

Thank you for buying a GY240 AVCS gyro.

Before using your new gyro, please read this manual thoroughly and use the gyro properly and safely. After reading this manual, store it in a safe place.

- No part of this manual may be reproduced in any form without prior permission.
- The contents of this manual are subject to change without prior notice.
- This manual has been carefully written. Please write to Futaba if you feel that any corrections or clarifications should be made.

## I FOREWORD

The GY240 is a high performance, small, and light weight AVCS (Angular Vector Control System) gyro developed for model helicopters.

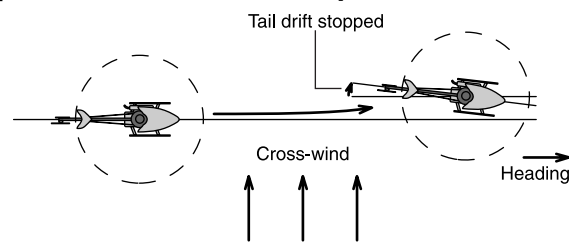
Because the sensor section and control circuit are integrated, mounting is easy.

### AVCS Gyro

Conventional gyros send control signals to the rudder servo only when the tail of the helicopter moves. When the tail stops moving, the control signal from the gyro becomes zero. Conversely, the AVCS gyro continues to send control signals to the servo even when the tail of the helicopter stops moving.

The following sequentially describes the conventional gyro and the AVCS gyro.

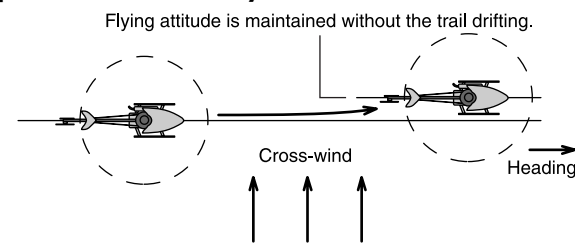
#### Operation of Conventional Gyro



Basic operation is described by considering the case when the helicopter is hovering under cross-wind conditions. With a conventional gyro, when the helicopter encounters a cross-wind, the force of the cross-wind causes the tail of the

helicopter to drift. When the tail drifts, the gyro generates a control signal that stops the drift. When the tail stops drifting, the control signal from the gyro becomes zero. If the cross-wind continues to cause the tail to drift in this state, the "stop" operation is repeated until the tail faces downwind. This is called the "weathervane" effect.

#### Operation of AVCS Gyro



Conversely, with an AVCS gyro, when the helicopter encounters a cross-wind and the tail drifts, a control signal from the gyro stops the drift. At the same time, the gyro computes the drift angle and constantly outputs a control signal that resists the cross-wind. Therefore, drifting of the tail can be stopped even if the cross-wind continues to effect the helicopter. In other words, the gyro itself automatically corrects (auto trim) changes in helicopter tail trim by cross-wind.

Considering operation of an AVCS gyro, when the tail of the helicopter rotates, the servo also rotates in accordance with the angle of rotation of the tail. When the tail stops rotating, the servo judges that it has stopped in that position. This is the auto trim function.

## Special Markings

Pay special attention to the safety at the parts of this manual that are indicated by the following marks.

Mark	Meaning
<b>Danger</b>	Procedures which may lead to a dangerous condition and cause death or serious injury to the user if not carried out properly.
<b>Warning</b>	Procedures which may lead to a dangerous condition or cause death or serious injury to the user if not carried out properly, or procedures where the probability of superficial injury or physical damage is high.
<b>Caution</b>	Procedures where the possibility of serious injury to the user is small, but there is a danger of injury, or physical damage, if not carried out properly.

Symbol: ; Prohibited ; Mandatory

## 2 FEATURES

### Adoption of AVCS

Since rudder trim changes caused by changes in tail reaction torque changes due to wind and other meteorological changes and main rotor rotation variations are automatically cancelled, tail (rudder) operation is easy, making it perfect for beginners.

### SMM gyro sensor

Use of a new extremely small drift SMM (Silicon Micro Machine) gyro sensor virtually eliminates rudder trim changes during flight.

### High-speed, high-precision control

High-speed, high-precision control realized by digital advanced control by microcomputer.

### Small, light weight, integrated type

Small size (27 x 27 x 20mm) and light weight (25g) are realized through high precision mounting technology.

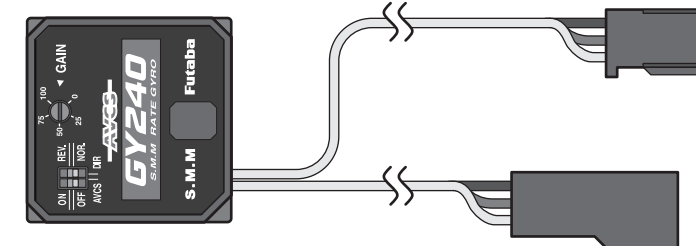
### Conductive resin case

Conductive resin case improves anti-EMI (static electricity, radiowave interference) characteristic.

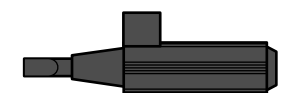
## 3 SET CONTENTS

The GY240 comes with the following accessories:

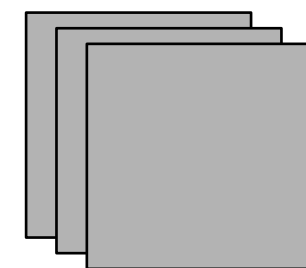
### GY240



### Mini screwdriver (for adjustments)



### Double-sided tape (3 sheets)



### Ratings

- (Integrated sensor type AVCS rate gyro)
- Control system: Digital advanced PI (Proportional Integration) control
  - Gyro sensor: SMM (Silicon Micro Machine) system vibration gyro
  - Operating voltage: +4 to +6VDC
  - Operating temperature range: -10°C to +45°C
  - Dimensions: 27 x 27 x 20mm
  - Weight: 25g (including connector)
  - Functions: Sensitivity trimmer, gyro operating direction adjustment switch, AVCS on/off switch

## 4 FUNCTIONS AND CONNECTIONS

### AVCS on/off switch (AVCS)

Turns the AVCS function on and off. In the "off" position, the GY240 operates as a conventional gyro.

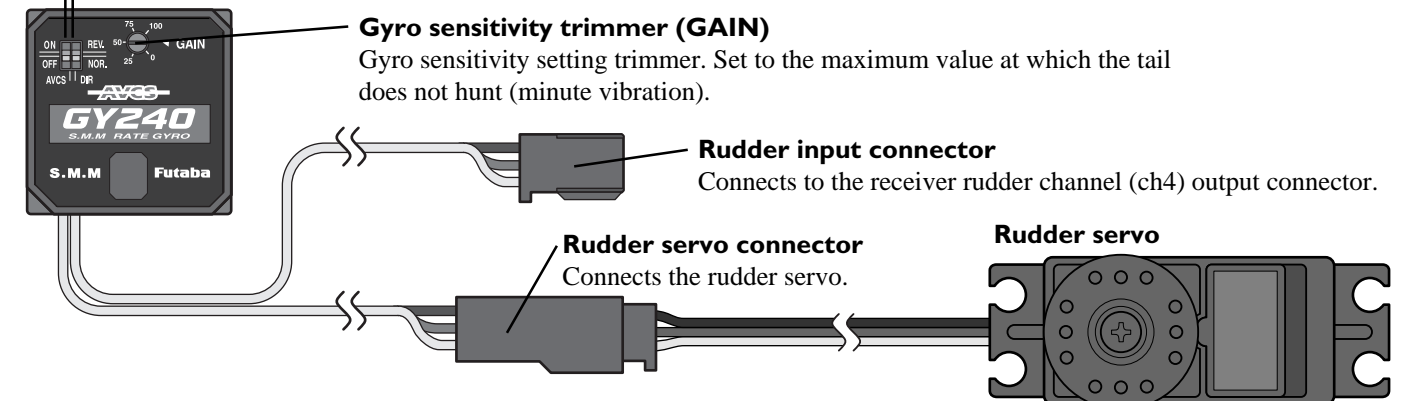
### Gyro direction switch (DIR)

Switches the gyro control direction. Must be switched according to the main rotor rotating direction and rudder linkage direction.

(If you try to fly a helicopter with a clockwise rotation rotor with the gyro in the reverse direction, the nose will swing to the left.)

### Gyro sensitivity trimmer (GAIN)

Gyro sensitivity setting trimmer. Set to the maximum value at which the tail does not hunt (minute vibration).



This section describes how to use the GY240. Mount and adjust the GY240 as described below.

**Switch and Trimmer Operation**

To make the GY240 small and lightweight, a small switch and trimmer are also used. Be careful when operating the switch and trimmer. Always operate the switch and trimmer with the mini screwdriver supplied.

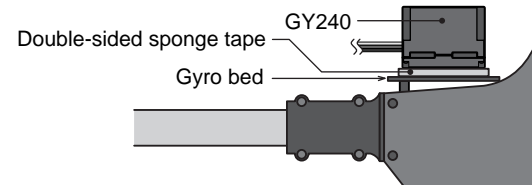
**Mounting to Fuselage**

1 Set the AVCS on/off switch to "off".



Push the white protruding part of the switch in the arrow (down) direction.

2 Install the GY240 body to the helicopter gyro bed using the double-sided sponge tape supplied with the GY240. At this time, check that the bottom of the gyro body is perpendicular to the main rotor shaft (parallel to the tail pipe).

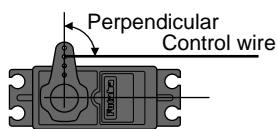


When used with a motor helicopter, install the GY240 at least 10cm away from the drive motor.

3 Connect the GY240 rudder servo connector to the rudder servo.

4 Connect the GY240 rudder input connector to the receiver rudder channel (ch4) connector.

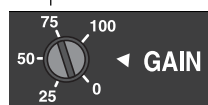
5 Install the rudder servo and tail control wire linkage and servo horn in accordance with the helicopter instruction manual. For the gyro to display top performance, it must be linked at a position at which the servo horn and control wire are perpendicular at the rudder neutral position.



Set the length of the servo horn based on the model manufacturer's instructions.

6 Try moving the rudder stick to the left and right, and check the direction of operation of the rudder servo. If the rudder servo moves in the opposite direction, use the transmitter reverse function to reverse it.

7 Set the gyro sensitivity trimmer to the approximately 75% position.



First, turn the trimmer fully clockwise. At this time, the position at which the trimmer cuts in is the 100% position. Set the cut-in position to the 75% position.

8 If the rudder servo moves to the left when the nose of the helicopter turned to the right, the gyro direction is correct. If the servo moves in the opposite direction, switch the gyro direction switch.

If the rudder servo moves in the opposite direction, switch the switch.



Since this switch is close to the adjacent switches, switch it carefully.

\* If you try to fly the helicopter while the gyro operation direction is wrong, the nose will swing to the right or left.

**Flying Adjustment**

In the AVCS mode, the gyro automatically sets the rudder neutral position. Therefore, it is impossible to judge if the mechanical rudder neutral position changed. Consequently, during initial flight and when correcting the linkage, turn off the AVCS function and adjust the mechanical rudder neutral position.

**(Rudder neutral adjustment)**

1 First, to adjust the rudder neutral trim, start with the AVCS on/off switch in the "off" position.



Since this switch is close to the adjacent switches, switch it carefully.

Push the white protruding part of the switch in the arrow (down) direction.

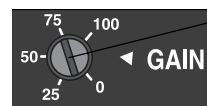
2 Set transmitter revolution mixing (pitch to rudder) to 0% or "off".

3 Next, turn on the transmitter power, then turn on the gyro power (shared with the receiver, etc.). Since the GY240 initializes the data when the power is turned on, never move the helicopter for about three seconds.

4 Lift off and hover, then adjust the rudder neutral position with the transmitter trim lever.

For large deviation, use the fuselage linkage to adjust the rudder neutral position.

5 Adjust the gyro sensitivity to just before the helicopter tail starts to hunt.



When hunting occurs, set to a lower value.

Adjust the sensitivity gradually while checking for hunting.

For more information, see <One-Point Advice>.

**(AVCS Adjustment)**

6 Turn off the gyro power and turn on the AVCS on/off switch.

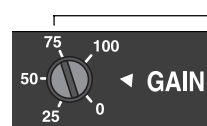


Since this switch is close to adjacent switches, switch it carefully.

Push the white protruding part of the switch in the arrow (up) direction.

7 In the transmitter power on state, turn on the gyro power. At this time, hold the transmitter rudder stick in the neutral position and do not move the helicopter for approximately three seconds.

8 Hover the helicopter and adjust the gyro sensitivity to just before the helicopter begins to hunt.



When hunting occurs, set to a lower value.

Adjust the sensitivity gradually while checking for hunting.

For more information, see <One-Point Advice>.

9 Adjust the rudder effect with the transmitter rudder adjustment functions (ATV, AFR, D/R, etc.).

**Rudder Neutral Adjustment**

In the AVCS mode, the servo does not return to the neutral position even when the rudder stick is returned to the neutral position. When you want to check the servo neutral position during linkage neutral check, etc., set the AVCS switch to the "off" position, or move the rudder stick at least three times larger to the left and right in one second intervals and immediately return the stick to the neutral position. This operation resets the AVCS function and outputs the neutral signal to the servo.

**Setting Precautions**

**⚠ Caution**

- ❗ Always use the attached sensor tape to mount the gyro sensor. Always reinstall the sensor tape if it has started to separate or tear.
- ❗ When mounting the GY240, leave a small margin so that the gyro connection cable is not stretched tight. If the cable is stretched tight, the gyro will not display top performance. If the gyro is dislodged, the gyro may malfunction and is very dangerous.
- ❗ When used with a motor helicopter, mount the GY240 as far away as possible (at least 10cm) from the drive motor. The drive motor generates strong electromagnetic noise. This noise may interfere with the gyro sensor and cause erroneous operation.
- ❗ Mount the GY240 so that metal and other conductive parts do not touch the case of the GY240. The GY240 uses a conductive resin case to reduce static electricity and electromagnetic interference. Since the surface of the case is conductive, it may cause a short circuit.
- ❗ Insert the connectors fully and firmly. If vibration, etc. causes a connector to work loose during flight, the heli may crash.

**Fuselage Maintenance Precautions**

**⚠ Caution**

- ❗ Always perform proper maintenance for ultimate performance. The rigidity of the fuselage tail has a large effect on gyro performance.

**<One-Point Advice>**

The gyro sensitivity also changes with the length of the servo horn.

If the sensitivity is too low, lengthen the servo horn. Conversely, when hunting does not stop, shorten the servo horn.

**<Other Precautions>**

- To improve the tail control characteristic, a delay function is added to the rudder control signal from the transmitter. When this signal is passed through the gyro, movement of the servo is slower than the transmitter rudder operation. This is normal.
- When the fuselage is static, the servo may move a little. This is normal and occurs because the gyro sensitivity is set to a high value.

**Operating Precautions**

**⚠ Caution**

- ⊘ Do not move the helicopter and the transmitter rudder stick from the neutral position during about 3 seconds (during initialization) when turning on the gyro power.
- ⊘ Never use the transmitter rudder trim in the AVCS mode. When the power is turned on, the GY240 judges that the rudder stick is in the neutral position. Operating the rudder trim during flight will change the neutral position.
- ❗ Avoid sudden temperature changes. Sudden temperature changes will cause the neutral position to change. For example, in the winter, do not fly immediately after removing the model from inside a heated car and in the summer, do not fly immediately after removing the model from inside an air conditioned car. Allow the model to stand for about 10 minutes and turn on the power after the temperature inside the gyro has stabilized. Also, if the gyro is exposed to direct sunlight or is mounted near the engine, the temperature may change suddenly. Take suitable measures so that the gyro is not exposed to direct sunlight, etc.
- ❗ When using the GY240 in the AVCS mode, set revolution mixing to OFF (or 0%).
- ❗ Check the remaining receiver and gyro/servo ncd battery operating time during the adjustment stage and decide how many flights are remaining.

**Repair Service**

Before requesting repair, read this instruction manual again and recheck your system. Should the problem continue, request repair service as follows:

Describe the problem in as much detail as possible and send it with a detailed packing list together with the parts that require service.

- Symptom (Including when the problem occurred)
- System (Transmitter, Receiver, Servo's and model numbers)
- Model (Model name)
- Model Numbers and Quantity
- Your Name, Address, and Telephone Number.

If you have any questions regarding this product, please consult your local hobby dealer or contact the Futaba Service Center.