VBAR NEO

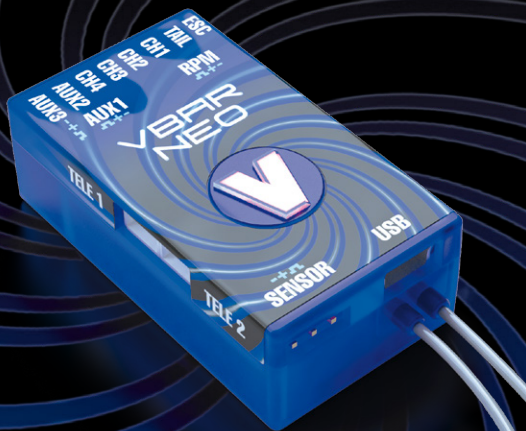## QUICK START GUIDE
EXPRESS-FIRMWARE

Mikado
Model Helicopters

Welcome to VBar NEO!

VBar NEO is an innovative product setting new standards for model helicopters in terms of flight performance and programming capacity.

Features:

- Easy setup using either VBar Control or a Windows/Macintosh computer.

- Programming Assistant (Setup Wizard): gets you ready for flight in 13 steps.

- Fine adjustments can be done at the field using VBar Control or other radios (e.g. Dual Rate/Expo).

- Ready for online updates as they become available.

- Contains governor for electric model helicopters (IC powered models require the Pro firmware).

- Fully compatible with VBar Control. For setup using VBar Control, please refer to your VBar Control manual.

Safety Instructions

An R/C controlled helicopter is not a toy! While moving, the rotor blades pose a serious danger to persons and things. You must obey all safety instructions of the manufacturer for operation of your helicopter.

VBar is not an autopilot! VBar may be installed in model helicopters which are suitable for flying without flybar. During installation and operation you must follow all instructions given in the software and in this manual. VBar may not be operated in wet conditions (high humidity or rain). If the helicopter shows vibrating behavior during flight, operation of the helicopter is to be stopped immediately. Do not continue flying until the cause for vibration has been eliminated.

- **Since the ESC is connected directly to the VBar, disconnect the motor wires or remove the pinion gear to avoid accidental spooling up of the helicopter while setting up the speed controller (ESC) functions. The same applies when loading unknown setup or preset-files, as they may transport other receiver and speed controller settings as you have on your heli!**

- **The external gyro sensor (set with sensor included) must not be connected to a different connector than Sensor, else it will be destroyed beyond repair immediately.**

- **Make sure you use a sufficient power supply.**

- **Set and check fail safe. Refer to the manual of your radio. The motor must turn off when the radio is switched off or when the receiver is disconnected from the VBar.**

1. Items needed for first installation

On first installation, you will need:

- VBar NEO with an external VBar Control Satellite and a VBar Control radio, or a radio system with a **digital** or **bus output**-receiver or Spektrum satellites. *Analog receiver output (standard hookup with patch wires, analog single-line PPM like Jeti (old), HoTT SUM(O), RASST) are* **not** *supported.*

- For updates and extensions, and to set up VBar NEO using a computer, you need the *VBar Control Manager* and the *PC Software* for VBar NEO which you can download conveniently from www.vstabi.info in one single software download.

- To perform updates, you need a *Boot Plug* **(connects to the Sensor connector at the time of updating only)**.

- To use the VBar Control Manager and the PC software, you need a Windows PC or a Macintosh computer with access to the world wide web (for Registration, Updates, Downloads, but not for the actual setup) and a *Mini USB wire* to connect.

- Power supply (BEC or receiver battery).

- Helicopter with servos installed, **but not yet connected! Only digital servos allowed!**

- Pitch Gauge (swash plate levelling tool).

Contents

VBar NEO, USB wire, Boot Plug, Gyro Pad, external gyro sensor with certain sets, patch wire, this manual.

Registration, Update, Key File

Use *VBar Control Manager* to register your VBar at our App Store (click *Applications*). It will be updated automatically. Connect the *Boot-Plug* to *Sensor*, power up the VBar, and connect it to the PC using the USB wire. Every time you use a new/yet unknown VBar NEO with your PC Software, you will be asked to download a Key File (copy protection). It is required that the VBar in question is registered to your MikadoID. You will find more information about using key files behind the link provided in the PC Software whenever you connect a new/yet unknown VBar.

2. Preparing the Helicopter

First you need to assemble the helicopter in accordance with manufacturer's instructions. The heli must have a flybarless rotor head and a swash plate driver. It is very important that you assemble the helicopter mechanically correct with exact symmetry and geometry. This is to ensure that you do not run into problems resulting from mechanical inconsistencies later.

3. Preparing the Transmitter

If you are using VBar Control, please refer to the VBar Control Manual to bind and set up your model.

If you are using a different radio system, in your transmitter, choose a new model and select a heli program with swash plate configuration H-1 or with mechanical mixing (1 Servo). When using VBar, swash plate mixing in the transmitter is not necessary. However, you do need to use other functions which are adjustable in heli programs only, such as flight modes, autorotation and so on.

Set all transmitter trims to zero or switch off all trimming functions. This is important because a change in trimming, e.g. in flight modes in the transmitter, is interpreted by VBar as control inputs, which will lead to drift.

The transmitter needs to be calibrated in setup mode. That is, all center and end positions of all channels need to be aligned with VBar. (See Adjusting the Transmitter.)

You may use the dual rate function for adjusting agility, and the expo function for adjusting control behavior around stick center. You can set this differently for different flight modes.

At least six radio channels are required, four for the control functions as well as one each for the motor switch and bank switching (= flight modes). For the optional rescue feature or other additional functions (e.g. gear, light), additional channels may be necessary.

4. Installation of PC Software

Important: The PC Software will only connect to a VBar if it is registered on www.vstabi.info using the VBar Control Manager, and if the current key file is installed.
Copy the key file to C:/Program Files (x86)/VBarControl/. On the Mac, *right-click* the program and select *Show Package Contents*, follow the *VStabi alias*; copy the key file here.

Windows
Download the VBar Control Manager and the PC Software from www.vstabi.info and install. Program icons will appear on your desktop.

Connect your VBar to the computer using the USB wire. Wait until the message *"new hardware found"* appears and the *hardware assistant* has started up. When prompted to enter the location on which the drivers are stored, please point to the directory ...\Program Files (x86)\VBarControl... or click on *"install automatically."*

On some Windows installations, it may be necessary to connect the VBar to your PC and install the driver manually using the device manager. Additional help is available on www.vstabi.info (see PC Software section).

Apple Macintosh
For Mac OS X there is a separate VBar Control Manager and PC Software version available as a download from www.vstabi.info, including the driver. The necessary driver installation starts when you double-click on the driver package. Then follow the

on-screen instructions. The applications should be copied into the folder /Applications.

It can be necessary to do a restart to get the driver to work.

5. Format of the PC Software

The VBar Software has two modes: The **flight menu** and the **Programming Assistant (Setup Wizard)**. You will use the **flight menu** to select your preferred flying style and adjust the gain of your model. Tail gain is set in the PC Software as well as the requested head speeds, for each bank (= flight mode).

The Programming Assistant (Setup Wizard) leads to a finished setup in 13 consecutive steps. You must read and follow the short explanations supplied at each step. In several places you have the option of clicking on buttons showing a little book with a question mark. These buttons lead you to the www.vstabi.info website where you will find additional relevant information. Also, by hovering the cursor over elements, you can find additional online information.

You can enter the **Setup** at any time again and move around in the setup menu by clicking *Continue* and *Back.*

Careful: Should you want to create a new setup, disconnect the motor / speed controller first in order to avoid unintentional spooling up! This is necessary because after clicking on *Create New Setup*, all values will be reset, and you have to begin from scratch. The reset also applies to the receiver configuration and for the ESC.

6. Initial Programming

After you have clicked on the program icon, your screen will show the main page with the parameter settings.

Now connect the VBar **(first time with servos still disconnected!)** via the USB cable with the PC and with your power supply (3.5 V to 8.4 V, e.g. to ESC or AUX2/3). VBar will start flashing blue. The USB connectivity status display will switch to green, and the connection status will also switch to green, indicating *"connected".* Now the screen will switch to initialization mode. Do not move the model until VBar has completed initialization.

On successful initialization, the main page will reappear on the screen, the LED will turn solid green or flash red/green (if no receiver is configured yet).

You might be required to download a Key File first (see above).

Now click on the **Setup** button to switch to the **Setup Wizard**, which is your programming assistant. You will be led through the setup menu step by step. After completion of the 13 steps, your helicopter will be ready for flight. At each step you will find information on the left-hand side of the screen. Be sure to read the text and follow the instructions! It is necessary that you perform the steps in the order provided. Do not skip back and forth between steps.

Attention: once you have set up your heli for the first time, you can navigate the Wizard using the Continue and Back buttons. **Don't click** *Create new setup* **unless you really need to**, **and mind the safety instructions concerning speed controllers and accidental spooling up!**

7. Using the Wizard

Start
In the Start menu select *Create new setup.* After you receive confirmation you are automatically led to the next step, *Receiver.*

Receiver
Here you select the receiver type for use with VBar. Connect bus receivers to AUX1, Spektrum satellites to Tele 1 and 2. Select VBar Control to use an external VLink receiver (special adapter wire required).

Tail Rotor Gain
Note that with VBar NEO, the tail gain adjustment is done exclusively in the PC software in the flight menu, for each bank separately. Gain can only be adjusted in flight using VBar Control.

ESC
The ESC will be connected to the ESC connector on the VBar.

Adjusting the Transmitter
It is necessary to set the TX signals to the correct directions, center, and end positions. This is done by using the transmitter's sub trim menu and the ATV menu. **It is mandatory** to assign a free channel to the motor function in a way so you can safely switch between *Stop*, *Idle* (bailout for autorotation) and *Run*. **It is also mandatory** to assign a channel (e.g. the gyro channel) to bank switch in a way so you can switch safely between banks (= flight modes) 1 to 3. With the gyro channel, you can switch banks together with the flight modes in your radio (like Dual Rate, Expo etc.). Once this is done, you need power cycle your VBar so it will perform a cold start and reinitialize.

Sensor Mounting
Choose the mounting orientation of the sensor in your model. Use the doctor's hat to set up the optional external sensor.

Direction of Main Rotor
Select whether the main rotor turns clockwise or anti-clockwise.

Swash Plate Type
Click on the type of swash plate used. Other types require Pro firmware (free swash plate configuration).

Collective Direction
VBar needs to know the direction which way the swash plate moves for positive collective. Please check this on your heli and set it accordingly. Helis where levers between the swash plate and the blade grips reverse the output might require an opposite setup.

Servo Directions
Now install the VBar into your helicopter and connect the swash plate servos. It is very important that the servos are connected to the proper slots of your VBar *(CH 1/2/3)*. **VBar will not work if you have misconnected the servos.**

Swash plate adjustment
In this menu, the swash plate is set to center position of its collective travel (zero pitch), and also leveled at 90° to the main shaft in both aileron and elevator axis using the controls per servo or per function. For this, it is necessary that the helicopter has been built with correct geometry (servos, swash plate, and linkages). A Pitch Gauge (swash plate leveling tool) is best to accomplish this task.

Adjust collective travel
Please set the desired collective travel here. The range for this is optimal between 80 and 100. You may reduce (but not increase) the pitch values later in your transmitter using the pitch curve function, e. g. if you measure different angles for maximum positive and maximum negativ collective. Check that your transmitter output **doesn't exceed 115 %** of travel in any case.

Adjust cyclic throw
Adjust cyclic throw here to the indicated value. The range between 80 and 110 is optimal.

Tail
The last step in the programming assistant is for the tail settings. Please **first** choose the tail servo type used in your model, **then** connect the tail servo to the VBar by plugging the servo into the slot in the VBar labeled *"Tail"*, to avoid servo damage.

Finally you should check if stick travel and tail rotor travel correspond properly. If they do not, it is necessary to reverse the function **in the software**. The servo limits are set separately for each direction. For top performance, the values should be approximately equal for both directions. If that is not possible, move the servo arm by one notch around the center postion and try again.

Programming is now finished. Go back to the main page by clicking **Finished.**

Governor/ESC

On the tab *Gov. I*, select the preferred type of Governor/ESC you want to use. External Governor means, the ESC itself does the governing of the head speed. VBar Governor means, you want to use the internal Governor of VBar. Press *Reset* after the selection, to load appropriate default values into VBar.

With an **External Governor**, enter the throttle values for each bank (= flight mode) into the box External Governor in the flight menu. The value *bailout* represents the throttle value that will be output to the ESC when you switch back from *Run* position to *Idle* position.

With the **VBar Governor**, you can use the *Throttle Servo Adjustment* feature on *Gov. II* tab to program the ESC using the collective stick, according to the ESC's manual. Enter the values required for a proper head speed calculation here, too: gear ratio of your model and half the pole count of your motor (e.g. with a 10 pole motor, enter 5).

Set the requested head speeds in the box *Governor* in the flight menu, for each bank (= flight mode) separately.

Governor gain is OK with the default setting. If the head speed drops too much on load changes of the system, or if it is not constant in normal flight conditions (e.g. pumping), make adjustments here.

Now programming is done, with the button *Finished* you get back to the flight menu.

8. Wiring your VBar

Connectors

ESC	Electronic Speed Controller, Throttle Servo
TAIL	Tail servo
CH1-4	Swash plate servos according to diagram in the software
AUX1	Bus-Receiver (SBus, HoTT SUM(D), UDI)
AUX2, AUX3	Additional functions (AUX2+3 VBar Control Satellite)
RPM	RPM sensor input
Sensor	External gyro sensor (optional), NO power supply!
USB	USB wire
TELE 1, TELE 2	Telemetry bus for VBar Control, or Spektrum satellites

Power supply may be connected to any port except *Sensor*. There is no voltage divider needed for rpm sensors. For further applications (additional functions) see App in VBar Control and online manual on www.vstabi.info.

9. Initialization (Pitch Twitch, V is lit)

During Initialization, the VBar goes through a self-test. The helicopter must be at rest during this test. When the test is finished, you will see a brief twitching (jump) of the swash plate. Also the V will light up solid green.

10. Pre-flight check

Before each flight you must double-check the active direction of the swash plate and the tail rotor. To do so, lift the helicopter up and move it along the three axis.

11. Operation

Upon successful initialization of the VBar and pre-flight check you may proceed to the maiden flight with your VBar. At the field you may further adjust the following values in your transmitter:

• Yaw rate (via dual rate tail channel)

• Cyclic rates aileron and elevator
  (via dual rate, cyclic channels, < 110 %)

• Expo function for aileron, elevator and tail.
  You can adjust the control behavior at
  stick center.

• Collective pitch travel via pitch curve

Trim flight:
During a trim flight, VBar performs all necessary trims of the helicopter automatically (elevator, aileron, tail). A trim flight is not necessary if the servo linkages are installed mechanically correct, the swash plate is leveled, and the center of gravity is set properly.

To perform a trim flight, turn on the helicopter while the stick for collective is at full positive. The VBar confirms this with a **short double-twitch (jump)** of the swash plate. It is best to perform the trim flight in very calm weather conditions. For further information on how to perform a trim flight, click on **Trim flight info** in the flight menu.

12. Miscellaneous

Exemption from Liability
Mikado does not assume liability for completeness or correctness of the content of this manual and of the PC software. The user assumes all liability for all potential damages or claims that might arise from the operation of the VBar and his helicopter.

Technical Data
Supply Voltage	3.5-8.4 V (2S LiPo)
Current Consumption	ca. 120-170 mA
Operating Temp.	-5 to 60 °C / 23 to 140 °F
Dimensions/weight	45 x 25 x 15 mm / 17 g
	.177 x .098 x .059 in / .6 oz

Accessories
You will find accessories to be used with VBar on Mikado's website www.mikado-heli.de

Support
Forum and extensive online manual at www.vstabi.info
Email: service@mikado-heli.de
       vstabi@mikado-heli.de