BEASTX

BE ABSOLUTE STABLE

MICROBEAST

3 AXIS MEMS GYRO SYSTEM FOR RC-MODEL AIRCRAFT

INSTRUCTION MANUAL

SAFETY NOTES

⚠ R/C helicopters are no toys! The rotorblades rotate at high speeds and may cause potenial risks and severe injuries due to imporper usage. It is necessary to observe the common safety rules for R/C models and the local law. You can gather information from your local r/c models club or from the national modelers associations.

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

⚠ The MICROBEAST-System is no flying aid for beginners! It replaces the conventional mechanical flybar on most R/C helicopters only. It is absolutely necessary that you have flying experience and that you are experienced in the usage of R/C helicopters. Otherwise we suggest you to seek the support of an experienced helicopter pilot before you dare the first flight. Also flight training with a R/C simulator on the PC can make the access to R/C helicopter flying easier for you. Ask your local dealer if you need technical support or if you observe problems during to the usage of our system.

⚠ R/C models consist of several electrical components. Therefore it is necessary to protect the model from moisture and other foreign substances. If the model is exposed to moisture this may lead to malfuncion and therefore damaging or crashing the helicopter. Never fly in rain or extreme high humidity.

⚠ Do not expose the MICROBEAST-System to extreme variation in temperature. Before powering up the system wait some time so that the electronics can acclimatize and possibly occuring condensation is able to evaporate.

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1. INTRODUCTION

Dear customer, thank you for purchasing the MICROBEAST **!**

MICROBEAST is an easy to use three axis gyro system which makes it possible to fly R/C helicopters without a mechanical flybar. This brings a boost in power as well as longer flight times and makes it possible to adapt the agility and flying behaviour of your helicopter to your individual preference.

Also the MICROBEAST has a built in high end tail gyro based on the latest MEMS Technology which gives your helicopter's tail a perfect stopping behaviour and constant rotation rate at any speed.

MICROBEAST can be used in nearly any size of helicopters with electric motors as well as combustion engines. It provides flight stability for beginners and maximum agility and precision for intermediate and professional pilots.

The following manual will lead you step by step through the setup procedure from the correct mounting of the unit up to the first flight. Please read the following instruction manual carefully. You will see the MICROBEAST is very easy to handle.

As attachment you get an overview map of the setup menus that you can take out to the flight field as a quick reference.

Take a look at our website **WWW.BEASTX.COM** regularly where we inform you about latest updates and downloads.

Now have fun and a good time using MICROBEAST !

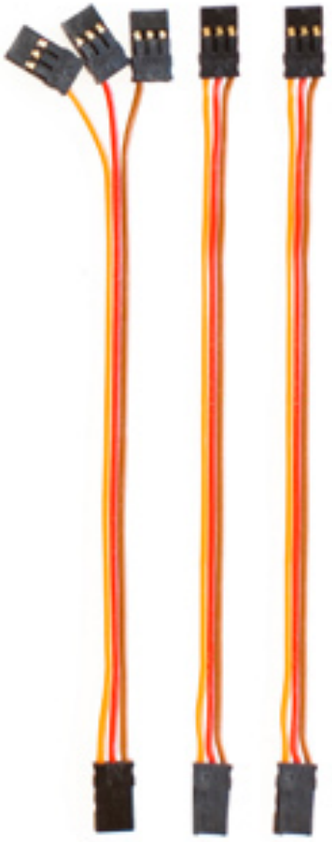
Sincerely, the BeAStX-TEAM

2. BOX CONTENTS

MICROBEAST



Receiver wiring leads 15 cm



Instruction manual



Gyropads



BEASTX adjustment tool



Optional accessories (sold separately)



Receiver wiring leads 8 cm

Cable for stand-alone tail gyro use



USB-Interface



3. MOUNTING AND CONNECTION

3.1 Mounting the MICROBEAST unit



fig. 1

Attach the MICROBEAST unit by using one of the provided gyropads at a preferably low vibrating position on your helicopter such as gyro platform or receiver platform.

The gyropad's area is slightly larger than the surface of the MICROBEAST unit. This allows a perfect fit together with good dampening. **Please do not cut the gyropad to the exact size!**

The MICROBEAST unit can be attached flat or upright even upside down under the helicopter.

The connection board always has to show in or against flying direction. The edges of the MICROBEAST unit have to be in parallel with the rotation axes of the helicopter!



fig. 2

3.2 Connection of receiver cables and servo wiring

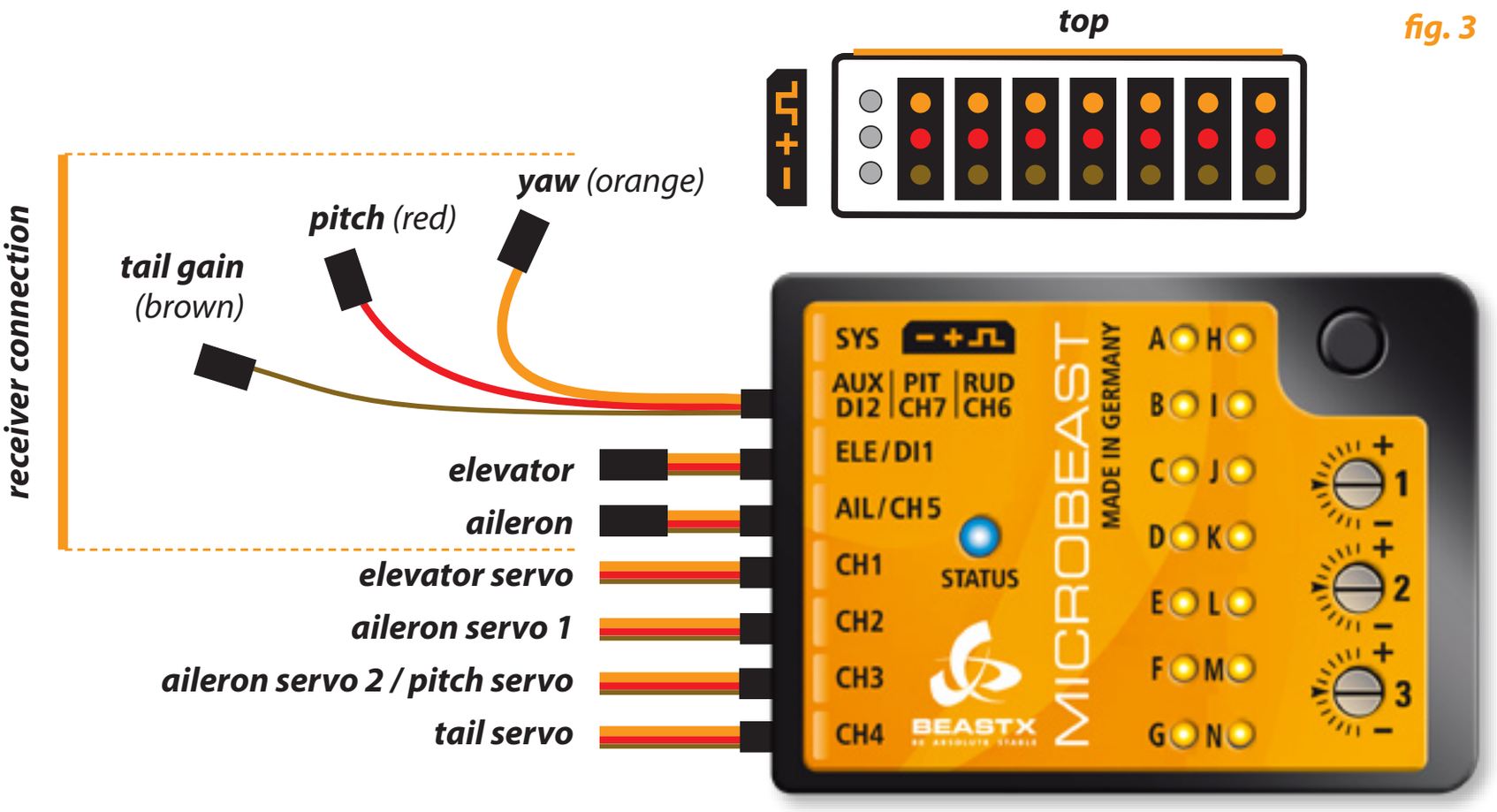


fig. 3

Now plug in the receiver cables for aileron, elevator, pitch, yaw and tail gain into the MICROBEAST.

The aileron and elevator connectors are two separate wire leads which provide the current supply. Pitch(red), yaw(orange) und gain(brown) are summarized to one lead. Only the signals are transfered.

Watch out to connect the plugs in the right direction to the receiver. Normally the signal line is marked with „S“.

To check your radio‘s correct channel assignment read the manual provided with the radio or ask the radio‘s vendor. On the next page you can see two common cases of application.

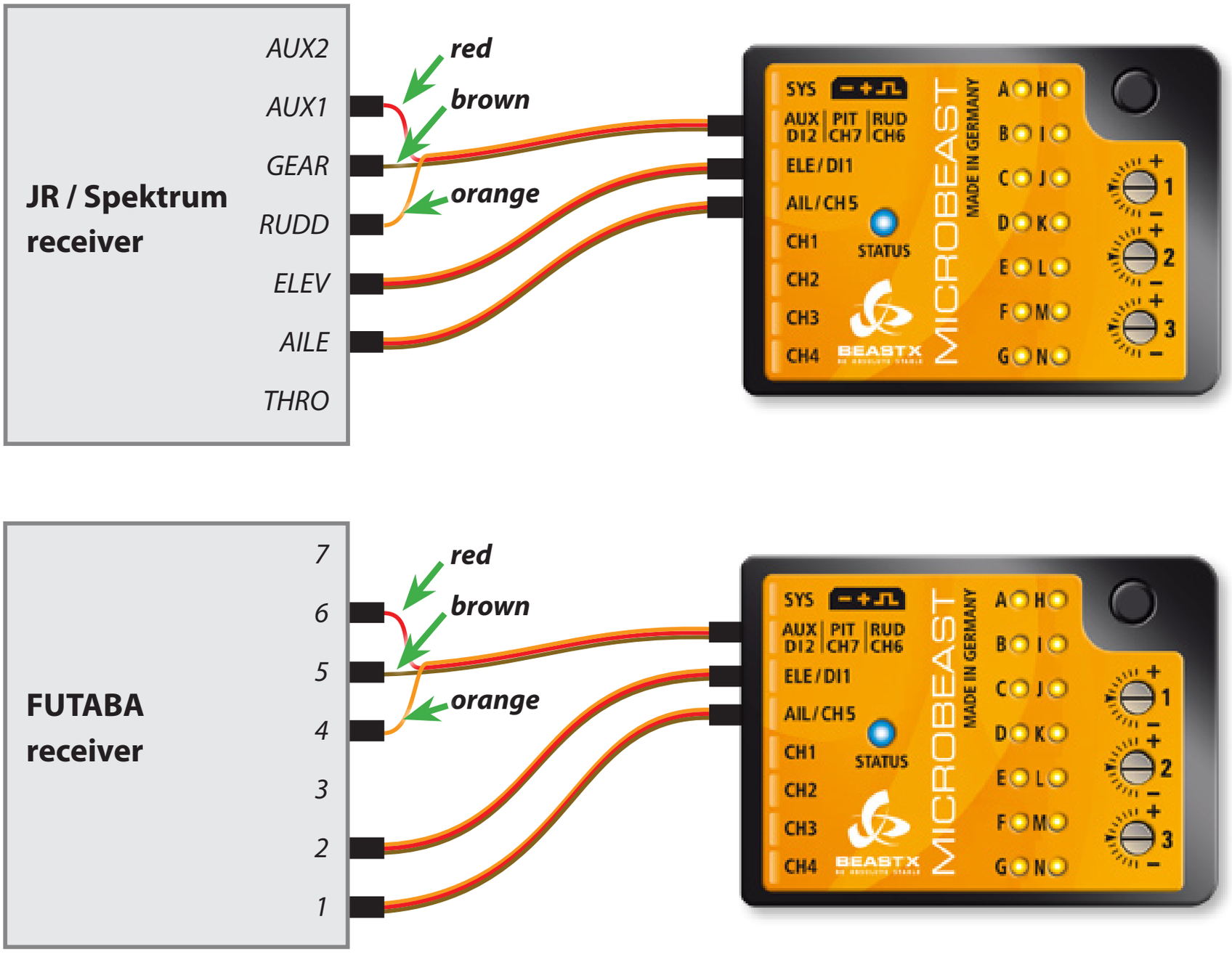


fig. 4

All other connections like for throttle servo, esc or current supply can be made as usual.

Now connect the three swash servos to the MICROBEAST. Slot CH1 is for the elevator servo. When using eCCPM the slots CH2 and CH3 are for the aileron servos.

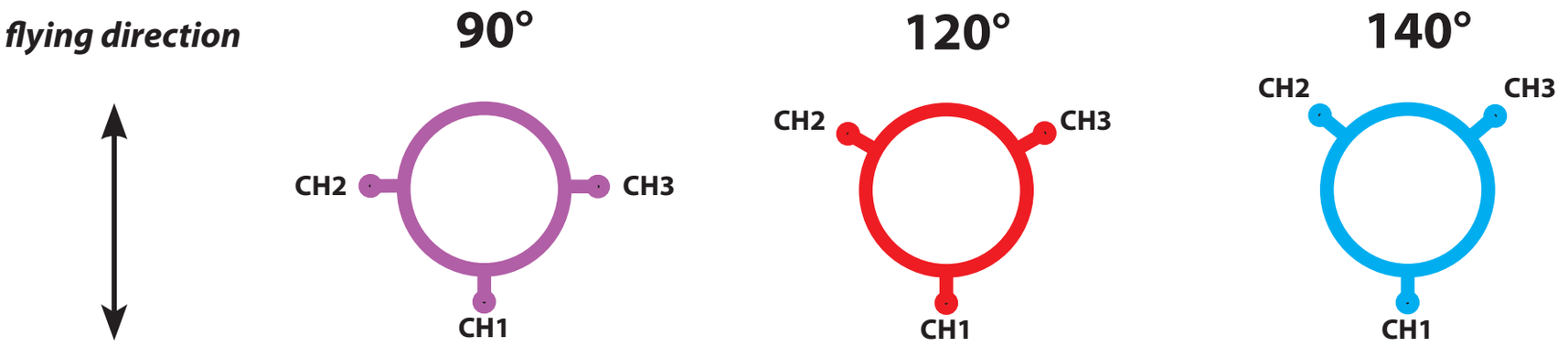


fig. 5

When using mCCPM connect the servos in the following direction:

CH 1 = elevator servo | CH 2 = aileron servo | CH 3 = pitch servo

Do not mount the servo wheels on the servos at this step. Otherwise it is possible that the servos may jam and get destroyed when powering on the system for the first time.

When you route the wire leads in your model make sure that there is no tensile load to the MICROBEAST. Make sure that the MICROBEAST unit is able to vibrate freely.

It is not recommended to bundle the leads shortly after the MICROBEAST unit.

Please make sure that your current supply is dimensioned sufficiently. The servo load and power consumption in flybarless helicopters is much higher than in flybared helicopters!

3.3 Preparing the radio

(This step has not to be considered when using the optional cable for stand-alone tail gyro use)

At first create a new model in your radio's model memory. When using the MICROBEAST it is not allowed to activate any mixing functions on the swashplate or tail. Every steering function has to be assigned to one receiver channel.

Make sure that any sub trim is set to zero and the servo travel is 100% (by reducing or increasing the servo travel for aileron, elevator and yaw you can later adjust the maximum roll rate, see chapter 7-B).

Never use your radio's eCCPM mixing function: this job will will be done by the MICROBEAST. Always set your radio's swash mixer to mCCPM which is often called „H1" or „1 servo" mixing.

Also do not adjust the pitch curve at the moment. It has to be set linearily from -100% to +100%.

Again make sure that there are no mixing functions active like revolution mixing.

Other functions like throttle curves, ESC switches or additional functions can be adjusted as usual.

3.4 Usage as stand-alone tail gyro

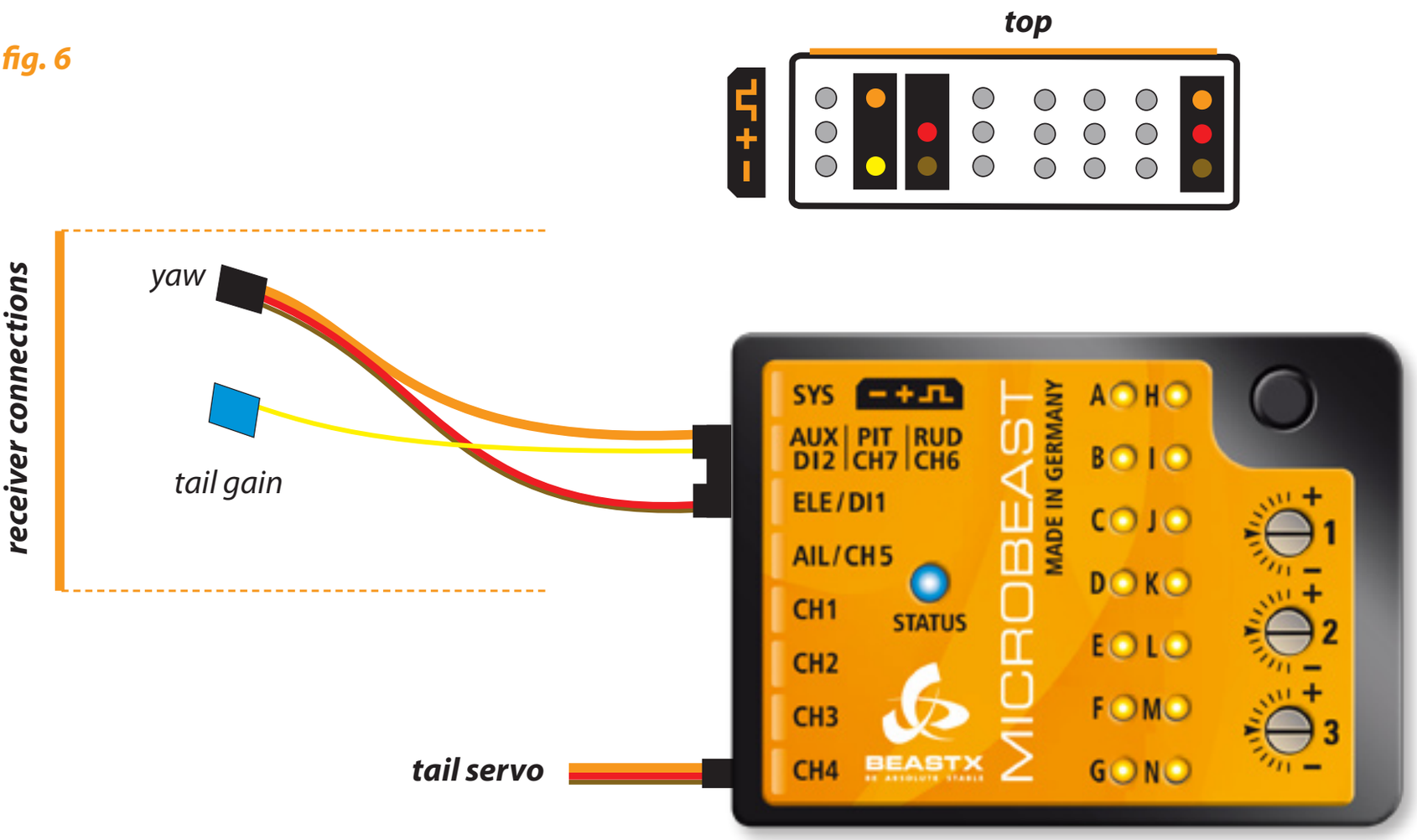
MICROBEAST can also be used as stand-alone tail gyro. Therefore you need a special patch cable which is optional available. This ensures that the MICROBEAST is provided with power and that the signals for yaw and tail gain are transferred from the receiver.

The signal wires with the orange and yellow lines have to be connected to the slot **[Aux | Pit | Rud]**.
The orange line has to be the upper one that is closer to the topside of the MICROBEAST.

The power line must be plugged into the slot **[ELE | DI1]**. The brown line for the minus pole is on the bottom, the red line for the plus pole is in the middle position. Connect the tail servo to **[CH4]**.

If using the MICROBEAST as stand-alone tail gyro only the menu points Ⓐ, Ⓑ, Ⓓ, Ⓔ, Ⓕ and Ⓖ have to be adjusted in setup menu. All other menu points can be skipped.

fig. 6



4. SETUP PROCEDURE OVERVIEW

Now you can switch on the power supply for the first time. The MICROBEAST will initialize shortly. During this phase do not move the MICROBEAST unit. The status LED is glowing red. The blinking LEDs Ⓐ - Ⓖ show the initialization of the sensors, the LEDs Ⓗ - Ⓝ show the initialization of the receiver inputs.

When the system's ready this is visualised by some short moves of the swashplate servos and the status LED getting blue or purple, depending whether the tail gyro is in normal mode or in heading lock. For a short amount of time you can see one of the LEDs Ⓐ - Ⓝ being on similar to the amount of tail gain.

The setup procedure works in the following way:

- To enter the setup menu hold down the button for at least 3 seconds. The LED Ⓐ will at first flash and then get constant on. Now release the button.
- To enter the parameter menu hold down the button until the LED Ⓐ will flash and release the button.
- While being in one of the menus you normally select the different options by giving an input with the tail stick to the left or right. The momentary selected option is indicated by the colour of the status LED.

Possible colours can be: off | purple | red blinking | red | blue blinking | blue.



- While being 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, just press the button once again.
- After the last menu point the short press on the button will lead to exiting the menu. Then the MICROBEAST is ready to fly again. None of the LEDs Ⓐ - Ⓝ is glowing and the status LED is blue or purple, depending whether the tail gyro is in normal mode or in heading lock. Also if there is no stick input for 4 minutes while being in one of the menus, the MICROBEAST will exit the menus.

Never fly while being in one of the menus!
In this condition the gyro control is disabled and often several stick inputs as well.

system ready

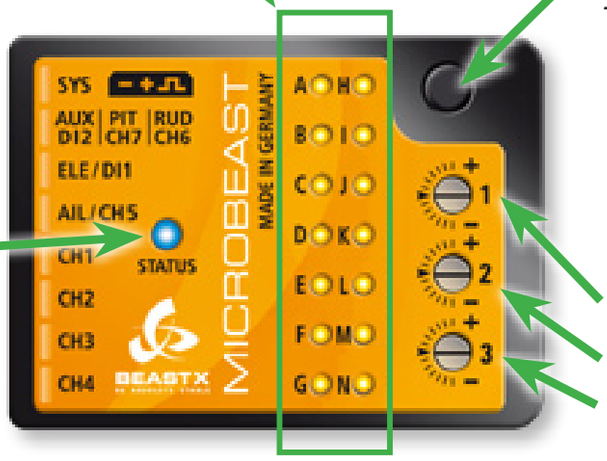
menu LEDs: *Amount of tail gain A=0% bis N=150%*
(only indicated after powering up or when adjusting the gain)

button:

- hold until LED Ⓐ is glowing constant to enter setup menu

- hold shortly until LED Ⓐ is flashing to enter parameters menu

status LED:
tail gyro mode
blue = heading lock
purple = normal mode



dial 1*: swashplate gain*
dial 2: *swashplate direct gain*
dial 3*: tail dynamic*

menu selection

menu LEDs: *constantly on = setup menu*

flashing = parameters menu

button:
press short for next menu point

status LED:
off
purple
red
blue

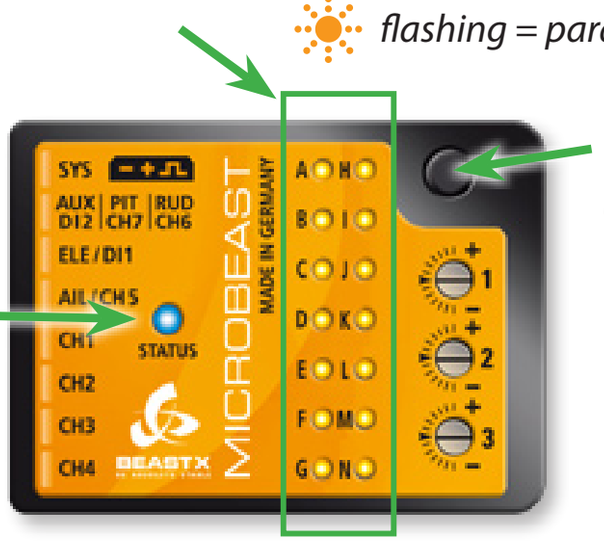


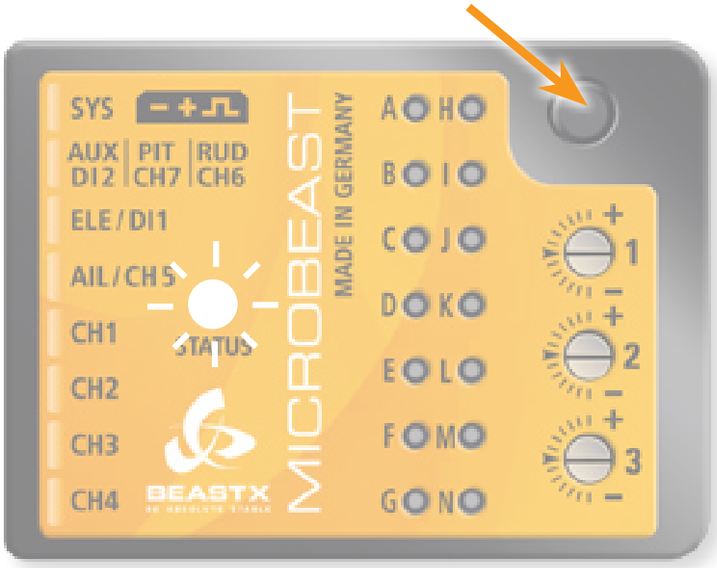
fig. 7

Selection by tail stick input or **aileron / elevator / pitch** stick as needed

4.1 Setup menu

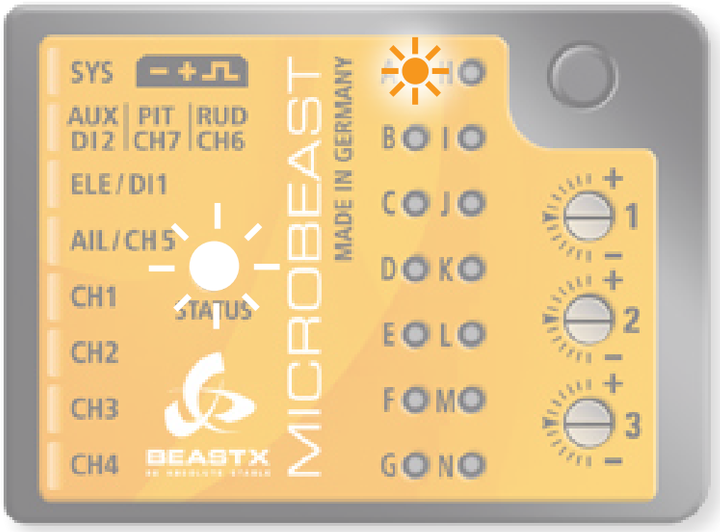
fig. 8

no LED on
push button for at least 3 seconds



system ready

menu LED Ⓐ constant on

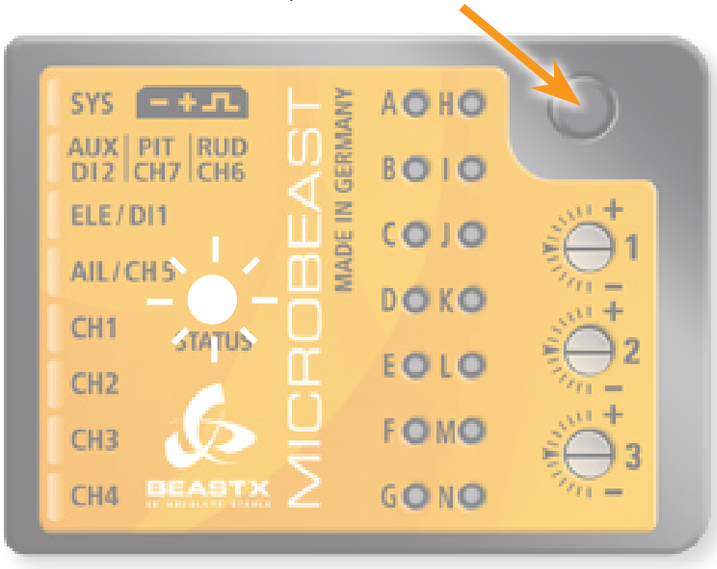


setup menu - menu point Ⓐ

4.2 Parameters menu

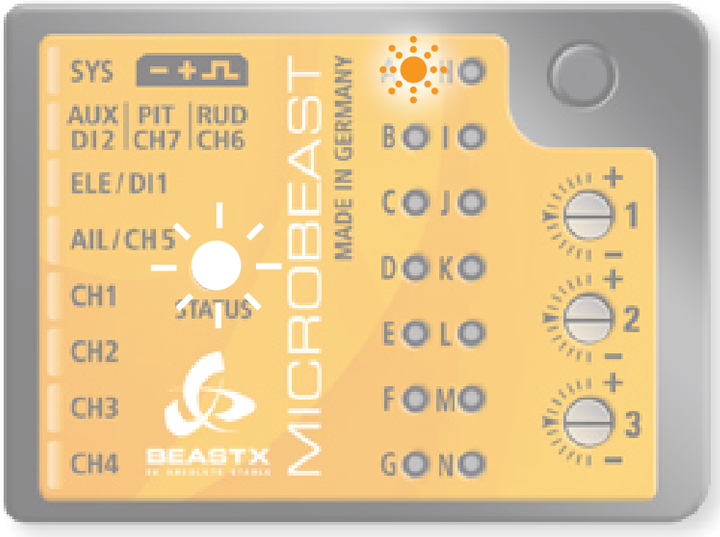
fig. 9

no LED on
press button shortly



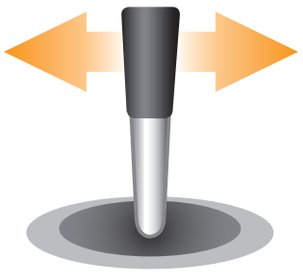
system ready

menu LED Ⓐ flashing



parameters menu - menu point Ⓐ

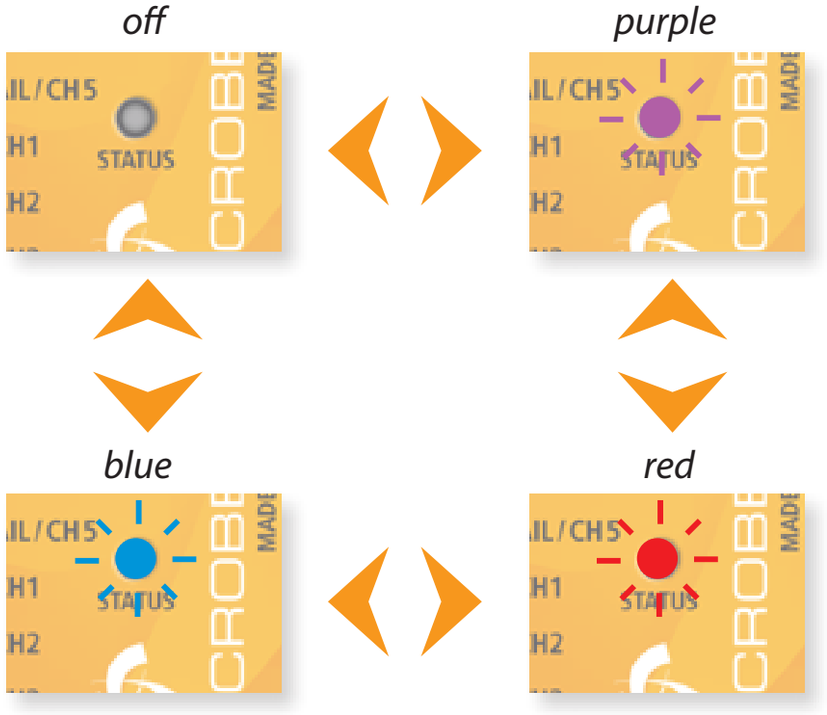
4.3 Example: Selection within the menus



by moving the tail stick left or right
you can select the different options
within a menu point

fig. 10

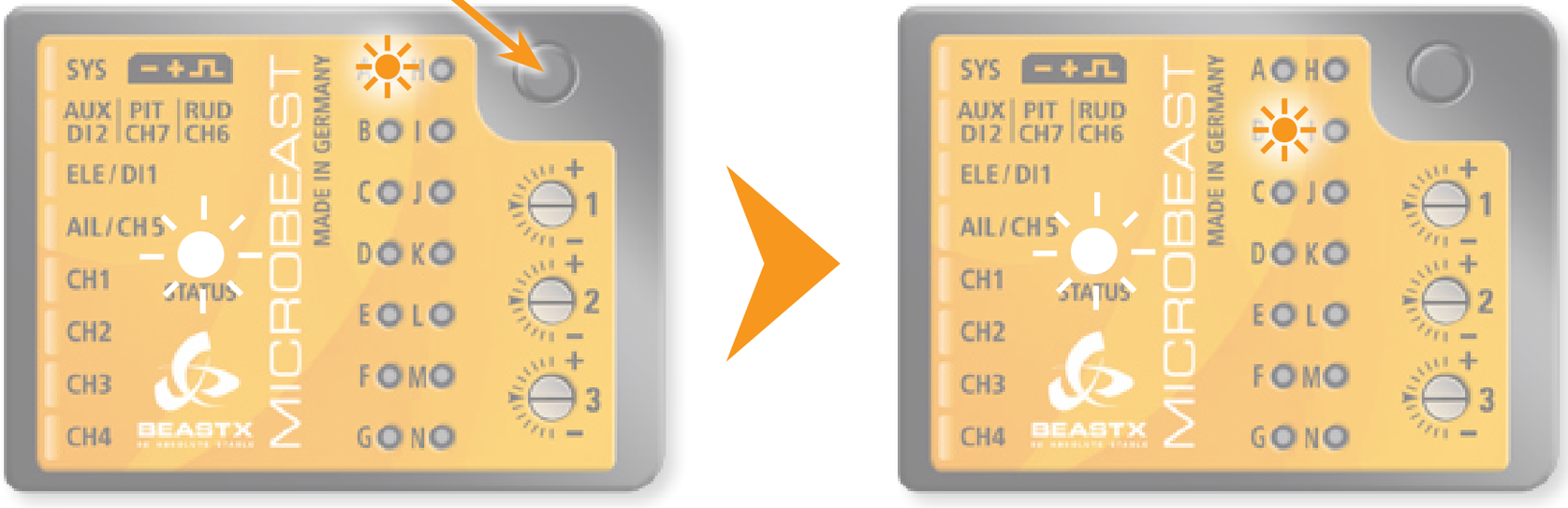
status LED:



4.4 Switching to the next menu point

fig. 11

shortly press the button



menu point Ⓐ ***menu point Ⓑ***

4.5 Exiting the menus

After the last menu point the system will be ready again by pressing the button shortly.

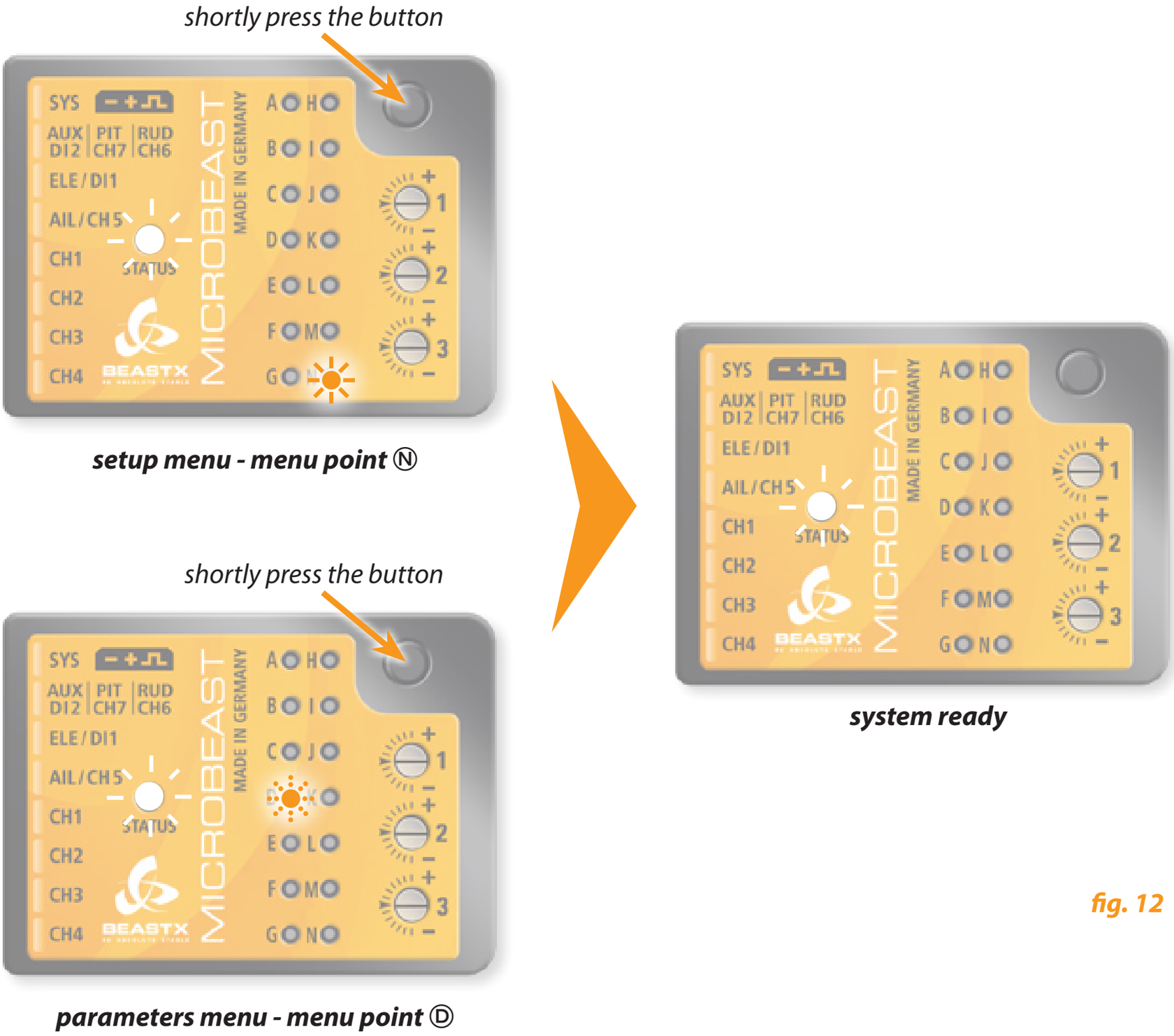


fig. 12

5. SETUP MENU

Before doing the first flight the MICROBEAST has to be adjusted to your helicopter.

When the MICROBEAST shows that the system is ready hold down the button for at least 3 seconds. The menu LED next to menu point Ⓐ will flash at first and then be permanent on. Now release the button. You entered setup menu and are located at menu point Ⓐ.

To leave setup menu you have to switch through all menu points by pressing the button shortly several times. After pushing the button at menu point N you exit the setup menu and the system is ready again. None of the LEDs Ⓐ-Ⓝ is glowing and the status LED is blue or purple, depending whether the tail gyro is in normal mode or in heading lock (see chapter 4).

⚠ **If there is no stick input for 4 minutes while being in the setup menu, the MICROBEAST will exit the menu automatically.**

Factory Reset:

At any menu point in the setup menu it is possible to execute a factory reset. Hold down the button for at least 10 seconds. The LEDs Ⓐ-Ⓝ will blink one after another to confirm the reset.

Please note that any configuration made is deleted now. Do not try to fly the helicopter without doing the setup procedure again otherwise you will crash the helicopter with the utmost probability!

A – Operating mode

At menu point Ⓐ you can choose between two different operating modes. One is using the MICROBEAST as 3-axis-gyro-system for flybarless helicopters. The other is using the MICROBEAST as a conventional tail gyro for flybared helicopters. In this mode the sensors for aileron and elevator are deactivated.

> ⚠ **Never try to fly a helicopter with flybar in 3-axis mode! MICROBEAST is neither an autopilot nor a training device for beginners. It only replaces a conventional flybar. Flying with a flybar in 3-axis mode will lead to uncontrolability and probably in crashing the helicopter.**

At menu point Ⓐ the currently activated operating mode is shown by the colour of the status LED:

Status LED	Operating mode
red	tail gyro only
blue	flybarless

To switch between the operating modes move the tail stick shortly to one side like mentioned above (see fig.10). For confirmation the status LED will change its colour.

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

B – Mounting direction

The MICROBEAST unit can be mounted in nearly all possible orientations. The only restriction is that the plug connector has to point in or against flying direction (see chapter 3).

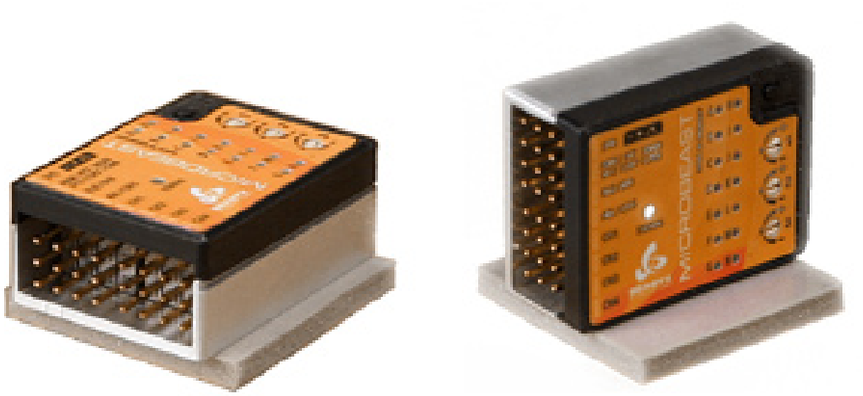


fig. 13

At menu point Ⓑ you have to choose whether the MICROBEAST is mounted horizontally (printed surface 90 degrees to the main shaft) or vertically (printed surface in parallel with main shaft).

The colour of the status LED shows the currently selected mounting direction:

Status LED	Mounting direction
red	vertical (on the edge)
blue	horizontal (flat)

By shortly moving the tail stick to one direction you can switch between the two options. For checking purposes the status LED will change its colour.

Push the button to save the configuration and to proceed to menu point Ⓒ.

C – Swashplate servo frequency

If you are using the MICROBEAST as stand-alone tail gyro with the optional patch cable (see chapter 3.4) it is not necessary to make any adjustments at this menu point.

Menu point © is for selecting the servo frequency of your **swashplate servos**.

If using analog servos never select a higher frequency than 50 Hz as far as it is not known to you that your servos can sustain a higher frequency. Otherwise your servos may overheat and get damaged.

Digital servos usually admit the use of higher frequencies. For getting the best performance by using MICROBEAST as a general rule the frequency should be as high as possible.

If you determine a very high current consumption of your receiver battery or your servos getting unusually warm you should reduce the servo frequency.

When in doubt ask your vendor or manufacturer of your servos for the maximum allowed servo frequency.

As attachment to this manual we provide a list of common servo types and the parameters you should set in the MICROBEAST when using one of these servos.

The colour of the status LED shows the currently selected frequency:

Status LED	Swashplate servo frequency
off	50 Hz
purple	65 Hz
red	120 Hz
blue	200 Hz

To select the desired servo frequency repeatedly move the tail stick into one direction until the status LED glows in the correct colour.

Then push the button to save the configuration and to proceed to menu point Ⓓ.

D – Tail servo neutral impulse

Almost any commercially available servo works with 1520 µs. But there are a few special tail servos on the market which use a different neutral impulse. At menu point Ⓓ you can select the tail servo's neutral impulse.

As attachment to this manual we provide a list of common servo types and the parameters you should set in the MICROBEAST when using one of these servos.

The colour of the status LED shows the currently selected servo neutral impulse:

Status LED	Tail servo neutral impulse
purple	960 µs
red	760 µs
blue	1520 µs

To select the desired servo neutral impulse repeatedly move the tail stick into one direction until the status LED glows in the correct colour.

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

E – Tail servo frequency

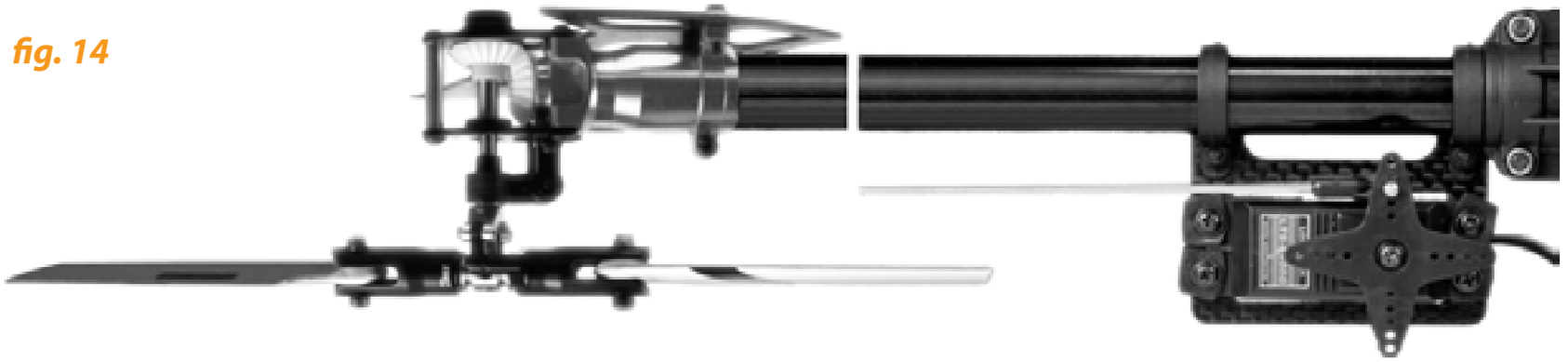
As with the swashplate servos at menu point Ⓒ you can select at menu point E the servo frequency for the tail servo.

The colour of the status LED shows the currently selected frequency. By moving the tail stick repeatedly in one direction you can choose the desired tail servo frequency:

Status LED	Tail servo frequency
off	50 Hz
purple	165 Hz
red	270 Hz
blue	333 Hz

Attach the servo horn to the tail servo in such way that the tail linkage rod forms a 90 degrees angle to the servo horn as best as possible and adjust the linkage rod as mentioned in the manual to your helicopter. For most helicopters the tail pitch slider should be centred and the tail rotor blades have some positive pitch to compensate the torque of the main rotor in this position.

fig. 14



Push the button to save the configuration and to proceed to menu point Ⓕ.

F – Tail rotor limits

At menu point Ⓕ you have to adjust **the maximum possible** servo throw at your tail rotor.

Therefore move the tail stick into one direction as long as long as the servo reaches the maximum endpoint without any binding and release the tail stick. The further you move the tail stick the quicker the servo will steer to the given direction.

If you moved the servo too far you can steer the stick to the opposite direction and move the pitch slider a short way back.

If you adjusted the maximum end point don‘t move the tail stick any more and the status LED will flash and then get solid red or blue glowing, depending on the adjusted direction. Now you have saved the servo limit for one direction.

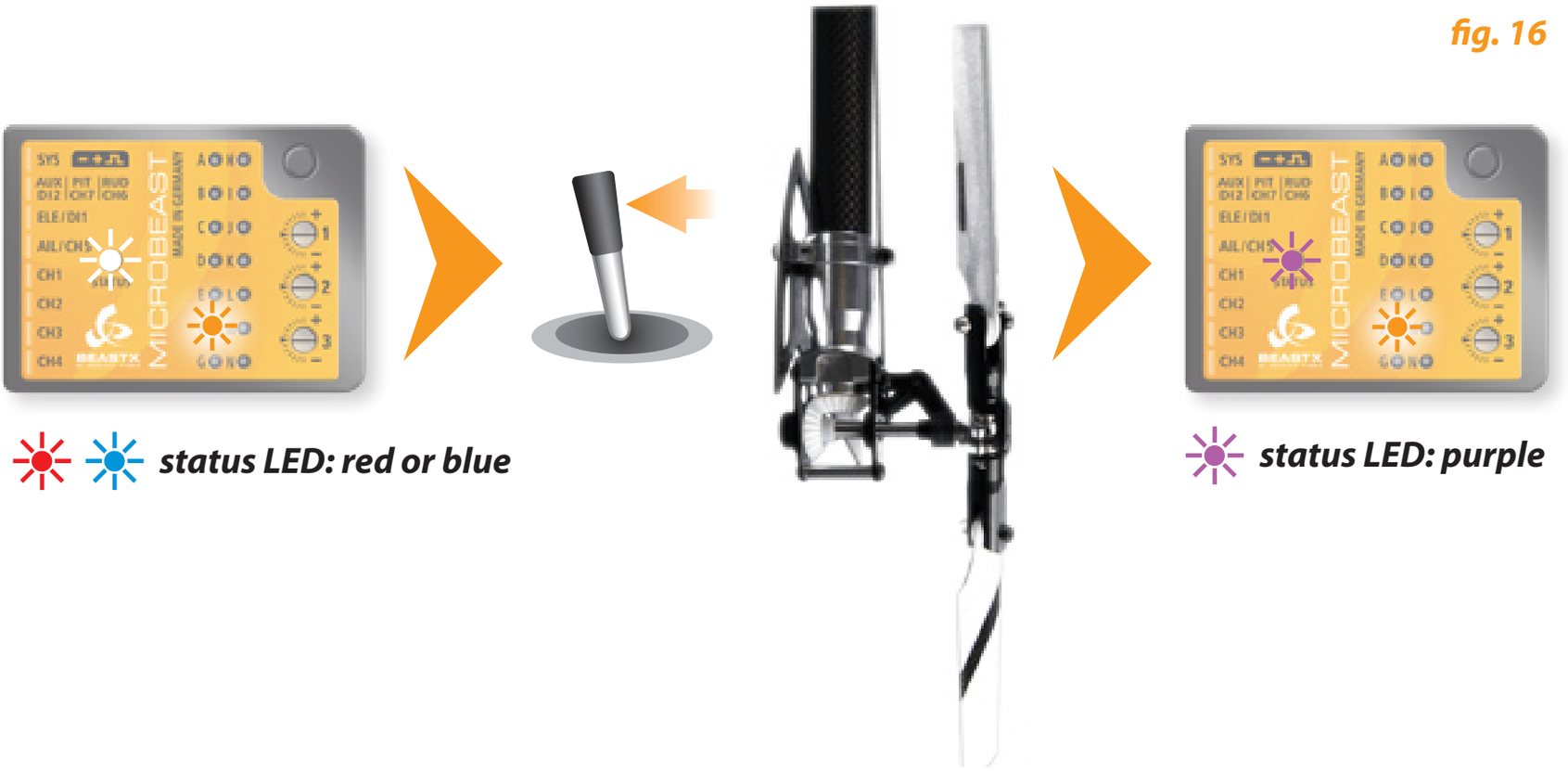
⚠ Pay attention that the steered direction of your tail stick is similar to the direction your helicopter should rotate. If this is not the case use your transmitter‘s servo reversing function for the tail stick. If you‘re not sure in which direction the helicopter should rotate consult the manual of the helicopter.



fig. 15

Then adjust the servo limit for the other direction. Drive the tail pitch slider by using the tail stick to the maximum endpoint and then release the tail stick. After a short amount of time the colour of the status LED should get purple.

fig. 16



status LED: red or blue

status LED: purple

⚠ If the status LED does not glow or glows not in the demanded colour, the steered servo throw is obviously too small. In this case mount the linkage ball of the tail linkage rod at the servo horn further inwards.

This ensures that the tail gyro of the MICROBEAST can perform the best way and that enough servo resolution is available.

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

G – Tail sensor direction

Here you have to check if the MICROBEAST's tail gyro does correct to the right direction.

You can find this out very easy:

The gyro always tries to steer in the opposite direction of a possible rotation of the helicopter.

If you move the helicopter by hand on its vertical axis the gyro must actuate a 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 tail stick (see fig. 17)

If this is not the case you have to reverse the sensor direction. This happens by moving the tail stick once into a random direction. For confirmation you will see that the status LED will change its colour:

Status LED	Tail sensor direction
red	normal
blue	reversed

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

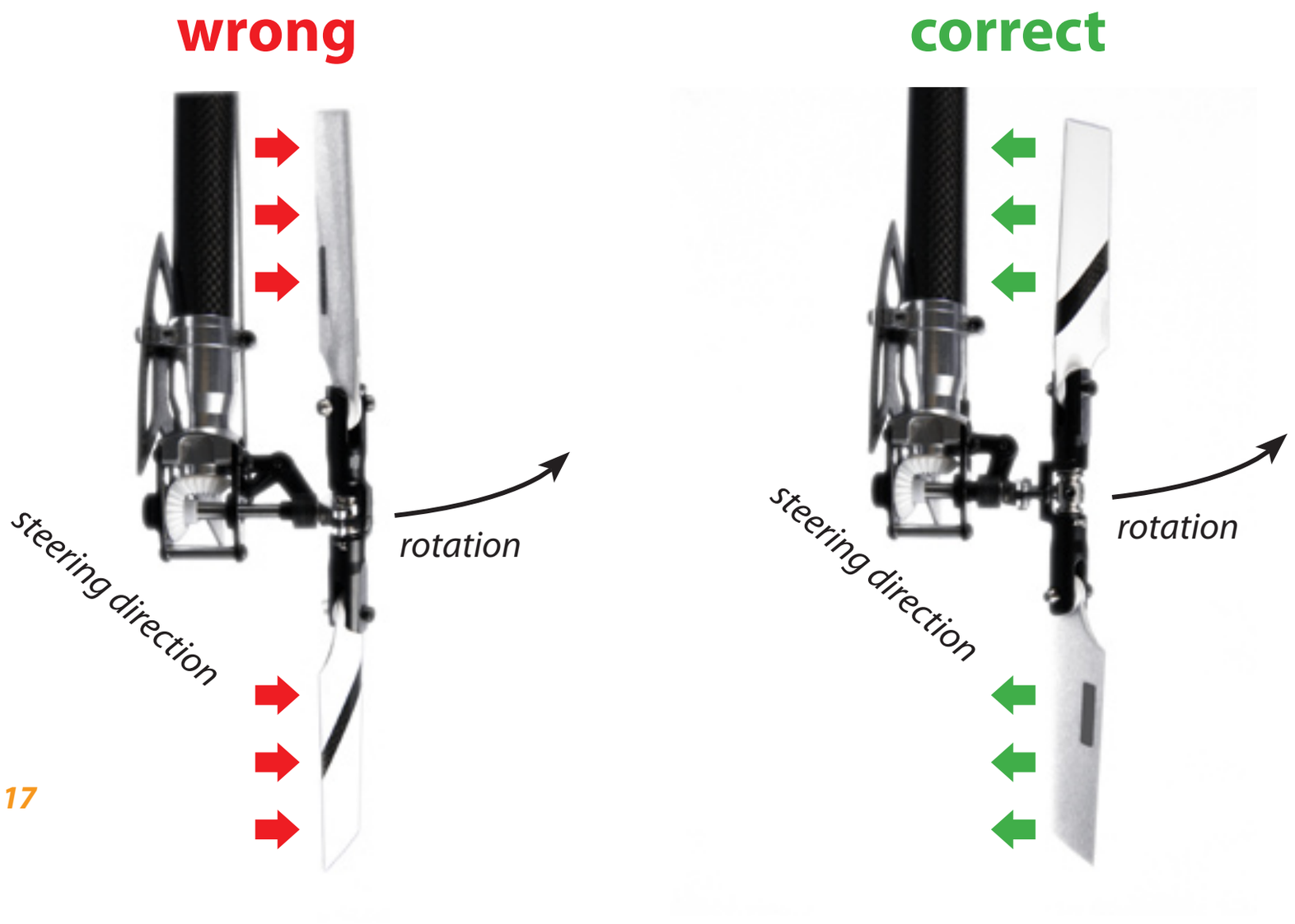


fig. 17

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

When using MICROBEAST as stand-alone tail gyro with the optional patch cable (see chapter 3.4) you do not have to do any further adjustments. Push the button repeatedly to skip the following menu points until no menu LED is glowing any more and the system is ready for operation again.

H – Swashplate servo sub trim

When entering menu point Ⓗ the status LED is off and all swashplate servos are in their centre position (1520 µs).

Mount the servo horns on the servos so that they form a 90 degrees angle to the linkage rod as best as possible. Usually this will not work out perfectly depending on the servo‘s gear train and the servo horn therefore you can sub trim every single servo in the next steps.

If you move the tail stick to a single direction once you can select one servo and trim it by moving the elevator stick back and forth. Every colour of the status LED is corresponding to one servo channel.

If you move the tail stick once again to the same direction as before you can select the next servo and trim it as mentioned.

Status LED	Function
off	swashplate servos centred
purple	CH 1 - elevator servo sub trimm
red	CH 2 - aileron servo (1) sub trimm
blue	CH 3 - aileron servo (2)/pitch servo sub trimm

You can switch between the servos as often as you want or also switch back to the central position. The executed servo trimming will not be deleted any more.

Adjust the linkage rods according to your helicopters manual. The swashplate should be perpendicular to the main mast and the rotor blades should have 0 degrees of pitch.

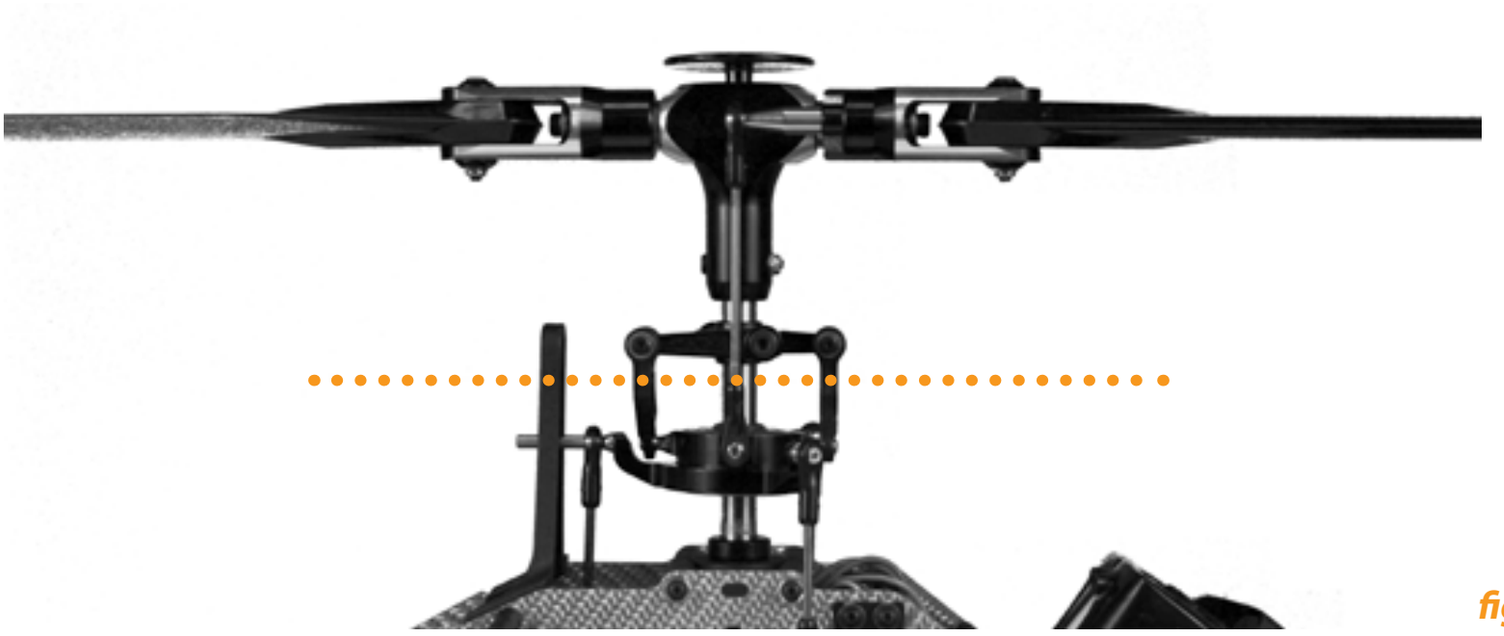


fig. 18

Also level the swashplate driver in the correct way.

At 0 degrees of pitch the driver arms must be horizontally and the linkage balls of the blade grips have to be perpendicular to the spindle shaft.

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

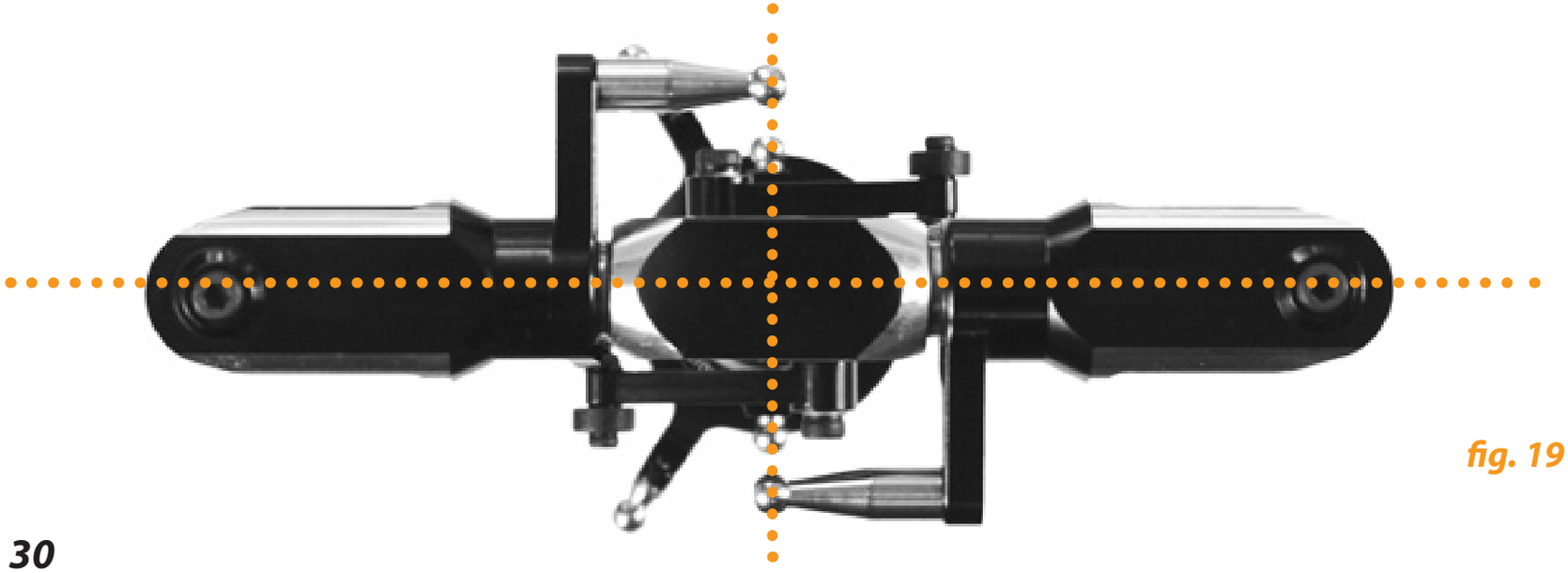


fig. 19

I – Swashplate mixing

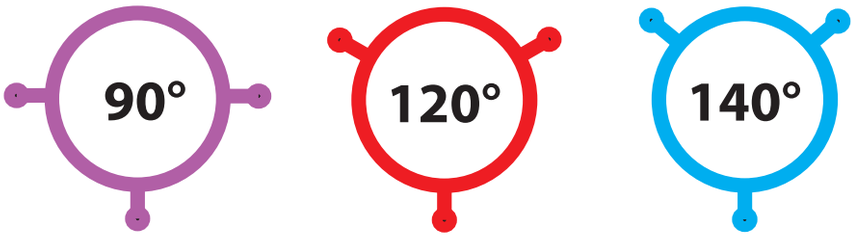
At menu point I you can select whether your helicopter requires eCCPM or if it has mCCPM. For eCCPM MICROBEAST can be used with 90°, 120° and 140° swashplates.

Which kind of CCPM your helicopter uses can be read in the manual to your helicopter.

> ⚠ **If your helicopter requires eCCPM by no means use your transmitter's eCCPM function!**
>
> The mixing is all done by the MICROBEAST. Deactivate the eCCPM in your radio or program it to mCCPM mostly called „H1" or „1 servo" although your helicopter requires eCCPM (also see chapter 3.3).

The colour of the status LED indicates which swashplate type is selected in the MICROBEAST. Additionally when using eCCPM you always have 4 possibilities to adjust the servo directions which are indicated by the number of flashes (1 to 4) of the status LED:

Status LED:	**off**	**purple**				**red**				**blue**			
swashplate mixing	mCCPM	90°				120°				140°			
servo reverse (number of flashes)		1	2	3	4	1	2	3	4	1	2	3	4



Move the tail stick repeatedly to one direction until the status LED has the colour corresponding to the desired swashplate type.

To find out the correct direction of servo movement actuate the pitch stick up and down and watch if the swashplate is driving vertically up and down correctly (the direction is not important at the moment). If one or two servos are moving incorrect once again move the tail stick to the same direction as before and try again moving the swashplate up and down. Repeat this step as long until the swashplate moves vertical.

Watch out not to change the colour of the status LED by mistake. In that case move the tail stick to the opposite direction as before as long until the swashplate moves up an down correctly. As mentioned above you always have 4 possibilities per LED colour respectively per eCCPM mixing type (90°, 120° and 140°).

Now check if aileron, elevator and pitch control commands are implemented correctly. If the direction is wrong use the transmitter's servo reversing function for the corresponding command.

⚠ If the wrong servos are commanded when steering aileron or elevator or the wrong function is performed check if the wire leads are connected in the correct order to the MICROBEAST like mentioned in chapter 3.2 .

Push the button to save the configuration and to proceed to menu point Ⓙ.

J – Adjusting the cyclic control loop

At this menu point you have to teach the MICROBEAST the proposed cyclic pitch range.

Firstly don't move any stick at your transmitter when entering menu point J. Orientate the helicopter's rotor head so that the rotor blades are parallel to the tail boom respectively to the longitudinal axis of the helicopter. Then attach a pitch gauge to the forward rotor blade. The swashplate should be in the neutral position and the blades should have 0 degrees of pitch otherwise repeat the swashplate sub trimming at menu point Ⓗ.

Now move the aileron stick as long until the rotor blades must have exact 6 degrees of cyclic pitch. The further you move the aileron stick the quicker the servo will steer to the given direction. If you moved the swashplate too far you can steer the stick to the opposite direction and reduce the pitch. Also by moving the tail stick to one direction you can delete the adjustment and bring the swashplate back to 0 degrees.

When reached 6 degress the status LED should glow in blue colour now. This indicates that your helicopter's rotor head geometry is perfect for the use with a flybarless system. Otherwise if the status LED's colour is red or purple or 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 at the swashplate or longer blade grip link levers.

⚠ Always set the cyclic pitch to 6 degrees! This function does not affect the maximum rotation rate of the helicopter but serves to advise the MICROBEAST the apposed ranges. A wrong adjustment at this step will deteriorate the correct function of the MICROBEAST.

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

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



fig. 20

2. Adjust the cyclic pitch to exact 6 degrees.

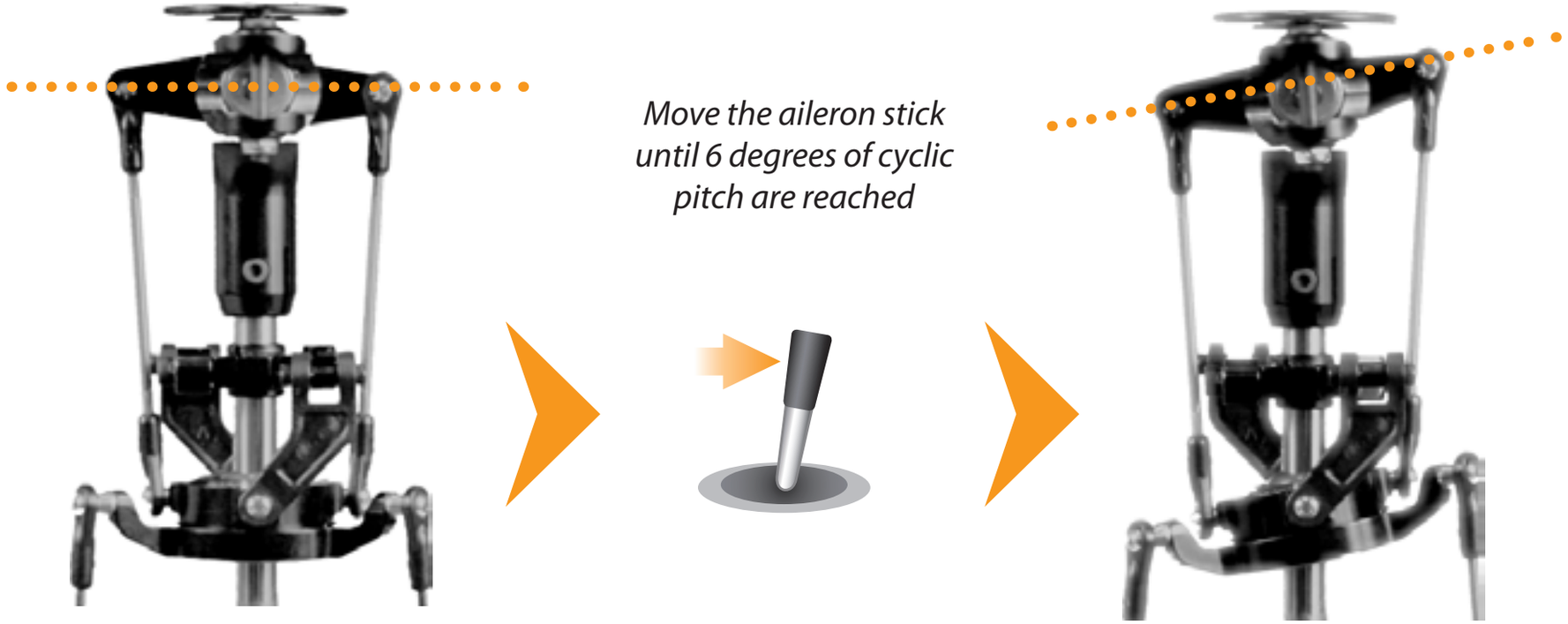


fig. 21

K – Adjusting the collective pitch range

At menu point Ⓚ you have to adjust the maximum negative and positive collective pitch. Move the pitch stick all the way up. With the tail stick you can increase or decrease the maximum amount of pitch.

Then move the pitch stick all the way down and again increase or decrease the pitch to the maximum desired value.

⚠ Again watch out if the steered pitch direction is the same as on the model. Otherwise use your transmitter‘s servo reversing function for the pitch channel.

Don‘t use any pitch curves in your transmitter when doing these adjustments. Later on you can use pitch curves if you desire. Menu point Ⓚ solely serves to teach the MICROBEAST the maximum used pitch range.

Push the button to save the configuration and to proceed to menu point Ⓛ.

L – Adjusting the swashplate limit

At menu point Ⓛ you have to adjust the maximum allowed 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 steer the sticks for aileron, elevator and pitch to the maximum end points. See if the swashplate or the linkage rods are binding somewhere. By moving the tail stick you can increase or decrease the limiter. The higher the swashplate deflection is the higher the maximum rotationrate of the helicopter will be later in flight.

The minimum possible value of the limiter is 6 degrees which is corresponding to the adjusted cyclic pitch at menu point J. In this case the status LED is off. Here you should always try to get as much deflection as possible (status LED should be blue) otherwise the performance of MICROBEAST may be restrained significantly.

If afterwards adjustments are done at one of the other menu points which affect servo adjustment (Menu points Ⓗ, Ⓙ and Ⓚ) recheck if the swashplate limit is correct yet.

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

M – Checking the sensor directions

At menu point Ⓜ you have to check if the sensors for the aileron and elevator work correctly.

If you roll or tilt the helicopter by hand the swashplate has to steer against this movement:

> ⚠ When tilting the helicopter forwards the swashplate has to move backwards and vice versa.
>
> When you roll the helicopter to the left the swashplate has to steer right and vice versa.

If this is not correct for your helicopter you can invert the sensor directions by moving the tail stick into one direction. For confirmation you will see that the status LED changes its colour. Repeat this step until both sensors are correcting in the right direction.

There are four possibilities to choose, one must be right:

Status LED	Sensor direction elevator	Aileron
off	normal	normal
purple	reversed	reversed
red	reversed	normal
blue	normal	reversed

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

Tilt the helicopter forwards



The swashplate has to move backwards



fig. 22

Roll the helicopter to the left

The swashplate has to steer to the opposite direction



fig. 23

N – Adjusting the pirouette optimization

When entering menu point Ⓝ the swashplate will tilt forwards or backwards depending on your helicopter's setup and will show into a specific point of the compass.

Now grab your helicopter at the rotor head and rotate it on the vertical axis by hand. The swashplate must always show into the same point of the compass (see fig. 24 on the next page).

If the swashplate does not stand still but rotate against the rotation of the helicopter you have to invert the pirouette optimization.

This can be done by moving the tail stick into one direction shortly. For confirmation the colour of the status LED on the MICROBEAST will change:

Status LED	Pirouette optimization
red	normal
blue	reversed

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

1. Swashplate points to the left

2. Rotate the helicopter on the vertical axis



3. Swashplate must point to the same direction as before

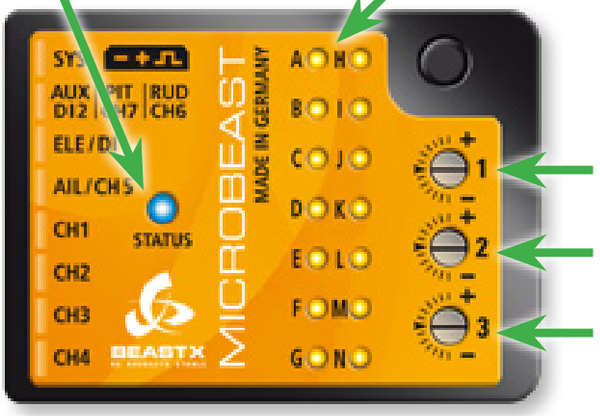


fig. 24

6. DIALS AND TAIL GYRO GAIN

status LED tail gyro mode
blue = heading lock
purple = normal mode

menu LEDs:
amount of tail gain is indicated when adjusting



***dial 1**: swashplate gain*

***dial 2:** swashplate direct gain*

***dial 3**: tail dynamic*

fig. 25

To turn the dials use the original BEASTX adjustment tool only to prevent damaging the dials!

1. Swashplate gain (Dial 1)

Turn dial 1 clockwise to increase the swashplate gain.

Factory set the dial is horizontal corresponding to 100% swashplate gain. For the first flights we suggest not to change this setting. Solely when using very small helicopters like 250 or 450 size reduce the swashplate gain slightly.

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 feels spongy and tends to oscillate especially on the elevator axis.

If the gain is too low the helicopter does not stop exactly after a cyclic movement and feels unstable in fast forward flight.

2. Swashplate direct gain (Dial 2)

Turn dial 2 clockwise to increase the swashplate direct gain for the cyclic functions. Factory set the dial is horizontal which provides a good setup in most cases.

Increasing the direct gain will provide a more aggressive response characteristic to aileron and elevator stick inputs. This assumes servos which have both a high-speed and a high-torque rating.

Decreasing the direct gain gives you a softer feeling in flight. Especially when using in small helicopters like 250 or 450 size helicopters this can be an advantage.

If the direct gain is too high the helicopter feels spongy and tends to overlap and undercut in fast forward flight.

3. Tail dynamic (Dial 3)

Turn dial 3 clockwise to increase the tail dynamic. Factory set the dial is horizontal which provides a good setup in most cases.

Increasing the tail dynamic will lead to a harder stopping tail and more aggressive response to tail stick inputs. If the dynamic is too high the tail will bounce back shortly after a hard stop and feels spongy when making fast direction changes. Ideally the tail should stop perfectly to the point without making any flapping noises.

4. Tail gyro gain (adjusted by transmitter)

As with a conventional tail gyro the tail gain can be adjusted by one of the transmitter‘s auxiliary channels.

In one direction you can select the normal mode and in the other direction the heading lock mode is selected.

The colour of the status LED indicates the selected mode when the MICROBEAST is ready for operation.

Purple indicates the normal mode and blue indicates the heading lock mode. Additionally when adjusting the gain or after the first start up the current amount of gain is indicated by one of the menu LEDs. This ensures that you are always informed about the actual amount of gain in your helicopter independent of the applied transmitter.

When the gain channel is nearly centred this will correspond to 0% gain indicated by menu LED Ⓐ. The maximum adjustable tail gain is 150% corresponding to menu LED Ⓝ in both modes.

For the initial flight we suggest to start with 70% gain similar to menu LED Ⓖ in heading lock mode. Then increase the gain step by step until the point is reached when the tail starts to oscillate anxiously. This effect will occur sooner in fast forward flight than in hovering. Therefore reduce the gain approx. by 10% when the oscillation was determined while hovering.

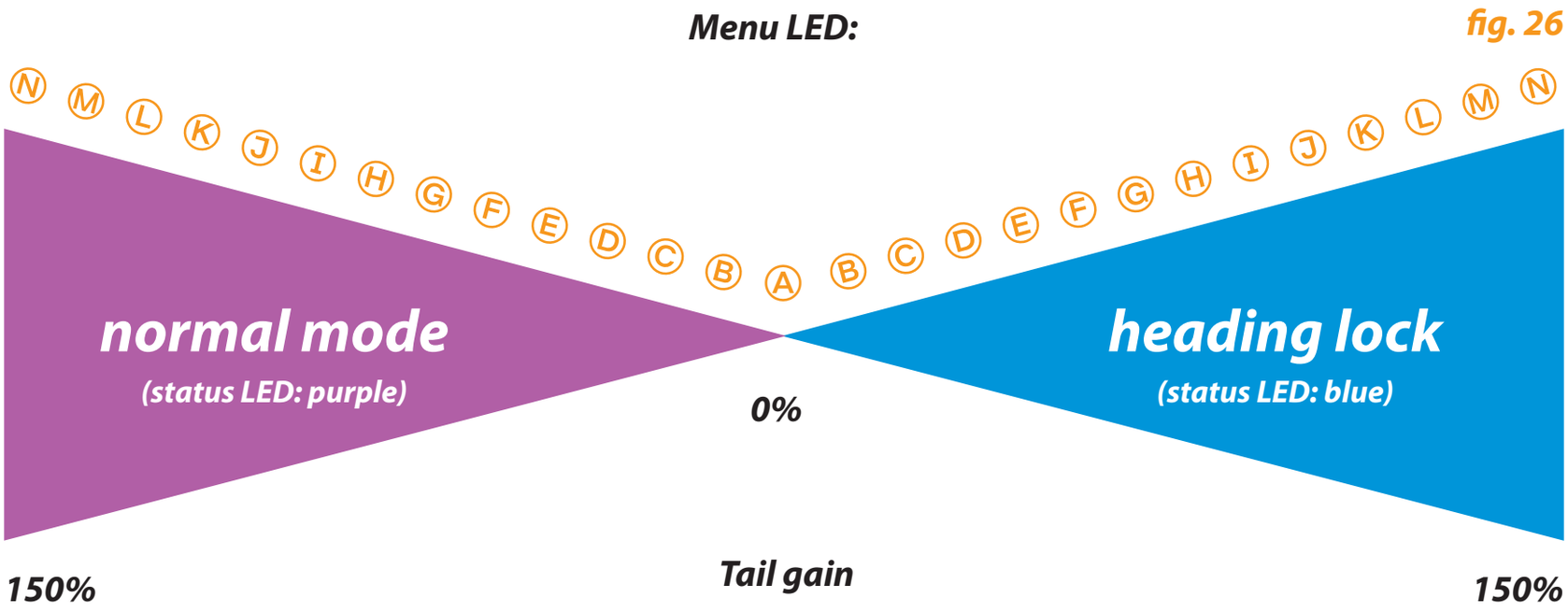


fig. 26

7. PARAMETERS MENU

When the MICROBEAST is ready for operation hold down the button until the Menu LED next to point Ⓐ will flash and release the button. This is how to enter the parameters menu. To switch to the next menu point shortly press the button once again.

After the last menu point pressing the button exits the parameters menu and the MICROBEAST is ready for operation again (status LED will indicate the tail gyro mode and the LEDs Ⓐ-Ⓝ must not be glowing).

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

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

A – Fine trimming the swashplate

The first menu point in the parameters menu gives you the possibility to easily trim your helicopter on the flying field as for instance your helicopter is slightly drifting to one side in hovering or when it drifts during vertical climb outs. Contrary to sub trimming every single servo in the setup menu here you can directly trim aileron or elevator without taking care about the servos. At menu point A just move the aileron or elevator stick to the desired trimming direction until the swashplate is adjusted correctly. The further you move the stick the faster the servos will move. At this menu point it is not possible to trimm the collective pitch!

By moving the tail stick to one direction you also can delete the adjustment and bring the swashplate back to the origin position.

⚠ **Never use your transmitter's trim functions! MICROBEAST would interpret this as a steering command and not as servo sub trim.**

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

B – Control behaviour

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

Factory set the option „sport“ is selected! This should be suitable for most pilots.

If you are a rather unexperienced model pilot it is absolutely suggested to select the option „normal“ for the first flights. In this state the rotation rate of the helicopter is decreased very much and the stick inputs are very gentle.

It is also possible to adjust the control behaviour by your transmitter‘s expo function. Therefore switch the status LED colour to „blue“.

The maximum rotation rate for aileron, elevator and yaw can be adjusted by increasing or decreasing the servo travel for the corresponding function in your transmitter.

Move the tail stick into one direction until the status LED glows in the correct colour:

	Status LED	Control behaviour
	**violett**	normal
	**red (flashing)**	sport *
	**red**	pro
	**blue (flashing)**	extreme
	**blue**	adjustment per transmitter
	**off**	adjustment per PC

* Factory set

Push the button to save the configuration and to proceed to menu point Ⓒ.

C – Swashplate pitching up behaviour

During fast forward flight give jerky pitch inputs. The helicopter should remain its horizontal position during climbing and descending. If the nose of the helicopter is pitching up and down like the move of a dolphin, increase the value at menu point © to compensate this effect. If the value is too high the helicopter will feel synthetical and lazy. Try to find a suitable adjustment.

If the helicopter is still pitching up at the highest value, try alternatively to increase the swashplate gain (dial 1) and use faster and sturdier servos as well as rotor blades with as less forerun as possible.

The selected value is indicated by the status LED:

Status LED	Swashplate pitching up behaviour
violett	very low
red (flashing)	low
red	medium *
blue (flashing)	high
blue	very high
off	adjustment per PC

* Factory set

Move the tail stick into one direction until the status LED glows in the correct colour.

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

D – Tail heading lock gain

At menu point Ⓓ the heading lock gain for the tail can be adjusted:

- If the heading lock gain is too low pirouettes will be inconsistent during fast forward flight or in cross-wind situations.

- If the heading lock gain is too high the tail will bounce back slowly after stopping maneuvers. It is also possible that the tail in general will not lock in perfectly and that it bounces slightly while flying around. This indicates that the tail gain and the heading lock gain are imbalanced.

Move the tail stick into one direction until the status LED glows in the desired colour:

Status LED	Tail heading lock gain
purple	very low
rot *(blinkend)*	low
rot	medium *
blau *(blinkend)*	high
blau	very high
aus	adjustment per PC

* Factory set

Push the button to save the configuration and to exit the parameters menu.

8. THE FIRST FLIGHT

Now it's time to fly your helicopter with the MICROBEAST!

After powering up the receiver wait until the MICROBEAST has initialized completely. This is indicated by a short move of the swashplate servos and the status LED beeing constant glowing in blue or purple colour.

Like mentioned in chapter 6 the three dials should be in factory setting (centered horizontaly). The tail gain should be set to point Ⓕ or Ⓖ corresponding to 50% to 60% servo travel on gain channel. Select the control behaviour at menu point Ⓑ in parameters menu best suiting to your flying style.

⚠ Before the first start make a function quickcheck and again make sure if the sensors are correcting to the right direction when you tilt or roll the helicopter by hand. It is normal that the swashplate will move slowly back to its orgin postion after a stick input. Also in heading lock it is normal that the tail servo will stay in its end postion after a tail stick input or tail movement and that it does not react immediate to the stick input.

Immediately before the lift off make sure that the swashplate is horizontal and that the tail pitch slider is nearly centered (you could also shortly switch to normal mode, in this state the tail servo will always centre if the tail stick is not moved).

Avoid excessive steering during lift off otherwise the helicopter may fall over!

The best way is to expeditiously give pitch input and lift the helicopter dauntless into the air. This demands some re-educaton if you have just flown flybared helicopters before.

Now at first you should try to find the maximum possible tail gain and later on do some fine tuning as decribed in chapters 6 and 7 if necessary.

9. ATTACHMENTS

9.1 SERVO PARAMETERS

manufacturer	servo type	swashplate servo frequency colour - Hz	tail	
			neutral impulse colour - µs	servo frequency colour - Hz
Align	DS 410	blue - 200	blue - 1520	purple - 165
	DS 420	blue - 200	blue - 1520	blue - 333
	DS 510	blue - 200	blue - 1520	purple - 165
	DS 520	blue - 200	blue - 1520	blue - 333
	DS 610	blue - 200	blue - 1520	purple - 165
	DS 620	blue - 200	blue - 1520	blue - 333
	DS 650	-	blue - 1520	blue - 333
Futaba	BLS 153	blue - 200	blue - 1520	purple - 165
	BLS 251	-	red - 760	blue - 333
	BLS 252	blue - 200	blue - 1520	purple - 165
	BLS 253	blue - 200	blue - 1520	purple - 165
	BLS 254	blue - 200	blue - 1520	blue - 333
	BLS 257	blue - 200	blue - 1520	blue - 333
	BLS 351	blue - 200	blue - 1520	purple - 165
	BLS 451	blue - 200	blue - 1520	purple - 165
	BLS 452	blue - 200	blue - 1520	purple - 165
	BLS 551	blue - 200	blue - 1520	purple - 165
	BLS 651	blue - 200	blue - 1520	purple - 165
	S3115	purple - 65	blue - 1520	off - 50
	S3116	purple - 65	blue - 1520	off - 50
	S3151	blue - 200	blue - 1520	purple - 165
	S3152	blue - 200	blue - 1520	purple - 165
	S3156	blue - 200	blue - 1520	purple - 165
	S3157	blue - 200	blue - 1520	purple - 165
	S9251	-	red - 760	blue - 333
	S9252	blue - 200	blue - 1520	purple - 165
	S9253	blue - 200	blue - 1520	blue - 333
	S9254	blue - 200	blue - 1520	blue - 333
	S9255	blue - 200	blue - 1520	purple - 165
	S9256	-	red - 760	blue - 333
	S9257	blue - 200	blue - 1520	blue - 333
	S9551	blue - 200	blue - 1520	purple - 165
	S9650	blue - 200	blue - 1520	purple - 165

manufacturer	servo type	swashplate servo frequency colour - Hz	tail neutral impulse colour - µs	tail servo frequency colour - Hz
HITEC	HS-5065 MG	blue - 200	blue - 1520	purple - 165
	HS-5083 MG	-	purple - 960	blue - 333
	HS-5084 MG	blue - 200	blue - 1520	blue - 333
	HS-5245 MG	blue - 200	blue - 1520	purple - 165
	HS-65 HB/MG	purple - 65	blue - 1520	off - 50
	HS-6965 HB	blue - 200	blue - 1520	purple - 165
	HS-6975 HB	blue - 200	blue - 1520	purple - 165
	HS-82MG	purple - 65	blue - 1520	off - 50
Graupner/JR	C261	off - 50	blue - 1520	off - 50
	DS3500G	blue - 200	blue - 1520	red - 270
	DS3781	blue - 200	blue - 1520	purple - 165
	C4041	purple - 65	blue - 1520	off - 50
	C4421	purple - 65	blue - 1520	off - 50
	DS368	blue - 200	blue - 1520	purple - 165
	DS8077	blue - 200	blue - 1520	purple - 165
	DS8700G	blue - 200	blue - 1520	red - 270
	DS8900G	blue - 200	blue - 1520	red - 270
	DS8717/8915	blue - 200	blue - 1520	purple - 165
robbe	FS 550	blue - 200	blue - 1520	purple - 165
	FS 555 SPEED	blue - 200	blue - 1520	blue - 333
	FS 61	red - 120	blue - 1520	purple - 165
	FS 61 SPEED	red - 120	blue - 1520	purple - 165
SAVOX	SH-1250MG	blue - 200	blue - 1520	purple - 165
	SH-1257MG	blue - 200	blue - 1520	blue - 333
	SH-1350	blue - 200	blue - 1520	purple - 165
	SH-1357	blue - 200	blue - 1520	blue - 333
	SC-1257TG	blue - 200	blue - 1520	purple - 165
	SC-1258TG	blue - 200	blue - 1520	blue - 333
	SH-1290MG	-	blue - 1520	blue - 333
Logictec	LTS3100	-	purple - 960	blue - 333
	LTS6100	-	purple - 960	blue - 333

This information is supplied without liability.

9.2 Troubleshooting

Description	Reason	Solution
MICROBEAST does not initialize. The status LED is flashing red.	sensor failure	- helicopter must stand absolutely still during initialization process - strong wind can vibrate the helicopter and therefore the sensors - sensors damaged
The helicopter slowly rotates by itself on aileron, elevator and/or tail. The swashplate is leveled perfectly and neither sub trimming is done in the radio nor any mixing function is active. This behaviour seems to be influenced by the rotor head speed.	this indicates a vibration problem which interferes the sensors	- check the helicopter for imbalances - in electric helicopters the motor can cause high frequent vibrations - balance the rotor blades thoroughly - check the tension of the tail belt - choose another mounting postion for the MICROBEAST - try other types of gyropads

Description	Reason	Solution
The sensors do not seem to work correctly. The tail servo does not react or reacts very slowly to rotation of the heli. The same happens to the elevator axis.	wrong mounting direction selected	- in setup menu point Ⓑ select the correct mounting direction
The helicopter oscillates on aileron and elevator axis. Reducing the swashplate gain does not help to suppress this effect completely.	the helicopter's leverage ratio is not suitable for flybarless usage or the MICROEBAST setup is not correct	- in setup menu point Ⓙ adjust the cyclic pitch to exactly 6 degrees: the colour of the status LED must be „blue" in this case, otherwise the leverage ratio has to be changed by using longer blade grip levers, shorter servo horns or different linkage balls at the swashplate - check if the swashplate travel for aileron and elevator is limited to much at menu point Ⓛ in setup menu: try to achieve a larger travel by changing the leverage ratio
The tail oscillates slowly and unregularly while hovering.	the heading lock gain is too high	- reduce the heading lock gain in parameters menu point Ⓓ by one step and therefore increase the tail gain at your transmitter - use a faster and stronger tail servo

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Do not hesitate to send us your suggestions for improvement by e-mail to info@beastx.com.

Disclaimer

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Declaration of confomity

It is hereby confirmed that MICROBEAST is being produced according to EMC Directive 2004/108/EC:

Emission : IEC 55011 class B
Immunity: IEC 61000-6-1

EAR WEEE-REG. Nr.: DE 72549415

MICROBEAST OVERVIEW

SETUPMENU *(Menu LED permanent on)*

	Status LED:	off	purple	red	blue
A	**operating mode**			tail gyro	flybarless
B	**position of installation**			upright	flat
C	swashplate - **servo frequency**	50 Hz	65 Hz	120 Hz	200 Hz
D	tailservo - **neutral impulse**		960 µS	760 µS	1520 µS
E	tailservo - **frequency**	50 Hz	165 Hz	270 Hz	333 Hz
F	tailservo - **limit**	*tail stick input* - limit left / limit right			
G	**tailsensor direction**			normal	inverse
H	swashplate - **servo sub trim**	middle position	**CH1 trim**	**CH2 trim**	**CH3 trim**
I	**swashplate mixing**	**mechanically**	**90°**	**120°**	**140°**
	servo reversing (number of flashes)		1 2 3 4	1 2 3 4	1 2 3 4
J	**regulation adjustment**	by *aileron stick input* adjust 6° of cyclic pitch			
K	**collective pitch setup**	move the *pitch stick* to max. and min. and adjust pitch by *tail stick* input in each case			
L	swashplate - **limit**	move *aileron, elevator* and *pitch* and adjust the cyclic range by *tail stick* input			
M	swashplate - **sensor direction**	nor. nor.	inv. inv.	inv. nor.	nor. inv.
N	**pirouette optimization**			normal	inverse

PARAMETERS MENU *(Menu LED flashing)*

	Status LED:	off	purple	red (flashing)	red	blue (flashing)	blue
A	swashplate **fine trimming**	*aileron + elevator stick input*			discard changes by *tail stick* input		
B	**control behaviour**	PC	normal	sport *	pro	extreme	**radio**
C	swashplate - **pitching up behaviour**	PC	very low	low	medium *	high	very high
D	tail - **heading Lock-Gain**	PC	very low	low	medium *	high	very high

* Factory set



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