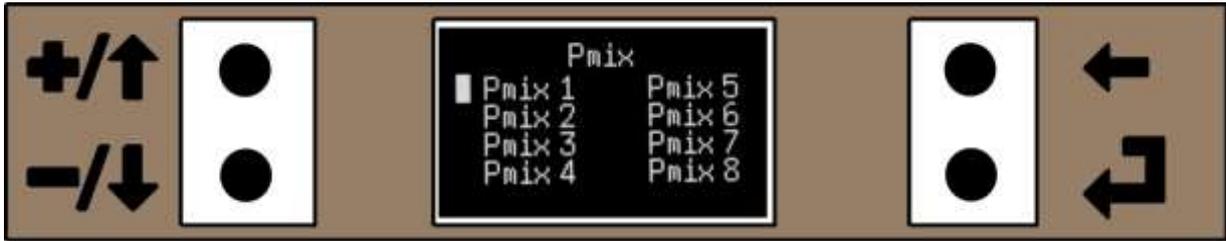


Figure 71. The Prog Mix Menu (Programmable Mixes)

To select the Pmix Menu:
Home Menu -> Main Menu 1 -> Pmix.

There are 8 free Pmix (programmable mixes). To open a Pmix use the +/↑ or -/↓ keys to move the cursor to select the required Pmix and press ↵.



Figure 72. Prog Mix Menu as a Monitoring Menu

The Prog Mix menu also doubles as a Pmix monitor menu, a ">" beside the Pmix indicate that that Pmix has been programmed ie not INH (Inhibited) and highlighted text means it is active. This saves having to open all eight individual Pmix's to see what is programmed and what is active. In the above Figure 72, Pmix1 to Pmix4 have been programmed and Pmix1, Pmix3 and Pmix4 are active. Pmix2 is programmed but is not active (ie the switch that turns Pmix4 on/off and is in the off position).

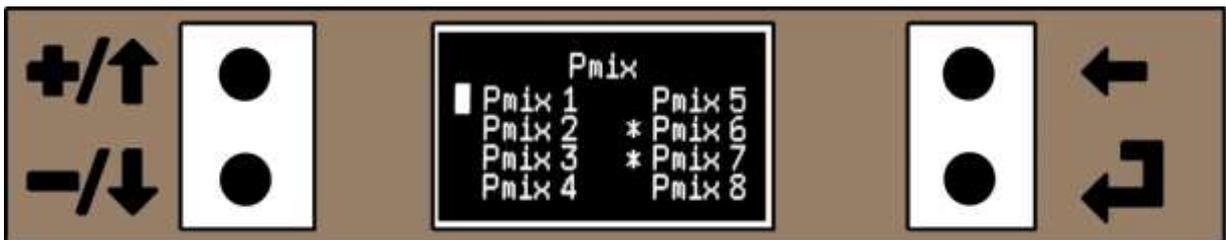


Figure 73. Pmix menu showing the Throttle Curve Mix Selected (* beside Pmix6/7)

Pmix6 and Pmix7 share their memory with the Throttle Curve mix. If the Throttle Curve is in use then Pmix6 and Pmix7 are not available to use and a * will be beside Pmix 6 and Pmix7 to show they are not available as in Figure 73 above.



Figure 74. Pmix menu showing Single Channel Mix Selected

Similarly Pmix8 shares its memory storage with the Single Channel mix and a * will be beside Pmix8 if single channel function has been selected to show Pmix8 is not available.

3.19.1 Pmix Basics



Figure 75. Typical Pmix for Correcting Knife Edge Coupling

The program mixing is similar to most other computer transmitters, but there are a few minor differences. The below is not a tutorial on how mixing works, but a description of the VintageTx mixing.

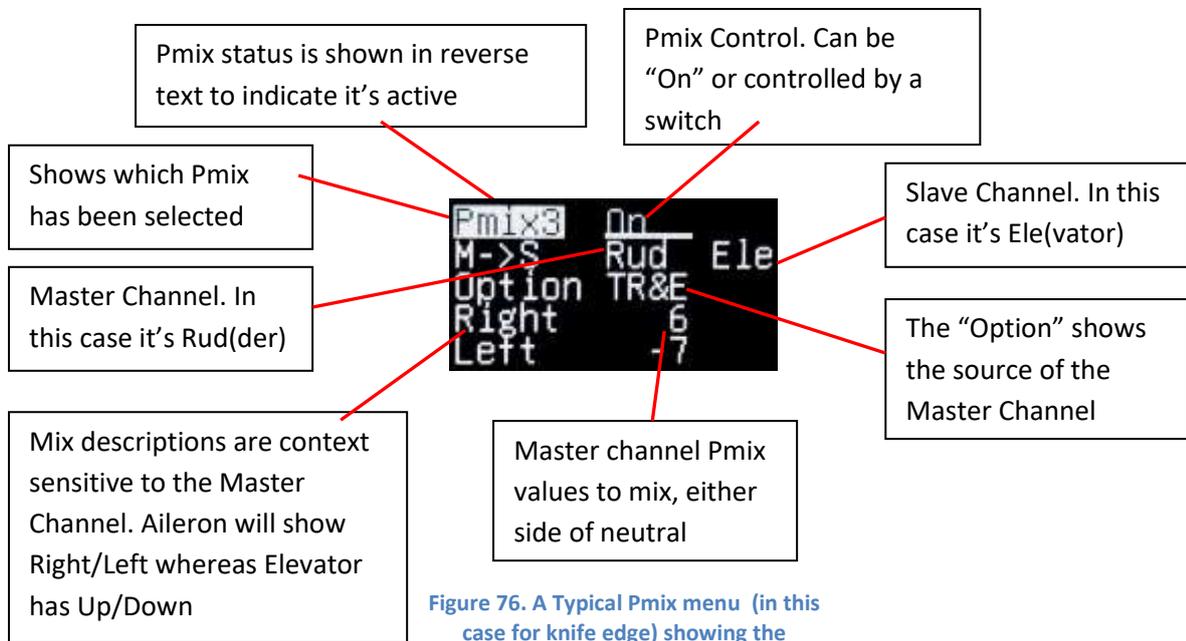


Figure 76. A Typical Pmix menu (in this case for knife edge) showing the various Settings

Figure 76 shows a typical Pmix menu with the various settings. Below is a description of each component.

3.19.2 Pmix Status



Figure 77. Pmix Status (Active Left and Not Active Right)

The Pmix status is displayed in the top left hand of the menu. It shows two things, which Pmix menu has been selected and the status of the Pmix, either Active (highlighted text as above left) or Off with normal text (as above right).

In Figure 77. Pmix Status (Active Left and Not Active Right), the left hand picture has the Gear Switch in the OFF position and Pmix4 is active (highlighted text), in the right hand picture the Gear Switch is in the ON and Pmix4 will be inactive (normal text). In this example, Pmix4 was used to mix Aux2 channel into Flap (both aileron) to give camber adjustment to the ailerons.

Showing when the Pmix is active can help when setting up the Pmix to indicate which way around the switch controlling the Pmix works (see Pmix Control immediately below) as the switches may have been wired in reverse from transmitter to transmitter.

3.19.3 Pmix Control

- | | |
|--|---|
| 1. Inh (Inhibit). This turns the A>R mix off | 10. T/L On (Throttle Cut Switch Off) |
| 2. On. This turns the A>R mix on so it is always active. | 11. Gear Switch On |
| 3. A/R On (Aileron Rates Switch On) | 12. Gear Switch Off |
| 4. A/R Off (Aileron Rates Switch Off) | 13. Ax2A On (Aux2 Switch Position A On) |
| 5. E/R On (Elevator Rates Switch On) | 14. Ax2B On (Aux2 Switch Position B On) |
| 6. E/R Off (Elevator Rates Switch Off) | 15. Ax2C On (Aux2 Switch Position C On) |
| 7. R/R On (Rudder Rates Switch On) | 16. Ax2A Off (Aux2 Switch Position A Off) |
| 8. R/R Off (Rudder Rates Switch Off) | 17. Ax2B Off (Aux2 Switch Position B Off) |
| 9. T/L On (Throttle Cut Switch On) | 18. Ax2C Off (Aux2 Switch Position C Off) |

Figure 78. Switches that can control the Pmix

The Pmix Control (what turns the Pmix on or off) is displayed at the top right of a Pmix menu and it can be inhibited (always off), On (always active) or any of the switches as above in Figure 78.

In Figure 77 at the top of the page “Gear Off” (gear switch off) is selected. When the gear switch is off the Pmix will be active and the Pmix4 is in highlighted text to show it is active. When the Gear Switch is on, the Pmix4 isn’t active and is display in standard text (ie non-highlighted text).

3.19.4 Master and Slave Channels



Figure 79. Rudder as Master and Elevator as Slave

The Master and Slave channels to mix are on the second row and are preceded by M->S as a reminder of their order.

The Master channel will have some effect on the Slave channel, for example if a model pulls towards the undercarriage in knife edge, rudder (master) can be mixed into elevator (slave) to correct this as in Figure 79 above. Movement of the master (rudder) moves the elevator (slave).

Another common mix is if the engine thrust line is not set correctly, when the throttle is opened the aircraft will climb (or dive). This could be corrected by having the throttle set as master and elevator as slave, when the throttle is opened (Master) it mixes a small amount of down elevator (Slave).

3.19.5 Master Channel

The Master channel can be any of the normal input channels plus two other options:

- | | |
|-------------------|-------------------------|
| 1. Ail (Ailerons) | 6. Aux2 |
| 2. Ele (Elevator) | 7. Gear |
| 3. Rud (Rudder) | 8. Ail.L (Left Aileron) |
| 4. Thr (Throttle) | 9. Slow |
| 5. Aux1 | 10. Ofst (Offset) |

Figure 80. Master Channel Selections

The first seven should be self-explanatory, but Ail.L, Slow and Offset may not be so obvious and a full explanation of the Ail (Ailerons) also needs to be made.

3.19.5.1 Master Channel - Ail (Ailerons)

Ail (Ailerons) as a master mix may seem obvious, but “Aileron Differential” is applied before any of the Pmix so the right and left ailerons may not both be the same.

Therefore when Ail is selected as a Master it will use the Right Hand Aileron value. Depending on which “Mix Option” (see Page 65) has been selected, this may or may not make a difference.

3.19.5.2 Master Channel - Ail.L

There are times when you may need to mix aileron to flaps on a glider with 4 servos in the wing (2x aileron + 2x flap/spoiler). If you just used Ail (Aileron) as the master, you couldn't use aileron differential as the left and right hand aileron values would be different and Ail always uses the Right Hand Aileron value.

Therefore Ail.L is provided as a Master, as a way of mixing the Left Hand Aileron into the left hand flap.

3.19.5.3 Master Channel - Servo Slow



Figure 81. Servo Slow as the Master Channel

Slow as the master gives “Servo Slow” to the slave channel i.e. the servo moves slower than the joystick or control is being moved. It is adjustable from 0 to 10 seconds “end to end servo travel” (ie including the trims) in 0.1 second increments and individually adjustable in each servo direction (Time+ and Time-). The time is displayed x10 e.g. 55 = 5.5 seconds

The Pmix can be controlled in the normal manner and can be Inh (inhibited/Always Off), On (always on) or controlled by the same switches as other Pmix (see “Pmix Control” on page 60).

Selecting Slow as the Master channel forces the Option to be Pmix as the source (see “Master Channel - Servo Slow” on page 62).

If Ail (Aileron) is selected as the Slave, it uses the right hand aileron value and will make both right and left hand ailerons have the same output. If Aileron Differential is in use or if “Flap” has been selected as a Slave in a Pmix before Slow is used with aileron as a slave, it will have an undesirable effect as both right and left aileron will now have the right aileron output value. In such situations ensure that aileron differential is set to 0% and that a flap Pmix follows Slow on Ail.

3.19.5.4 Master Channel - Offset



Figure 82. Pmix with "Ofst" (Offset) selected as the Master

As the name suggest, selecting Offset as the Master channel mixes in an offset or a "fixed value" into the slave channel. The Pmix control can be any of the normal options (Inh, On, or one of the switches). When it is selected the "Option" is forced to Pmix (see below for a description of the various options).

There is only a single Pmix value "Amount". This can be +/-100% and equates to +/-50% normal servo movement (see Pmix values below), so it can move a servo from neutral to full movement or similarly from full movement back to neutral. It can't move a servo from one end to the other (if this is required, to Pmix with an Ofst could be used, one will move it from the end to neutral, the second from neutral to the other end).

Offset can also be used like sub-trim, to add an offset from neutral, if the sub-trim does not move the servo enough, though it would be recommended to adjust the servo linkages or rotate the servo arm in this instance.

3.19.6 Slave Channel

The Slave channel can be any of the normal input channels plus three other options:

- | | |
|-------------------|----------|
| 1. Ail (Aileron) | 8. Int1 |
| 2. Ele (Elevator) | 9. Int2 |
| 3. Rud (Rudder) | 10. Int3 |
| 4. Thr (Throttle) | 11. Flap |
| 5. Aux1 | 12. AuxF |
| 6. Aux2 | 13. IntF |
| 7. Gear | |

Figure 83. Slave Channel Selections

The first seven should be self-explanatory, but Int1, Int2, Int3, Flap, AuxF and IntF are not obvious and are detailed below.

3.19.6.1 Slave Channel - Int1, Int2 and Int3



Figure 84. Pmix showing Int1 as the slave channel

It is common to need to output the same channel to two separate outputs such as when you have separate servo's for rudder and a steerable nose-wheel, two elevator servo's, two flap/spoiler servo's etc and want to be able to adjust the second servo's sub-trim, EPA (volume travel) and maybe the servo direction (which is not straightforward to do with a Y-Lead).

The second servo would typically be connected to one of the auxiliary channels or the gear channel. The traditional method would be first "turn off" the auxiliary channel by mixing -100% to itself, otherwise if the auxiliary lever/switch was activated it would have an effect on the output. Then the Master channel is mixed 100% to the auxiliary channel (Slave).

Using Int1, Int2 and Int3 as "Slave" is the same as using Aux1, Aux2 or the Gear but with the Aux1/Aux2 potentiometer, slider or switch turned off automatically or the Gear switch disabled for Int3. This saves having to use a mix to turn them off. "Int" in this instance is a short abbreviation for "initialise".

In Figure 84 above, Pmix4 is used to duplicate the rudder channel on the Aux1 output, with the Aux1 potentiometer knob/slider switch disabled. The Aux1 output for rudder can be reversed, has its own sub-trim and EPA (end point adjustment) set independently of the master channel (rudder in the example).

3.19.6.2 Slave Channel - Flap



Figure 85. Pmix Flap as Slave

"Flap" in this instance is really short for "Flapperon". When "Flap" is chosen as a "Slave", it acts on both the right and left aileron channels to give a "Flapperon" mix, using the ailerons.

If separate flaps (ie not the ailerons) are fitted to the model, say connected to Aux1 and Aux2, selecting "Flap as a Slave" in a Pmix will have no effect on the "real" flaps whatsoever as the transmitter "doesn't know" that separate flaps are fitted (see the following on AuxF and IntF that work in a similar way for "real" flaps connected to Aux1 and Aux2).

3.19.6.3 Slave Channel – AuxF and IntF



Figure 86. Pmix with AuxF as Slave

AuxF is a mix for when two flap servos have been fitted on a four servo wing to outputs Aux1 and Aux2 and it mixes to both to give the effect of flaps. In this instance it is an abbreviation of Aux Flap.

In Figure 86 above, when the E/R (elevator rates) switch is on it will mix the Elevator into both Aux1 and Aux2, so they move together. When the elevator joystick is at full movement, the Aux1 and Aux2 servo's will be moved 50% by the Pmix.

If the Pmix makes the flaps work in the opposite sense than required (eg up elevator makes the flaps go up instead of down), then make the Up/Down values negative (ie -50 in the above example).

IntF is the same as AuxF, but with the Aux1 and Aux2 potentiometers, sliders or switches disabled, so that they have no effect on the control surfaces (IntF is an abbreviation of initialise flap, similar to the slave Int1, Int2 and Int3).

3.19.7 Option

The "Option" setting selects the source of the "Master" channel, and can be one of the following five options:

1. J/S (Joystick)
2. RtEx (Joystick with Rates/Expo)
3. TR+E (Joystick with Trim, Rates/Expo)
4. Pmix (The current programmable mix value)
5. T/H (Threshold)

Each Option is described below, and where the option is derived from is explained in the "Program Mixers Order" section on page 57.

3.19.7.1 Option - J/S.



Figure 87. Pmix J/S Option

The J/S or “joystick” option takes the value from the joysticks (scaled to give a value in the range +/- 100%) before the rates and/or expo is applied and before the single channel mix is added (if it is active).

This option would typically be used if the Pmix was being used for a second output channel, where the master has rates, expo and trim and the slave output has joystick output. A typical application could be where a steerable nose wheel is used and it would not have enough movement with rates applied, but you want rates on the rudder.

3.19.7.2 Option - RtEx.



Figure 88. Pmix RtEx (Rates and Expo) Option

The RtEx or “Rates/Expo” option takes the value from the joysticks (scaled to give a value in the range +/-100% before the rates and/or expo are applied and after the single channel mix is added (if it is active), but before the Trim memory is added. So if rates are set to 50% and are active the value would be in the range +/-50.

This option would typically be used for mixes such as “knife edge correction”, where the amount of rudder rates/expo needs to be considered, but where you do not require the rudder trim (which is just there to make the aircraft fly in trim).

3.19.7.3 Option - TR+E.



Figure 89. Pmix TR+E (Trim, Rates and Expo) Option

The TR+E or “Trim, Rates plus Expo” option takes the value from the joysticks (scaled to give a value in the range +/-100% after the rates and/or expo are applied and after the single channel mix is added (if it is active) and after the Trim memory is added.

This option would typically be used for mixes where you want to duplicate the master channel including any trim, such as if you have two elevator or rudder servo’s.

As only aileron, elevator, rudder and throttle have Rates/Expo and Trim memories, using TR+E as the “Option” for Aux1, Aux2 and gear will be the same as using J/S or RtEx as the Option.

3.19.7.4 Option - Pmix



Figure 90. Pmix "Pmix" Option

The Pmix or “programmable mix value” option takes its value from the previous Pmix eg if Pmix4 menu is being programmed, “Pmix as an Option” will take the value from the output from the previous Pmix3 (or the last active Pmix if Pmix3 is not active), so any previous Pmix that modified the Master channel will have an effect.

If Pmix1 menu is being used and “Pmix is selected as an Option”, it will take its value from the aileron differential output as there is no previous Pmix.

3.19.7.5 Option - T/H (Threshold)

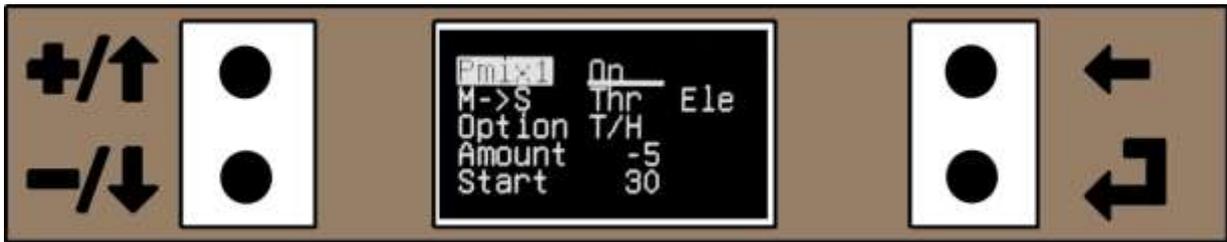


Figure 91. Pmix T/H (Threshold) Option

Many transmitters have a mix “Offset” value for when used with channels without a natural centre, normally the throttle or auxiliary channels, so the neutral point can be adjusted. There would still be +mix and – mix values. Typically it would be used for things like Throttle -> Elevator mix to compensate for an engine with incorrect up or down thrust.

The VintageTx encoder simplifies this by having T/H (threshold) as a Pmix “Option” with an amount% to mix and a start% ie the threshold of when to start mixing.



Figure 92. Pmix with T/H (Threshold) starting at 25% Throttle Joystick, -30% (Down) Elevator

In the above Figure 92 when the throttle is opened beyond 25% (as the Start value is +25%), it starts mixing down elevator (Amount is a negative value), so that at full throttle there is 30% down elevator. This is the equivalent of adding “down thrust” to an engine (in practice you probably will not need as much as 30%, it is just given as an example).

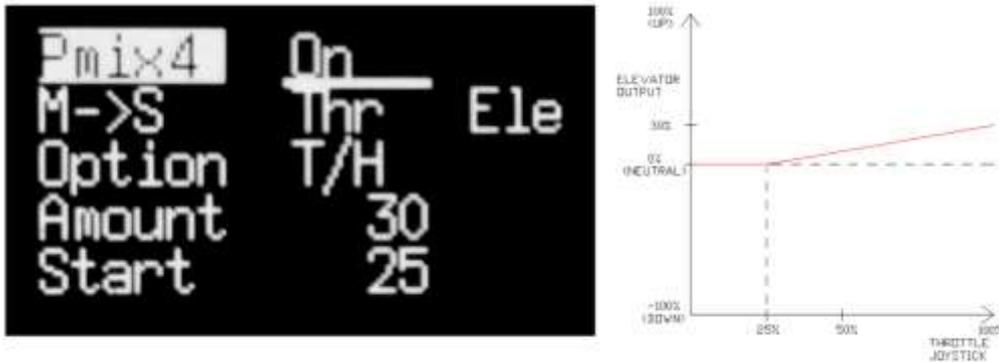


Figure 93. Pmix with T/H (Threshold) starting at 25% Throttle Joystick, adding +30% (Up) Elevator

In the above Figure 93, when the throttle is opened beyond 25% (as the Start value is +25%), it starts mixing up elevator (Amount is a positive value), so that at full throttle there is 30% up elevator. This is the equivalent of adding “up thrust” to an engine (in practice you will not need as much as 30%).

To get the Threshold to work from the other end of the servo travel, use a negative “Start” value. To illustrate the other two options, they are illustrated by simple graphics below:



Figure 94. Pmix with T/H (Threshold) starting at -25% Throttle Joystick, adding -30% (Down) Elevator

In Figure 94 above, the Pmix starts at -25% Throttle Joystick that is 25% from full throttle or 75% from tick-over (100 – 25) and mixes Down Elevator until the Throttle is fully closed when it is mixing -30% Down Elevator.

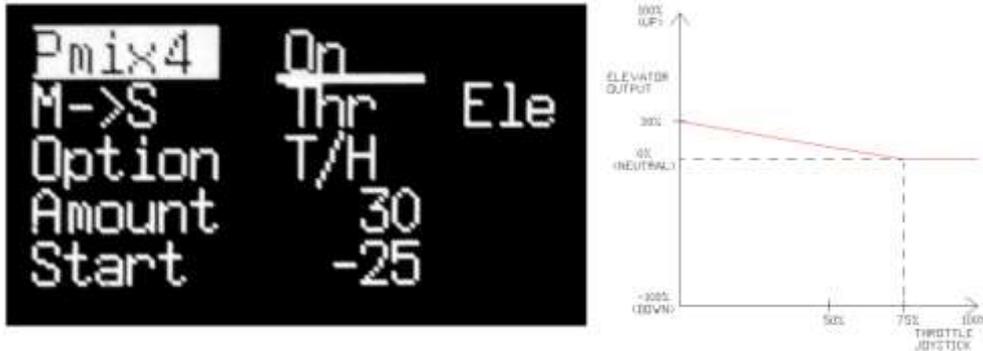


Figure 95. Pmix with T/H (Threshold) starting at -25% Throttle Joystick, adding 30% (Up) Elevator

In Figure 95 above the Pmix starts at -25% Throttle Joystick, that is 25% from full throttle or 75% from tick-over (100 – 25) and mixes Up Elevator until the Throttle is fully closed when it is mixing 30% Up Elevator.

3.19.8 Pmix Values



Figure 96. Pmix menu showing Pmix Values for Knife Edge

The Pmix values and the descriptions are context sensitive and will be different for different Master and Option selections.

- Ail and Rud: Right and Left. Adjustable +/-100%
- Ele: Up and Down. Adjustable +/-100%
- Thr, Aux1, Aux2, Gear: Hi and Lo. Adjustable +/-100%
- Slow: Time+, Time-. Adjustable 0% – 100%
- Threshold, Start Adjustable +/-100%, Amount Adjustable +/-100%
- Offset: Amount. Adjustable +/-100%

To adjust a value use the +/↑ or -/↓ keys to the selected value and press the ↵ key and the value should become highlighted. Use the +/↑ or -/↓ keys to increase/decrease the value or press the +/↑ and -/↓ keys together reset to the default 0%. When complete press the ↵ key or the ← key to return to a moveable cursor.

Press the ← key to return to the previous menu and save the values to EEPROM.

3.19.8.1 Limits to Pmix Channel Values



Figure 97. Example of Pmix Channel Value Limit

When a slave channel has a value mixed into it and then the joystick for that channel is moved to the limit, the channel value could theoretically go to +/-200%. In Figure 97 above, Rudder is being mixed into Aileron. If the Aileron and Rudder were both moved fully to the right, the Aileron “channel value” would be 200%. Obviously this is not possible, so after every Pmix the slave channel value is limited to +/-120%. But it is not normal to mix 100% into the slave, so will not normally be an issue.

3.19.8.2 Selecting Pmix6 or Pmix7 when Throttle Curve is Already in Use

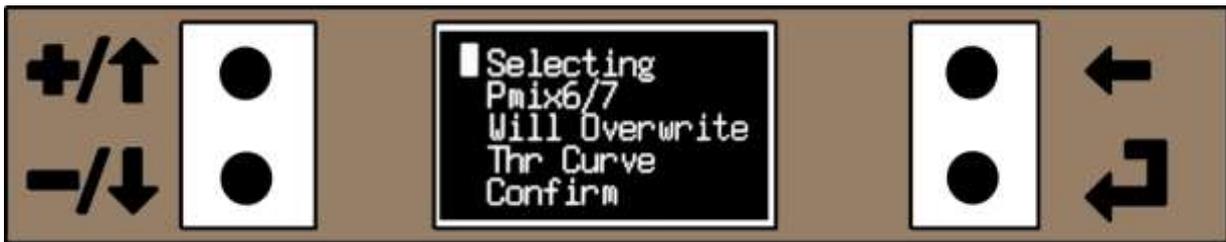


Figure 98. Selecting either Pmix6 or Pmix7 when Throttle Curve is in use

Pmix6 and Pmix7 share their memory storage with the Throttle Curve mix and therefore if the Throttle Curve is already in use, you can’t use Pmix6 or Pmix7 at the same time. If you want to select either Pmix6 or Pmix7 you will overwrite and lose the Throttle Curve settings. When you select either Pmix6 or Pmix7 from the “Mixers 2” Pmix menu, you get a warning message that shows that the Throttle Curve is already in use is already in use and will be deleted if either Pmix6 or Pmix7 is selected.

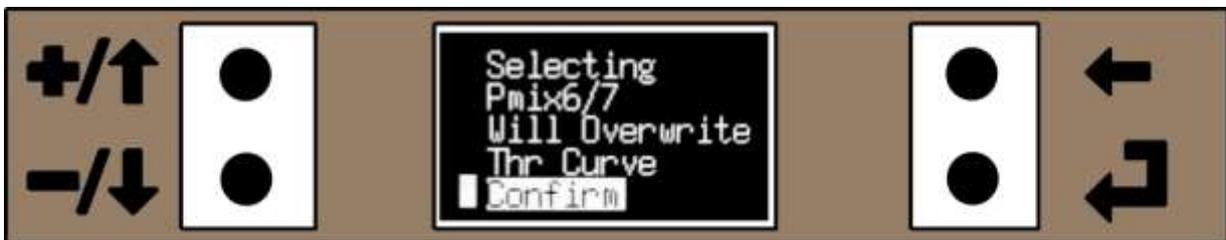


Figure 99. Selecting Pmix6 or Pmix7 - Confirm that you want to overwrite the Throttle Curve Settings

To open Pmix6 or Pmix7, use the +/↑ or -/↓ keys to move the cursor to “Confirm”, it will become highlighted and press ↵. You will then go to either the Pmix6 or Pmix7 menu.

If you do not want to lose the Throttle Curve mix then press the ← to return to the previous menu without changing anything.

3.19.8.3 Selecting Pmix8 when Single Channel is already in use



Figure 100. Selecting Pmix8 when the S/C (Single Channel) mix is already in use.

Pmix8 shares the same memory storage with the Single Channel mix and only one of them can be selected at a time. Therefore if the Single Channel mix is already in use, you can't use Pmix8 at the same time. If you want to select Pmix8 you will overwrite and lose the Single Channel mix settings.



Figure 101. Selecting Pmix8 - Confirm that you want to overwrite the Single Channel Mix Settings

To open Pmix8, use the +/↑ or -/↓ keys to move the cursor to "Confirm", it will become highlighted and press ↵. You will then go to the Pmix8 menu.

If you do not want to lose the Single Channel mix settings then press the ← to return to the previous menu without changing anything.

3.20 Main Menu 2

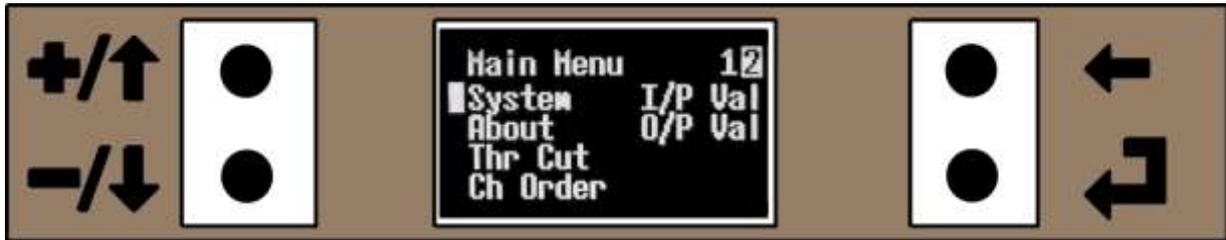


Figure 102. Main Menu 2

To select Main Menu Page 2 see “Main Menus 1 and 2” on page 23.

Main Menu 2 allows you to select other sub-menus:

- | | |
|------------------------------------|--|
| 1. System | 5. I/P Val - Input Values |
| 2. About | 6. O/P Val - Output Values |
| 3. Thr Cut - Throttle Cut | 7. Range Check (only when Spektrum DX6i module fitted) |
| 4. Ch Order - Channel Output Order | |

To select a sub-menu, use the -/↓ and/or the -/↓ keys to move the cursor to the desired sub-menu and press the ↵ key. To return to the home menu at any time, press the ← key.

3.21 System (System Settings) Menu



Figure 103. System Menu

The System Menu allows you to access various other sub-menu's for system settings that are global to all ten of the model memories:

3.21.1 Calibrate Joystick Menus.

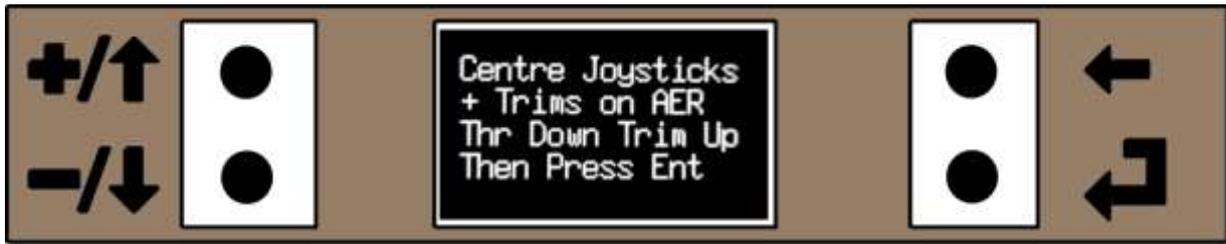


Figure 104. Calibrate Joystick menu that set the Joystick Centres/Neutrals

When the transmitter is first used (or if the Arduino or a joystick potentiometer is changed), the joysticks will need calibrating so the encoder knows the limits of movement and joystick neutral positions (centres).

To access the Joystick Calibration:

Home Menu -> Main Menu 2 -> Settings -> Cal Joystick



Figure 105. First Stage with Joysticks with trims in the centre, Throttle Joystick closed and its trim up (Mode 2 throttle left)



Figure 106. Joysticks with trims in the centre, Throttle Joystick closed and its trim up (Mode 1 throttle Right)

In the first stage, the joystick centres are set (with the trims centred), except the throttle joystick where the joystick should be closed (down position) but the trim up (as in Figure 105 for Mode 2 transmitters and Figure 106 for Mode 1 transmitters). If a three position switch has been connected to Aux1 and/or Aux2 then it needs to be in the centre position. The menu text as in Figure 104 acts as a reminder. Once the joysticks and switches are set in position press the ↵ key.

The second stage of calibrating the joysticks (with the second Joystick Calibration menu displayed as in Figure 107), both joysticks and trims should be moved to their limits, with the trims being moved in the same direction as the joystick is being moved (as in Figure 108).

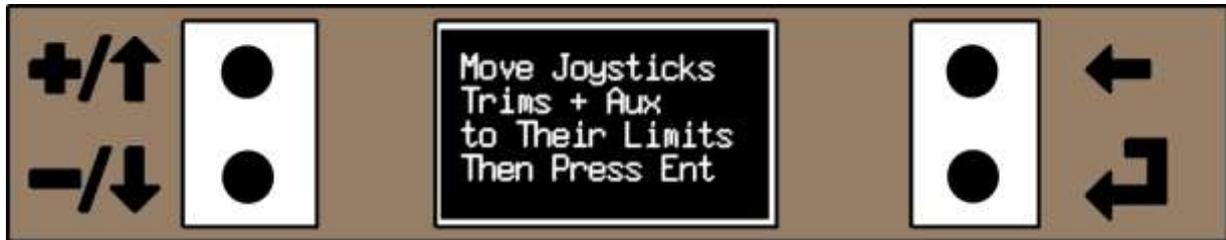


Figure 107. The Second Calibrate Joystick Menu - Where all Joysticks and Trims are moved to their limits

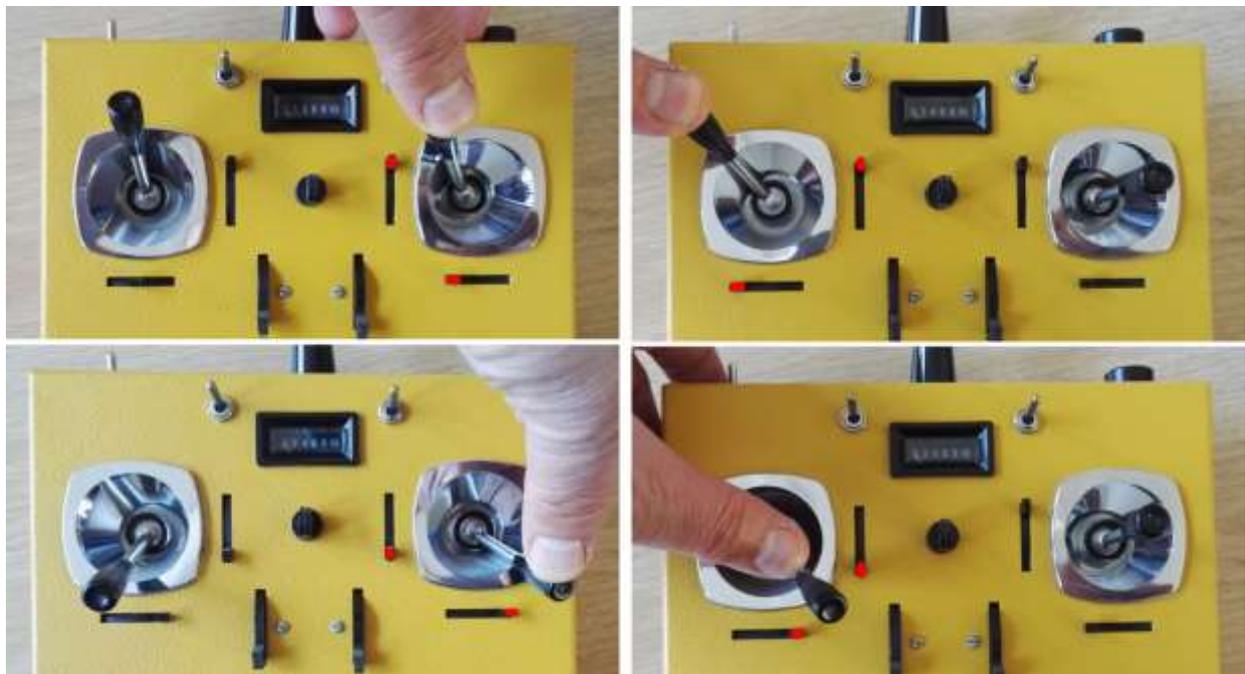


Figure 108. Joysticks and the trims being moved to their limits

Once all the joysticks and trims and the Auxiliary channels Aux1 and Aux2 have been moved to their limits re-centre all joysticks and trims, shut the throttle joystick with its trim up and centre any 3-position switch then press the ↵ key to save the settings to EEPROM and the menu will automatically revert to the System menu to confirm that the calibration is complete.

It's very important to re-centre the aileron, elevator and rudder joysticks and shut the throttle with the trim up at the end of the second stage of calibration as an average is taken of the joystick centre positions from the first stage and the end of the second stage of calibration. The reason is that many vintage joysticks do not re-centre very accurately, especially closed gimbal joysticks and taking the average of the two "centres neutrals give a better representation of the neutrals/centres.

To cancel the calibration process, press the ← key at any time during calibration to return to the System menu without the values being saved to EEPROM.

3.21.2 Other System Menu

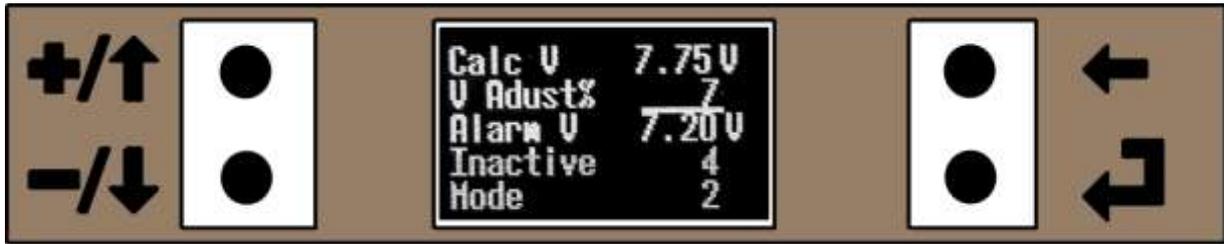


Figure 109. Other System Menu

The Other System menu is used to calibrate and configure the battery voltage, battery alarm voltage and the inactivity alarm time. It should only be necessary to set these values once when the transmitter is first converted and being commissioned.

To access the Other System menu:

Home Menu -> Main Menu 2 -> Settings -> Other System

To adjust any of the values use the +/↑ or -/↓ keys to move the cursor to the value to be edited and press the ↵ key and the value should become highlighted. Now use the +/↑ or -/↓ keys to increase/decrease the value as required and then press the ↵ or ← key to return to the moveable cursor.

Press the ← key to return to the System menu.

3.21.2.1 V Adjust% (Voltage Calibration Value).

The resistors used as a potential divider to measure the battery voltage have a tolerance and need calibrating to give an accurate reading. A voltage calibration value is used to adjust the reading so that it is accurate to within 0.1V. A multimeter will need to be connected across the battery voltage to read the voltage and the “V Adjust%” will need to be adjusted until the “Calc V” value is the same as the multimeter. It can be adjusted in the range +/-100 (which equates to +/-1.00V)



Figure 110. V Adjust set to make Calc V match the Voltage on a Meter

Alternatively if a Lipo battery is being used, one of the popular “Battery Capacity Checkers” can be plugged into the balance lead of the battery and the “V Adjust%” value adjusted until the “Calc V” voltage reads the same as the meter or the “Battery Capacity Checkers” as in Figure 110 above.

3.21.2.2 Alarm Voltage.

As the VintageTx can be built as a kit, various battery types may be used, such as Lipo, LiFe or NiMH. The preferred batteries include 2S Lipo, 2S LiFePO4 or 6S to 8S NiMH.

The minimum voltage needs to be set to suit the battery type used. Suggested values are:

- 2S Lipo 7.20V (nominal 20% remaining)
- 2S LiFe 6.20V (nominal 20% remaining)
- 6S NiMH 7.10V
- 3S Lipo 10.80V (nominal 20% remaining)
- 3S LiFe 9.60V (nominal 20% remaining)
- 8S NiMH 9.50V

When the battery voltage drops to the alarm voltage, the sounder beeps repeatedly, the low voltage message is displayed on the home page and the battery symbol shows “empty” on the home page.

If a 2S LiFe battery is used, ensure that the 2.4GHz module will work down to 6.2V (the minimum useable voltage for a 2S LiFe)

Also, if a 27MHz, 35MHz, 72MHz or similar module is being used from a Futaba or JR set, then a 2S lipo does not have adequate voltage for reliable operation, so a 3S Lipo, 3S LiFePO4 or 8S NiMH should be used.

3.21.2.3 Transmitter Inactive

If the transmitter is inadvertently left on at the end of a flight, there is an inactive alarm sounder warning and an “Inactive” message is displayed on the Home menu status.

Activity is detected when the Aileron joystick is moved or a menu key is pressed, so if neither is operated within the time period, the alarm is sounded. The delay is user adjustable and the actual time is set as a user preference. Some prefer to set it to one minute as normally the aileron joystick will have been moved during this time, others who are flying “assisted” free flight may not touch the aileron joystick (usually used for the rudder when this is the primary control) for a few minutes at a time and will prefer a longer delay of say 3 minutes (as in Figure 110). The maximum inactivity time is 15 minutes.

3.21.2.4 Mode

This needs to be set to the Throttle Mode configuration, either Mode 1 (throttle on the right hand stick) or Mode 2 (throttle on the left hand stick). If all potentiometers are wired the same, the throttle and elevator channels are reversed for Mode 1 compared to Mode 2 and this reverses them at a system level so that “Throttle Arm/Lock” works correctly.

3.21.3 PPM + Channels Menu (PPM Output Polarity, Pulse Length, Aux Channel Mode and Default Channel Output Order).



Figure 111. PPM Polarity, Pulse Length, Aux Mode and Default Output Order.

This menu sets five parameters, the first two the PPM+/- and the Pulse 300/400uS are needed to suit various 2.4GHz modules (or other modules), the Aux1 and Aux2 to select between if a potentiometer /2 position switch or a 3 position switch has been fitted and the default channel output.

To access the PPM + Channels menu:

Home Menu -> Main Menu 2 -> Settings -> PPM + Channels

To select one of the options use the +/↑ or -/↓ keys to move the cursor to the required option and press the ↵ key. A ">" symbol should appear next and the previous option should be cancelled. Use the ← key to return to the System menu.

3.21.3.1 PPM+/-

The PPM+/- can be set to either PPM+ or PPM- , PPM+ is what many modules designed for Futaba radio's require and PPM- for some modules designed for JR and Spektrum radios, though many modules such as FrSky, LemonRx, 4-in-1 multi-protocol and OrangeRx will happily work with either.

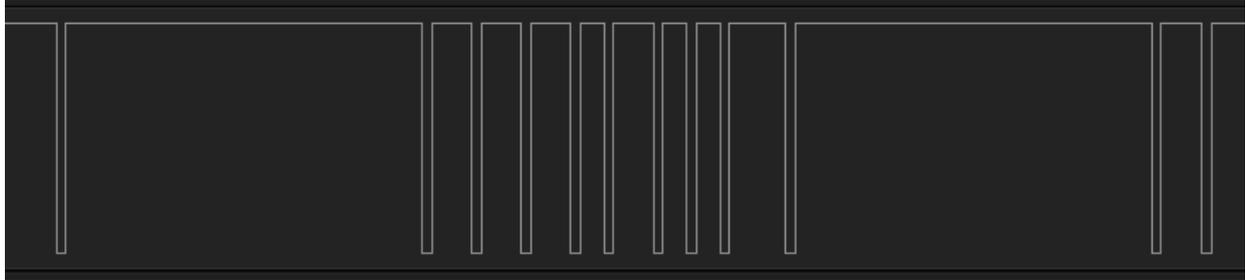


Figure 112. Trace of a PPM+ Needed for some Futaba Modules

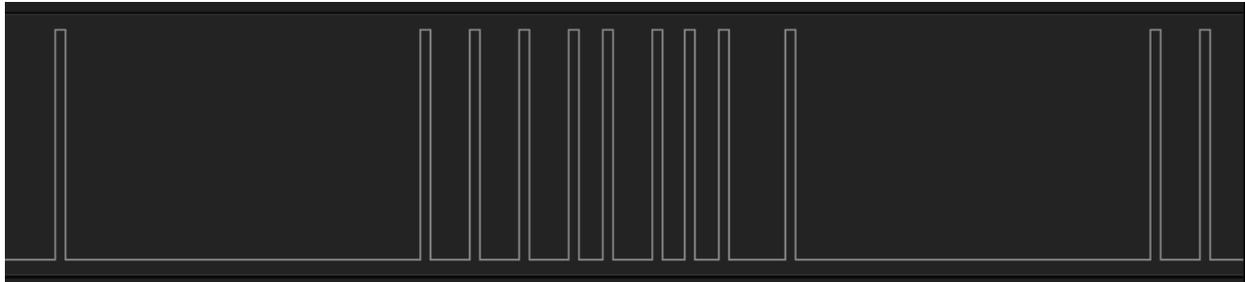


Figure 113. Trace of a PPM- Needed for some JR/Spektrum Modules

There is no universal convention if the PPM waveform is described as positive or negative, so the FrSky convention has been adopted, though other manufacturers describe the PPM positive and negative the other way around! Also some modules require an open collector output, where the PPM signal is pulled low, but goes to the system voltage for the positive going part of the waveform. These systems should be connected to the ppm output via a Schottky diode.

Changing the PPM polarity doesn't take effect until the system is restarted.

3.21.3.2 Pulse (300uS or 400uS)

The Pulse can be set to 300uS or 400uS and is the "off" part of the PPM pulse. Most modules will work with 300uS, but some Spektrum modules designed to fit JR radios need it setting to 400uS. Most modules such as the FrSky, LemonRx, 4-in-1 multi-protocol and OrangeRx will work with either 300uS or 400uS off pulse.

The Pulse length doesn't take effect until the system is restarted.

3.21.3.3 Aux1 and Aux2

The auxiliary channels can either be potentiometers (proportional levers, knobs or dials) or two or three position switches. The switches are wired as potentiometers, so get calibrated the same as and treated like a “normal” potentiometer.

When a potentiometer is used (lever, knob or slider) it doesn't have a true centre so its output is calculated between its calibrated max/min values as a linear value. However a three position switch does have a centre, so its calculated output value uses the centre calibration value (saved when the joysticks are calibrated) to get an output 100%, 0% and -100%.

So if a potentiometer (slider, lever or knob) is fitted it needs setting to “Pot”, if a 3 position switch is fitted it needs setting to “3P Sw”. It is important to set Aux1 and Aux2 properly calibrating the joysticks to get them both working correctly.

3.21.3.4 Order (Default Channel Order)

The default output channel order is used when a model is reset, to set the channel order. It can be one of four settings:

TAERAXXG – Throttle, Aileron(R), Elevator, Rudder, Aileron(L), UAx1, Aux2, Gear (JR/Spektrum)

TAERGAXX – Throttle, Aileron(R), Elevator, Rudder, Gear, Aileron(L), Ax1, Aux2 (JR/Spektrum)

AETRAXXG – Aileron(R), Elevator, Throttle, Rudder, Aileron(L), UAx1, Aux2, Gear (Futaba)

AETRAXXG – Aileron(R), Elevator, Throttle, Rudder, Gear, Aileron(L), Ax1, Aux2 (Futaba)

Where Aileron(R) is the right hand aileron channel and Aileron(L) is the left hand aileron channel

Note that this menu only sets the default order when a model is reset and does not alter the output order of existing models. You can set each individual model memory to have different channel output orders/configurations via the “Ch Order”, see Channel Order on page 85 for details.

Note that some OrangeRx DSM2/DSMX modules designed for Futaba transmitters alter the order from AETR to TAER, while others do not. If you use an OrangeRx module you will need to experiment to find which order is required or preferred.

3.21.4 Trim Alarm

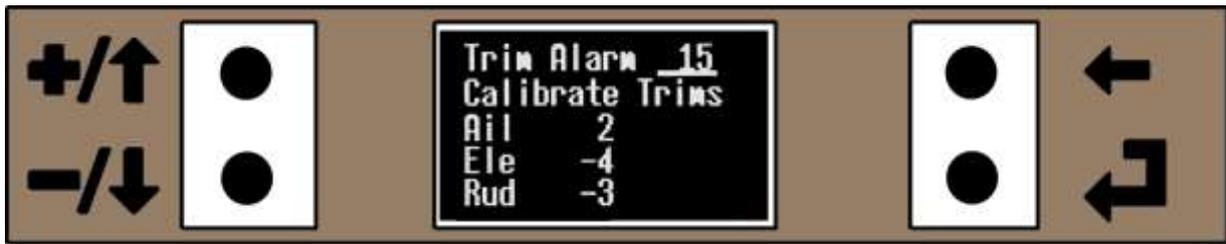


Figure 114. Trim Alarm

When the encoder powers on or when a different model is to be selected, the joystick trims are checked to ensure they are in the centre. This works by comparing the present position with the neutral/centre joystick calibration values stored when the joysticks were calibrated. This setting allows you to adjust how far from centre the joystick trims have to be before an alarm. The default setting is 15uS which is OK for most sets.

The “Trim Alarm” value needs to be set to alarm when the trims are not centred but high enough value to avoid “false” alarms. You need as low a value as possible, without getting repeated false alarms. The complete trim range is typically +/-100uS so 15uS is around one “click” from centre for many transmitters. The current values from centre for the Ail, Ele and Rud are displayed for information

The reason the setting is adjustable is some old designs of joystick or badly worn joysticks do not return accurately to centre. As an example a set with Bonner joysticks centre to 1500uS +/- 35us so the alarm needs to be set at 40uS. Some transmitters with good quality open gimbal joysticks (Pro-Line, late Kraft, late Futaba etc) return to centre very accurately (1500uS +/-5uS so the alarm value can be reduced to 10uS).

If you wish to disable the Trim Alarm, set it to the maximum setting of 127uS which should be greater than the trim is capable of, so the alarm will never sound.

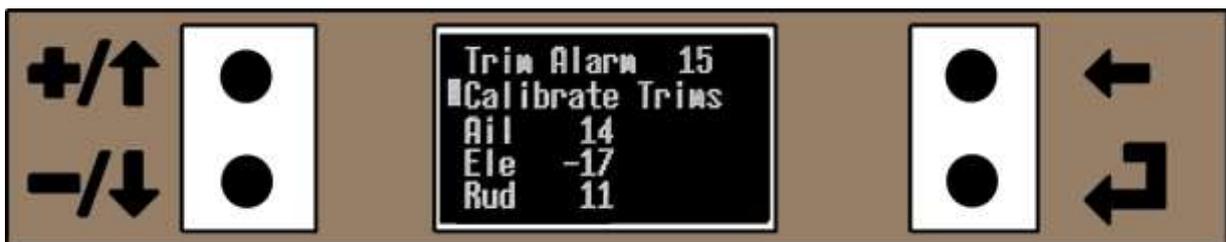


Figure 115. "Calibrate Trims"

You can also calibrate the Trim neutrals (with the joysticks centred) for the aileron, elevator and rudder from this menu without having to do a complete joystick calibration. This feature is included as some older joystick potentiometers tend to drift from neutral with different temperatures. If you are certain the joysticks and trims are centred you can quickly calibrate the “new” neutrals without a full joystick calibration.

Move the cursor using the +/↑ or -/↓ keys to the “Calibrate Trims” and then press the ↵. You should see the Ail, Ele and Rud values go to zero.

Press the ← key to return to the System menu.

3.22 About Menu



Figure 116. The About Menu showing Contact Details and Firmware Version Number

This shows the website address for support (www.vintagetx.co.uk), firmware version number and the serial number for the board. The firmware version may have been updated after the manual was written, so the firmware version may be greater than in Figure 116 above.

To access the About menu:

Home Menu -> Main Menu 2 -> About

You can't edit or alter any value in this menu, it is for information only. Press the ← key to return to the System menu.

3.23 Throttle Cut Menu



Figure 117. Throttle Cut Menu

To access the Throttle Cut menu:

Home Menu -> Main Menu 2 -> Thr Cut

To adjust one of the settings, use the +/↑ or -/↓ keys to move the cursor to the parameter to be altered and press the ↵ key to highlight the value.

Use the +/↑ or -/↓ keys to scroll through the various options and when you have selected the required option press the ↵ or ← key to return to an underline cursor.

Once all the settings are complete, press the ← key to return to the previous menu and save the values to EEPROM.

3.23.1 Mode

There are two different Throttle Cut Modes, “Cut” and “Limit”. “Cut” is similar to many other modern transmitters and “Limit” is specifically designed for I/C powered models where they have to be carried or taxied from a starting area to the flight line.

3.23.1.1 Cut (Throttle Cut)

Throttle Cut can be used to ensure that an electric model’s motor doesn’t start inadvertently if the throttle joystick is opened. It can also be used to stop I/C engines, though it’s not necessary for I/C as the engine can be stopped by shutting the throttle joystick and putting the trim fully down.

It is activated when the selected switch is “On” and the throttle joystick is closed (with trim in any position), but once active can only be turned off with the throttle joystick closed, so if the throttle is advanced with the Throttle Cut switch on and then the controlling switch is turned off, Throttle Cut will remain on. The user can select from the throttle cut switch, rudder rate switch or gear switch to control the Throttle Cut.

Remember that Throttle Cut for an electric powered aircraft is just another level of safety, but it should never be used as a substitute for having the model properly restrained or other safety procedures ignored.

3.23.1.2 Limit (Throttle Limit)

Throttle Limit is provided as an alternative to Throttle Cut for I/C powered aircraft. When the selected switch is operated with the throttle joystick partially opened, the throttle setting will be limited to that as a maximum, it will not increase even if the throttle joystick is opened further. The throttle can however be reduced. It was designed with small I/C powered models in mind where they have to be carried from the starting area to the flight line with their engines running, if the throttle joystick inadvertently gets knocked opened, then the engine can’t go above the throttle setting, which aids safety. It can also be used for larger glow and petrol powered models which have to be taxied to the flight line, again the throttle can’t be accidentally opened beyond the set point.

3.23.2 Throttle Cut Switch

The Throttle Cut/Limit can be controlled by the “Rudder Rates”, “Throttle Cut” or “Gear” Switch. You can also select Inh (inhibit), see below. It is suggested that you are consistent and use the same switch with all models.

3.23.2.1 Throttle Cut Inh (Inhibited)

It is possible to inhibit the Throttle Cut/Limit for models such as a glider that do not have a motor or models without throttle control and/or use the throttle joystick for flaps/spoilers. Some people prefer flying these types of model with the throttle stick in the centre or even fully open and there is nothing more annoying than the sounder warning you that throttle Cut is active and the throttle joystick is open when you don’t have a throttle to control. Select the “Inh” option (inhibit) under “Switch” to inhibit the Throttle Cut

3.23.3 Sw Rev (Switch Reverse)

This setting allows you to reverse the direction of how the Throttle Cut switch works, Norm (normal) and Rev (reverse). Some pilots may prefer the switch to operate towards them, others may prefer the switch to operate away from them. This setting lets you have the switch work in the direction you want. It is however suggested that you set the “Throttle Cut Action” consistently so that Throttle Cut switch works the same with all models.

3.23.4 Sounder

There are two settings, Norm (normal) and Inh (inhibit). When the Throttle Cut is active and the throttle joystick is opened beyond tick-over or the Throttle Limit is active and the throttle joystick is opened beyond the set-point the sounder will alarm when in “Norm”, but will not sound when “Inh” has been selected.

3.23.5 Throttle “Lock” at Power On

If the transmitter is powered on or a different model is selected, with the throttle joystick open, it will alarm and the throttle output will be “fully closed” until the throttle joystick is fully closed to “enable” it. Once “enabled” the throttle joystick will work as normal. This feature cannot be disabled.

3.24 Ch Order Menu (Channel Output Order/ Channel Output Assignment)

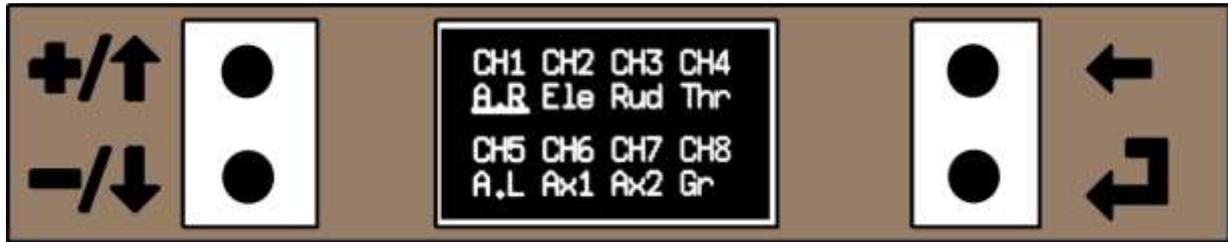


Figure 118. The Channel Output Order Menu with Multiplex Order

In many transmitters, the output order follows a convention eg JR/Spektrum use TAER (Throttle, aileron, elevator and rudder), Futaba use AETR (Aileron, elevator, throttle and rudder) and Multiplex AERT (Aileron, elevator, rudder and throttle). The second aileron channel is often channel 5 or 6 and the other auxiliary channels and the gear are on other spare outputs.

The VintageTx encoder allows you to freely assign the output order, including outputting the same channel multiple times if desired. You output the channels in the order you need.

When a model is deleted or all the models are reset, the default output order is set by the selection in the “PPM+/- and Order menu” under the system settings, there are options for JR/Spektrum, Futaba and Multiplex default output orders (see page 77). In Figure 118 above the output order is shown with the Multiplex order.



Figure 119. The Channel Output Order with the default JR/Spektrum shown.

To change the channel output order use the +/↑ or -/↓ keys to move the cursor to the required channel and press the ↵ key and the channel should become highlighted. You can now use the +/↑ or -/↓ keys to scroll through the various output channels. Once the required channel has been selected, press the ↵ or ← key to get back to the moveable cursor.

Press the ← key to return to the Main Menu 2.

Channel output order is very useful in a number of situations, such as using 4 channel receivers with two aileron servos but no rudder, where the left hand aileron servo can be moved to where the rudder would normally be. Examples are given in the “Programming Examples” section, Output Channel Assignment Order. on page 95.

3.25 Range Test



Figure 120. Range Test Menu

Range Test is a bit of a misnomer for this function, it would be better described as “single handed range test aid” as all it does is “waggle” the ailerons!

It is intended to be an aid when ranging testing a model without the help of a second person, you put the 2.4GHz module into the “low power” range check mode, turn the “Range/T” function on and then put the transmitter down. You can then walk away holding the model where it is easy to observe the ailerons moving from +/-75% left/right movement every second. This contrast with walking away with the transmitter for a range test, where it can be difficult to see if the servos are moving correctly at the test distance.

It is important to ensure that the receiver “fail-safe” has been set correctly, so that you don’t find that as you move away from the transmitter, you enter fail-safe and the motor is set incorrectly and runs up to full power, with no immediate way of stopping it.

To ensure you don’t forget that the “Range/T” function has been selected and you attempt to fly, if the aileron or elevator joystick is moved more than 20% from neutral, then the “Range/T” function is automatically turned off. Also the “Range/T” function is turned off if the menu is exited.

To select Range/T, move the cursor to the “On” and press the ↵ key. Similar to turn off, move the cursor to the off position and press the ↵ key (or just exit the menu).

The “>” symbol indicates next to off or on to indicate its state.

3.26 I/P Val Menu (Input Value Monitoring)



Figure 121. Input Value monitoring menu.

This menu displays the “raw” analogue input values and the state of the switch inputs (on or off). It is used during testing and commissioning to ensure that the analogue inputs (joysticks, auxiliary inputs, menu switches and battery voltage) are working correctly and the joystick potentiometers have not been wired in reverse. It’s also useful to check the correct operation of joysticks and switches etc. Full details are in the building, testing and commissioning manual.

The I/P Val menu (Input Value): Home Menu -> Main Menu 2 -> I/P Val

You can’t edit or alter any value in this menu, it is for information only. Press the ← key for 3 seconds to return to the Main Menu 2. While pressing the ← key, a pop-up box is counting down how long until the menu is exited. **Note** that the 3 second delay when exiting the menu is intentional so as to give you time to read the analogue value of the back key (the Menu keys are all connected to the same analogue input) and is not a programming bug.

Abbreviations are used for all the inputs are:

- Ail – Aileron
- Ele – Elevator
- Rud – Rudder
- Thr – Throttle
- Aux1 – Auxiliary 1
- Aux2 - Auxiliary 2
- Menu –Menu Switches
- Volt – Battery Voltage
- AR– Aileron Rate Switch
- ER – Elevator Rate Switch
- RR – Rudder Rate Switch
- TC – Throttle Cut Switch
- GR – Gear Switch
- AT –Auto-Trim/Single channel Switch

What are the raw analogue inputs? The microcontroller that controls the VintageTx encoder converts voltage signals from the joysticks, Aux1 and Aux2 potentiometers or switches, the menu switches and the battery voltage into a numerical value which are in the nominal range 0 to 1023. In practice the range will be a lot less, potentiometers used in joysticks are standard commercial/industrial grade and have 300 degree rotation, but the joysticks only move them around 60-70 degrees, so you only get around 1/5 total movement. With no gain that equates to around a 200 range of the raw analogue input, typically from about 200-400 with older sets and 400-600 with sets from the late 1970s and 80s. If the gain is increased the range will vary from around 500-1000 to 650-1000.

The status of the rate switches, throttle Cut switch, gear switch and auto-trim switch are shown on the menu by changing the switch to highlighted text when on and normal text when off. In **Error! Reference source not found.** above the Aileron Rate and Gear switches are in the on position, the other switches are off. Also remember that if switches are fitted for the Aux1 and/or Aux2 channels, they will be read as analogue values just the same as a joystick.

3.27 Output Values Menu



Figure 122. Output Values Menu with the Default Futaba Output Order

This menu displays what values are being output for each of the channels in the “output order” (in this instance AERT). It can be used to monitor the outputs especially when using mixes to ensure you are getting the required response.

Abbreviations are used for all the output values:

- CH1 A.R – Aileron Right
- CH2 Ele – Elevator
- CH3 Rud – Rudder
- CH4 Thr – Throttle
- A.L – Aileron Left
- Ax1 – Auxiliary 1
- Ax2 - Auxiliary 2
- Gr - Gear

To Access the O/P Val menu (Output Value): Home Menu -> Main Menu 2 -> O/P Val

You can't edit or alter any value in this menu, it is for information only. Press the ← key to return to the Main Menu 2.

A numerical output was chosen instead of a graphical output to represent servo positions as the resolution of a graphical output would not be adequate on the size of the screens used. The value is the output value in uS (microseconds) with centre nominally at 1500uS and full servo movement at 1000uS and 2000uS, though with End Point Adjust set to 120% or with some programmable Pmix the output between 900uS and 2100uS are possible.

If the output order is changed in the “Channel Order Menu”, then the order of the values displayed are also changes to match.

The convention for the output values is the value increases for right aileron (both right and left hand outputs), up elevator, right rudder and opening the throttle if the channels are not reversed. If a channel is reversed, then the response is also reversed eg if the elevator channel is reversed then up elevator decreases the value.

4 Programming Examples

4.1 Setting up the throttle of an I/C engine

4.1.1 Setting Up the Throttle Servo

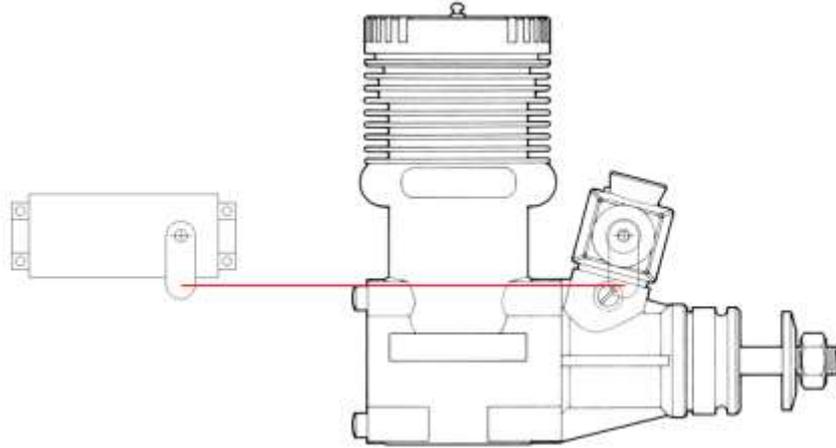


Figure 123. Throttle at Mid Position, with Servo Arm and Throttle Arm Vertical (and Parallel)

The VintageTx encoder has some additional features to make setting up the throttle on an I/C engine as straightforward as on other transmitters. The example below assumes all the model settings for the throttle are their default values. If another model has been copied and is being used as a starting point, ensure that the tick over trim, throttle sub trim, throttle end point adjust and throttle curve are all at their default values as a starting point.

First setup the throttle linkage mechanically. If you are comfortable doing this, then you can skip to step 4 below.

1. Turn on the radio and ensure the throttle servo is going in the correct direction and reverse if necessary.
2. Set the throttle joystick in the middle with the trim fully up.
3. Set the servo arm at 90° to the linkage to the engine.
4. Connect the throttle linkage to the engine and make the linkage the correct length so that the throttle arm is also at mid position and the carb arm is either straight up or down, depending how the carb is mounted (as in Figure 123).
5. Most servos have approximately 90° of movement, but throttle arms generally have less. Therefore put the throttle linkage clevis on the servo and throttle arm about the same distance out from the centre. This will ensure that the servo has more than enough movement to give fully open and closed throttle.

6. With the throttle joystick fully open, use the End Point Adjust to get the throttle fully open (with the throttle trim up and then repeat for the throttle fully shut (with the throttle trim down) without the servo binding at either end. If the servo has nearly enough movement, end point adjust can be increased up to 120% if needed to get that little extra movement.
7. Go to the Throttle Cut menu and select the Throttle Cut mode (either Cut or Limit), select a switch to control it and select the direction to get the switch to work the way around desired. It can also be inhibited if you plan to stop the engine on the throttle joystick trim.
8. Start the engine, warm up and adjust the mixture as necessary.
9. Next set up the tick over. With the throttle joystick trim up, close the throttle joystick. If the tick over is too slow or fast increase/decrease the Throttle Tick-Over Trim value in the Trim Menu (see Throttle Tick Over “Trim” on page 28) until a reliable tick over is achieved.
10. Open and close the throttle a number of times to ensure the tick-over is satisfactory as older joystick are not always repeatable ie when the throttle is shut the servo doesn't always return to exactly the same position.
11. Next close the throttle and bring the throttle joystick trim down or use the Throttle Cut switch (if throttle cut has been setup) to ensure the engine stops. Don't forget to reset your fail safe to ensure your throttle fully shuts (or at least goes to tick-over) if the failsafe operates.

4.2 Setting up the Throttle for Electric Powered Models with an ESC

With electric powered models, many people use the ESC (electronic speed control) as they come out of the box and don't calibrate them. If the ESC is used uncalibrated and the VintageTx encoder is used with its default settings, it will be found that with most ESC, the motor will run slowly with the joystick closed, but the trim up.

Why? When vintage sets were designed, the throttle closed, but trim up was used for tick over. Most sets give around the equivalent of 20% throttle the throttle closed, but trim up, which is enough to start most ESC/motor combinations. There are a few ways to overcome this.

1. Go to the Trim menu and set the “Tick Over” trim to -127 (the minimum value). This will give around 5% open throttle with the throttle joystick closed and the trim up. It will take a few “clicks” of throttle before the motor will then start.
2. Accept that the motor trim needs to be down for the motor to be stopped.
3. Use the Throttle Cut to stop the motor.
4. Use a combination of the above!

Finally there is a growing trend of people who fly electric powered scale aircraft who prefer to have the motor running continuously, even when static to aid in the realism (who ever sees a real aircraft have its motor start/stop so frequently). So the throttle may work how it's intended by default.

And with electric powered models don't forget to set the throttle cut and use it. While an electric powered model with a battery connected should always be treated as live, it is an extra level of safety to handle the aircraft with the throttle cut active. See page 83 “Throttle Cut” for full details.

4.3 Throttle Curve Mixes

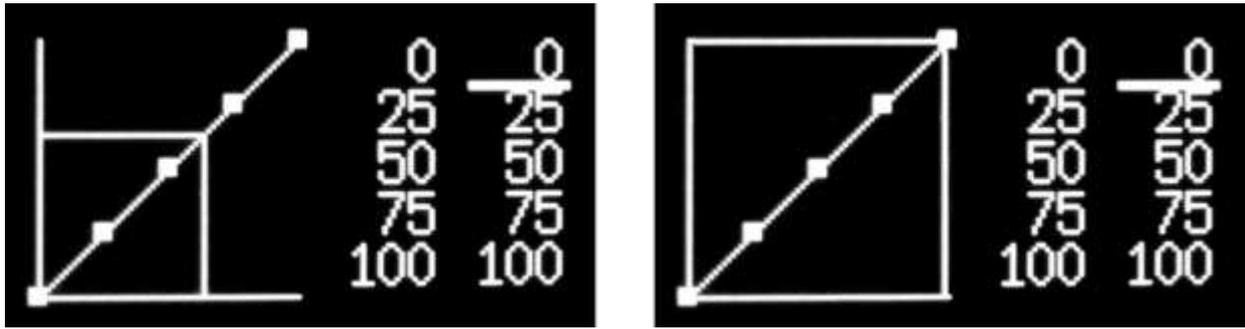


Figure 124. Throttle Curves with the Throttle Joystick Open 50% and 100% and its Position Superimposed on the Graph

The Throttle Curve mix can be used so that the throttle output is not linear with the throttle joystick movement, but follows a user programmable “curve”. The curve is not actually a curve but five points that are linked together to form an approximation of a curve.

The throttle joystick values are in the left hand column and are plotted horizontally on the x axis of the graph. The throttle output values are in the right hand column and are plotted vertically on the y axis of the graph. As the joystick is opened the output “follows the curve”.

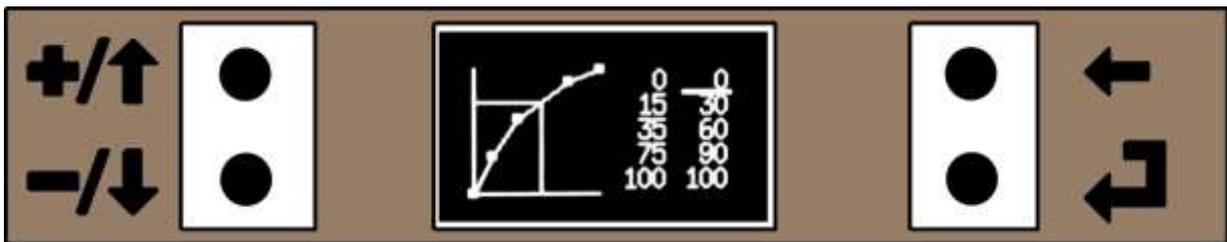


Figure 125. Example of a Throttle Curve

In Figure 125 the throttle is open 50% (half way), but the output is just over 70%. The input is in the range 35% to 75% where the output will be between 60% and 90%. But the user can adjust the input and output values to suit their needs.

4.3.1 Throttle Curve Mixes - Making the Power Delivery more Linear

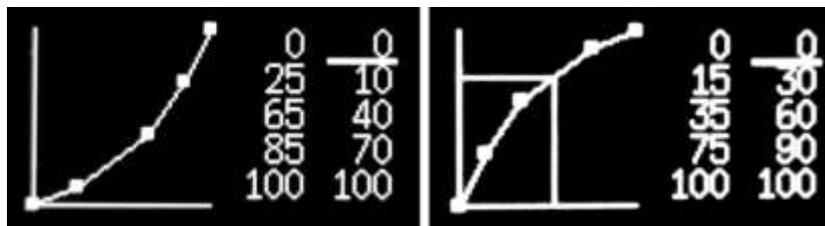


Figure 126. Throttle Curve Mix set to make power delivery more linear. on the left gives less power at low throttle settings and on the right to give more power at lower throttle settings

Many glow engines have most of the power below half throttle and the top half of the throttle joystick does little. But many 2 stroke petrol engines feel flat at lower throttle settings and the power comes in in the last part of the joystick movement. Both of the above can be corrected with a throttle curve. In the above example the left hand screen-shot is for engines with most of the power low down and the

mix will make the throttle output initially less than the throttle joystick (flattened out) and will increase for the top half of the throttle joystick movement.

In the right hand screen-shot the throttle output will initially increase at a greater rate than the throttle joystick is opened and flatten out for the top half of the throttle joystick movement.

4.3.2 Skipping Part of the Engines RPM Range

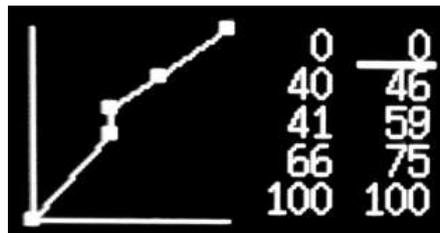


Figure 127. Throttle Curve Mix set to miss part of an Engines RPM Range

If part of the engine's rpm range has an unwanted vibration/resonance, but the tick over and top end are OK, then the throttle curve can be used to "step over" the problem rpm band to avoid excessive vibration/resonance. As an example, an old Fox 40 R/C engine had a bad vibration around 8,500 RPM, the output can be made to skip, step or jump over this (whatever you prefer to call this).

- Start the engine, warm up and with the model restrained, increase the throttle until the vibration/resonance starts.
- Increase the second throttle setting value until the marker is inline with the superimposed line
- Decrease the second output value until the vibration stops.
- Open the throttle one indent. The engine speed may increase slightly and the vibration may start again, now increase the third throttle values to the superimposed line.
- Now increase the third output value to increase the engine speed until the engine is running smoothly again.
- Adjust the fourth joystick and output values to make a straight line as possible between the third and fifth markers.

4.3.3 Flatten the Power Curve for Around the Hover for Electric 3D Models

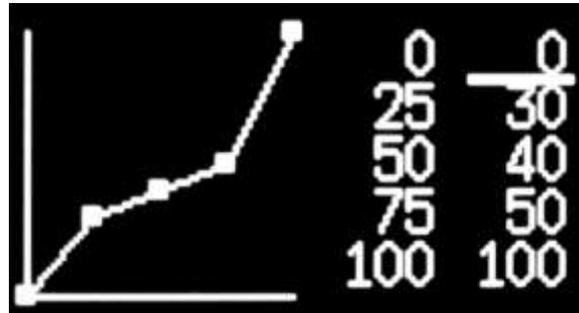
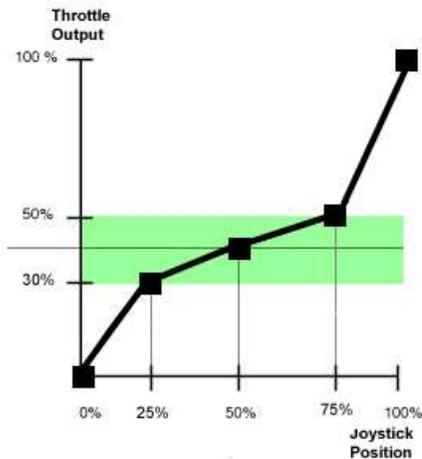


Figure 128. Throttle Curve set to aid hovering of 3D Models

Probably not of interest to all VintageTx owners, but throttle curve can also be used to flatten the power curve on 3D models around the throttle setting used to “hover”. It can be thought of as similar to throttle expo for hovering, similar to what expo does for aileron, elevator and rudder ie you get a finer control of the throttle around the hover. It's especially useful if the throttle stick has coarse ratchet/indents which is very common on older transmitters.

In the above the model requires between 30% and 50% power to hover, but with the throttle curve the joystick is from 25% to 75%. Above 75% the throttle output increases rapidly to help “punching out” of the hover.

4.4 Setting Up I/C Engines on a Twin

The “Tick Over trim” and Throttle Curve on the VintageTx encoder are applied after the Pmix (programmable mixes) where a second Throttle output channel would be configured on either the Aux1 or the Aux2 channel (see the example of setting up two servos on page 112).

If the “Tick Over trim” or the Throttle Curve were used it would only apply to the Thr channel and not the other channel used for the second engine. This would give different responses for the two engines which is not desirable.

Therefore it is recommended that on twin engine aircraft either a Y-Lead is used for the two motors (recommended for electric aircraft) or that the “Tick Over trim” is left at 0 and that the Throttle Curve is not used. On a twin I/C, both engines will have to have their throttles set up the traditional way by using each channels End Point Adjust, Sub Trim and getting the linkages set mechanically correctly.

4.5 Notes on Rates and Expo

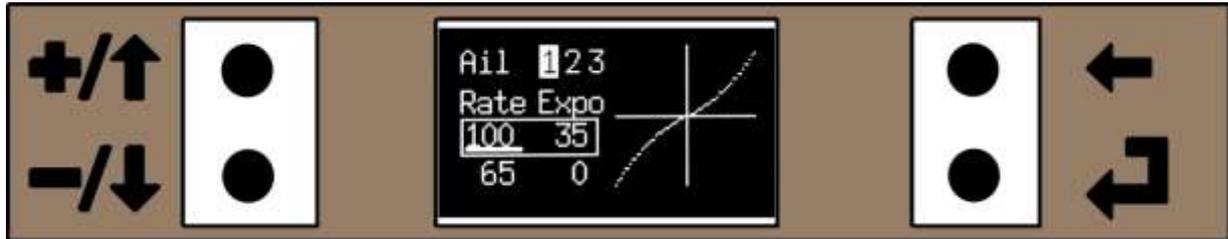


Figure 129. Rates/Expo Set to give equal feel around the centre

Some experienced pilots try to set their Dual Rates and Expo so that both full and reduced settings have a similar feeling around neutral. Expo has a fairly linear response for roughly the first third of the joystick movement proportional to $(100\% - \text{expo } \%)$.

So for example in Figure 129 above, if you set 35% expo it is the same effect as 65% rates for the first third of the joystick movement, but then still gives full movement and in the above example both aileron rates/expo settings will give the same feel around neutral.

Most manufacturers do not specify the exact method they use for the exponential function, it seems a closely guarded secret. It is not a secret for the VintageTx and for the mathematically minded, it uses the following formula for its exponential output:

$$\text{Output} = \text{Input}^3 * \text{expo} + (1 - \text{expo}) * \text{Input}$$

Where:

$$-1 \leq \text{Input} \leq 1$$

$$-1 \leq \text{Output} \leq 1$$

$$-1 \leq \text{Expo} \leq 1$$

So the Expo function is actually a cubic polynomial that equates roughly to an exponential function, but it is the formula that most of the major manufacturers also use.

4.6 Output Channel Assignment Order.

As the VintageTx encoder can be used with various modules that use different default output orders, the VintageTx can have three default Output Orders, AETR (FrSky and Futaba modules), TAER (Spektrum and OrangeRx modules) and AERT (Multiplex). But the VintageTx is not limited to those two default assignments, the output channels are all freely assignable. This can be used to great advantage with the following examples:

4.6.1 Output Order When Servo's have been Connected to the Wrong Channel

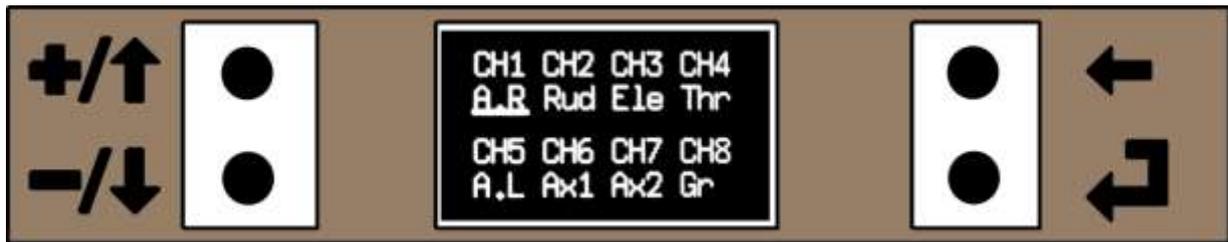


Figure 130. Output Order with the Elevator, Rudder and Throttle Channels Swapped to Normal

If an Rx is buried deep in a fuselage and two servo's have inadvertently been swapped, it is a lot more convenient to just reassign them in the Channel O/P Order menu than having to start unplugging servo leads. If for example the elevator, rudder and throttle servos have been inadvertently swapped, the outputs can be "swapped back over" in the Output Order menu as in Figure 130 above (Ele would normally be Channel 2, Thr Channel 3 and Rud channel 4 for a Futaba AETR order).

You can also choose where a servo is plugged into the Rx, so in a tight installation where a servo lead may foul on a bulkhead or former, it can be plugged into any other spare channel and reassigned in the Output Order menu.

4.6.2 Using a 4 channel Rx for a Slope Soarer or a Glider with 2x Aileron Servo's



Figure 131. Output Order for a DLG Glider (Futaba Output Order)

Many gliders with 2x ailerons, elevator and rudder such as DLG (discuss launched glider) and sports slope soarers can be flown with a 4 channel receiver as the second aileron servo can be moved to the channel that would normally be for the throttle. It is especially useful for DLG gliders where a 4 channel Rx such as a FrSky D4R-II can be used to save weight and every ounce/gram saved counts. In Figure 131 above the left aileron output has been moved to where the throttle would normally be with a Futaba output order.

Channels 5 to 8 are ignored by a four channel receiver so can be left with their default channels.

4.6.3 Using a 4 channel Rx for a Delta or Flying Wing

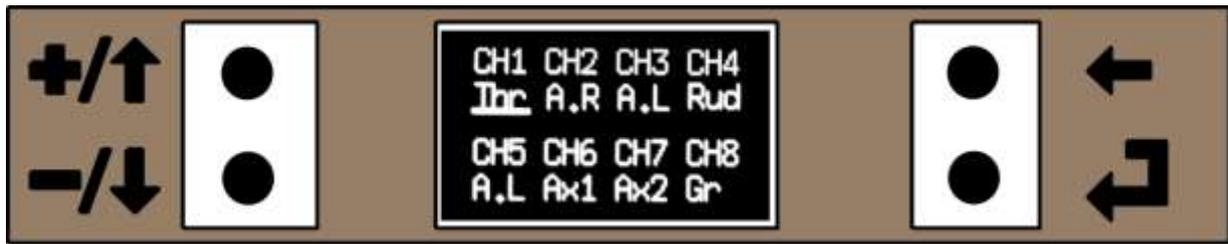


Figure 132. Output Order for a Delta or Flying Wing with a Four Channel Receiver (Spektrum/JR TAER Order)

The VintageTx Elevons mix puts the output channels on the A.R and A.L (right and left aileron) channels. This output configuration was chosen so that the elevator channel can still be used on deltas with elevons and a canard elevator, such as EDF Eurofighters, Rafale or Gripen.

If a delta or flying wing (without canard) is to use a 4 channel receiver, the left hand aileron channel needs to be moved to where the elevator would normally be (channel 3 on a Spektrum TAER order and channel 2 on a Futaba AETR order). Figure 132 above has the output order for a delta or flying wing for a Spektrum/JR TAER output order.

4.6.4 Using a Spektrum AR6400 with Integral Servo's for a Delta or a Flying Wing



Figure 133. Output Order for a Spektrum AR6400 Rx used for a Delta or Flying Wing

If a Spektrum AR6400 UMX type micro-brick receiver/servo unit is re-used from a Parkzone/E-Flite model such as an UMX Mustang or Sukhoi, it has the elevator and rudder servo's on board, with the aileron servo being plugged in separately. If it is re-used for a delta or flying wing, you have the problem of outputting the elevons on the elevator and rudder output channels (nominally channels 3 and 4 on a Spektrum TAER output).

For transmitters without an Output Channel Order feature, it involves complicated mixers on the transmitter, but it is made simple with any transmitter with channel output assignment. On the VintageTx the Ail.R and Ail.L output channels (the elevon outputs on the VintageTx) can be assigned to channels 3 and channel 4 with no additional mixes required (besides the elevon mix). If the delta or flying wing has a rudder, it is easy for it to use a separate micro servo plugged into the channel 2 output normally used for the ailerons.

5 Setting the Joystick Gain

Any transmitter converted by the factory will already have its joystick gain pre-set and will not require any further adjustment. It only applies to the VintageTx boards sold separately where the user has converted the transmitter themselves.

The VintageTx encoder has an adjustable gain for the joysticks to increase the resolution. By default the encoder boards are supplied with the gain at a minimum so it will be suitable for any joystick, but the majority of transmitters can have the gain increased. After increasing the gain the joysticks will need recalibrating and the battery voltage may also need recalibrating.

Setting up:

- Ensure the gain potentiometer is fully anti clockwise (minimum gain).
- Power up the encoder, the LCD should display the homepage with the backlight on.
- Open the main menu and select I/P Values on the second page.
- Move each joystick and auxiliary control in turn to ensure the values alter and increase in the correct direction. The values should increase for the following joystick direction.
 - Right aileron
 - Up elevator
 - Right rudder
 - Open throttle
- If the appropriate value does not increase for the above movement, then the joystick or auxiliary channel wiring will need reversing.
- Operate each joystick control in turn to the maximum, including the trim, to see which control attains the highest value. The control with the highest value will be used to set the overall gain.
- Move and hold the control with the maximum value to full movement (including full trim). Slowly turn the gain potentiometer clockwise. You should see the value of the control increasing.
- Keep turning the potentiometer until the value reaches 1000. You do not need to keep looking at the display as when this value is reached as the sounder will emit a continuous beep.
- Turn back the potentiometer slightly anti clockwise, just enough to stop the sounder being continuous. The value should be just under 1000 (say 995) with full joystick movement and trim.
- Move all the joysticks (with trims) and the auxiliaries Aux1 and Aux2 (if fitted) to their maximum movements to ensure no control exceeds 1000 (and start the sounder).
- If one (or both) of the auxiliary channels exceed 1000, see the section on wiring the auxiliary channels in the “Installing the Encoder Board” manual.
- The gain is now set and will not need adjusting again.
- Re-calibrate the joysticks. See page 74 for details.
- Calibrate the battery voltage. See page 76 for details.

6 Examples of Commonly Used Mixers

In this section are examples of commonly used mixers. There may not be an example of the exact mix required, but there should be enough to be used as a basis for other mixers.

6.1.1 Throttle to Elevator and Throttle to Rudder Pmix to Correct the Engine Thrust Line

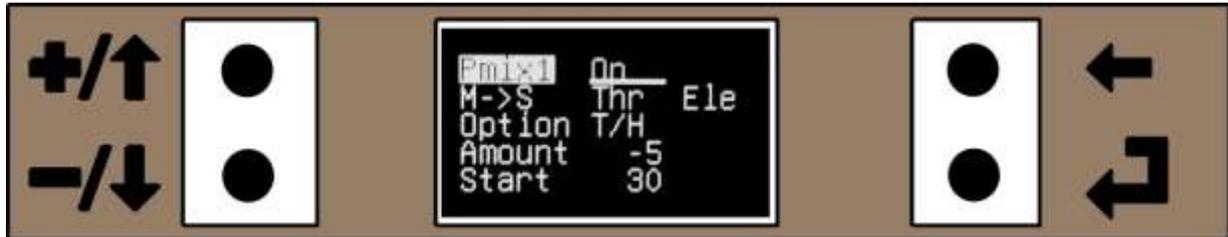


Figure 134. A Throttle to Elevator Pmix

Many aircraft have the engine thrust line set incorrectly, typically without enough down thrust or right thrust. Ideally it should be corrected by adjusting the engine mount, stand-offs or plate to the correct angle, but there are many models, especially ARTF or foam models where this is not easily possible.

A Throttle to Elevator Pmix and a Throttle to Rudder Pmix can be used to give the equivalent of down thrust and right thrust (or up and left thrust). When the throttle is opened the Pmix progressively adds a small amount of down elevator and/or right rudder.

In Figure 134 above, the Throttle (master) is being mixed into the Elevator (slave). It uses the T/H (threshold) option so that it doesn't start the Pmix until the throttle joystick reaches 30% open. It then applies down elevator (positive values give up elevator and negative values give down elevator) so that at full throttle there will be 5% down elevator, but you may need to experiment to get the correct value. The mix is always on, but you can put it on a switch, so if too much elevator is applied by the mix it could be turned off. If the "Amount" value was positive you would get the equivalent of up-thrust.



Figure 135. A Throttle to Rudder Pmix

Similarly in Figure 135 above the Throttle (master) is being mixed into the Rudder (slave). It again uses the T/H (threshold) option so that it doesn't start the Pmix until the throttle joystick reaches 30% open. It then applies right rudder (positive values give right rudder and negative values give left rudder) so that at full throttle there will be 4% right rudder, but you may need to experiment to get the correct value. If the "Amount" value was negative you would get the equivalent of left-thrust.

You do not have to use Pmix1 and Pmix2, they were arbitrarily chosen and any other Pmix will work in the same manner.

6.1.2 Rudder to Elevator and Rudder to Aileron for Knife Edge Correction



Figure 136. Rudder to Elevator Pmix to correct for Rudder Coupling causing the aircraft to pitch down

On many sports aerobatic models the rudder has a secondary effect and interact with the other controls causing the aircraft to pitch and/or roll when the rudder is applied. This is most noticeable when flying knife edge as any pitch and/or roll coupling will be more obvious.

As an example, the popular Pulse series from Horizon Hobbies and the Acrowot series from Chris Foss (distributed by Ripmax) both tend to roll in the direction of the applied rudder and pitch “down” towards the undercarriage with both left and right rudder. This can be corrected “on the sticks”, but many people prefer to use a pair of Pmix to correct the interaction and then only make small corrections “on the sticks”. The Pmix required are a Rudder to Elevator Pmix and a Rudder to Aileron Pmix.

In Figure 136 above the Rud (master) is mixed into the Ele (slave). That is to say when the rudder joystick is moved it will progressively move the elevator a small amount, with different percentage amounts for right and left rudder. It uses the RtEx (rates and expo) option for the rudder, so if the rudder rates and/or expo are used, they will be taken into account (but not the trim). The mix is always on as the rudder always has some coupling, though it will vary slightly with different power settings and airspeeds, so some manual correction may still be needed, albeit a reduced amount.

We want up elevator to be applied for both right and left rudder as when rudder is applied the nose goes down towards the undercarriage in both directions. For right rudder we mix in a positive value, but for left rudder we mix in a negative value. Why? For the VintageTx, the mixing convention is positive values for right rudder and negative values for left rudder and positive values give up elevator and negative values give down elevator. When left rudder joystick is applied it is treated as a negative value. If it is multiplied by a negative value it gives a positive value, in this case up elevator.

Right Aileron + Left Aileron -
 Up Elevator + Down Elevator -
 Right Rudder + Right Rudder -

Remember from basic arithmetic:

Two positive numbers multiplied together gives a positive value. $+ \times + = +$

Two negative numbers multiplied together gives a positive value. $- \times - = +$

One negative number and one positive number multiplied together gives a negative value. $+ \times - = -$

The amount of correction needed may not be the same in both rudder directions and in Figure 136 above there is slightly more correction to the left than to the right.



Figure 137. Rudder to Aileron Pmix to correct for Rudder Coupling causing the aircraft to roll

The next Pmix stops the model rolling when rudder is applied. In Figure 137 above the Rud (master) is mixed into the Ail (slave). That is to say when the rudder joystick is moved it will progressively move the ailerons a small amount (in this case in the opposite direction to the rudder), with different percentage amounts for left and right rudder. It uses the RtEx (rates and expo) option for the rudder, so if the rudder rates and/or expo are used, they will be taken into account, but not any rudder trim. The mix is always on as the rudder always has some coupling, though it will vary slightly with different power settings and airspeeds, so some manual correction may still be needed, albeit a reduced amount.

We want the ailerons to be applied in the opposite direction to which the rudder is applied so we mix in negative values for both right and left rudder. The amount of correction needed may not be the same in opposite directions and in Figure 137 above there is more correction to the left than to the right.

Again you do not have to use Pmix3 and Pmix4, they were arbitrarily chosen and any other Pmix will work in the same manner.

6.1.3 Elevator to Flaps (Flapperons) "Snap Flap"



Figure 138. Pmix to give "Snap Flap"

This mix is used on to move both ailerons up and down in unison with the elevator (the ailerons drop with up elevator and are raised with down elevator) to make an aerobatic model loop or turn tighter. It is commonly used on slope soarers, "fun fly" and 3D type models. It can also be used with models with non-symmetrical wing sections to assist flying inverted. The term "Flap" (the Slave) is short for Flapperon and not ordinary flaps.

In the above example (Figure 138), the mix is controlled by the elevator rate switch being on, so that when full elevator rates are switched in you get the additional elevator response from the ailerons acting as flapperons. But any other switch could have been used to control the flapperons or they could be permanently on.

In the example the master is elevator and when the elevator joystick is at full deflection it moves the slave channel which is the ailerons (flapperons) up or down 40%. It is using the “rates and Expo” option, so it will take into account the rates and expo, but no trim.

It should be noted that this mix can make the ailerons exceed the normal maximum throw, the ailerons will normally move 100%, but with the mix adding additional aileron movement for flap it can go to 120% of normal movement. Therefore it should be ensured that the mix does not bind the control surfaces with full aileron and elevator applied.

6.1.4 Flaps to elevator (to stop zooming when the flaps are deployed)



Figure 139. Flap to Elevator Pmix to stop ballooning up

When flaps are deployed on an aircraft, it often causes a secondary effect of “ballooning” up, but there are some models where the nose pitches down.

To overcome this pitching, a couple of Pmix’s can be used, by mixing flaps into the elevator, so that as flap is applied, it automatically feeds in down elevator correction. Further the secondary pitching movement is quite slow, so if the flaps are deployed quickly and the down elevator correction was applied, the model would initially pitch down as the elevators have an immediate response that is faster than the pitching response of the flaps.

This can be overcome by putting “servo slow” on the flaps so the speed they move is limited (ie they can only move slowly) and any pitching is gradual. This has the additional benefit on a warbird of the flaps moving slowly looks more “scale like”. The two Pmix’s in Figure 139 above achieve this.

Pmix4 puts “servo slow” on Aux1 so that it takes 2 seconds for full servo movement end to end in both directions (ie up and down).

In Pmix5, Aux1 is the mixed into the Ele (elevator) when Aux1 is 5% (flaps just being applied) and linearly mixes down elevator until when Aux1 is 100% (flaps full down) there will be 10% down elevator. Depending how Aux1 has been wired, if you put the flaps half down and there is no down elevator compensation then change the Start value to 5%. The “Servo Slow” speed to be individually adjusted for up and down in the range 0 to 10 seconds (see Master Channel - Servo Slow on page 62)

You do not have to use Pmix4 and Pmix5, they were arbitrarily chosen and any other Pmix will work in the same manner, but obviously the Aux1 to Ele Pmix has to come after the “Servo Slow”.

6.1.5 Flaps to elevator (Alternative Method)

Pmix5	On		
M->S	Slow	Aux1	
Option	Pmix		
Time+	20		
Time-	15		

Pmix6	On		
M->S	Aux1	Ele	
Option	T/H		
Amount	-7		
Start	-5		

Pmix7	On		
M->S	Aux1	IntF	
Option	J/S		
Hi	100		
Lo	100		

Figure 140. Alternative Flap to Elevator Pmix to Stop Ballooning

Alternatively the “servo slow” is only put onto the elevator correction and the flaps (connected to Aux1 and Aux2) operate at the same speed the slider/potentiometer is moved.

It is assumed in these examples that the flaps are controlled by Aux1 lever, the right hand flap is connected to Aux1 output and a second flap servo is connected to Aux2 output (ie it isn’t connected via a Y-Lead).

Pmix5 puts “Servo Slow” on Aux1 so that it takes 2 seconds to go down and 1.5 seconds to go up. The “Servo Slow” speed to be individually adjusted for up and down in the range 0 to 10 seconds (see Master Channel - Servo Slow on page 62). It will need to be adjusted with flight tests to achieve the correct values.

In Pmix6, Aux1 is the mixed into the Ele (elevator) when Aux1 is 5% (flaps just being applied) and linearly mixes down elevator until when Aux1 is 100% (flaps full down) there will be 7% down elevator. Depending how Aux1 has been wired, if you put the flaps half down and there is no down elevator compensation then change the Start value to 5%.

Pmix7 uses the Aux1 value from the slider/potentiometer (by using Option J/S – joystick) and ignores the Aux1 with Servo Slow from Pmix5 (to use the delay Option Pmix would need to be selected) and mixes it to IntF (see “Slave Channel – AuxF and IntF” on page 65). This moves both Aux1 and Aux2 with the Aux1 slider/potentiometer.

You do not have to use Pmix5, Pmix6 and Pmix7, they were arbitrarily chosen and any other Pmix will work in the same manner, but obviously they need to be in the same order with “Servo Slow” first, Aux1 to Ele second and the Aux1 to IntF last.

6.1.6 4 servo wing with camber/reflex and flaps/crow/spoilers



Figure 141. Four Servo Wing Glider – The Phoenix 2000 was typical of the gliders used for testing

This would typically be used on 4 servo wing gliders or electric powered gliders. As VintageTx transmitters have limited switches and auxiliary sliders/levers/dials, the options for controlling these mixes are limited, but the below have been used successfully on a Radian Pro, a HK Phoenix 2000 and a Multiplex Easy Glider (modified with flaps in addition to the ailerons).

The below assumes that the converted transmitter has the following configuration:

- Aux1 is a proportional knob/lever/slider
- Aux2 is a three position switch.
- A rudder rates switch has been fitted
- A Gear switch has been fitted

This example with the above powered glider and all the relevant menu's used are shown. The transmitter Pmix and other Mix for the model as follows:

- The Rudder Rate switch is used to control normal/crow mode. Alternatively one of the other rate switches could be used.
- The Throttle is swapped with the Gear switch (see "Using the Swap Throttle Mix" on page 56). The motor is then controlled by the Gear Switch and the "Throttle Joystick" controls the flaps.
- In normal mode (Rudder Rate switch off)
 - Aux2 (3-position switch) is used to give aileron and flap camber/neutral/reflex:
 - Camber (aileron/flaps dropped slightly) for thermal and launch
 - Neutral (aileron/flaps normal) for general cruising around
 - Reflex (aileron/flaps raised slightly) for speed and moving out of sink
 - The Throttle joystick proportionally drops the flaps (but no crow breaking, the, ailerons don't raise)
- In crow mode (Rudder Rate switch on)
 - The Throttle joystick proportionally drops flaps and raises both ailerons (crow braking)
 - As the flaps drop, it is mixed into down elevator to stop zooming, with servo slow to limit the speed of elevator compensation
 - Aileron -> Rudder mix is activated as the ailerons become less effective when crow is applied and additional rudder is used to help directional control

In both normal and crow modes, if the flaps are operated there is down elevator compensation with a delay in the compensation.

The Throttle does not have to be swapped, it is down to pilot preference and the Aux1 channel can be used for the flaps if preferred. Also in the example the Rudder Rates switch On/Off can be swapped over to suit pilot preference.

6.1.7 Programming the 4 Servo Wing Glider/Powered Glider



Figure 142. Home Menu showing the "Swap Thr" (Swapped Throttle)

The Home Menu has the "Swap Thr" (swapped throttle) status and the Down Timer set to 40 seconds, so that you can achieve 40 second motor run (manually stop the motor when the timer alarms) for practice without having a motor/altitude limiter fitted.



Figure 143. The Throttle Channel has been Swapped with the Gear Channel

Swapping the Throttle and the Gear channels is purely optional, doing so will control the Throttle with the Gear switch (on/off) and the flaps will be controlled by the Throttle joystick, but for programming purposes will now be called Gear. Also the operation of the throttle by the Gear switch has been reversed (what would have been On/Off is now Off/On), again a personal preference.

The values shown in Figure 144 are only a starting point, different aircraft and personal tastes will require adjusting and fine tuning.

Pmix1 R/R Off M->S Aux2 Gear Option Pmix Hi 10 Lo 10	Pmix4 On M->S Slow Aux1 Option Pmix Time+ 20 Time- 20	Pmix7 On M->S Gear Int2 Option Pmix Hi 100 Lo 100
Pmix2 R/R Off M->S Aux2 Flap Option Pmix Hi 10 Lo 10	Pmix5 On M->S Aux1 Ele Option T/H Amount -10 Start -5	
Pmix3 On M->S Gear Int1 Option J/S Hi 100 Lo 100	Pmix6 R/R On M->S Gear Flap Option T/H Amount -30 Start -5	

Figure 144. 4 Servo Wing – Example of Pmix required

Pmix1 and Pmix2. These Pmix's use the Aux2 three position switch as a "joystick" and mix it into the "Gear" channel (right hand flap) and "Flap" (Flapperons ie both ailerons). When the Aux2 switch is centre it will have no effect, but the other positions will mix in +/-10% up and down. These 10% values need to be adjusted to suit. They are only active when the Rudder Rate Switch is in the On position. This makes use of the fact that Pmix slave can be up to +/-120% of normal travel.

Pmix3, Pmix4 and Pmix5 are used for the flap to elevator compensation to stop the model zooming up when flap is applied. They are always on as the flaps can be lowered in both normal and crow modes.

Pmix3 copies the Gear into Aux1 (Int1 is the Aux1 input with the lever/potentiometer turned off). This will be used for the flap to elevator compensation, with a delay added in Pmix4 below.

Pmix4 puts a delay on Aux1, in this case 2 seconds in both directions. This will be used for the flap to elevator compensation. The time values can be adjusted in both directions to suit.

Pmix5 is a T/H (Threshold) mix. When the Throttle Joystick (Gear) goes below 5% from the top of the stick movement (what would normally be full throttle) it will mix in down elevator to a maximum of 10%, but with the delay from Pmix4. Again the amount of down elevator (or even possibly up elevator) will have to be determined by experimentation.

Pmix6 is used to raise the Flapperons (both ailerons) as the flaps go down (controlled by Gear). It is only active when the rudder rates switch is active.

Pmix7 is used to copy the RH flap (Gear) to Int2 (Aux2 with the switch turned off) the LH flap.

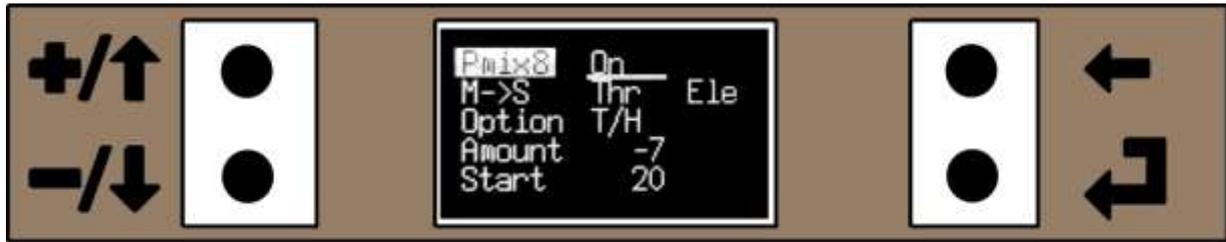


Figure 145. Throttle to Elevator Pmix to Add "Down Thrust"

Pmix8 is included as an example for adding "down-thrust". A Pmix was used to correct the pitching up when under full power as additional down-thrust could not be added (the body of the outrunner motor would foul the fuselage if shimmed anymore). Pmix8 is always on and when the throttle gets above 20% it adds down elevator until at full throttle there is 7% down elevator added.



Figure 146. Aileron to Rudder mix

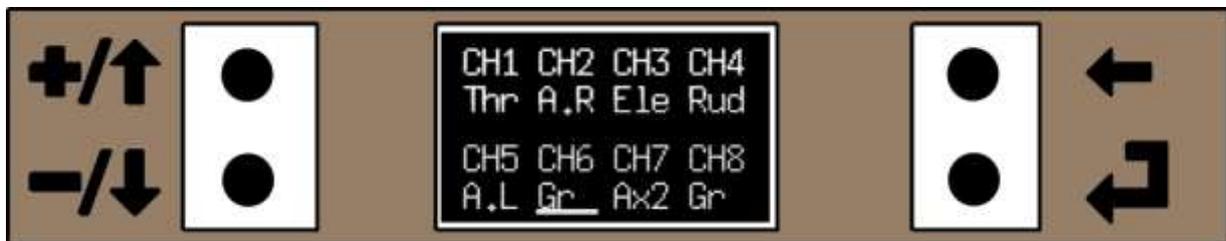


Figure 147. Channel Output Order for the 4 Servo Wing Mix

If less than an eight channel receiver is used (such as a Spektrum AR7000) the Ch Order menu (Channel Order) will need to be used to move the Gear to CH6, so that it's useable on the receiver.

6.1.8 Setting the Flaps Up on a 4 Servo Wing Glider

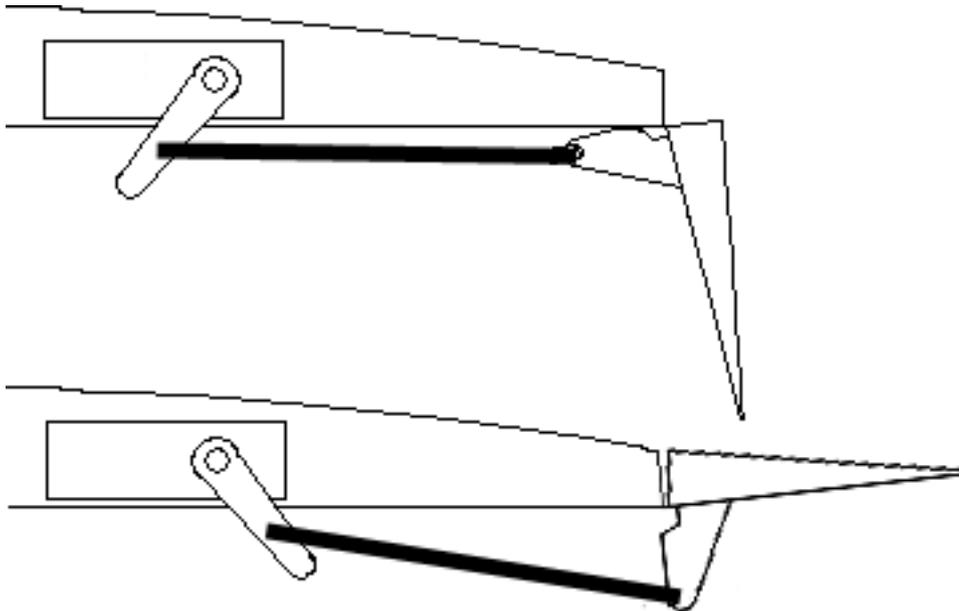


Figure 148. Flaps at the Two Limits of Movement, Fully Down and with Reflex

The setting up of the 4 Servo Wing is straightforward if the following steps are taken

1. Program Pmix1 through Pmix7 and optionally Pmix8, Swap Throttle and Channel Output Order
2. Check that all control surfaces work in the correct direction and use servo reverse if necessary
3. Put the flaps full up and Aux2 in the centre so that it does not add reflex/camber
4. Set the flap mechanical movement so that the flaps go up past the required reflex and down as far as required
5. Use the E Point (End Point Adjust) to adjust the flaps to neutral (not reflex) and the required full down
6. Use the E Point to set the required throw for the other channels
7. Open Pmix1 and with the Pmix1 active (Rudder Rate Switch Off and the Pmix1 reverse text to show its active) operate the Aux2 three position switch to the position for reflex. Depending which way round the switch has been wired/installed try adjusting the "Hi" value first. If the flaps don't move, try adjusting the "Lo". Adjust to give the required reflex, if you are getting camber then a negative figure is required.
8. Open Pmix2 and repeat the above to get correct reflex and camber for the ailerons.
9. Open Pmix6 and change the Rudder Rate Switch to On (Pmix6 should be reverse text to indicate it's active). With the flaps fully up the ailerons should be at neutral
10. Put the flaps half down. The ailerons should raise up. If they don't then change the "Start" value in Pmix6 for -5 to 5.
11. Similarly with the flaps still half down, there should be some down elevator compensation.
12. Put the flaps full down. Adjust the Pmix6 "Amount" value to get the ailerons to the desired position. If the ailerons drop, then change the "Amount" value in Pmix6 to a positive number
13. The amount of down elevator for flap compensation and the time delay has to be set by test flying
14. Program Pmix1 through Pmix7 and optionally Pmix8, Swap Throttle and Channel Output Order

6.1.9 Four Aileron Wing with Snap Flap and Flap/Crow

This would typically be used with powered aerobatic models (such as fun fly, 3D or biplane) and aerobatic gliders (such as slope soarers) with a 4 servo wing with two ailerons on each wing or biplanes with an aileron on each wing.

In this example there are three modes controlled by the Aux2 Switch:

1. Aux2 switch in position A. All four ailerons move as ailerons and also move with the elevator to give “snap flap” ie when up elevator the ailerons go down and when the ailerons go down the ailerons go up. This combination gives the quickest roll response and a tighter elevator response.
2. Aux2 switch in position B. All four ailerons move as ailerons only (no snap flap)
3. Aux2 switch in position C. Crow Braking. The inboard ailerons become flaps and are controlled by Aux1 slider or potentiometer. As the flaps are lowered, the ailerons are raised creating drag to steepen the glide angle. As the flap is applied, down elevator is mixed in to stop the model ballooning up. The down elevator compensation is on an adjustable delay.

The “inboard” ailerons are connected to Aux1 (right) and Aux2 (left) outputs



Figure 149. Four Aileron Wing Pmix

The values shown in Figure 149 above are a starting point only, different models and personal taste will require adjusting and fine tuning.

Pmix1. This Pmix is only active when the Aux2 switch is in position “A”. It mixes elevator into the flapperons, to make both ailerons move down with up elevator and up with down elevator.

In Figure 149, -40% up and down is used, but this figure can be adjusted to suit. When the elevator is at 100% deflection it gives -40% aileron movement, the negative value makes the ailerons move in the opposite direction to the elevator.

Pmix2 and Pmix3. These Pmix’s use the Aux2 three position switch in the “C position off”, which is the same as “either A or B on” so the mix is active when Aux2 switch is in the A or B position. Pmix2 mixes the right aileron to Int1 (Aux1 with the slider/potentiometer disabled) and Pmix3 mixes the left aileron to Int2.

Why 100% in Pmix2 and -100% in Pmix3? In Pmix4 the Aux1 and Aux2 (inboard ailerons) are treated as flaps with both moving together. To get them moving together you may have to use "servo reverse" on one of the Aux channels. In the example to get the Aux channels to move in the same direction as the outboard ailerons Pmix 3 required -100% to be used, but it could be that Pmix2 requires -100%.

Pmix4 is used to get the Aux1 and Aux2 (inboard ailerons) to work as flaps, with them starting from neutral to 100% dropped. If you want the Aux1 pot/slider/lever to work in reverse you need to change the "Start" to -5%.

Pmix5 is used to give "elevator compensation" when the "flaps are deployed". In the example the "Start" is at -55% because the "flaps" start at 50%. When the flaps are fully deployed it mixes -7% elevator (negative values give down elevator). When the flaps are deployed, some aircraft don't pitch or pitch up. In these cases a 0% or a positive % value will be needed.

Pmix6 is used to give the "Crow Braking" effect ie when the flaps are deployed, the ailerons both move up. In the example the "Start" is at -55% because the "flaps" start at 50%. When the flaps are fully deployed it mixes -33% Flapperon ie both ailerons move upward.

6.1.10 Engine differential for throttle steering on twins (Twin Motor Models)



Figure 150. Typical Twin used for Testing a "Dynam Catalina" (picture courtesy of CML)

What is differential throttle steering? On twins, one motor can be throttle up compared to the other to give differential thrust steering. This can be used when taxiing but it's especially useful when a model is fitted with floats or for seaplanes manoeuvring on water

There are two mix examples, one for electric models, the other for I/C models. Why two different mixes? For differential steering you need one motor running faster than the other.

With an electric twin model, you don't want any control other than the throttle to start or speed up the motors, so the recommended mix for electric models slows down the required motor. When you are taxiing, you have to open the throttle and then use rudder to slow down the motor to get the desired direction ie left rudder slows the left motor and right rudder slows the right motor.

But with I/C engines you don't want the slow motor stopping, so rudder is mixed to the opposite throttle to speed it up (ie left rudder speeds up the right throttle).

6.1.11 Differential Steering for Electric Twins



Figure 151. Mixing the Throttle to Int1 (Aux1)

In this example it is assumed that the Throttle channel is for the right hand motor (starboard) and the Aux1 channel is for the left motor (port). The differential steering is switched on by the rudder rate switch being turned on, but any other switch could be allocated.

The first Pmix (Figure 151 above) copies the Throttle (master) to Int1 (slave) with the mix always on. The slave Int1 is the Aux1 channel with the lever/slider/potentiometer turned off so that it does not interfere with the Aux1 channel if were moved (see Slave Channel - Int1, Int2 on page 64).



Figure 152. Mixing Right Rudder to the RH Motor

The second Pmix (Figure 152 above) mixes rudder (master) into the Thr (slave) which is the RH motor, starting when the rudder goes above 60% (0% full left rudder, 50% centre and 100% full right rudder) and at full right rudder it gives -100% throttle. But with a T/H (threshold) mix -100% is half of the throttle movement (see Option – T/H (Threshold) on page 68), so if the throttle is fully open and full right rudder is applied, the throttle will close to half throttle, which will give very effective steering.



Figure 153. Mixing Left Rudder to the LH Motor

The third Pmix (Figure 153 above) mixes rudder (master) into the Aux1 (slave) which is the LH motor, starting when the rudder goes below -60% (0% full right rudder, -50% centre and -100% full left rudder) ie 10% left of neutral and at full left rudder it gives -100% into Aux1 (LH throttle). But with a T/H (threshold) Pmix -100% is half of the servo movement (see Option – T/H (Threshold) on page 68), so if the throttle is fully open and left right rudder is applied, the Aux1 (LH throttle) will close to half, which will give very effective steering.

6.1.12 Differential Steering for I/C Twins



Figure 154. Mixing the Throttle to Int1 (Aux1)

In this example it is assumed that the Throttle channel is for the right hand engine (starboard) and the Aux1 channel is for the left engine (port). The differential steering is switched on by the rudder rate switch being turned on, but another switch could be allocated.

The first Pmix (Figure 154 above) copies the Throttle (master) to Int1 (slave) with the mix always on. The slave Int1 is the Aux1 channel with the lever/slider/potentiometer turned off so that it does not interfere with the Aux1 channel if were moved (see Slave Channel - Int1, Int2 on page 64).



Figure 155. Mixing Left Rudder to the RH Engine

The second Pmix (Figure 155 above) mixes rudder (master) into the Thr (slave) which is the RH motor, starting when the rudder goes below -60% (0% full right rudder, 50% centre and -100% full left rudder) and at full left rudder it gives 100% throttle. But with a T/H (threshold) mix 100% is half of the throttle movement (see Option – T/H (Threshold) on page 68), so if the throttle is closed and full left rudder is applied, the RH throttle will open to half throttle, which will give effective steering.



Figure 156. Mixing Right Rudder to the LH Engine

The third Pmix (Figure 156 above) mixes rudder (master) into the Aux1 (slave) which is the LH motor, starting when the rudder goes above 60% (0% full left rudder, 50% centre and 100% full right rudder) ie 10% right of neutral and at full right rudder it gives 100% into Aux1 (LH throttle). But with a T/H (threshold) Pmix 100% is half of the servo movement (see Option – T/H (Threshold) on page 68), so if the throttle is closed and right rudder is applied, the Aux1 (LH throttle) will open to half, which will give effective steering.

6.1.13 Two Elevator Servos (or Two Rudder Servos)



Figure 157. Pmix to have two Elevator Servo's

This Pmix is for use with models with two elevator servos, that move together including any trim memory that is applied, but have the flexibility to set sub-trim, servo reverse and end point adjust for each individual servo to get the same travel. In the example one elevator servo will be connected to the Ele channel, the other to the Aux1 channel, but the Aux2 channel could be used instead if required.

In this Pmix, it is always On (you always want both elevators to move together), and Ele (master) is mixed to Int1 (slave). The slave Int1 is the Aux1 channel with the lever/slider/potentiometer turned off so that it does not interfere with the Aux1 channel if were moved (see Slave Channel - Int1, Int2 on page 64). If you mixed directly to Aux1 as slave and the Aux1 lever/slider/potentiometer was moved, it would move one of the two elevators which could potentially crash the model. A 100% is mixed both up and down so both elevators have the same movement.

Pmix8 is shown in the example, but other Pmix can be used as long as it's after any other Pmix with the elevator as the slave. Why? With the VintageTx encoder the Pmix are run in sequence, Pmix1 first, Pmix2 etc and Pmix8 last. If Pmix1 was used to copy the elevator to the Int1/Aux1 channel and then another Pmix had Ele as a slave (such as a rudder to elevator mix for knife edge), it would only mix into the Ele channel, not the Aux1 channel, so the elevator servos wouldn't move together.

A similar approach can be used for models with two rudder servos (or twin engines), just make Rud or Thr the master and Int1, Int2 or Int3 as the slave (Aux1, Aux2 and Gear) with the other parameters the same as the twin elevator servos mix.

7 Appendix

7.1 Using the VintageTx Encoder with Flight Simulators

The VintageTx encoder has a CCPM output suitable for many commercial flight simulators and all the prototypes have been used with the RealFlight™ simulator as part of the development program and to familiarise the operation of the transmitter. See the hardware manual for details of connecting up popular flight simulators. Many flight simulators now offer wireless connection which is also suitable.

7.2 Using the VintageTx for Training/Buddy Box



Figure 158. Servo Multiplexer/ Dual Receiver Controller - "On Board Buddy Box"
(Photo shows the Pololu Servo Multiplexer)

The VintageTx encoder has a CPPM type output suitable to connect as the slave for some buddy box setups where the voltage signal levels are compatible. However the VintageTx encoder can't be used as the master transmitter in the traditional method where the pupil/slave transmitter is connected to the VintageTx via a cable as there is no ppm input.

But not all is lost as there is an easy and reliable method that allows the VintageTx to be used as the master or slave transmitter with any brand or model of transmitter. Both Pololu and Assam make a series of dual receiver controller modules that fits in the model with two receivers connected, the VintageTx is the master receiver and the other receiver the slave. The master transmitter needs a receiver with a spare channel that is used to switch between master and slave receivers. They are widely available in 4, 6 and 8 channel versions on the internet including Pololu and HobbyKing.

But how do you control it? You could use the gear switch if you don't mind having an un-sprung switch, but it's not ideal. You could replace the gear switch with a sprung loaded switch if the transmitter would never use the gear switch. The only sprung loaded switch on the VintageTx is the AutoTrim switch also used for the single channel (which was originally the trainer switch if fitted). The AutoTrim switch does not normally have an output, so some lateral thinking is required.

If the VintageTx has the Single Channel mode selected, the Single Channel switch (AutoTrim) is directly output on the Gear output with the gear switch being disabled. This can be used to switch the trainer module between master and slave. You have to ensure that the Single Channel mix has no throttle control selected and the rud and ele % are set to zero. When the switch is pressed it outputs on the Gear channel which switches to slave and when released, it goes back to master. And the joysticks work normally regardless if the Single Channel mix is selected, so as soon as the switch is released you have full normal control.

7.3 Suitable Transmitters for Conversion

The list below is of transmitters that have either been converted or physically checked to ensure they would be suitable for conversion. Obviously the list is not definitive and there are hundreds of others.

EK Logitrol (USA)

Champion, LRB

Fleet / Digi-Fleet (UK)

Fleet-4, Custom Deluxe, Custom MK1, Custom MK2 and Custom MK3

(any blue or black cased Fleet transmitter is suitable, but the silver cased XP/FM, PCM or Omega will need the trim potentiometers wiring to the main joystick)

Futaba (Japan)

Digimax 3, 4 and 5 (UK)

M3, M4, M6 (beige cases) and M6 FM (silver alloy case) UK models

FP-3FN, FP-4FN, FP-5FN, FP-6FN, FP-T3FN, FP-T4FN, FP-T5FN, FP-T6FN (Rest of World)

Robbe (France) and Sataba (S. Africa)badged Futaba's that are the equivalent of the above

Gem/Mainstream (UK)

GEM4 – metal cased versions

Horizon Systems (UK sets from the 1970's and have no connection to Horizon Hobbies/Spektrum)

HS4D *, HS6D *, HS8D *, HS3E *, HS4E *, HS6E *

KO Digiace (Japan)

IC4N, IC6N

Kraft (USA)

Gold Medal, 71, 72, 73 and 74 Series, Kraft Sport Series (from 71 - 74). Later models can be converted but require the trim pots to be wired with additional components.

(Any Kraft system with auxiliary channels will need a bracket to hold the auxiliary potentiometer that was mounted on the battery box – the battery box has to be removed for the display)

MacGregor (UK)

Digimac III*, IV*, VI*

Micron (UK)

PL-6D, PL-7D (AM and FM)

(* indicates that the display can't be hidden behind a label and will need a bezel on the front or rear mount the display inside the transmitter)

Microtrol (UK)

All models, but some have no label and will need either rear mounting or a bezel for the display

MRC (Japan via USA or UK Distributor)

MK5, 764, 766

Orbit (USA)

OS (Japan)

Cougar MK1, Cougar MK2, Diamond

RCM&E (UK)

RCM&E kit based on the Controlaire MAN234/World Engines*

RCM&E FM Kit

RCS (UK)

DigiFour, DigiFive, DigiSix

Sanwa

Excellence

Simprop/Mainstream (Germany + built under licence in the UK)

Digi 5

Sprengbrook (UK/USA – Designed by Doug Spreng, built in UK)

Sprengbrook 4, 6

HB4, HB6 (same as above but supplied as kits)

Staveley/Swan (UK – Early digital models designed by Doug Spreng)

Analogue, Gold Star, Silver Star, Series 73, Cob Master

Skyleader (UK)

SL, S3, SLX, TS, TSX, Clubman, Clubman Super, Courier, Courier Special MK1 & MK2

Waltron (UK)

4-5, Super 4, Super 6

World Engines (USA/UK)

Blue Max (US), Expert MK1 & MK2 (US), Talisman (UK)

(* indicates that the display can't be hidden behind a label and will need a bezel on the front or rear mount the display inside the transmitter)

7.4 What is single channel Control?

In the early days of radio control the majority of radio controlled aircraft had just rudder control. The transmitter had a push button switch and when pressed operated a relay in the aircraft. This was used to operate an escapement that gave full rudder in one direction, say left and when the switch was released the rudder returned to neutral. When the switch was pressed again it gave full right rudder and again when released it returned to neutral. Next left, then right, then left etc. This became known as sequential control. The actuator was normally a rubber powered escapement, but some versions were clockwork and some later versions were electric motor driven.

Later compound escapements were developed that offered selective right or left. The escapement actually cycled through four positions, right, neutral, left and then back to neutral, but with correct switch timing could be stopped at the right and left positions (without the switch being pressed they would return to neutral).

For the popular Elmic Commander or Compact (in the UK), if the switch was pressed and held it gave right (and when released through neutral, left and stopped back at neutral). If the switch was pressed twice it would pass through right and neutral and stay at left rudder until the switch was released when the rudder would return to neutral.

Some motor driven actuators such as some OS Minitron's worked in the reverse sense and one press for left left and two for right. To emulate an OS Minitron set the `rud%` to a negative value in the S/C menu.

Escapements were further developed so that a "quick blip" of the switch would actuate a second escapement to give alternate full throttle/tick over or a three position throttle depending on the make. The main escapement would still cycle through right/neutral/left/neutral. A further development gave kick up (or down) elevator with three presses on the switch, though the timing had to be fairly accurate otherwise the escapement would just cycle the whole way around again.

Single channel continued to be popular in the UK until the early 70's as the cost of early multi-channel reed and proportional sets made them unaffordable for many.

There is a revival of single channel flying in the UK, with many old single channel sets being converted to 2.4GHz and even new sets being made by hobbyist.

7.5 With Thanks

Thanks to the following people to have helped the VintageTx project:

Dave Anderson for proof reading the manual and making suggestions to the manual's layout.

Phil Green for inspiring the VintageTx project with his encoder for vintage transmitters.

My wife for putting up with me in front of the PC programming for so much time and then test flying at the field.