Futaba.

GYRO & GOVERNOR

GY701

Advanced and adaptive operation

GYRO QUICK START

CE

The Futaba® GY701 is a heading hold AVCS gyro and head speed governor in one box. Its cutting-edge MEMS (Micro Electro Mechanical System) sensor design, ultra high-speed processing and advanced PID control algorithm put it a quantum leap ahead of all other heading hold gyros in size, weight and performance. The GY701 has been optimized for model helicopter competition.

Please read through this guide completely before flying the GY701. You must also read the instruction manual in its entirety (including all of the precautions and safety warnings). The goal of this quick start guide is to get you up and flying with the GY701 in a minimum number of steps. It is also recommended that you find the optimum settings using the gyro mode only. Once you have found the optimum settings and are satisfied with the flight performance, please refer to the GY701 instruction manual to begin governor setup. This quick start guide also assumes that you are familiar with your transmitter and programming functions.

The information within this manual will provide a heading hold 3D setup that is mild overall. If you feel any changes are necessary, please refer to the GY701 instruction manual.

If you want to setup Normal Mode only (non heading hold), then please refer to the GY701 Instruction Manual.

Prepare your model by installing the servos, receiver and power system. Leave the servo arm off of the tail rotor servo and do not connect the tail rotor servo to the GY701 until you have completed the setup later in this guide. Once the correct tail rotor servo type has been selected, the servo can be connected to the control box.

GYRO SENSOR INSTALLATION

The gyro sensor should be mounted on a rigid platform, at least 6 in [152mm] away from a Nitro Engine. It is not necessary to mount the gyro near the main shaft of the helicopter, but it is very important that the mounting area chosen is rigid. Please refer to your helicopter manufacturer's instructions for recommended mounting locations.

Installing the gyro sensor

When mounting the gyro in a larger electric or .50 through .91 size nitro helicopter, we recommend using one 2mm Mounting Pad.

Gyro Sensor

2mm Mounting Pad

Gyro Mount
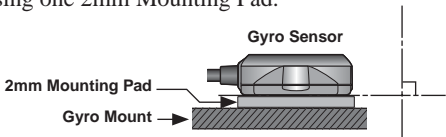
TROUBLESHOOTING

If you experience erratic gyro operation (drifting, not holding well or inconsistent pirouette rate), please follow the troubleshooting tips listed below.

1. Always verify that your model's tail rotor control and drive system are working correctly.

2. Electromagnetic interference could affect the gyro or tail rotor servo. Mount the gyro in a different location, away from the electronic speed control, servos and drive motor.

3. The trouble may be caused by vibration. Verify that your helicopter's components are balanced. If problems persist, try mounting the gyro in a different location.
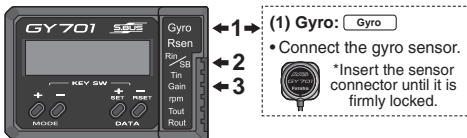
TAIL ROTOR SERVO INSTALLATION & SETUP

Follow your transmitter instructions and program the transmitter as follows:

❏ Enable the gyro function within the transmitter.

❏ Set the gyro mode to AVCS (GY) within the transmitter.

❏ Set the remote gyro gain to 70% AVCS in the transmitter for the Normal and Hold flight conditions. Use 60% AVCS for all idle up conditions. See "Setting The Gain" section in the instruction manual for more details.

❏ Set the Tail Rotor ATV/EPA to 100% for both left and right.

❏ Set D/R to 75% for both left and right. This will reduce the maximum pirouette rate. Make adjustments to these values once the initial test flight has been completed.

❏ It is recommended that you run 30% softening expo on the tail rotor channel within the transmitter.

⚠**WARNING** ⊘ Do not connect the tail rotor servo to the gyro until the servo type has been selected. Operating the servo using the incorrect setting may damage the GY701 or the servo.

(1) Gyro: `Gyro`
• Connect the gyro sensor.
  *Insert the sensor connector until it is firmly locked.

Receiver

(2) Rin/SB:
• S.BUS receiver: Connect to the S.BUS output of the receiver.
• Other than S.BUS receiver: Connect to the rudder channel output. `Gyro`

(3) Gain: `Gyro`
• Connect to the gyro gain channel output.

Find a suitable location for the GY701 control box and mount it using double sided tape. Connect the gyro sensor to the [Gyro Rsen] connector on the control box and ensure the clip is firmly engaged. Connect the supplied extensions to the GY701 connecter. Route the wires through the helicopter mechanics and connect them to the appropriate receiver channels. If you are using a standard receiver, then the only two connections needed are Receiver Tail Rotor Channel → GY701 [Rin] connection and Receiver Gain Channel → GY701 [Gain] connection. To determine the appropriate receiver channels, please check your transmitter's instruction manual.

If using a Futaba S.Bus receiver, then only one extension is needed between the S.Bus Receiver connection and the GY701 [SB] connection. If any other information is needed please see the "S.Bus Basic Setting" section of the GY701 Instruction Manual.
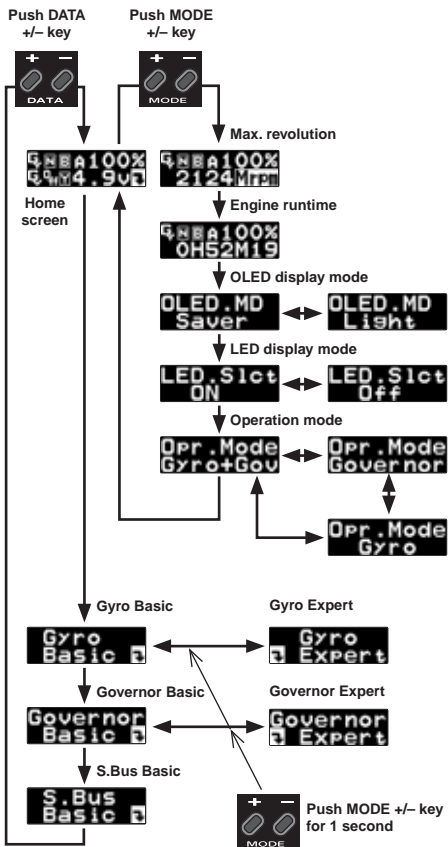
CONTROL BOX INSTALLATION

Using wire mounts, wiring fixtures molded into the helicopter, or hook and loop material, route the extensions to the receiver. Ensure that the extensions leading to the receiver cannot become entangled in rotating components and make sure the extensions are not rubbing against metal or carbon fiber which may damage the wires. Once the power system is installed and connected, please move onto the next step to learn how to program the gyro.

GY701 BASIC SETUP
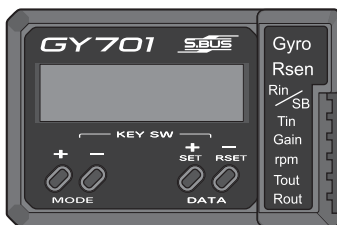
Turn your transmitter on and allow it to initialize. Switch the helicopter on and allow the GY701 to initialize. During the initialization of the gyro, the screen will show an animated helicopter. Once the screen changes to show status, the initialization is complete.

Push DATA
+/– key

Push MODE
+/– key

Home screen

Max. revolution

Engine runtime

OLED display mode

OLED.MD Saver ↔ OLED.MD Light

LED display mode

LED.Slct ON ↔ LED.Slct Off

Operation mode

Opr.Mode Gyro+Gov ↔ Opr.Mode Governor ↕ Opr.Mode Gyro

Gyro Basic — Gyro Expert

Governor Basic — Governor Expert

S.Bus Basic

Push MODE +/– key for 1 second

From the home screen the mode [+] and [–] button
will take you through the various status screens for
the gyro or governor. It also displays basic options.

MENU STRUCTURE

From the home screen the data [+] and [–] button
will navigate the upper menus which include the
Home screen, Gyro Basic, Governor Basic and S.Bus
Basic menus. Once the menu you would like to enter
is selected (for example Gyro Basic), simply press
the mode [+] or [–] button to navigate the options.
Once you have found the option you would like to
change simply press the data [+] or [–] button.
Please take a few minutes to become accustomed
to navigating the interface.

To select an Expert menu (for example Gyro Expert
or Governor Expert) simply press either mode [+]
or [–] button and continue to hold for one second.
If you have performed this correctly the screen will
change to either Gyro Expert or Governor Expert.

Feel free to navigate the various menus and change
options since we will be completely resetting the
gyro and governor before beginning setup. Please
review the menu structure listed to become familiar
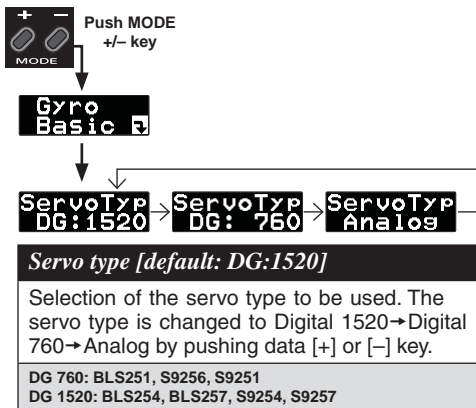with the options available.

GY701 SETUP

Once you are done navigating the menus and have
become accustomed to the user interface it is time
to reset the gyro and governor. Cycle the receiver
power and allow the gyro to initialize. Press the data
[+] button until Gyro Basic is shown on the display.
Press and hold the mode [+] button for one second
to enter Gyro Expert Mode. Once the screen shows
Gyro Expert, press the mode [–] button until "Data
Reset?" is shown. Next press the data [+] button and
the display will change to show "Exec.??". The gyro
is asking you for confirmation before resetting the
gyro. Press the data [+] button again and the gyro will

be reset to the defaults and the screen will change to "Exec.—" to confirm that the gyro has been reset.

Cycle the receiver power and allow the gyro to initialize. To disable the governor, press the mode [+] button until "Opr.Mode Gyro+Gov" is shown. Press the data [+] button until the screen shows "Opr.Mode Gyro". This indicates that the gyro only is operating and the governor has been disabled. Press the mode [+] button until the home screen is shown again.

Press the data [+] button until "Gyro Basic" is shown. Press the mode [+] button to scroll through the menu options until "ServoType" is displayed on the screen. Press the mode [+] button until the proper servo type has been selected.

Push MODE +/– key

```
Gyro
Basic
```

```
ServoTyp      ServoTyp      ServoTyp
DG:1520   →   DG: 760   →   Analog
```

Servo type [default: DG:1520]

Selection of the servo type to be used. The servo type is changed to Digital 1520→Digital 760→Analog by pushing data [+] or [–] key.

DG 760: BLS251, S9256, S9251
**DG 1520: BLS254, BLS257, S9254, S9257**

⚠WARNING

❶ The servo type parameter must match the type of servo you are using. Incorrect setting may damage the GY701 or the servo, possibly resulting in a loss of control during flight.

Turn the receiver and transmitter power off for now.

TAIL ROTOR SERVO INSTALLATION

❏ Install the tail rotor servo into the mechanics and connect the servo to the gyro. Remove the servo arm screw from the servo. Turn the receiver power on and allow the gyro to initialize. Enter the "Gyro Basic Setting" mode and go to parameter (4) "Servo Limit Point Setting". While in the servo limit setting the servo will remain centered.
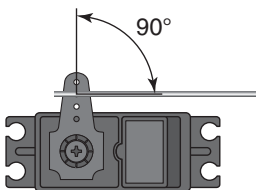
❏ Place an appropriate servo arm onto the servo and ensure that it is perpendicular to the tail rotor pushrod as shown. Remove the unused sides of the servo arm.

❏ Install the control ball supplied with your helicopter onto the servo arm. For larger electric models or nitro powered models we recommend placing the ball 13.25mm from center. Once the control ball has been installed, place the arm back

onto the servo ensuring that it is perpendicular to the tail rotor pushrod. Install the servo arm screw.

13.25 – 16.5 mm
(Depending on T/R linkage geometry)
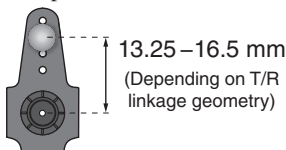
Carefully hold the tail rotor pushrod ball link onto the servo arm and verify that the tail rotor operation matches the transmitter stick input. If necessary, reverse the operation direction within your transmitter.

Press the mode [+] key until "GY.Dir Normal" is shown on the screen. Carefully hold the tail rotor pushrod ball link onto the servo arm. Rotate the helicopter counter clockwise (or what would normally be left tail rotor) and ensure that the gyro compensates by adding right tail rotor. If the gyro compensates the incorrect direction, then press the data [+] or [–] key until the gyro compensates the correct direction.

Gyro direction [default: Normal]
The gyro compensation direction is changed by pushing the data + or – key.

⚠ WARNING

❶ Verify that the gyro compensates in the correct direction before flight. If the compensation direction is incorrect the model will pirouette uncontrollably, at a very high rate.

Next we need to set the servo limits within the gyro to ensure the tail rotor servo does not travel too far, causing binding. While performing this step, simply hold the tail rotor pushrod link onto the tail rotor servo ball link to ensure nothing can bind and cause damage to the servo.

Enter the "Servo Limit" setting menu on the GY701. From the home screen press the data [+] key until Gyro Basic is shown on the screen. Now press the mode [+] key until "Sv.Limit" is shown on the screen. Move the tail rotor stick slowly towards full left and full right while listening for servo binding. Press the data [+] or data [−] key to increase or decrease the servo travel limit. The goal is to have maximum throw with no binding or servo buzzing at the end points.

```
Sv.Limit
B: 100 %
```

Limit setting [default: 100%, setting range: 50 150%]

⚠ WARNING

❶ When using the GY701 for the first time, or when making changes in the throw of a servo, always perform the limit setting operation.

Press the mode [+] key until "FLT.mode" is displayed on the screen. It is recommended that you start with the 3D flight mode even for beginners. The 3D mode offers a higher pirouette rate and better pirouette consistency. Press the data [+] key until "FLT.mode 3D" is displayed on the screen.

FLT.Mode ↔ FLT.Mode
F3C   3D

Flight mode [default: F3C]

Selection of the flight style. F3C mode is more precise rudder control; the 3D mode is more active rudder control; pirouette speed is faster than F3C mode. The mode is changed by pushing the data+ or – key.

Pirouette rate at AFR100% to full stick:
 F3C = 450 deg/sec
 3D = 720 deg/sec

SETTING THE PIROUETTE RATE

The pirouette rate of the GY701 is controlled by the gyro rotation rate settings and the transmitter tail rotor channel endpoints or dual rates. When using the 3D flight mode it is recommended to reduce your tail rotor channel end points or dual rates within the transmitter to 75% and then test the pirouette rate. If the pirouette rate is too slow, then increase the tail rotor channel end point or dual rates within the transmitter.

FINISHING UP

Ensure that all extensions and servo wires are attached and bundled within the helicopter and that everything is plugged in correctly. Before the test flight verify all settings and ensure that the gyro compensates the proper direction.

Ensure that:

❏ the Transmitter and Receiver batteries are fully charged.

❏ the gyro mounting pads are in good condition.

❏ the gyro wiring has some slack in it and all wires are clear of the main frame.

❏ the GY701 servo type parameter matches the servo you are using.

❏ the tail rotor servo arm is perpendicular to the pushrod and the pitch slider is centered.

❏ the servo does not bind when full left or full right tail rotor is applied.

❏ the gyro is operating in the correct mode (AVCS or Normal).

❏ the tail rotor stick operates the tail rotor the correct direction.

❏ the gyro compensates the correct direction when the helicopter is rotated.

❏ the gain is set correctly and the gyro operates in the correct mode (AVCS or Normal) in every flight condition.

⚠**WARNING**

❶ Always make small (1%) adjustments to the tail rotor D/R or EPA once the value exceeds 100%. Over 100%, it is possible to exceed the sensor's Angular Velocity Sensing Range (+/- 1,200° per second). The gyro will then no longer control the pirouette rate or consistency. The pirouette rate can be extremely fast.

If you experiment with the ultra-fast pirouette rate, make sure that your flight battery and fuel tank are secure. Also be certain that your model's tail rotor drive train is up to the task.

The gain should be raised until the tail begins to oscillate quickly (also called Tail Wag). Once this point has been achieved, reduce the gain by a couple of percent and test fly the model again. Check and set the gain for each flight mode. Typically the gain will be lower for the Idle up 1 and Idle up 2 flight modes due to the higher head speed being used. The gain for the Hold condition can also be much higher than other flight modes since the head speed is lower and the engine vibration is minimized.

The Tail Rotor AFR or D/R function within the transmitter is used to adjust the pirouette rate of the helicopter. For example at 100% D/R, with the gyro set to F3C mode, the helicopter will achieve a 450 deg/sec pirouette rate. If you would like the model to pirouette faster, then increase the AFR or D/R. If you would like the model to pirouette slower, then decrease the AFR or D/R.

FINISHING UP

The tail rotor ratio, tail rotor pitch range and tail blade length play a large part in achieving optimum tail rotor performance. The gain value can vary drastically from model to model and the exact value should not play a part in the evaluation of the gyro's performance. How the gyro operates during flight is the only concern of ours.