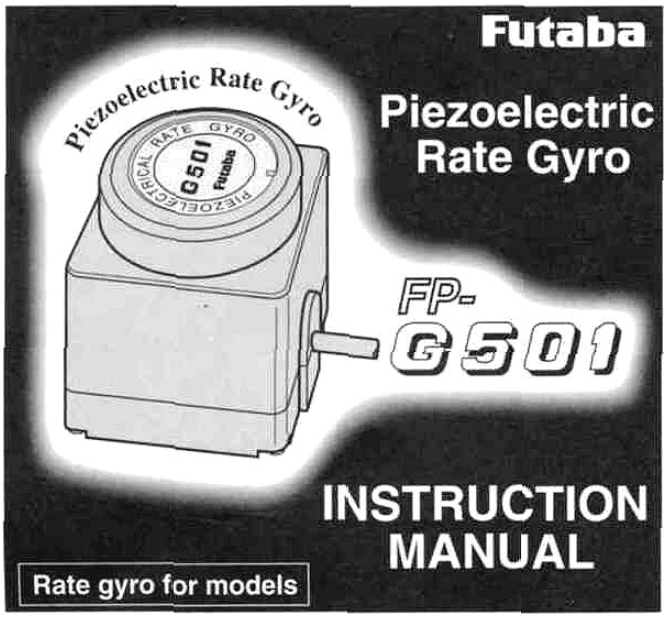


D60510

FOREWORD

Thank you for buying a Futaba FP-G501 piezoelectric rate gyro.

The FP-G501 is used with model helicopters and fixed wing aircraft when wanting to suppress changes in the aircraft's attitude by changes in air currents, engine torque, etc.

The FP-G501 features a very fast response speed and high gyro sensitivity made possible by using a piezoelectric ceramic element as the angle sensor. In the past a rotating motion was used which resulted in a wide dynamic range that allowed constant control of the rotating speed which was much slower performance. To obtain full performance from this rate gyro and also for safety, please read this manual before use. After reading this manual, please retain it for future use. Also read the instruction manual supplied with the digital proportional radio control set, model kit, and engine.

NOTE: The FP-G501 should be used with the FP-S9203 to obtain maxima performance. If used with another servo, the FP-G501 may not operate satisfactorily, or yield maximum performance.

CONTENTS

IMPORTANT:

For safe use, read the items indicated by the following caution mark especially carefully.

! ;Caution mark

1. FEATURES

• Minimizes changes in an aircraft's attitude by wind, etc.

The especially high frequency response of the piezoelectric gyro allows an increase in gyro sensitivity. The original ability of a gyro to suppress changes in an aircraft's attitude due to wind and engine torque changes and other unexpected phenomena has been increased substantially.

• Angular acceleration commands used.

To take advantage of the wide dynamic range of the piezoelectric gyro, angular acceleration commands are used. The transmitter stick operating angle becomes the aircraft command for angular acceleration and the aircraft rotating speed is proportional to the stick operating angle that is obtained while maintaining stabilization performance. This is the greatest merit of the piezoelectric rate gyro over conventional gyros. Fixed rotation of the aircraft can be commanded by the transmitter stick operating angle.

• Piezoelectric gyro drift cancellation.

Deviation of the gyro from the direction to be maintained (neutral) is called drift. When the power is turned on, the FP-G501 senses this drift and automatically compensates it during gyro operation. Therefore, do not move the aircraft for four to five seconds after turning on the power.

• FP-S9203 high response servo.

To take advantage of the excellent response of the **FP-G501** and to extract the ultimate performance of the piezoelectric gyro, a FP-S9203 coreless servo has been designed for this purpose.

• Sensor vibrationproofing.

A special suspension is built into the gyro to vibration-proof the sensor element itself. The sensor is protected against unwanted vibrations around the sensor shaft while maintaining high response.

• Simple sensitivity adjustment.

High side and low side sensitivity can be easily adjusted from 0 to 100% each by means of control box trimmers.
The sensitivity can also be adjusted from the transmitter.

(Terminology)

Piezoelectric gyro

Whereas the conventional gyro uses a rotating body to sense angular acceleration, the piezoelectric gyro uses a piezoelectric ceramic element. When rotation angular acceleration is applied while the piezoelectric ceramic element is vibrating, force proportional to the rotation angular acceleration is generated in the direction perpendicular to the direction of vibration. The piezoelectric element is flexed by this force and the angularacceleration is sensed by extracting the change of this vibration as an electric signal. The gyro is called a piezoelectric gyro because of this principle. An amplifier processes the sensed signal, together with the control signal from the transmitter, and controls the servo.

2. SET CONTENTS

	Single set	Set w/servo
Gyro	FP-G501	
Servo		FP-S9203
Accessories	Small screwdriver (for adjustment) Double-sided tape (for gyro mounting)	

3. MOUNTING AND CONNECTIONS

Mounting precautions

The amount of improvement of gyro performance has a considerable effect on the fuselage vibration level or the size, type, linkage method, looseness, **etc.** of the tail rotor.

The use of a tale rotor drive tube or other part with a high torsion performance for the tail drive is recommended. Since a higher gain than usual can be used then the tail rotor is more effective, the load on the tail is also greater. Therefore, take the strength of the tail into account during inspection and adjustment.

Gyro mounting

Mount the gyro so that it is on a straight line with the **axis you** want to stabilize as shown in the mounting example

In this case, stick thick double-sided tape (use the double-sided tape supplied with the gyro) to the entire bottom of the sensor so that unwanted vibrations of the fuselage are not directly transmitted to the sensor and the gyro is fastened firmly to the fuselage.

Control amp mounting

Wrap the control amp in sponge and mount it the same as the receiver.

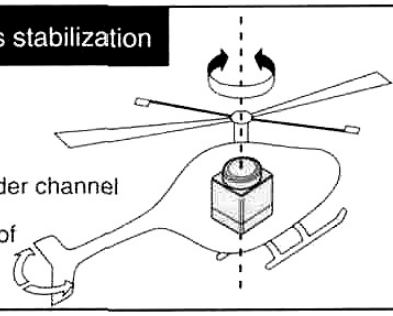
Control box mounting

Modify the aircraft to match the mounting position hole and mount the control box, or fasten the control box to the aircraft with double-sided tape.

Mount the control box where vibration and exhaust are small.

Mounting examples

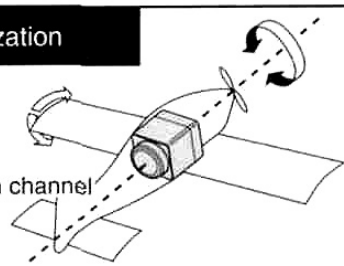
Helicopter yaw axis stabilization



- Rudder use

Connections
Connector A
➡ To receiver rudder channel
Rudder servo
➡ To "SX" output of control amp

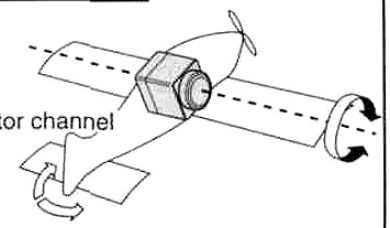
Aircraft roll axis stabilization



- Aileron use

Connections
Connector A
➡ To receiver aileron channel
Aileron servo
➡ To "SX" output of control amp

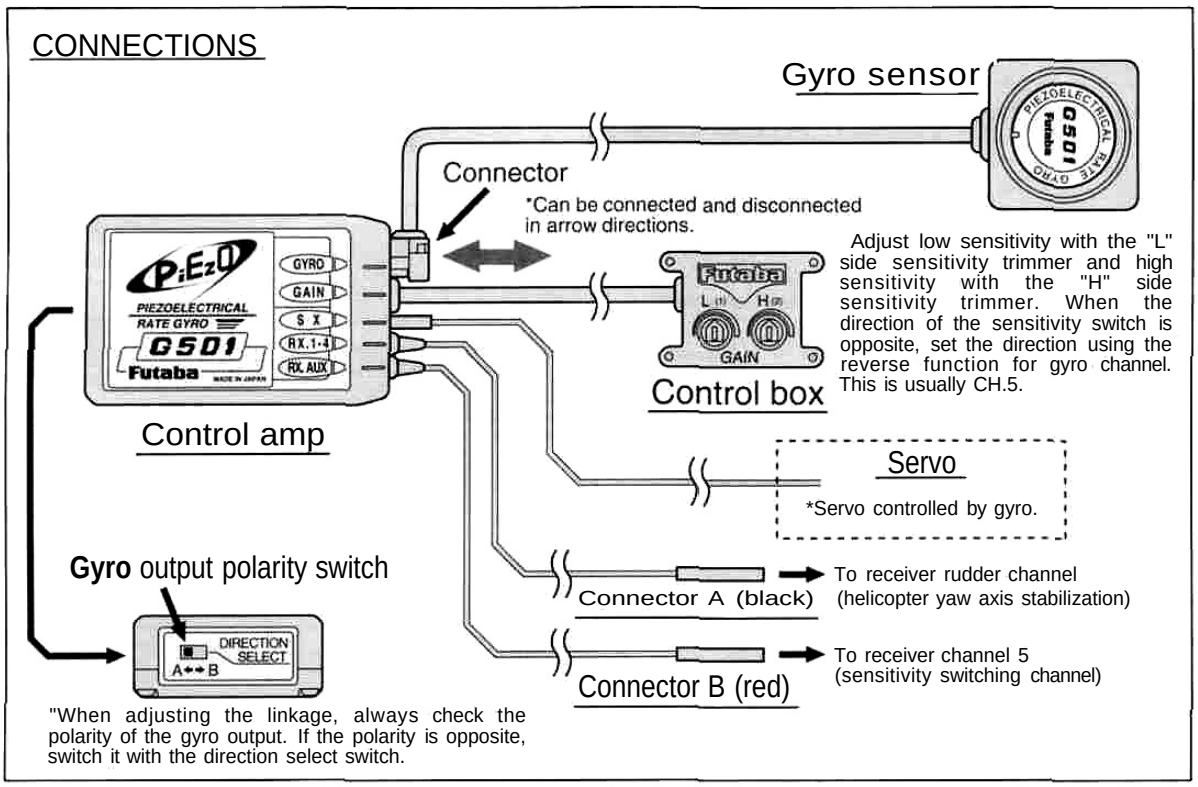
Aircraft pitch axis stabilization



- Elevator use

Connections
Connector A
➡ To receiver elevator channel
Elevator servo
➡ To "SX" output of control amp

CONNECTIONS



PRECAUTIONS WHEN TURNING ON THE RECEIVER POWER

Never move the aircraft for four or five seconds after turning on the gyro power (shared with receiver).

Since initialization is automatically performed inside the gyro immediately after the power is turned on, if the aircraft is moved at that time, the neutral position will change. In this case, turn on the power again.

At this time, the rudder servo (servo controlled by gyro) moves to the home position after the servos on the other channels, but this is normal.

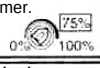
4. SENSITIVITY ADJUSTMENT

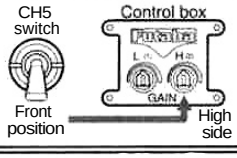
There are two methods of adjusting the sensitivity.
(1) adjustment at the gyro (2) adjustment from the transmitter

(1)Adjustment at the gyro

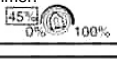
The sensitivity can be arbitrarily **set over the 0 to** 100% range to correspond to the position of the transmitter sensitivity switch with the control box sensitivity high side and low side trimmers.

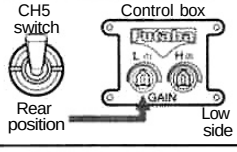
(Hovering sensitivity)
When the CH5 (sensitivity switching) switch is in the front position, the sensitivity can be adjusted from 0 to 100% with the control box high side trimmer.
• Setting standard: Approximately 75°





(Climbing sensitivity)
When the CH5 (sensitivity switching) switch is in the rear position, the sensitivity can be adjusted from 0 to 100% with the control box low side trimmer.
•Setting standard: Approximately 45%

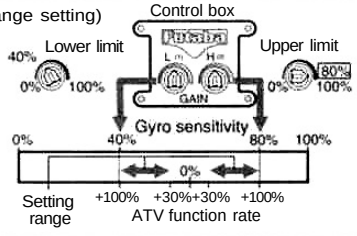




(2)Adjustment from the transmitter

■When ATV function is used
(When reverse function is normal)

(Sensitivity adjustment range setting)
After deciding the upper and lower limits of the sensitivity adjustment range with the control box high side and tow side trimmers, adjust the sensitivity using the transmitter CH5 ATV function.
●'Setting standard:
Upper limit Approximately 80%
Lower limit Approximately 40%



(Hovering sensitivity)
Adjust the CH5 switch Iront position ATV rate and adjust the sensitivity high side.
The higher the ATV value, the higher the sensitivity.
● Setting standard:
ATV rate: Approximately 75%

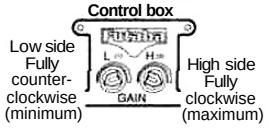
(Climbing sensitivity)
Adjust the CH5 switch rear side ATV rate and adjust the sensitivity low side.
The higher the ATV value, the lower the sensitivity.
• Setting standard:
ATV rate: Approximately 75%

*With a PCM1024Z Series transmitter, the sensitivity can **be** adjusted from 0 to 100% using the AFR function.

■When using PCM1024Z Series transmitter program mable mixing can be used.

1. First, set the sensitivity adjustment range to maximum at the control box.

(Sensitivity adjustment range setting)
Set the control box high side and low side trimmers as shown at the right so that the sensitivity can be adjusted from 0 to 100% from the transmitter.



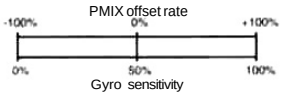
2. Next, set the transmitter as follows for each flight condition.

Programmable mixing (PMIX) setting
(1) Set PMIX to one circuit.
(2) Select "OFS" (offset) type.
(3) Make CH5 (GYR) the slave **channel.**

In this state, the gyro sensitivity for each flight condition (hovering, forward flight, etc.) can be arbitrarily set by setting the PMIX function rate.

The following shows the relation between mixing rate and gyro sensitivity.

PMIX offset rate and sensitivity



(4) At this time, release the CH5 (GYR) switch by software as follows:

Function control(FNC) setting
Set the CH5 (GYR) switch to "NUL" (not used state).

(5) Also set the CH5 (GYR) ATV function to the following value:

ATV function (ATV) setting
Set the CH5 (GYR) ATV function to 90% in both directions.

5. ADJUSTMENT PROCEDURE

The following describes the adjustment procedure when the FP-G501 is used with a helicopter. Make these adjustments after all the connections are complete.
(All values are for when the FP-S9203 servo was used.)

Rudder linkage adjustment

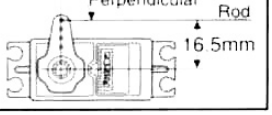
Place the transmitter into the neutral state and adjust the rod as described below so that the neutral position is near the center.

1. Transmitter steering angle setting
Set the ATV function rudder left and right steering angles to maximum.
2. Set the transmitter to the neutral state (including mixing).
-Set rudder subtrim to 0%.
-Set rudder trim to the center.
-Set the throttle stick to the center. (When revolution mixing is on.)
3. Turn on the power.
In this state, turn on the power in transmitter and receiver order.

! At this time, do not move the aircraft for about four or five seconds.

4. Check the rudder direction.
Operate the transmitter stick and check the direction of the rudders. If the direction is incorrect, reverse it.
5. Servo horn mounting
Change the servo horn spline so that the horn is perpendicular to the rod and servo.

"Make the length of the servo horn **as** close to 16.5mm as possible. This may be impossible, depending on the aircraft. In this case, set the servo horn length to maximum.
(Expansion horn: Futaba splined horn "A")



6. Gyro output polarity check
When the nose of the aircraft swings back and forth, check the direction of rudder. If reversed, switch it with **the gyro** control amp polarity switch.

! If the aircraft is flown at reverse polarity, it may swing severely in a fixed direction and this is dangerous. Be sure that the gyro output polarity is correct.

7. Sensitivity selector switch direction check
Set the control box high side trimmer for maximum sensitivity (fully clockwise) and the low side trimmer for minimum sensitivity (fully counterclockwise) and check that the sensitivity switch high side (CH5 switch front position) and low side (CH5 switch rear position) relationship is correct.

Adjustment during flight

•Precautions before flight

Since the piezoelectric gyro uses a angular acceleration command control system, the rudder has an excellent effect despite the high gain.

If hovering was performed at 100% dual rate (rudder) in the past, reduce it to about 80%. When you want to perform a fast spin, use 100%. Since the rudder is very effective near the neutral position, exponential use (40 to 60% for hovering, 60 to 80% for forward flight)

Set rudder trim, rudder offset, and revolution mixing rate to about 1/3 of their normal value. Start rudder offset from neutral.

■ Sensitivity adjustment points

The suitable sensitivity depends on the fuselage, tail rotor, tail drive shaft, servo, and servo horn. However, when starting adjustment, start with the following value as the set value standard.

Sensitivity setting for hovering: 70 to 80%
Sensitivity setting for forward flight and aerobatics: 40 to 50%

'Adjust the sensitivity within the range at which hunting does not occur when moved during hovering.

*If the aircraft was suddenly stopped during operation at a high angular acceleration, hunting may occur. Adjust the sensitivity so that hunting does not occur over the necessary operating range.

*For forward flight, adjust the sensitivity within the range **at** which does not occur hunting.

Trim adjustment

If the trim changes, use the fuselage rod to adjust the trim to near the neutral position.

■ Revolution mixing adjustment

Make the mixing amount small. If the mixing amount is large, control is in the reverse direction. (About 1/3 of normal)

■ Rudder steering angle adjustment

Perform left and right pirouette. If the left and right rotation speeds are different, reduce the high side by rudder ATV function.

6. USAGE PRECAUTIONS

(Operating precautions)

● Do not move the aircraft for four or five seconds after turning on the gyro power (shared with receiver). Since initialization is automatically performed inside the gyro immediately after the power is turned on, if the aircraft is moved at that time, the neutral position may change. In this case, turn on the power again.

● If the gyro remains in the static state for a long time, the neutral position may change. In this case, correct it by turning on the power again.

• **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.

•Since the transmitter rudder channel is operated as the angular acceleration command, do not adjust the rudder channel throw (ATV function) when the aircraft is static. Use ATV function to adjust the rudder effect.

• When the aircraft is static, a dead zone is created in transmitter stick operation. However, this is done to protect the linkage and to restrict the servo output.

•Check the remaining receiver and gyro servo nicd battery operating time during the adjustment stage and decide how many flights are remaining.

(Fuselage maintenance precautions)

•The rigidity of the fuselage tail has a large effect on gyro performance. Therefore, proper maintenance from the beginning is essential for ultimate performance.

• Fuselage vibration also has an adverse affect on gyro operation. Make the fuselage vibration as small as possible.

7. RATINGS

Gyro FP-G501
Power supply voltage: 4.8V (shared with receiver)
Current drain: 35mA (at 4.8V)
Dimensions: (Gyro) 1.18x1.18x1.22in (30x30x31mm)
(Control amp) 2.40x1.50x0.63in (61x38x16mm)
(Control box) 1.30x0.91x0.51 in (33x23x13mm)
Weight: 2.47oz (70g)

Servo FP-S9203
Control system: Pulse width control
Power supply voltage: 4.8V (shared with receiver)
Output torque: 76.4oz-in (5.5kg-cm) (at 4.8V)
Operating speed: 0.11sec/60 deg (at 4.8V)
Dimensions: 1.59x0.79x1.48in (40.5x20x37.5mm)
Weight: 1.87oz(53g)

8. REPAIR SERVICE

Before requesting repair, please refer to this instruction manual again and verify your settings. If you are still experiencing trouble, please request service as follows:

Address
Your nearest Futaba dealer.

Repair information
Describe the trouble in as much detail as possible.
1) Symptom: Including the state of the set when the trouble occurred.
2) Digital proportional set used: Transmitter, receiver, and servo model numbers.
3) Fuselage: Fuselage name and mounting conditions.
4) Your name, address, and telephone number.

Warranty contents
Read the warranty card supplied with your set.
*The warranty contents differ with geographic locations.

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