

### INTRODUCTION

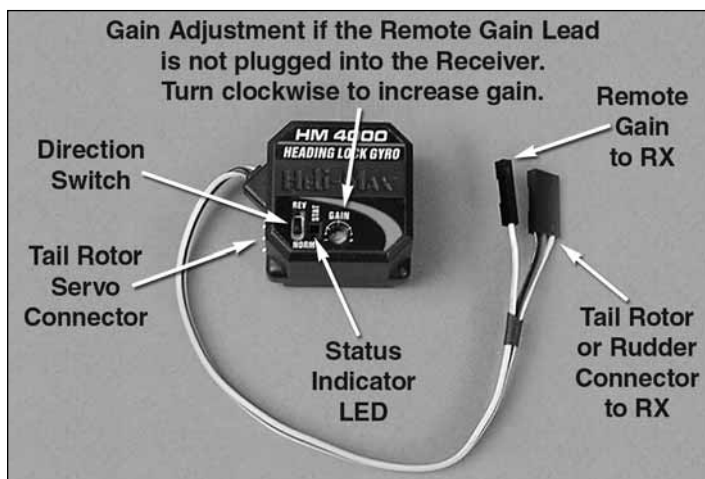
Thank you for purchasing the Heli-Max HM4000 Heading Lock Gyro. Please read through this instruction sheet before starting installation. This gyro has been tested extensively and the best initial settings are listed within this manual. The HM4000 Heading Lock Gyro is a high-performance, lightweight gyro to be used with electric helicopters of any size.

### Contents

- ❑ (1) HMXM1012 Heli-Max HM4000 Heading Lock Gyro

### Required (Not Included)

- ❑ (1) Electric Helicopter
- ❑ (1) FUTQ1000 Futaba Gyro Foam Mounting Pads 30x30mm (3 pieces)
- ❑ (1) Small, flat-bladed screwdriver



**EPA / ATV (Tail Rotor):** 70% (Left) / 70% (Right)  
**Dual Rate:** 100% (Left) / 100% (Right)  
**Exponential:** -40% (Left) / -40% (Right)  
**Trim Step (Tail Rotor Trim):** set to 1 after initial flight  
**Gain:** Normal 45% (AVCS), Idleup1 45% (AVCS), and Idleup2 45% (AVCS)

### INSTALLATION

- ❑ 1. Once your helicopter is fully assembled and you are ready to install the gyro, you should verify that the tail rotor slider and linkage moves freely. Any friction will degrade the performance of any gyro and shorten the life of the tail rotor servo. If there is any friction in the tail rotor pitch control, please take a few minutes now to fix the problem.
- ❑ 2. Please follow the instructions provided with your helicopter and install the tail rotor servo. Remove the servo arm attachment screw and servo arm.
- ❑ 3. To remove any grease or mold release agents from the gyro and helicopter, moisten a paper towel with isopropyl alcohol and clean the bottom of the gyro and the gyro mounting location on the helicopter. Before moving to the next step, allow time for the isopropyl alcohol to evaporate.

- ❑ 4. Peel one side of the protective paper from the gyro mounting pad. Carefully center the mounting pad on the bottom of the gyro and press down firmly.

- ❑ 5. It is best to test fit the gyro onto the helicopter. This will allow you to find the best orientation for the gyro, which will provide the most convenient access to the wires and allow the best wire routing. Please keep the gyro at least [76mm] away from the main motor or electronic speed control. On most helicopters available today, the gyro will mount either on the top or bottom of the tail boom clamp. Please refer to the instruction manual for your helicopter to determine the recommended mounting location for the gyro.

- ❑ 6. Plug the gyro's 3 wire connector into the tail rotor (rudder) channel on the receiver (typically channel 4 for Futaba transmitters). Ensure that the white wire is aligned with the signal wires of the other plugs connected to the receiver.

- ❑ 7. Plug the remote gain wire coming from the gyro into the remote gain channel on the receiver (typically channel 5 for Futaba equipment). Ensure that the white wire is aligned with the signal wire of the other plugs connected to the receiver.

- ❑ 8. Using the label as a reference, plug the tail rotor servo into the side of the gyro. The signal wire must face the control leads exiting the gyro and the black wire must face the outside of the gyro. If necessary trim the connector as shown so it will fit into the gyro.

- ❑ 9. Once you have found the best orientation, you can peel the protective paper from the mounting pad and mount the gyro onto the helicopter.

- ❑ 10. Bundle the excess wires together using hook and loop material or wire ties. Review your work and verify that none of the wires can become entangled in the main rotor gear, swash plate or other rotating components on the helicopter. Verify that all of the wires are plugged into the correct locations and all of the signal wires are in the correct location.

- ❑ 11. The setup discussed here will be for Futaba radio systems. Most of the parameters should carry over to other brands of transmitters. Please refer to your transmitter instructions for exact programming instructions. Turn your transmitter on. Go to the gyro function within the radio and enable this function. Select the desired gain switch on the transmitter and set the gain to +45% for gain A and -45% for gain B. These are temporary settings that will be used for setup only. Verify that all tail rotor compensation mixing (Revo Mixing) is disabled in the transmitter and all offsets or sub-trims are set to 0.

#### WARNING

**To prevent the possibility of the main rotors turning during setup, you must disconnect the main drive motor from the ESC or remove the pinion gear from the motor. Failure to do this may result in injury to yourself or damage to the model and its surroundings.**

- ❑ 12. Connect the flight battery to the ESC on the helicopter. You must allow 7 to 10 seconds for the gyro to initialize. During this initialization do not move the helicopter. Once the gyro has initialized you will notice that the LED status indicator on the gyro will turn on.

□ 13. Install a servo arm onto the tail rotor servo. Please note the current position of the arm and move the tail rotor stick full left. Hold for one second and allow the control stick to re-center. If the servo returns to center every time, then you are in non-heading lock mode which is what we require to continue with the setup. Please move onto the next step. If the servo does not return to center, then you are in heading lock mode. Please change the gyro gain switch on the transmitter and re-test until the servo re-centers every time.

□ 14. Now that we know the gyro is in normal mode we need to position the servo arm properly. Remove the servo arm and place it onto the servo so that the arm is perpendicular or parallel to the servo. Most servos use an odd number of splines so it is possible to achieve different mounting positions by simply rotating the arm by 90° intervals. Once you have found the best mounting position, remove the unused sides of the arm.

□ 15. Mount a control ball onto the servo arm 7.5mm from center. Apply thread locking compound to the screw and nut. Reinstall the servo arm mounting screw.

□ 16. Our goal is to have maximum mechanical throw without any binding. The first step is to verify centering and throw limits for the gyro, servo, and helicopter. Move the tail rotor stick full left on the transmitter and hold the tail rotor pushrod ball link over the control ball on the tail rotor servo. Now perform the same thing using full right tail rotor. Evaluate the alignment and throw and make any length adjustments necessary to the t/r pushrod. Once you have the throw centered, if you have determined that the pushrod is not traveling far enough, simply move the control ball one hole out from center on the servo arm. If you have determined that less throw is needed simply move the control ball in one hole towards center on the servo arm.

□ 17. Apply full right tail rotor and verify that the tail rotor will cause the nose of the helicopter to move to the right. If you have trouble trying to determine which direction the tail rotor operates for left and right, please refer to the helicopter's instruction manual.

□ 18. Pick the helicopter up by the main shaft with the nose facing away from you. Now rotate the nose of the helicopter to the left (counter clockwise). While doing this verify that the gyro compensates in the correct direction. In this example the gyro would apply right tail rotor (clockwise) to compensate for the helicopter rotating to the left (counter clockwise).

□ 19. Set the gain to 45% heading lock mode. Set any secondary gain %'s to 45% heading lock mode at this time. Later on you can make adjustments as necessary.

□ 20. The ATV or End Point function within your transmitter will control the maximum pirouette rate. The ATV and End Point functions in the transmitter have no control over how far the tail rotor servo will travel. If you are having any binding problems in the tail rotor linkage, then you must adjust the control ball location on the servo arm instead. Set the ATV or End Points for the Tail Rotor channel (Rudder – typically channel 4 for Futaba) to 70% for left and right directions. This will reduce the pirouette rate to a reasonable level for your first flights. If you feel that the pirouette rate is slow after the first test flight, then increase the ATV or End Point values until you have achieved a setting you like. If you feel the pirouette rate is too quick, then reduce the ATV or End Point values.

□ 21. Exponential should be used on the transmitter to help soften the feel of the tail rotor stick. On a Futaba transmitter use –40% Expo to start with (typically this is channel 4 on Futaba transmitters).

□ 22. Please review your work and ensure all connectors are firmly plugged in. Verify that the gyro compensates in the correct direction and the tail rotor servo is responding in the correct direction.

□ 23. Disconnect the power from the helicopter for 30 seconds. Re-connect the power, allowing 7–10 seconds for the gyro to initialize. Once the gyro has initialized, the tail rotor servo should center and remain there. If you notice any slow drifting in the tail rotor servo, please try to trim this out using the tail rotor trim. During the initial flight you may have to make some minor trim adjustments.

□ 24. Your gyro is now setup and ready to fly. Heading Lock mode operates completely different than normal rate gyros. Once you place the model on the ground, you must center the tail rotor pitch slider before starting to spool the blades up. You will have to make some small corrections as the model begins to lift off. Once the helicopter is in the air the gyro will hold the tail at all times unless you make an input. If this is the first time you have flown a Heading Lock gyro, please be patient during the first few test flights until you have become accustomed to the new gyro.

## **GAIN ADJUSTMENTS**

Start with the recommended gain setting of 45% and slowly increase the % until the tail starts to oscillate (wag) during flight. When using a heading lock gyro it is not necessary to run the highest gain possible. Typically you will find the gyro works the best around 3%–5% lower than the maximum gain you can run. Once you have found what you believe is the ideal gain setting, try adding and subtracting 3% to see if operation improves. Finding the ideal gain setting will take some experimentation.

If the gyro is allowing the tail to drift then raise the gain % and test fly the model.

If the tail is quickly oscillating (wagging), then lower the gain % and test fly the model.

## **TROUBLESHOOTING**

**The gyro indicator light does not come on.** *Make sure the rudder and gyro gain control leads are plugged into the receiver and verify the polarity of the connections. Verify that the servos connected to the receiver operate.*

**I cannot control the tail rotor after takeoff.** *Verify that the gyro compensation direction is correct and that the drive system and linkages to the tail rotor are in proper working condition.*

**The model spins out of control after lift off.** *Verify that the gyro compensation direction is correct. If the compensation direction is incorrect, the model will spin uncontrollably.*

**The trim changes constantly in flight.** *Verify that there are no issues in the tail rotor drive system and the pitch control linkage. Extreme heat near the gyro may cause some drift. Vibration will cause the trim to shift and erratic operation of the gyro. If you notice any vibrations in the mechanics, please address that issue first.*