BAVARIAN Demon

INSTRUCTIONS

3X / 3SX

CONTENT

FEATURES

The units within the bavarianDEMON X-series, 3X and 3SX, are professional SAS FBL electronics and replace the mechnical flybar. Helicopter models without flybar are more agile and manoeuvrable and offer approx. 15% more power. In combination with these FBL electronics, huge performance is supplied without the need to adjust the fragile flybar mechanism. The head gyro eliminates all undesired rigid head characteristics, resulting in optimum control and precision.

Its' precision throughout the range and with maximum „lock-in" performance are outstanding. By means of the latest generation high-quality MEMS gyros, these systems have full 3D capability, whilst boasting a top-quality, ultra-fast tail gyro. No external gyro is required. In addition, it has a built-in symmetrical torque control (revo). This results in a further increase in holding ability, made possible by coupling the tail gyro internally with the coll.pitch data of the rotor head control.

The 3SX includes an optional horizontal stabilisation (active self-leveling and unique rescue modes), which can also be used in helicopters with flybar. The 3X expressly incorporates no horizontal or position stabilisation and is thus fully suitable for competition. It can be upgraded any time to the additional functionality of the 3SX.
For further information regarding any upgrade possibilities see www.bavarianDEMON.com.

Of course, the system is also suitable for flybarless scale helicopters (twin- and multi-bladed) as well as flybarless helicopters such as turbine powered trainers, etc. Of course it can be used for helicopters with electric, nitro or combustion engines too. In case of using the systems in a turbine powered helicopter, please see the important note on page 7!

Supported servo types: All current analog, digital and brushless servos , including narrow-pulse servos (760µs) for the tail (e.g. Futaba BLS256HV).

Supported swashplate types: All current variants, including four swashplate servos and virtual swash rotation, CCPM/H1, H3-90°, H3-120°, H3-140°, H4-90°, H4-90°+45°.

Direct USB connection for fast programming as well as clear separation of the gain (sensitivity) settings for head and tail gyro in independent auxiliary channels reduces the setup work to a minimum. In case of the 3SX the head gyro channel additionally provides activation and in-flight-adjustment of the multiple Horizon and rescue modes.

3X and 3SX can be updated via internet. For hints and instructions, please see PC software.

TECHNICAL SPECIFICATIONS:

Dimensions:	36 x 34 x 14mm
Supply voltage:	4…10V (2S-LiPo-compatible, min. 5.5V using Spektrum/JR satellites)
Max. roll & pitch rotational speed:	500°/s
Max. tail rotational speed:	650°/s (typical)
Tail servo output:	optionally digital (220Hz) / analog (55Hz) / 760µs
Head servo output:	optionally digital servo (220Hz) / analog servo (55Hz)
Maximum servo currents:	Total 10A (continuous load)
Weight:	Approx. 18g (without cable loom)
Length of connecting cables to receiver:	90mm (longer cables optionally available, see "accessories")

SCOPE OF DELIVERY:

- Main unit including assembly material
- Cable loom for receiver connection (90mm)
- USB lead for direct connection to PC/notebook

PC software (Win98, ME, 2000, XP, Vista, 7) available as internet download on www.bavarianDEMON.com.

QUICK INTRODUCTION

INSTALLATION

MOUNTING POSITION

Important is an orientation exactly aligned to the level of the main rotor in all 3 axis, i.e. the assembly surface must be orthogonal or parallel to the rotor shaft. Contrary to normal tail gyros, this is particularly important to ensure that the head stabilisation maintains constant attitude even during pirouettes. During static manoeuvres, the electronic unit may ignore an inclination in the mounting angle, but not during pirouettes. The helicopter would „wobble".
All four orientation directions are possible with 3X and 3SX (see PC software). As an alternative, the FBL system can also be fitted upside down, or on a left or right vertical side. After changing the orientation, this must be reprogrammed to the new orientation!

AVOIDING VIBRATIONS

The mounting surface must be sturdy and vibrate to the least possible extent. It must not give way elastically. In case of vertical mounting to a chassis wall, choose a location close to a screw joint. The closer it is fitted to the rotor shaft, the less are vibrations, and the more precise is guidance during very fast turning manoeuvres. Avoid tail booms containing transmission shafts, since they may vibrate to a huge extent. In case of internal combustion engines, it is particularly important to optimally observe this issue because of invisible vibrations. If the housing should tangibly or visibly vibrate extremely while the engine is running, we recommend choosing a different installation position that is protected better against vibrations.

AVOID HEAT

Keep distance from exhaust tubes etc. Using the system inside a fuselage, make sure to supply fresh air. In general, any gyro system is affected by temperature changes. We took care about this in all possible technical ways. Anyway, this needs special notice and care.

USE THE SUPPLIED ADHESIVE FOAM TAPE

Use the thin adhesive tape for acro / 3D models, as well as in case of vertical mounting. For scale models or models with an internal combustion engine, we recommend to first use the included thick (softer) tape. Before sticking on the tape, remove any traces of oil or dirt so the FBL system cannot come loose (this would result in the loss of control!).
Do not additionally lash the housing as this would restrict the damping effect of the foam. For the same reason, do not tightly lash the connecting cables (servos and receiver) and do not lay them in a straight line, but in a bend leading to the FBL system.

o.k. wrong! o.k.

EARTHING THE TAIL BOOM

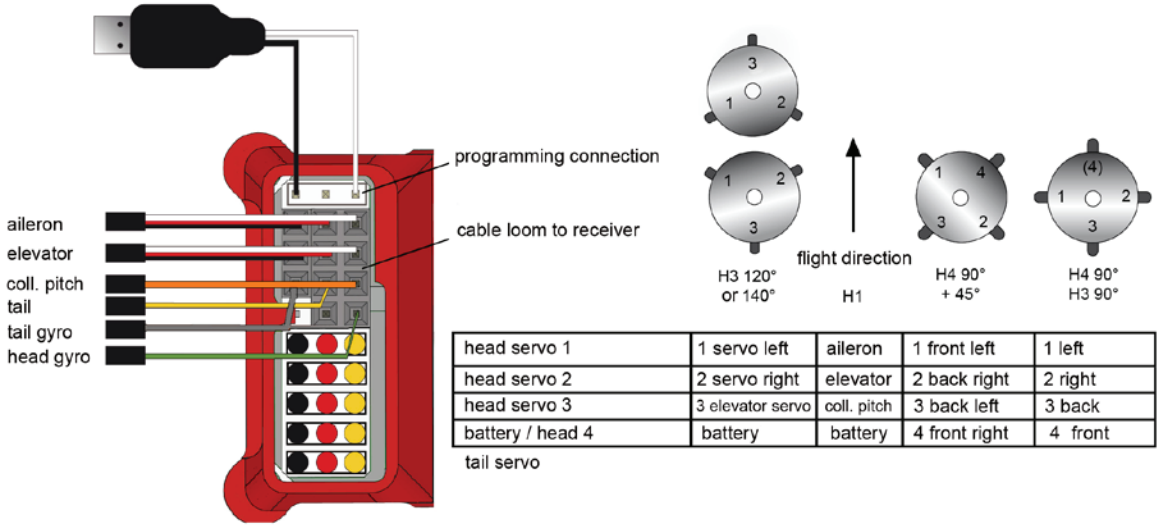
Make absolutely sure that there is an electrically conductive connection between the tailboom, engine housing and chassis. If necessary establish an equipotential bonding connection. Especially a belt drive in the tail boom can act as a „Van de Graaff generator" and its sparks can penetrate into receivers and servos and destroy them.
Caution: Carbon is also conductive!

PREPARING THE REMOTE CONTROL

Switch off ALL mixers in the transmitter! The mixers are set only in the FBL system according to the linkage type. In the transmitter, select an unmixed standard program (CCPM/H1, in case disable the collective tail mixing).
The functions for AVCS menu, pitch-throttle curve, or if (e.g. when scale flying) you want to achieve idling with the coll.pitch stick, remain in the transmitter.

CONNECTION

VIA SERVO OUTPUTS (STANDARD RECEIVER)

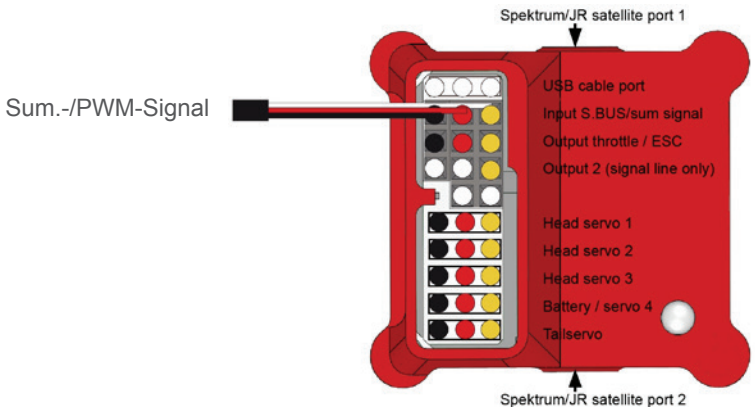


head servo 1	1 servo left	aileron	1 front left	1 left
head servo 2	2 servo right	elevator	2 back right	2 right
head servo 3	3 elevator servo	coll. pitch	3 back left	3 back
battery / head 4	battery	battery	4 front right	4 front

tail servo

VIA FUTABA S.BUS OR SUM/PWM SIGNAL (ROBBE, JETI, GRAUPNER, ETC.)

If the receiver features a sum signal (PPM pulse or ‚serial PWM') output, it can be connected via this output, so only one cable is needed. To make use of this, use one single cable (e.g. gyro cable), connecting it as illustrated. In this case, the throttle channel is looped through by the FBL system, its output supplied at the neighbouring slot named "Output throttle / ESC". Alternatively, if available, the ESC or throttle servo can remain at the reseiver's throttle port. Activating this feature is done via PC software.
A further channel is available, output2, e.g. for speed controller gain, illumination accessories or retractable gear. This channel supplies only the signal pin. If necessary, connect the power supply via a Y-cable to e.g. one of the servo ports.



VIA SATELLITE RECEIVERS (SPEKTRUM / JR)

Up to 2 (diversity) receivers can be connected, one at each side of the system. See the info texts in the PC software for activation, adjustments and satellite binding. No main receiver is needed for binding the satellites to the transmitter! The usual input ports for tail gyro and head gyro channel must be idle, i.e. not connected to any signal source. When using Spektrum/JR satellites, the FBL system needs to be supplied with min. 5,5V. 4,8V batteries (4x NiMH or NC) are not sufficient!

PLEASE NOTE WHEN CONNECTING

• As high servo currents can occur, a voltage supply should be routed directly to the device!
Also, the receiver should be supplied via the FBL system, not vice versa. Using the supplied cable loom and a BEC connected to the receiver, the power supply via cable loom is possible. Anyway, a direct feed is preferable.

Use one of the following possibilities:

a) Battery connection / head 4 (in case no 4th head servo is used).

b) Programming connection (Note: using a Y-lead for easy handling, so the USB cable can be connected without unplugging the power cable).

c) In case of supply from a BEC controller, route a parallel supply cable (e.g. Y-cable) to either battery or programming connection of the FBL system. This connection must not possess a signal line, i.e. the third pole may have to be cut.

d) For using only the tail gyro of the FBL system, you can either do a setup with deactivated head gyro (still using the internal mixer), or only connect the tail gyro cables, plus one of the three-wired connectors (aileron or elevator input) only for supplying the receiver with power from the FBL system, connecting it to any vacant socket of the receiver; preferably with disconnected signal-wire.

• Do not connect servos until the FBL system has been set to the correct servo type.
• Do not move the heli for the first five seconds after switching on (LED flashes red). The FBL system runs a self-test and needs standstill to do this, as otherwise it does not activate the servos and starts to flash 3x red.
• In case using the cable loom: The cables coming from the receiver should all be laid as one common bundle. Single wires must not lie separately.
• The additional „head gyro“ and „tail gyro“ channels serve to set the respective gain (sensitivity) in flight. One potentiometer or slider on the transmitter each should be assigned. As an alternative, and recommended for later on, a fixed value can be programmed on the transmitter, a gyro menu can be used, or the values can be programmed from the PC directly into the device if the corresponding channel is not connected. However, it is considerably easier and faster to have a pot or slider at the transmitter to adjust directly in flight.

LED DISPLAY

SWITCHING ON

• • • • • • • • • •	(flashes red)	Switch-on phase: do not move, no output of servo signals

OPERATION

———	(continuous red)	Centre of head gyro channel, minimum stabilisation (20%)
———	(continuous yellow-orange)	Active rigid stabilisation > 20%
———	(continuous green)	3SX only: Horizontal stabilisation ON
• • • • • • • • • •	(flickering green)	3SX only: Horizontal stabilisation with collective pitch rescue action ON

SETTING UP

• • • • • • • • • •	(flickering red)	(flickering red) If connected to [Diagnose] or [Trim] menu: Servos remain in neutral position

ERROR DURING SELF-TEST, NO SERVO SIGNAL OUTPUT

– –	(1x)	Waiting for RC signal
– – – –	(2x)	Battery as from switch-on < 4V
– – –	(3x)	Movement during switch-on phase, repeat power-on
– – – – – –	(6x)	3SX only: too extreme temperature (>55°C or <-15°C)

SETUP / ADJUSTMENT

After installation, the FBL system must be tuned to heli and transmitter, which first includes adaptation of the transmitter to the FBL system, followed by setting up the FBL system to the model.
The PC software includes a setup wizard guiding you swiftly and easily through all the steps. Additionally there are helpful mouse-over tips available for each parameter in the software, as well as additional notes in the [Help] menu.
At this point please open the software and start the setup wizard. And do not miss the following notes 1-3!

1. IMPORTANT NOTE IN CASE OF USE WITH TURBINE HELICOPTERS:
   If running a turbine, it is mandatory to apply the protective hood, available as accessory, protecting the unit from the influence of ultrasonic sound!

2. IMPORTANT BEFORE FIRST FLIGHT AND AFTER ANY CHANGES!
   EXTENDED STEERING TEST INCLUDING A DIRECTION TEST FOR ALL THREE GYROS:

   a) When the model is ready to fly, check the neutral positions and directions of all stick functions and for all servos. If the swashplate tilts while you increase head gyro gain, this must be related to wrong transmitter's trims (step 4, b in particular).

   b) Check directions of all three sensor axes, as a wrong direction would fairly lead to acrash! Briefly move the model to and fro about all three axes, tilting and turning. Swashplate and tail must initially respond with the opposite action, i.e. swashplate wants to stay horizontal against rolling and tilting, and front side of the tail rotor blades move opposite to the tail swivel direction, i.e. tail rotor blows in the direction of its swivel movement. In the event of errors, a mistake must be either in the direction of the bars in the [Diagnose] menu or in the ‚mounting orientation'.

   c) RC range test: In compliance with the data specs of the 2.4GHz RC system or with antenna pushed in (35/40MHz)

3. [ALL] MENU: BACKUP OF ALL SETTINGS IN THE PC
   Data backup is optionally only, since all settings are stored permanently in the device, unless they are overwritten by new values or a factory reset. It also makes sense to save settings when carrying out tests with various parameters. If the result is not satisfying, you can easily restore the prior data by loading the backup.

FLYING IN

! It is mandatory to have tested all sensor directions! (page 7, point 2)
! First fly with considerably reduced gain settings for tail and head gyro.
! Control test before every take off. Never take off before the servos can be moved! Only if servos are moving, the initialisation was completed.

PAY ATTENTION DURING TAKEOFF

! Generally pay attention to the horizontal position of the swashplate!
Similarly to a tail gyro, it may happen that inadvertently issued slight stick deflections are amplified by the stabilisation before you are in the air.
! Especially acro helis with a hard head-damping must not be launched on hard asphalt, unless skids are dampened. Otherwise, when the motor is spooled up, resonances can occur with the risk of tilting over the heli, because in this state it cannot correctly follow the system‘s control commands.

REALTIME-TUNING

The channel that normally controls the tail gyro gain can be assigned for control of any parameter from [Tail gyro] and [Rigid] menu (and [Horizon] menu in case of 3SX).

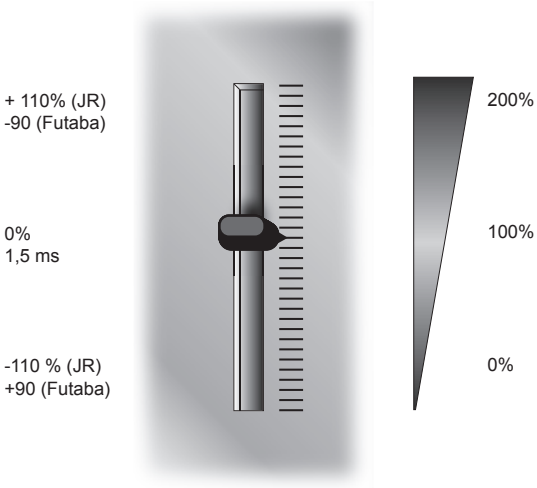
Note: When using this option, make sure, that the previously found tail gyro gain is set fix in the [Tail gyro] menu (see PC software).

When you have selected and assigned a parameter in the [RealTime-Tuning] menu, you can adjust it in flight from the transmitter via the ‚modified‘ gyro channel. It is best to use a slider or a potentiometer on the transmitter (or a fixed value programmed there).

The applicable parameter‘s setting can be altered from zero to twice the pre-set value (active value is shown in the RTT tab), but no higher than the setting limits. Neutral signal from the transmitter results in the parameter value as set in the PC software (Factor 1.0).

When the assignment is cancelled again, the setting made on the transmitter is discarded, i.e. it will not be saved automatically. You have to set it manually as the new setting for this parameter.

REALTIME-TUNING CHANNEL



TAIL GYRO OPTIMISATION

SENSITIVITY (GAIN) SETTING

As usual, set the gyro gain as high as possible, at which the tail does not yet tend to oscillate, not even at high flight speed. The tendency to oscillate and thus the holding force crucially depend on the speed of the tail servo, but also on a play-free and easy-moving linkage as well as an optimum drive (no belt slipping, no breakdown of the motor controller at full coll.pitch, etc.).

You can additionally optimise the gyro's performance to the model by tuning further parameters of the [Tail gyro] menu. In the case of high-performance acro helicopters, the following tuning procedure has proven itself and excellent performance can be achieved with it, even under extreme loads.

P-GAIN AND D-GAIN

Search for the setting at which the tendency to oscillate is at its lowest (referred to the same overall rigid gain), and you may then further increase the overall gain to some extent.

- You prevent fast oscillations (fine dithering) by means of a lower D-gain.
- You prevent medium-speed oscillations by a higher D-gain or by a lower P-gain.
- You prevent slow oscillations and bouncing back by means of a higher P-gain.

DELAY

Use this to optimise the locking-in when the stick is released suddenly, with the result that the tail stands still without bouncing back or overshoot. Before adjusting the delay, adjust the tail gyro gain to a good and high value.

REVO-MIX

To improve tail stability (particularly with slower tail servos) by generating a direct ahead correction for the tail with every load change caused by coll.pitch elevations, even before measurable drift occurs, which the gyro would have to first detect in order to balance it out.

For the Revo-mix you can select:

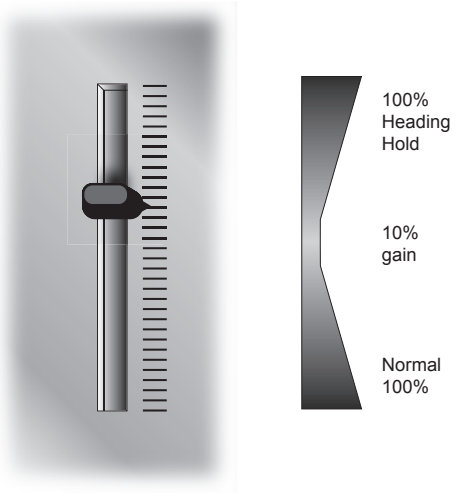
- for 3D-flying → symmetrical pitch curve
- For scale flying, with coll.pitch hover position in stick centre → asymmetrical pitch curve

Optimise Revo mix with reduced gyro sensitivity as a test measure: Issue sharp coll.pitch deflections and observe the tail. If the tail gives in to the torque at the start of ascent, i.e. swivels in the opposite direction to the main rotor, then increase the Revo amount. Finally raise the gyro sensitivity again.

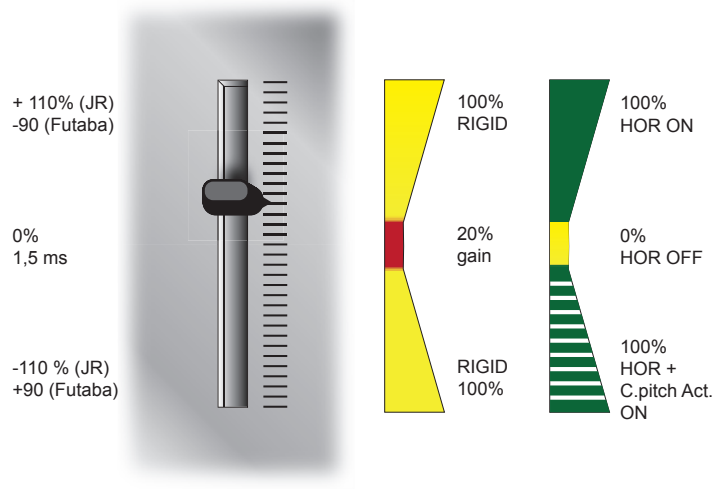
OPTIMISING THE ESC

If the tail performs a tiny excursion only after a coll.pitch change, the cause of this is mostly a sluggishly responding motor controller that allows the motor speed to break down briefly at the maximum load and then accelerates, thus applying a high load to the tail. In this case, mostly an improvement is achieved by increasing the motor's speed.

TAIL GYRO CHANNEL



HEAD GYRO CHANNEL



HEAD GYRO OPTIMISATION

The attitude stabilisation („head gyro“) for the rigid linkage maintains any pilot-operated attitude and prevents disturbances, like e.g. ballooning. On ground, the function is visible at the swashplate: when giving control commands and let go off the stick, the swash moves slowly back to level, maybe even stays in the inclined position for a short while.

AN EFFICIENT WAY TO OPTIMISE THE RIGID SETTINGS:

- We suggent to use a pot or slider at the radio to easily find the optimum gain. Use the ‚Head-gyro‘ channel or, in case no signal is supplied from the transmitter, it‘s default gain slider in the [Rigid] menu to set the gain as high as possible, approx 10% below the onset of oscillations. For safety reasons, begin with small values. Too high gain may provoke oscillations, for example like a ‚shivering‘ in roll axis or a pitching in elevator axis.
- Then set the ‚agility‘ slider in the PC software as desired. Only with 3Xbase, use the transmitter‘s travel settings.
- Usually at this point the performance is close to the optimum or perfect. If improvement is necessary, you can test sudden halt („locking-in”) after vigorous and abruptly ended stick deflections:

In case of a tendency of rocking / luffing in elevator axis, increase the elevator filter value (see the tool-tip). This job is easily done by using RealTime-Tuning, after having pre-set the elevator filter to a medium value.

In case of abrupt and jerky reaction to small and sudden stick inputs:
Reduce ‚Initial response‘, or increase ‚Rigid gain’ or ’P-portion’.

In case the turning continues a short while even after ending the stick deflection:

for avoiding a too soft (sluggish) reaction: Increase ‚‘Initial response‘; possibly also increase the ‚Rigid gain’ and/or the travels in the [Mixer] menu.
for avoiding exaggerated and harsh reactions: reduce ‚Agility‘ in the [Rigid] menu, and carefully increase the travels in the [Mixer] tab.

If aileron and elevator impulses cause mixed movements, this might be because of an incorrect setting of „virtual swashplate rotation“. Test it with reduced rigid gain: If the tail moves downwards in the event of rolling to the right, then increase swashplate rotation in the positive direction.

- Test response to long stick elevations:

  In the case of a strong first reaction and then decelerated continued reaction: reduce ‚Initial response and, if applicable, increase the „Agility“.

- Test high-speed flight

  Against slow ballooning or undercutting: reduce or resp. increase the „withdraw rate“.

  Against temporary nose-up („dolphin“) during harsh coll.pitch rises: increase ‚Rigid gain‘ as far as possible.
  Also try with increased P-portion and ensure mixer is set to maximum travels.

  Against lasting ballooning after hard coll.pitch-up: see mouse over text for „altitude holding range“.

- In case of tilting or tumbling motion during pirouettes:
  Align the sensor parallel to the rotor shaft.
  Trim the swashplate exactly straight while there is a connection to the [Trim] menu (necessary to have all servos at neutral).

PARTICULAR FEATURES OF THE 3SX

As long as the functions of the [Horizon] menu are not activated, the 3SX's function is identical with the 3X's function.

SETTING UP THE 3SX

Important: The 3SX does not allow „exceptions" during the setup procedure, particularly the coll.pitch travel has to reach its 100% marks as displayed in the [Diagnose] menu, positive and negative, with the correct direction, and, for using any of the extended 3D options, the angle of attack has to be exactly 0° when connected to the [Diagnose] or [Trim] menu. If this is not the case, first complete the setup according to manual or wizard. Otherwise a proper function of the 3SX's additional features can not be ensured.

HORIZONTAL STABILISER

The horizontal stabilisation can be used for various purposes, e.g. as support during photographic flights, particularly in greater distances, or as a training aid for beginners, or as a safety feature during acro flight training, using the stabilisation only as a „rescue switch" in an emergency case.

HOW TO ACTIVATE THE HORIZONTAL STABILISER

Using FBL-helicopters without flybar, first optimise the Rigid stabilisation. For flybared helicopters, see the section „Trimming neutral" below. Then read the resulting gain-setting of the head-gyro channel from the [Diagnose] menu (not from the transmitter, values may differ!) and enter this value as default setting into the [Rigid] menu. Now the head-gyro channel is free for the use of the Horizon option. To activate Horizon-Mode, use the [Horizon] menu to switch the channel assignment from ‚Rigid gain' to ‚Horizon'. Using the head-gyro channel, you can now control the strength (gain) of the Hor-Mode during flight. To this end we suggest to use a switch or better a pot or slider at the transmitter for instant adjustment access. Note that the 3D options act depending on the signal polarity (direction) given at the head-gyro channel (concerning the automatic coll.pitch action, see below). Stronger gain means quicker self-levelling and more necessary stick deflection, for example to decelerate a fast flight. The [agility] setting in the [Rigid] menu always affects the Horizon gain too.

FLYING WITH HORIZONTAL STABILISATION

Before starting the motor, ensure that the swashplate remains in approximate horizontal position while activating the
Hor-stabilisation. It must not run into an end-blocking!
Important: Begin with small stabilisation gain and increase carefully.

Rigid stabilisation, set at high level, may increase a tendency to oscillate. In this case it may be helpful to just slightly reduce the rigid gain, allowing a large increase of horizontal gain. Normally, take-off and landing is possible with activated Hor-Mode. This should be tested first with a gain not higher than 30%. Some large helicopters however are susceptible to a collision of main rotor and tail boom, if harsh elevator-back commands are given. This can be checked by whether the rotor blade bends down to that point when pushed hardly enough. In this case, the horizontal gain and/or the [Mixer] menu (servo ways) have to be adjusted so that the swashplate inclinations are limited to an appropriate elevation, and the Hor-Mode should be switched off during take-off and landing. The tendency to oscillations may be increased before take-off, if the skids are standing on a hard surface and during fast flight. Therefore, in both cases the gain setting should be tested. Important: If flying with permanently engaged Hor. stabilisation, do not reduce travels for aileron or elevator at the transmitter (dual rate). Otherwise, the priority of the manual control (override), which is necessary for safety reason, may get lost. Therefore, allow a travel reduction (dual rate) at the transmitter only when the Hor-Mode is disabled (otherwise reduce either the maximum signal of the head-gyro channel in the same proportion as the travel has been diminished, or increase the 'Manual override' slider in the [Horizon] menu to at least the value which is in reciprocal proportion higher than its minimum end).

The Horizon stabilisation can make pirouettes out-of-round, since it aims to bring the main rotor plane into its neutral hover attitude (adjustable in the [RC] menu): for round pirouettes reduce the Horizontal strength (gain) and/or increase the Rigid stabilisation.

HORIZON MENU

Usually all settings can be left at their default values. Beyond that, there are several options, which are precisely explained in the tool-tips (mouse-over) and should be read.

The slider ‚Manual priority' defines the stick elevation of aileron and elevator, which will disable the horizontal stabilisation (fading-out, yielding to manual control). High setting means early fade-out; the stabiliser only interacts with neutral stick (experienced pilots). Low setting creates a large ‚deadband', in which the sticks work but control the attitude angle only (beginner).

Select the desired mode of operation using the self-levelling mode. This decides whether the stabiliser keeps the helicopter in normal (upright) position or brings it to the horizontal attitude, inverted or normal, which is „closer".

1 [hover & scale] LED yellow = ON, red = OFF

Is not suitable for 3D flying and allowed only for helicopters which, due to their c.pitch range, are not capable of inverted flight. The gain channel here works similar in bothdirection, no matter if negative or positive signal is supplied, e.g. 50% = -50%.

2 [norm. & inv.] LED yellow = ON, red = OFF..

Is the default option. It can be used as aid for hovering (beginner) or for inverted flying (training), as well as for experts (flying in greater distances etc.). This option is capable of inverted leveling, but has certain restrictions regarding 3D flight: the accuracy is guaranteed only if loops, rolls, turns, tic-tocs and similar figures are flown not more than ca. 10 times in a subsequent series. The gain channel here works similar in bothdirection, no matter if negative or positive signal is supplied, e.g. 50% = -50%.

The 3D modes are suitable for unlimited 3D flying, and therefore provide the most reliable „rescue" functions. These options are allowed only if the model will not be tilted more than 30° from powering on the 3SX until takeoff. If this can not be granted, use the first two options only! Regarding safety, it is always recommended to „arm" the heli at the starting point.
Moreover, a symmetrical coll.pitch curve has to be set with 0° attack angle at stick centre.

3 [acro] LED yellow = ON, red = OFF..

The most recommended option for 3D flying with best performance. The model will be self-leveled to the „closer" horizontal attitude (normal or inverted) The decision wether the heli will be leveled upright or inverted, is depending on the current c.pitch stick position. As long as inclination was less than ca. 45°, the main attitude will not change.

Example: if the heli has an inclination of 70° on elevator and/or aileron, i.g. is closer to normal flight attitude than inverted, but the current c.pitch signal is 'negative', then the heli will be levelled inverted.

3b) [acro with pitch] LED green = ON, red = OFF..

The model will be self-leveled to the „closer" horizontal attitude (normal or inverted), and additionally c.pitch will automatically be controlled for increasing altitude (fast "safety switch" incl. "escape into the sky"). Read tooltips in PC software! Not suitable for indoor flying! For activation, select [acro] and apply negative signal (recommended is 100% negative or more) in the Hor. channel, i.e. left direction in the [Diagnose] menu.

4) [goes to pos.] LED yellow = ON, red = OFF..

For levelling 3D helis in upright hover ("safety switch"). If the model was almost levelled in inverted flight, the faster way via aileron may be used to level it back to upright flight.

4b) [goes to pos + pitch] LED green = ON, red = OFF.

Levels the model into upright position, as with 4, and at the same time automatically controls c.pitch for increasing altitude (as 3b), which may include negative c.pitch at the beginning, if flight was inverted. For activation, select [goes to pos] and apply negative signal (recommended is 100% negative or more) in the Hor. channel, i.e. left direction in the [Diagnose] menu. The most effective and fastest rescue mode still is [Acro+Pitch].

AUTOMATIC COLL. PITCH

The automatic c.pitch action of the rescue features (3b), (4b) overrides the pilot‘s commands from coll.pitch stick more and more with increasing gain setting at the Hor.-Channel. A signal of 100% negative (left according to [Diagnose] menu) brings 100% of the control to the automatic, which is highly recommended. Such setting is perfect as a rescue action, however should be triggered only by a spring loaded momentum switch, so that thepilot re-gains full control by releasing the switch.

NOTE ABOUT THE RESCUE OPTIONS (EXTENDED 3D LEVELLING MODES)

The described rescue options provide an extremely high reliability, even during most extreme 3D and acro manoeuvres, acted in accordance with our rules for set-up and handling. The sensors‘ immunity agains vibrations, particularly of the Horizon-stabilisation, is unmatched in the world of RC model flight.

We see this feature as a highly efficient rescue option, as well as a training chance for un-familiar acro manoeuvres.

However we warn to not go for any risks, particularly not to pull the rescue button for testing without flying in sufficient safety altitude, unless being in a real trouble situation. Likewise, nobody would use an emergency-only parachute for regular skydiving. As with any complex system, even in model flight, unpredictable influences have to be accounted for at any moment. Also note that the levelling can naturally not perform a halt from high speed, and the heli may climb sideward.

The manufacturer confirms an extremely high probability of proper operation (presupposed proper setup and testing), but excludes any liability for damages caused by lack of function (no or wrong or delayed reaction etc.).

TRIMMING NEUTRAL

Using Rigid stabilisation, trim adjustment at the transmitter is not allowed (and not neccessary) any more.
Helicopters equipped with flybar, even though they would not need a Rigid stabilisation, can still use this stabilisation in order to correct any minor trim differences and drifts. To this end, use the preset button [Flybar: stab] in the [Rigid] menu. If necessary, the setting can be optimised using the gain (by RC or default setting) and the 'Direct control portion' slider. 'Elevator filter' may be used as additional feature.

DIFFERENCES TO THE BAVARIANDEMON M-SERIES
For those familiar with the bavarianDEMON, here are some essential differences:

Hor-Mode is only accessable after assigning the head gyro channel for this feature, and can, depending on the selected option, include automatic pitch action by using a negative signal at the head gyro channel.

Rigid stabilisation is activated by default. For deactivation use the preset-button [Flybar: Off] in the [Rigid] menu. Another preset button [Flybar: stab] is particularly meant for engaging the Rigid stabilisation with conventional flybar helicopters, useful as compensation against off-trims and drifts.

Autotrim for flybar-equipped helicopters has been replaced by the above setting [Flybar: stab].

The SET button (learning transmitter neutrals) has been replaced by adjusting the transmitter's neutral signals in the [Diagnose] menu.

Connection to the [Diagnose] or [Trim] menu brings all servos to neutral position, and radio sticks will not move the servos.
No optical sensor, therefore no position hold mode available.

APPENDIX

TROUBLESHOOTING

SERVOS DO NOT RUN AND LED FLASHES RED
See page 6 (LED)

Fine agitation movements audible when using digital servos
No problem; these result from the control loop; much stronger movements occur during flight anyway.

JERKING TAIL SERVO
If the tail gyro‘s auxiliary channel is at neutral position, it will stay around the switching point between heading hold mode and normal mode, and will randomly switch it on or off. Use either a positive or a negative signal in the tail gyro channel to define heading hold or not and to obtain a useful gyro gain.

STEPWISE SERVO MOVEMENT
No problem - this is the slower time grid (frame rate) in which some RC systems transfer their pulses.
With the faster frame rate of the device, this is merely more clearly visible on the servos.

NO CALM FLYING ATTITUDE ON THE TAIL AND/OR HEAD
Extreme vibrations (visible or tangible only) on the housing
Especially in the case of internal combustion engines → Observe the installation notes on page 4.

TILTING DURING PIROUETTES (LURCHING OR TUMBLING MOTION)
• Housing not mounted exactly aligned to the rotor shaft?
• With a neutral signal (when in the [Diagnose] menu), swashplate not exactly perpendicular to the rotor shaft?
• 3SX only: Horizon stabilisation active? → (neutral attitude, see p.11 bottom)

TILTING DURING PIROUETTES, ONLY DURING STRONG WIND OR IN HIGH SPEED
• Equalize aileron and elevator inclinations of swashplate using the Mixer menu.
• Use similar Rigid gains for aileron and elevator (Rigid Menu).

WEAK TAIL HOLDING
Travel limit and gyro gain correctly set?

TAIL UNEXPECTEDLY SWINGS OUT TO THE SIDE
Tail drive (belt or shaft) slipping?

WE RECOMMEND FOR YOUR SAFETY

• Always observe a sufficient safety distance from persons and objects.
• Do not underestimate the weightiness of rotating rotor blades.
• Always observe legal regulations.
• Keep your distance from radar stations, transmission masts and other radio interference sources.
• When passing on the model to third parties, always pass on these warning notes as well!

DISCLAIMER

Installation, adjustment and operation of the autopilot and a helicopter require appropriate skills. Errors and lack of attention can result in accidents involving severe personal injury and/or property damage or even traffic accidents. As the manufacturer and seller have no influence on correct handling, these risks are expressly pointed out. Liability for all manner of damage resulting from operation, even due to disruptions of the built-in instruments or signal transmission, is fundamentally ruled out, insofar as legally possible.

WARRANTY

We assume a warranty of 24 months for this device.
Any repairs performed will not extend the warranty period. During the warranty period, we will remedy any occurring malfunctions or manufacturing or material flaws free of charge. Further claims, e.g. in the event of consequential damages, will be ruled out. The unit must be transported to us at no expense to us, and it will also be returned at no expense to us. We cannot accept unpaid consignments. We cannot assume any liability for transportation damage and loss of your consignment. We recommend appropriate insurance.

THE FOLLOWING PREREQUISITES MUST BE MET FOR PROCESSING OF YOUR WARRANTY CLAIMS:
• Purchase receipt included with the consignment.
• The devices have been operated in compliance with the operating instructions.
• The device has not suffered any moisture damage, unauthorised tampering,
  excess voltages, overloads or mechanical damage.
• If possible, include pertinent hints on how to detect the fault.

NOTE

The content of this document can be amended or adapted without prior announcement.

The bavarianDEMON may be modified at any time on the basis of ongoing tests and resulting improvements. Please inform yourself regularly about current versions of the instructions, bavarianDEMON firmware and PC software.

The manufacturer provides no warranty for operability and usefulness in specific applications

The manufacturer is not liable for errors in this documentation and resulting damages in connection with equipment, performance or use of the material.

ACCESSOIRES

Foam tape ‚Acro' (3 pcs)	No. 92769
Foam tape ‚Soft' (3 pcs)	No. 92770
Cableloom L90 (90mm)	No. 92771
Cableloom L150 (150mm)	No. 92772
Cableloom L250 (250mm)	No. 92773
USB cable	No. 92774
Ultra-acustic suppression hood	No. 92775

VERSION 6.0

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F Par la présente, la Sté CAPTRON Electronic GmbH, declare que cet appareil répond aux exigences fondamentales et à d'autres prescriptions significatives des directives CE correspondantes de la Communauté européenne. L'original de la declaration de conformité se trouve dans l'Internet sur le site www.captron.de.

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