Heli-Max™
PERFORMANCE PARTS

HEADING-HOLD PIEZO GYRO
INSTRUCTIONS

Congratulations and thank you for purchasing the Heli-Max™ Heading-Hold Piezo Gyro. A gyro stabilizes the tail rotor control on your R/C model helicopter. Of all the controls to master, the tail rotor is the most difficult. In fact, flying an R/C helicopter without a gyro is nearly impossible, or extremely difficult at best. Even an expert wouldn't be caught without a gyro and a beginner would probably never get off the ground without one. In addition to the piezo crystal inside your Heading-Hold Piezo gyro, a special feature is the Heading-Hold capability allowing your helicopter to return to its original position predetermined by you! This is an extremely helpful feature when learning to hover, maintaining a steady hover or performing aerobatics that involve much backward movement. Additionally, you may switch between standard mode and heading-hold mode while in flight.

FEATURES

Standard Mode
While in standard mode, this gyro behaves as a regular yaw damping gyro by sensing motion about the axis which it controls (the yaw axis for your helicopter). The electronic components in the gyro send a signal to your servo instructing it to steer the tail in the opposite direction, thus preventing unwanted rotation of the tail. The result is a much more stable tail and a helicopter that is easier to control! In this mode, the gyro does not return the model to its starting position.

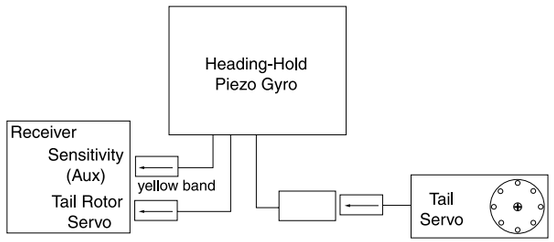
Heading-Hold Mode
In this setting the gyro will hold the tail in the position determined by the last input of your control stick, until a new stick command is given. You can virtually fly the tail rotor hands-off! This is especially helpful during backwards flight.

SET UP YOUR HELICOPTER

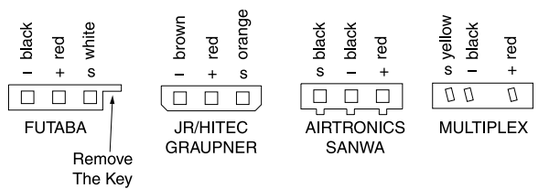
Test fly and set up your helicopter so it will hover when the rudder trim is centered, the linkages are squared and the servo will travel the same rate to the right and to the left. If you are installing your gyro in a new helicopter that has not yet flown, pay careful attention to the manufacturer's instructions on how to set up the tail rotor system and how to connect the linkages. All linkages must be centered, squared and symmetrical. You may set the ATV's as required but try to get your linkage set up so your ATV's are as close to 100% as possible. The most important thing about your ATV's is that your servo cannot overdrive your rudder linkage—make sure your servo will not push the rudder pushrod further than your rudder linkage at the tail rotor can go.

HOOK UP THE GYRO

Hook up your gyro before you actually mount it in your helicopter. It will be easier for you to understand its operation and perform the necessary tests in order to make sure your gyro is set up correctly.



❑ 1. Your gyro comes with a Futaba® brand "J" style connector that plugs into your receiver. If you own a Futaba radio control system proceed to step 3. If you own another brand of radio with a different type of connector, you may have to modify the connector on the gyro to match your radio, and the connector on your servo that plugs into the gyro. Usually, all that is required is to carefully shave the key from the gyro connector so it will fit into your receiver and rearrange the wires so the polarities match your radio system. In some cases, you may have to cut your servo cord and the cord on the gyro, then solder on Futaba J-connectors.



❑ 2. If you've modified your connectors, make certain the wiring order on your servo connector and the gyro connector is the same as the wiring order on the Futaba connector. Study the diagram. The positive (+) wire is in the center, the negative (-) wire is on the side opposite of the key on the connector, and signal (s) is on the side of the connector nearest the key. **WARNING!** Failure to match polarities on any connector may damage your gyro and will void your warranty.

❑ 3. Connect the cord with the yellow band coming from the gyro to an auxiliary channel on your receiver. This channel will be used to switch between standard mode (non Heading-Hold mode) and Heading-Hold mode. When in standard mode the ATV is used to adjust the gyro's sensitivity.

❑ 4. Connect the other cord coming from the gyro to the channel in your receiver that operates the tail rotor servo.

❑ 5. Connect your tail rotor servo to the remaining cord coming from the gyro.

SET UP THE GYRO

There are four different settings you must initialize before you can use your gyro. During the setup procedures that follow, each time you turn off the receiver switch, **you must wait ten seconds before you turn it back ON, and wait an additional ten seconds before you give a control input from the transmitter or move the gyro.**

Set The Endpoints

The first thing we must do is tell the gyro what its endpoints are, or how far it can drive the servo when it is in heading-hold mode.

❑ 1. Once you have connected your gyro as instructed, make sure the four white switches on top of the gyro are in the OFF position.

❑ 2. Turn switch #1 to the ON position.

❑ 3. Turn ON your transmitter, then the receiver. Wait ten seconds. Move the rudder stick all the way to one side, back to center, then all the way to the other side and back to center.

❑ 4. Turn the white switch #1 back to OFF, but do not turn OFF your receiver or transmitter. Observe your rudder servo moving back and forth. Now turn OFF the receiver.

Now your gyro has recorded its limits and will not travel beyond those limits unless you perform this procedure again.

❑ 5. Turn ON your receiver and move the servo with the rudder stick. It should operate correctly.

Note: While confirming that your rudder servo operates correctly after you have set the limits, you may notice that the rudder servo will reach its limits (endpoints) when the rudder stick reaches only 2/3 of its limit. This is because of the stick expander feature which increases servo throw from the transmitter to provide better resolution. If, after test flying, you wish to cancel this feature, decrease your rudder ATV's. Note that once you have set the servo limits (by performing steps 1 - 5 above), the ATV's will have no effect. The servo limits can be changed only by performing steps 1 - 5 above.

Set The Pulse Rate

Your Heading-Hold Gyro updates or sends information to the tail rotor so rapidly (every 8ms or 12ms depending upon the position of the #2 switch) that it provides ultra-smooth control and operation of your heli. With the #2 switch in the ON position (this is the 8ms selection), the gyro will provide the most optimum performance, but this requires that you use an ultra-fast servo for the tail rotor. For the best results in this setting, use a servo which has a rated rotational speed of 0.11sec/60° or faster.

Do not try to use a servo with slower speed with the #2 switch in the ON position, as the servo will not be able to keep up with the operating speed of the gyro and could ultimately become damaged. With the #2 switch in the OFF position (this is the 12ms selection), the gyro can be used with normal, slower servos. With the receiver OFF, set the #2 switch to the correct position.

Note: If, in the future, you wish to adjust the switch to work with a faster or slower servo, you must adjust the switch with the receiver OFF. Adjusting the switch with the radio on will not change the setting.

Set The Gyro Mode

With switch #3 in the OFF position, the gyro will operate in standard, non heading-hold mode at all times. With the switch in the ON position, you are able to switch between heading-hold mode and standard mode from your transmitter.

To switch the gyro into heading-hold mode (where you can switch back into standard mode from the transmitter) follow the instructions that follow.

❑ 1. Turn switch #3 on the gyro to the ON position. Turn ON your transmitter, then your receiver. Wait ten seconds before moving the gyro or giving an input to the transmitter.

❑ 2. Set the auxiliary switch on your transmitter so that in one position the gyro is in standard mode, and in the other position the gyro is in heading-hold mode. The position of the switch is up to you.

❑ 3. Confirm that you have set your gyro correctly. With your aux. switch in the standard gyro mode, move the gyro back and forth and move the control stick. The gyro will behave as a standard gyro.

❑ 4. Switch to Heading-Hold mode from your transmitter using your aux. switch. Move the rudder control stick slowly to one side, then return it to center. Notice that the control horn on the servo will move with the stick to its limit, but remain even when the stick is returned to center. This is the Heading-Hold feature. Your gyro is holding the heading of your helicopter.

❑ 5. To set the sensitivity of your gyro while in Heading-Hold, adjust the ATV of the side of the aux. switch that controls Heading-Hold. Start at about 40%.

❑ 6. To adjust the holding power of the gyro while in heading-hold mode, adjust the dynamic pot on top of the gyro with a small Phillips screwdriver. Start at about 40%.

Note: The sensitivity and dynamic adjustment of the gyro are not one in the same. Sensitivity adjusts how much the gyro feels.

Dynamic adjustment determines how aggressively the gyro holds heading. Also note that the sensitivity in standard mode does not affect the sensitivity in heading-hold mode.

❑ 7. While your gyro is in standard mode, the LED will flash quickly. While your gyro is in heading-hold mode, the LED will flash slowly.

❑ 8. In the heading-hold mode, the gyro holds the position of the tail as long as there is no stick input from the pilot. The position in which the gyro will hold the helicopter is set either when switching ON the receiver when it is in heading-hold mode, by switching from standard to heading-hold mode from the transmitter, or after every stick movement.

Note for aerobatic pilots: For performing aerobatics that require much tail response, we recommend you mix your gyro sensitivity (aux.) with your aerobatic pitch curves (Idle up 1, Idle up 2) using your flight conditions. This way you can automatically access a lower gyro setting, and a different gyro setting for each of those aerobatic pitch curves.

To better understand the function and advantages for using a heading-hold gyro, try these tests.

1. Set your gyro to operate in standard hold mode. Turn ON the transmitter and receiver.

2. Rotate the gyro on the bench. The tail rotor servo will move as you turn the gyro, but will always return to neutral.

3. Now switch to heading-hold mode. Rotate the gyro and hold it in a new position. The tail rotor servo will move with the gyro but stay in the new position. Rotate the gyro to the original position. The servo will return to neutral. This means that while you are flying, any outside forces that tend to rotate the helicopter will cause the tail servo to adjust the helicopter until it (the tail) returns to the original position! In effect, the gyro is working with the rudder servo to hold the tail.

4. While still in heading-hold, move the tail stick to one side until the servo has reached its limit. Now move the stick back to neutral. The tail servo will not respond. The gyro will wait until you move the stick to a new position before it adjusts the tail. Now turn the gyro until the servo returns to neutral. This is the new position of the gyro (helicopter). **Note:** A slow drift of the servo's neutral position during heading-hold mode is normal. During flight this drift will be corrected by the gyro.

Set The Gyro Direction

❑ 1. Confirm that your gyro is responding in the correct direction. With the system on, turn your gyro quickly to the right. The tail rotor servo should respond in a direction that will provide a left input to the tail rotor. If it does not, turn the reverse switch on top of the gyro (#4) to the ON position.

❑ 2. Turn OFF the receiver, wait ten seconds, turn ON the receiver, wait ten seconds, and repeat the procedure. Now your tail rotor servo will respond in the correct direction.

MOUNT THE GYRO IN YOU HELICOPTER

❑ 1. Wherever you decide to mount your gyro, make sure it is securely mounted so it cannot break free during flight. Although the gyro is mounted in a protective case, as with any electronic device, you must protect it from vibration or shock. Test fit the gyro in the location of your helicopter intended for the gyro. If the gyro is too large, you will have to find an alternate location. Wherever you decide to mount your gyro, make sure it is in a strategic location where it is not likely to hit the ground or be hit by parts of your helicopter that may break away in a crash (such as the battery pack). Use one layer of 1/8" (3mm) double-sided foam mounting tape to mount your gyro, and make certain none of the surfaces of the gyro contacts any part of the helicopter. Some modelers prefer to fashion a strap from a rubber band for extra security. Clean the mounting surfaces with alcohol so your gyro will remain secure.

❑ 2. Make certain you mount your gyro with the axis of rotation (noted on the label on the gyro) aligned with the yaw axis of your helicopter (the main rotor shaft).

❑ 3. You may use servo extension cords if the cords on your gyro are not long enough to reach your receiver.

❑ 4. Piezo crystals are sensitive to temperature changes. It is important that you mount your gyro in a ventilated area to avoid excess heat buildup during operation. Avoid mounting your gyro close to the engine or muffler, or locations on your helicopter that do not provide any air flow.

LED INDICATOR

The LED is attached to the gyro by wire and it can be mounted in the helicopter where it can be seen during flight. The LED shows the current status of the gyro and warns of any voltage drop or loss of radio signal by flashing in different sequences.

❑ 1. After switching the receiver ON, the LED will continually flash "X - X - X" if all functions are operating normal.

❑ 2. If your receiver battery voltage drops below 4.2V for more than 2 seconds, the LED will flash "XX - XX - XX". If you see this during flight, LAND IMMEDIATELY. Re-charge your battery before you fly again.

❑ 3. If your receiver battery voltage drops to a point where signal to your receiver completely disappears for 100ms (0.1 seconds) or longer, either indicating a severely weak battery or poor power connections, the LED will flash "XXX - XXX - XXX". If you observe this signal, LAND IMMEDIATELY and check all radio and power equipment and correct the problem before you fly again.

❑ 4. If the LED flashes four times "XXXX - XXXX - XXXX" or five times "XXXXX - XXXXX - XXXXX" the gyro's microprocessor has detected an undefined problem. If you observe this signal, check all radio and power connections, and all mechanical connections related to your tail control.

USING YOUR GYRO AT THE FLYING FIELD

The first thing to do is confirm that the gyro is operating correctly. After that, fine tune the sensitivity in the standard, non heading-hold mode.

❑ 1. Before the first flight of the day, allow your helicopter to sit at your flying site for about ten minutes before you turn on the receiver and fly. This gives your gyro time to adjust to the temperature outdoors. This will avoid unwanted drifts during flight.

❑ 2. Don't forget; after you turn ON the receiver, do not move the helicopter for ten seconds. During this time the gyro will calibrate the piezo sensor's center position, and will confirm that the gyro is functioning correctly as indicated by the blinking LED with consecutive single flashes.

❑ 3. Make certain the tail rotor servo is responding in the correct direction. With the Tx and Rx ON, rotate the helicopter to the right. Observe the tail rotor servo. Make sure it responds with a left input as you move the helicopter to the right.

WARNING! Always start your helicopter in standard mode. When ready, switch to heading-hold mode during a hover. If you start out in heading-hold, the helicopter may begin to turn its tail as soon as it lifts off the ground. The gyro will remember the position it was in when you turned ON, then return to that position when you lift into a hover.

❑ 4. In normal, non heading-hold mode, start your engine. Lift your helicopter into a hover. Observe how the heli feels and pay attention to the action of the tail. Slowly increase the gain (using the ATV in your Tx) until the tail of the model starts to hunt from left to right. At this point the sensitivity is too high. Reduce the gain until the tail stops hunting. Now your sensitivity is set at its optimum position.

❑ 5. Take the helicopter into forward flight. Do not attempt 540° stall turns with the gyro in its maximum setting. Other aerobatics may be equally difficult with a gyro that is "turned up too high." Switch to your lower gyro settings (using your aux. switch or your programmable mixes with your other pitch curves) and test the sensitivity the same way you did while hovering. If the tail hunts, the gain is too high. Land the helicopter, reduce the gain in that pitch curve, and try again.

Now you may switch to Heading-Hold Mode.

❑ 6. While In Heading-Hold mode, the gyro holds the position of the stabilized axis as long as the stick is centered. While you move the stick, the gyro is "disconnected" and is working the tail directly. After you return the stick to center, the gyro recognizes this as its new holding position.

❑ 7. Don't forget, while in Heading-Hold mode the LED will flash slowly.

❑ 8. Do not adjust your tail rotor trim while in heading-hold mode. Using the trim is the same as giving a stick input and will cause the tail to rotate. Trim your helicopter only when the gyro is operating in standard mode. Then, you may switch to Heading-Hold mode.

❑ 9. When in heading-hold, all mixing functions to the tail must be turned OFF. Any signal other than the center position will start your helicopter turning.

While in heading-hold mode, you can fly your helicopter backwards or sideways at high speed, as long as the tail rotor has enough power to hold the tail. The dynamic adjustment has much influence to the heading-hold mode, adjusting how hard the tail is held.

GENERAL TRANSMITTER SETUP NOTES

While in standard mode you can use all the standard helicopter mixing functions such as revolution mixing.

While in heading-hold mode do not program any tail mixing. When operating in this mode, you must inhibit any mixing functions affecting the tail. The sensitivity of the heading-hold gyro can be adjusted from the transmitter with any free proportional auxiliary channel or with the flight mode switch, so the response can be adjusted during flight. The operating mode of the gyro ("standard" or "heading-hold") can be switched with this auxiliary channel as well.

TECHNICAL SPECIFICATIONS

Voltage range:	3.3V - 9V DC
Current consumption:	45mA
Weight:	2.12oz (60g)
Dimensions:	2.1 x 1.6 x 1.6" (53 x 41 x 41mm)
Temperature Range:	14° - 140° F (-10° - +60° C)

Servo-limiter built into software 10-bit microprocessor, clock speed 18MHz, 1536 bit

ONE YEAR WARRANTY STATEMENT
***USA and Canada Only**

Heli-Max warrants this product from defects in materials and workmanship for a period of one year from the date of purchase. During that period, Heli-Max will, at its option, repair or replace without service charge any product deemed defective due to those causes. You will be required to provide proof of purchase (invoice or receipt). This warranty does not cover damage caused by abuse, misuse, alteration or accident. If there is damage stemming from these causes within the stated warranty period, Heli-Max will, at its option, repair or replace it for a service charge not greater than 50% of its then current retail list price. Be sure to include your daytime telephone number in case we need to contact you about your repair. This warranty gives you specific rights. You may have other rights, which vary from state to state.

For service on your Heli-Max product, warranty or non-warranty, send it post paid and insured to:

HOBBY SERVICES
1610 Interstate Drive
Champaign, IL 61822
Attn: Service Department
Phone: (217) 398-0007 9:00 A.M. - 5:00 P.M. Central Time M-F
E-Mail: ***hobbyservices@hobbico.com***

We can also be reached on the internet at:

www.hobbies.net/helimax

*For warranty and service information if purchased outside the USA or Canada, see the additional warranty information (if applicable) or ask your retailer for more information.

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