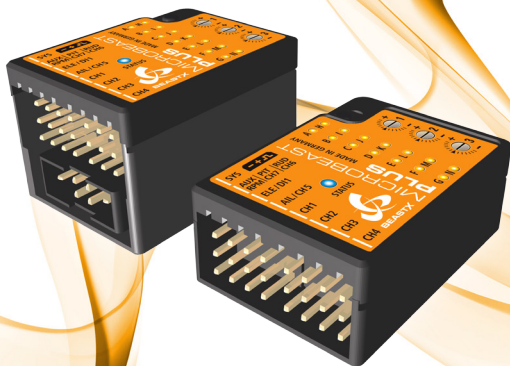**BEASTX**

THE NEXT LEVEL!

MICROBEAST **PLUS**

6-AXIS MEMS SENSOR SYSTEM FOR RC-MODELS

INSTRUCTION MANUAL

INSTRUCTION MANUAL

CONTENTS

SAFETY NOTES

⚠ Radio controlled (R/C) helicopters are not toys! The rotor blades rotate at high speed and pose potential risk. They may cause severe injury due to improper usage. It is necessary to observe common safety rules for R/C models and the local law. You can gather information from your local R/C model club or from your national modelers association.

⚠ Pay attention to your own safety and the safety of other people and property in your vicinity when using our product. Always fly in areas away from other people. Never use R/C models in close proximity to housing areas or crowds of people. R/C models may malfunction or crash due to several reasons like piloting mistakes or radio interference, and cause severe accidents. Pilots are fully responsible for their actions, and for damage or injuries caused by the usage of their models.

⚠ The MICROBEAST PLUS system is not a flying aid for beginners! It replaces the conventional mechanical flybar on most R/C helicopters. It is absolutely necessary that you have flying experience and that you are experienced in the operation of R/C helicopters. Otherwise we suggest you to seek the support of an experienced helicopter pilot before you undertake the first flight of your model. Additionally, flight training with a R/C simulator can help make flying easier and more enjoyable. Ask your local dealer if you need technical support or if you observe problems during the usage of our system.

⚠ Please read the following instructions thoroughly before the first use of your MICROBEAST PLUS and setup the system carefully according to this manual. Allow sufficient time for the setup procedure and check each step carefully. Watch for a mechanically clean and proper build of your helicopter. A wrong system setup can lead to a serious accident and damage to the model.

⚠ Radio controlled (R/C) models consist of several electrical components. It is therefore necessary to protect the model from moisture and other foreign subtances. If the model is exposed to moisture this may lead to a malfunction which may cause damage to the model or a crash. Never fly in the rain or extremely high humidity.

⚠ Do not expose the MICROBEAST PLUS system to extreme variations in temperature. Before powering up the system, wait some time so that the electronics can acclimatize and any accumulated condensation is able to evaporate.

⚠ MICROBEAST PLUS consists of highly sensitive electrical components with limited capability to operate with excessive vibrations or electrostatic discharges. If you find such disturbances in your model, the use of MICROBEAST PLUS should be postponed until the problems have been fixed.

⚠ The sensors of MICROBEAST PLUS consist of highly sensitive electomechanical components. These can be damaged due to moisture or mechanical or electrical impact. Do not continue using this product, if it hase been exposed to such influences, e.g. dure to a crash of the model or due to overvoltage caused by a defective receiver power supply. Otherwise a failure may happen any time.

⚠ When operating the helicopter with a MICROBEAST PLUS ensure there is a sufficiently large and stable receiver power supply. Because of the direct coupling of the rotor blades to the servos, without the use of a flybar mixer, the servos are exposed to increased actuating forces. In addition, because of the intermediary electronic gyro system, the servos are driven more often than with traditional use.
These factors can make the power consumption increase a lot compared to a flybar helicopter. When the supply voltage falls below 3,5 volts for a short amount a of time, the system will power off and reboot. In this case a crash of the helicopter is unavoidable.

⚠ To connect receiver and MICROBEAST PLUS only use the supplied connection cables. Extending the cables is at your own risk. For the rest only use high quality servo plugs and keep the cables' length as short as possible. So contact resistance of the power supply is kept down to a minimum.

⚠ When operating electric helicopters make sure that the electric motor cannot start inadvertently during the setup procedure. Particularly pay attention if using a single-line receiver and if the ESC is connected directly to the MICROBEAST PLUS. We recommend disconnecting the electric motor from the ESC during the setup procedure. Prior the first usage please slide the motor/pinion away from the main gear, then check that the motor does not to start inadvertently when the receiver is switched on.

Please note that these instructions are only valid for the MICROBEAST PLUS firmware version 3.2.x !

The delivered firmware version is printed on a sticker on the outside of the MICROBEAST PLUS packaging. You can also read it out on a computer by using the optional USB2SYS Interface along with the StudioX software bundle. Also you can directly read on the MICROBEAST PLUS unit during the initialization phase what firmware version your MICROBEAST PLUS is running:

MICROBEAST PLUS first carries out a brief selftest by lighting up all Menu-LEDs simultaneously, and cycling the Status-LED color. Then for about 3 seconds, the Status-LED lights red while the Menu-LEDs Ⓐ - Ⓖ display the first digit of the firmware version, and the LEDs Ⓗ - Ⓝ the second digit of the firmware version.
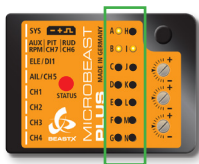
Firmware version 3.2.x

On the first column LEDs Ⓐ and Ⓑ must light corresponding to digit 3.
LED Ⓘ corresponds to minor version 2.

By briefly pushing the button you can get more version informations displayed. In respect to the manual this information is not important. You will get more information about the version display in chapter 11.

Following changes have been made to MICROBEAST PLUS with firmware version 3.2.0 compared to firmware 3.1.3:

- Additional SRXL „Singleline" receivers: Spektrum® SRXL, Multiplex® SRXL „V2" (chapter 5)

- Tailservo sub trim feature (chapter 9 - Parameter menu point Ⓐ)

- Modification of Receiver setup menu for safety reason (see note at chapter 5)

- Setup menu point Ⓜ: Sensor directions and corresponding Status-LED colors now identical to MICROBEAST Firmware 3.0.x.

This manual is an updated version of the manual for MICROBEAST PLUS firmware version 3.1.x. The changes listed above were considered and are described in this manual at the locations indicated.

Dear customer,

congratulations on your purchase.

MICROBEAST PLUS is the official successor of the famous MICROBEAST flybarless system. In comparance to MICROBEAST the hardware has been revised thoroughly to be on par with the state of the art. Latest MEMS sensors and faster processing gives a more precise control in all flight situations.

If you have MICROBEAST already in use you will find that the setup of MICROBEAST PLUS runs as usual. The proven „EasySetup" concept and ease of use is maintained. So upgrading to MICROBEAST PLUS is very easy.

As MICROBEAST PLUS is much more powerful than MICROBEAST, it is specifically tailored for use with the StudioX software solution that enables more complex adjustment processes thus resulting in completely new applications. We recommend to visit our website from time to time to get the latest features for your MICROBEAST PLUS.

We thank you for your confidence and wish you fun and great flights
with **MICROBEAST** PLUS.

Your BEASTX-Team

WWW.BEASTX.COM

2.1 Box content MICROBEAST PLUS

MICROBEAST PLUS

Empfängeranschlusskabel 15cm

Bedienungsanleitung

MICROBEAST

BEDIENUNGSANLEITUNG

Klebepads
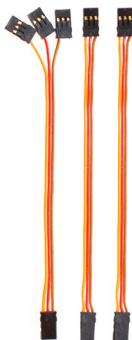
Einstellwerkzeug

2.2 Optional accessories
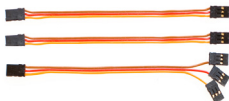
Empfänger-anschlusskabel 8cm

USB2SYS Interface

Kabel für den Heckkreiselbetrieb

Spektrum®-Adapterkabel

2.3 MICROBEAST PLUS HD

MICROBEAST PLUS HD is the most powerful flybarless system from the MICROBEAST series. While function and operation are identical to MICROBEAST PLUS, the HD version is characterized by the possibility of a high power supply. This meets the requirements of speed flyers and extreme 3D pilots and is primarily used in helicopters larger than 500 size that have very power consuming servos installed.

By using a low-resistance high-current connector system MICROBEAST PLUS HD makes it possible to use thick power cables for connecting receiver battery or BEC which preserves a virtually loss-free transfer of electric current. In addition the power connection is switchable* using a particularly fail-safe switch system, so there is no need for a separate and costly power switch. **The input voltage range is 3.5 to 8.4 volts.**

Fig. 1

Power cable

Switch*

Fig. 2

Switch harness (no polarity)
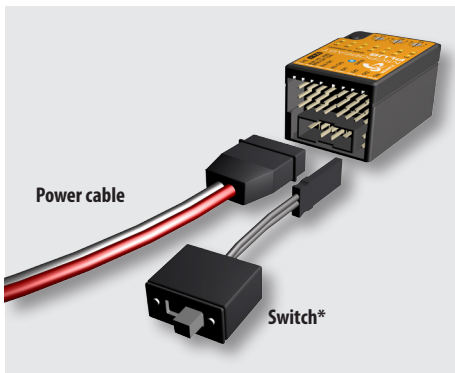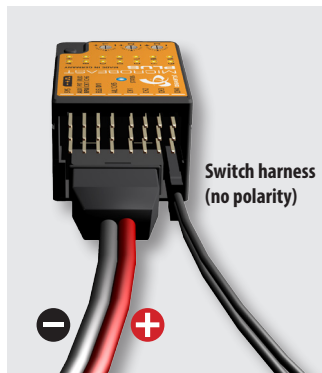
Solder to the supplied power cable a matching counterpart for the supply battery used or connect it with the BEC power wires (of your speed controller). When using a battery it is not recommended to directly connect the battery to the MICROBEAST PLUS HD without using the supplied power cable as an adapter. Continuous plugging and unplugging can cause the overlying servo plugs getting unplugged accidentally or cause the adhesive gyro pad to get loose!

Receiver and servo plugs are connected to the ports on top of the unit, similar as described in the MICROBEAST / MICROBEAST PLUS manual in section 3.3 and illustrated in chapter 4. There is no difference between HD and non HD version in this respect.

Fig. 3

Battery
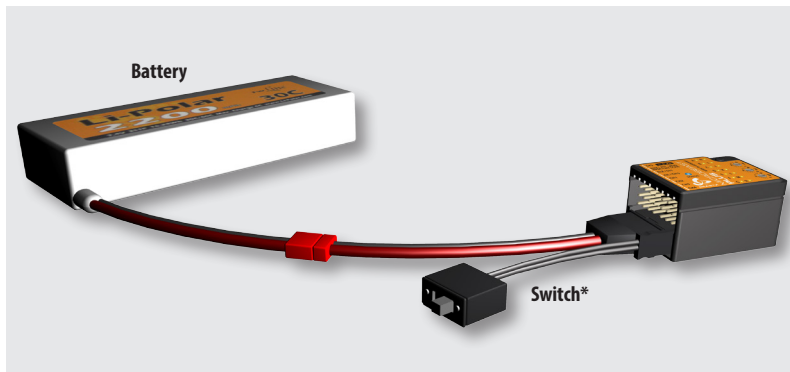
Switch*

The use of the electronic switching system is optional. The switch is designed in a way so that it interrupts the power circuit by shorting the switch circuit in OFF position. If the switch is not connected MICROBEAST PLUS HD is switched on permanently as soon as the power is connected.

Please note:

- Using the high power connection port is not a must. You can also use MICROBEAST PLUS HD in a conventional manner by powering the unit from the receiver ports in the top row, as shown in chapter 4 of the MICROBEAST / MICROBEAST PLUS manual. However, using the electronic power switch system is not possible then!

- The electrical connections of the high power connection port and the upper terminal row form a parallel power circuit during operation. So it is possible to connect an additional power source at the upper terminal row. For example this can be a buffering battery or a backup system that shall protect against failure of the primary power source. In this case note the manufacturer's instructions, if this is possible and permissible for the supply systems used. Also note that using the electronic power switch system of MICROBEAST PLUS HD is not possible in this combination!

- Note that the system can only be as powerful as the power source allows. Use power cables with sufficient diameter, avoid long cable length and only use a plug system for connection of battery and power cable that is capable of transferring high currents.

- MICROBEAST PLUS HD **does not supply an internal voltage regulation**! The voltage that is applied to the high power connection port will directly be passed to the servo and receiver connections. Only use electronic components (servos and receiver) that are designed for your power source.

⚠ **When switched off MICROBEAST PLUS HD consumes a very low amount of standby current.** Therefore always completely disconnect the battery from the system if you do not use the model for a extended period of time to prevent the supply battery from getting discharged and damaged in consequence.

The operation of MICROBEAST PLUS HD is identical to MICROBEAST PLUS apart from the high power supply and the switch system. So it is not explicitly dealt with the HD version later on in this manual. All subsequent executions are also based on MICROBEAST PLUS HD!

3. MOUNTING AND CONNECTION

3.1 Mounting the MICROBEAST PLUS unit

Attach the MICROBEAST PLUS unit by using one of the provided gyropads at a preferably low vibrating position on your helicopter such as the gyro platform or receiver platform. You may need to choose another type of mounting pad depending on the vibration pattern of your helicopter. For more information please ask you MICROBEAST PLUS dealer.

The MICROBEAST PLUS unit can be attached flat or upright and even upside down under the helicopter. **However, the servo connector pins must always point toward the front (or rear) of the helicopter.**

Pay attention that the edges of the MICROBEAST PLUS unit are all parallel with the corresponding axes of the helicopter! And be sure that the mounting platform is perpendicular to the main shaft!

Fig. 4

Connectors parallel to the longitudinal axis

Longitudinal axis

Fig. 5

3.2 Preparing the transmitter

The following step is unnecessary when using MICROBEAST PLUS with the optional cable for stand-alone tail gyro use, see 4.1.2. In this case you can setup your transmitter as described in the transmitter's manual. MICROBEAST PLUS then acts like any other tail gyro system using rudder and gain channel of the transmitter to control the gyro.

First create a new model in your radio's model memory. When using MICROBEAST PLUS you have to disable any mixing functions for the swashplate or tail. Each function should be assigned to just one receiver channel. As you see the requirement for the transmitter is very low, you can use nearly any transmitter that provides 5 channels for controlling the MICROBEAST PLUS one channel for the motor.

Never enable your radio's eCCPM mixing function. All the swash plate mixing will be done by MICROBEAST PLUS. Always set your radio's swash mixer to mCCPM (mechanical mixing) which is often called "H1", "1 servo" or "normal" mixing or disable "swash mixing" at all.

Be sure that all trims and sub trims are disabled and that all servo travels are 100%. Increasing or decreasing the servo travel/stick throw for aileron, elevator and rudder can later adjust the maximum control rates (see chapter 9 - Point ❸). For the moment to setup MICROBEAST PLUS let anything stay at default. Also do not adjust the pitch curve at the moment. For the setup procedures it has to be set as a straight line reaching from -100% to +100% (or 0 to 100% depending on radio brand).

Again make sure that there are no mixing functions active (for example revo-mixing). Have a look at the radio's servo monitor: each stick has to control one channel/servo output (except for thrust stick which typically controls collective pitch and motor). Remember when using MICROBEAST PLUS you do not directly control the servos of the helicopter. By moving a stick you give a control command to the MICROBEAST PLUS unit which then performs the necessary servo movements. This command is transmitted by one servo output channel from the receiver.

Other functions such as throttle curves, ESC switches or auxiliary functions can be adjusted as usual. **Always make sure that the motor in electric models can not start when doing the adjustment work! If the drive battery is used as power supply for receiver, servos and MICROBEAST PLUS, disconnect the motor from the ESC.**

3.3 Servo connections and auxiliary channels

The following describes the order in which the servos are plugged into MICROBEAST PLUS. **Don't plug the servos into the MICROBEAST PLUS yet! The correct servo type and appropriate driving frequency has not yet been selected in the Setup menu. Also we recommend not installing the servo horns yet as the servos could bind and get damaged on first power up.**
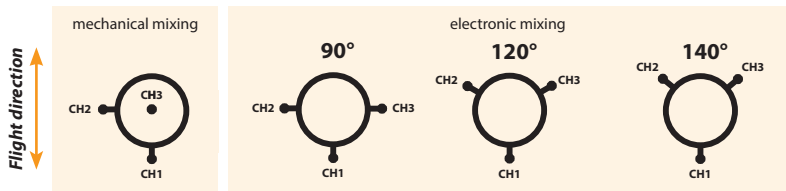
In slot CH1 is the elevator servo. With electronic swashplate mixing the two aileron servos have to be connected to CH2 and CH3, with a mechanical mixed head (H1) the aileron servo connects to CH2 and collective pitch servo to CH3. The rudder servo is always connected on CH4.

> When you route the wire leads in your model make sure that there is no tension passed to the MICROBEAST PLUS. Make sure that MICROBEAST PLUS is able to move freely, so no vibrations get passed onto the unit by the wire leads. It is not recommended to bundle or tie down the leads close to the MICROBEAST PLUS.
> On the other hand the wires must be attached so that they are unable to move the MICROBEAST PLUS during the flight caused by g-force. In particular, do not use any shrink tubing or fabric hose to bundle or encase the wiring in close proximity to the point at which the cables are plugged into the MICROBEAST PLUS. This makes the cables stiff and inflexible and can cause vibrations being transmitted to MICROBEAST PLUS.

We would like to point out that the correct dimensioning of receiver power supply is very important (BEC and battery current rating, number of supply cables, cable diameter, cable length ...). For flybarless helicopters, the load on the servos and the resulting power consumption is significantly higher than for helicopters with a flybar! Also the servos are constantly in motion when used with an electronic control system.

4. RECEIVER CONNECTION

To control the MICROBEAST PLUS you have the opportunity to use different receiver types. Basically it is distinguished between (conventional) „Standard" receivers and „Single-Line" (or „sum signal") receivers:

A **standard receiver** is a receiver that is connected to MICROBEAST PLUS by using any single servo output of the receiver to connect the five control channels between MICROBEAST PLUS and receiver. The channel which determines the controlled function simply is selected by inserting each plug to the correct output at the receiver. In section 4.1.1 it is shown how to exactly connect the receiver to MICROBEAST PLUS when using MICROBEAST PLUS as flybarless system. In addition the use of MICROBEAST PLUS is possible as a stand-alone tail gyro. See section 4.1.2 to learn how to connect receiver and MICROBEAST PLUS in this case.

When using a **single-line receiver** all channels (control functions) are transmitted by one single connection line to MICROBEAST PLUS. Because of this, it is not possible here to assign functions by inserting the appropriate plugs in the receiver. Since almost any manufacturer uses its own channel ordering, this must be explicitly be set in MICROBEAST PLUS. Additionally most singleline transmission protocols are coded. This requires further setup steps which are described in chapter 5. How to connect a single-line receiver to the MICROBEAST PLUS is described in section 4.2.

Note: There are single-line receivers available that supply additional single channel connectors/servo outputs similar to a standard receiver. In combination with MICROBEAST PLUS you only have to treat such receivers as single-line receivers if you really use the single-line function (see section 4.2.4). If you connect the receiver by using the standard 5-plug layout, such receiver has to be considered as standard receiver.

⚠ Ensure a tight fit of the connectors. The pin board of MICROBEAST PLUS is designed so that the plugs firmly clamp each other when they are fully inserted. Anyhow, especially when using a single-line receiver, it is possible that connectors are plugged in with no adjacent neighbors. Such plugs should additionally be secured against loosening.

4.1 Connection of a standard receiver

4.1.1 Flybarless usage

If using a conventional standard receiver connect the receiver outputs to MICROBEAST PLUS as follows:

Fig. 7
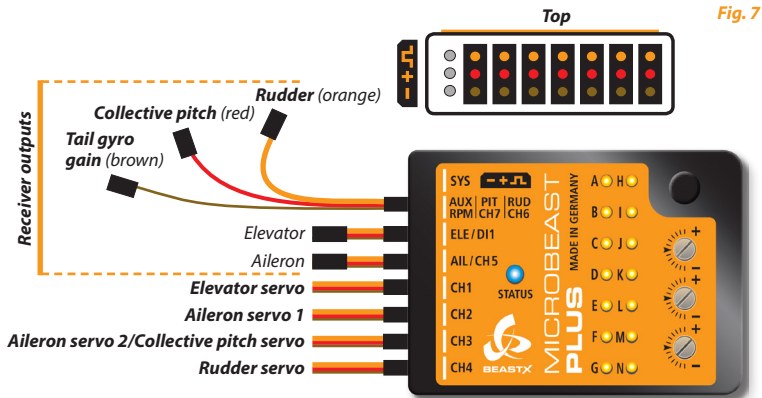
Now plug the receiver cables for aileron, elevator, pitch, rudder and tail gain between MICROBEAST PLUS and receiver. To find out the channel assignments of your remote control receiver, please refer to the user manual of your transmitter or contact its manufacturer. To connect **elevator and aileron**, use the plain 3-wire cables that transmit the control signal in addition to the power supply from the receiver to MICROBEAST PLUS. **Collective pitch** (red), **tail** (orange) and **gain** (brown) have only one lead for the control signal on the receiver side and are connected to MICROBEAST PLUS on the combined connector. Please ensure these plugs are connected correctly to the receiver. Although the cable color is different, all three wires are signal lines which go to the usual orange, yellow or white side! "+" and "-" remain open on theses channels.

Please respect the polarities for the plugs going to MICROBEAST PLUS. The orange line on MICROBEAST PLUS must always be on the top and the brown on the bottom. **Also be sure when inserting the connectors not to accidentally plug them into the space next to the pins or vertically offset by one pin.**
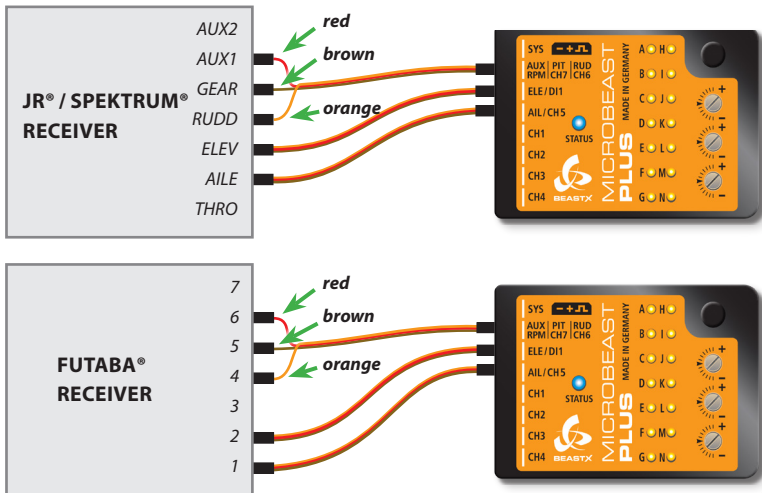
Fig. 8

Other wires such as throttle servo, ESC or power supplies are connected as usual to the remote control receiver.

The illustrations are only examples. MICROBEAST PLUS works with nearly any other receiver and remote control system that supplies 6 servo output channels (5 channels for MICROBEAST PLUS and 1 channel for the motor).

Remember that it is not the receiver that is crucial for the channel order but that this depends primarily on the allocation of control functions in the transmitter. If you do not know in which order the channels of your transmitter/receiver have to be connected, refer to the instructions that came with your transmitter and receiver, see the servo monitor of the transmitter (if available) or contact the manufacturer of your remote control system.

4.1.2 Usage as stand-alone tail gyro

MICROBEAST PLUS can also be used as high-end stand-alone tail gyro. This requires the use of a special patch cable which can be purchased separately. The patch cable ensures that MICROBEAST PLUS is provided with power and that the signals for rudder and tail gain are available from the receiver.

The signal lead with the orange and yellow wires must be connected to the slot **[Aux | Pit | Rud]**. The orange wire must be closest to the topside of MICROBEAST PLUS.

The power lead must be plugged into the slot **[ELE | DI1]**. The brown wire (negative or ground) is on the bottom, the red wire (positive or power) should be in the middle position. Connect the rudder servo to **[CH4]**.

If using the MICROBEAST PLUS as stand-alone tail gyro only the menu points Ⓐ, Ⓒ, Ⓓ, Ⓔ and Ⓕ need be adjusted in Setup menu. All other menu points can be skipped.

To avoid damage to the rudder servo, first adjust Setup menu points Ⓒ and Ⓓ which are rudder servo pulse and frequency, prior to connecting the servo.

Fig. 9

4.2 Use of single-line receivers

MICROBEAST PLUS enables the use of conventional receivers with individual channel outputs or the use of special receivers which output the channel signals as a merged single-line signal. These include Spektrum® satellite receivers, PPM composite signal receiver (e.g. robbe®/Futaba® SP Series receiver, satellite receivers by Jeti ®, G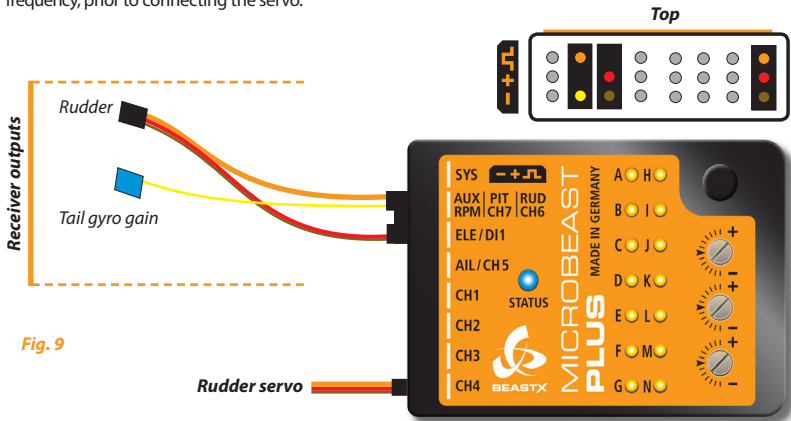raupner® HOTT® receivers in SUMO mode), receivers with Futaba® S-BUS as well as receivers with SRXL compatible data output (e.g. SRXL-Multiplex®, BEASTRX®, Graupner/SJ® HOTT in SUMD mode, JR® receivers with X.Bus Mode B output, Spektrum® receivers with SRXL output).

4.2.1 General notes

When operating with single-line receivers (Spektrum® satellite receiver in direct connection, PPM composite signal receivers, receivers using Futaba® S-BUS protocol or SRXL compatible receivers), the throttle servo/motor controller <u>can</u> be connected to **[CH5]** on the MICROBEAST PLUS. When using a motor controller for electric models with a BEC this slot then also will be supplying MICROBEAST PLUS, servos and receiver with power.

On slot **[DI2 | CH7 | CH6]** another auxiliary channel is available on the top pin **[CH6]**, for example to hook up a headspeed governor for nitro engines. Please note that this slot is only issuing a control signal and has no power. For this reason a servo cannot be plugged here directly. The two lower pins **[DI2]** and **[CH7]** are reserved for other applications. **Never connect a power source on those two pins. This could damage the MICROBEAST PLUS!**

In the case of an electric model if the ESC has a second BEC output or when using a buffering battery this wire can be connected to the **[SYS]** or **[CH5]** terminal (if **[CH5]** is not occupied in case the ESC is connected to the receiver). This ensures that the power supply for the servos is carried over short distances.

On models with a separate power supply this also can be connected to slot **[SYS]** and/or **[CH5] (**if **[CH5]** is not occupied). Please ensure adequate sizing of the supply lines. Especially with large models use a second (or even third) supply line which can be derived to the receiver or that can be injected by using a Y-cable parallel to one of the servo outputs. When using very powerful servos you might consider using the MICROBEAST PLUS HD which allows to connect one sufficiently sized supply line.

4.2.2 Spektrum® satellite receiver

To connect a single Spektrum® satellite (remote) receiver directly to the MICROBEAST PLUS a special adapter is required (sold separately). This adapter is connected to the **[DI1]** input of the MICROBEAST PLUS. Please observe correct polarity, the orange signal line must be next to the cover. The cable for the Spektrum® satellite receiver is then plugged into this adapter.
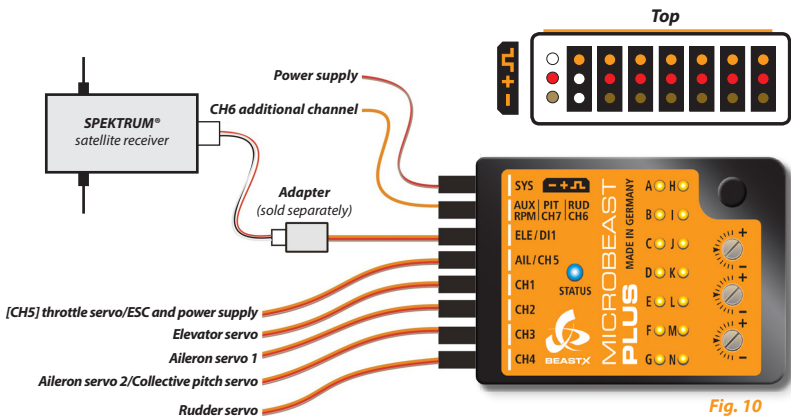
Fig. 10

⚠ **The use of MICROBEAST PLUS with a single Spektrum® satellite receiver is allowed only on micro or mini helicopters (450 size helicopters and smaller) because of the limited range due to the lack of antenna diversity!** For larger models we recommend using a Spektrum® receiver with SRXL data output which also can be connected to MICROBEAST PLUS by only one single line (see 4.2.4) and which allows the connection of multiple satellites.

Binding procedure

In the case of using a single Spektrum® satellite receiver directly connected to MICROBEAST PLUS, it is very important to bind the receiver first before programming MICROBEAST PLUS. This step is essential to perform, even if the satellite was already in use elsewhere (e. g. in connection with a "standard" Spektrum® receiver) and was already bound to the transmitter earlier.

Simultaneously with the binding process, the type of satellite receiver has to be set, i.e. whether it is a DSMX or DSM2 satellite (The actual selected signal protocol in the transmitter is not relevant!). It is very important to choose the correct type of satellite receiver here, since an improper setting may seem to work but can lead to radio interference or total loss of the link in the subsequent operation!

Insert a Spektrum® "Bind Plug" in the **[SYS]** slot on MICROBEAST PLUS.
In cases where power is supplied exclusively by the **[SYS]** connection, to bind a Spektrum® satellite receiver the power supply must be provided temporarily through any of the ports **[CH1]** - **[CH5]**.

To select a **DSM2** satellite and to enter bind mode, simply switch on the power supply now. The LED on the receiver and LED ❶ on MICROBEAST PLUS will start to flash. You can bind the transmitter as usual (for more information refer to the instructions of your radio control system).

To select and bind a **DSMX** satellite, **hold down the button** on MICROBEAST PLUS while switching on the power supply. Now the receiver's LED and LED ❶ (!) on the MICROBEAST PLUS will flash and you can release the button and bind the receiver with your transmitter.

After successful binding procedure the receiver's LED will stay solid. LED ❶ respectively ❶ flash alternately to all other LEDs. Now switch off the power supply and remove the bind plug. Continue with receiver type setup (see next chapter).

It makes no difference if you pull off the "Bind Plug" during the binding process or leave it connected as you would expect from some "standard" Spektrum® receivers.

Watch out that the motor can not start accidentally when using the BEC of your speed controller to power the unit!

hold down button   *release button*

Bind Plug

DSMX - satellite

power supply (either on [CH1] - [CH5]

DSMX satellite selected

LED **H** *flashes*

switch on power supply

Bind Plug

DSM2 - satellite

power supply (either on [CH1] - [CH5]

DSM2 satellite selected

LED **N** *flashes*

Now start bind procedure on transmitter!

LED **H**
+ all Menu-LEDs flash

LED **N**
+ all Menu-LEDs flash

switch off power supply - remove Bind Plug

Fig. 11

Decisive for the selection alone is, which type of satellite receiver is plugged in! It is irrelevant which transmission method between the receiver and transmitter is actually used.

Check carefully what type of receiver you have and what type you setup. An incorrect setting is not obvious but will lead to malfunction or failure of the radio link later in use.

4.2.3 Single-line receivers without additional servo outputs
(e.g. PPM composite signal receivers)

Many single-line receivers (especially satellite receivers with PPM composite signal) only have one single output port. Some receivers (e.g. "RSat" receivers from Jeti®) have the connection cable directly soldered to this port. Others (e.g. Futaba® "SP" series receivers) can be connected to MICROBEAST PLUS by using one of the supplied connection cables that have one servo plug at each end. Plug it into your receiver's output for the sum signal. Pay attention to maintain correct polarity. Since the supplied cable can be used universally it lacks the polarity protection tab that is common to some servo connectors and which mark the signal line (orange).

Plug the other end of the cable into the MICROBEAST PLUS input **[DI1]**. Make sure the polarity is correct. The orange signal line must be next to the MICROBEAST PLUS top cover.

All devices (servos, ESC, power supply) are connected to MICROBEAST PLUS. The receiver is powered over the sinleline connection and transfers the control commands from the transmitter to MICROBEAST PLUS over this line.

Fig. 12

Top

Power supply
CH6 additional channel
PPM composite *signal Receiver*
[CH5] throttle servo/ESC and power supply
Elevator servo
Aileron servo 1
Aileron servo 2/Collective pitch servo
Rudder servo
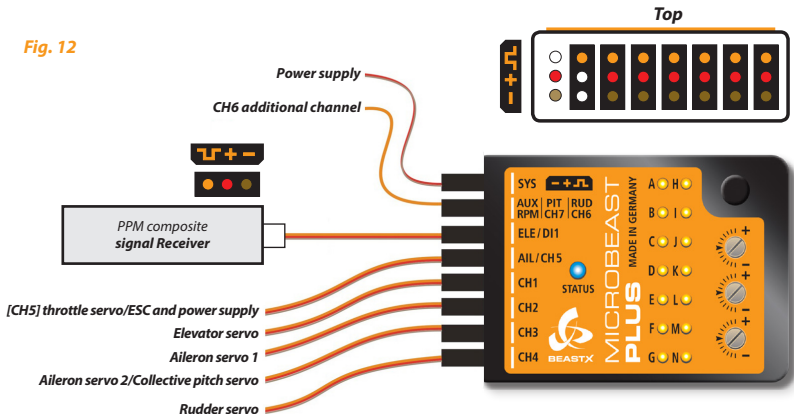
4.2.4 Single-line receiver with additional servo connectors (e.g. S-Bus and SRXL receivers)

Some receivers have a terminal that outputs all the channel data as sum signal in addition to conventional servo sockets. Plug one of the supplied connection cables to this terminal (marked **[S.BUS]** for Futaba®, **[SRXL]** for Spektrum® and BEASTRX, **[B | D]** for Multiplex®, Graupner/SJ® HOTT receivers typically use channel **[8]** port) and the other end to input **[DI1]** of MICROBEAST PLUS. Please make sure that the plugs are inserted with correct polarity. On MICROBEAST PLUS the (orange) signal line must be next to the case cover.
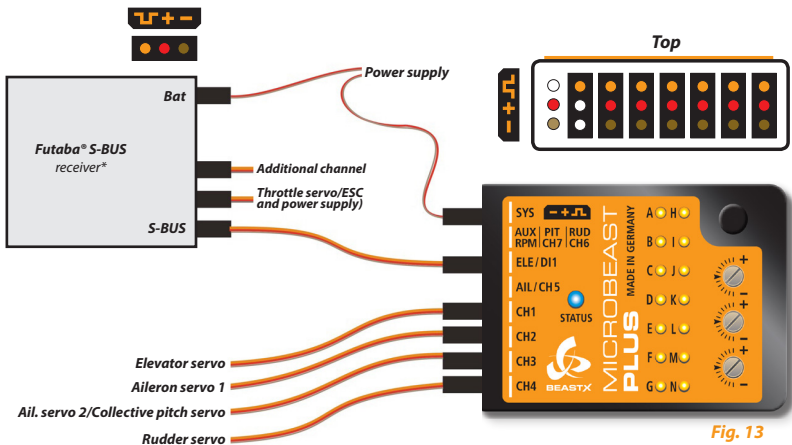
Fig. 13

* This description also applies to other single-line receivers with additional servo connectors e.g. SRXL receivers like BEASTRX®, Multiplex®, Graupner/SJ®, Spektrum®.

ESC and additional functions can either be connected directly to the receiver or to the terminals **[CH5]** and **[CH6]** of MICROBEAST PLUS. When the BEC of the speed controller is used to power the devices it is recommended to plug the controller's servo lead directly to **[CH5]** port of MICROBEAST PLUS. This ensures that the power is transferred to the servos as lossless as possible.

5. RECEIVER TYPE SETUP

By default the use of a conventional standard receiver is provided. Therefore it is not necessary to call the Receiver setup menu. Skip the following sub-items and proceed with chapter 6.

If using a **single-line receiver** (see chapter 4) because of the different signal protocols the receiver type must be selected in the Receiver menu before the first use and further steps such as allocation of individual channels and failsafe setting are needed. To get into the Receiver menu press the button on MICROBEAST PLUS and hold it down while you turn on the receiver power supply. The yellow Menu-LED **Ⓐ** should now be flashing instantly. Release the button.

⚠ **If you use a speed controller with BEC disconnect the motor to avoid unintentional starting of the engine! For a heli with combustion engine you should remove the servo horn from the throttle servo.** Note that in the first menu points of Receiver setup menu no control signal is emitted on **[CH5]** of MICROBEAST PLUS. At menu point **Ⓝ** (Throttle failsafe setting) the output is activated though to check servo position!

Note: For safety reason the Receiver menu setup must be done completely. Only when the end of the menu is reached the modified values will be stored and the selected receiver type can be used. If the power is turned off before the end of Receiver menu is reached, the previous settings remain unchanged.

Reconfiguration in the Receiver setup menu does not affect the other settings of MICROBEAST PLUS. For example if you switch to a different brand of remote control system and thus change the receiver type you can usually fly again immediately after changing the settings in the Receiver setup menu. Note, however, that transmitter-specific parameters may change very well. It is absolutely necessary to check all control functions for proper operation before the first flight. In particular these are directions of control functions, the collective pitch settings (Setup menu point **Ⓚ**) and the tail gyro adjustment (see section 8.4).

5.1 Receiver type choice (Receiver menu point Ⓐ)

At menu point Ⓐ color and state of the Status-LED give you information about which type of receiver/transmission protocol is currently selected (refer to the table below). In order to change the type, **press and hold the button for about 2 seconds**. The Status-LED will light in the next color and flash eventually. Repeat this as many times as required until the Status-LED matches your receiver type/transmission protocol:

Status-LED	Receiver type/Transmission protocol
off	Standard receiver (*Fig. 7, 8, 9*)*
purple	Single Spektrum® satellite (*Fig. 10*)
red *flashing*	Futaba® S-BUS (*Fig. 12, 13*)
red	SRXL (*Fig. 12, 13*)
blue *flashing*	PPM composite signal (*Fig. 12, 13*)

*Factory Setting

Push and hold button for about 2 seconds
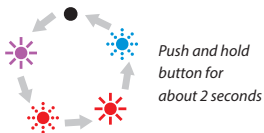
Press the button, but only **briefly,** to save the setup and switch to Receiver menu point Ⓑ (the yellow Menu-LED Ⓑ will flash).

- If you have already briefly pressed the button by mistake and it did not change the receiver type but switch to menu point Ⓑ, switch off the power and repeat the above procedure.

- If the selected receiver type is "Standard" the setup is finished now and briefly pushing the button will complete receiver setup (all LEDs flashing). Switch off power supply and directly proceed with chapter 6. Channel assignment is not necessary and not provided since the allocation takes place by appropriate insertion of the cables into the "standard" receiver.

Programming example - operation with a Futaba® S-Bus receiver using the S-Bus transmission protocol:

Hold the button down

LED **Ⓐ**: flashing
Status-LED: OFF =
Standard receiver

Release button

LED **Ⓐ**: flashing
Status-LED: *purple* =
Spektrum® receiver

Release button

Turn Power
supply ON

Menu point **Ⓐ**

Keep button
pushed
a *long time*

Release button

LED **Ⓐ**: flashing
Status-LED: *flashing red* =
Futaba® S-Bus receiver

LED **Ⓑ**: flashing
Status-LED: *blue*
as soon as signal is valid

Keep button
pushed
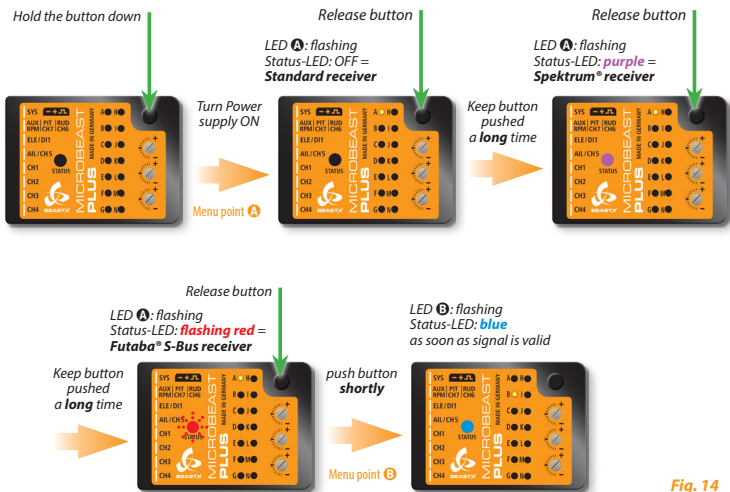a *long* time

push button
shortly

Menu point **Ⓑ**

Fig. 14

30

5.2 Input channel assignments (Receiver menu points ❸ - ❽)

If not a standard receiver but a single-line receiver was selected at menu point ❹, it must be established which control function is controlled by what channel. This is necessary because all the control functions are transmitted via one single line and virtually every manufacturer uses its own order in the arrangement of channels to control functions. There is no possibility of plugging the cables in each individual channel matching, like it is with a standard receiver.

5.2.1 Preset channel assignment

When selecting a specific type of single-line receiver the appropriate type of receiver channel allocation will be preset in MICROBEAST PLUS. Please refer to the tables below and check if your radio transmits the channels in the correct order. If this is not the case, you have to assign the channel order step by step through the menu points ❸ - ❽ (for this see section 5.2.2). **To know the channel assignment of your transmitter you can check the user manual of the transmitter or look at the servo monitor of the transmitter (if it has this feature). If in doubt ask the manufacturer of your transmitter.**

If you are on Receiver menu point ❸, please wait until the Status-LED lights blue. **To load the selected standard channel assignment (see tables below), hold the button down for several seconds.** The yellow Menu-LED will immediately jump to Receiver menu point ❹.

- **If the Status-LED stays red at one of the menu point ❸ - ❽, it means that there is no valid remote control signal available.** A channel assignment in this case is impossible! Check if the receiver is properly bound to the transmitter (if using a single Spektrum satellite see section 4.2.2) and that a receiver/transmission protocol of the correct type is selected in Receiver menu point ❹. Switch off the power and restart the receiver type setup procedure from the beginning.

- You can also load the default settings by pushing the button for several seconds in any of the points from ❻ to ❽. This will erase all previously made individual channel assignments.

transmitter	Spektrum® satellite	Futaba® S-BUS	PPM composite signal*
	function	function	function
channel 1	throttle [CH5]	aileron	collective pitch
channel 2	aileron	elevator	aileron
channel 3	elevator	throttle [CH5]	elevator
channel 4	rudder	rudder	rudder
channel 5	tail gyro gain	tail gyro gain	auxiliary [CH6]
channel 6	collective pitch	collective pitch	throttle [CH5]
channel 7	auxiliary [CH6]	auxiliary [CH6]	tail gyro gain

* e.g. provided by Futaba® SP-Series receivers, Jeti® satellite receivers in PPM-mode, Graupner/SJ® receivers in mode SUMO

transmitter	SRXL				
	BEASTRX®	Multiplex® SRXL JR® X.Bus Mode B JETI® UDI	Graupner® SUMD	Graupner® SUMD 6 - Kanal (MX -12)	Spektrum® SRXL
	function	function	function	function	function
channel 1	aileron	aileron	collective pitch	collective pitch	throttle [CH5]
channel 2	elevator	elevator	aileron	aileron	aileron
channel 3	throttle [CH5]	rudder	elevator	elevator	elevator
channel 4	rudder	collective pitch	rudder	rudder	rudder
channel 5	tail gyro gain	throttle [CH5]	auxiliary [CH6]	tail gyro gain	tail gyro gain
channel 6	collective pitch	tail gyro gain	throttle [CH5]	throttle [CH5]	collective pitch
channel 7	auxiliary [CH6]	auxiliary [CH6]	tail gyro gain	-	auxiliary [CH6]

When using SRXL the preset channel assignment is based on the receiver's protocol version. MICROBEAST PLUS will detect automatically which brand of receiver is used and will choose the appropriate channel assignment accordingly.
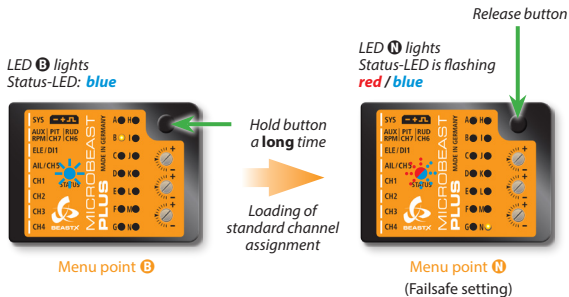
Release button

LED ❷ lights
Status-LED: blue

LED ⓝ lights
Status-LED is flashing
red / blue

*Hold button
a long time*

*Loading of
standard channel
assignment*

Menu point ❷

Menu point ⓝ
(Failsafe setting)

Fig. 15

5.2.2 Teaching of customized channel order

If you need a customized channel order, please first prepare your transmitter as described in section 3.2 (if not already done). **Additionally make sure that each control function of your transmitter activates one and only one channel, for example by using the servo monitor of your transmitter.** This can be tricky especially for throttle/collective pitch functions which are usually coupled by a mixer in the transmitter. In this case set the throttle channel quiet, for example by using the throttle hold switch or providing a flat throttle curve, so that the thrust stick actually controls only the channel for the collective pitch. For the later, keep the possibility to control also the throttle channel like by flipping a switch or similar.

In the following seven menu points ❷ - ⓗ, you can assign different functions by simply actuating the appropriate channel function on your transmitter. A blue flash of the Status-LED indicates that a channel has been detected. It does not matter how far or in what direction you move the stick or in what position the stick/switch was. Note the channel value itself is not important, but the change of this value is. It is therefore important that only the requested function is activated and not by accident several simultaneously. Otherwise MICROBEAST PLUS may not recognize the allocated channel correctly.

Menu-LED	Function
B	collective pitch
C	aileron
D	elevator
E	rudder
F	tail gyro gain
G	throttle [CH5]
H	auxiliary [CH6]

If you have moved the wrong stick/switch, you can reactivate the correct function again. The MICROBEAST PLUS remembers only the last function that was operated and confirms it with blue flashing of the Status-LED.

Press the button after learning each function to save the assignment and to go to the next function. The button remains locked until you operate a new control function. **You have to assign every function** with the exception of the last auxiliary channel **[CH6]** (this channel can be skipped by pressing the button without learning the function).

Once a channel is assigned, it is no longer available and is ignored by MICROBEAST PLUS for the remaining process. Thus, after learning of the collective pitch function (menu point **B**) you can enable the throttle function (remove throttle hold and switch to a linear or V shape curve) and teach the throttle channel by re-operating the thrust stick (menu point **G**). Now the collective pitch channel is no longer considered, as this channel has already been assigned previously!

If the Status-LED stays red at one of the menu point ❸ - ❽, it means that there is no valid remote control signal available. A channel assignment in this case is impossible! Check if the receiver is properly bound to the transmitter (if using a single Spektrum satellite see section 4.2.2) and that a receiver/transmission protocol of the correct type is selected at Receiver menu point ❹. Switch off the power and restart the receiver type setup procedure from the beginning.

Fig. 16

LED ❸ flashing
Status-LED: *blue*

Move thrust stick

Learning of collective pitch channel

Status-LED: flashing *blue*

Push button *shortly*

LED ❻ flashing
Status-LED: *blue*

Move aileron stick

Learning of aileron channel

Status-LED: flashing *blue*

Push button *shortly*

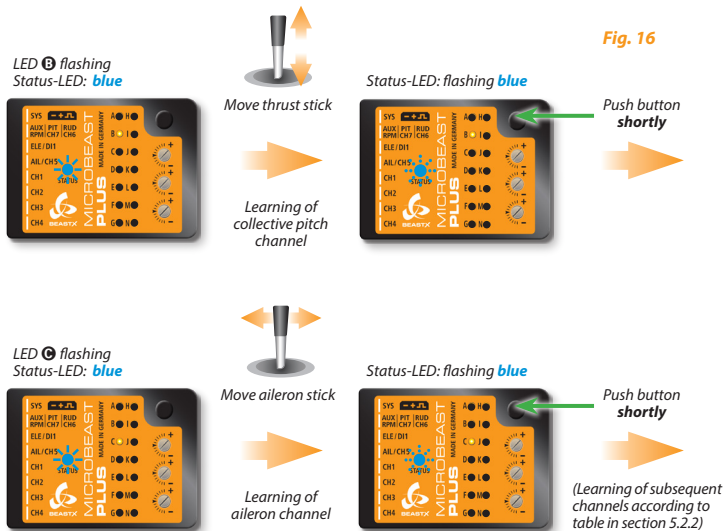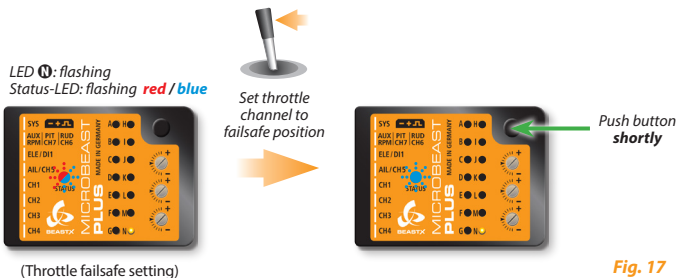*(Learning of subsequent channels according to table in section 5.2.2)*

By pressing the button at Receiver menu point ❽ the Menu-LED jumps directly to Receiver menu point ⓝ.

5.3 Throttle failsafe setting (Receiver menu point Ⓝ)

At Receiver menu point Ⓝ you have to program the failsafe position for the throttle channel. If during operation the received single-line signal is interrupted, the throttle servo/speed controller connected to the output **[CH5]** is automatically set to this failsafe position. To avoid accidents, you should program electric motors to "off" and reduce throttle on nitro helicopters to idle. The other control functions will be set to „position hold" in case of signal interruption. For these setting a failsafe position is not provided.

Set the throttle channel on your remote control to the desired position and press the button **briefly**. If you did not connect a function to **[CH5],** anyway press the button to complete setup.

LED Ⓝ: *flashing*
Status-LED: *flashing* *red* / *blue*

Set throttle channel to failsafe position

Push button **shortly**

(Throttle failsafe setting)

Fig. 17

The throttle failsafe is triggered if MICROBEAST PLUS does not get valid channel data from the receiver. This particularly is the case: :
- if using a single-line receiver that turns of the single-line signal in case of signal loss between receiver and transmitter (e.g. Spektrum® satellite receiver, Graupner/SJ® receiver in „SUMDOF" mode)
- if the connection between between MICROBEAST PLUS and receiver gets disconnected
- during initialization when the transmitter was not switched on before or was switched on too late and the radio link between transmitter and receiver is not established yet

The fail-safe function is not effective if the receiver continues sending data even if the radio link is interrupted. In this case the failsafe setting of the remote control system may take precedence.

This completes the basic receiver setup and the MICROBEAST PLUS will go into sleep state after the button is pressed (all Menu-LEDs flash). Power off the unit and proceed as described in the next chapters.

6. SETUP PROCEDURE OVERVIEW

After power on MICROBEAST PLUS will perform an initialization sequence. **During this phase, do not move the MICROBEAST PLUS unit and the helicopter.** First MICROBEAST PLUS runs a short selftest and the firmware version is displayed for 3 seconds. After that, the running LEDs ⓗ to ⓝ show the initialization of the receiver input signals. Lastly the sensor zero positions are calibrated, indicated by the running LED light from Menu-LEDs ⓐ - ⓖ.

When the system is ready it does a short move of the swashplate servos and the Status-LED turns blue if the tail gyro is in HeadingLock mode or purple in Normal-Rate mode. For about 10 seconds you can see one of the LEDs ⓐ - ⓝ light up according to the current amount of tail gain which is adjusted by the transmitter's tail gain channel.

The programming of MICROBEAST PLUS works in the following way:

There are two menu levels. From ready mode (flight mode) you can always get into the one or the other menu level. A change between the menu levels is not possible. You always have to first get out of the current level to enter the other menu level. Each level includes several setup points. The yellow LEDs next to the letters shows at which setup point you are currently. Note that the two menu levels have a different number of setup points.

- To access the **Setup menu** level you keep the button pressed for several seconds until LED ⓐ stops flashing and lights up continuously. In this menu level all the basic settings are made to adjust MICROBEAST PLUS to your helicopter.
- To access the **Parameter menu** level, press and hold the button briefly until the LED ⓐ starts to flash quickly and immediately release the button. This menu level is used to fine tune the flight characteristics and is mostly needed at the airfield.
- While in one of the menus you normally select the different options by giving an input with the rudder stick to the left or right. The momentary selected option is indicated by the color of the Status-LED. Possible colors are: off, purple, flashing red, red, flashing blue and blue. On some of the menus you might have to adjust settings with different stick functions.
- While in one of the menus, a short push on the button will switch to the next menu point. It is also possible to skip a menu point. Therefore do not move any stick while being in the menu point you want to skip, and just press the button once again.

After the last menu point, a short press on the button will exit the menu. Then MICROBEAST PLUS is ready to fly again.

⚠ **Never fly while MICROBEAST PLUS is in Setup or Parameter menu!** In this condition the gyro control and the stick controls are disabled.

Operation Mode

Menu-LEDs: *Amount of tail gain ⓐ=0% to ⓝ=100% (only after powering up or when adjusting the gain)*

Button:
- *to enter Setup menu push down several seconds until LED ⓐ is steady on*
- *to enter Parameter menu push shortly until LED ⓐ is flashing*

Status-LED
Tail gyro mode
blue=HeadingLock mode
purple=Normal-Rate mode

Dial 1: *Cyclic gain*
Dial 2: *Cyclic feed forward*
Dial 3: *Tail gyro response*

Menu selection

Menu-LEDs: ☀ *steady on = Setup menu*
☀ *flashing = Parameter menu*

Button:
press shortly for next menu point

Status-LED:
off
purple
red flashing
red
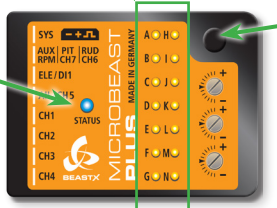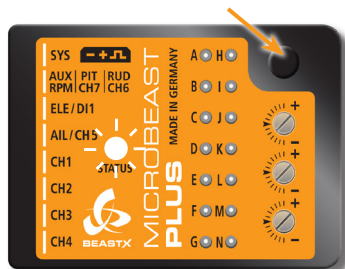*blue flashing*
blue

Fig. 18

Selection by **rudder** stick input and **aileron / elevator / thrust** stick within menus as needed.
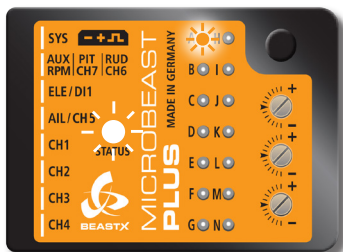
6.1 Setup menu

Fig. 19

No Menu-LED is on
Push button for about 3 seconds

Menu-LED Ⓐ steady on

Operation mode

Setup menu – menu point Ⓐ

6.2 Parameter menu

Fig. 20

No Menu-LED is on
Press button shortly

Menu-LED Ⓐ is flashing quickly

Operation mode

Parameter menu – menu point Ⓐ

6.3 Selection within the menus

By moving the rudder stick to the left or right, you can select the different options within a menu point.

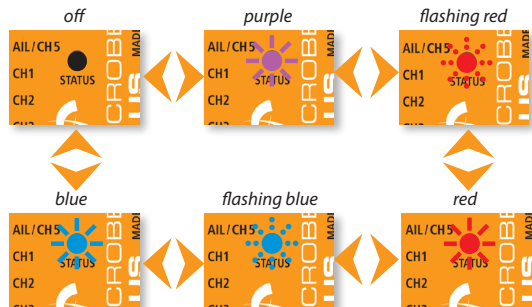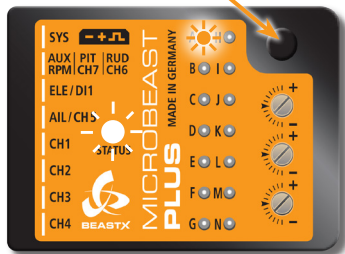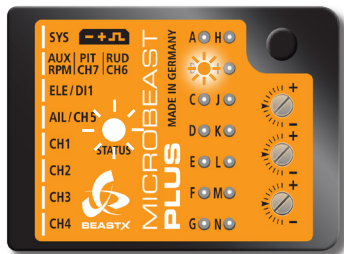The number of possibilities depends on the menu point.

Status-LED:

off → purple → flashing red

blue → flashing blue → red

6.4 Switching to the next menu point

*Push button **shortly***

Menu point Ⓐ

Menu point Ⓑ

Before the first flight MICROBEAST PLUS has to be adjusted to your helicopter mechanics and its components. This is done in Setup menu level.

When MICROBEAST PLUS shows that the system is ready, press and hold the button down, the Menu-LED next to menu point Ⓐ will begin to flash and then after a while will be steady on. Now and only now you can release the button. You just entered the Setup menu at menu point Ⓐ (description on next page).

To leave the Setup menu you have to skip through all menu points by pressing the button several times. After pushing the button at menu point Ⓝ you will exit the Setup menu and the system is ready for operation again. None of the LEDs Ⓐ - Ⓝ are glowing anymore (see chapter 6).

Note: If there is no stick or button input for 4 minutes, while being in the Setup menu, MICROBEAST PLUS will exit the menu automatically. This will not happen during setup points Ⓓ, Ⓖ, Ⓘ and Ⓙ to give you enough time to adjust the mechanical setup of your helicopter.

Factory reset:
To reset MICROBEAST PLUS to factory settings, **at any Setup menu point** push down the button for at least 10 seconds, until the LEDs Ⓐ - Ⓝ quickly blink one after the other to confirm the reset.

Please note that any previous configuration is now deleted. Do not attempt to fly the helicopter without doing the complete setup procedure again, otherwise you will crash your helicopter. Please also note that all servo settings are lost, therefore you should unplug the servos and remove the servo horns before resetting MICROBEAST PLUS.

The receiver type settings (see chapter 6) are not affected by the reset!
Conversely, if you change the receiver type in Receiver setup menu, the parameters of Setup menu and Parameter menu are not affected. However, you have to redo all the receiver-specific settings (channel assignment and fail-safe, see sections 5.2 to 5.3).

Ⓐ Mounting orientation of MICROBEAST PLUS

The MICROBEAST PLUS unit can be mounted in nearly all possible orientations. The only restriction is that the plug connectors have to point in or against flying direction and the egdes of the unit must be parallel to the rotation axis (see section 3.1).

At Setup menu point Ⓐ, you have to choose whether MICROBEAST PLUS is mounted horizontally (printed surface 90 degrees to the main shaft) or vertically (printed surface in parallel with the main shaft). The color of the Status-LED shows the currently selected orientation:

Status-LED	Mounting orientation
red	vertical (on the side)
blue	horizontal (flat)*

Factory Setting

Status-LED: red

Status-LED: blue

Fig. 23

You can switch between the two options by moving the rudder stick to one or other direction (see section 6.3). The Status-LED will change the color according to the selected orientation.

Push the button to save the configuration and to proceed to Setup menu point Ⓑ.

ⓑ Swashplate servo frequency

If you are using the MICROBEAST PLUS as stand-alone tail gyro with the optional patch cable (see section 4.1.2) it is not necessary to make any adjustments at this Setup menu point.

Setup menu point ⓑ is for selecting the servo frequency (pulse rate) of your **swashplate servos**.

If you do not know what the maximum pulse rate tolerated by your servos is, do not select more than 50Hz driving frequency. A higher driving frequency can lead to failure of the servos!

Digital servos allow usually higher frequencies, but this has to be verified in the servo datasheet. On **WWW.BEASTX.COM** you can find a list of parameters for the most common servos. Please understand that we can not list all servo types. We also can not guarantee the accuracy of this data. Ask the manufacturer of the servos or your local dealer for detailed information.

To optimize the performance of MICROBEAST PLUS, the rule is the higher the better! Nevertheless if you experience an unusually high power consumption of the receiver power supply or if the servos get hot, you should reduce this frequency.

When using a servo that allows a higher frequency as MICROBEAST PLUS offers or that allows a maximum frequency which is not choosable, please select the next lower frequency that is closest to the given frequency. Using a lower frequency is always possible. Only too high frequencies can damage the servo and/or will cause the servo to not work properly.

With high frequencies, some servos run in a jerky manner, especially the fast ones with coreless or brushless servos. This is due to the high update rate that the servo receives. This is not critical and will not impact flight performance.

To select the desired servo frequency, move the rudder stick repeatedly in one direction until the Status-LED lights in the correct color.

The option "**user defined**" allows you to choose your own setting that can be edited by using the StudioX software bundle and the separately available USB2SYS interface.

The color and state of the Status-LED shows the currently selected frequency:

Status-LED	Swashplate servo frequency
purple	50 Hz *
red *flashing*	65 Hz
red	120 Hz
blue *flashing*	165 hz
blue	200 Hz
off	**User defined**

* Factory Setting

MICROBEAST PLUS can be used with nearly all available servo types. However, the selected servos should be adequate for flybarless operation (high torque and also fast and precise). Also the servo should allow using a high pulse rate and should offer an (almost) linear response. The quality of the servos will have a direct influence on the range of rotor blades that can be used. The more the servos are suited for flybarless operation, the less important is the flybarless specificity of the rotor blades. This is especially important if the pilot demands fast cyclic reactions and wants to use light and aggressive rotor blades. Conversely, when using special rotor blades for flybarless operation the requirements for a powerful servo are reduced as the necessary control forces are smaller.

The use of a bad servo-rotor blade combination will lead to several issues, ranging from oscillations during hover to unwanted reactions in fast forward flight.

Push the button to save the configuration and to proceed to Setup menu point ◔.

Ⓒ Rudder servo center position pulse length

At Setup menu point Ⓒ you can select the pulse length for the rudder servo's center position. Almost all commercially available servos work with 1500 - 1520 μs. But there are a few special rudder servos on the market which use a different center position pulse length. On **WWW.BEASTX.COM** you can find a list of parameters for the most common servos. Please understand that we can not list all servo types. If a servo needs a special pulse length this usually is mentioned in the data sheet of the servo, mentioned on the packaging or directly printed on the servo. Ask the manufacturer of the servos or your local dealer for detailed information. If in doubt about the center pulse for your servo use the setting 1520 μs. It is very likely that the servo will work with this pulse length. Also when the servo is rated with 1500 μs center pulse use this setting. There is barely any difference between 1500 and 1520 μs and the operating pulse range is nearly the same, so these servos are all of the same type.

> There is a relationship between the setting of the rudder servo center pulse length and the rudder servo frequency (menu point Ⓓ). If a pulse length is selected that does not allow a certain frequency, the frequency is automatically reduced. The center position pulse setting always has priority, since a servo can run without problems at a lower frequency but can not be operated with an incorrect center position pulse.

The color of the Status-LED shows the currently selected servo center position pulse length:

Status-LED	Rudder servo center pulse length
purple	960 μs
red	760 μs
blue	1520 μs *
off	**User defined**

* Factory Setting

To select the desired servo center pulse repeatedly move the rudder stick in one direction until the Status-LED glows in the correct color.

The option "**user defined**" allows you to choose your own setting that can be edited by using the StudioX software bundle and the separately available USB2SYS interface.

Push the button to save the configuration and to proceed to Setup menu point Ⓓ.

Ⓓ Rudder servo frequency

As with the swashplate servos at Setup menu point Ⓑ you can select at Setup menu point Ⓓ the frequency for the rudder servo.

If you do not know what the maximum pulse rate tolerated by your servos is, do not select more than 50Hz driving frequency. A higher driving frequency can lead to failure of the servos!

Digital servos allow usually higher frequencies, but this has to be verified in the servo datasheet. On **WWW.BEASTX.COM** you can find a list of parameters for the most common servos. Please understand that we can not list all servo types. We also can not guarantee the accuracy of this data. Ask the manufacturer of the servos or your local dealer for detailed information.

To optimize the performance of the MICROBEAST PLUS tail gyro the rule is: the higher the better! A good rudder servo should be capable of running at least 270Hz.

Please note that depending on the rudder servo center position pulse length chosen at Setup menu point Ⓒ, you may not be able to choose a frequency higher than 333Hz. This also applies to the "**user defined**" setting which might be limited to 333Hz (see note at Setup menu point Ⓒ).

By moving the rudder stick repeatedly in one direction you can choose the desired rudder servo frequency.

Status-LED	Rudder servo frequency
purple	50 Hz *
red *flashing*	165 Hz
red	270 Hz
blue *flashing*	333 Hz
blue	560 Hz
off	**User defined**

* Factory Setting

The option "**user defined**" allows you to choose your own setting that can be edited by using the StudioX software bundle and the separately available USB2SYS interface.

Connect the rudder servo to **[CH4]** port of MICROBEAST PLUS **after choosing the rudder servo frequency.** Attach a servo horn to the rudder servo in such a way that the tail linkage rod forms a 90 degree angle to the servo horn (or as close as possible). Then adjust the linkage rod as described in the manual for your helicopter. For most helicopters the tail pitch slider should be centred and the tail rotor blades will then have some positive pitch to compensate for the torque of the main rotor. This mechanical adjustment especially is important when using the tail gyro in Normal-Rate mode. If the adjustment was not done properly the helicopter will constantly drift to one side or the other on the rudder axis. When using the tail gyro only in HeadingLock mode this adjustment is not so critical. Here the gyro will actively control the rudder so the helicopter does exactly follow the commands of the rudder stick. For optimum performance it is nevertheless recommended to perform the mechanical adjustment as good as possible.

Note: This menu item will not be left automatically after 4 minutes, so you have plenty of time to adjust the mechanical setup.

Fig. 24

Push the button to save the configuration and to proceed to Setup menu point Ⓔ.

E Tail rotor endpoints

At Setup menu point **E** you adjust the best possible servo throw for your tail rotor. To adjust the limits, move the rudder stick in one direction until the servo reaches the maximum endpoint without any binding or stall and release the rudder stick. The further you move the rudder stick the quicker the servo will steer into the given direction. If you move the servo too far you can steer the stick to the opposite direction and move the pitch slider a short way back.

Once you adjusted the maximum endpoint don't move the rudder stick anymore and wait for the Status-LED to flash and then light steady red or blue, depending on the adjusted direction. Now you have saved the servo limit for one direction.

Fig. 25

red or blue

> **Pay attention that the steered direction of your rudder stick corresponds to the direction your helicopter should turn. If this is not the case, use your transmitter's servo reversing function for the rudder stick.** If you're not sure in which direction the helicopter should rotate consult the manual for your helicopter.

Then adjust the servo limit for the other direction. Drive the tail pitch slider by using the rudder stick to the other maximum endpoint and then release the rudder stick. After a short moment, the color of the Status-LED should start flashing followed by lightning steady purple (mix of red and blue) indicating that the servo endpoint adjustment is complete.

Fig. 26

☀ ☀ *Status-LED: red or blue*   ☀ *Status-LED: purple*
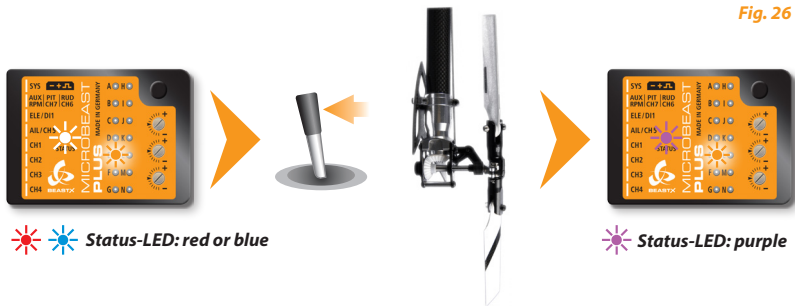
⚠ If the Status-LED does not light or lights in an unexpected color, the servo throw is obviously too small. In this case mount the linkage ball of the tail linkage rod further inward on the servo horn. This ensures that the tail gyro of MICROBEAST PLUS will perform in the best way and that enough servo resolution is available.

The optimum throw is determined by the maximum possible control travel of the tail mechanism or based on the maximum allowed angle of attack of the tail rotor blades that will not lead to an aerodynamic stall of the blades. Such stalls can cause very bad stopping behavior like overshooting of the tail when stopping from rotation and can also cause bad tail response to rudder stick input when performing directional changes. Keep this in mind when adjusting the tail rotor endpoints. Several helicopters on the market allow for a very wide range of tail travel. Here is not necessarily useful to use the whole range of travel. Check the helicopter's manual to find out where to set tail pitch end points.

Push the button to save the configuration and to proceed to Setup menu point ❻.

Note: By (re-)adjusting tail rotor endpoints the servo center trim will be set to zero (in case it has been changed at Parameter menu point ❶ - see chapter 9).

Ⓕ Tail gyro sensor direction

Here you have to check if the tail gyro of MICROBEAST PLUS does compensate to the correct direction.

At setup point Ⓕ, you can find this out very easily:

The gyro always tries to steer in the opposite direction of the rotation that is applied to the helicopter.

If you move the helicopter by hand around its vertical axis, the gyro must actuate a rudder servo movement to compensate this rotation. If for example you move the nose of the helicopter to the right, the gyro has to steer left the same way as you would steer left with the rudder stick (figure 27).

If this is not the case you have to reverse the sensor direction. This happens by moving the rudder stick once into any direction. For confirmation you will see that the Status-LED will change its color:

Status-LED	Tail Sensor direction
red	normal *
blue	reversed

* Factory Setting

Once again repeat the test as described above. MICROBEAST PLUS should now correct in the right way:

Fig. 27

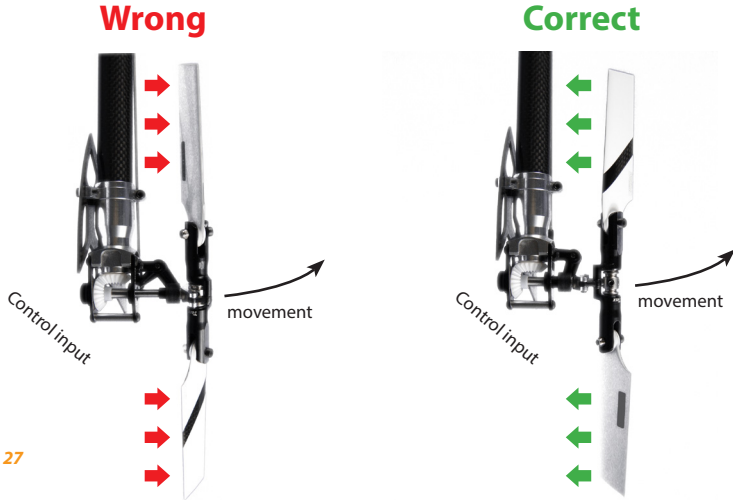**Push the button to save the configuration and to proceed to Setup menu point Ⓖ.**

If using MICROBEAST PLUS as a stand-alone tail gyro with the special patch cable (see chapter 4 and section 4.1.2) you do not have to do any further adjustments within the Setup menu from here on. Push the button repeatedly to skip the following Setup menu points until no menu LED is on anymore and the system is ready for operation.

Ⓖ Swashplate servo center trim

When entering Setup menu point Ⓖ connect all swashplate servos as described in chapter 3.3. They now will be running to their origin zero position (1520 μs) what we call reference position here when the Status-LED is off. This reference position is used to mount the servo horns on the servos at their true center position, so that you get roughly equal throws to both direction. Mount the servo horns so that they form as much as possible a 90 degrees angle to the linkage rod. Then in the next step you electronically fine trim every single servo's center position, as usually mounting the servo horn at exact 90 degrees will not work out perfectly depending on the servo's gear train and the servo horn.

Note: Although if you were able to mount the servo horn perfectly at 90 degrees, check the electronical trimming as described below as the reference possition is not used later onwards and in operation but the trimmed position is!

If you move the rudder stick to a single direction once, you can select one servo and change its center position by moving the elevator stick back and forth. Every color of the Status-LED is corresponding to a specific servo channel that is indicating its selection by a short up and down move.

If you move the rudder stick once again in the same direction as before, you can select the next swash servo and adjust its center position by using the elevator stick.

Status-LED	Function
off	Swashplate servos at reference position
purple	CH 1 – elevator servo center trim adjust
red	CH 1 – aileron(1) servo center trim adjust
blue	CH 3 – aileron(2)/pitch servo center trim adjust

You can switch back and forth between the servos as often as you need and also switch back to the reference position anytime. The already adjusted servo centers will not be lost doing this.

Only the trimmed servo positions are important and get stored (those which have been set with the corresponding Status-LED colors). The servo positions at "Status-LED off" only serve for reference and to get the servo horns best plugged into position, for instance if you install new servos or replace the servo gears after a crash. This reference position will not be used later onwards. Only the servo positions with active trimming are used.

Now if servos are trimmed do not yet proceed to the next menu point. With active trimming (Status-LED still lights up in one color!) adjust the linkage rods according to your helicopter manual. The swashplate should now be at the midpoint and perpendicular to the main shaft and the rotor blades should have 0 degrees of pitch. Always work this out from bottom (servos) to top (blade grips).
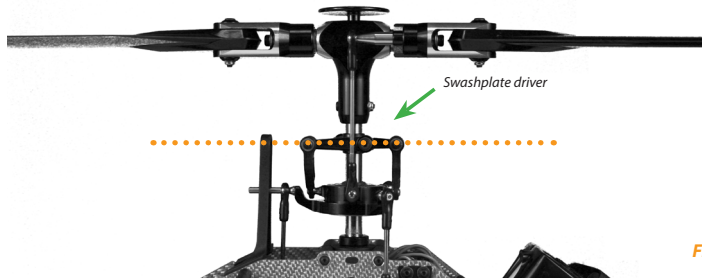

Swashplate driver

Fig. 28

Don't forget to level and phase the swashplate driver in the correct way (if it's adjustable)!
At 0 degrees of pitch the swash driver arms must be horizontal and the linkage balls of the blade grips have to be perpendicular to the spindle shaft.
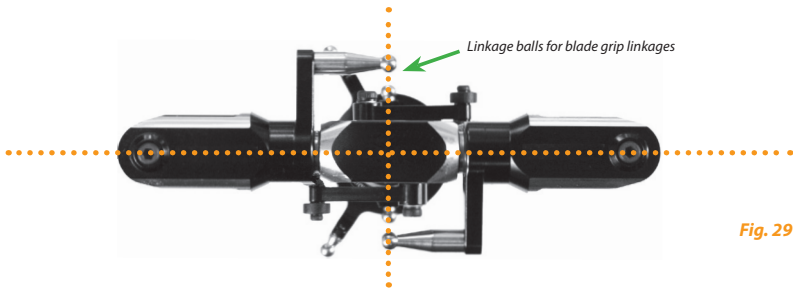

Linkage balls for blade grip linkages

Fig. 29

Push the button to finally save the servo configuration and to proceed to Setup menu point ⓗ.

Ⓗ Swashplate mixer

At Setup menu point Ⓗ you can choose the electronic swashplate mixer your helicopter requires or choose "mechanical" for switching of the electronic swashplate mixer if your helicopter has a mechanical mixer. For the electronic mixer by default MICROBEAST PLUS supports 90°, 120° and 140° swashplates. Besides these choices, you can set any swashplate geometry by using the StudioX software bundle in combination with the optional USB2SYS interface. This also includes setting a virtual swash phasing for scale helicopters. Which kind of CCPM your helicopter uses can be read in the manual for your helicopter.

> ⚠ **If your helicopter requires an electronic swashplate mixer by no means use your transmitter's swashplate mixer function!**
>
> The mixing is all done by MICROBEAST PLUS. Deactivate the swashplate mixing in your transmitter or program it to mechanical mixing (which is often called "normal", "H1" or "1 servo" mixing), even if your helicopter requires electronic mixing (also see section 3.2).

The color and state of the Status-LED shows the currently selected mixing type:

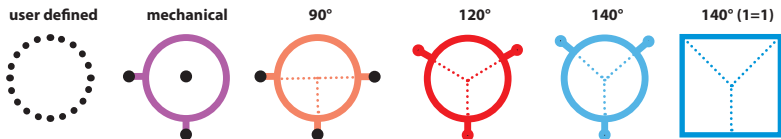| Status-LED:	off	purple	red *flashing*	red	blue *flashing*	blue
swashplate mixer	user defined	mechanical	90°	120° *	140°	140° (1=1)

* Factory Setting

Fig. 30

The type **140° (1=1)** can also be considered as **135°** swashplate! There is no uniform designation for this type of swash mixing. The main idea with this type of swash is to have an equal servo ratio on the elevator axis. If this is the case on your helicopter then choose this type, no matter whether it's called 135° or 140° swashplate.

Push the button to save the configuration and to proceed to Setup menu point Ⓘ.

❶ Swashplate servo directions

At Setup menu point ❶, you adjust the correct swashplate servo directions. To facilitate this setup, you don't need to adjust every servo by its own, but just try the 4 possible combinations. Move the thrust stick and check if the swashplate moves horizontally up and down. The direction itself is not yet important. If one or more servos are not running in the right direction, just choose another combination of servo directions by giving a short rudder input. Repeat this rudder input until all servos are running in the same direction and moving collective pitch up and down.

Servo directions

Status-LED	CH1	CH2	CH3
off	normal	reverse	reverse
purple	normal *	normal *	reverse *
red	normal	reverse	normal
blue	normal	normal	normal

* Factory Settings

Check now, if your control directions of aileron, elevator and collective pitch are correct. If this is not the case, you have to use the **servo reverse feature** of your transmitter to reverse the appropriate control function.

> ⚠ If the servos are not reacting properly to aileron and elevator functions, check if the servos and receiver wires are connected as described above in section 3.3 and chapter 4. Also check if the channel assignment within Receiver menu has been done correctly (section 5.2) if applicable.
> Additionally verify the settings of your transmitter on any remaining mixer functions (see section 3.2) and check if the transmitter is set to the correct stick mode.

Note: This menu item will not be left automatically after 4 minutes, so you have plenty of time to adjust the mechanical setup.

Push the button to save the configuration and to proceed to Setup menu point ❿.

⟳ Cyclic pitch geometry

At Setup menu point ⟳, you have to teach MICROBEAST PLUS the cyclic pitch ratio.

First don't touch any stick on your transmitter when entering Setup menu point ⟳. Orientate the rotor blades (or one of the rotor blades when using a rotorhead with more than two blades) so that they are parallel to the tail boom (Fig. 31). The swashplate should be in the neutral position and the blades should have 0 degrees of pitch. If this is not the case repeat the swashplate servo centering at Setup menu point ⟳. Then attach a pitch gauge to one of the rotor blades on the longitudinal axis to measure aileron pitch.

Move the aileron stick until the rotor blade has an exact 6 degrees of cyclic pitch and release the stick (Fig. 32). If you moved the swashplate too far you can steer the stick to the opposite direction and reduce the pitch. The direction you choose is not important, what is important is that you keep the position steady on 6° when you save and leave this menu point (it is not enough to go to 6° and then move back before saving and leaving).

When reaching 6 degrees, the Status-LED should light blue. This indicates that your helicopter's rotor head geometry is perfect for the use with a flybarless system. Otherwise, if the Status-LED's color is red or purple or even if the Status-LED is off, this indicates that your helicopter's geometry is not optimal for flybarless usage. Correct this by using shorter servo horns, shorter linkage balls on the inner swashplate ring or longer blade grip link levers.

By moving the rudder stick to one direction you can also delete the adjustment and reset the swashplate back to 0 degrees, e.g. to readjust your pitch gauge.

> ⚠ **Always set the cyclic pitch to 6 degrees!** This setup does not affect the maximum rotation rate of the helicopter but is only there to show and teach MICROBEAST PLUS the actual mechanical cyclic geometry and to estimate servo throws. A wrong adjustment at this step may be extremely detrimental to the performance of MICROBEAST PLUS. The blue color of the Status-LED is secondary and just for information. Do not try to get a blue Status-LED by any means. For example if the LED only lights up red when the pitch is set to 6° then use this adjustment anyway but keep in mind that your helicopter's head geometry is not perfect. Do not adjust 7° for instance just because the Status-LED does become blue there!

Note: This menu item will not be left automatically after 4 minutes, so you have plenty of time to adjust the mechanical setup.

1. Orientate the rotor blades parallel to the longitudinal axis of the helicopter.

Fig. 31
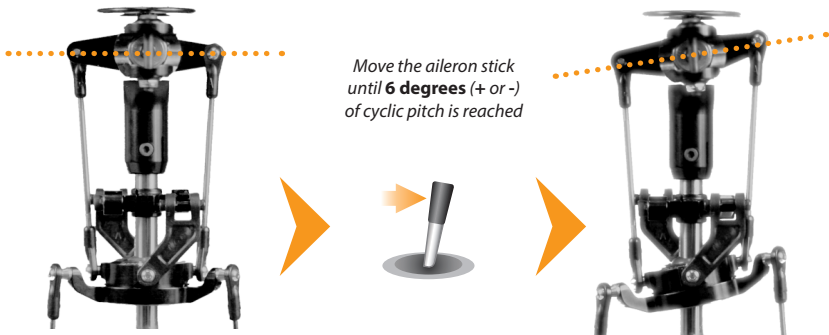
2. Adjust the cyclic pitch to exactly 6 degrees.

*Move the aileron stick until **6 degrees** (+ or -) of cyclic pitch is reached*

Fig. 32

Push the button to save the configuration and to proceed to Setup menu point Ⓚ.

ⓚ Collective pitch range and endpoints

At Setup menu point ⓚ you adjust the maximum desired negative and positive collective pitch.

Move the thrust stick all the way up and let it stay there. Now you can increase or decrease the maximum amount of collective pitch using the rudder stick.

When you adjusted the desired maximum pitch angle, move the thrust stick all the way down and again increase or decrease the collective pitch to the minimum desired value using the rudder stick.

> ⚠ At this point, verify again that the demanded collective pitch direction on the transmitter is in the correct direction for the model. Otherwise use your transmitter's servo reversing function for the collective pitch channel to correct this as already described in section ❶.

Don't use any pitch curves in your transmitter **while doing these adjustments**. Later on for the flights, you can adjust your pitch curves as you like and are used to. Setup menu point ⓚ solely serves to teach MICROBEAST PLUS the maximum pitch range and the endpoints of the thrust stick.

Push the button to save the configuration and to proceed to Setup menu point ❶.

➊ Cyclic swashplate limit

At Setup menu point ➊ you adjust the maximum possible tilting of the swashplate for aileron and elevator. The deflection will be limited in a circular path similar to a cyclic ring function.

For adjustment proceed in the following way:
Carefully move the sticks for aileron, elevator and pitch to all maximum end points and watch out if the swashplate, the linkage rods or servos are binding somewhere or even getting not more driven.

By moving the rudder stick to the left or right, you can increase or decrease the throw limiter. The limiter affects all servo directions, so adjust it until there is just no binding at all possible servo deflections. Always try to achieve the maximum possible cyclic throw. This will ensure that the maximum possible rotation rate of the helicopter can be achieved and the the gyro control loop does not get sacrificed.

⚠️ Similar to Setup point ➒, the color of the Status-LED indicates whether the adjusted limit allows sufficient cyclic throw. In the ideal case, the swashplate is limited only to the extent where the Status-LED still lights blue. In particular, for models that are intended to be used in 3D aerobatics, 10° to 12° cyclic throw should be possible. But even for all the other helicopters, it is recommended to adjust as much throw as possible, because otherwise the control loop may not work properly. Here, the color of the Status-LED provides a clue. If you get only purple or even no light at all, it is essential that you change the mechanical setting of your model to increase the available throw.

Note: If afterwards any modifications are done to one of the other Setup menu points which affect servo adjustments (Setup menu points ➐, ➒ and ➓) the cyclic swashplate limit adjustment has to be checked and redone.

Push the button to save the configuration and to proceed to Setup menu point Ⓜ.

Ⓜ Swashplate sensor directions

At Setup menu point Ⓜ you check if the sensors for aileron and elevator are measuring the correct direction. This can be directly verified in this menu point: If you roll or tilt the helicopter by hand the swashplate has to steer against the rotational movement. See figures 33 and 34 on the next pages.

⚠ When tilting the helicopter forward the swashplate has to move backwards, when tilting the helicopter to the back, the swashplate has to compensate forward. Same thing applies to the roll axis, when you roll the helicopter to the left the swashplate has to steer right and vice versa. Basically the swashplate has to remain horizontal while banking the helicopter.

If this is not correct, you can reverse the sensor directions by moving the rudder stick in one direction. For confirmation you will see that the Status-LED changes color. Repeat this step until **both sensors** are working in the correct manner.

There are four possible displays for control to choose from, one will be correct.

| | **Sensor directions** | |
Status-LED	**Elevator**	**Aileron**
off	reversed *	reversed *
purple	reversed	normal
red	normal	reversed
blue	normal	normal

* Factory Setting

Note: The sensor direction colors may differ between different MICROBEAST PLUS devices and different firmware versions. Therefore the Status-LED colors should be used as reference for one device with one specific firmware version only. We highly recommend not to rely on the Status-LED color when transfering setups from one device to another. Always check sensor directions manually!

Push the button to save the configuration and to proceed to Setup menu point Ⓝ.

Tilt the helicopter forwards

The swashplate has to move backwards

Fig. 33

Roll the helicopter to one side

The swashplate has to steer to the opposite direction

Fig. 34

Ⓝ Pirouette optimization direction

When entering Setup menu point Ⓝ the swashplate will tilt forwards or backwards depending on your helicopter's setup (servos, linkages,…). This resulting tilt will correspond into a specific compass heading.

Grab your helicopter at the rotor head and rotate it on the vertical (yaw) axis by hand. The swashplate must continue to maintain the same compass heading (see fig. 35 on the next page). The initial direction (forward or backward) is irrelevant.

If the noted swashplate tilt opposes the rotation of the helicopter and rotates against the direction of the model, the pirouette optimization should be inverted. This can be done by moving the rudder stick in one direction. For confirmation the color of the Status-LED on the MICROBEAST PLUS will change.

Status-LED	Pirouette optimization direction
red	normal *
blue	reversed

* Factory Setting

Now the initial setup of the MICROBEAST PLUS is finished. When you press the button now, you will exit the Setup menu and the MICROBEAST PLUS is ready for operation.

*1. Swashplate points to the left
(initial position may differ)*

*2. Rotate the helicopter
around the vertical axis*

*3. Swashplate must always point to the same
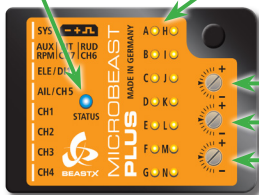direction as before (in this case to the left)*

Status-LED
Tail gyro mode
blue = HeadingLock mode
purple = Normal-Rate mode

Menu-LEDs:
Amount of tail gyro gain **Ⓐ**=0% to **Ⓝ**=100%
(only shown after power up or when adjusting the tail gyro gain)

Dial 1: Cyclic gain

Dial 2: Cyclic feed forward

Dial 3: Tail gyro response

Fig. 36

To adjust the dials please only use the supplied plastic BEASTX adjustment tool to prevent damage to the dials!

8.1 Swashplate: Cyclic gain (Dial 1)

The swash gyro gain (cyclic gain) can be set by dial 1 from 50% up to 150%. Turn dial 1 clockwise to increase the gain. The factory setting is horizontal which corresponds to 100% swashplate gain. For your first flights we suggest not changing this setting. However, when using very small helicopters (such as 250 or 450 size), reduce the cyclic gain by 3 marks (=75% gain).

In general the higher the gain the harder the helicopter will stop after cyclic moves and the helicopter will feel more stable in the air. If the gain is too high, the helicopter will tend to oscillate at high frequency especially on the elevator axis. Due to their low mass, this behavior will occur sooner on small helicopters, so typically these do not need as much gain as large helicopters.

If the gain is too low the helicopter does not stop precisely and overshoots the more or less after a cyclic movement. Additionally it feels unstable in fast forward flight and when hovering. In general low gain will allow the helicopter to have more life of its own and so it will not react to stick inputs as precise and immediate as the pilot expects it.

8.2 Swashplate: Cyclic feed forward (Dial 2)

Turn dial 2 clockwise to increase the swashplate's cyclic stick feed forward. This part mixes some amount of stick input directly to the servos, bypassing the control loop. If correctly adjusted, this relieves the control loop which will work more efficiently by only having to make residual corrections. Factory setting of the dial is horizontal which provides a good setup in most cases.

Increasing the cyclic feed forward will cause more cyclic stick input going directly to aileron and elevator on the swashplate. Decreasing the direct stick feed forward will do the opposite.

If the cyclic feed forward is too high, it will over control your cyclic input. The control loop needs then eventually to steer back. Even though you get the impression to have a more direct control, unwanted side effects may appear, like pitch backs on cyclic stops and imprecise fast forward flight.

If the direct cyclic feed forward is too low, the helicopter will feel softer, slower and less direct. The optimal point depends of many factors like blades, servos, head speed, size and mass of the helicopter.

At delivery the dial is in the middle which should be a good starting point for most helicopters. Before adjusting the cyclic feed forward you should try to find the optimal maximum cyclic gain first (dial 1). Then after adjusting the cyclic feed forward you may have to adjust the cyclic gain once again. Both parameters interact to each other.

The cyclic feed forward does not affect the maximum rate of rotation! If the helicopter turns too slowly, you should check the settings of the swashplate limiter in Setup menu point **L**, change the control behavior in the Parameter menu at point **B** or increase the servo travels or "Dual Rate" setup of your transmitter.

Also to get a quicker and more aggressive response increase the control behavior at Parameter menu point **B** (reducing expo and increasing the maximum rotation rate) and increase the cyclic response at Parameter menu point **G**.

8.3 Tail gyro response (Dial 3)

Turn dial 3 clockwise to increase the tail gyro response. Turning dial 3 counter clockwise will decrease it. Increasing the tail dynamic will lead to harder stopping behavior and more aggressive response to rudder stick inputs. If the dynamic is too high the tail will bounce back shortly after a hard stop and feel spongy when making fast direction changes. If the dynamic is set too low the tail feels dull and stopping might be too soft. Ideally the tail should stop perfectly to the point without making any flapping noises.

Factory setting of the dial 3 is horizontal which provides a good setup in most cases. You have to make sure the maximum possible tail gyro gain has already been determined (see section 8.4) before adjusting the tail gyro response. Then after adjusting the tail gyro response you may have to adjust the tail gyro gain once again.

⚠ If the tail rotor only stops properly from rotations into one specific direction, check your tail rotor's pitch values. If the tail pitch is too large, the rotor blades may stall. Also check the tail rotor center position as described in the section of Setup menu point **Ⓓ**, so the tail rotor reaction is as uniform as possible.

8.4 Tail gyro gain (Adjusted by transmitter)

The tail gyro gain can be adjusted by one of the transmitter's auxiliary channels. The more servo throw this channel produces, the higher the tail gyro gain will be. Additionally the direction of servo throw determines whether the gyro works in Normal-Rate mode or in HeadingLock mode. **The color of the Status-LED indicates the selected mode when MICROBEAST PLUS is ready for operation.** Purple indicates Normal-Rate mode and blue indicates HeadingLock mode. Additionally while adjusting the gain or shortly after the first start up, the current amount of gain is displayed by one of the menu LEDs for about 10 seconds. When the gain channel is centered, this will correspond to 0% gain indicated by LED **Ⓐ**. In both modes, the maximum adjustable tail gain is 100% and will correspond to LED **Ⓝ**. Please note that the actual percentage of servo throw in the transmitter will depend on its brand and/or type.

For the first flight we suggest to start with medium gain not higher than LED **Ⓖ** (LED **Ⓓ** for 450 size helicopters and smaller) in HeadingLock mode. Low gain will cause the tail rotor control to feel weak and it will stop with overshoots. Increase the gain step by step and you will feel the tail having more and more precise stops, and hold better and better on jerky pitch inputs. If the gain gets too high, the stops will bounce back quickly and wagging will appear in fast forward or backward flight. In this case immediately reduce the gain! For optimum performance set the gain as high as possible, just before the tail rotor starts to wag in fast forward flight.

- Operation without using the auxiliary channel for tail gyro gain is not possible!
- When gain is close to point Ⓐ the rudder servo will not perform full servo travel as the gyro is switched off. Do not fly if tail gain is close to 0%.
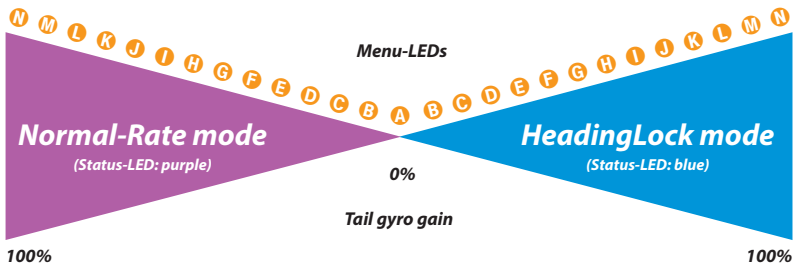

Fig. 37

In **Normal-Rate mode** the tail gyro of MICROBEAST PLUS only acts as dampening that decelerates sudden rotations caused by external influences. Slow, constant rotational movements will not be compensated. Thus the tail does not drift in hover due to the main rotor torque, a perfect mechanical adjustment of the tail rotor is essential (see the section to Setup menu point Ⓓ). But even with perfect mechanical adjustment you will always encounter some drift on the rudder axis due to crosswinds and the pilot has to constantly perform corrections when doing hovering flight. In high-speed flight on the other hand the tail will be aligned in flight direction by the wind, so curves can be flown very dynamically and the pilot doesn't have to constantly concentrate on controlling the rudder.

We recommend to use the **HeadingLock mode**. Here the tail is actively controlled by the gyro system. You will barely feel any external influences. By giving rudder stick input, the pilot only commands the gyro how fast it has to turn the tail. When the stick is in center position the tail gyro will ensure that the tail keeps locked into position by any means. This simplifies the control significantly. In hovering flight the beginner can fully concentrate on the control of cyclic and collective pitch and the advanced pilot can perform 3D - flight maneuvers such as backwards flying quite easily. The only disadvantage of HeadingLock-Mode is that the rudder must be steered by the pilot when flying curves. Otherwise the gyro will try to keep the tail aligned with the initial direction.

9. PARAMETER MENU

The Parameter menu offers a variety of settings with which you can further improve the system performance and which allow you to adjust the flight characteristics of the helicopter to suit your personal preferences. Normally for the first flight you don't need to make any adjustments here. Only the control behavior (menu point Ⓑ) and the stick deadband (menu point Ⓔ) should be adapted under certain circumstances.

When MICROBEAST PLUS is ready for operation, hold down the button until the Menu-LED next to point Ⓐ flashes quickly and then release the button. This is how to enter **Parameter menu**.

To switch to the next Parameter menu point, just briefly press the button once again. After the last menu point pressing the button one more time exits the Parameter menu and MICROBEAST PLUS is ready for flight again (in this case the Status-LED will indicate the tail gyro mode and the LEDs Ⓐ - Ⓝ are off).

Single menu points can be skipped without performing any changes. Therefor don't move any stick while you are at the menu point you want to skip and just press the button shortly once again.

Parameter menu in comparance to Setup menu only has eight menu points, Ⓐ to Ⓗ. After menu point Ⓗ you will exit the Parameter menu and MICROBEAST PLUS returns to flight mode.

> ⚠ **Never attempt to fly when MICROBEAST PLUS is in one of the menus!** In this condition the control system and sometimes the stick inputs are deactivated!

Ⓐ Cyclic and rudder trim

The first menu point of the Parameter menu gives you the possibility to easily adjust your servo center trim on the flying field as for instance your helicopter does slowly drift in hovering flight or when it doesn't climb out straight on collective pitch inputs.

> ⚠️ **Never use the trim functions of your remote control!** MICROBEAST PLUS will see trim as a control command to turn the heli and not as servo trim.
>
> There is one exception: The rudder servo can be trimmed on the remote control when the tail gyro is operated in **Normal-Rate mode** (see section 8.4). Note, however, that this trimming should only be temporary as MICROBEAST PLUS calibrates the stick center positions during every initialization process. Thus, on the next flight the servo would be back on center position despite trimming in the transmitter.

a) Swashplate servos

Contrary to centering every single servo at Setup menu point Ⓖ, here you are able to directly adjust aileron and elevator without taking care about the single servos. Similar to the digital trim function of most transmitters here at Parameter menu point Ⓐ you can adjust the swashplate "one click" by shortly moving the aileron or elevator stick in the desired direction. If you want to trim the swashplate any further repeat tapping the stick several times or simply hold the control stick pushed for a longer time to automatically perform several trim steps. The color of the Status-LED gives you an approximate indication of how much you did trim.

Please note that this function, as opposed to the digital trim of the transmitter, is not a separate trim function. Here you directly adjust the servo centers as well as you would set servo centers at Setup menu point Ⓖ. Technically there is no difference between Parameter menu point Ⓐ and Setup menu point Ⓖ.

b) Rudder servo

If the tail gyro is operated in **Normal-Rate mode**, the rudder servo must often be trimmed precisely so that the tail rotor produces just enough thrust to counteract the rotor torque in hovering flight. Otherwise the helicopter would constantly drift into one or another direction on its vertical axis as the gyro only dampens sudden movements but does not control the tail rotor's absolute position.

To trim the rudder servo proceed as follows: Switch the tail gyro to Normal-Rate mode fly the helicopter. By using the digital trim function of your transmitter trim the rudder servo so that the helicopter does not drift in hovering flight. Land the helicopter and immediately open Parameter menu point Ⓐ by briefly pressing the button on MICROBEAST PLUS once. To take the tail trim value from the transmitter once again press the button and this time hold it for at least 2 seconds (if you briefly press the button only, you would switch to menu point Ⓑ!). You can see the rudder servo move to the new center position and the Status-LED will flash for some moment to signalize the position has been set. Now reset the digital trim of your transmitter back to zero.

- MICROBEAST PLUS only accepts the the tail trim value from the transmitter when the gyro is set to Normal-Rate mode. When you land after the trim flight and open Parameter menu point Ⓐ make sure that you do not change the gyro mode and/or trimming of the transmitter by accident, e.g. when using a flight mode switch in the transmitter.
- If the tail gyro solely is operated in HeadingLock mode, trimming the rudder servo is not required under normal circumstances. Here the gyro actively controls the rate of rotation whereby drifting is excluded on the vertical axis. Anyhow, in unfavorable mechanical conditions it may be helpful to fly the heli in Normal-Rate mode once and to trim the rudder servo accordingly, so that the mechanical throw is balanced more equally.

c) Reset adjustment

During the trim procedure you can delete the just performed trimming by moving the rudder stick in any direction. All servos will be moved to the initial position from entering Parameter menu point Ⓐ. Note that a subsequent reset to previous states is not possible! If the servo trimming was changed and Parameter menu point Ⓐ is left, the servo positions will be saved permanently. You can only bring back the servos to the previos positions by manually trimming them back into the opposite direction.
The trimming of the rudder servo will be fully deleted when the tail rotor endpoints are readjusted at Setup menu point Ⓔ (see chapter 7)!

Push the button to save the configuration and to proceed to Parameter menu point Ⓑ.

❷ Control behavior

At Parameter menu point ❷ you can choose between different control behaviors for your helicopter. This includes the maximum rotation rate of the helicopter as well as how sensitive MICROBEAST PLUS will react to stick inputs for aileron, elevator and rudder around the stick centre.

Factory setting for this option is "sport"! This should be suitable for most pilots.

If you are a rather inexperienced model pilot it is absolutely suggested to select the option „normal" for the first flights. In this state the rotation rate on cyclic and tail is very much decreased and the stick inputs around center are very gentle. Then find your individual preference by increasing the option step by step

The choice is done by moving the rudder stick in one direction until the LED indicates the desired color and state.

Status-LED	Control behavior
purple	normal
red *flashing*	sport*
red	pro
blue *flashing*	extreme
blue	**transmitter**
off	**user defined**

* Factory Setting

If you are not satisfied with the presets, you may adjust the control behavior by using your remote control. To do so, set the control behavior to "**transmitter**" (Status-LED "blue"). The maximum rotation rate for aileron, elevator and rudder can then be adjusted by increasing or decreasing the servo travel for the corresponding function in your transmitter or by using the "DualRate" function. **Approximately** 100% stick throw (servo throw) in the transmitter are equivalent to maximum rotation rate in this mode. However, it is also possible that the maximum possible rotation rate of MICROBEAST PLUS is achieved at values greater than 100%.
To adjust the sensitivity around mid stick position you can use the "Expo" function of your transmitter. Please refer to the manual for your transmitter.

When using predefined control behaviors other than "transmitter" we do not recommend to additionally adjust control curves (Expo/Dual rates) in your transmitter as this will indefinably mix the preset curves of MICROBEAST PLUS with the curves of the transmitter. Anyhow, if you only make small adjustments (e.g. slightly increasing the servo throw to increase rotation rate) this should be no problem.

The option "**user defined**" allows you select your own predefined setting. This can be edited by using the StudioX software bundle in combination with the optional USB2SYS interface. Thus you can take the values of the predefined settings and modify them directly without the need of adjusting anything in the transmitter.

⚠ If the tail gyro is operated in **Normal-Rate mode** (see section 8.4) the rudder stick directly controls the rudder servo instead of commanding a rotation rate to the gyro. In this mode the tail turns as fast as it is determined by servo position and angle of attack of the rotor blades. The tail gyro does not monitor the rate of rotation. Therfore it is possible when using Normal-Rate mode, that extremely high rotation rates can be achieved. It is absolutely necessary to check how much pitch angle can be achieved at full rudder stick deflection at the tail rotor. Reduce the servo throw of the rudder servo by decreasing it on the remote control or limiting it at Setup menu point **ⓔ** to a reasonable level.

Push the button to save the configuration and to proceed to Parameter menu point ⓒ.

Ⓒ Swashplate – Pitching up compensation

While in fast forward flight apply jerky collective pitch inputs to test this parameter. The helicopter should mainly remain in its horizontal path during climbing and descending. If the nose of the helicopter is pitching up and down heavily like a swimming dolphin, increase the value at Parameter menu point Ⓒ to compensate for this effect. But if the value is too high, the helicopter might feel sluggish and lazy. Try to find the lowest suitable setting. Note that the Cyclic gain (Dial 1 - see section 8.1) must be set as high as possible, otherwise the pitching up effect maybe a result of too low reaction of the gyro system in general.

If the helicopter is still pitching up at the highest value, check if the swashplate has enough cyclic throw at high collective pitch values (Setup menu point Ⓛ) and use faster and stronger servos as well as rotor blades that are as neutral as possible (for example blades specifically designed for flybarless helis).

The currently selected value is indicated by the Status-LED color and state. Move the rudder stick into one direction until the Status-LED lights in the desired color.

Status-LED	Pitching up behavior
purple	very low
red *flashing*	low
red	medium *
blue *flashing*	high
blue	very high
off	**user defined**

* Factory Setting

The option "**user defined**" allows you to choose your own setting that can be edited by using the StudioX software bundle and the separately available USB2SYS interface.

Push the button to save the configuration and to proceed to Parameter menu point Ⓓ.

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Ⓓ Tail gyro - HeadingLock gain

At Parameter menu point Ⓓ the HeadingLock gain for the tail can be adjusted. This gain comes into play when the tail gyro is operated in HeadingLock mode (see section 8.4). It determines how hard the tail gyro tries to maintain a given rotation rate from the transmitter. If the HeadingLock gain is too low, pirouettes will be inconsistent during fast forward flight or in crosswind conditions and the helicopter will slowly drift on the vertical axis when in stationary hovering flight with crosswinds. If the HeadingLock gain is too high, the tail rotor will respond delayed to fast directional changes and the rudder stick control does feel very inprecise. So only adjust this parameter as high as necessary. It is also possible that the tail will bounce back slowly after stopping from a rotation and commute **gently** while hovering or flying around. Please note that very often this also may be a sign of a stiff tail mechanics, slop in the tail linkage or an inadequate rudder servo! The tail rotor system in this case does not react as precise as necessary and hinders the tail gyro from working properly. If you cannot increase the HeadingLock gain higher than "very low" or "low" it is very likely that there is a mechanical issue.

> • Before adjusting the HeadingLock gain always try to find the maximum amount of tail gyro gain by flying around and using the tail gyro in HeadingLock mode.
> • After adjusting the HeadingLock gain it might be necessary to readjust the tail gyro gain! Both parameters interact to each other.

Move the rudder stick into one direction until the Status-LED lights in the desired color.

Status-LED	HeadingLock gain
purple	very low
red *flashing*	low
red	medium *
blue *flashing*	high
blue	very high
off	**user defined**

* Factory Setting

The option "**user defined**" allows you to choose your own setting that can be edited by using the StudioX software bundle and the separately available USB2SYS interface.

If the tail does not turn constantly at high speeds or not at all turns around even in the setting „very high" then this may be due to a mechanical cause. Make sure that the maximum blade pitch at the tail rotor neither is too large nor too small. A large pitch angle can lead to a stall of the tail rotor blades. Then the tail rotor produces hardly any thrust, similar to a very small angle. Also check the entire tail mechanics running smooth and without binding. Make sure that the rudder servo is strong enough and that it is supplied with sufficient power (long supply leads cause high voltage loss!). Additionally check that the rudder servo does not get powerless at maximum servo deflection. This can happen if the pulse range of the servo is exceeded. The cause for lacking tail thrust also can be that the tail rotor blades are too small or too soft, or because the rotation speed of the tail rotor is too low!

Push the button to save the configuration and to proceed to Parameter menu point Ɛ.

Ɛ Stick deadband

Use Parameter menu point Ɛ to adjust the stick deadband for elevator, aileron and rudder sticks. The deadband is the range around the very center of the stick in which MICROBEAST PLUS will not react to stick inputs.

Unfortunately, some on the market available transmitters have the problem that when the sticks are brought back to the center position after a stick input, they aren't exactly at the same center position as before. This generates a continuous deviation on the corresponding function, although the stick seems to be at mid position. This deviation is interpreted as a small input by MICROBEAST PLUS which leads to an unwanted drift on one or more axis. Especially you can see and feel this in hovering flight when the helicopter is turning slightly to one or another direction all the time. This makes it difficult to have precise hovering as it is hard to find a stick position at which no input is sent to MICROBEAST PLUS. This can be very dangerous as it may cause the helicopter to tip over when trying to take off or it can cause the pilot to loose control over the helicopter at all! So increase the stick deadband stepwise just until you don't see such effects. Note that as a result of large stick deadband there will be a wide range around mid stick position in that MICROBEAST PLUS will not react to stick inputs. This will make the control more inprecise. So if using "large" or "very large" deadband is necessary, we recommend to let your transmitter get checked by its manufacturer for damaged or worn out stick potentiometers.

The choice is made by moving the rudder stick into one direction until the Status-LED lights in the desired color.

The option "**user defined**" allows you to choose your own setting that can be edited by using the StudioX software bundle and the separately available USB2SYS interface.

Status-LED	Stick deadband
purple	very small
red *flashing*	small *
red	medium
blue *flashing*	large
blue	very large
off	**user defined**

* Factory Setting

Push the button to save the configuration and to proceed to Parameter menu point ❻.

❻ Tail rotor – Torque precompensation (RevoMix)

The advantage of always knowing the pitch and cyclic load on the flybarless system, allows MICROBEAST PLUS to precompensate for the torque variations on the tail rotor, just before any noticeable deviation occurs. This method of torque precompensation (RevoMix) relieves the tail control loop and improves the tail performance, especially when using MICROBEAST PLUS on helicopters with insufficient tail authority and/or extreme motor torque (e.g. well powered electric helicopters) where the tail does blow out shortly when applying a sudden pitch or cyclic input.

To see the compensation direction, you can move the collective pitch, roll and elevator control stick at Parameter menu point ❻. With **precompensation activated** the tail rotor has to produce a deflection which must counteract the rotor torque. Since at 0° pitch the least torque is applied by the main rotor, also the tail rotor makes the least deflection and the tail slider is in center position. If you pitch in positive or negative direction or move aileron or elevator control, a deflection will be added to the tail rotor which will act against the torque of the main rotor.

- Torque precompensation can only be used if you have 0° of pitch at the servos' center positions like adjusted at Setup menu point **ⓖ**!
- The amount of servo throw in the ratio of cyclic to collective pitch adjustment depends on the setting of the maximum collective pitch angle at Setup menu point **ⓚ**. The larger the maximum collective pitch angle, the greater the rudder servo throw due to the collective pitch input will be, while the servo throw through cyclic control commands will remain the same.

For helicopters with clockwise rotating main rotor, the precompensation has to always push the tail to the left (nose of the heli to the right). For helicopters with the main rotor turning anti-clockwise, the precompensation has to push the tail to the right (nose of the heli to the left). The deflection will be to the same direction, whether positive or negative pitch, as the torque only increases. You then have two options to set the precompensation (low or high).

The choice is made by moving the rudder stick into one direction until the Status-LED lights in the desired color.

The option "**user defined**" allows you to choose your own setting that can be edited by using the StudioX software bundle and the separately available USB2SYS interface.

Status-LED	Torque precompensation
purple	off *
red *flashing*	low - normal direction
red	high - normal direction
blue *flashing*	low - reverse direction
blue	high - reverse direction
off	**user defined**

* Factory Setting

Push the button to save the configuration and to proceed to Parameter menu point ⓖ.

Ⓖ Cyclic response

With point Ⓖ can be set how aggressive the MICROBEAST PLUS responds to cyclic control commands (roll and pitch). This can reduce the usual uniform and linear control feeling of flybarless systems and approach it to the feeling of a flybared helicopter.

If you want to use this feature, start from the "slightly increased" setting, gradually increasing to the desired level, until you have found your ideal setting.

A too high setting will result in uncontrollable, inaccurate rotation and deteriorating stopping behavior of each control function.

How high this feature is adjustable without causing any adverse effects depends on many factors such as heli size, swashplate servos, main rotor blades, main rotor speed, servo power supply and depending on the particular heli setup.

If using an increased Cyclic response (greater than „normal" setting) it is recommended to set Parameter menu point Ⓑ (Control behavior) to „transmitter" (Status-LED = blue). Additionally you should only add a very small amount of Expo by the transmitter or don't use any Expo at all. Otherwise this feature may not show any significant effect!

The choice is made by moving the rudder stick into one direction until the Status-LED lights in the desired color.

The option "**user defined**" allows you to choose your own setting that can be edited by using the StudioX software bundle and the separately available USB2SYS interface.

Status-LED	Cyclic response
purple	normal *
red *flashing*	slightly increased
red	increased
blue *flashing*	high
blue	very high
off	**user defined**

* Factory Setting

Push the button to save the configuration and to proceed to Parameter menu point Ⓗ.

ⓗ Collective pitch boost

Parameter point ⓗ allows you to setup the collective pitch boost function. This function causes that the faster you move the thrust stick the more additional collective pitch will be exposed. This can be especially useful in 3D aerobatics when very rapid collective pitch changes are necessary for certain flight maneuvers, as hereby dynamically the required control stick deflection will be reduced. However, the maximum set pitch value (Setup menu point ⓚ) will not be exceeded.

A too high setting can cause the rotor blades to stall when giving very fast collective pitch commands. The collective pitch will feel slow and spongy, precisely causing the opposite effect as desired.

Start from the "low" setting, gradually increasing to the desired level, until you have found your ideal setting. How high this feature is adjustable without causing any adverse effects depends on many factors, such as maximum pitch values, pitch curve, swashplate servos, main rotor blades, system headspeed, ...

The choice is made by moving the rudder stick into one direction until the Status-LED lights in the desired color.

The option "**user defined**" allows you to choose your own setting that can be edited by using the StudioX software bundle and the separately available USB2SYS interface.

Status-LED	Collective pitch boost
purple	off *
red *flashing*	low
red	medium
blue *flashing*	high
blue	very high
off	**user defined**

* Factory Setting

> **By pressing the button you save the setting and exit the Parameter menu. Now MICROBEAST PLUS is ready for operation again!**

10. FLYING

After turning on the receiver power supply wait until MICROBEAST PLUS has fully initialized. This is displayed by a short movement of the swashplate servos (see chapter 6). For initialization, it is irrelevant whether the helicopter is leveled horizontally! Only important is that it is not moved as long as the calibration of the sensor positions takes place (LEDs lights **Ⓐ** - **Ⓖ** running). Also the control sticks of the transmitter must not be moved as long as MICROBEAST PLUS calibrates the stick center positions (LEDs **Ⓗ** - **Ⓝ**). If the initialization is not completed even after several minutes, read the **Trouble shooting guide** at the end of this manual.

Like mentioned in chapter 8 the three dials should be turned to factory setting (centered horizontally), when using in small helicopters for safety reason dials 1 and 2 should be set to slightly below the center position. The tail gain channel should be set so that point **Ⓖ** lights up, similar to approx. 50% tail gain adjustment. In micro or mini helicopters experience has shown that the gain must be lower (set to point **Ⓓ**). Select the control behavior at Parameter menu point **Ⓑ** to fit your flying style. If you're a beginner or unexperienced with flying flybarless helicopters you should highly decrease the maximum rotation rate, so change Parameter menu point **Ⓑ** to "**normal**" setting.

⚠ Before the first take off, make a stick direction check and again make sure that the sensors are correcting to the right direction when you tilt, roll or yaw the helicopter by hand.

It is normal that the swashplate might move only slowly back to its original position after a stick input and that the servos don't run at the same speed as your sticks. In comparison to a flybar head you are not directly controlling the servos anymore but controlling rotational rates like for fly-by-wire. The control of the servo is left to the control loop of MICROBEAST PLUS. Thus it is also normal when the tail gyro is operated in HeadingLock mode, that the rudder servo will stay in its end position after a rudder stick input or tail movement and that it does not always react immediately to a stick input. For the same reason, it is also normal that the rudder servo runs to the endpoints even with small stick inputs.

Just before lift off make sure that the swashplate is horizontal and that the tail pitch slider is near center. You can shortly switch the tail gyro to Normal-Rate mode, in this mode the rudder servo will center itself if the rudder stick is released.

Avoid excessive steering during lift off, otherwise the helicopter may tip over! The best way is to give a fair and direct collective pitch input to lift the helicopter quickly up into the air. This demands some re-education, if you have only flown flybared helicopters before.

Now at first you should adjust and try to find the maximum possible amount of tail gyro and cyclic gain (dial 1). Then you may optimize the tail gyro by adjusting Parameter menu point **Ⓓ** (when operating the tail gyro in HeadingLock mode) and adjust the response of the tail gyro with dial 3. Additionally you may need to adjust the Cyclic feed forward (dial 2) and Parameter menu point **Ⓒ**. If the helicopter does react very aggressive to stick inputs, change the Control behavior at Parameter menu point **Ⓑ** to a lower adjustment and/or reduce stick throws (servo throws) in the transmitter for the specific functions. Likewise increase the stick throws and/or Parameter menu point **Ⓑ**, if the reaction is to slow and gentle for you. When the control loop is well adjusted you can additionally use Parameter menu points **Ⓖ** and **Ⓗ** to fit your flying style and stick feeling. To support the tail gyro you can activate the Torque precompensation (Parameter menu point **Ⓕ**) if necessary.

We recommend to remove main and tail rotor blades before the first flight and let the motor/engine run at all speeds. **Caution: Risk of injury**!

Watch whether the swashplate automatically starts to tilt in one direction or begins to twitch at a specific speed. This usually is a sure sign that the helicopter mechanics vibrate at a very high frequent range which disturbs the sensors of MICROBEAST PLUS.

Before the first flight it is absolutely necessary to correct the cause of these vibrations. Often simply the attachment of the cables or MICROBEAST PLUS is not optimal, so that vibrations can very easily be transferred to MICROBEAST PLUS.

When your helicopter uses a tail belt drive system for the tail rotor then it also is highly recommended to perform a bench test as described above. A tail belt can produce static discharges which may interfere with the electronic components on your heli such as MICROBEAST PLUS. This can result in twitching servos, random lighting up of the LEDs or even can cause the system to hang up or reboot. **Take precautionary measures against static discharges and do not fly the heli, if effects occur as described above.**

11. VERSION DISPLAY

After powering up MICROBEAST PLUS, it performs a brief initialization phase. A quick self test turns all menu LEDs on simultaneously and the Status-LED cycles through all colors. Then for about 3 seconds, the Status-LED turns red and the first two digits (X and Y) of the internal firmware version are displayed. Then, in the remaining time a running light of the LEDs **Ⓐ** - **Ⓖ** signals that the sensors are being calibrated and the LEDs **Ⓗ** - **Ⓝ** do indicate the initialization of the receiver signals.

During the initialization phase (i.e. when viewing the firmware version or later) briefly push the button and you can display the third digit (Z) of the firmware version. Here the Status-LED flashes purple. Press the button again briefly, and the color of the Status-LED changes to flashing blue while displaying the firmware's data version (X.Y). If you press the button third time, the Status-LED goes off and the hardware version (X.Y) of this MICROBEAST PLUS device is displayed. Press the button once again to leave the version display and to view the initialization display.

Representation of values:
The representation of all values using the menu LEDs is in binary. A lighting menu LED stands for a 1, an off LED for 0. The least significant bits are **Ⓐ** and **Ⓗ**. The type of value that is currently displayed is represented by the Status-LED as described above.

Firmware version:
The firmware version consists of three values X.Y.Z. X and Y are displayed automaticaly before the initialization sequence. X is displayed through menu LEDs **Ⓐ** - **Ⓖ**, Y through **Ⓗ** - **Ⓝ**. The Z value is shown if the button is pushed once while initialization takes place. To display Z all LEDs **Ⓐ** - **Ⓝ** are used.

Data version:
The data version consists of two values X.Y which are displayed at the same time through menu LEDs **Ⓐ** - **Ⓖ** for X and **Ⓗ** - **Ⓝ** for Y.

Hardware version:
The hardware version consists of two values X.Y which are displayed at the same time through menu LEDs **Ⓐ** - **Ⓖ** for X and **Ⓗ** - **Ⓝ** for Y.

12. TROUBLE SHOOTING GUIDE

Description	Reason	Solutions
MICROBEAST PLUS does not initialize. Menu-LEDs Ⓐ - Ⓖ are running for some time, then only Status-LED flashes red.	Sensor failure occured.	- Helicopter must stand absolutely still during initialization process. - Strong wind can shake the helicopter and disturb sensor calibration. Lay the heli on its side during the initialization. - Don't initialize on a vibrating support, like a car hood or trunk with a running motor or a work bench that people are layed against or sitting on. - Sensors damaged. Return MICROBEAST PLUS for repair. - Power supply voltage is dropping due to weak power supply or damaged servos.
MICROBEAST PLUS does not initialize. Menu-LEDs Ⓗ to Ⓝ do not quit running up and down.	No valid signal from the receiver.	- Check the wiring. Mainly check receiver wires for polarity on both sides and correct plugging (no vertical offset by one pin). - In case of 2.4GHz, check the transmitter-receiver binding. - Check the correct receiver type is set, chapter 5. - When using a single-line receiver check whether the receiver is set to correct signal output mode.

Description	Reason	Solutions
Selection in the menus with the rudder control stick does not work.	No movement or not enough movement on the rudder channel.	- Increase the servo throw / dual rate for the rudder channel in the TX. - Check that the connector for the rudder channel (orange wire) is inserted correctly in the receiver. - Is the correct stick moved? Check stick mode of transmitter.
The sensors do not seem to work correctly. The rudder servo does not react or reacts very slowly to rotation of the helicopter. The same happens to the elevator axis.	The gain of tail gyro is too low or wrong mounting orientation has been selected .	- Check assignment of gain channel and adjust the gain in the transmitter (see section 8.4) - Correct wiring or setup of tail gain cable/channel. - In Setup menu point **Ⓐ** select the correct mounting orientation.
The helicopter slowly drifts by itself on aileron, elevator and/or tail. The swashplate is perfectly leveled and no sub trimming is present in the radio nor is any mixing function active. This behavior seems to be influenced by the rotor head speed.	This indicates to a vibration problem which interferes with the sensors of the MICROBEAST PLUS.	- Check the whole helicopter for imbalances. - In electric helicopters the motor can cause high frequent micro-vibrations. - Balance the tail rotor blades very accurately. - Check the tension of the tail belt. - Choose another mounting position for MICROBEAST PLUS. - Try other types of gyro pads.

Description	Reason	Solutions
The helicopter wobbles on aileron and elevator axis. Reducing the swashplate gain does not help to suppress this effect completely.	The helicopter's linkage ratio is not suitable for flybarless usage. The servo-blade combination is not good Some linkages aren't moving smoothly and freely.. Imbalance of the main rotor head.	- In Setup menu point ❶ adjust the cyclic pitch to exactly 6 degrees. The color of the Status-LED should light up "blue" (see chapter 7). - Use faster and stronger servos and/or specific flybarless blades. - Check the mechanics for any hard points (ball linkages, blade grips) - Check if the dampers are greased and that the thrust bearings in the blade grips are correctly mounted. - Do not tighten rotor blade bolts to much. The blades must be able to align themselves by centrifugal force.
The tail rotor turns around instantly when doing backwards flying.	Tail gyro gain too low. No sufficient thrust produced by the tail rotor.	- Increase tail gyro gain as described in section 8.4. - Check tail pitch angles. Reduce the maximum amount of available tail pitch throw at Setup menu point ❺ to prevent the tail blades from stalling. Increase the tail pitch angle if it's too small. - Use different (larger) tail rotor blades or increase the rotor rpm.

Description	Reason	Solutions
The tail oscillates in <u>horizontal</u> position slowly and irregularly while hovering.	The HeadingLock gain of the tail gyro is too high. Due to mechanical issues the tail gyro can not work precisely.	- Reduce the HeadingLock gain in Parameter menu point ❶ by one step and increase the tail gain instead at your transmitter. - Check the linkage and mechanics for absolute free movement without hard points. - Use a dedicated rudder servo that is fast and accurate and allows a high driving frequency.
During slow hovering pirouettes, the helicopter is rolling out.	The pirouette optimization setting is wrong	- Adjust the pirouette optimization in setup point ❶ correctly.
Status-LED flashes in operation mode, e.g. after landing.	During operation a software-reset occurred.	- The receiver power supply does not seem to be sufficient. The voltage during operation dropped in a critical area (<3.5 Volts). Use a stable power supply and make sure that the wiring and plugs are dimensioned big enough and feature low contact resistance. - A reset can be triggered due to a transfer of high voltage. Take measures to prevent static discharges.

For further information have a look at our online content at WWW.BEASTX.COM.

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DECLARATION OF CONFORMITY

We

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Germany

herewith declare that MICROBEAST **PLUS** / MICROBEAST **PLUS HD** meet all the essential requirements of the Directives 2004/108/EC und 2011/65/EU. For the evaluation of compliance with these Directives the following standards where applied:

EN 61000-6-1:2007
EN 61000-6-3:2007 + A1:2011 + AC:2012

The products carry the CE mark:

$C \epsilon$

The products mentioned above are fully compliant with requirements stipulated by REACH (1907/2006/EC) and RoHS (2011/65/EC), where applicable. Furthermore, the articles and their packaging materials do not contain substances included on the current candidate list for authorization (SVHC list) according to Art. 33 and 59(1, 10) REACH in a concentration above 0.1 % weight by weight. The candidate list and its updates are closely monitored on a regular basis. In addition, our products do not contain any substances subject to authorization or restriction (REACH Annexes XIV and XVII).

Kerpen, 01.08.2014
place and date of issue

Markus Schaack, CEO
name and signature

SETUP MENU

(Menu-LED is steady ON)

	Status-LED:	off	purple	red *flashing*	red	blue *flashing*	blue
A	**Mounting orientation**				upright (vertical)		flat (horizontal)*
B	Swashplate - **servo frequency**	user defined	50 Hz*	65 Hz	120 Hz	165 Hz	200 Hz
C	Rudder - **center position pulse length**	user defined	960 µs		760 µs		1520 µs*
D	Rudder - **servo frequency**	user defined	50 Hz*	165 Hz	270 Hz	333 Hz	560 Hz
E	Rudder - **servo endpoints**	use rudder stick to move servo to right endpoint and wait, then left endpoint and wait (or vice versa)					
F	Rudder - **sensor direction**				normal*		reversed
G	Swashplate - **servo centering**	reference position	CH1 center pos.		CH2 center pos.		CH3 center pos.
H	Swashplate - **mixer**	user defined	mechanical	90°	120°*	140°	140° (1=1)
I	Swashplate - **servo directions**	nor | rev | rev	nor | nor | rev*		nor | rev | nor		nor | nor | nor
J	Swashplate - **cyclic pitch geometry**	aileron stick – adjust 6° cyclic pitch on the roll axis to one direction (blades aligned with fuselage)					
K	**Collective pitch range and endpoints**	collective stick on max/min position, use rudder stick to adjust desired pitch					
L	Swashplate - **cyclic limit**	move aileron, elevator and thrust stick – adjust maximum limit with rudder stick					
M	Swashplate - **sensor directions**	rev | rev	rev | nor		nor | rev		nor | nor*
N	**Pirouette optimization direction**				normal*		reversed

PARAMETER MENU

(Menu-LED is flashing quickly)

	Status-LED:	off	purple	red *flashing*	red	blue *flashing*	blue
A	**Cyclic** and **rudder trim**	aileron and elevator stick to trim cyclic, hold button 2s to trim rudder – reset all with rudder– stick					
B	**Control behavior**	user defined	normal	sport*	pro	extreme	**transmitter**
C	Swashplate - **Pitching up compensation**	user defined	very low	low	medium*	high	very high
D	Tail - **HeadingLock gain**	user defined	very low	low	medium*	high	very high
E	**Stick deadband**	user defined	very small	small*	medium	large	very large
F	Tail - **Torque precompensation (RevoMix)**	user defined	off*	low - nor	high - nor	low - rev	high - rev
G	**Cyclic response**	user defined	normal*	slightly increased	increased	high	very high
H	**Collective pitch boost**	user defined	off*	low	medium	high	very high

* Factory settings

Menu-LEDs: *Amount of tail gain* Ⓐ*=0% to* Ⓝ*=100%*
(only after powering up or when adjusting the gain)

Button:
- *to enter Setup menu push down several seconds until LED* Ⓐ *is steady on*
- *to enter Parameter menu push shortly until LED* Ⓐ *is flashing*

Status-LED
Tail gyro mode
blue = HeadingLock mode
purple = Normal-Rate mode
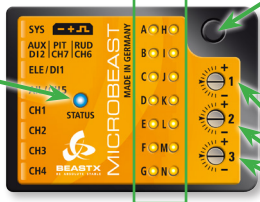
Dial 1: *Cyclic gain*
Dial 2: *Cyclic feed forward*
Dial 3: *Tail gyro response*

Parameter menu:

| operational | *Push button shortly* → | Parameter menu point Ⓐ | → … → | Parameter menu point Ⓗ | *Push button shortly* → | operational |

Push button shortly (above second arrow)

Setup menu:

| operational | *Hold button a long time* → | Setup menu point Ⓐ | → … → | Setup menu point Ⓝ | *Push button shortly* → | operational |

Push button shortly (above second arrow)

Receiver setup menu:

| powered off | *Hold button pushed* **and** → | Receiver menu point Ⓐ | → … → | Receiver menu point Ⓝ | → | END of adjustment |

power on while still pushing the button

Push button shortly (above second arrow)

when selecting „standard" at point Ⓐ

⚠ **Never fly while MICROBEAST PLUS is in one of the menus!** In this condition gyro and stick controls are partially disabled and not used for controling the helicopter.

Heli	

SETUP MENU
(Menu-LED is steady ON)

	Status-LED:	off	purple	red *flashing*	red	blue *flashing*	blue
A	**Mounting orientation**	▓	▓	▓			
B	Swashplate - **servo frequency**						
C	Rudder - **center position pulse length**			▓			
D	Rudder - **servo frequency**						
F	Rudder - **sensor direction**	▓	▓	▓		▓	
H	Swashplate - **mixer**						
I	Swashplate - **servo directions**			▓	▓	▓	▓
M	Swashplate - **sensor directions**			▓	▓	▓	
N	**Pirouette optimization direction**					▓	

PARAMETER MENU
(Menu-LED is flashing quickly)

	Status-LED:	off	purple	red *flashing*	red	blue *flashing*	blue
B	**Control behavior**						
C	Swashplate - **Pitching up compensation**						
D	Tail - **HeadingLock gain**						
E	**Stick deadband**						
F	Tail - **Torque precompensation (RevoMix)**						
G	**Cyclic response**						
H	**Collective pitch boost**						

Notes:

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MICROBEAST **PLUS** Manual

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