

Mini VStabi



Manual

Mikado
Model Helicopters

**This manual must be read in its entirety before
installing and operating the Mini VBar System!**

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Questions / Help

Mini VBar is an innovative technology developed and produced in Germany. Its applications are diverse. When installing or operating Mini VBar, you may have questions which are not answered by this manual. Purchase of this Mini VBar System entitles you to technical support by the manufacturer. If you have any questions or comments, please go to the V-Bar Forum on the following website: **www.vstabi.de** (Questions can be asked in English!) or use the following contact:

phone: +49 (0)331-237490
email: info@mikado-heli.de

1. General Information

VBar stands for „Virtual Flybar.“ (In German we have called it "VStabi", from Virtual Stabilizer Bar). The VBar and the Mini VBar simulate the behavior of the flybar and all its associated mechanical parts, so that these parts can be entirely be dispensed with.

The Mini VBar is **not** an autopilot! An autopilot can steer or hold the heli in a given position. This is **not** what the Mini VBar does. Rather, the Mini VBar simulates the expected behavior of a conventional rotorhead (which includes a flybar). With the Mini VBar, control of the helicopter's movements remains fully with the pilot. Errors in controlling the helicopter will inevitably lead to crashes. There are several advantages of the Mini VBar, compared to a conventional rotor head. We will mention just a few of the important ones here. Firstly, as the digitally controlled rotor head has fewer mechanical components, weight and air drag are reduced. Secondly, by changing the settings in the Mini VBar System, it is much easier to adjust the heli's performance to the pilot's individual requirements. In a multi-blade helicopter, a mechanical flybar cannot be used at all, so that the digital rotor head can supply all the advantages of a flybar head.

How does the Mini V-Bar work?

Mini VBar is an electronic unit which is placed between the receiver and the servos. It reads and analyzes the receiver signals. In addition it registers the helicopter's yaw rates along all three axes (elevator, aileron, and rudder) by MEMS sensors. All measurements are entered into a mathematical algorithm, which outputs the desired values to be transferred to the servos.

Which helicopters are suitable for the Mini VBar System?

The Mini VBar System can be used in smaller model helicopters with a rotor diameter of up to 100 cm. A prerequisite is that the use of the V-Bar must not lead to any restrictions concerning the safe operation of the model. **You must refer to the safety recommendations included in section 14 of this manual.**

2. Installation

The Mini VBar System includes the following components:

- Central Unit
- Bluetooth Module (optional)
- Control Panel (optional)



Control Panel (optional)



Central Unit

The Mini VBar must be installed in the helicopter in a place with few vibrations. For mounting, please use the adhesive tape which comes in the package. In its position the Mini VBar must stand clear from all other surfaces of the frame. The strip of connectors must face to the front or the back of the helicopter.

You may attach the Mini VBar „upside down“, so that the label faces to the ground (e.g. in the TRex 250). Do NOT mount the VBar sideways or „standing up.“

The wires must be placed correctly. For one, the receiver must be connected without pulling or bending the wires. At the same time, the Mini VBar must be connected to the swashplate servos. Note also that wires which are hanging loose can cause disturbances during flight. Loose wires interfere with the controlling function of the Mini VBar.

- Mini VBar power supply

Important note: With 4 digital servos and the Mini VBar, the current consumption of the receiver unit will be at least 50% more than when using a conventional flybar rotor head. You need to adjust power supply for your receiver accordingly!

The central unit houses the microprocessor and the power/voltage supply for the V-Bar. The supply voltage is 3.5 to 9 V. Sufficient power must be available to the central unit at all times during operation, also during peaks. The three swasplate servos alone may jointly draw up to 20A during peaks. You must use wires which are suitably dimensioned. (Two leads are recommended to connect to the receiver.) You must ensure that the power supply used has sufficient capacity.

- Receiver

There are two ways for the Mini VBars to receive the radio signal:

1) Transmission by a standard receiver:

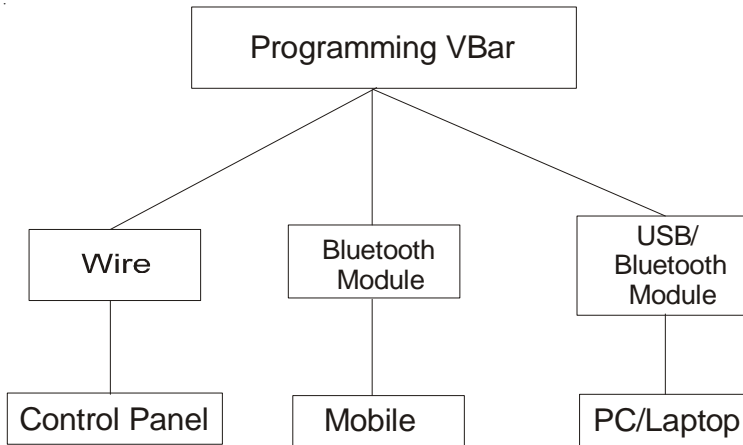
In this case, the Mini VBar is connected between the receiver and the servos. Each channel to the Mini VBar is connected via a separate patch wire.

2) Single Line Connection:

In this case, a special satellite receiver transmits all data to the MiniVBar with a single wire. A satellite receiver takes up very little space and makes several extra wires obsolete. You may obtain satellite receivers for use with Mini VBar from Spektrum, Jeti, and Fasst.

3. How to program your Mini VBar

Before you can use the Mini VBar in your helicopter it needs to be programmed. There are several different means for carrying out the programming:



Every Mini VBar unit comes with a USB cable and software which allows for programming it via a PC or laptop. You can also use a mobile phone, blue-tooth module (Mikado item no. 4056) or the special VBar control panel (Mikado item no. 4152). You can switch among these options at any time, so you can program your Mini VBar at home, at the flying field, or anywhere you choose.

4. Installation of the PC-Software

To install the Software, insert the CD into the CD drive and follow the onscreen instructions. The installation process automatically takes care of the installation of the drivers.

The VBar software is fully compatible with the most common Windows operation systems. There is one exception, namely the 64 bit version of Windows Vista. If you are using Windows Vista 64 bit, or an Apple, MAC or Linux System, please refer to the our VBar support page on www.vstabi.de, where you will find the relevant instructions.

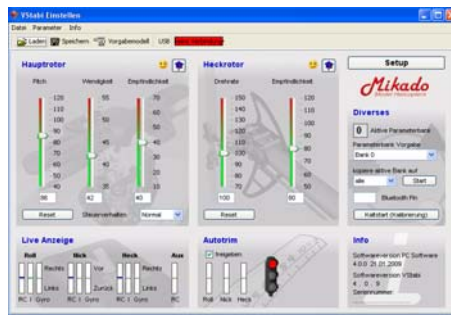
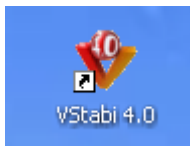
After successful installation, go to the Start menu where you will find 3 different links:

- The Program for standard USB connection
- The Program for the Bluetooth connection
- A simulation, which allows you to view VBar parameters, but without the need to overwrite your currently set parameters.

The following series of images leads you through the installation software step by step.



On opening the software, you will see a screen as shown below. This is the page for using the pre-installed model set-ups.



Transmitter Settings

It is sufficient to use a simple 4- channel transmitter with no active mixing. This is because flight control and swash plate mixing will be controlled entirely by the VBar. The only exception to this would be cyclic to throttle in a nitro heli.

Select a model on your transmitter and set it to mechanical swash mixing (no ccpm). In this way, we have one receiver where one channel is dedicated to each control function of elevator, aileron, pitch and tail.

In addition, the pitch curve needs to be linear from 0 to 100%. Servo travels must be set to 100%, and servo centers at mid position. Also, make sure all subtrims are set to zero, and all servo directions to normal. Reset dual rate to 100% and expo to linear, Turn off any tail mixers that apply to your radio.

Bear in mind that some of these settings change with flight modes, so you might need to reset them in all flight modes or copy one setting to all the others.

5. Connecting the Mini VBar to the Receiver

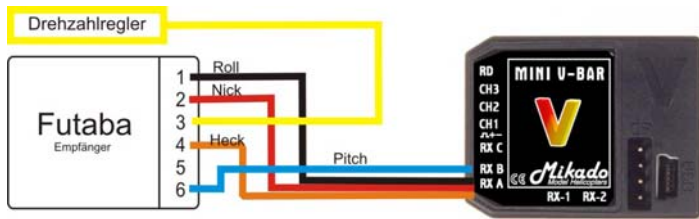
A) With a standard receiver (see video 4a on www.vstabi.de)

Turn on the MiniVBar and connect it to the PC via the USB cable. On first connection the PC will ask for installation of the drivers. (Should the drivers not be found automatically, search for them manually on the VBar installation CD which is still in the CD drive of your PC.)

Once the drivers are installed and the Mini VBar is recognized, you can start the PC Software in USB mode. The green bar in the upper left corner of the screen shows you the connection status.

Hook up the input connectors of the Mini VBar with the output connectors of your receiver. Please refer to your radio manual for the appropriate channel function assignments, in order to assign the connections for Pitch, Elevator, Aileron and Tail correctly. A 3-way adaptor wire is used for the control functions collective, aileron, elevator and tail. The collective channels is connected via a standard 3-pole patch wire which is also the power supply for the Mini VBar.

You must make sure the polarity is correct. The ground connection, usually brown or black, has to face upwards (as is indicated on the printed label on the VBar central unit.)



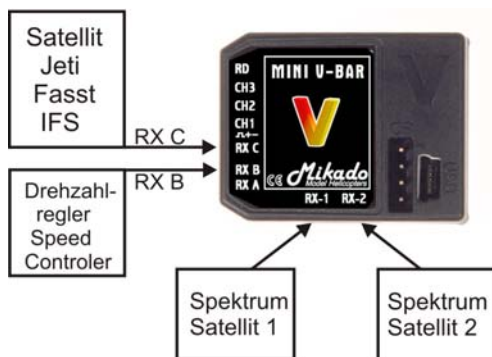
The factory preset is for standard connection with a receiver and four patch wires

B. Connecting the Mini VBar with a Satellite Receiver

There are two types of Satellite Receivers: .

-*Spektrum Satellites*: These are connected on the side of the Mini VBar to RX1 und RX2. Smaller models need only one satellite, larger models need two.

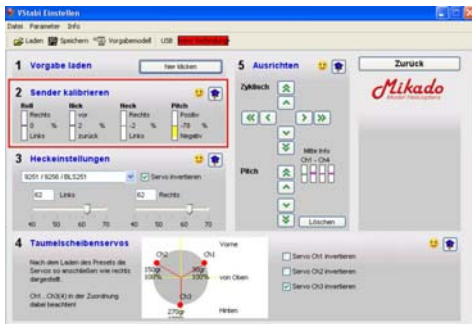
-*Satellites made by Faszt and Jeti*: These are connected to the plug labelled "RX C" in the strip of connectors at the front of the Mini Vbar.



Spektrum Satellites (see also Video 4b on www.vstabi.de)

Mini VBar can be operated with one or two Spektrum satellites. To initiate operation (binding) and for programming, please connect the satellites to the Mini VBar and supply power to the Mini VBar, using a receiver battery. Then connect the Mini VBar with your PC via the USB cable. On first connection the PC will ask for installation of the drivers. (These are automatically loaded onto your PC when installing the Mini VBar PC software.)

Now you must select the use of the satellites and their type in the PC software and activate their use as receivers. To do so, go to the *Setup* Menu and to *TX Calibration*. By clicking the doctor's hat you get to „receiver adjustments“.



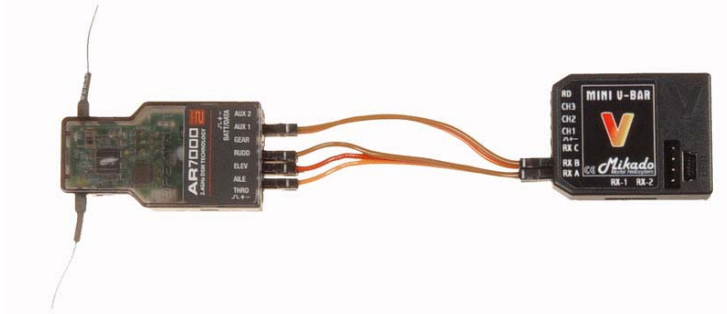
Here you select the applicable receiver. For Spektrum the default is set for DX7, so that the correct channels are automatically assigned. To finish, click on „prepare binding.“

Now disconnect the Mini VBar from the power source for a very brief momentl, no more than two seconds. Then start the binding procedure on your radio. During binding the LEDs in your satellites will flicker. Once the binding process is completed, the LED lights will remain on without flickering.

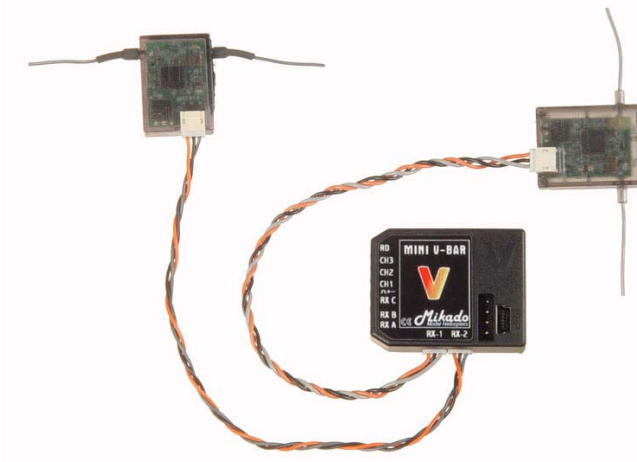
If you need to repeat the binding process at any point, you must check the box „prepare binding“ in the set-up menu first.

Note: Each time you change the receiver settings, you must do a cold start of the Mini VBar (on/off switch), so that it can initialize again.

Connection Mini VBar - receiver (via 3 way adaptor wire):



Mini VBar with two receiver satellites:



6. Pre-defined Set-ups (Presets)

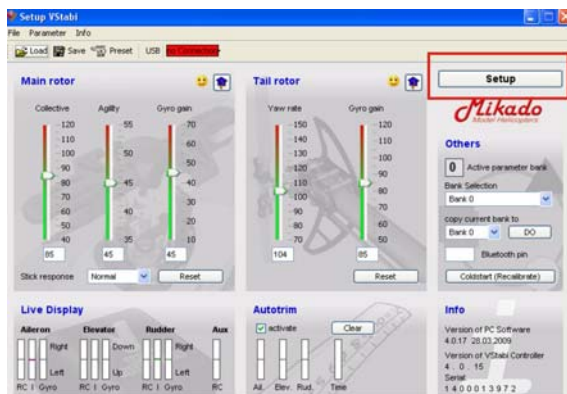
This section explains how you will achieve a completely finished set-up in just a few steps. You may start with this section if and only if you have installed and opened the PC software successfully on your computer. Once you have connected the Mini VBar with the receiver, you can begin.

Only if your model is **not** included as one of the pre-defined set-up options here, you need to carry out a few extra steps. Then, in each section, click on the little blue doctors hat (where applicable) for additional set-up options.



By clicking the smiley you can return to the previous screen. In this manual we will present all information on these additional options in blue font.

The Mini VBar software has two different user interfaces, or programming pages: the one you see right after start-up shows the Flight Parameters, and the other one is for set-up on the bench. To set up your heli, press „Setup“ in the upper right corner.



On the left you will find the serial number of your Mini V-Bar and the date it was manufactured. If you wish to update the software at a later point in time, you will need this serial number.

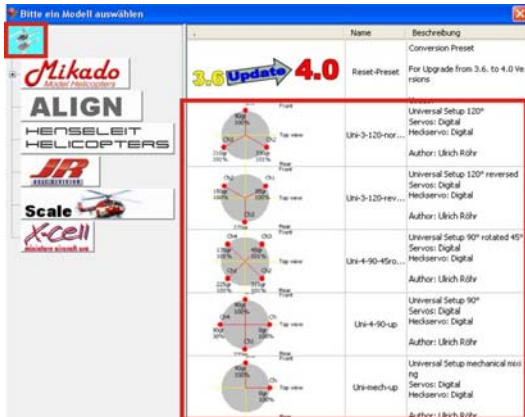
The dialogue leads you through the necessary steps for the basic set-up. In Step 1, choose a pre-defined setup - we call this a Preset - and load it into the Mini V-Bar. The components shown in each preset are intended as recommendations only. You can choose other appropriate equipment.



What's important later is the correct alignment of the sensor and the direction of the swash plate movement. Otherwise the preset will not function correctly. If there is no Preset for your heli brand, please select a universal preset and read the hints in the pop-up tutorials carefully.

After loading a preset into the Mini V-Bar, the diagram at the bottom of the screen indicates the current assignment of swash plate servos. Now switch off the helicopter, disconnect the USB cable and plug in the servo wires as shown in the diagram.

If your helicopter does not appear among the listed models, select the heli symbol at the very top. You will be able to choose among several different swashplate set-ups. Choose an appropriate set-up for your helicopter.



Step 2 Calibration of your Radio

Now turn on your radio and the receiver and connect the VBar with your PC. The software will now be in set-up mode for making further adjustments:

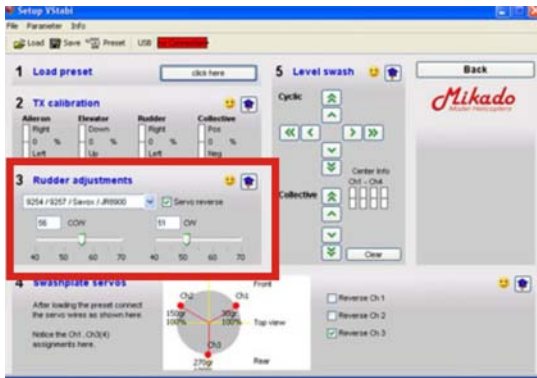


To ensure correct and troublefree operation of the entire system, the transmitter needs to be calibrated.

The stick inputs must match certain directions, center positions and overall throws in the Mini VBar. There is no real standard for radio equipment, so we will have to deal with various different signal ranges, depending on the equipment used.

First, if necessary, please match the direction by using servo reverse in your radio. Then adjust the servo center positions using sub trim. Finally, adjust the maximum servo travel using the servo throws in your radio. The goal is to achieve on all 4 functions travels of 100% as well as the correct servo travel direction.

Step 3: Tail Rotor Settings



In Step 3 of the setup procedure you can carry out the necessary tail adjustments for the tail assembly. This includes choosing the correct servo type. If your specific servo is not listed, please contact our support team on the online VBar site (www.vstabi.de) to obtain the appropriate setting.

In your Mini VBar software, you can adjust the servo direction and the limits for both directions. With no stick input, the tail servo is in neutral position in setup mode. This helps to mount the servo arm at the best angle possible. Then adjust the length of the tail rod in such a way that the tail blades show 2-3° pitch. This is for torque compensation.

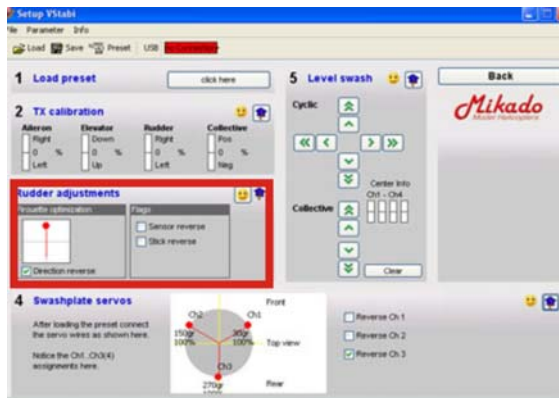
Now double-check the direction of the tail pitch. The nose of your heli must move into the direction of stick input. If this is not correct, check-mark the reverse box in your Mini VBar software.

Check the mechanical limit sof the tail assembly carefully.

If your helicopter does not appear among the listed models in the presets, you will need to program Piro Optimization and Torque Compensation for the tail. The following text shows you how.

a) Piro Optimization

As you may know, one great advantage of the Mini VBar is its integrated tail gyro. This makes it a 3-axis system, which is able to compute simultaneously the movements of the heli and the pilot's inputs. It is this feature which allows for automatic piro optimization.



The goal in piro optimization is to be able to fly a pirouette without cyclic input. The piro optimization function ensures that during the movement through the pirouette, the elevator input is corrected in such a way that the swashplate's tilt is kept constant in relation to the direction of motion.

It is easy to see that for this to happen correctly, the system must recognize stick input correctly. To check this, go to rudder adjustments in the set-up menu and click on the little blue doctors hat. The red ball in the diagram represents the nose of the helicopter. Turn the heli around its vertical axis by 90 degrees. The ball must move in the same direction.

b) Torque compensation for the tail

One great advantage of the Mini VBar is its integrated tail gyro. This makes it a 3-axis system, which is able to compute simultaneously the movements of the heli and the pilot's inputs. It is this feature which allows for automatic torque compensation. This compensation process has several advantages. For instance, it optimizes the movements of the helicopter and it saves extra power.

Automatic torque compensation will require that the system recognizes stick input correctly.

To check this go to the expert tail menu, note the original torque compensation value, then set it to 100.

On pitch stick input, starting from center, and regardless of positive or negative pitch input, the tail pitch angle must now increase to counter the expected increased torque.

For clockwise main blade rotation, the compensation moves the tail boom to the left, and the nose will be moved to the right. And for counterclockwise main blade rotation, the model's nose will be moved to the left, while the tail moves to the right.

If the travel direction for torque compensation is incorrect, all three tail travel directions must be reversed in your Mini V Stabi PC software. These are: tail servo, tail gyro and RC input.

You must reverse directions of the tail servo, tail gyro and the tail channel input.

Once this check is done, return the torque compensation value to its original setting.

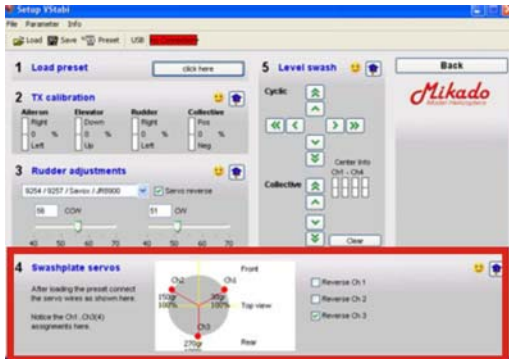
If your model is not equipped with asymmetrical main blades, for example if you have a scale model with -5 to +12 degrees of pitch, the point of the least expected torque needs to be programmed for the static mixer function.

To do this, go to the advanced menu which is hidden behind the little blue doctors cap. Move the transmitter's pitch control to the zero pitch position and click the zero pitch button to set it to zero pitch.

Step 4: Setting up the Swashplate

In setup mode all servos are decoupled from control. This enables mechanical adjustments because the control loop is rendered inactive. Now set all sticks to center position.

Mount the servo arms as close to a 90° angle to the casing or control rods. The direction of the servo's collective pitch movement is set using servo reverse in step 4 on your screen.



After the direction of collective pitch has been set correctly, the directions of elevator and aileron should also be correct. If this is not the case, please re-check the servo assignments on your VBar.

Now fine-adjust the servo arms to an exact 90-degree angle using the control buttons in Step 5 on your screen.

If you are using a model without presets, you need to set the direction of swashplate travel in the servos.

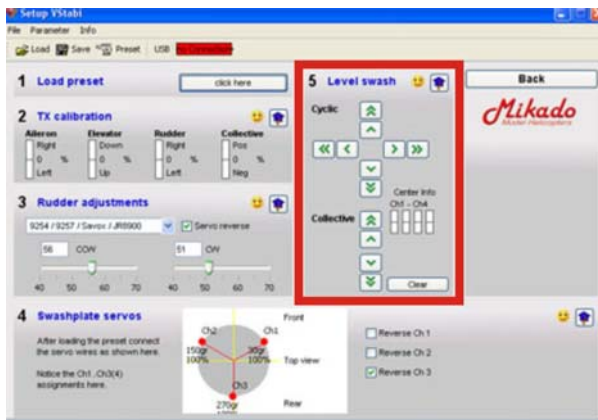
The washplate in a model helicopters normally moves upward on pitch positive. The same has been implemented in the universal presets of the Mini VBar.

It is also possible for you to choose the direction of swashplate travel. If it is necessary that your swashplate moves downward on positive pitch, simply set the check-mark at the box of for collective reverse. You can do so by clicking on the little blue doctors hat in step 4 of the set up menu.

Step 5: Adjust the Swashplate

To achieve a geometrically correct mechanical setup of the swash plate with perfectly aligned servo arms, it is necessary to adjust the push rods.

The swash plate needs to be centered and level within the pitch travel range. Fine-tuning can be done with the collective buttons in step 5, located below the cyclic buttons. Then ensure that the swash driver is in mid position of its travel range and level with the axis of the spindle shaft.



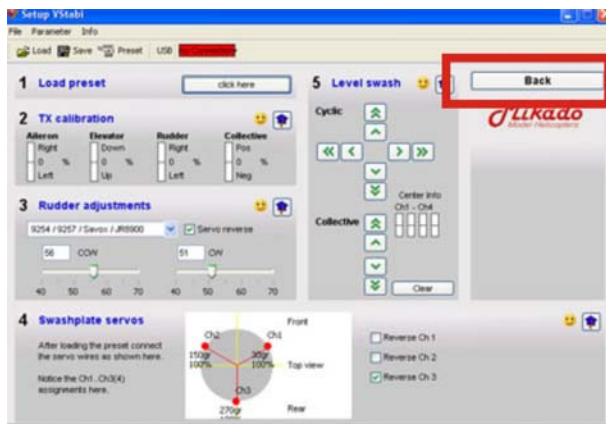
Now that the swash plate is exactly centered and level, you can adjust the control rods to the blade holders. The rods need to be of equal length and the blade grips need to be exactly at 0° position.

Now double-check the collective travel. If the direction is incorrect, the reason may be that the bladeholders are not properly installed and need to be turned by 180°. Check back with the assembly manual, if necessary.

Maximum and minimum collective pitch needs to be measured by using a pitch gauge. The pitch maximum and pitch minimum values need to be obtained in setup mode.

To set the desired maximum for collective pitch, click „Back“ and return to the menu for the flight parameters. There, move the bar for collective until you read the desired maximum collective pitch. Bear in mind that the actual maximum value can only be checked by returning to the Setup mode, so you may have to switch back and forth between the two menus several times.

You can determine pitch maximum by using a pitch gauge. For entering the desired values, leave the Setup menu and use the bar for collective. For checking the values using the pitch gauge you must return to the Setup-Menu.



8. Checking Travel Directions

Prior to your maiden flight, you need to re-check all travel directions on your transmitter and on the VBar set-up menu.

During power-on, which initializes the VBar, do not move sticks or the helicopter. After you see a brief twitch of the swash plate, you must check both positive and negative Collective pitch, Elevator up and down, and Aileron right and left. You must also check the sensors are moving the swash plate in the right direction.

Elevator

To do so, move the heli nose-down. The swash has to tilt to the back. Move the heli tail-down. The swash has to tilt to the front.

The compensation movements of the swash plate are rather small, so take a close look. You can also check the servo arms.

Aileron

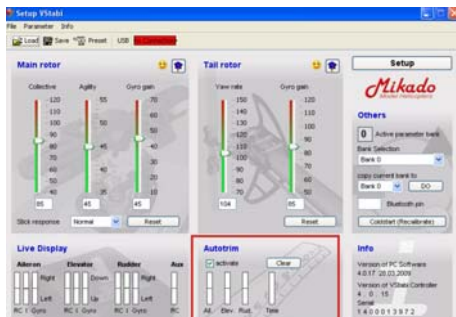
Now roll the heli to the left. The swash plate has to tilt to the right. Roll the heli to the right, and the swash plate moves to the left.

Tail

And lastly, the tail: the compensation always occurs against the actual movement.

8. Trim Flight

To achieve perfect flight performance, you will need to trim your heli. This will not take much time, if you have done your assembly work properly. The center of gravity should coincide with the center axis of the main rotor shaft, and the mechanics of your machine must be set up properly as described earlier. On IC powered helis, make the trim flight with the fuel tank half full. This is the best compromise to compensate for the shifting center of gravity on most IC powered helis.



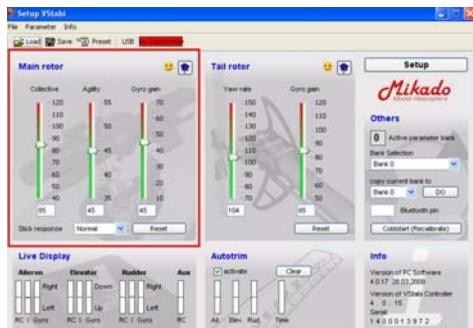
Autotrim is activated in your VBar software by checking the appropriate box. At the flight line, turn on your heli with the collective stick at full positive. Use throttle hold to prevent the motor from starting, until you are ready to fly. Wait until you see a double twitch. The first twitch confirms successful initialization; the second acknowledges activation of the Autotrim mode.

Make your trim flight in calm conditions. The less wind, the more spot-on your trims will be. Autotrim is active while positive collective is input, even on the ground. This is why we suggest the following procedure:

Turn on your heli with the collective pitch at full positive at the takeoff-point at your field. Move the pitch lever to zero collective after you see the double twitch, and start the motor. Take off as soon as you can, without rushing. The Autotrim flight should last about one minute. Let the heli drift without moving the sticks for some seconds - recover and repeat. Autotrim works best if not disturbed by any inputs.

After landing and turning off the motor, move your collective stick to negative to prevent the Mini VBar from continuing it's trim measurements. The Autotrim flight can now be evaluated using the Mini VBar software. When the lights show green, uncheck the box to avoid further unwanted changes. A yellow or a red light indicates that you should do the trim flight again.

10. Flight Parameters



First lets look at the bar „Agility“. This bar adjusts the maximum agility of the heli on both the elevator and aileron axis. If your heli reacts to fast, reduce the value. If your heli reacts to sluggishly, increase the value.

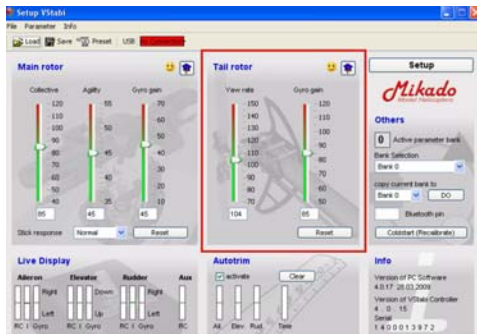
The bar „Gyro Gain“ controls how crisp the heli reacts to environmental disturbances, for instance to wind. It also controls how much force the control system uses to translate a stick input into a flight maneuver. The higher the value, the crisper and more defined your heli will perform. If you recognize repeated control system bouncing, especially on short elevator inputs, reduce this value by a few percentage points, until the bouncing stops.

By selecting „Stick Response“, you can determine how directly the VBar responds to Stick inputs depending on the speed the stick is moved. Adjust this to your style of flying.

10. Tail Settings

Adjust the maximum tail yaw rate using the Yaw Rate bar. 100 % translates to an approximate yaw rate of 1 pirouette per second at full stick input.

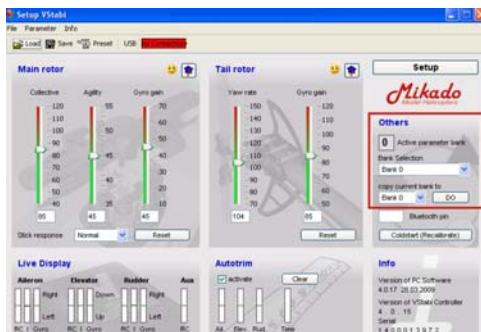
Adjust the tail gyro gain using the Gyro Gain bar. It is possible to set Gain to a maximum, but it should not be so high that the tail starts wagging. But with Mini VBar, a much lower value can translate into an excellent tail performance.



11. Bank Switching

If you want to compare different setups, or you want to fly your heli with variable rpm and the resulting different Autotrim and Optimization set-ups, use bank switching.

You can control bank switching from your transmitter, using a spare channel and an additional patch cable.



To activate bank switching, choose Bank Selection Bank 0/1/2/3 in the Mini VBar software. Please do not forget to copy your current set-up to all the other banks so you have a basic setup on all of them. The status bar „AUX“ in the „live display“ shows the currently active bank.

During a trim flight, you can do Autotrim on all banks available. Let the heli perform a 1-to-2-minute hover in each bank. Then land, move the collective stick to zero pitch and turn off autotrim.

12. Parameter Optimization

Different flight parameters, such as choice of main rotor blades, rpm, Agility-Setting, style of flying require different reactions of the control loop.

(Mini) VBar Software 4.0 adapts to these flight parameters continuously.

Control loop optimization runs as a background task on Mini VBar, continuously optimizing the parameters on the cyclic axis.

The system needs a few flights to adapt to these parameters.

When you feel the flight behavior is just right, you can disable „optimize“ by unchecking the box to preserve the current state.

13. Control Panel

The VBar Control Panel contains the set-up menu for the pre-installed setups as well as for the Expert software. It can also be used with Mini VBar. The menus are structured very similar to how it is done in the PC software. An exact description of the menu structure is included with the control panel.



14. Important Safety Guidelines

- Initializing

After connecting the Mini VBar, it initializes. This can take a few seconds. The completion of the initialization is indicated by a twitch of the swashplate. The heli must not be moved during the initialization process. You must have seen this brief twitch of the swashplate before you start operating the helicopter in flight.

- General Guidelines

A radio-controlled model helicopter is not a toy. Absolutely every step in connection with building and operating the helicopter must be carried out with utmost care. It is essential that you are aware of the function of every step which you are performing. If there is the slightest unclarity about what you are doing, you must stop immediately, you must have that question completely resolved first. You must also stop building or operating the model, if you find that the manual is unclear to you.

Be aware that any improper handling can cause the helicopter to crash. Such crashes may lead to total loss of the helicopter and it can severely damage things or persons. Any model helicopter, and in particular a model helicopter with an installed Mini VBar System, may not be operated in such a way that any things or persons are in danger of being damaged. The Mini VBar System may be installed and operated only in helicopter systems, which are designed to be operated with a flybarless rotor head.

- Settings

The Mini VBar is a system placed between the receiver and the controlling units of the helicopter. Thus the Mini VBar is one of the actively controlling elements of the helicopter.

If any parameter is set incorrectly, it is possible that this setting can no longer be overridden via a radio signal. This may lead to an uncontrollable crash of the helicopter.

Even when overriding is possible, it is usually the case that the pilot cannot react fast enough to make the appropriate correction. For this reason you must proceed carefully when adjusting any settings.

Of all the parameters, the following are the most critical: polarity of the sensors, all swashplate parameters, the Hiller ratio of the control loop.

-Pre-flight check

Prior to each flight, you must double-check the active direction of the sensors and the setting of the swashplate parameters. You can do this without using the software, simply by lifting up the helicopter at its rotor head, after it has been turned on and initialized. To test effective direction, simply move the heli in your hand along all axes. The direction of swashplate movement always needs to be the opposite of the direction of motion. In multi-blade rotor heads there can be a timelag. In this case you may take the rotor blades as a point of reference.

To check the swashplate settings you need to give stick input to all functions prior to start. Check that cyclic and collective are responding in the right directions.

The Hiller ratio is checked by brief consecutive inputs to elevator and aileron. After each input the swashplate must move back approx. 30% of the way immediately. Subsequently the swashplate moves back slowly the rest of the way.

. New or Adjusted Parameters

Special care must be taken after changing a parameter value or entering a new parameter value. You cannot predict exactly how the helicopter will behave. For this reason it is essential that you operate the helicopter such that no person or thing will be damaged, even if the heli becomes uncontrollable. Let there be enough distance between the heli and you/other persons/surrounding items.

- Flying

The default settings in the Mini V-Bar System are such that it the model will behave much similar to a model with a flybar and paddles. If you do not modify the settings for elevator, aileron or rudder, you should not expect any surprises. We call this setting a "balanced system setting".

Sometimes it may appear that on lift-off the heli "overreacts". This is due to the fact that the control functions are not working for als long as the heli is not up in the air.

15. Rotorhead Set-up

If you do not want to use a Mikado rotor head in your helicopter, you need to check a few mechanical points in the rotor head, before using the Mini VBar.

1) The blade holders must be installed such that the linkages run exactly parallel to the center axis of the rotor shaft. (See picture below.) If the arms of the blade holders are not long enough, you can make them longer using distance bolts or washers. The distance between the center of the main rotor shaft and the ball at the bladeholder should be 30 mm.

2) The dampening in the rotor head has a great effect on the flight properties of a VBar rotor head. It is advisable that the rotor head dampening is adjustable, should this become necessary.



3) It is necessary to install a swashplate driver. Mikado offers a swashplate driver for 10 mm main rotor shafts. It has eight ball bearings:
item no. 4018



You will find more information on the mechanical prerequisites for using the VBar in the VBar Wiki on www.vstabi.de.

16. Additional Components

VBar rotorhead w. 14mm blade holders (LOGO 14/600), item no. 4042
VBar rotorhead upgrade for LOGO 14/20/24/600, item no. 4053
VBar rotorhead w. 12mm blade holders (LOGO 10/500) item no. 4041
V-Bar rotorhead upgrade for LOGO 10/500, item no. 4052



Wire set Mini VBar 80 mm, item no. 04282
Wire set Mini VBar 120 mm, item no.04283
Wire set Mini VBar 180 mm, item no. 04284



Blue-tooth module, item no. 4056



Control Panel for VBar, item no. 4152



17. Technical Data

Supply Voltage.....	3,5-9 V (1)
Current Consumption.....	max. 150mA
Operating temperature	-15° to 60° Celsius
Processors.....	2*DSP 32/60 Mhz

(1) Absolute limit. Exceeding these values may cause damage.



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Returning a VBar: Checklist

If you have reason to return your VBar to Mikado, you must complete the list below and send it along with the unit. This information is essential for us - without it we cannot carry out any necessary checking routines or successfully repair the unit.

Faulty behavior of the VBar is not necessarily due to a defect. Some problems are caused by incorrect operation. Please go to the forum on www.vstabi.de to exclude that the problem's origin is easy to fix. This saves you time and cost.

If you do need to send in the VBar for check-up or repair, please send both the main unit and the gyro. Please include a phone number and/or email address, so we may contact you.

Name:.....

Address:.....

email / phone.....

V-Bar

- Software Version Mainboard

- Software Version PC Software

Model Helicopter: brand and type.....

Rotorhead

Mikado V Bar Rotorhead upgrade?..... yes.....no.....

Own head upgrade?.....yesno.....

If you have made your own head upgrade, please describe brand, type, and attach pictures

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Radio: brand and type.....

2,4 Gh.....

PCM/PPM.....

Receiver brand and type.....

Servo swashplate brand and type.....

Tail rotor servo brand and type.....

Power supply for receiver? (BEC/Regulator brand and type).....

Receiver battery NiCd / Lipo / capacity.....

Motor and Speed Controller

Gyro sensor mounting (soft or hard, how many pads?).....

Damage report

Which unit is defect?

-Mainboard

-Gyro Sensor.....

How did the defect occur? Please describe the malfunction. If you crashed also describe the crash.

- defect occurred once.....

- defect occurred sporadically.....

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