

HeliCommand



World's First - HeliCommand !
Flight attitude stabilisation and positioning system for model helicopters.

The breakthrough:

Many vain attempts have been made to create a stabilisation system for free-flying helicopters. The control aids familiar in the modelling world are either just additional x-y gyro systems, or simple light sensors which only work if the horizon is very flat, with no obstacles in the line of sight.

Until now, regulatory systems offering genuine inherent stability have been enormously complex, due to the unavoidable fact that it is impossible in a helicopter to measure angles of inclination relative to gravity; the second problem is that of obtaining a stable geographic position; these problems could only be overcome if at least a GPS system was installed in the model.

If you were piloting a conventional helicopter and left it to its own devices for a few seconds, it would quickly start to drift off in a random direction, at the same time constantly accelerating - in short, it would not survive for long.

The HeliCommand unit stabilises the geographical position of the model helicopter as well as its flight attitude.

This involves a new technique of ground sensing which is much lighter and cheaper than GPS, and also works far more accurately when close to the ground: unwanted movements can be measured much more finely, and automatic compensation applied much more accurately.

An additional advantage over GPS is that the system even works where the flying site is closely surrounded by buildings or trees, and even indoors, provided that the lighting and contrast conditions are adequate.

This completely new attitude stabilisation and positioning technology is now available to modellers for the first time. The HeliCommand incorporates several control and measuring systems, and provides a superb level of stabilisation.

Decisive features are a quality of regulation never obtained before, combined with compactness and light weight and a reasonable price.

Applications:

- Ideal as a training aid for the beginner. When set to maximum stabilisation, the system makes it possible to learn the art of helicopter flying without outside help.
- Safety function for advanced and scale model pilots: reduced crash risk (emergency knob).
- deal assistance for long-range flying, and when manoeuvring in cramped conditions.

Technical features:

- High-level reliability thanks to two independent instrument systems and sophisticated software.
- New type of sensing process provides reliable geographical positioning, completely independent of the visible horizon.
- Electronic triple-axis gyro provides attitude regulation with an artificial horizon.
- The instruments can be activated individually; the degree of stabilisation is adjustable.

Integral functions:

Tail rotor gyro

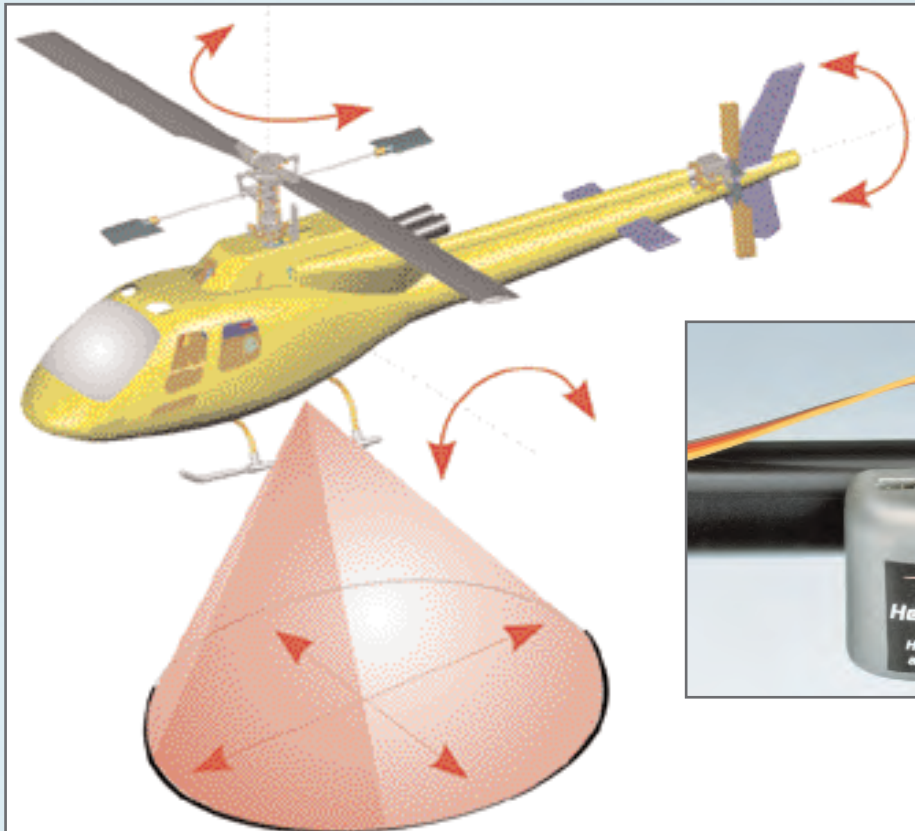
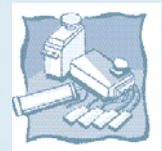
The HeliCommand unit features an integral high-quality heading-hold gyro. Of course, a separate gyro can also be used if you prefer.

Auto-trim

Another important feature is automatic trim; a button-press on the transmitter automatically neutralises the three control axes: pitch, roll and tail.

For auto-pilot operations the trim is only necessary during the first flight (after installation). However, the trim can also be used for manual control. Any reasonably smooth phase of flight lasting a minimum of seven seconds is sufficient for the automatic trim system to define correct trim values. The

HeliCommand 3A No. 8493
 HeliCommand 3D No. 8494
 HeliCommand „Rigid“ No. 8495



settings are stored, but they can also be revised and corrected at any time.

Swashplate mixer

The HeliCommand unit incorporates a comprehensive integral swashplate mixer (H2, HR3, H4). This makes it possible to control all current types of helicopter using simple radio control systems (without swashplate mixers). In this case the display module or the PC adaptor and software is required in order to carry out adjustments.

The mixer settings are entered using a new form of procedure which is very simple to operate; this saves the user the task of studying the menu system etc.

Pilot channel

The effect of the stabilising / positioning mode can be adjusted proportionally using a spare radio control channel; it can also be switched off completely for 3-D flying.

The in-flight switchable gain system offers three different positions:

- Stage 0 = Off (conventional)
- Stage 1 = Attitude regulation (stabilisation)
- Stage 2 = Position-holding and “ground-speed” regulation

Fail-safe

High-quality fail-safe function with FM receivers. If the radio link fails, the fail-safe responds extremely quickly and almost continuously, setting the roll-axis and pitch-axis functions to neutral, whilst maintaining the collective pitch function at the last value.

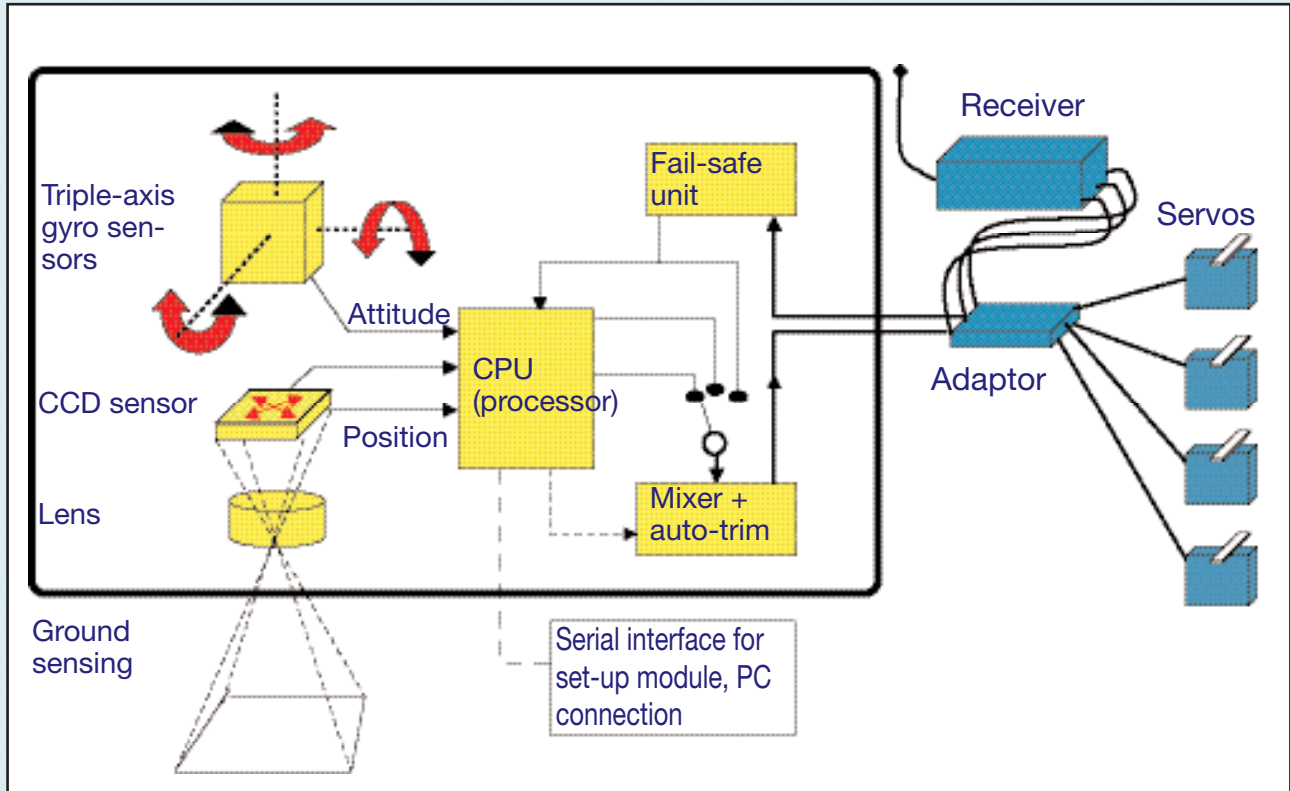
How the Heli-Command works

Two independent instrument systems are used in conjunction with sophisticated software to ensure high reliability. The position measurement is based on a ground sensor which works on a similar principle to an optical computer mouse; the difference is that the position-finding continues to work at flight altitudes of around 3 m and more, even when daylight is beginning to fade.

The movement sensor detects the ground while the helicopter is flying, and can be considered as a replacement for the eye of an airborne pilot. The sensor is able to detect all relative movement in the horizontal plane by analysing the contrasts exhibited by virtually every type of ground surface; this works just as accurately as a computer mouse on its base surface.

The supplementary attitude stabilisation system contains three electronic gyros and works using an artificial horizon, i.e. it is entirely independently of the visual conditions.

HeliCommand



This arrangement enables the HeliCommand to stabilise the helicopter's inclination relative to the horizontal plane, independently of lighting conditions (in contrast to previous types of stabiliser), and also to stabilise the machine's position above the ground when in regulatory mode.

Only in exceptional cases, e.g. in the dark, above stretches of water, or over a totally smooth covering of snow, is the optical sensing device unable to supply a signal; if this should occur, the remaining on-board instruments automatically assume the task of stabilising the helicopter.

If brief, this "bridging" action is not noticeable. If it lasts longer, the helicopter will automatically switch from positioning mode to stabilising mode. The pilot will then detect this, and may have to compensate for any slow drift which occurs by giving a straightforward corrective control command.

If particular ambient conditions make it obvious that the optical ground sensor cannot pick up adequate contrast (such as when flying indoors), the pilot would normally switch over to stabilisation mode (attitude regulation). However, these special features do not need to be taken into account if you limit yourself to normal weather and usual model flying conditions and environments.

HeliCommand 3A **No. 8493** possesses all the characteristics described above.

HeliCommand 3D **No. 8494** possesses the same characteristics as the HeliCommand 3A, but also features:

- attitude stabilisation in inverted flight;
- switchable support for brief 3-D manoeuvres.

HeliCommand "Rigid" **No. 8495** The HeliCommand "Rigid-Stabi" is another version of the system:

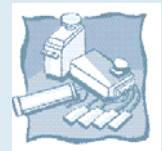
In addition to all the functions of the HeliCommand 3D, this variant provides stabilisation for helicopters which are not fitted with a mechanical stabiliser bar (flybar). This applies, for example, to some scale machines and helicopters with multi-blade rotor heads. This special attitude-holding stabilisation reliably prevents the characteristic tendency of "flybar-less" rotor heads to balloon up abruptly.

Model helicopters with a rigid head are more agile, contain fewer parts and consume less motor power. The HeliCommand "Rigid" offers a broad field for experimentation in the future.

HeliCommand 3A **No. 8493**

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This variant also features a technique for linearising servo travels, compensating for the angular offsets inherent in the H-4 swashplate linkage.

Optional upgrades:

- **3D:**

With a software upgrade the HeliCommand 3A can be converted into the HeliCommand 3D, providing supplementary attitude stabilisation in inverted flight.

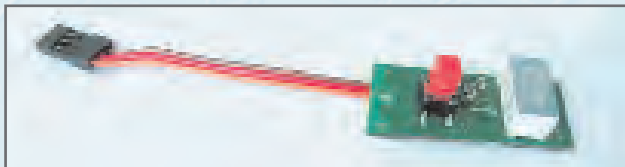
- **Rigid-Stabi:**

A further software upgrade converts the HeliCommand 3D to the HeliCommand “Rigid” specification.

To upgrade the HeliCommand units to the next higher version it is necessary to return the device to a robbe Service Centre.

Optional accessories

- **Display module No. 84941000**



This supplementary module is necessary for setting up the integral swashplate mixer if you are using a transmitter without its own swashplate mixer.

This module is absolutely essential for setting up additional parameters such as gyro mode, degree of holding, pre-set mode etc. with the HeliCommand “3-D” and “Rigid-Stabi”.

PC adaptor lead (RS232) and software No. 84942000

PC connecting lead for setting and storing all parameters and options; a convenient alternative to the display module.

Offers the additional facility of transferring complete (pre-programmed) settings into the HeliCommand unit (download currently in preparation).

Altitude sensor (in preparation)

Upgrade sensor giving height stabilisation. Automatically regulates the model's altitude by measuring the distance above ground (up to 1.5 m) using an optical sensor. The flight altitude can be controlled directly or via the collective-pitch function, according to the selected mode.

Also provides a range of additional functions such as altitude limiting for beginners, and automatic landing.

The final version of the HeliCommand is the Profi; this is designed for industrial helicopters and extremely valuable models:

- Ultra-smooth, super-accurate hover stabilisation.
- Accurate positioning up to around 10 m altitude, in winds of up to around 5 m / sec.
- Can also be used over built-up areas.
- High-level fail-safe function, including automatic landing if radio link fails.
- Expanded permissible temperature range.
- Weatherproof aluminium case, fitted with robust anti-vibration mounts / shock absorbers.
- High-quality instrumentation for maximum possible security.

This version includes:

- Four optical imaging systems
- Acceleration sensors in three axes
- Three high-quality SMM gyros
- Barometric pressure altimeter
- Four micro-processors
- Second redundant CCD sensor for drift measurement

Specification:

Operating voltage:	4.8 - 6 Volts (4 - 5 NC)
Current drain:	55 mA
Weight incl. cables:	33 g
Dimensions:	55 x 35 x 12.5 mm