Turnigy® V-Bar 600

Flybarless System. Firmware V3.01

Preface

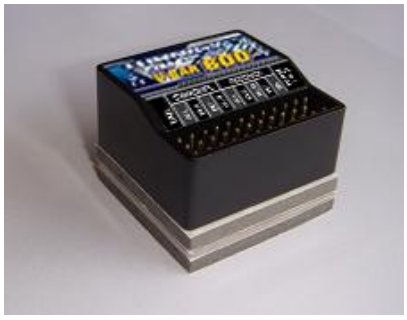
The Turnigy® V-Bar 600 is an extremely high quality precise controller and stabilizer for the swash plate and tail rotor of a model helicopter flight control system. It has super-stabilization and super-response to control input. This makes for incredible stability and agility. The programmability allows for performance settings from smooth scale to sport or hard 3D flying. Flybarless also means longer flight times and a tremendous reduction in parts and aerodynamic drag. You no longer need to use a separate external tail gyro, resulting in reduced weight, with a large cost savings. The Turnigy® V-Bar 600 offers 4 switchable flight modes.

Technical details:

●MEMS Gyro Sensors in three axes
●Digital signal processor
●Operating voltage: 4-10 Volts, current < 80mA
●Temperature range: -10°C to +50°C
●Size: 33x34x18 mm
●Weight: 15 g
●Servo compatibility: 1520uS/333Hz, 1520uS/250Hz, 1520uS/167Hz, 960uS/333Hz (tail only) and 760uS/333Hz Digital servos. Also, standard 1520uS/71Hz Analog servos.
●Supplied: Foam and double-side adhesive tape and Stainless steel plate.

Installation:

Only use the thick double sided adhesive pads when installing the Turnigy® V-Bar 600 unit on an electric helicopter. If installing on to a nitro or turbine helicopter, you may want to use the two double sided adhesive pads on the bottom plus a stainless plate on the top of these, then a thin double sided adhesive pad on the top layer, for better vibration isolation.

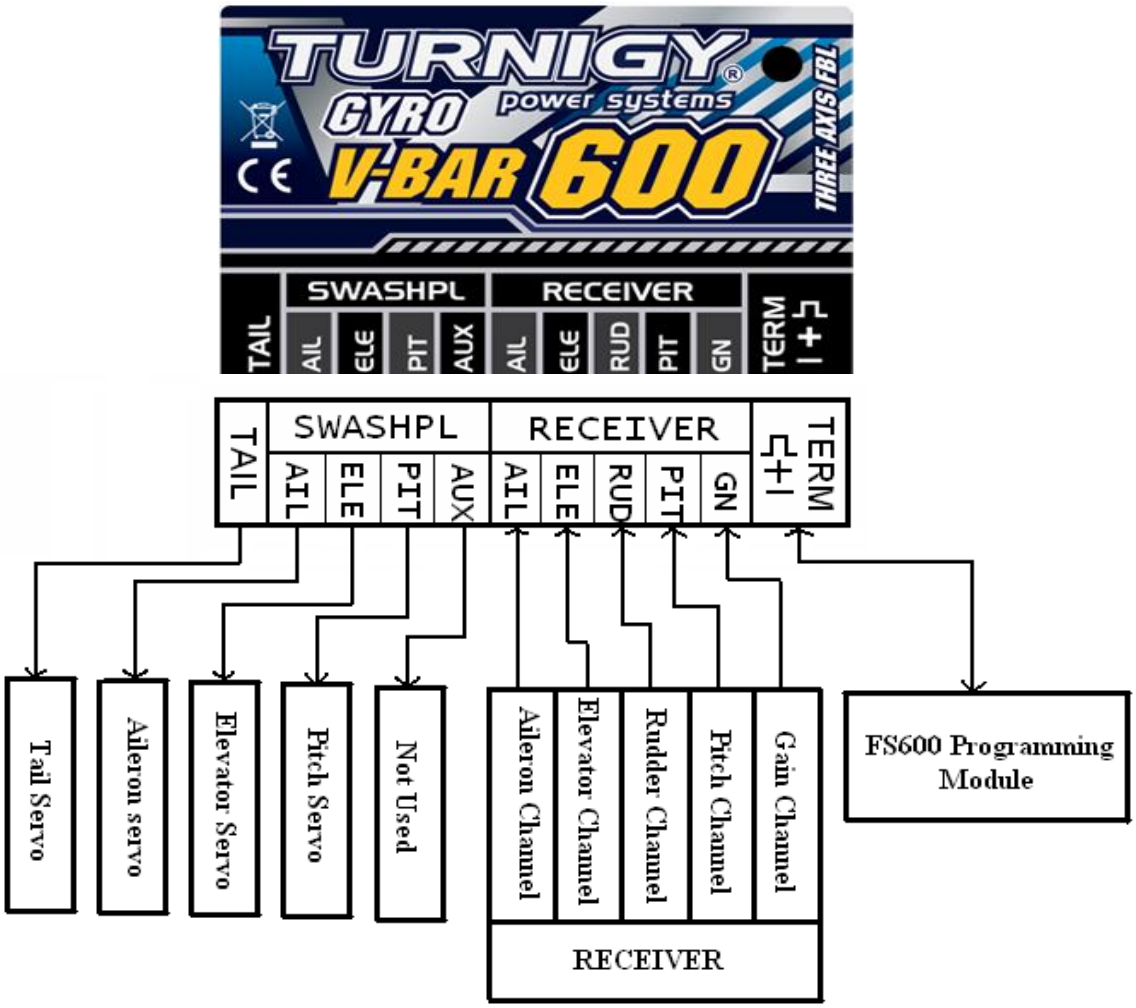


As shown in the pictures below, when installing the Turnigy® V-Bar 600 unit to your helicopter, you can choose the following four mounting positions. If the Turnigy® V-Bar 600 unit is installed on bottom of the helicopter, the same four directions can be chosen as well.

Turnigy® V-Bar 600 can run parallel to the helicopter's nose

Turnigy® V-Bar 600 can also run perpendicular to the helicopter's nose

Turnigy® V-Bar 600 port connection layout



Important:

The gain channel (GN) input positive (centre) pin is isolated from all the other positive pins.

The positive (centre) pins of both the rudder input and tail outputs terminals are also isolated, but connected together, from the remaining terminals on the unit. This allows a connection of a ‘regulated voltage’ rudder input - e.g. Spektrum AR7100(R) receiver.

All negative (lower) pins are connected together.

Basic setup instructions:

Please perform the following steps, to install the Turnigy® V-Bar 600 unit.

- A rigid rotor head has no flybar, no washout assembly and no collective pitch mixer arms. You must have a flybarless head with proper geometry installed.
- Install the Turnigy® V-Bar 600 correctly as illustrated previously. Do not power on as yet.
- Secure the Turnigy® V-Bar 600 unit tightly with a Velcro style strap as needed.
- Connect the Turnigy® V-Bar 600 to your receiver using the supplied link cables. Do not connect the servos to the Turnigy® V-Bar unit at this stage.
- Ensure that the transmitter's trims and sub-trims are reset to zero and that any collective pitch to tail pitch mixing (revo) is disabled.
- Ensure the swash plate type on the transmitter is set to HR3 (120°) or H-3 (135° or 140°) CCPM mode, matching the type of helicopter swash plate setup used.
- Adjust the rudder, pitch, aileron and elevator servo travel (ATV, end point) to +/-100% in your transmitter.
- Ensure that the collective pitch curve in the transmitter is linear (straight) and set to the full (default) range.
- Set a gain switch in your transmitter (if needed) for switching between flight modes. Use the GN input on the unit.
- If a gain (GN) input is not used the unit will default to a single flight mode. Flight mode zero - 0
- Connect the LCD programmer.
- **Important:** Before connecting any servos – remember - every parameter than can be changed in the LCD programmer's menu must be checked and set to at least the default value listed in the table later on in this manual. Once everything is set to default, the parameters can then be changed to suit the individual installation.
- See the last page of this manual for parameter reference sheet.
- Enter **Primary setup mode**. When installing the unit on your helicopter for the first time - primary setup mode should be activated. This mode allows full travel of the servos for easy setup, of their direction and orientation. In this mode, the gyros are not utilised and as such, there is no stabilising action from the servos from any motion.
- To activate primary setup mode, move the rudder stick in either direction, off the neutral point, within 3 seconds of system power-up. The LED will illuminate (for about 1 second) and then flash quickly twice, repeating the cycle continuously. The main purpose of this mode is for you understand and configure the direction of the swash plate servos. If there is no rudder stick input within 3 seconds of power-up then the unit will initialise in normal flight mode.
- Select the correct types of tail servo and swash plate servo, according to the instructions in the following chapters. This must be done before plugging in the servos to avoid possible damage. **1: TAIL BASE SETUP, 2: SWPL BASE SETUP**
- Connect the three servos to the Turnigy® V-Bar 600 unit. Refer to the servo diagram further on in the manual. See - **SWPL-TYPE - Swash plate Type Selection**
- Make any needed direction changes of individual servos, via the transmitter's servo reverse switches.
- Make any needed direction changes of the flight control (e.g. elevator is backwards), by adjusting the Swash mix in the transmitter.
- Confirm the correct relationship of rudder stick movement to the direction response of the tail. See further down for setting tail servo travel limits.
- Confirm the correct relationship of aileron stick movement to the direction response of the swash plate. Confirm there is no mechanical binding.
- Confirm the correct relationship of elevator stick movement to the direction response of the swash plate. Confirm there is no mechanical binding.
- Confirm the correct relationship of collective pitch stick movement to the swash plate movement. Confirm there is no mechanical binding.
- Once all the swash plate servo directions and orientation is correct, the required collective pitch travel must be set, either mechanically or via the transmitter s ATV settings. Ensure there is no mechanical binding at full positive or negative collective pitch. E.g. +14° to -14° of collective pitch.
- The cyclic range must also be set and then checked. E.g. +10° to -10° of cyclic pitch

- **Important:** You must ensure there is no mechanical binding of the swash plate system, when applying full cyclic control (both aileron and elevator), with the swash plate in either full positive or negative collective pitch. This is adjusted via the **2: SWPL BASE SETUP – CYCLIC LIMIT** menu.
- Restart the unit and let it power-up in normal flying mode - LED Solid ON.
- Set the gain channel (e.g. GEAR channel) on your transmitter so that the Turnigy® V-Bar 600 is in flight mode zero - 0
- Set the tail gyro gain in the Turnigy® V-Bar 600 unit to be in normal (rate) mode See - **8: TAIL ROTR PARAM**
- With the tail in normal (rate) mode, perform the mechanical adjustment of the rudder servo horn and control linkages to achieve approximately 8deg tail pitch. See - **1: TAIL BASE SETUP**
- **Important:** In order to determine the unit's gyro neutral point, ensure helicopter is stationary and level for 3 seconds upon power-up.
- Ensure all 3 Gyro sensors are operating in the correct direction. E.g. Tilt the helicopter forward - the swash plate should tilt backwards to counteract the movement. See - **4: SENSOR SETTINGS**

Status LED

During normal operation the LED provides simple status information for users.

On	AVCS (Heading Hold) and Normal (rate) mode. Rudder stick at neutral
On with two short flashes	Primary setup mode.
Off with two short flashes	Rudder input (off neutral position) is detected
Off	No power or loss of gain signal
Constant flashing	Error. Gyro not receiving a valid signal from the receiver or is unable to calibrate because the rudder stick is not centred

LCD Programmer - Button Description

There are 7 function keys: FUNC+, FUNC-, +10, -10, +1, -1, Reset

Description	Function
FUNC+, FUNC-	Scroll up/down within function menu
+10, -10	Increase (+) or decrease (-) value by 10 units each time. Automatically changes to 1 units if the maximum function value is less than 20. Enter for main menu and "RETURN"
+1, -1	Increase (+) or decrease (-) value by 1 unit each time. Enter for main menu and "RETURN"
Reset	System reset

Power On：Once powered on, the LCD will display 'HELLO'. After 5 seconds, the programmer will display the main menu and is ready for use.

Default Setting：When HELLO is displayed, pressing the '+10' and '-1' buttons simultaneously will force configuration settings to return to their default value. **This function does not appear to work**

System Reset：The Reset button is located at the back of LCD programmer. This has the same effect as disconnecting and reconnecting the LCD programmer's cable.

Return to the previous menu: Scroll through menu using either the FUNC+ or FUNC- buttons. Once the 'RETURN' option is displayed, press any one of the **"+10,-10, +1, -1"** buttons to return to the previous menu.

Turnigy® V-Bar 600 Main menu configuration steps. These are in the correct order to be completed.

Pre-flight Initial setup
1: TAIL BASE SETUP
2: SWPL BASE SETUP
3: TX CALIBARTION
4: SENSOR SETTINGS
5: TX DEADBAND
6: AUTOTRIM
7: GN-MODE

Post setup – Flight characteristics.
8: TAIL ROTR PARAM
9: TAIL TORQUE COMP
10: MAIN ROTOR PARAM
11: PIRO OPTIMIZE

Information Control
12: FBL UPLOAD PARAM
13: DOWNLOAD PARAM
14: VERSION

Submenus

1: TAIL BASE SETUP - Initial Pre-flight Tail setup menu

TAIL-SRV
RUD-TRIM
RUD-LEND
RUD-HEND
RETURN

2: SWPL BASE SETUP - Initial Pre-flight swash plate setup menu

SWPL-SRV
SWPL-MIX
GYRO-POS
CYCLIC LIMIT
V-SWPLRO
RETURN

3: TX CALIBARTION – Initial Pre-flight Transmitter calibration menu

SWPL TRIM CALIBR
SWPL LOW CALIBR
SWPL HIGH CALIBR
RETURN

4: SENSOR SETTINGS – Initial Pre-flight gyro sensor configuration menu

RUD-DIRE
ALGY-DIR
ELGY-DIR
RETURN

5: TX DEADBAND – Initial Pre-flight setup menu

RUD-DEAD
AIL-DEAD
ELE-DEAD
RETURN

6: AUTOTRIM – Initial setup for autotrim mode. This needs to be set for all flight modes used

7: GN-MODE – Initial setup to enable and test the flight modes

8: TAIL ROTR PARAM – Flight characteristics 'Tweaking' - Values need be set for all flight modes used

TAIL-GAIN
RUDLSTOP
RUDRSTOP
RUDD-ACC
RUDD-DEC
RUD-EXP
RUS-SENS
RETURN

9: TAIL TORQUE COMP

Flight characteristics 'Tweaking' - Values need be set for all flight modes used
PIT-COMP
CYC-COMP
RETURN

10: MAIN ROTOR PARAM

Flight characteristics 'Tweaking' - Values need be set for all flight modes used
AIL-GAIN
ELE-GAIN
AIL-FEED
AILLSTOP
AILRSTOP
ELELSTOP
ELERSTOP
RETURN

11: PIRO OPTIMIZE

Flight characteristics 'Tweaking' - Values need be set for all flight modes used
PIRO-THR
PIRO-OPT
RETURN

12: FBL UPLOAD PARAM - See the last few pages of this manual for further info.

13: DOWNLOAD PARAM - See the last few pages of this manual for further info.

14: VERSION - Current firmware version number

1: TAIL BASE SETUP Submenu configuration steps in detail

TAIL-SRV - Rudder servo type selection	
Menu Items	Description
152-33 1520uS 333Hz （Default）	Futaba：S9253, S9254, S9650, S9257, S3153 JR：8900G、DS3405、DS3500 Hitec：HS-5084MG、HS-5925MG LogicTech：3100G If the servos operate in an abnormal state, it is not adapting to the 333 Hz frequency. Select an option with lower frequency of 152-25 (1520us/250Hz) or 152-07 (1520us/71Hz).
76-50 760uS 500Hz	Futaba：S9251、S9256、BLS251
152-25 1520uS 250Hz	Futaba：S3154 JR：8700G、2700G Align：DS510、DS520、DS620
96-33 960uS 333Hz	LogicTech: 6100G
152-07 1520uS 71Hz	Analog servo, low-speed digital servo.

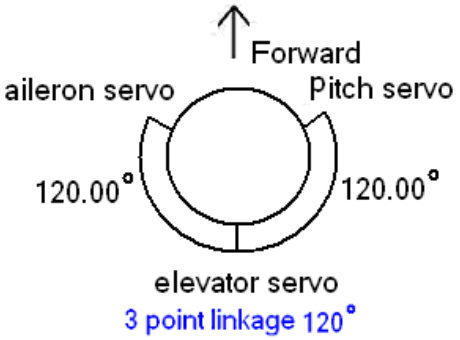
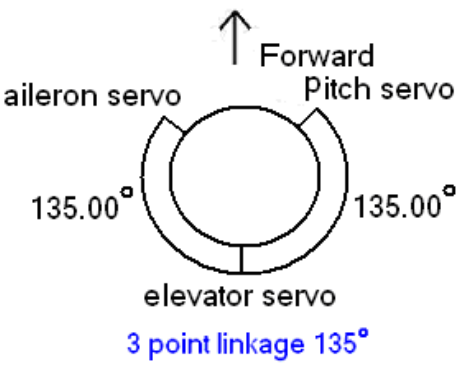
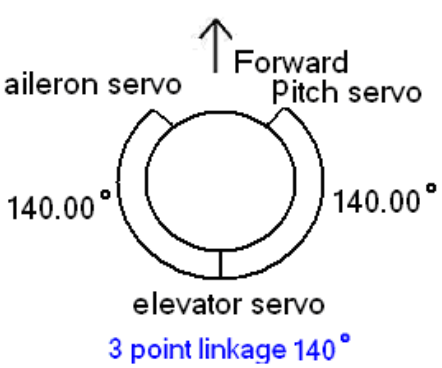
MID-TRIM - Rudder Servo Neutral Adjustment	
Attention: Rudder SUB TRIM value of Transmitter should be set to zero. When the unit is in normal tail mode, perform mechanical adjustment of the tail servo horn and control linkages to achieve approximately 8deg of tail pitch. Under AVCS (Heading hold) mode, rapidly move rudder stick left and right 3 times, then release the rudder stick, or switch normal mode into AVCS mode to confirm whether the middle point of tail rotor is correct.	
Menu items	Description
-100 - 0 - +100 （Default 0）	Fine tune rudder servo neutral point.

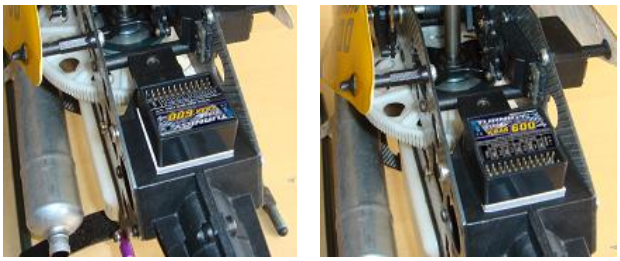
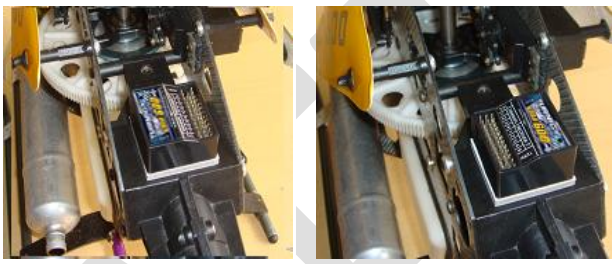
RUD-HEND - Rudder High Travel Limit	
Menu items	Description
130 - 240 (Default 160)	Adjustment of the tail/ rudder servo travel end limit - high.
Suggestion	Suggested setting between 160～230. If setting is higher than 230, please move horn ball link out further on the servo horn or use a longer horn. If this setting is lower than 140, please install the ball link closer in on the servo horn or use a shorter horn. It is recommended to keep the value difference between RUD-HEND and RUD-LEND within 20.

RUD-LEND - Rudder Low Travel Limit	
Menu items	Description
130 ~ 240 (Default 160)	Adjustment of the tail/rudder servo travel end limit – low.
Suggestion	Suggested setting between 160～230. If setting is higher than 230, please move horn ball link out further on the servo horn or use a longer horn. If this setting is lower than 140, please install the ball link closer in on the servo horn or use a shorter horn. It is recommended to keep the value difference between RUD-HEND and RUD-LEND within 20.

2: SWPL BASE SETUP Submenu configuration steps in detail

SWPL-SRV - Swash plate Servos Category Selection	
Item	Content
152-07 1520uS 71Hz (Default)	Analog servo, low-speed digital servo.
152-33 1520uS 333Hz	Futaba：Futaba: S9253, S9254, S9650, S9257 JR: 8900G, DS3405, DS3500 Hitec: HS-5084MG, HS-5925MG LogicTech: 3100G If the servos operate in an abnormal state, they are not adapting to the 333 Hz frequency. Select an option with a lower frequency of 152-25 (1520us/250Hz) or 152-07 (1520us/71Hz).
76-33 760uS 333Hz	Futaba：S9251, S9256, BLS251 LogicTech：6100G
152-25 1520uS 250Hz	Futaba：S3153 JR：8700G, 2700G Align：DS510, DS520, DS620 Ino-Lab：202
152-16 1520uS 167Hz	Align：DS410, DS610 Low-speed digital servo.

SWPL-MIX - Swash plate Type Selection	
Item	Content
HR-3 (Default)	Transmitter should be in HR-3 mode. Turnigy® V-Bar 600 controls 3 swash plate servos after being mixed controlled by Turnigy® V-Bar 600 using 3-point (120°) link method. 
H-3	Transmitter should be in H-3 mode. Turnigy® V-Bar 600 controls 3 swash plate servos after being mixed controlled by Turnigy® V-Bar 600 using 3-point (135°/140°) link method.  

GYRO-POS - Turnigy® V-Bar 600 Placement Selection	
Item	Content
NORM (Default)	Turnigy® V-Bar 600 runs parallel to the helicopter (nose) and can be placed at the top and the bottom. It must not be powered on when changing the placement. 
ROT-90	Turnigy® V-Bar 600 runs perpendicular to the helicopter (nose) and can be placed at the top and the bottom. It must not be powered on when changing the placement. 

CYCL-LMT - Settings for Limit of Cyclic Pitch of Swash plate	
Item	Content
10-540 (Default 240)	Limit of cyclic pitch, to avoid the swash plate's from mechanical binding. This also prevents the over correction of the elevator and aileron sensors.
Suggestion	Push the elevator stick or aileron stick forward and adjust CYCL-LMT value until swash plate will not become mechanical binding

V-SWPLRO – Setting of virtual swash plate rotation - phasing	
Item	Content
-89 - +89 (Default 0)	Phase compensation the of swash plate. The precision is 1°. For 2 bladed rotor heads - this value should normally be 0. Mainly used for the phase compensation of multi- bladed (above 3 blades) rotor heads.

3: TX CALIBRATION Submenu Configuration Steps

Ensure all controls are working correctly. In the primary setting mode, apply positive collective pitch. Check whether the directions of swash plate servos (AILERON, ELEVATOR and PITCH) are correct. If incorrect, the AILERON, ELEVATOR and PITCH servo direction can be changed via your transmitter – servo reverse. This step needs to be completed before continuing on.

SWPL TRIM CALIBR - Swash plate Level Calibration at Middle (Mid stick point)

Ensure the unit is in Primary setup mode

Place the collective pitch stick to the exact middle point (Mid stick). Ensure the swash plate is level. This can be changed mechanically via the swash links or by adjusting the Sub-trim within your transmitter.

Once level, activate the **SWPL TRIM CALIBR** calibration by pressing the appropriate button on the LCD programmer.

The LCD Programmer will display 'Calibration OK" once complete.

After this task has completed, any previous AUTOTRIM data in the memory will be deleted.

Return the unit the to normal flying mode.

SWPL LOW CALIBR - Swash plate Low Level Calibration

With the collective pitch stick is at the low end adjust the low end travel of the AILERON, ELEVATOR and PITCH servos via your transmitter (ATV settings) to set the desired position.

Press the appropriate button on the LCD programmer to activate the calibration.

The LCD Programmer will display 'Calibration OK" once complete.

SWPL HIGH CALIBR - Swash plate High Level Calibration

With the collective pitch stick is at the high end adjust the high end travel of the AILERON, ELEVATOR and PITCH servos via your transmitter (ATV settings) to set the desired position.

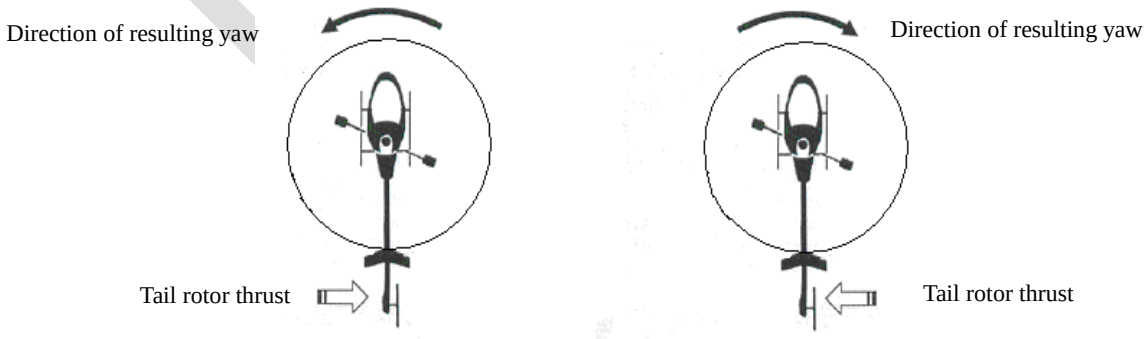
Press the appropriate button on the LCD programmer to activate the calibration.

The LCD Programmer will display 'Calibration OK" once complete.

4: SENSOR SETTINGS Submenu Configuration Steps

RUD-DIRE - Rudder gyro direction selection

Attention: Check that the rudder direction matches the transmitter stick direction. Otherwise, please reverse the rubber direction via your transmitter.



Menu items	Description
NORM (Default)	Rotate the helicopter left (nose). Rudder servo should compensate to the right automatically. Otherwise, change value to "REV". As shown in the diagram.
REV	Rotate the helicopter left (nose). Rudder servo should compensate to the right automatically. Otherwise, change value to "NORM". As shown in the diagram.

AIGY-DIR - Calibration Direction Selection for Aileron Sensor	
Item	Content
NORM (default)	Lift the helicopter, incline the body with left higher than right, the swash plate shall be calibrated with left lower than right, if it is calibrated with left higher than right, please adjust the data to 「REV」
REV	Lift the helicopter, incline the body with left higher than right, the swash plate shall be calibrated with left lower than right, if it is calibrated with left higher than right, please adjust the data to 「NORM」
Suggestions	First record the values of AIL-FEED, the values of AIL-FEED be set to zero, select the calibration direction of the aileron sensor by following the above procedures properly, and restore the values of AIL-FEED. If the helicopter banks to one side on take-off from the landing area, please inspect whether the direction of aileron sensor is set correctly. If it is, please revise the direction of aileron sensor.

ELGY-DIR - Calibration Direction Selection for Elevating Sensor	
Item	Content
NORM (Default)	Lift the helicopter, incline the body with back higher than front, the swash plate shall be calibrated with back lower than front, if it is calibrated with back higher than front, please adjust the data to 「REV」
REV	Lift the helicopter, incline the body with back higher than front, the swash plate shall be calibrated with back lower than front, if it is calibrated with back higher than front, please adjust the data to 「NORM」
Suggestions	First record the values of AIL-FEED, the values of AIL-FEED be set to zero, select the calibration direction of the elevating sensor by following the above procedures properly, and restore the values of AIL-FEED. If the helicopter banks forwards or backwards on take-off from the landing area, please inspect whether the direction of elevator sensor is set correctly. If it is, please revise the calibration direction of elevator sensor.

5: TX DEADBAND Submenu Configuration Steps

RUD-DEAD - Rudder Stick Dead Zone	
Menu items	Description
5 ~ 100 (Default 6)	
Suggestion	Rudder stick at neutral point. If LED has a short blink twice, this indicates that the rudder stick is not within deadband zone. Increase RUD-DEAD.

AIL-DEAD -- Aileron Stick Dead Zone	
Menu items	Description
5 ~ 100 (Default 6)	The swash plate will have no aileron response within aileron dead zone. This is the neutral point of the aileron stick. When this value is higher, the dead zone is larger. The model will have no aileron response within this dead zone of the stick.
Suggestion	If the aileron stick input induces movement in other stick directions, increase the AIL-DEAD value.

ELE-DEAD - Elevator Stick Dead Zone	
Menu items	Description
5 ~ 100 (Default 6)	The swash plate will have no elevator response within elevator dead zone. This is the neutral point of the elevator stick. When the value is higher, the dead zone is larger. The model will have no elevator response within this dead zone of the stick.
Suggestion	If the elevator stick input induces movement in other stick directions, increase the ELE-DEAD value.

6: AUTOTRIM **Optimize Swash plate Middle Point Level**

False

Disable sub-trim optimal with the swash plate level at mid point.

True

Enable sub-trim optimal with the swash plate level at mid point

Under windless condition, the helicopter needs to be in a stable hover for at least 20 seconds when optimizing. This needs to be completed for all flight mode used.

Disable the AUTOTRIM function once complete.

7: GN-MODE

Displays current gain pulse width and flight mode

The Turnigy® V-Bar 600 is capable of flying with four switchable flight modes which are pilot selected from the transmitter. This is the same process as selecting the gain in your tail gyro but it can configure all the flight characteristics on all three axes. If you only plan on using one flight mode it is advisable to leave the gain wire off of the installation and move on to setup.

When setting up the Turnigy® V-Bar 600, you use the transmitter to select which flight mode is being programmed. If you have the gain channel connected, the pulse width on the gain channel controls which flight mode the Turnigy® V-Bar 600 is in and which flight mode is being programmed. Simply switching to the desired flight mode will tell the Turnigy® V-Bar 600 to change values for the selected mode. If the gain channel is not connected you will program Flight Mode 0. If you do not intend on using multiple flight modes it is best to not connect the gain channel.

Pulse width is used by Radio Control systems to communicate between the radio and receiver the channel value information. This information below corresponds to the desired servo position, gain value etc. The pulse width for different radio systems such as FUTABA or JR varies to some extent but is approximately 1-2 milliseconds. Below is a table of the pulse width ranges acceptable to select each flight mode. The program box can read the pulse width on the gain channel to verify the flight mode you are in and that your radio is setup properly. Please consult your radio manual for instruction on how to setup multiple flight modes. A pulse width of approximately 1500 microseconds corresponds to center stick/center servo position. Flight modes with the Turnigy® V-Bar 600 are set with pulse widths from 1620 to 1919 microseconds.

The values below are only examples. In some cases the radio range may be 0-100 in others +/- 100%.
You should always check the actual pulse width is correct to get each mode setting by reading the Turnigy® V-Bar 600 data after the radio is switched to the desired mode

Display Format: XXXX-Y. (E.g. **GN-MODE 1705-1**): Where XXXX is a 4-digit gain channel pulse width in uS (microseconds). Y is the currently selected flight mode (0-3). Moving the gain switch changes the flight mode. The Turnigy® V-Bar 600 unit can have up to four different flight modes. The flight mode corresponds to the pulse width of the gain (GN) channel input.

Gain Pulse Width in (uS)	Flight Mode	Futaba 10CHX Gain % Gyro Sense AVCS Mode	JR 9303 Gain % For Auto Gyro Sense
Gain<1620 or Gain>1920	0	0-23	0-64
Between 1621 and 1719	1	35	71
Between 1721 and 1819	2	58	84
Between 1821 and 1919	3	81	96

8: TAIL ROTOR PARAM Submenu Configuration Steps

TAILGAIN - Tail Gain Setting	
Menu Item	Description
-80 - +80 (Default 26)	The rudder/tail servo is in normal (rate) mode when the value is less than 0. The rudder/tail servo is in AVCS (Heading Hold) mode when the value is greater than 0. Default mode is AVCS mode

RUDLSTOP - Rudder Left Piro Stop Gain	
Menu items	Description
60 - 180 (Default 100)	The sensitivity of hovering and counter-clockwise yaw. The stop speed used for preventing any side wind, hovering shift, or counter-clockwise tail rotation.
Suggestion	The sensitivity is RUDLSTOP*TAILGAIN when the hovering, and counter-clockwise rotation stop. When the ability to prevent side wind is poor, hovering drifts leftward or there is slow counter-clockwise rotation stopping speed, increase the RUDLSTOP value. If the tail rebounds when stopping, on counter-clockwise tail rotation, reduce the RUDLSTOP value. This value should not be varied greatly in any one instance.

RUDRSTOP - Rudder Right Piro Stop Gain	
Menu items	Description
60 - 180 (Default 100)	The sensitivity of hovering and clockwise spin. The stop speed used for preventing the side wind, hovering shift and clockwise rotation.
Suggestion	The sensitivity is RUDRSTOP*TAILGAIN when the hovering and clockwise rotation stop. If the ability to prevent side wind is poor, hovering drifts rightward, or slow clockwise tail rotation stopping speed, increase the RUDRSTOP value. If the tail rebounds when stopping, on clockwise tail rotation, decrease the RUDRSTOP value. This value should not be varied greatly in any one instance.

RUDD-ACC - Rudder Accelerate Delay	
Menu items	Description
0 - 15 (Default 0)	The higher the value, the longer it takes to reach the required Piro speed from stationary.
Suggestion	Increase RUDD-ACC on lag tail.

RUDD-DEC - Rudder Decelerate Delay	
Menu items	Description
0 ~ 15 (Default 0)	The higher the value, the longer it takes for the tail to slow down. Used to smooth the deceleration of a piro when coming to a stop.
Suggestion	Increase RUDD-DEC on rebounded tail.

RUDD-EXP - Rudder Stick Expo Curve	
Menu items	Description
-100 - +100 (Default 0)	Rudder expo curve relative to stick input.

RUD-SENS - Rudder Stick sensitive	
Menu items	Description
50 - 150 (Default 100)	Fine tune the stick response to the actual piro rate. The higher the setting, the more sensitive the stick movement.

9: TAIL TORQUE COMP Submenu Configuration Steps

PIT-COMP - Compensation of Collective Pitch to Tail Rotor	
Item	Description
-100 - +100 (Default 0)	A change in collective pitch will cause a change in the head speed of the main rotor, as well as causing a tail deviation. Adjust the **PIT-COMP** value until this torque change can be offset completely. If the torque change causes tail deviation counter-clockwise, compensate with rightward rudder direction input, i.e. compensate reversely rudder direction input.
Identification of Compensation Direction	Turn off brushless motor power or engine throttle, push the collective pitch stick, adjust PIT-COMP value, check if the compensation direction of collective pitch to tail rotor is correct.

CYC-COMP - Compensation of cyclic pitch to tail rotor	
Item	Description
-100 - +100 (Default 0)	A change in cyclic pitch will cause a change in head speed of the main rotor, as well as causing a tail deviation. Adjust the **CYC-COMP** value until the torque change can be offset completely. If the torque change causes tail deviation counter-clockwise, compensate rightward rudder direction input, i.e. compensate reversely rudder direction input.
Identification of Compensation Direction	Turn off brushless motor power or engine throttle, push elevator or aileron stick, adjust CYC-COMP value, check if the compensation direction of cyclic pitch to tail rotor is correct.

10: MAIN ROTOR PARAM Submenu Configuration Steps

AIL-GAIN - AILERON GAIN	
Item	Content
6 - 80 (Default 26)	Adjusts the gain of the aileron flight control. Increase the **AIL-GAIN** value enough but without allowing the aileron control to begin oscillating when flying.
Suggestion	Lower the aileron/elevator gain value or servo frequency when the swash plate servos oscillate. Increase the aileron/elevator gain value when the helicopter cannot be locked in or if it pitches up. Asynchronous swash plate servos can also cause the helicopter head to pitch up.

ELE-GAIN - ELEVATOR GAIN	
Item	Content
6 - 80 (Default 26)	Adjusts the gain of the elevator flight control. Increase the **ELE-GAIN** value enough but without allowing the elevator control to begin oscillating when flying.
Suggestion	Lower the aileron/elevator gain value or servo frequency when the swash plate servos oscillate. Increase the aileron/elevator gain when the helicopter cannot be locked in or if it pitches up. Asynchronous swash plate servos can also cause that the helicopter to pitch up.

AIL-FEED - Settings of Aileron Feedback Coefficient	
Item	Content
0 - 150 （The default 10）	The speed of swash plate moving from the position of title to neutral position makes the locking mode of aileron is between AVCS mode and the normal mode. When the value of **AIL-FEED** is lower, the aileron returns to the neutral position slowly and more smoothly. When the value of the **AIL-FEED** is higher, the aileron will return to the neutral position more quickly. Aileron is in AVCS mode when the **AIL-FEED** value is 0.

ELE-FEED - Settings of Elevator Feedback Coefficient	
Item	Content
0 - 150 （The default 10）	The speed of swash plate moving from the position of title to neutral position makes the locking mode of elevator is between AVCS mode and the normal mode. When the value of **ELE-FEED** is lower, the elevator returns to the neutral position slowly and more smooth. When the **ELE-FEED** value is higher, the elevator can return to the neutral position more quickly, and the operation of elevator control in more aggressive. Elevator is in AVCS mode when the **ELE-FEED** value is 0.

AILLSTOP - Aileron Leftward Stop Gain	
Item	Content
60 - 160 (Default 100)	The stopping gain when banking leftward. The stop speed against side-wind and banking leftward.
AILRSTOP - Aileron Rightward Stop Gain	
Item	Content
60 - 160 (Default 100)	The stopping gain when banking rightward. The stop speed against side=wind and banking rightward.

ELELSTOP - Elevator Backward Stop Gain	
Item	Content
60 - 160 (Default 100)	The stopping gain when banking backwards. The stop speed against side wind and banking backward.
ELERSTOP - Elevator Frontward Stop Gain	
Item	Content
60 - 160 (Default 100)	The stopping gain when banking forward. The stop speed against side-wind and banking frontward.

11: PIRO OPTIMIZE Submenu Configuration Steps

PIRO-THR -----Piro Optimize Threshold	
Item	Content
0 - 540 (Default 0)	Elevator stick and aileron stick are within the threshold of active piro optimization. A value of 0 disables piro optimization.

PIRO-OPT ---- Piro Optimize	
Item	Content
-60 - +60 (Default 0)	The stopping gain when banking frontward. The stop speed against side-wind and banking frontward.
Suggestion	At first increase the value in one direction by a step of 10, and maintain flying horizontal pirouettes. Carefully watch whether the helicopter holds its position better than before. If so, continue to increase the value by steps of 10 until the helicopter holds the best position. If not, increase the value in another direction by steps of 10. Carefully watch whether the helicopter holds its position better than before. When the behaviour in either directions not achieved, set the PIRO-OPT value to zero

12: FBL UPLOAD PARAM

Save All Parameters in Current mode from the V-Bar 600 unit to the LCD Programmer Box

Press any of the following keys '+10, -10, +1, -1' on the LCD programmer to upload and save all parameters in the unit to the LCD programmer's memory, for that particular flight mode. The group of parameters for each flight mode are saved independently and must be uploaded for each flight mode used. By uploading and saving to the LCD programmer, the parameters can be easily transferred to another Turnigy® V-Bar 600 unit. After the upload has completed, the LCD programmer will display "Upload Success".

13: DOWNLOAD PARAM

Download parameters from the LCD Programmer Box to the V-Bar 600 unit in the current flight mode

Press any of the following keys '+10, -10, +1, -1', on the LCD programmer to download the parameters from the LCD programmer's memory to the Turnigy® V-Bar 600 unit in the current flight mode. Repeat this step for all flight modes. Downloading is a means of transferring previously saved parameters (via upload) from a LCD programmer to a new Turnigy® V-Bar 600 unit. After the download had completed, the LCD programmer will quickly display "Download Success".

14: VERSION

Firmware version 3.01

Be sure to check your settings

Tip: Please take care of your Turnigy® V-bar 600 !

Do not open the bottom cover of the Turnigy® V-Bar 600 housing. This will avoid damaging the product.

Parameter Reference sheet

		Default setting	Range	Current setting
1: TAIL BASE SETUP	TAIL-SRV	152-33		
	RUD-TRIM	0	-100 to +100	
	RUD-LEND	160	130 to 240	
	RUD-HEND	160	130 to 240	
2: SWPL BASE SETUP	SWPL-SRV	152-07		
	SWPL-MIX	HR-3	HR-3 or H-3	
	GYRO-POS	NORM	NORM or ROT-90	
	CYCLIC LIMIT	240	10 - 240	
	V-SWPLRO	0	-89 - +90	
4: SENSOR SETTINGS	RUD-DIRE	NORM	NORM or REV	
	ALGY-DIR	NORM	NORM or REV	
	ELGY-DIR	NORM	NORM or REV	
5: TX DEADBAND	RUD-DEAD	6	5 - 100	
	AIL-DEAD	6	5 - 100	
	ELE-DEAD	6	5 - 100	
8: TAIL ROTR PARAM	TAIL-GAIN	26	-80 - +80	
	RUDLSTOP	100	60 - 180	
	RUDRSTOP	100	60 - 180	
	RUDD-ACC	0	0 - 15	
	RUDD-DEC	0	0 - 15	
	RUD-EXP	0	-100 - +100	
	RUS-SENS	100	50 - 150	
9: TAIL TORQUE COMP	PIT-COMP	0	-100 - +100	
	CYC-COMP	0	-100 - +100	
10: MAIN ROTOR PARAM	AIL-GAIN	26	6 - 80	
	ELE-GAIN	26	6 - 80	
	AIL-FEED	10	0 - 150	
	AILLSTOP	10	0 - 150	
	AILRSTOP	100	60 - 150	
	ELELSTOP	100	60 - 150	
	ELERSTOP	100	60 - 150	
11: PIRO OPTIMIZE	PIRO-THR	0	0 - 540	
	PIRO-OPT	0	-60 - +60	