



BAVARIAN
Demon

MANUAL
CORTEX

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PRELIMINARY INFORMATION

01 OPERATING PRINCIPLE AND FEATURES

The CORTEX stabilises all three flight axes with its three gyro sensors: aileron, elevator and rudder. The approved cutting edge technology of the HeliCommand/bavarianDEMON X-series is applied here and has been effectively modified to fit fix wing aircrafts.

All model-specific settings (servo centres, travels and mixers) remain in the transmitter and are automatically transferred to the CORTEX during setup. The model must be ready to fly without CORTEX. Afterwards the system will be integrated.

Up to 5 servos/channels running independently may be stabilised. The channels concerned are passed through from the receiver to the servo by the CORTEX. If the number of channels is not sufficient, unidirectional servos, e.g. ailerons with an identical direction of rotation or double rudder servos can also be connected via Y-cables, which increases the number of controllable servos.

Sensitivity and gyro mode can be adjusted from the transmitter using the gyro channel, even during flight (see also Section 8). This reduces the test flights to a minimum.

Further options may be configured using the PC software (under development). The required USB cable is already part of the scope of supply.

The PC software enables the following additional options:

- Connect the receiver via sum signal (Futaba S.Bus, Spektrum/JR satellites, PPM sum signal, such as Robbe, Jeti or Graupner)
- Increase the servo frame rate for digital servos
- Alternative installation positions: horizontal, head first and vertical
- Optimise the stabilisation of each of the 3 axes separately and for each bench
- Install firmware updates online

NOTE:

- (!) The model must not be flown until the setup operation and a gyration directional test has been carried out.
Incorrect gyration effect would certainly result in a crash.
- (!) In the case of an electric motor, remove the propeller or disconnect the motor for all adjustment work,
to prevent the motor from starting up accidentally and risk of injury.
- (!) Do not move the model during the first 5 seconds after the motor has been switched on to enable the gyros to initialise. Otherwise, the servos will run but not the stabilisation. A successful initialisation is indicated by the servos jerking twice and a constantly illuminated LED.
- (!) Each time it is switched on, the system recognises the transmitter trims. Therefore, only carry out a controlled test once the system has been fully initialised.
- (!) The ultra-acoustic suppression hood is urgently required (see Accessories) when using turbine-powered models.
- (!) Please note that using the gyro system will increase the activity of the servo and therefore the power consumption.
- (!) Only connect the PC adapter the PC after the setup software has been installed.

MOUNTING

02 CONNECTING RECEIVERS

Conventional receivers via single channels:

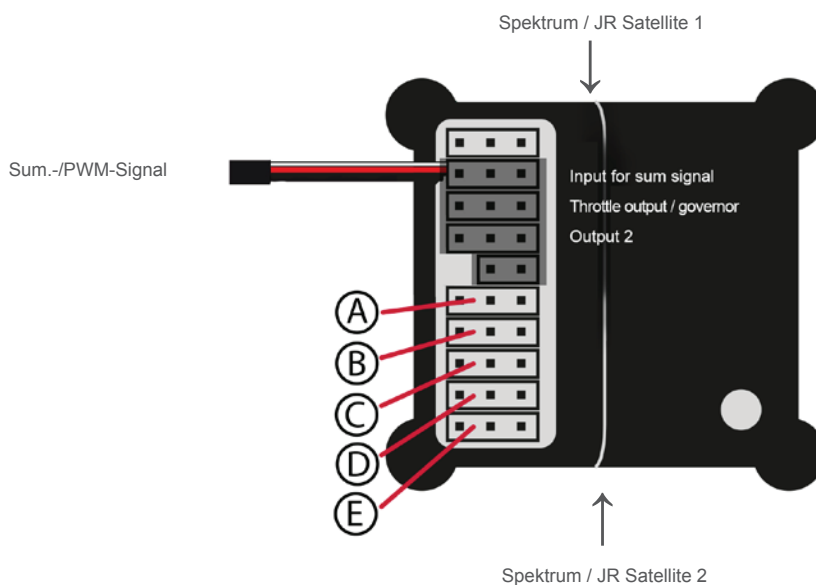
Disconnect all servos that need to be stabilised from the receiver and make a note of the servo's function. Connect the required cables A-E of the supplied cable harness to the receiver's outputs that have become available where the servos were previously connected (see Section 3 for details about connection).

The channels are intentionally only marked with letters and you are free to assign them. Only the following needs to be taken into account:

- At least connections A, B and AUX have to be used as they also transfer the power supply.
- The grey cable serves as a gyro channel. You should set up a channel in the transmitter for this gyro channel to enable stabilisation to be adjusted in flight and/or to switch the mode.

CONNECTING SUM SIGNAL AND SATELLITES:

Receivers that have a 'serial' connection make connection easier, as all channels can be transmitted via a single cable.



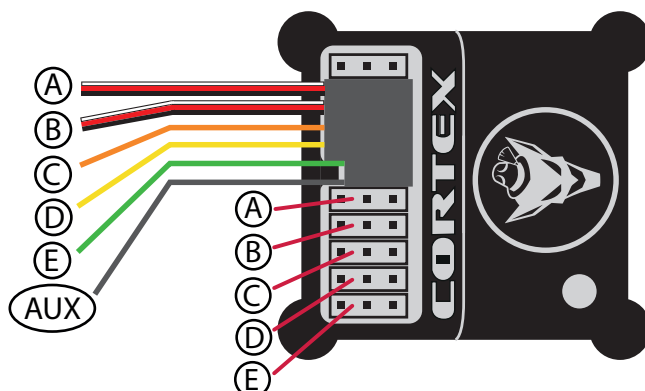
To use a serial connection (sum signal) the input mode of the system must be configured as per PC setup software. The channels on the PC are assigned in the same way. The setup software is also suitable for binding Spektrum/JR satellites. Furthermore, the setup software offers a very easy-to-understand test option for all received signals with its Diagnose page.

NOTE:

The CORTEX assigns the internal gyro axes to the corresponding servos automatically during the teach-in process. The same applies to any mixers. Any functions can therefore be combined. For example, ailerons can be stabilised, even if they also have an elevator function (which optionally can also be stabilised). In spite of this, these rudders can still execute an (unstabilised) landing flap function. If necessary, functions that should not or only optionally be stabilised can also be passed through.

03 CONNECTING SERVOS

The servos to be stabilised are connected to CORTEX's outputs A to E. The same assignment applies as for the input side, i.e. as used for the receiver connection. Cable A on the receiver corresponds to slot A on the CORTEX etc



Channels that are not subject of being stabilised, e.g. gas, must not be looped through, but must remain connected directly to the receiver.

Only for serial receiver connection (sum signal):

If the receiver also has individual outputs/servo connections alongside its serial output, any not stabilised channels (throttle, landing flaps etc.) will remain connected to the receiver. If the receiver only has the serial (sum) connection, even these functions must be passed through the CORTEX. The special outputs F (gas) and G (output 2) are available for this. Connection F may be used for other functions, e.g. with gliders without motor. Port G (output 2) only supplies the signal and no voltage. Earth (black cable) and battery plus (red cable) must be connected from another slot, in case using a Y-cable.

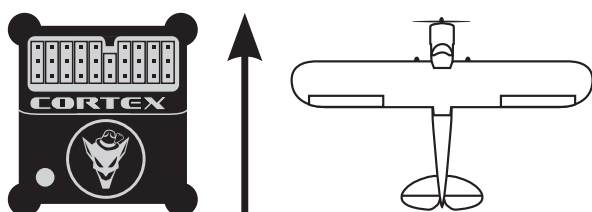
Control test without gyros:

Now all the servos must run correctly and identically as before (without gyro assistance). Otherwise, check the assignment of the connections, or the channel assignment per PC software for serial receiver connection.

(!) Even if the servos are running correctly: do not fly before setup of the CORTEX and gyration directional test is complete. Incorrect gyro effect would certainly result in a crash!

04 SECURING THE CORTEX

It is crucial that the installation position shown here is followed.



Exception: further installation positions can be programmed using PC software.

The adhesive foam pads supplied must be used. Use the thin pad ,acro' for electric, nitro and turbine powered models and for vertical installation. The thick and softer pad (,soft') is recommended primarily for models with a combustion engine.

Any dirt must be removed before applying the pad so that the device does not become detached. The model would become uncontrollable.

Also do not tie the housing tightly so as not to restrict the dampening effect of the foam pad. For the same reason, do not lay the connection cable (servos and receiver) in a taut but in a loose loop.

COMMISSIONING

05 SETUP

(!) For setup, the transmitter must already be programmed ready for flight, so that the model can be flown or is already flying without CORTEX.

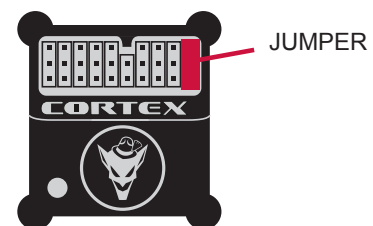
Servo directions, possible mixers, throw limits etc., as well as correct tuning settings for normal flight must already be set up correctly.

(!) Switch off dual rate while carrying out the setup. Initially leave the sticks (except gas) in neutral position at the start of setup. Set all remaining functions (flaps, possible flight modes etc.) to the position used during normal flight.

(!) The setup must be repeated every time, if a combination in the transmitter or a channel assignment on the receiver or transmitter has been changed.

Starting setup:

Plug in the jumper supplied as shown in the illustration, then power on the device.



The LED will now issue a series of green flashing signals after a starting initialisation. The servos then issue the same signals as an audible jerk. These are requests to the stick movements specified in the following table. Follow these instructions exactly, i.e. only move the stipulated function on the transmitter: move the stick to the corresponding end stop and hold it there until the following signal occurs. This confirms that the command just given has been correctly identified and gives the signal that this deflection can be taken back again and to apply the next one in the sequence described below.

NOTE: Simply skip over any axes that are not to be stabilised (do not deflect stick).

NOTE SIGNALS OF THE LED (FLASHING) OR THE SERVOS (JERKING):

• • (switching on) → Leave the sticks neutral, wait for signal

• • (2x) → Now hold aileron at right-hand stop

• (1x) → Now hold aileron at left-hand stop

• • (2x) Release aileron
→ Now „press“ elevator on stop and hold

• (1x) → Now „pull“ elevator on stop and hold

• • (2x) Release elevator
→ Now hold rudder on right-hand stop

• (1x) → Now hold rudder on left-hand stop

• • • (Servos 3x) (LED flashes green)
→ Setup completed successfully. Now first pull the jumper, then switch off.

Important: test gyro directions for all three axes, see Section 8.

NOTES FOR SETUP:

- Setup sequence only starts in case of correct RC reception.
- Setup can be repeated at any time by power-cycling (with jumper).
- If the device is switched off before the end of the setup sequence, no change will be saved but a possible, previous setup retained. If the jumper is pulled out before the end of the setup, the system's condition is undefined. Repeat setup.
- Do not teach any extremely short throws as full deflection. This can lead to errors, as the system does not recognise any greatly reduced throw clearly as deflection.
- The jumper may not under any circumstances touch the central pin in its slot electrically. It may only bridge the outer pins.

06 SWITCHING ON FLIGHT OPERATION

Start the CORTEX in normal operation without the connected jumper. The LED flashes red for the first 6 seconds and indicates that the system and the gyros are being initialised. The model must not be moved during initialisation. Otherwise, the stabilisation remains inactive (flashes red, see Section 7) until switch on is repeated.

When the system and gyros have been initialised, the servos will indicate this by jerking twice. The LED lights up constantly; its colour indicates the setting (mode) of the gyro channel.

Each time it is switched on, the CORTEX also recognises the transmitter's trims. This is why no control movements must be given until initialisation is complete directly after the device is switched on.

07 LED

• • • • • (5x)	Switch on Flashes red 5x → Do not move the model and control sticks, gyros initialising
• • • (3x)	Fault Flashes (cycle of 3) → Gyro deactivated, initialisation failed
• • •	Flashes yellow-orange → is waiting for RC reception
• • •	Setup Flashes or flickers green → Setup mode (teach-in process with jumper)
	Operation Permanently illuminated → Depends on the gyro channel (see Chapter 8)

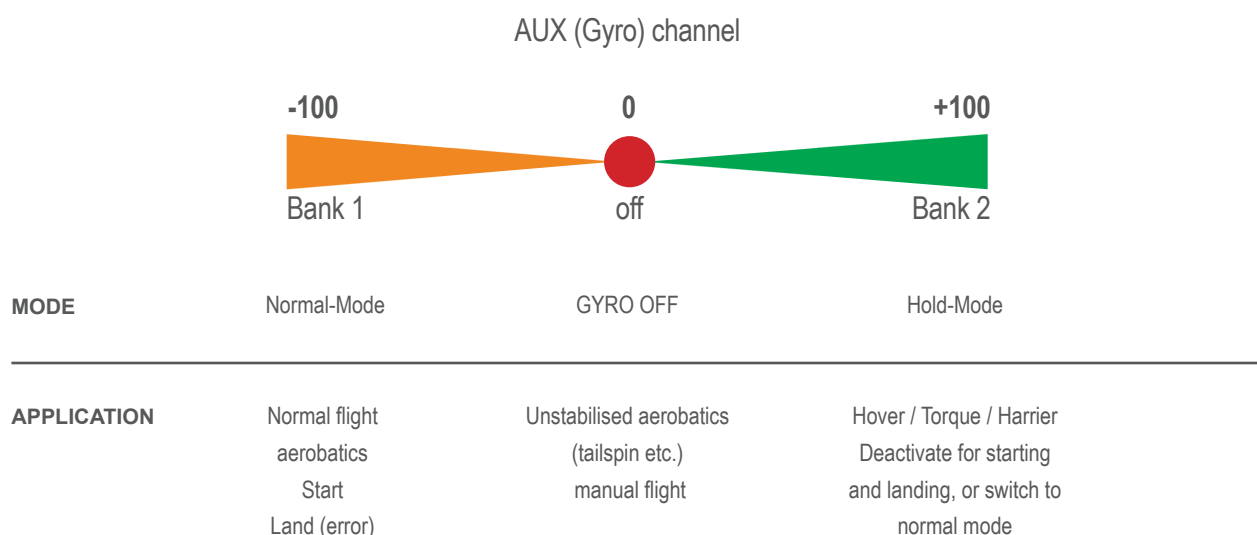
08 GYRO CHANNEL / ACTIVATING GYROS

For the first flight and in-flight tuning, it should be possible to adjust the gyro channel and therefore gyro sensitivity in flight. It is therefore possible to find the optimum quickly, or reduce it immediately if sensitivity is too high. A pot or slider is recommended.

Now check the function of the gyro channel by adjusting the modes/bench via the transmitter and comparing the LED's colour reaction.

It is possible to determine whether bench 1 or 2 is activated from the direction in the gyro channel. Negative signal <1.5ms activates bench 1 (normal mode: LED = yellow orange), positive signal >1.5ms activates bench 2 (Hold mode: LED = green).

Missing or neutral gyro channel signal (LED = red) switches off all the gyros (manual flight).



09 GYRO DIRECTIONAL TEST

Definitely required before the initial flight and following any change to the installation position or in the RC system (servo directions, channel assignment etc.). For the direction test, first ensure that all gyros have been activated (on the gyro channel and/or configuration by PC. Sole exception is if individual axes have deliberately not been taught so as not to enable the corresponding gyros, these will naturally also not give any gyro reaction).

Now tilt the model in each axis and check that during the movement the corresponding rudders deflect in the opposite direction, i.e. work against it. Check both directions for each axis and also check that only the rudders concerned move.

If the rudders deflect incorrectly, either the setup process has been unsuccessful or the installation position of the device is incorrect (or the transmitter was already incorrectly programmed prior to setup).

10 TEST FLIGHT/FLYING

Only start after a successful gyro directional test.

Setting sensitivity

Start with a low sensitivity setting in the gyro channel, maximum 20% and initially only in normal mode (LED = yellow orange). To achieve an as most powerfull stabilisation as possible, sensitivity is increased carefully as far as possible without any disruptive vibrating movements (oscillations) occurring. If vibrations occur, sensitivity is reduced by approximately 5-10%. Test the setting even at high flight speeds, as the control reaction will be strongest then and therefore the tendency to vibrations increased.

Under normal conditions, the gyro will produce an effect similar to expo. Therefore reduce the expo-setting or switch it off completely.

Once the optimum settings have been found, programme a 3-position switch on the transmitter with the corresponding endpoint/ATV setting to be able to switch between the required modes (bench 1 / Off / bench 2). This can, of course, also be achieved by means of the idle up switch.

11 USING GYRO MODES

The table of the gyro channel (Section 8) indicates various uses. Caution: this only applies to factory programming for bench 1 and bench 2 (standard or default, i.e. without PC software). Once the PC setup software (under development) is available, it will be possible to programme any number of functions for each of the 3 gyros.

If the transmitter has a flight condition switch, it may make sense to couple the gyro channel setting with various flight conditions. For example, at a higher speed, it is possible to switch to a lower gyro sensitivity.

Normal mode

Attenuates disturbances and smoothes the flight performance.

The gyros tend to reduce agility. The expo setting can therefore be reduced in the transmitter in most cases or even completely switched off. The rudder can also delay a turning movement because of the gyro. This is ideal for aerobatics and makes knife-edge flying easier. However, this can indicate a tendency to lean for normal turns. Then fly out of turns with a little rudder.

The normal mode can also remain activated even during lift-off and landing in most models.

Hold-Mode

For automatic hovering, torque and harrier etc. For technical reasons, this mode is only suitable for normal forward flight under certain conditions.

- 1) The model may vibrate or swing because of the high sensitivity of the sensor as the speed is increased.
- 2) The gyros try to hold the model in position against the pilot's control inputs. It may be that the model is being steered more rigorously or swings back somewhat after the stick is deflected.

(!) Do not land in hold mode! The model would then no longer be able to follow its physical reactions and may crash more easily.

Hold mode may influence the rudder's neutral setting (drifting away from centre). This only occurs on the ground and is not relevant in flight.

ACCESSORIES

Foam tape Acro (3 pcs)	No. 92769
Foam tape Soft (3 pcs)	No. 92770
Cable loom L90 (90mm)	No. 92771
Cable loom L150 (150mm)	No. 92772
Cable loom L250 (250mm)	No. 92773
USB-cable	No. 92774
Ultra-acoustic Suppression Hood	No. 92775

Technical data

Dimensions: 36 x 34 x 14 mm

Supply voltage: 4...10V (2S-LiPo-compliant, min. 5.5V for Spektrum/JR satellites)

Max. turn rate: 500/s on all axes

Switching servo rate (PC software): can be selected digital (220Hz)/analogue (55Hz)

Servo power max.: total 10A (permanent load 12A, short-term)

Weight: 18g (without cable harness)

Product contents

- Device including adhesive pads
- Connection cable harness for the transmitters, 150mm (optional shorter or longer cable available, see Accessories)
- USB cable for connection to PC/notebook

PC software (under development) available for download at www.bavarianDEMON.com.

VERSION 1.0

LEGAL DETAILS

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visit our website www.bavarianDEMON.com for a summary of authorized dealers and email contact addresses.

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