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* Flysky GT3B/C-PSX manual *
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This is a preliminary manual for alternative firmware for FlySky FS-GT3B/C radio and clones. This manual is written as differences to original firmware.

This firmware is completely written from scratch and is not compatible with the original Flysky firmware. It is distributed with NO-WARRANTY.

All of the model setups saved by original firmware will be erased!!!

You can backup your original firmware and config, use tabs "PROGRAM MEMORY" and "DATA MEMORY" in STVP to read it from radio and save it to disk.

### Flashing firmware

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- use STVP (ST Visual Programmer)
- select "PROGRAM MEMORY" tab
- load firmware "gt3b-VERSION.s19"
- program it with "Program -> Address Range..."
  - set "Start @" to "8000"
  - set "End @" to "E861" (it is possible to find place where zeroes will start and use last non-zero address)
- press "OK"
- if "Program -> Current tab" will be used, all models stored at FLASH will be erased

### Global characteristics:

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- 63 model memories, first 8 in EEPROM, rest in FLASH
  - > numbers 10-19 will show with Right-Arrow
  - > numbers 20-29 will show with Left-Arrow
  - > numbers 30-39 will show with Left+Right-Arrows
  - > numbers 40-79 will show like 0-39 with additional Percent symbol
- added Subtrims
- added SaveAs to save model config to another memory location
- added Global Setup menu to change function features, including backlight time, battery low voltage, etc.
- dead zone for steering and throttle
- added key mapping specific for each model memory
- calibrate menu will be automatically invoked after first power-on with this firmware, so 6 menu items will start to blink
- when radio is powered on with steering/throttle not in dead center, it beeps 3 times if poweron not-centered warning is allowed
- added inactivity alarm
- added settable servo speed
- added 4WS, DIG, MultiPosition functions
- added timers (up, down, lap, lap count)

### Buttons:

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- it is now possible to differentiate between long press (>1 second) to normal button press (short) and it will be recognized like "ENTER-long"
- Trims, DualRate and other popup informations
  - > now shows changed value only temporarily (5 seconds or till another

- key press), values are saved to EEPROM automatically when it disappears
- > when autorepeat disabled on trims (default), reset trim to 0 by pressing both trim keys together for long (eg. TRIM\_LEFT-long + TRIM\_RIGHT-long and similar for channel 2 trim)
- > while value is showed, it is possible to change it with rotate encoder also
- > when value set to reset\_value (usually 0), longer beep sounds to attention to it and short pause is intruduced to ignore keys

#### Main screens:

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- changeable by rotate encoder:
  - model name
  - battery voltage
  - timer1 - ENTER and ENTER-long operates this timer, not standard menu
  - timer2 - ENTER and ENTER-long operates this timer, not standard menu

#### Standard menu:

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- swapped behaviour of ENTER and END when editing items, ENTER now select next value and END (+ ENTER-long) will end editing items
- ENTER-long on ABS will leave menu also (as BACK)
- Trims are now only for steering and throttle
  - > trim move center position without moving endpoint positions
- Expo
  - > value for channel 2 is splitted to forward and back and is indicated by arrows
  - > positive values are those You want to use like at Spektrum radios
- DualRate
  - > value for channel 2 is splitted to forward and back and is indicated by arrows
- SaveAs
  - > choose menu MODEL and press ENTER-long
  - > menu MODEL will blink
  - > choose memory position where to save model config
  - > press ENTER/BACK to save it
- Model number of channels and Model reset
  - > choose menu NAME and press ENTER-long
  - > menu NAME will blink
  - > choose "C" for number of model channels or "r" for model reset
    - reset will show NO/YES
- Subtrims
  - > subtrim moves center position together with endpoint positions
  - > choose menu TRIM and press ENTER-long
  - > menu TRIM will blink
  - > set subtrims for each channel
- channel speed
  - > choose menu D/R and press ENTER-long
  - > menu D/R will blink
  - > select channel
  - > for channels 1 and 2 (steering and throttle)
    - turn wheel left to show left arrow
      - this represents Turn speed or throttle speed
    - turn wheel right to show right arrow
      - this represents Return speed or "throttle speed only for forward" (OFF/ON)
  - > select required speed 1...100%
    - 100% means no delay
    - 1% means above 4s delay end to end
- directly setting channel value of channels 3..8

- > values for 4WS and DIG channels cannot be changed
- > this can be used instead of mapping some key to appropriate function
- > choose menu EXPO and press ENTER-long
- > menu EXPO will blink
- > select channel and press ENTER
- > select value in range -100..100 and press enter
- mixes 4WS, DIG, throttle brake cut-off (for boats with forward-only throttle), Multi-Position (to set arbitrary up to 8 positions), brake channel (to send brake side of throttle to extra channel)
  - > choose menu EPOINT and press ENTER-long
  - > menu EPOINT will blink
  - > select one of mixes 4WS (4), DIG (d), brake cut-off (b), multi-position (P), brake channel (8)
  - for mixes 4WS, DIG:
    - > press ENTER and choose channel for this mix or OFF
      - for dual-ESC steering (boat, tank, ...) select DIG channel 1 and with steering D/R reduce required ESC travel (at 100% it will go to contra to allow steering at place)
    - > press ENTER and set mix in range -100...0...100 %
      - 0% is default and means both channels have same max steering/throttle
        - 100% means 100% reduce on rear steering/throttle (eg. no steering)
        - 100% means 100% reduce on front steering/throttle (eg. no steering)
    - > for 4WS press ENTER and select crab (CR1) or no-crab (CR0)
    - for Multi-Position:
      - > there are 4 Multi-Positions identified by numbers 1..4, they have 8/6/4/4 positions
      - > press ENTER and choose channel for this function or OFF
        - channel can be "D" also, which means map to DIG function
      - > press ENTER and set channel value for first position
      - > press ENTER and set channel value for second position or END
      - > ... up to eight position
    - for brake cut-off:
      - > press ENTER and choose OFF or CUT
    - for brake channel:
      - > press ENTER and choose channel fro brake or OFF
- Key mapping specific for each model:
  - > choose menu REV and press ENTER-long
  - > menu REV will blink
  - > choose trims (id: 1 2 3 d) or other keys (CH3: C, Back: b, End: E) or if trim is OFF, then also trim keys (id 1 2 3 d with left/right arrow)
  - > press ENTER and modify first setting
  - > press ENTER and modify next setting
  - > .....
  - 
  - steps of settings of trims (1 2 3 and D/R):
    - sequence:
      - function -> buttons -> step -> reverse -> opposite\_reset -> previous\_val
- > rotate
  - function: selected function listed at the end of manual
  - B buttons:
    - MO - momentary, hold left/right trim key to get end values, when nothing pressed, servo is at center
    - NL - no long keys, long press is the same as short press
    - AR - autorepeat is on
    - RS - long press of one of trim keys will reset to centre/reset value
    - EN - long press of trim key will set to coresponding end value
  - step: select trim step for one trim key press (1, 2, ... 100, 200), not available when buttons MO or fuction is list of items (multi-position)
    - is identified by symbol "V"
  - RE reverse:
    - 0 - no change

- 1 - swap left/right trim keys
- OR opposite\_reset: not available when buttons M0
  - 0 - no change
  - 1 - when trim key is pressed and value is at opposite side of center/reset, set value to centre/reset,
- PV previous\_val: available only when buttons M0 or fuction is list of items (multi-position)
  - 0 - no change
  - 1 - instead of setting value to centre/reset when key is released, it is set to previous value, which was active before key press
- RO rotate: available only if fuction is list of items (multi-position)
  - 0 - no rotate
  - 1 - rotate from max item to first item and back

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steps of setting of keys (C b E 1< 1> 2< 2> 3< 3> d< d>):

- sequence:
  - function -> momentary -> reverse -> prev\_val -> function\_long -> reverse\_long -> prev\_val\_long
- function: selected function listed at the end of manual
- M0 momentary: only available for 2-state functions (channel, ...)
  - 0 - switch, key press will switch something (channel value, ...)
  - 1 - momentary, value change will be active only while key is pressed
- RE reverse: only available for 2-state functions
  - 0 - normal, no-press or default value is left endpoint
  - 1 - reverse, no-press or default value is right endpoint
- PV prev\_val: only available for 2-state functions
  - 0 - key release or OFF state sets value to left endpoint (noREV)
  - 1 - key release or OFF state sets value to value active before key press or ON state
- function\_long: function applied when long press of key happens, choose from the same list as function, identified by "V" symbol
- reverse\_long: same as "reverse" + "V" symbol
- prev\_val\_long: same as "prev\_val" + "V" symbol

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steps of settings of ch3 potentiometer (if enabled at global config):

- sequence:
  - function -> reverse
- function: selected function listed at the end of manual
- RE reverse:
  - 0 - no change
  - 1 - swap left/right sides

### Operating timers:

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- select timer1 or timer2 main screen with rotate encoder
- timer1 is identified by left arrow, timer2 by right arrow
- lap count is written to 3char LCD place
- timer value is written to 7seg + 3char LCD place in format:
  - 0000 - MMSS minutes, seconds
  - 0000 % - SSHH seconds, hundredths (0.01 seconds)
- press ENTER to set timer params, use it as usual menu:
  - H set throttle trigger start OFF/ON
    - timer will start after throttle forward applied
  - A set alarm 0..255
    - in laps for lap counter
    - in minutes for others
  - P set timer type:
    - OFF timer is off
    - UP up timer
    - TxS start/pause timer

- TxR stop + reset timer
    - DWN down timer
    - TxS start/pause timer
    - TxR stop + reset timer and save rest time to lap times
    - when alarmed at time 0, starts counting up with "V" symbol blinking
    - LAP lap timer - 100 lap times are saved
    - TxS record lap time, show it for 3s blinking and during this time presses are ignored to eliminate double click
    - when timer not running, start timer
    - when timer alarmed, stop timer and save lap time
    - LPC TxR stop timer
    - lap counter - till 255 laps
    - TxS increment lap counter, minimum 3 seconds between presses are required to eliminate double click
    - TxR zero lap counter
- pres ENTER-long to show saved lap times (only for LAP and DWN timers):
  - > It is possible to see lap number (indicated by 'L' at 7seg number) or time showed as other timer values. Press ENTER to switch between lap number and time value
  - > use rotate encoder to switch between lap numbers or lap times
  - > there are special lap number identificators also at 3char display:
    - Txx - total time, 'xx' is number of laps
    - Axx - average time, 'xx' is number of laps
    - RES - pres ENTER and lap times will be erased, it is also displayed when showing lap time

#### Calibrate menu:

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- enter it by wheel right-turn and ENTER-long
- 6 menu items starts to blink (+ 2 arrows if CH3 is potentiometer)
- use END or ROTATE to change channels
- there is also channel 3 representing CH3 button (for those who will do some 3-position switch/potentiometer modification)
  - > There is 1K resistor connected between CH3 button and +5V, so simply connecting linear potentiometer instead of CH3 button will not work. Usefull results can be done with logarithmic potentiometer 10K which has 1K at half of turn. Or eliminate internal resistor to +5V, connect potentiometer between +5V and GND and potentiometer output instead of CH3 button.
- there is also channel 4 representing battery voltage
- calibrate as usual (for channel 1/2 left+mid+right and ENTER)
  - > calibrated value will disappear from menu
  - > it is not needed to calibrate all values
- calibrate CH3 potentiometer (if selected at global config)
  - > only left + right positions
- calibrate battery (it will not be probably needed to use this)
  - > select channel 4
  - > press ENTER
  - > set your current battery voltage (measure it by voltmeter)
  - > press ENTER to save it or END to no-save
- press BACK-long or ENTER-long to end calibrate menu and save values

#### Key-test menu:

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- enter it by wheel left-turn and ENTER-long
- if ENTER-long keep pressed, all segments on display will stay on till

ENTER is released

- now check keys by pressing them short or long
- if keys long pressed, an "L" symbol will appear left to displayed key symbols
- press BACK-long or ENTER-long to end key-test menu

Global setup menu:

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- enter it by ENTER-long
- now menu items MODEL and NAME will start blinking
- select requested item by ROTATE and press ENTER
- use ROTATE to change value and press ENTER to end value changing
- press BACK or END or ENTER-long to end global setup menu, values will be saved to EEPROM
- selected menu items are indicated by following symbols:
  - F firmware version (this of course cannot be changed :-)
  - L backlight time 5s,10s...10m...MAX
  - I inactivity alarm OFF,1m...10m
  - LOW POWER! battery low voltage 2.0...10.5V
  - C default number of channels 2..8
  - E maximum allowed endpoint value 100...150%  
DANGER - values greater than 120% can damage your servo or will not be possible to transmit to receiver because of 2.4GHz HF module limitation  
This danger zone will be indicated with a flashing '%' symbol for values greater than 120%
  - A analog settings, dead zones, ADC samples used
    - steering dead zone S00..S50
    - throttle dead zone T00..T50
    - number of ADC values A\_4/A\_1
  - b beeps
    - key beep K\_N/K\_Y
    - value at center/reset beep V\_N/V\_Y
    - poweron beep P\_N/P\_Y
    - poweron not-centered warn C\_N/C\_Y
  - d long press key delay 100...1000 miliseconds
  - H setting of hardware features
    - reverse rotate encoder E\_N/E\_R (Normal/Reverse) - for GT3C
    - ch3 is potentiometer P3N/P3Y (No/Yes)
    - select ppm sync/frame PTS/PTF (constant SYNC/frame length)
    - select ppm length Lxx - 3-18ms for constant SYNC length  
9-24ms for constant frame length
  - r global or all models reset
    - all configs (global+model) G\_N/G\_Y (No/Yes)
    - all models M\_N/M\_Y (No/Yes)
  - o lock keys till ENTER-long No/Yes

Return to original (and modified) firmware:

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- flash original firmware
- delete whole EEPROM (tab DATA MEMORY in STVP and write those empty zeroes) or return back your saved config (also tab DATA MEMORY in STVP, read your saved config from disk and write it to radio)
- calibrate steering and throttle (not needed when You returned back saved config)

#### Functions assignable to trims:

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- OFF - nothing, it is possible to assign each button individually as key
- TR1, TR2 - trim of channel 1/2
- DRS, DRF, DRB - dualrate of steering/forward/back
- EXS, EXF, EXB - expo of steering/forward/back
- CHn - change channel "n" value in range -100...100
- STn - subtrim of channel "n"
- SST - steering speed turn 1...100%
- SSR - steering speed return 1...100%
- CSn - channel speed for channel "n" 1...100%
- 4WS - 4 wheel steering mix -100...100%
- DIG - DIG throttle mix -100...100%
- MP1 - Multi-Position 1, switches position up/down
- MP2 - Multi-Position 2, switches position up/down
- MP3 - Multi-Position 3, switches position up/down
- MP4 - Multi-Position 4, switches position up/down

#### Functions assignable to keys:

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- OFF - nothing
- CHn - switch channel "n" value from one end value to opposite end value. There is special handling for CH3 button. When using 3-position switch instead of CH3 button and momentary is selected for this button, then centre 3-pos value will also be detected and set to servo (use 1K resistor to GND to get middle state)
- CnR - reset value of channel "n" to centre
- 4WS - switch crab (CRB) no-crab (NOC) for 4 wheel steering
- DIG - switch DIG mix between -100 and 100 (more useable when using return to previous val key setting)
- DGR - reset DIG mix to centre
- MP1 - Multi-Position 1, switches position up (at END back to 1.)
- MR1 - Multi-Position 1 Reset, switches position to first one
- MP2 - Multi-Position 2, switches position up (at END back to 1.)
- MR2 - Multi-Position 2 Reset, switches position to first one
- MP3 - Multi-Position 3, switches position up (at END back to 1.)
- MR3 - Multi-Position 3 Reset, switches position to first one
- MP4 - Multi-Position 4, switches position up (at END back to 1.)
- MR4 - Multi-Position 4 Reset, switches position to first one
- T1S - start/pause timer1
- T1R - stop + reset timer1
- T2S - start/pause timer2
- T2R - stop + reset timer2
- BRK - switch on full brake, this overrides throttle position
- BLS - battery low shutup, stop beeping, predefined to END-long