

Programming the MicroStar 2000

Version 1.1



Gordon Anderson
December 18, 2004
Rev 1.1

Dedication

I would like to dedicate this project to my Dad, Richard C. Anderson and my brother Dave. My Dad created my interest in RC at a very young age. This interest in RC sparked my interest and career in electronics.

Without his love and support this would not have been possible.

And to Dave, my big brother, who's life was cut short by cancer, at an age of only 37.

Table of contents

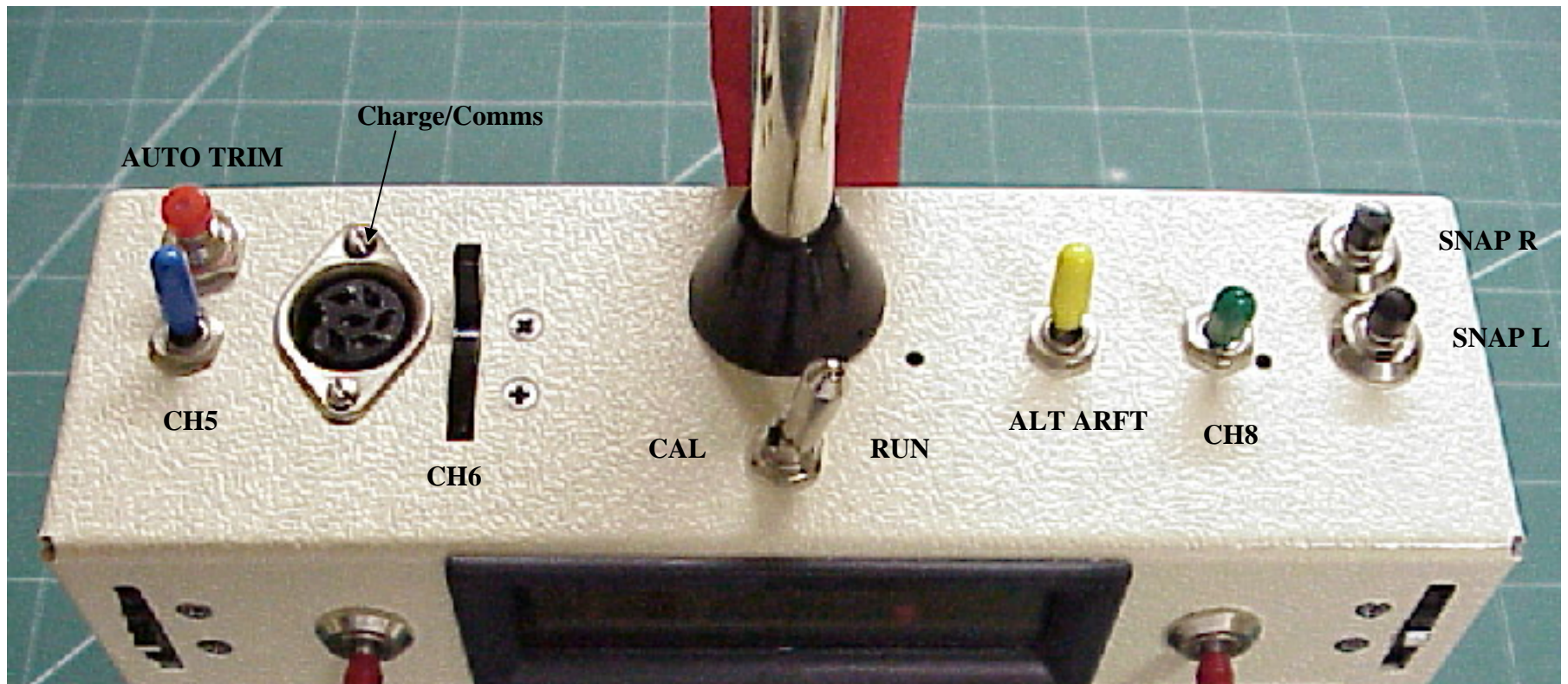
Transmitter Front Switches.....	4
Transmitter Top Switches.....	5
MicroStar startup.....	6
MicroStar TEST IO startup option.....	7
Tachometer Module.....	8
MicroStar 2000 Menu Options.....	9
Entering the Calibration mode.....	10
Select Aircraft.....	11
Aircraft Name.....	12
Timer.....	13
Timer notes.....	14
SNAP.....	15
Servos.....	16
Centering servo setup.....	17
Throttle servo setup.....	18
Non-centering servo setup...	19
CH8 servo setup.....	20

MIXER.....	21
General Mixers.....	22
General Mixer parameters.....	23
VTAIL.....	24
ELEVON.....	24
Dual Aileron.....	25
Throttle Hold.....	26
Idle Up.....	27
SWITCH.....	28
Options.....	29
Options parameters notes.....	31
Auto Trim.....	32
Copy Aircraft.....	33
Shared Options.....	34
Buddy Box.....	35
Table selection.....	36
Table setup.....	37
System Setup.....	38
System Setup notes.....	40
Voltmeter Calibration.....	41
SPROM.....	42
Configure.....	43
JoyStick Cal.....	45
Select Frequency.....	47
Transmitter Switch Definitions, Front.....	48
Transmitter Switch Definitions, Top.....	49

Transmitter Front Switches



Transmitter Top Switches



MicroStar startup

When power is first applied you will see the following signon message for about one second.

MircoStar 2000
Version 1.1a

After a 1 second delay this retract warning will be displayed if it has been enabled in the Options menu.

Retracts are UP!
Press Option

When my RF deck is used, this option will allow you to start up the transmitter without any RF output.

53.3 MHz
Accept? Yes (No)

R indicates RF is on, only applies when my RF deck is used.

A indicate alternate aircraft is selected

These three dashed (---) indicate the status of the mixer switches. If mixer number 2 is on your will see -M-.)

Option



Transmitter battery voltage

Aircraft name

Auto Trim

On time, or down counter. The down counter is started by pressing the Option button. The timer will beep three times at 1 minute, twice 30 seconds, once at 10 seconds and every second starting at 5 seconds.

10.5 RA--- 00:00
CUB

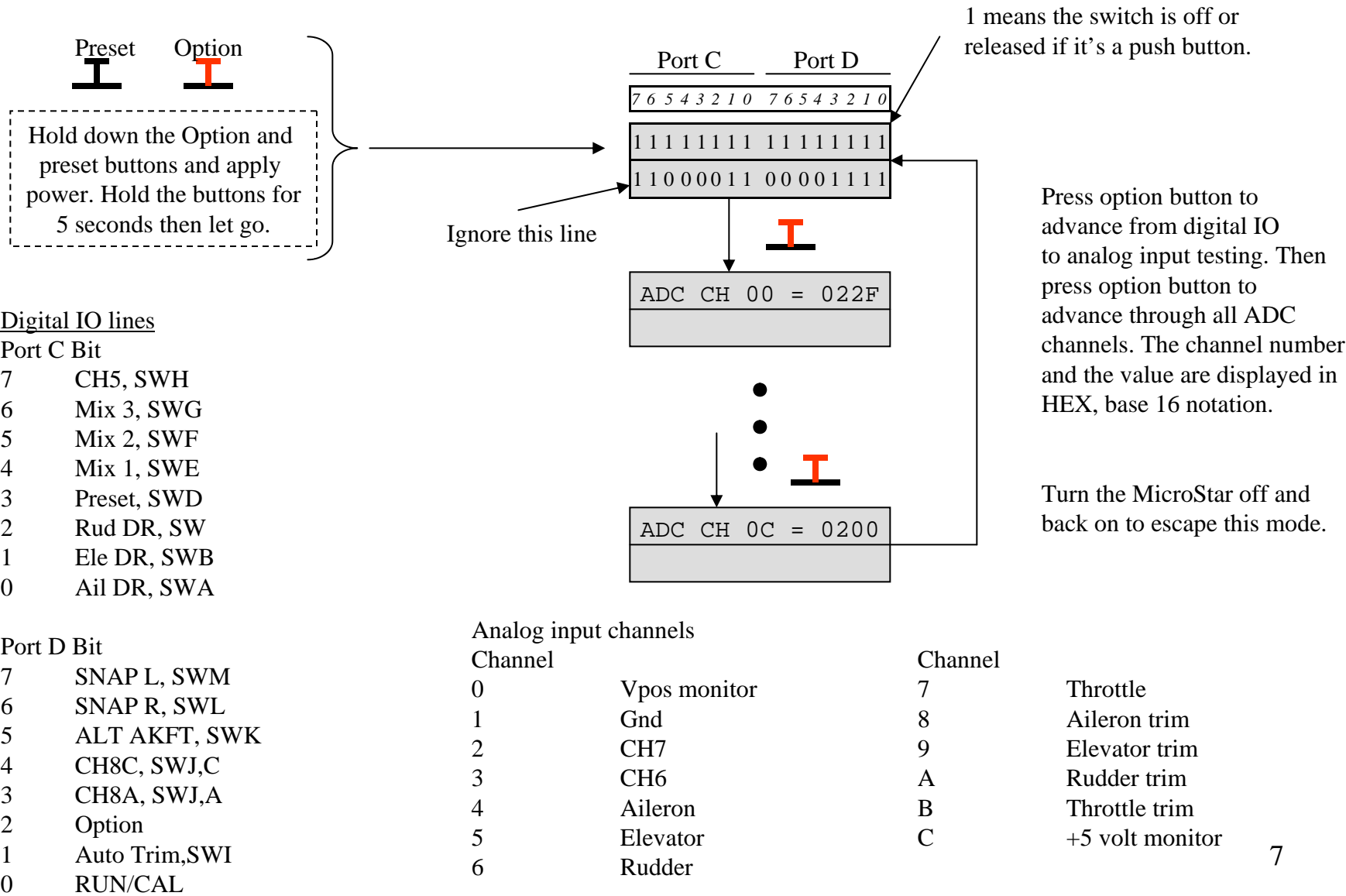
165 RA--- 00:00
CUB

Pressing the Auto Trim button will change the battery Voltage display to the total on time of the transmitter in minutes.

To startup using a default setup, bypassing the data in the configuration SPROM, press the Auto Trim and Option buttons then apply power. Wait 5 seconds then release the Option and Auto Trim buttons.

The second line of the display will also show a message any time a function switch is changed. For example if you switch the aileron dual rate switch to low rate, the second line will read "AIL D/R LOW" for about two seconds then return to the aircraft name.

MicroStar TEST IO startup option



Tachometer Module

When the optional Tachometer module is plugged into the accessory jack on the side of the MicroStar the second line of the display will read the detected RPM. The MicroStar detects the presents of the Tach module automatically!



Example display

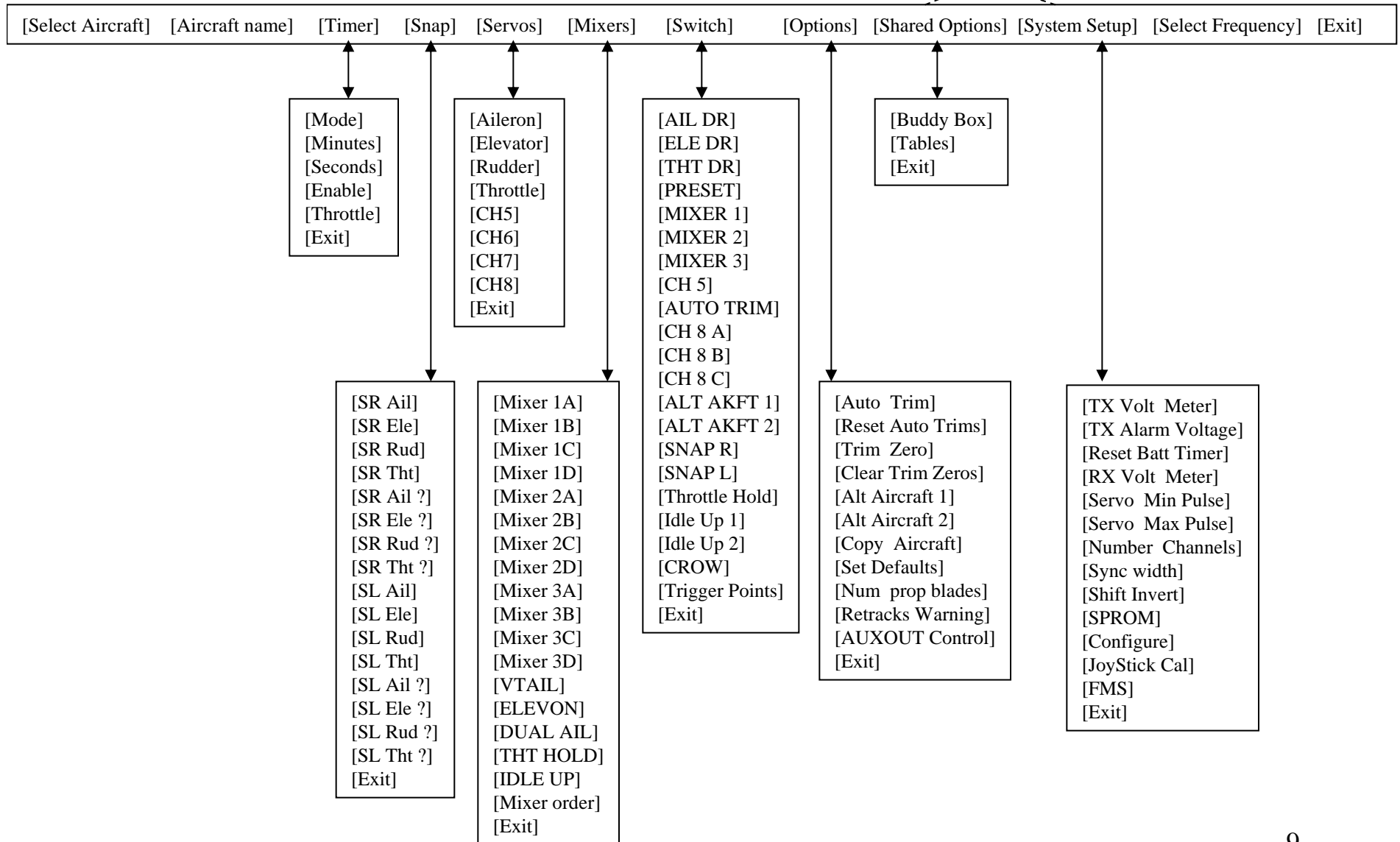
10.5	RA---	00:00
2Bl'd	RPM =	2430

The number of prop blades can be defined in the MISC parameters, Different aircraft can have different Tach parameters

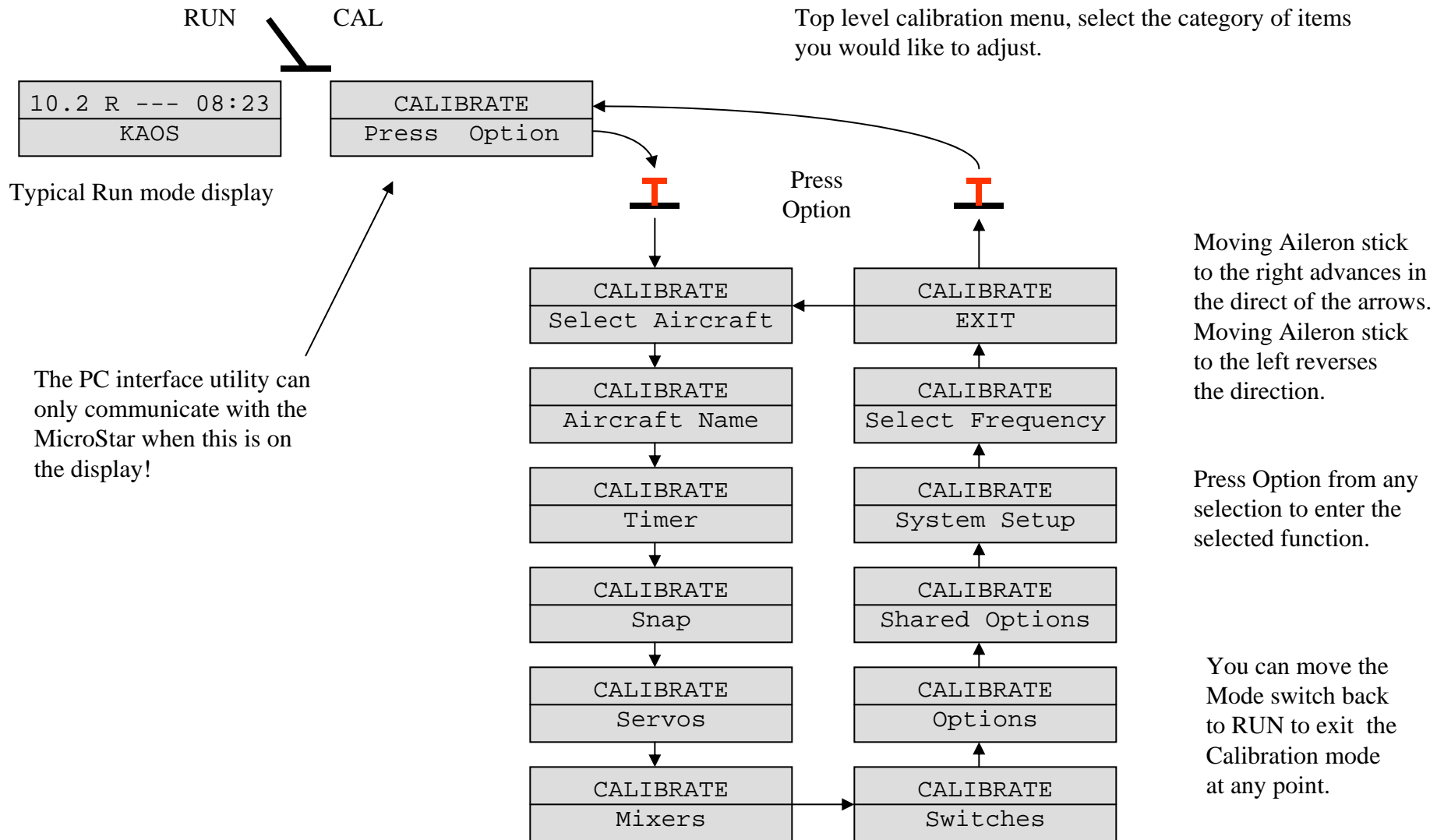
Another unique feature of the MicroStar is direct servo drive. Through the same accessory jack any channel can be used to drive a servo. This is helpful during programming and testing.

MicroStar 2000 Menu Options

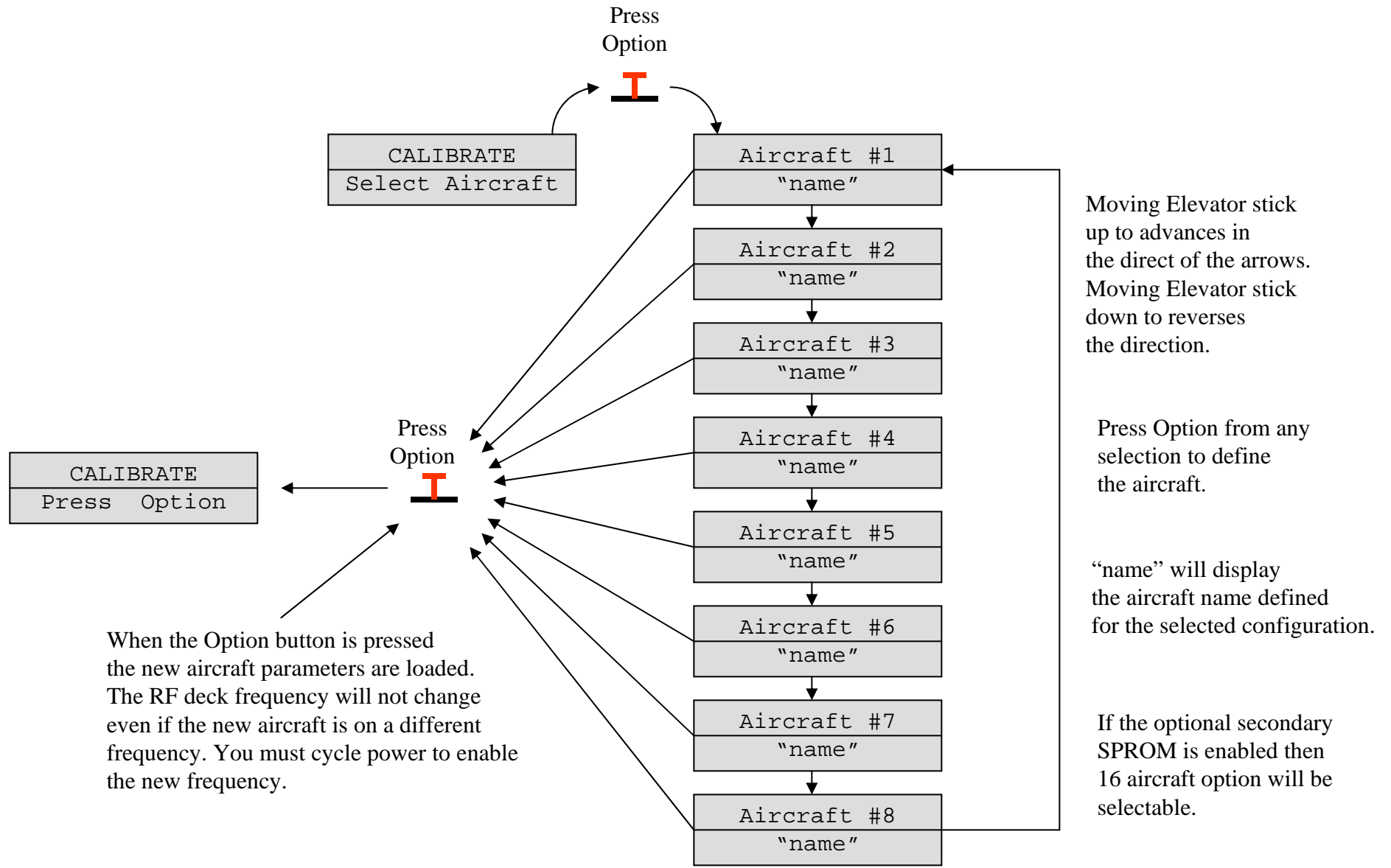
These two menus apply to ALL aircraft!



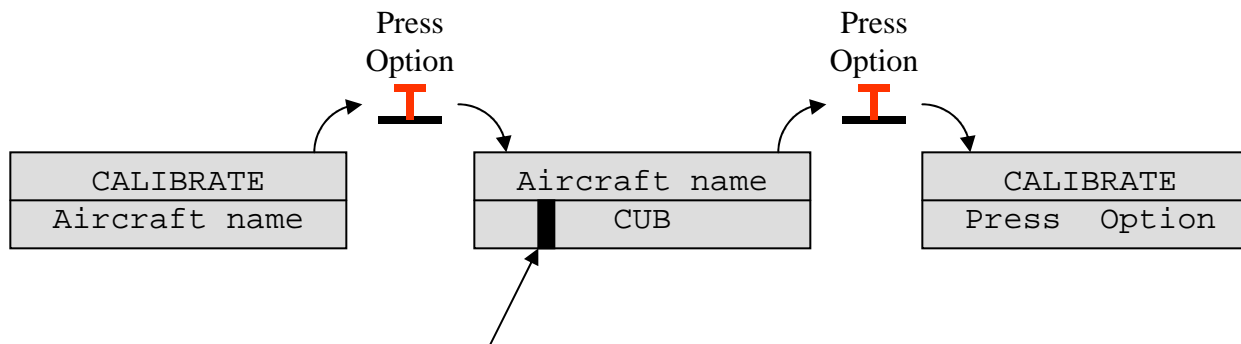
Entering the Calibration mode



Select Aircraft



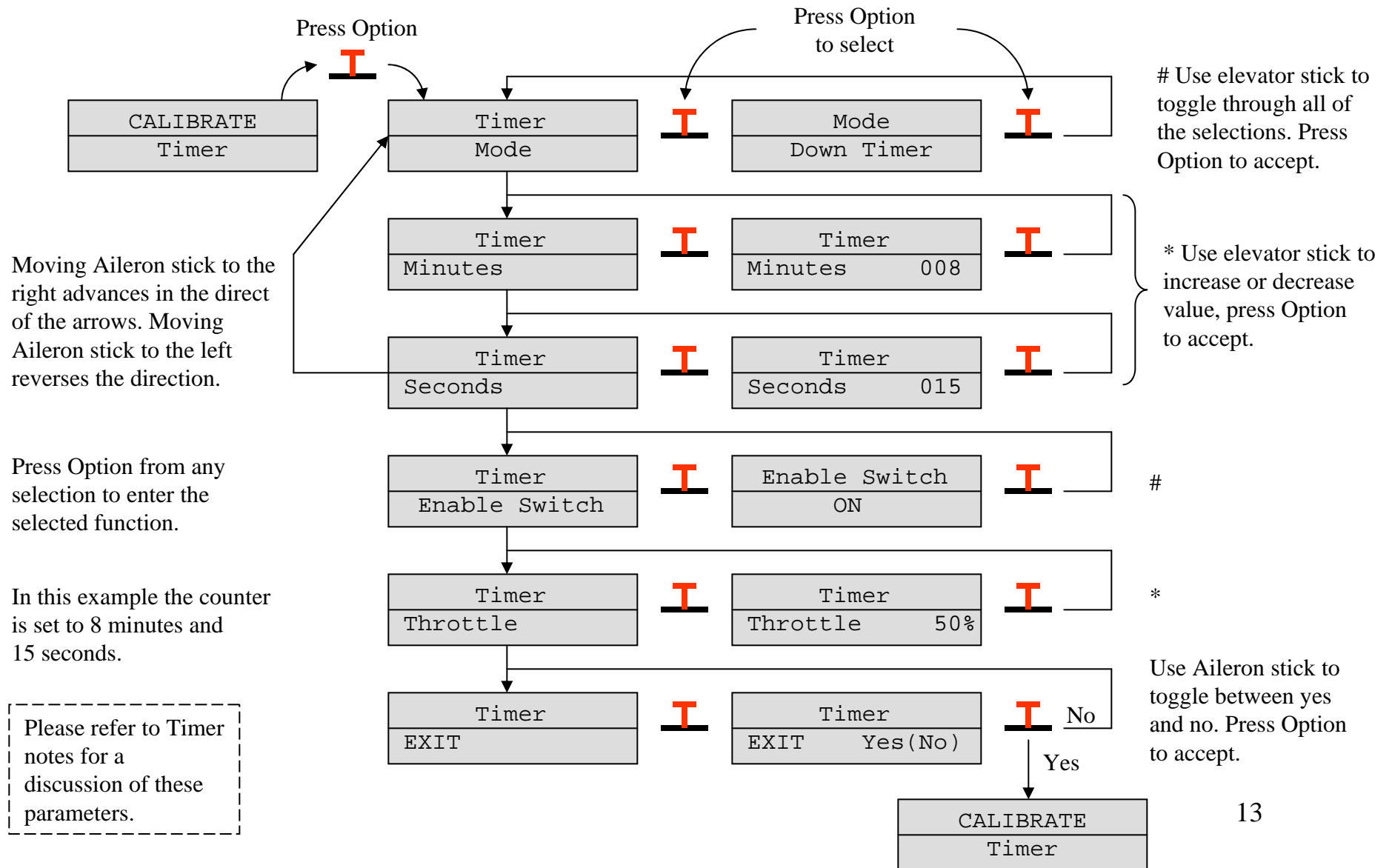
Aircraft Name



This blinking cursor can be moved to the right or left using the aileron stick. The character defined at the cursor can be changed using the elevator stick. After the model name is defined, press the Option button to accept the changes.

Timer

This function allows you to define the flight timers parameters. This counter is started by pressing the option button when you are in the run mode. Pressing the option button again will stop the timer. When the timer is started again, it will start counting down from the starting value defined in this function.



Timer notes

The Flight Timer is started by pressing the Option button. The timer will beep three times at 1 minute, twice 30 seconds, once at 10 seconds and every second starting at 5 seconds. The Timer can be stopped by pressing the Option button while the Timer is counting. Stopping the Timer will reset the count and when the Option button is pressed again the Timer will restart.

The flight timer supports three modes of operation.

Up Timer

In this mode the timer starts at 0 and counts up. When the time limit has expired the buzzer will sound warning the pilot that its time to land. After the alarm has sounded the timer will continue to count up, this allows you to determine the total flight time.

Down Timer

The Down Timer is the default mode. In this mode the counter starts at the programmed time limit and counts down to zero. At zero the alarm will sound and the counter will start counting up. After the alarm has sounded the count value indicates how long after the time limit expired that the flight continued.

Down Stop Timer

The Down Stop Timer works similar to the Down Timer except the counting stops when the limit is reached.

The timer can be enabled and disabled in using both the throttle position and a user programmable switch function. The two methods are described below:

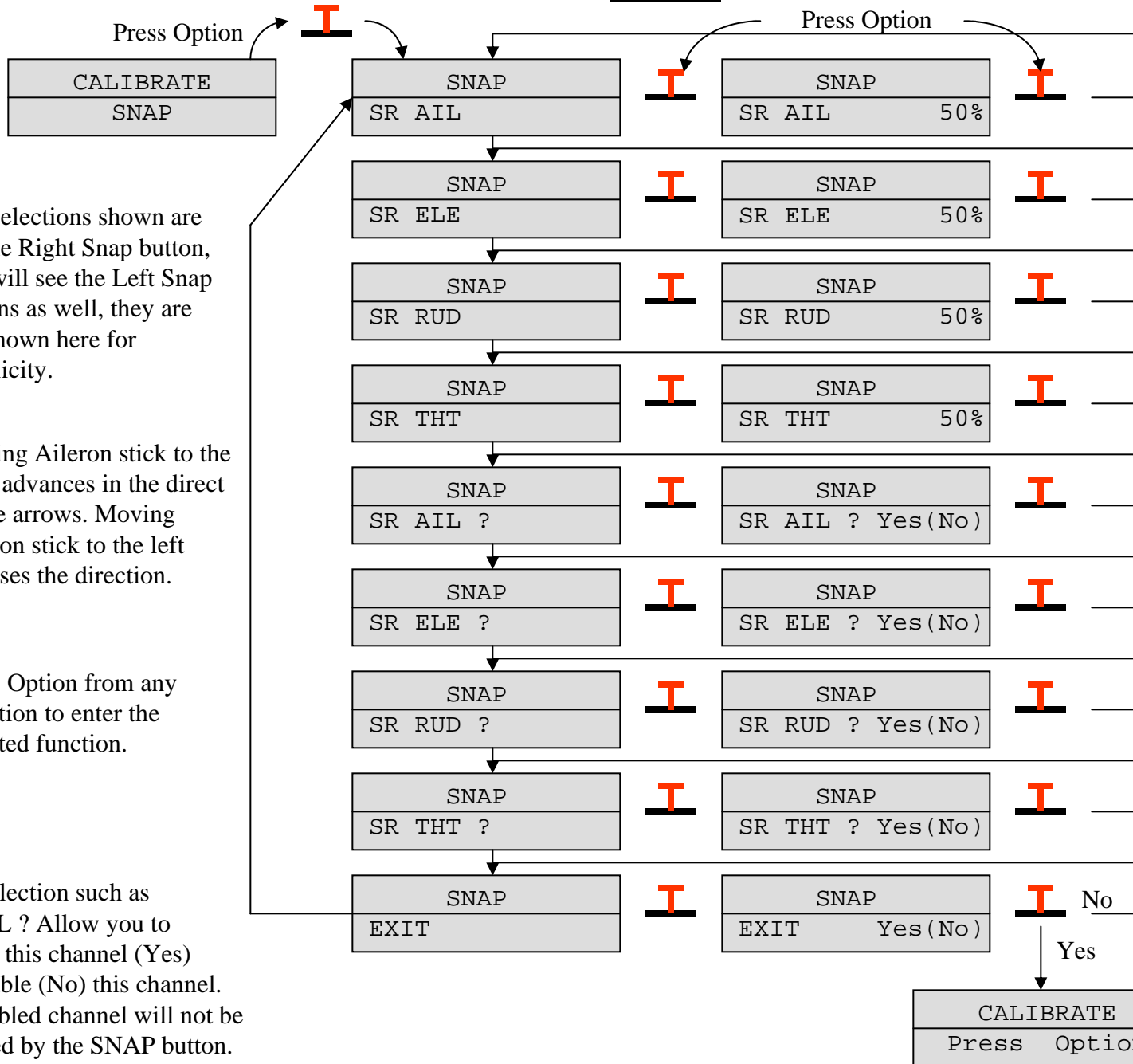
Throttle

Flight time is generally a function of the fuel consumption and this is controlled by the throttle setting. To allow the pilot to factor the throttle setting into the flight time, the throttle stick position can be used to enable and disable the timer. This setting is in percent of full throttle, if the throttle setting is above this value the timer will run. The default value is 0.

Enable Switch

The Enable Switch option allows the pilot to define a switch to be used to enable and disable the timer. The default value for this switch is “ON”.

SNAP



The selections shown are for the Right Snap button, you will see the Left Snap options as well, they are not shown here for simplicity.

Moving Aileron stick to the right advances in the direct of the arrows. Moving Aileron stick to the left reverses the direction.

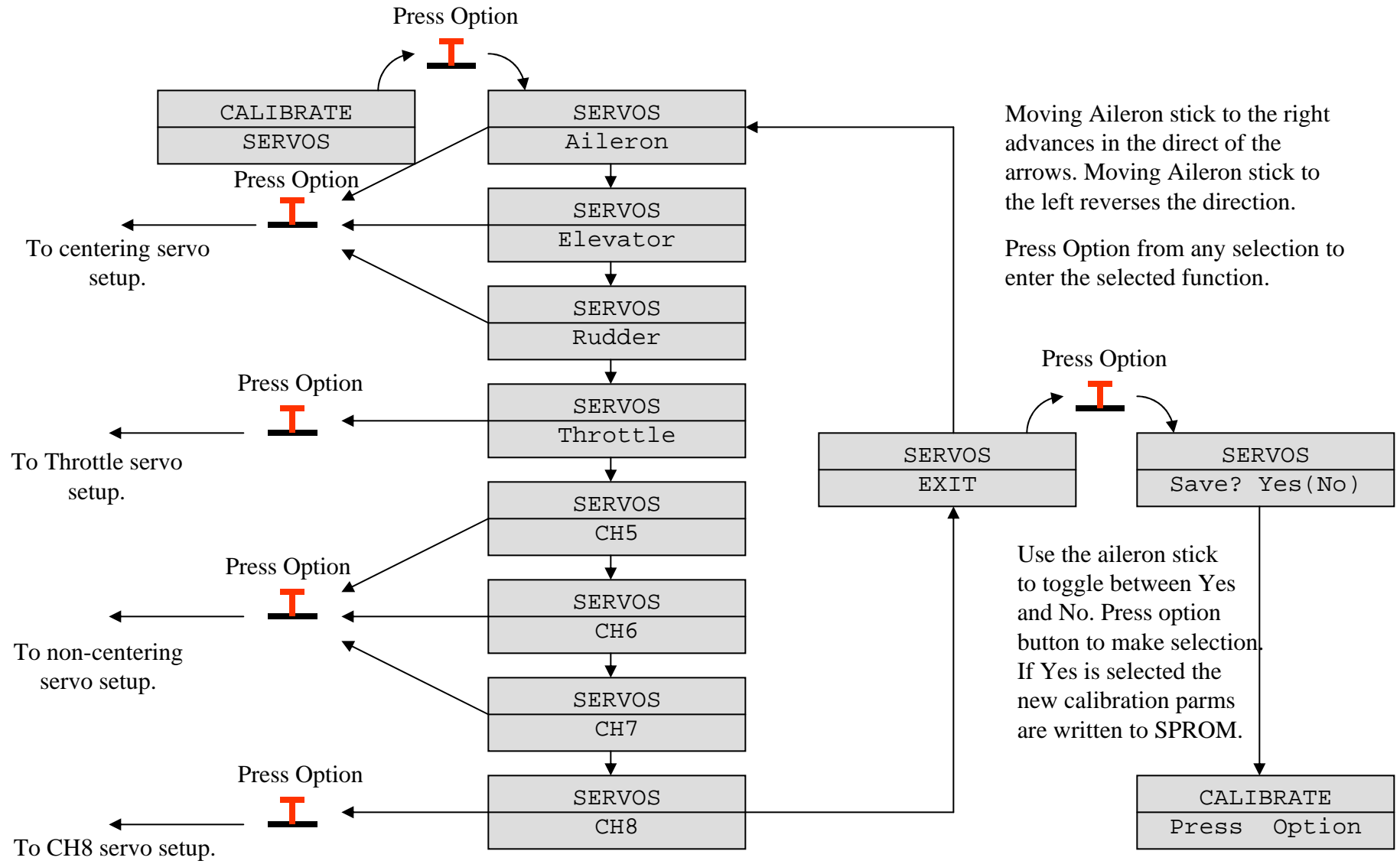
Press Option from any selection to enter the selected function.

The selection such as SR AIL ? Allow you to enable this channel (Yes) or disable (No) this channel. A disabled channel will not be effected by the SNAP button.

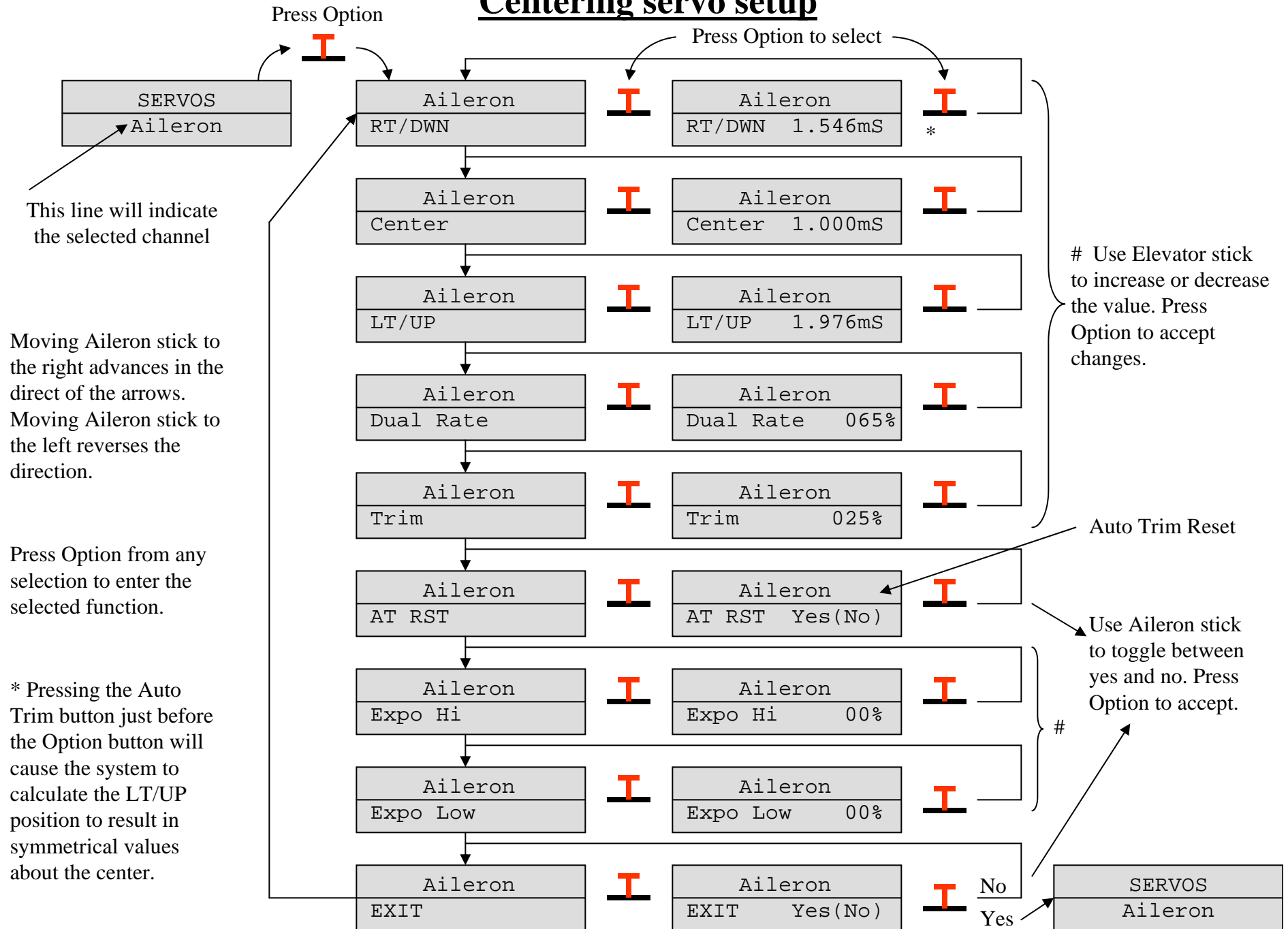
Use Elevator stick to increase or decrease the percentage. Press Option to accept changes.

Use Aileron stick to toggle between yes and no. Press Option to accept.

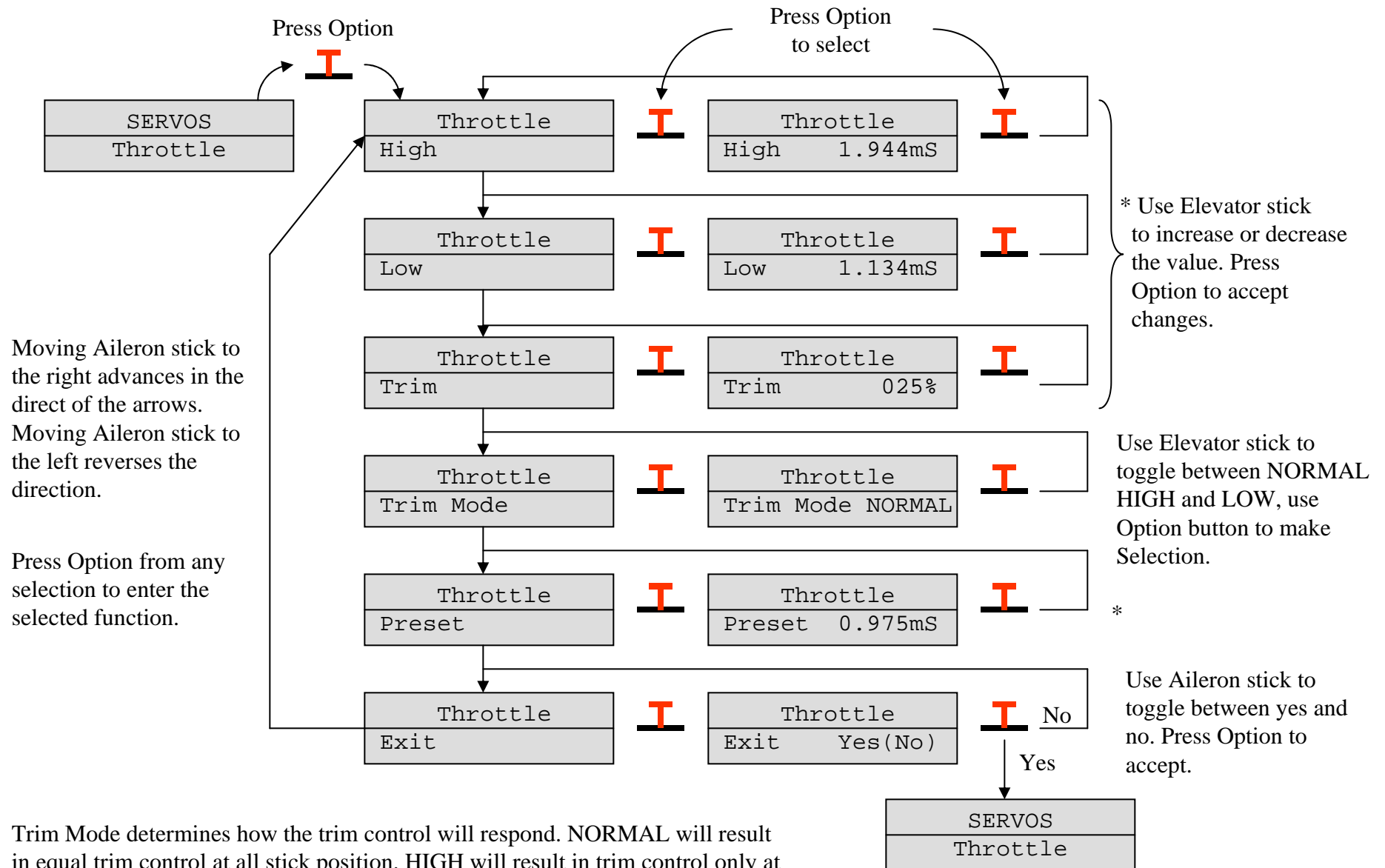
Servos



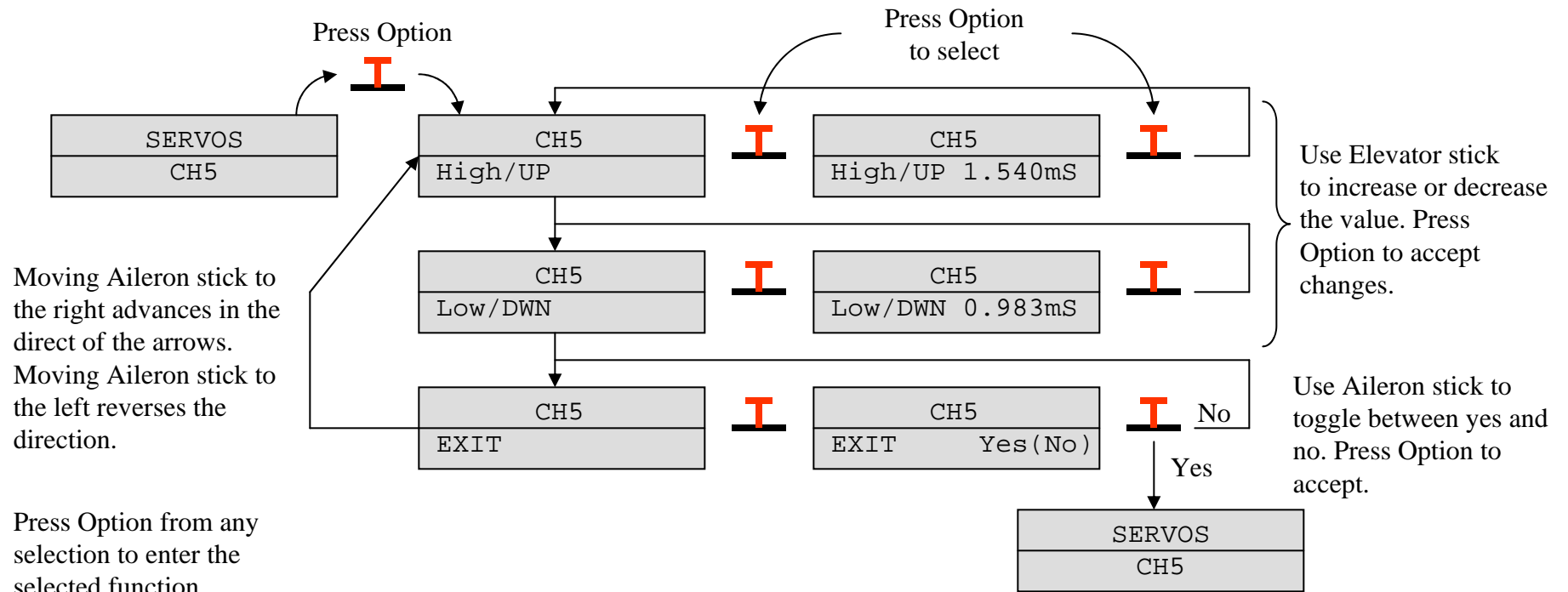
Centering servo setup



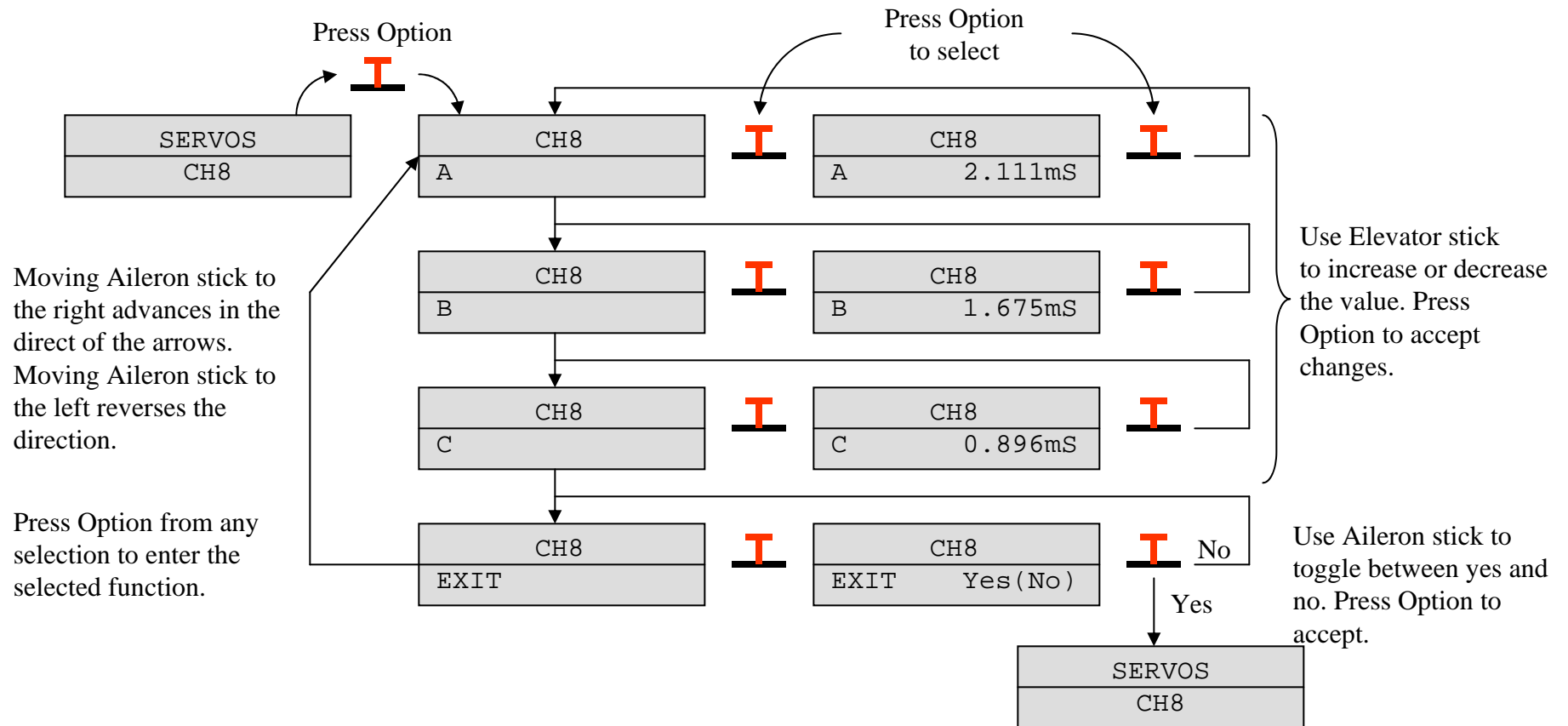
Throttle servo setup



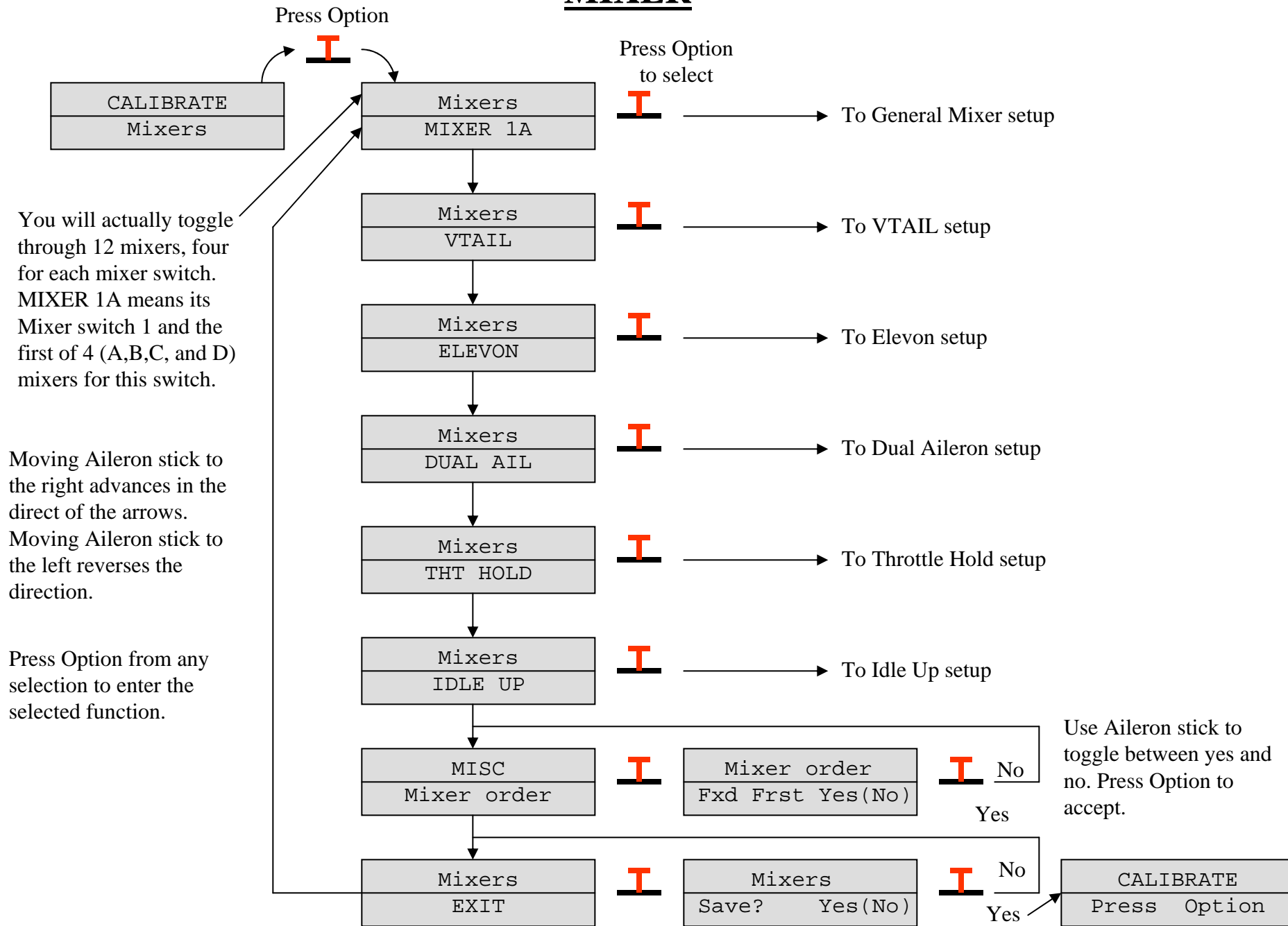
Non-centering servo setup



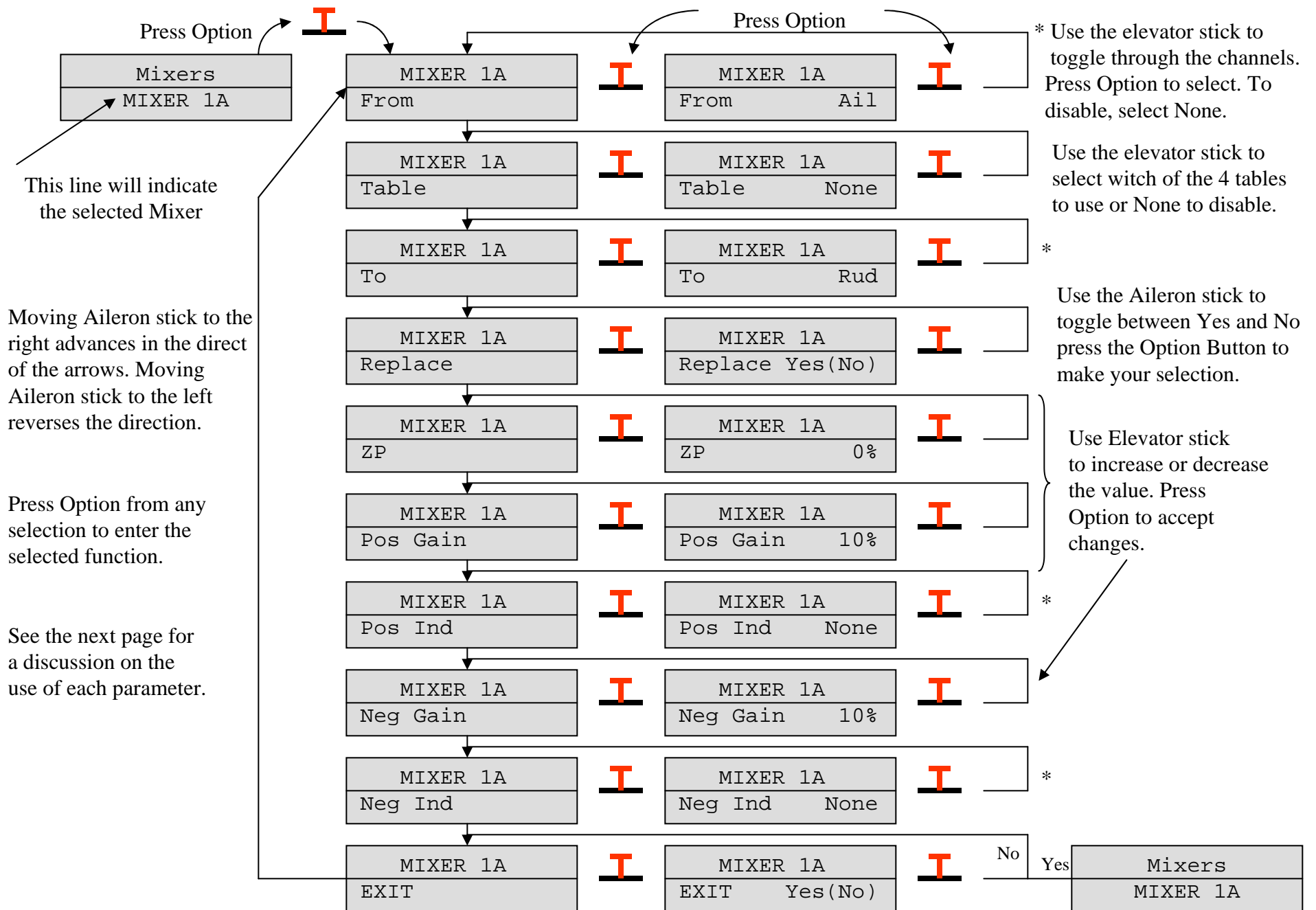
CH8 servo setup



MIXER



General Mixers



General Mixer parameters

From:

The From channel defines the input position data to be used by the mix function. Any of the 8 channels can be use.

To disable a mixer, set the from channel to None.

Table:

The input channel can be translated using any function you like through the use of the look up tables. Eight tables are provided (1 through 8), or select None to disable. The tables contains 11 points that the user can define (please see the details in the Shared Options section).

To:

The output channel for the mixing function, this is the channel effected by the mixing. Any of the 8 channel may be used.

Replace:

This is a Yes No parameter that lets you use the result to add to the To channel or replace the To channel.

Zp:

This is the zero point for the mixing function, in percentage. Mixing is performed by subtracting the zero point from the From channel position. The resulting value can be positive or negative. This result is multiplied by the negative of positive gain and then added to the To channel, or written to the To channel. Its important to remember that these calculation are performed using normalized stick positions. The centering controls are normalized to; -1000 for left or up, 0 for center, and 1000 for right or down. The non centering controls are normalized 0 to 1000.

Pos gain:

Position gain in percentage.

Pos Ind:

Positive indirection allows you to define a channel to be used as the gain channel. Any of the 8 channels can be used, or select None to disable.

Neg gain:

Position gain in percentage.

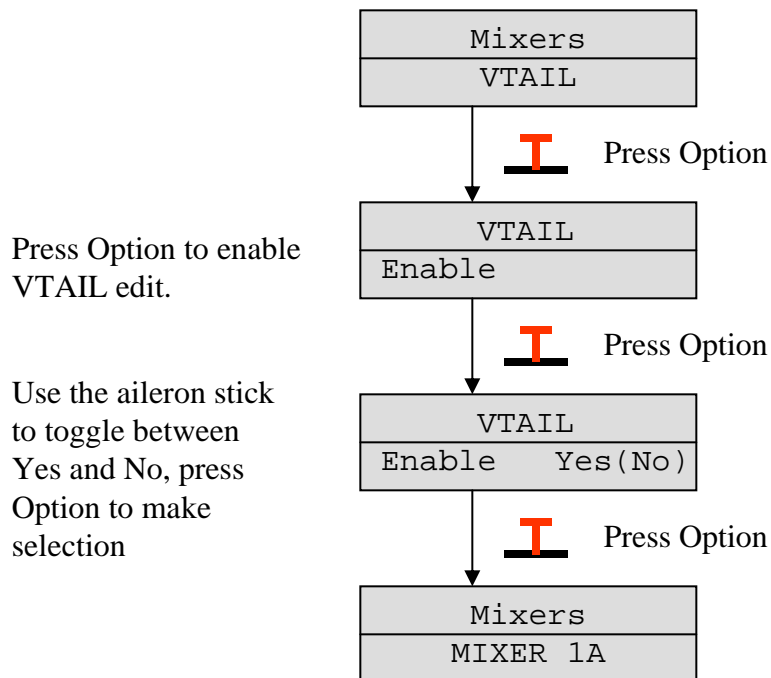
Neg Ind:

Negative indirection allows you to define a channel to be used as the gain channel. Any of the 8 channels can be used, or select None to disable.

EXIT:

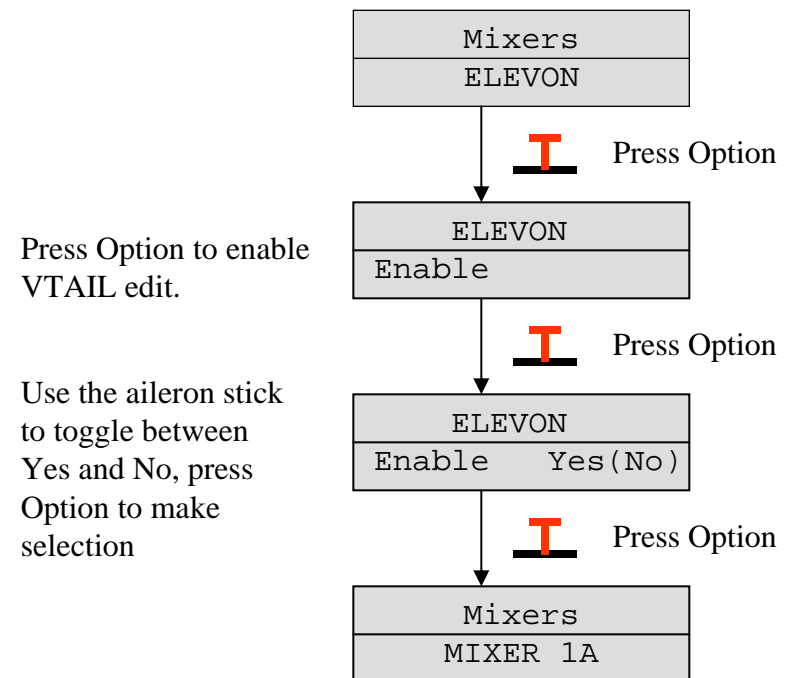
Select this option to exit this mixer function.

VTAIL



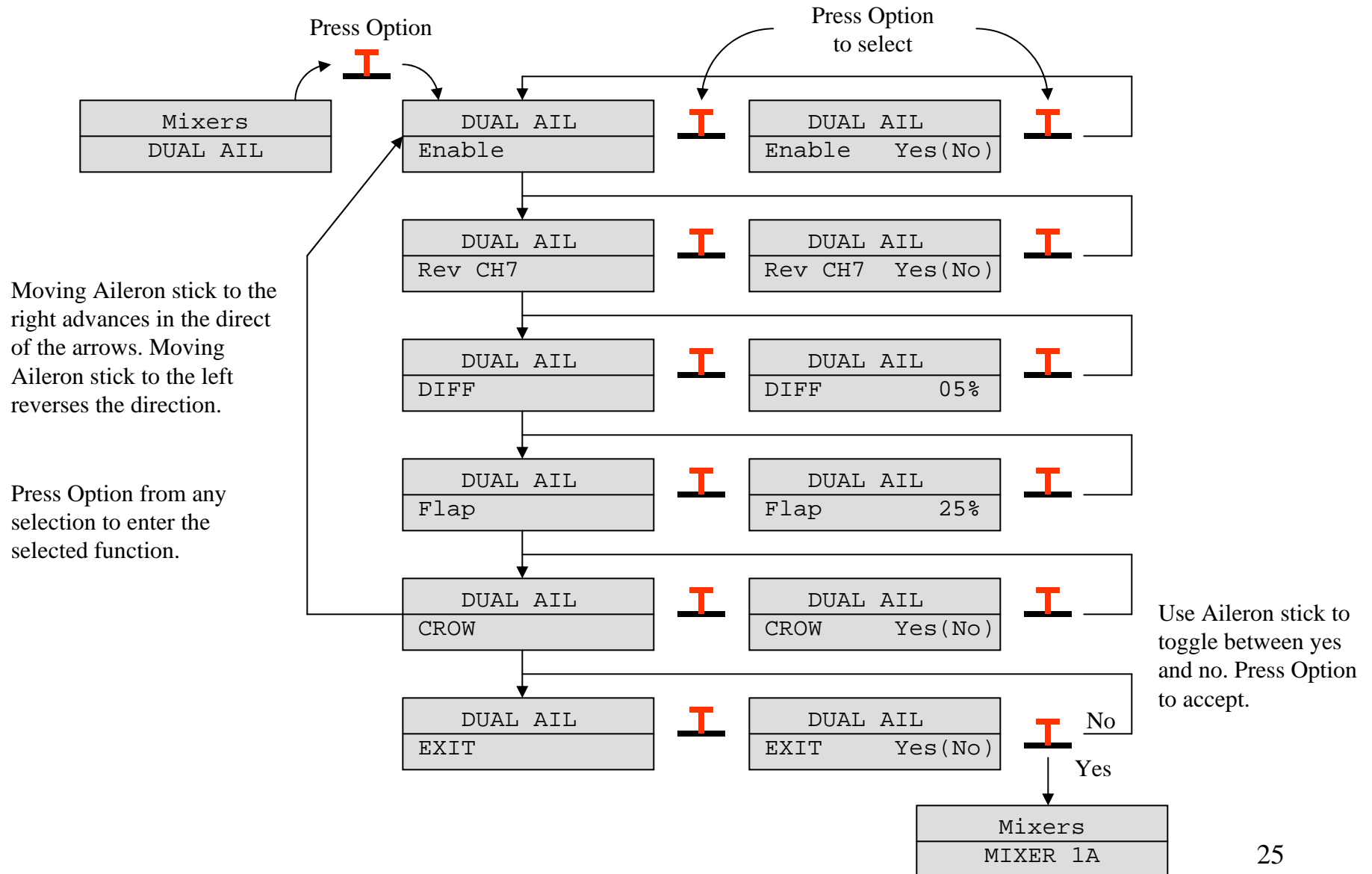
VTAIL mixing is Rudder and Elevator mixed to support aircraft designs with V shaped tail surfaces.

ELEVON

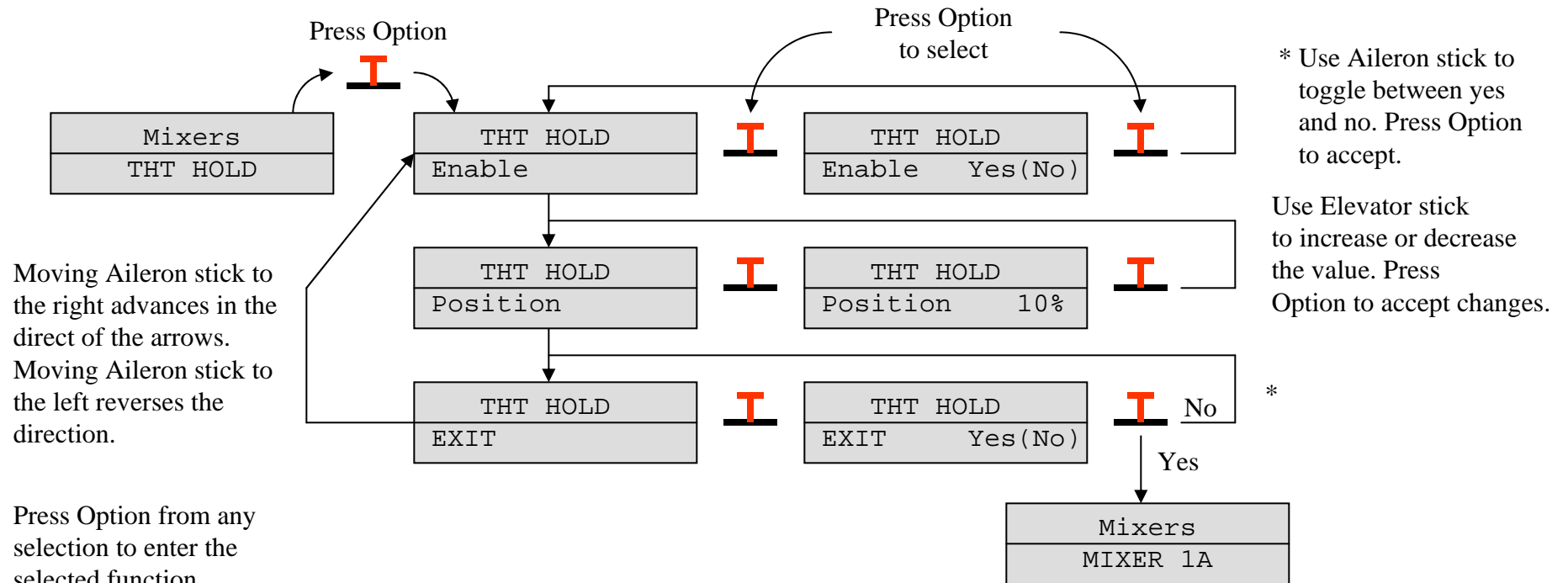


ELEVON is aileron and elevator mixing to support flying wing type of aircraft designs.

Dual Aileron

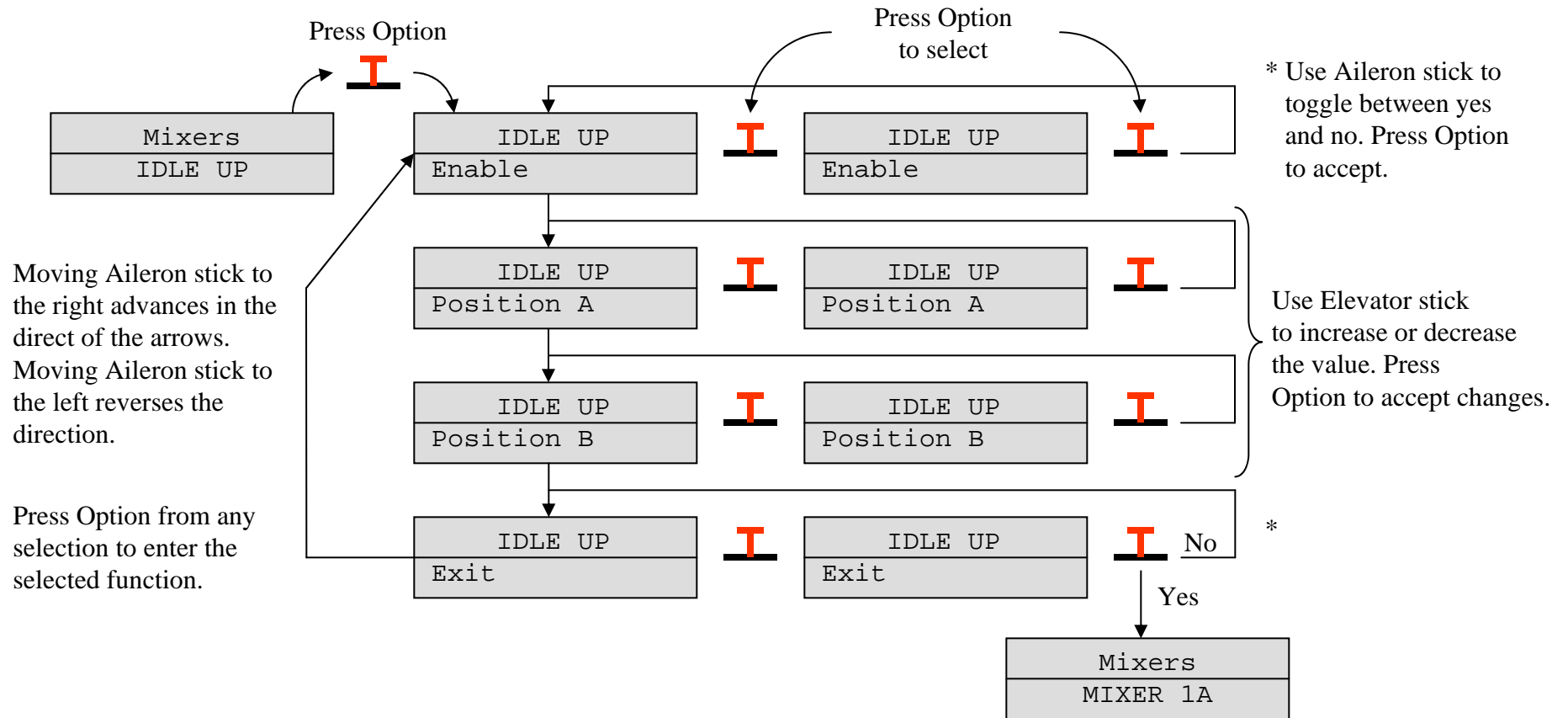


Throttle Hold



The Throttle hold function uses channel 5 to enable and disable, this switch can be changed using the SWITCH menu. When enabled this function will hold the throttle at a fixed position determined by the position percentage. 10% would hold the throttle 10% open.

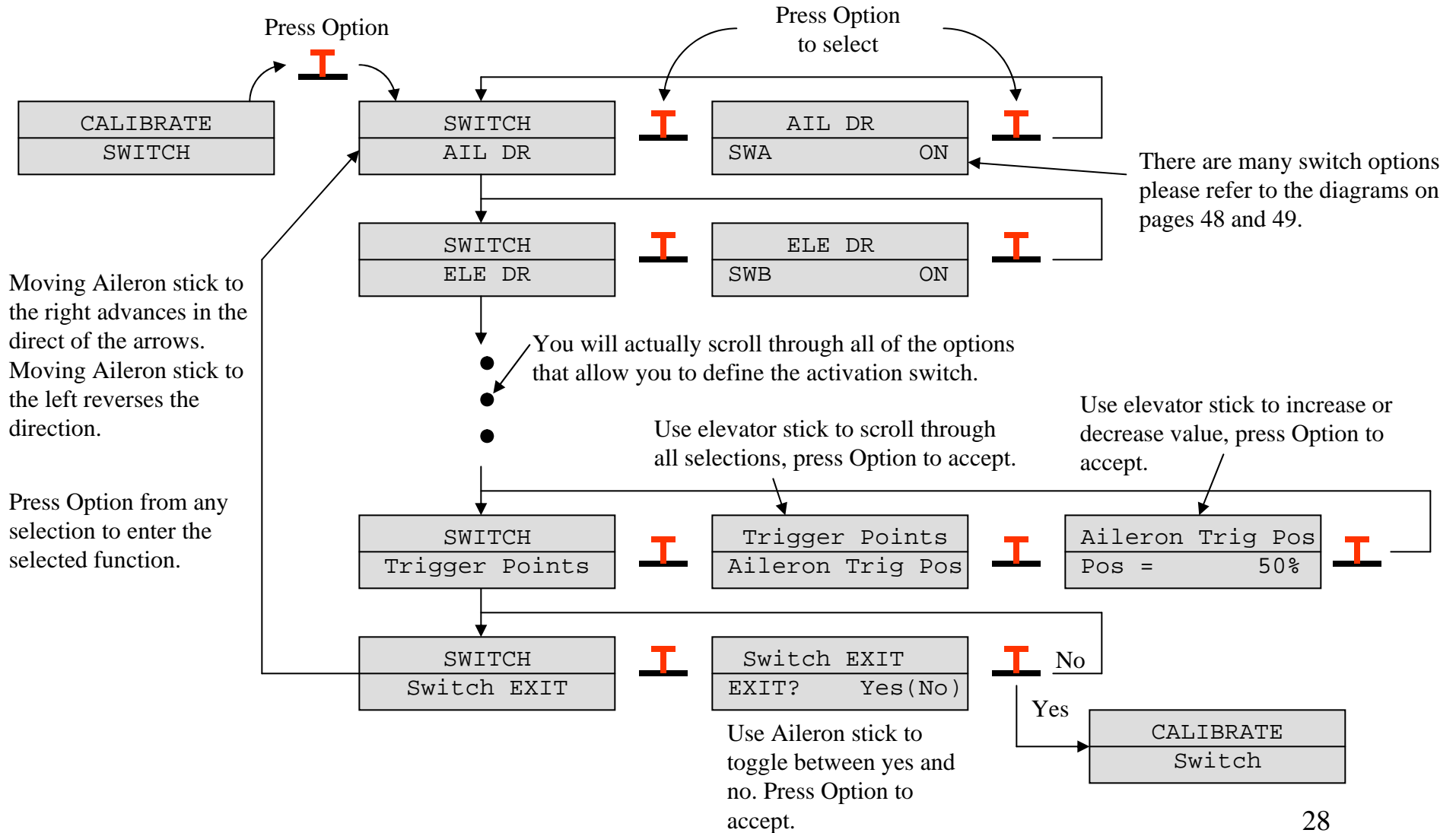
Idle Up



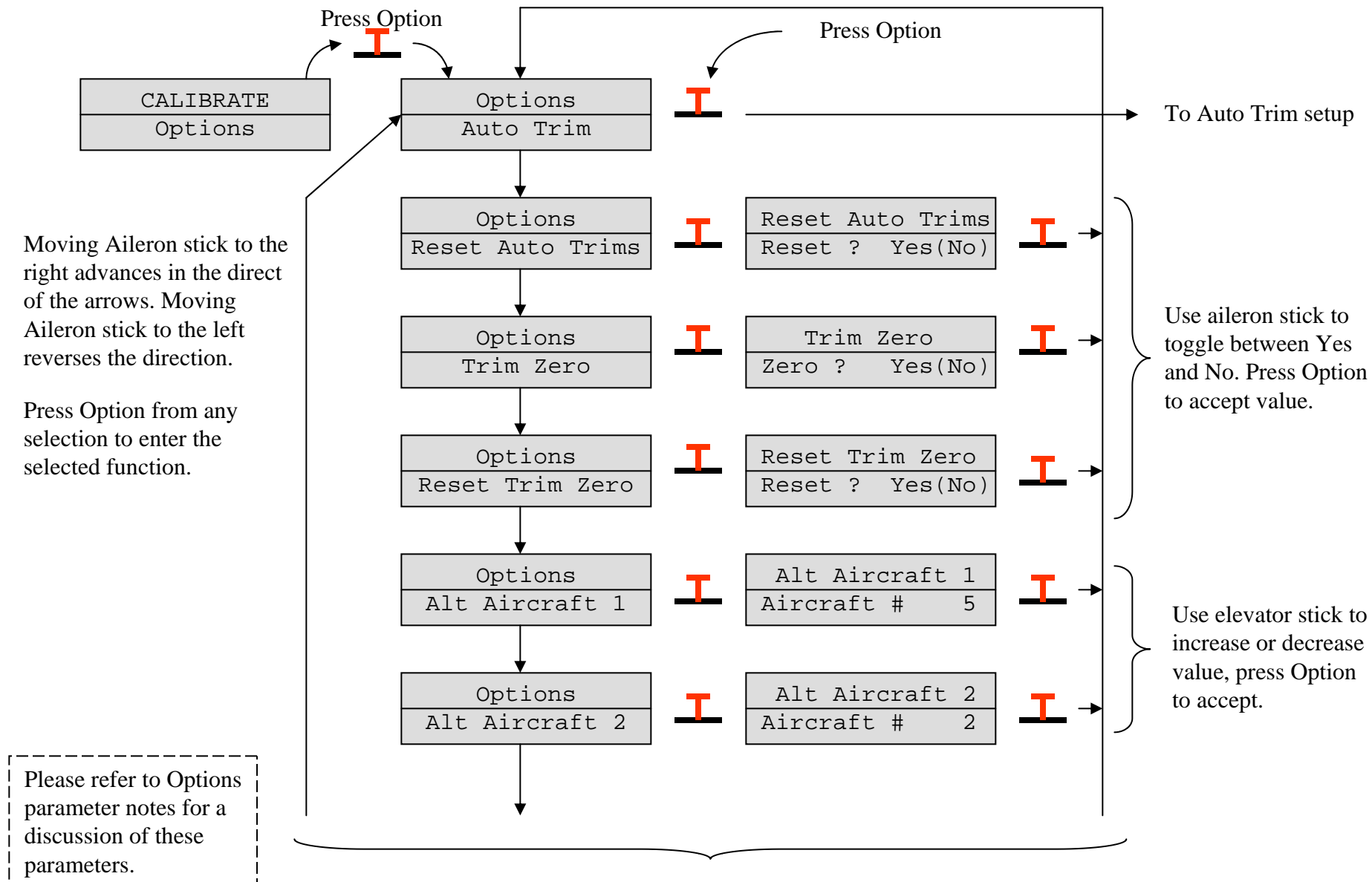
The Idle Up function uses the channel 8 three position switch to enable and disable, this switch can be changed using the SWITCH menu . In position C the function is disabled, in position A and B the percentages defined above are used to define a minimum throttle level.

SWITCH

The Switch calibration function allows you to define which transmitter switch is used to activate different options on the MicroStar transmitter. The 4 main controls can also be used as switches by defining a trigger position using this option.



Options



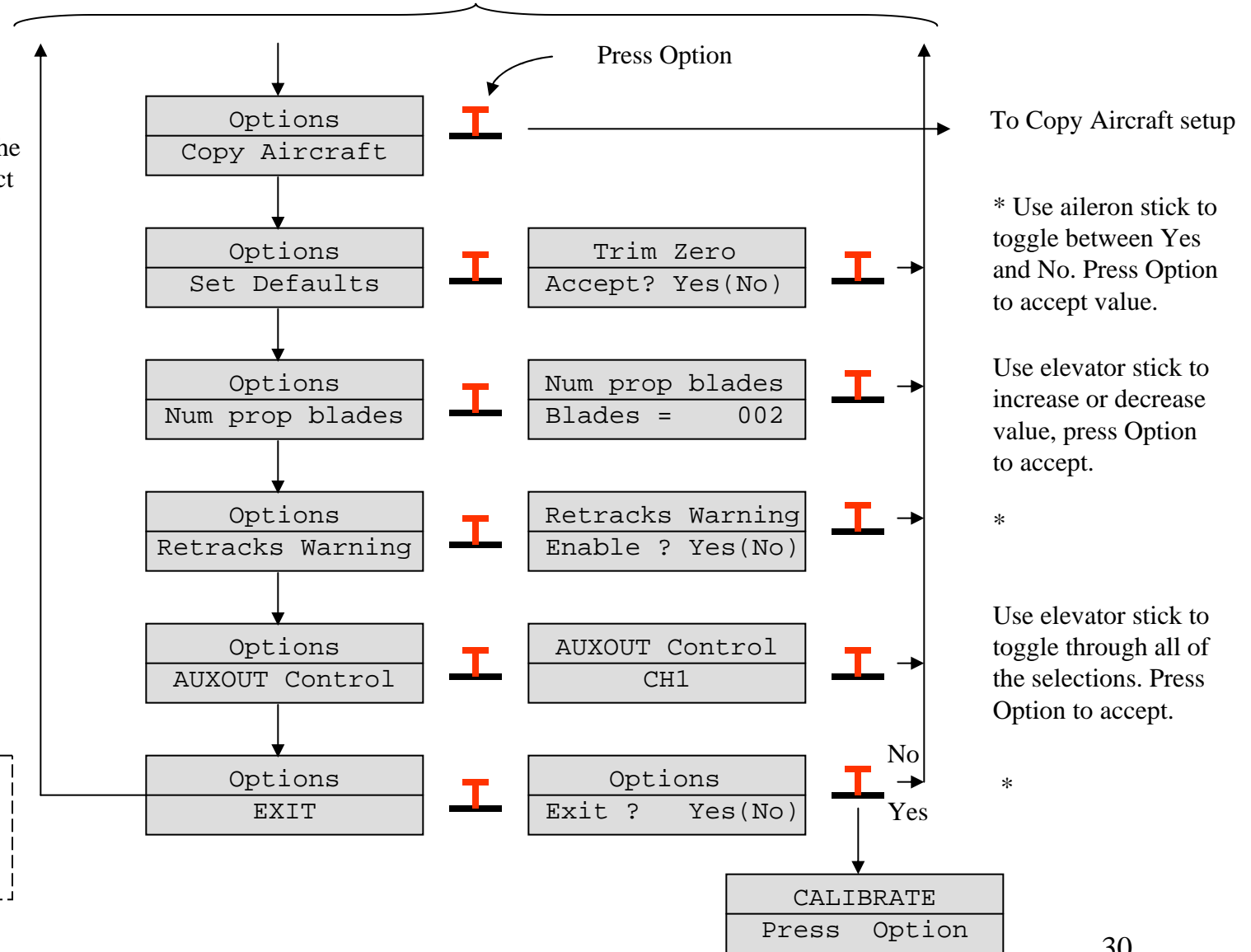
Options, continued

To previous page

Moving Aileron stick to the right advances in the direct of the arrows. Moving Aileron stick to the left reverses the direction.

Press Option from any selection to enter the selected function.

Please refer to Options parameter notes for a discussion of these parameters.



Options parameters notes

Reset Auto Trims

This function allows you to reset the data stored in the Auto Trim data registers. This data is stored with aircraft configuration and allows unique settings for each aircraft. The Auto Trim function is using, during flight to define this data. This function will reset all three (Aileron, Elevator, Rudder) values.

Trim Zero

The Trim Zero function, when enabled, will read the current trim settings for Aileron, Elevator, and Rudder, this data will then be saved in internal registers along with the aircraft configuration data. This data is used to correct for the current non-zero trim positions. After this function is selected, the trim data will be read and applied to the controls, this will allow you to then return the trim positions to zero.

Reset Trim Zero

This function allows you to clear the Trim Zero registers described above.

Set Defaults

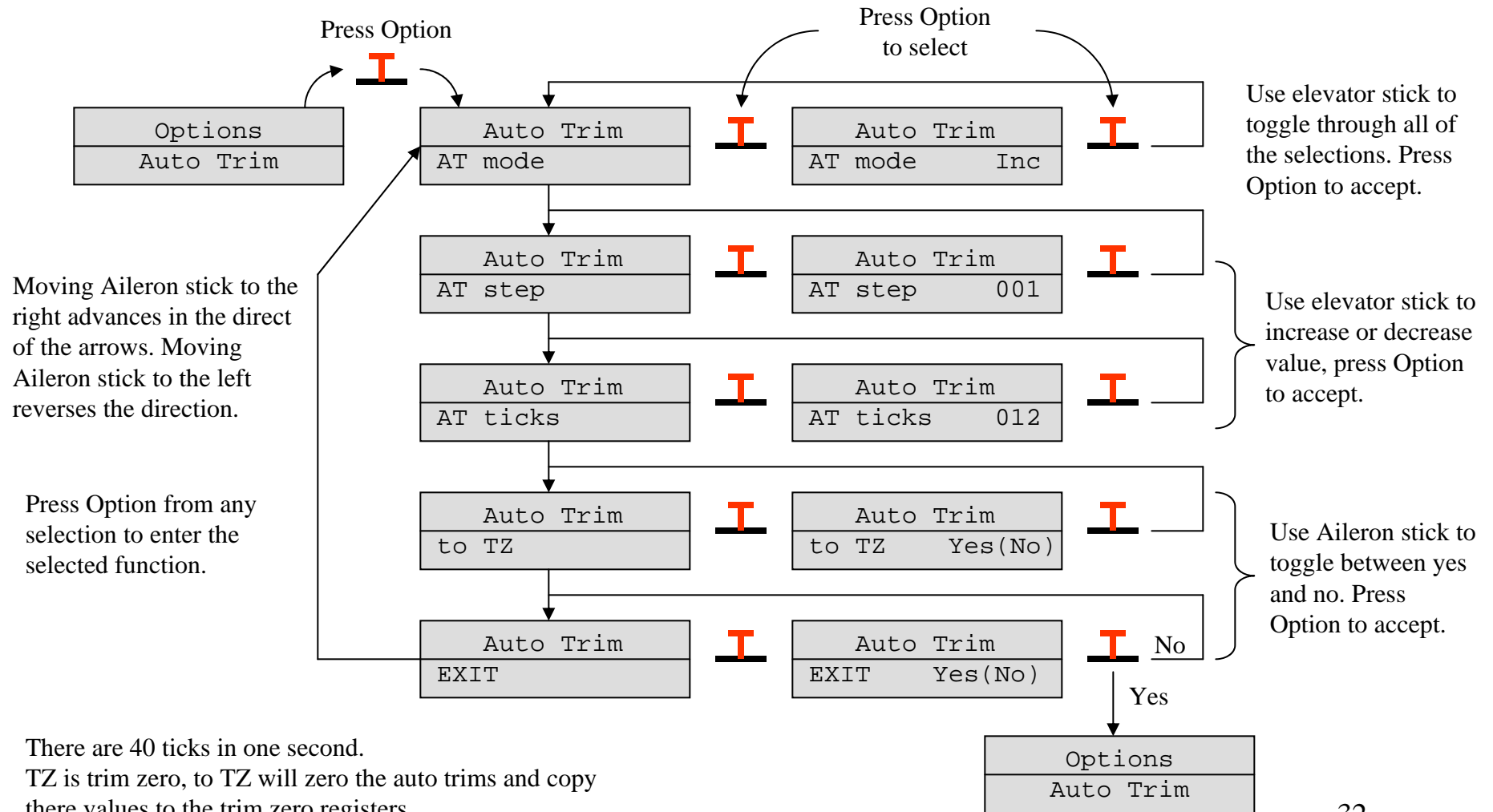
The Set Defaults function will set all Aircraft data to the factory default status. All aircraft configuration data that you have entered will be lost!

AUXOUT Control

This function allows you to define the signal sent to the AUXOUT pin. This can be any one of the servo position signals or the PPM modulation signal.

Auto Trim

The Auto Trim function allows the aircraft's trim to be adjusted without touching the trims! This is done by holding the flight controls in a position to make the aircraft fly straight. This function will then adjust the trims in small steps made a regular intervals. The steps and intervals can be defined in this menu. Two Auto Trim modes are supported, the Inc mode described above and a single shot mode. In Single Shot mode the entire trim adjustment is made when the Auto Trim button is pressed.



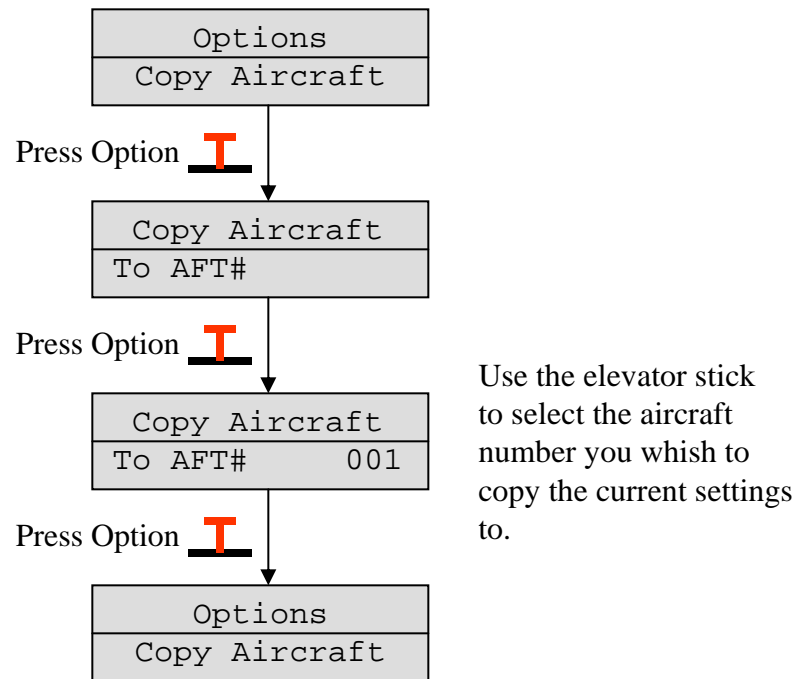
There are 40 ticks in one second.

TZ is trim zero, to TZ will zero the auto trims and copy there values to the trim zero registers.

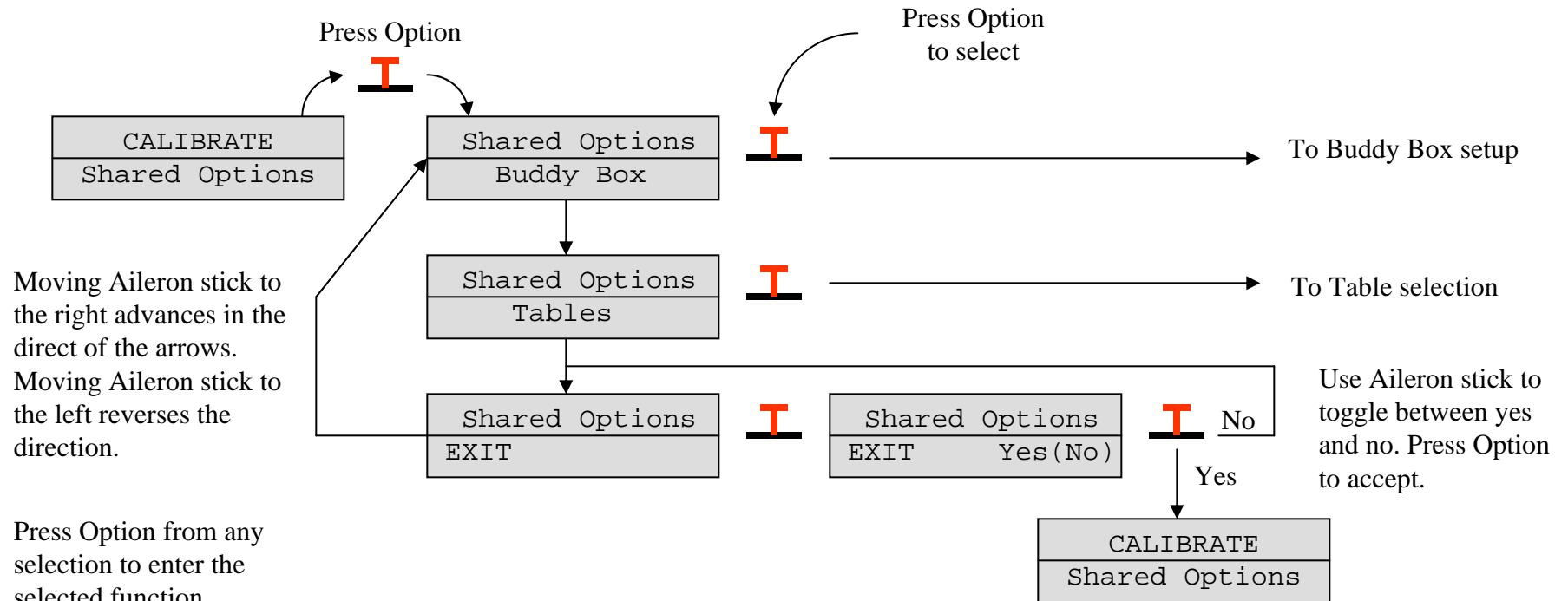
The auto trim function can only make changes of up to +/- 12 percent.

Copy Aircraft

This function will copy the current aircraft settings to a aircraft number that you define.

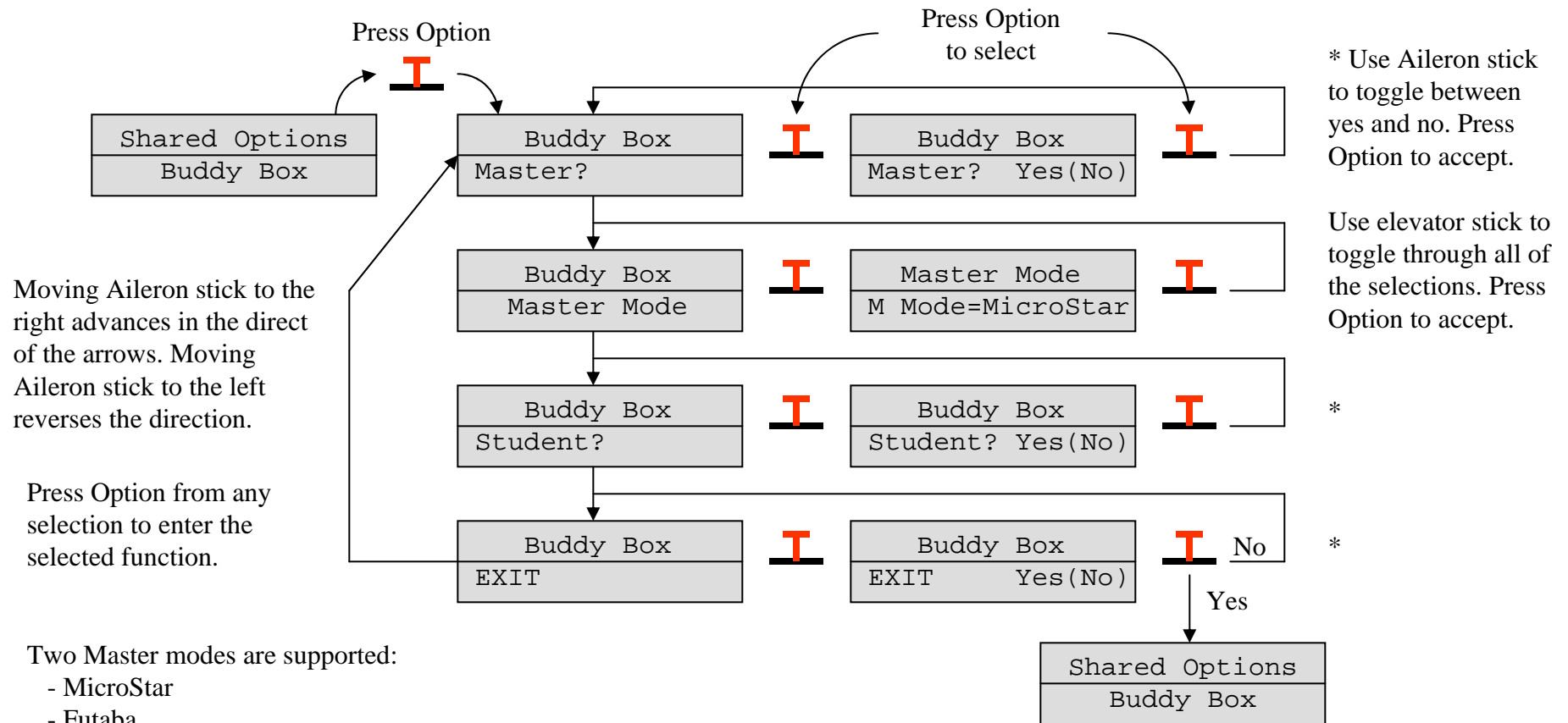


Shared Options



Buddy Box

This function allows you to define the type of Buddy Box behavior the MicroStar will have, it acts as a master or a Student. In the Master mode the instructor will push the AutoTrim button to give control to the student. Two Buddy Box modes are supported; The MicroStar mode is designed to work between MicroStar transmitters only, The Futaba mode is designed to work with a Futaba student transmitter.



Do not enable both Master and student, or unpredictable results will occur!

Table selection

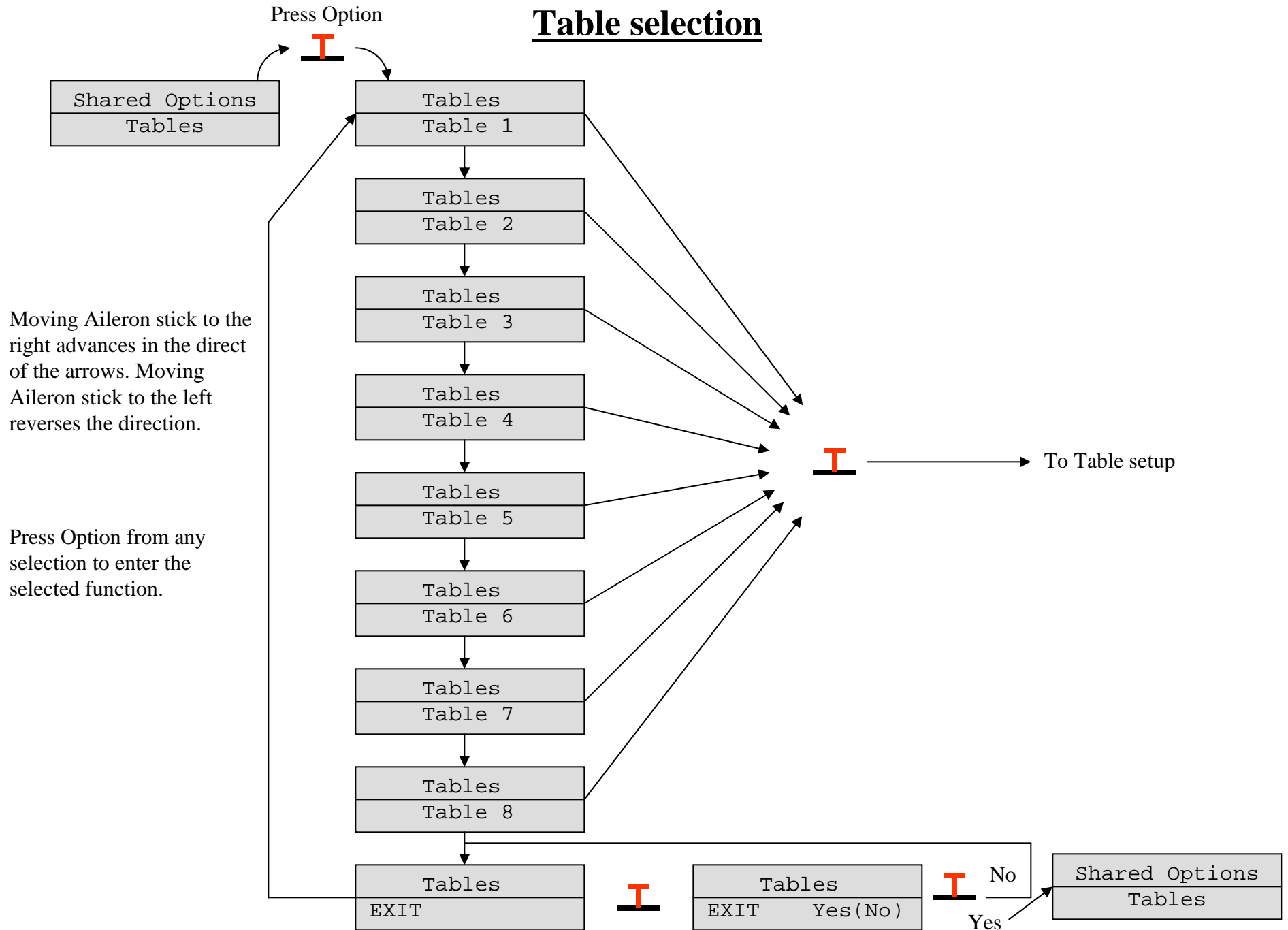
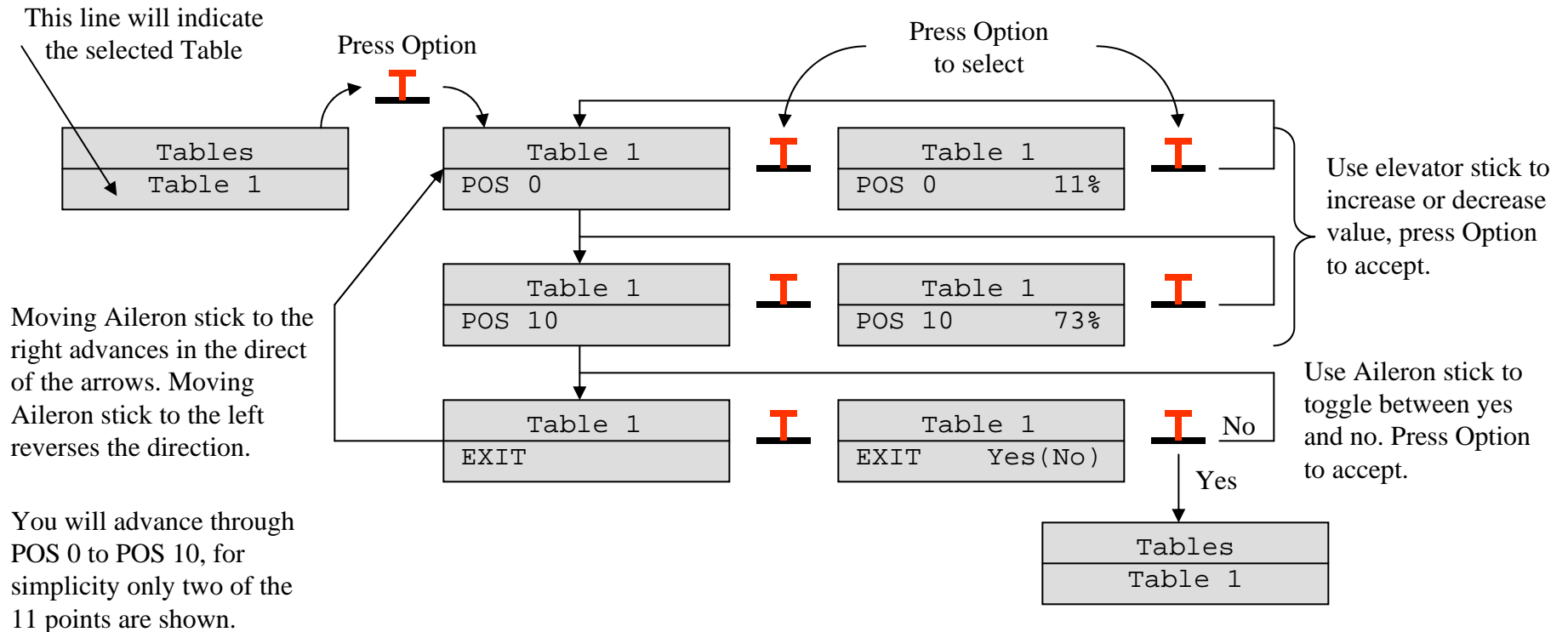
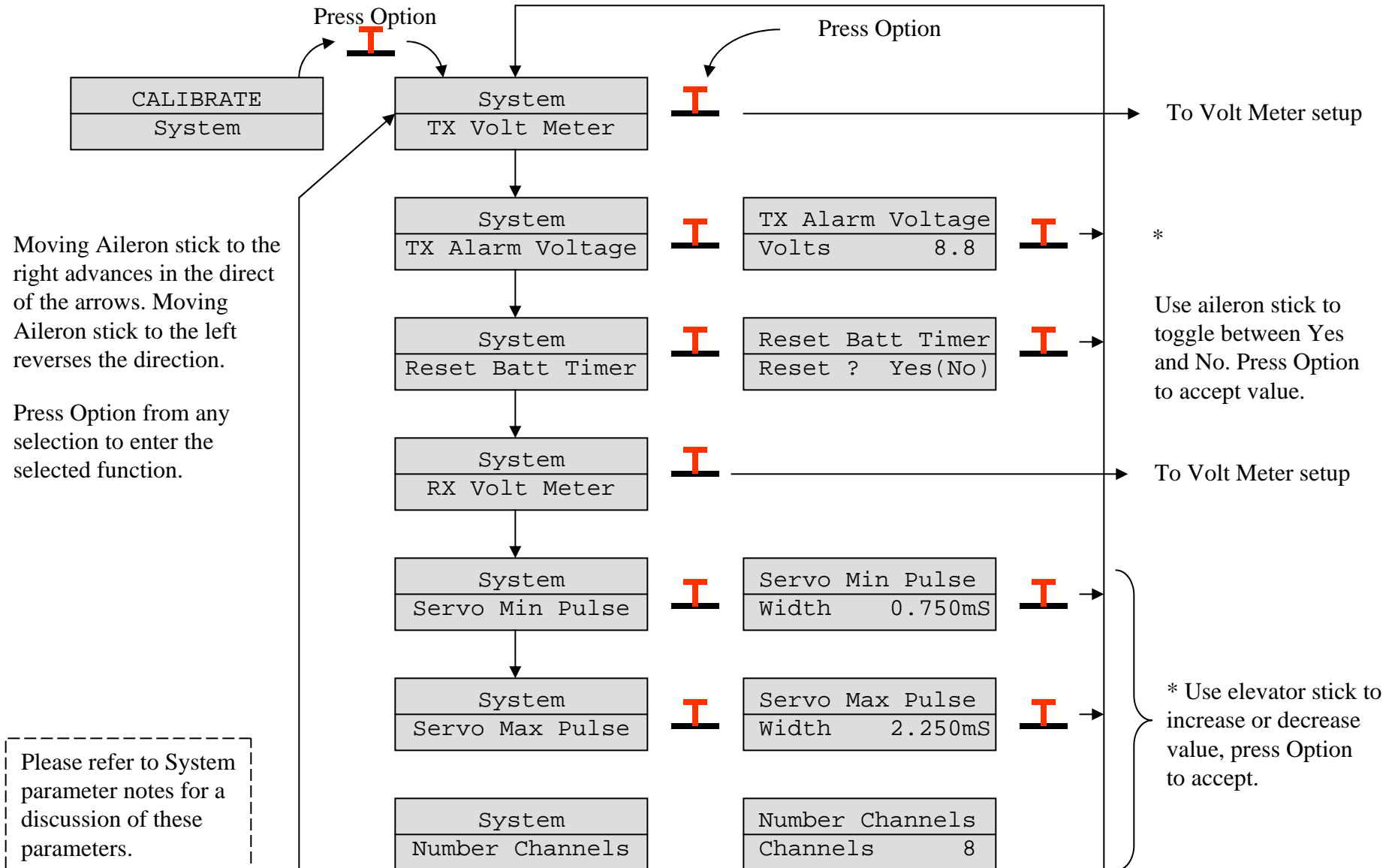


Table setup



System Setup



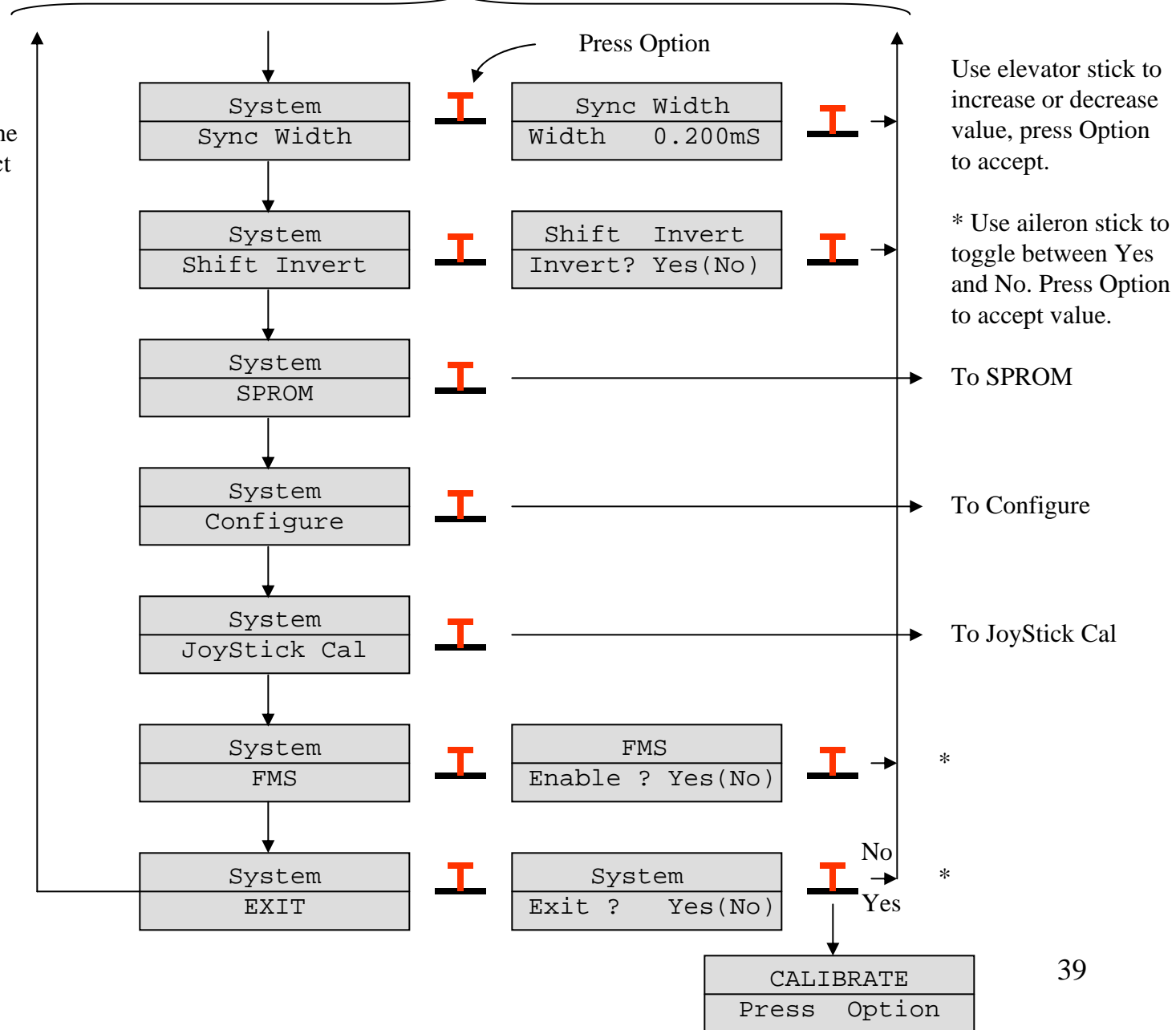
System Setup, continued

To previous page

Moving Aileron stick to the right advances in the direct of the arrows. Moving Aileron stick to the left reverses the direction.

Press Option from any selection to enter the selected function.

Please refer to System setup notes for a discussion of these parameters.



System Setup notes

Reset Batt Timer

The battery timer function is used to measure total transmitter on time. This is helpful in determining the transmitters battery status. To read the battery timer data, press the Auto Trim button. To reset this value to zero select this function. This timer is updated every minute when the transmitter is in run or cal mode.

Number Channels

This parameter allows you to define the number of channels you wish the MicroStar to transmit.

Sync Width

This parameter should be set to 0.200 mS. This defines the width of the PPM sync pulse that is sent to the RF deck.

Shift Invert

Shift invert determines the polarity of the FM RF frequency deviation. This value is specific to the type of receiver you are using.

Servo Min Pulse and Servo Max Pulse

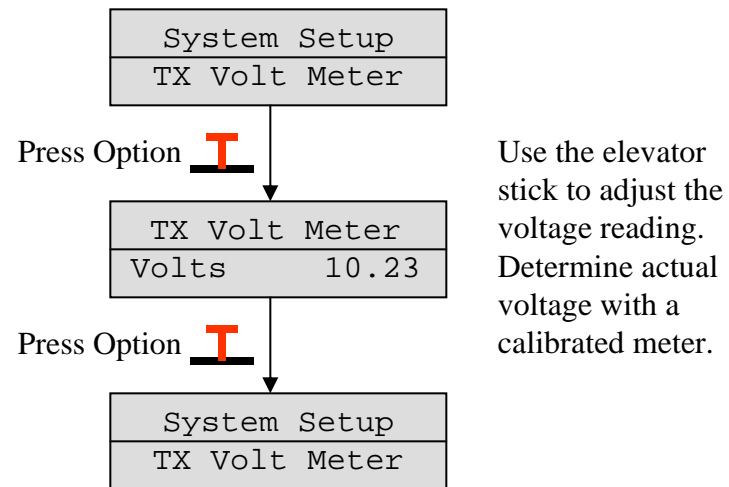
This is the minimum and maximum amounts any servo can move. Used to prevent overrunning due to extreme values on the individual channels, or caused by some combinations of mixing. [May need cross reference to here from the sections on servos and mixing].

FMS

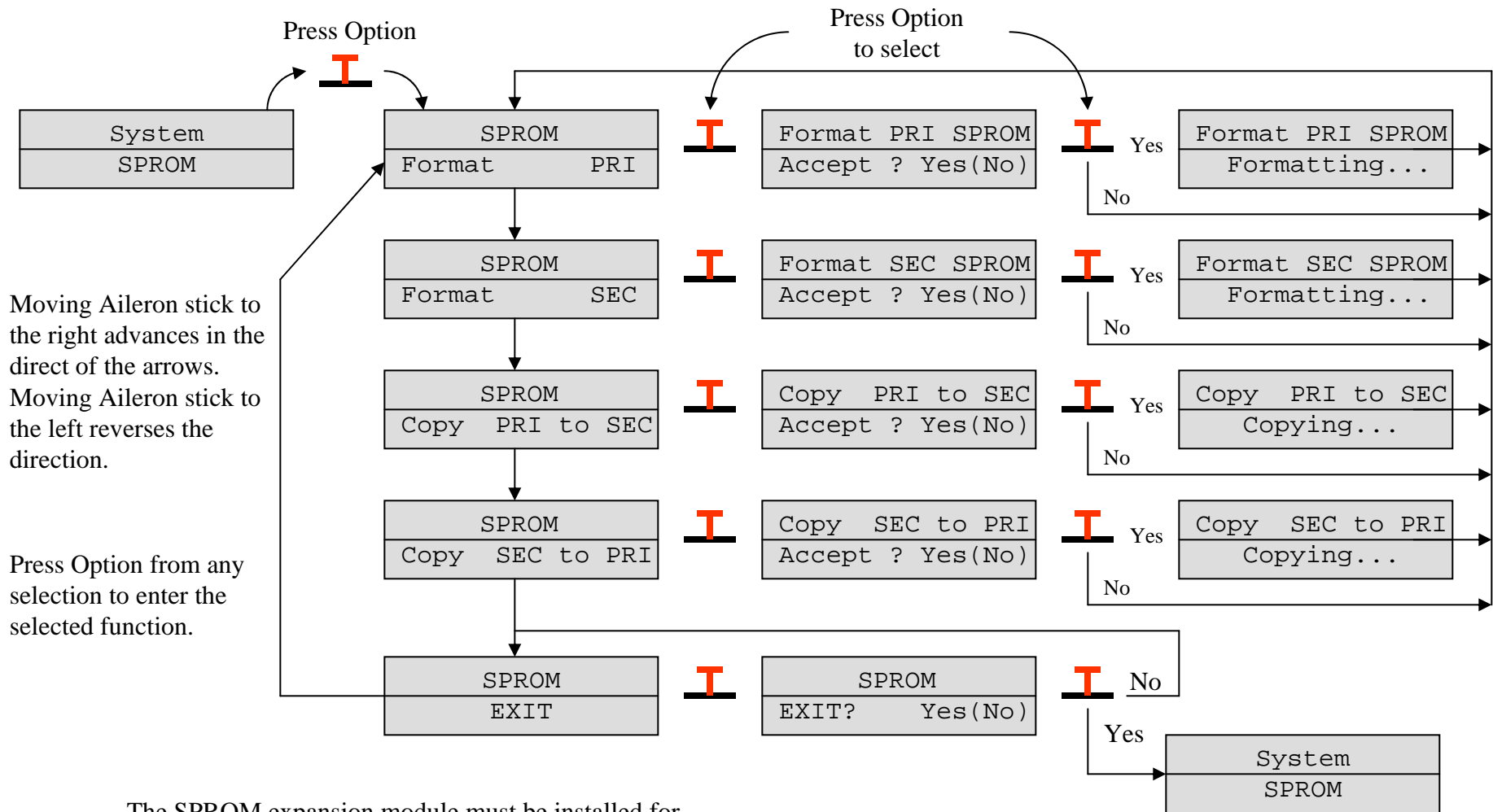
This option enables the Flight Model Simulator (FMS) serial interface. FMS is a free flight simulator and selecting this option will cause the MicroStar to generate and send RS232 data at 9600 baud to UART2, this is the serial channel used for the MicroStar buddy box. Connecting this serial port to the proper COMM port on our PC will allow you to use the MicroStar as the FMS controller. This setup information will be lost when you remove power from the MicroStar so you will need to enable the function each time you intend to use the simulator.

http://n.ethz.ch/student/mmoeller/fms/index_e.html

Voltmeter Calibration

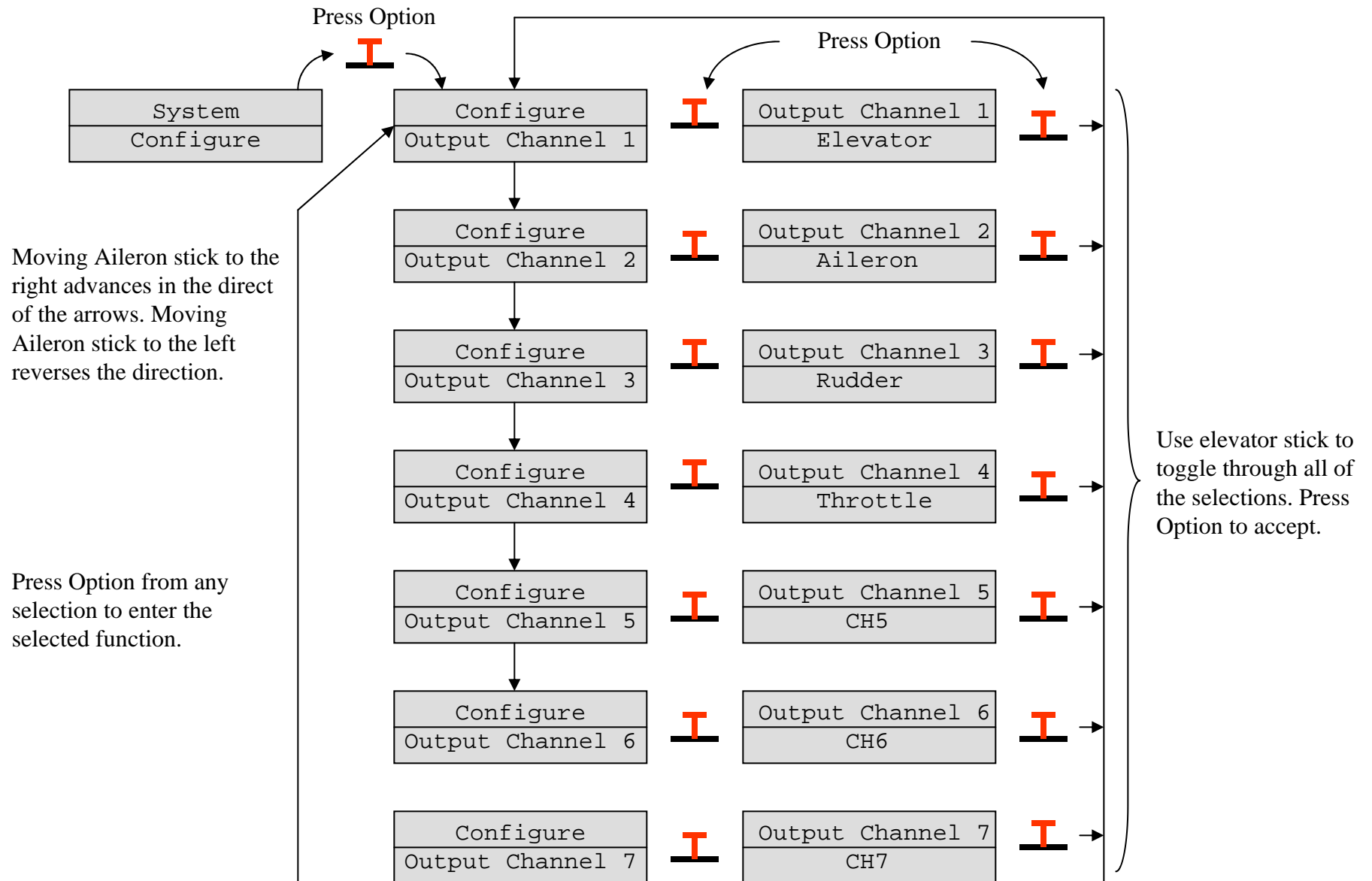


SPROM



The SPROM expansion module must be installed for the SEC options to function. **Formatting will erase all information including the joy stick calibration parameter.**

Configure

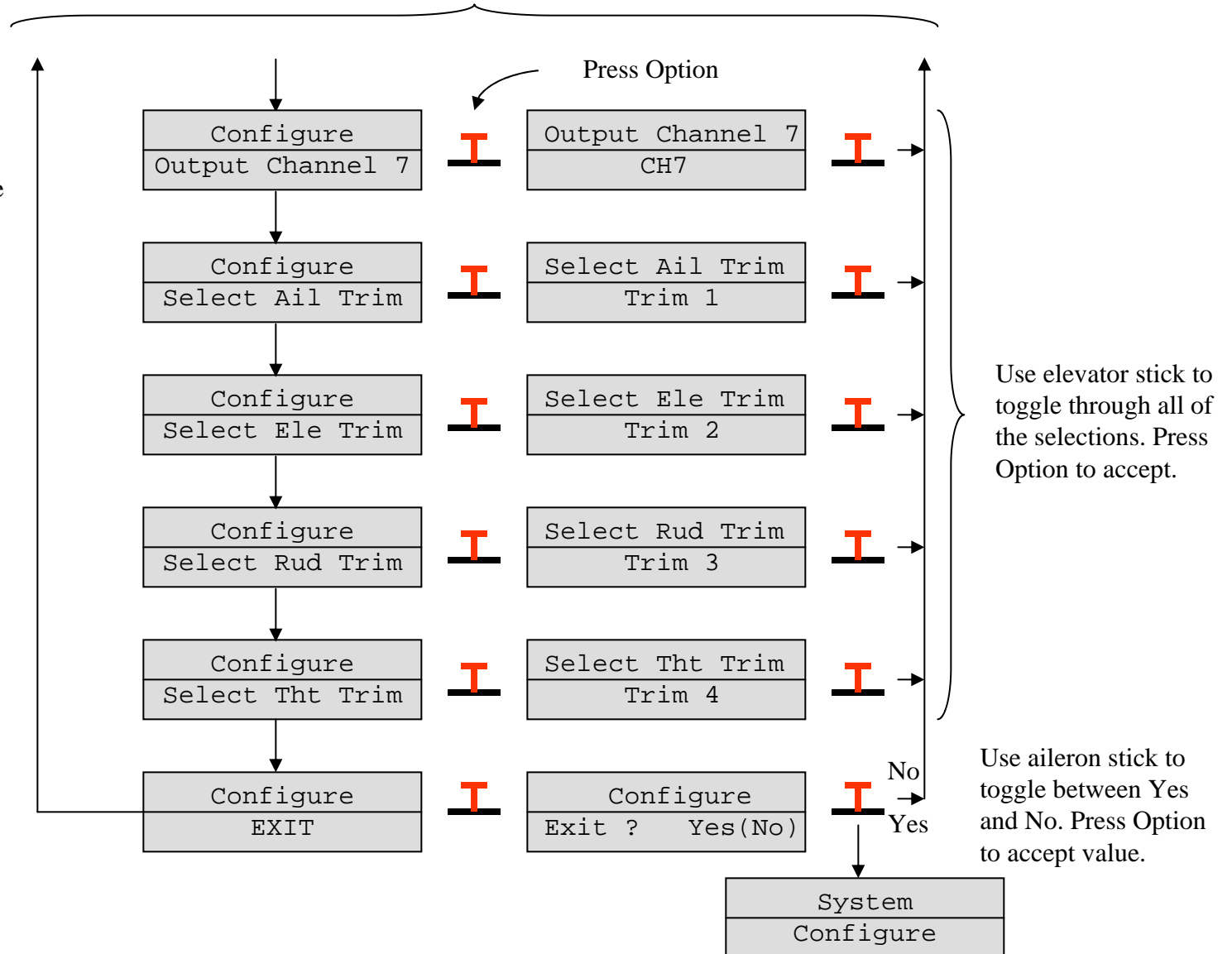


Configure, continued

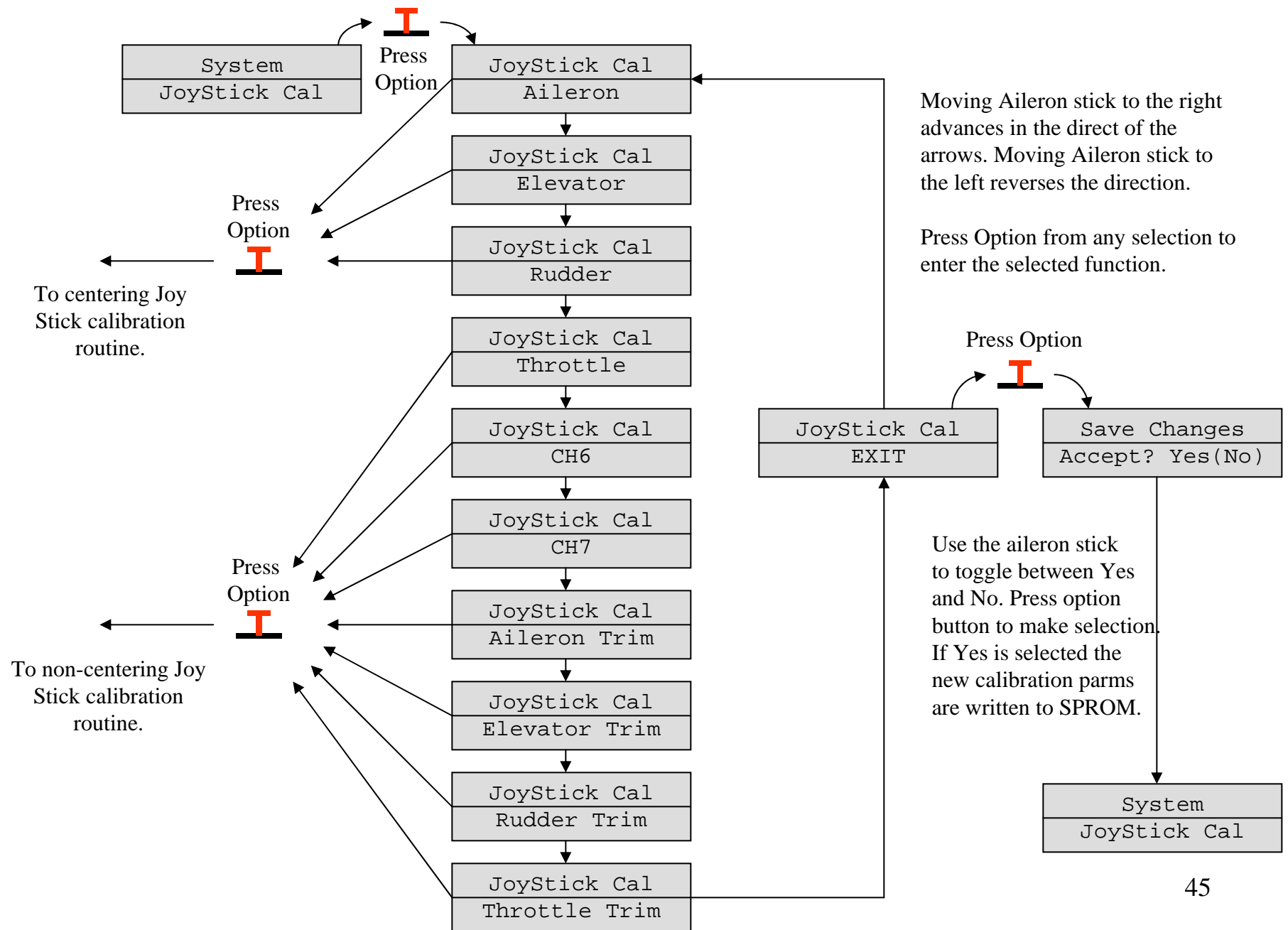
To previous page

Moving Aileron stick to the right advances in the direct of the arrows. Moving Aileron stick to the left reverses the direction.

Press Option from any selection to enter the selected function.



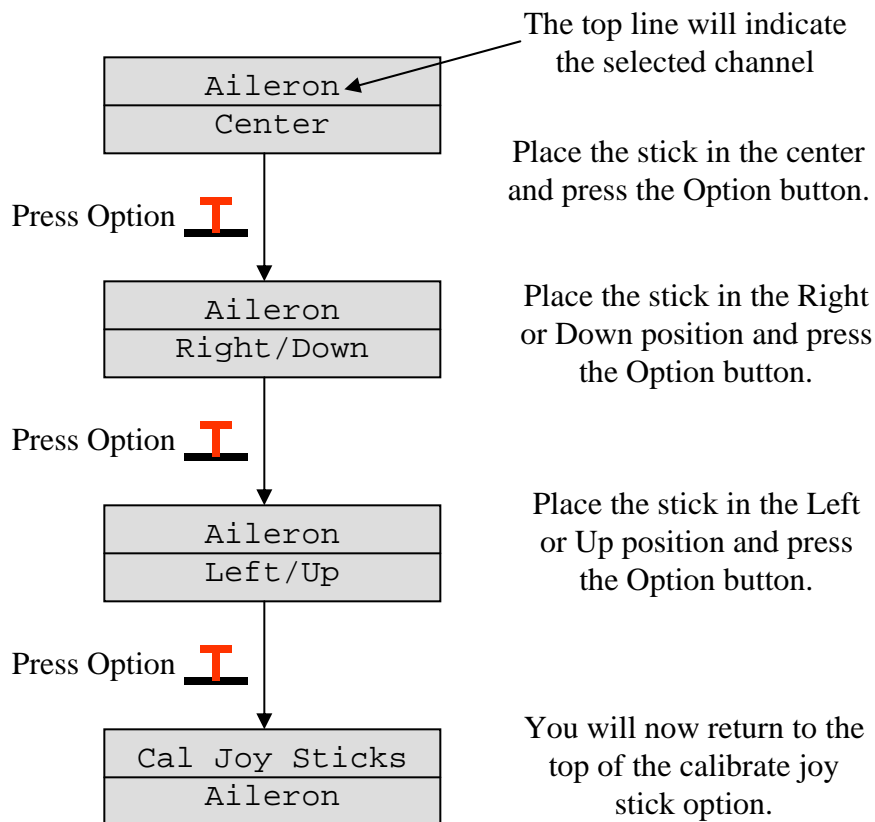
JoyStick Cal



JoyStick Cal, continued

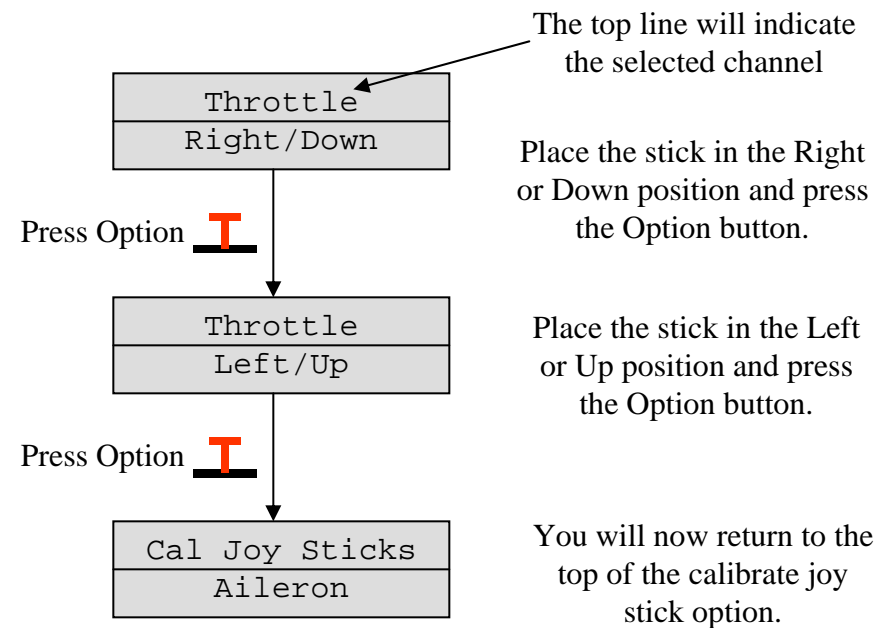
Centering Joy Stick calibration routine.

*“Down” below means as in “Down Elevator” – push the Elevator or Throttle stick toward the top of the case!
“Up” is the opposite!*

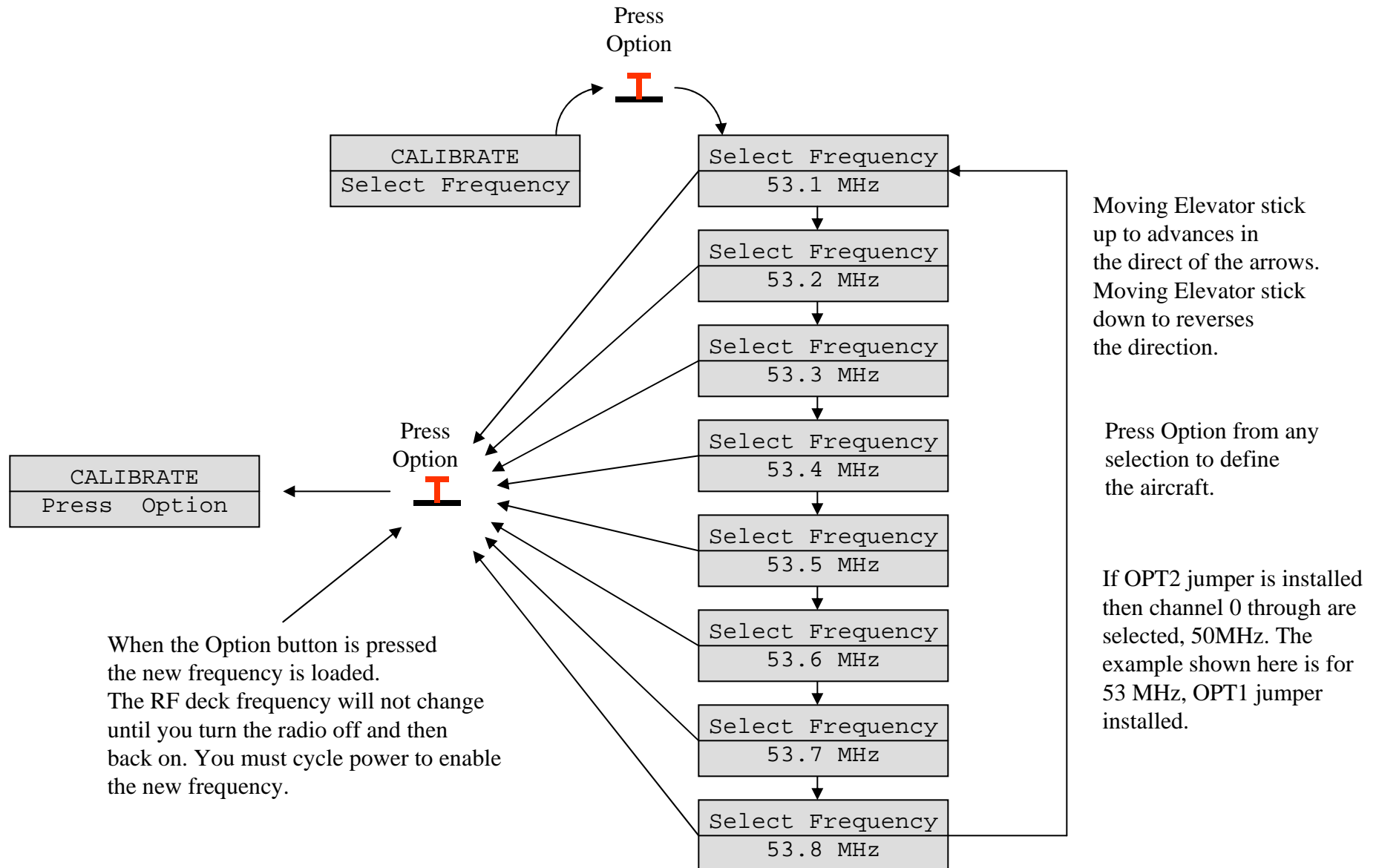


Non-centering Joy Stick calibration routine.

*“Down” below means as in “Down Elevator” – push the Elevator or Throttle stick toward the top of the case!
“Up” is the opposite!*



Select Frequency



Transmitter Switch Definitions, Front



Transmitter Switch Definitions, Top

