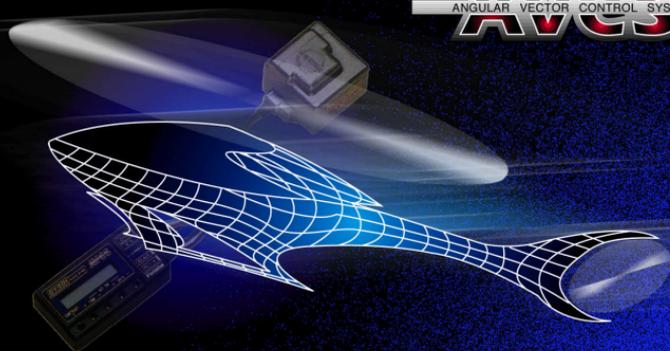


Futaba®

GY501

RATE GYRO

AVCS
ANGULAR VECTOR CONTROL SYSTEM



AVCS GYRO GY501 INSTRUCTION MANUAL

YAW-AXIS STABILIZER FOR MODEL HELICOPTER
(RATE GYRO)

1M23N04302



AVCS GYRO
GY501
INSTRUCTION MANUAL

**YAW-AXIS STABILIZER FOR MODEL HELICOPTER
(RATE GYRO)**

Thank you for buying a GY501 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.

FOREWORD

Up to now, movement of the tail from side to side due to changes in the wind, flight posture, and other disturbances during model helicopter flights was minimized by increasing the sensitivity of the gyro. However, a bad effect is that the sensitivity may be increased too much so there was a limit on how much the tail could be controlled. Changes in F3C rules add forward and reverse flight aerobatics and demand various flight positions so that controlling the position of the tail has become more difficult.

The GY501 gyro uses the Futaba AVCS system and makes it possible to theoretically correct this movement. This increases stabilization of the tail against disturbances. Since F3C contest fliers who use the GY501 gyro together with a high response servo, of course, achieve high stability against wind and other disturbances, it has a large effect also for helicopter novices.

-
- 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.

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FOR SAFETY

To ensure safe use, observe the following precautions.

Meaning of Special Markings

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

Mark	Meaning
 Danger	Procedures which may lead to a dangerous condition and cause death or serious injury to the user if not carried out properly.
 Warning	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.
 Caution	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

Setting Precautions

Warning

Connector Connection

-  **Insert the connectors fully and firmly.**

If vibration, etc. causes a connector to work loose during flight, the heli may crash.

Caution

Precautions When Turning on the Power Switch

During initialization, the message ****INIT*** appears on the GY501 LCD screen.

-  **Do not move the helicopter until this message disappears (in about 5 seconds).**
-  **Also, do not move the transmitter rudder stick from the neutral position during this period.**

Sensor Mounting

-  **Always use the attached sensor tape to mount the gyro sensor.**
Always reinstall the sensor tape if it has started to separate or tear.
-  **Do not get fuel, waste oil, etc. on the gyro sensor.**
The special paint may dissolve.

Caution

At linkage

-  **When the rudder neutral position was changed by the linkage, the rudder neutral position in the AVCS mode must always be re-read before use.**

Re-reading method:

Turn on the transmitter in the AVCS mode, then turn on the gyro .
Or quickly switch (interval of within 1 second) the remote gain channel switch between the AVCS mode and Normal mode at least three times with the transmitter in the ON state. This memorizes the new rudder position inside the GY501.

Operating Precautions

Caution

-  **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.

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

- ⊘ **Never use the transmitter rudder trim in the AVCS mode.**
When the rudder is trimmed during flight, the neutral position will change.

- ❗ **When using the GY501 in the AVCS mode, set revolution mixing to OFF.**

Fuselage Maintenance Precautions

Caution

Mounting Precautions

-  Use a tale rotor drive tube or other part with a high torsion performance for the tail drive.
-  Take the strength of the tail into account during inspection and adjustment.

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.

Since a higher gain than usual can be used then the tail rotor is more effective, the load on the tail is also greater.

-  Always perform proper maintenance for ultimate performance. The rigidity of the fuselage tail has a large effect on gyro performance.
-  Make the fuselage vibration as small as possible. Fuselage vibration has an adverse affect on gyro operation.

BEFORE USE

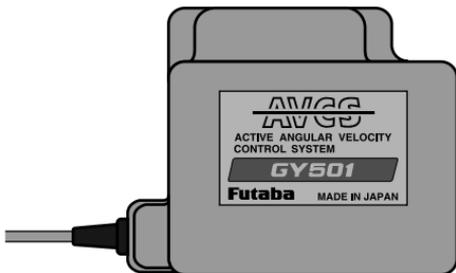
Set Contents

After unpacking the GY501 set, first check if the following parts are provided:

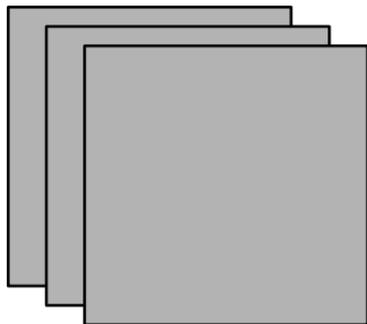


GY501 control amp (x1)

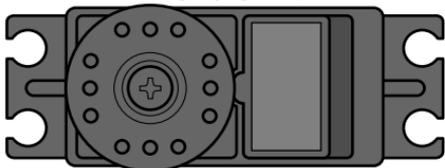
GY501 sensor (x1)



Sensor tape (x3)

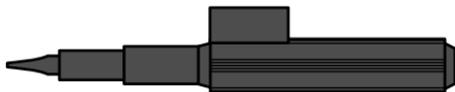


S9205 servo (x1) (Only a set w/servo)



Accessories: Servo horn,
mounting parts

Mini screwdriver (x1)



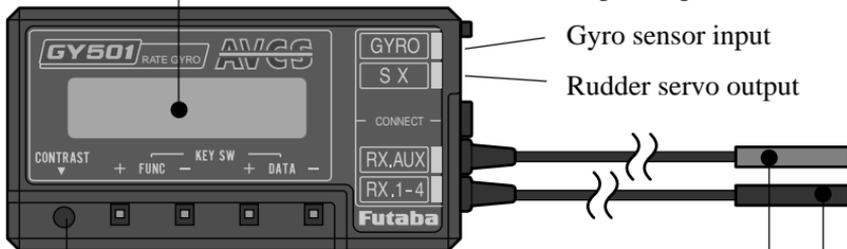
Name and Function of Each Part

GY501 control amp

LCD display

Displays the set data. (8 characters X 1 line)

(Input/output terminals)



Gyro sensor input

Rudder servo output

Edit keys

Used when setting data.

Operated by pushing with the accessory mini screwdriver.

(Receiver connectors)

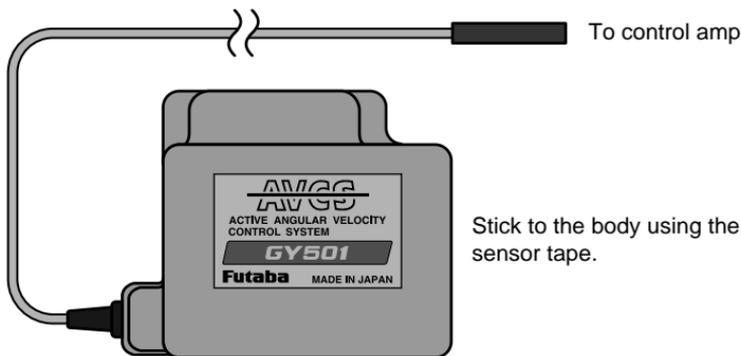
Remote gain input

Rudder input

LCD contrast trimmer

Allows adjustment of the contrast so that the LCD display is easiest to see. It is adjusted with the accessory mini screwdriver.

GY501 gyro sensor



Stick to the body using the accessory sensor tape.

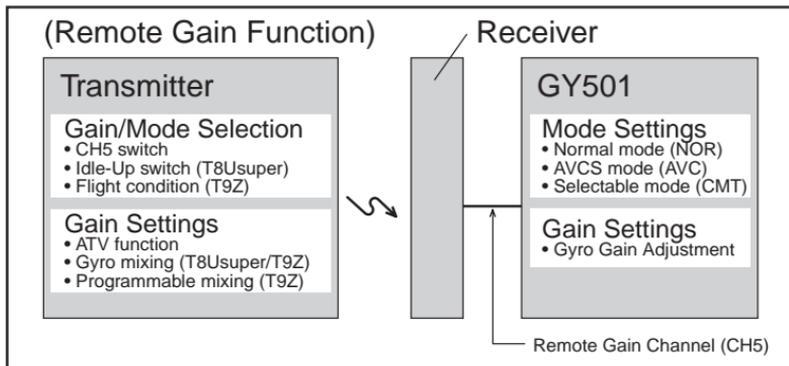
Description of GY501 Operation

The GY501 gyro allows the operator to switch between the AVCS mode (operation using AVCS function) and Normal mode (conventional gyro mode) from the transmitter. Of course, the GY501 can also be used in the AVCS mode only.

Remote Gain Function

The remote gain function lets operator perform AVCS mode and Normal mode sensitivity adjustment and operation mode switching from the transmitter. The channel used here is called the "remote gain channel".

(Channel 5 is used.)



When Using a T9Z World Champion Model Transmitter Gyro Sense Mixing

The Gyro Sense Mixing (GYR) function lets operator perform two-point gain adjustment at each condition. Set the sensitivity at all conditions.

[GY501 Settings]

Select the gyro operation mode at the GY501 Mode screen. (AVC, NOR, or CMT)

[Transmitter Settings]

ATV function:

Adjust both the RATE A and RATE B rates to 100% at the transmitter ATV function setup screen.

Gyro Sense Mixing function:

1. Select the Dual Mode (DUO) at the transmitter Gyro Sense Mixing setup screen.
2. Set the GAIN1 and GAIN2 gains.

(The following page shows a setting example in the CMT mode.)

[Sensitivity Display]

The gain display indicates the actual gain at the GY501 G:1 and G:2 screen. The following shows the relationship between transmitter and gyro setting when GY501 sensitivity setting is 100% in both the G1 and G2 gain modes.

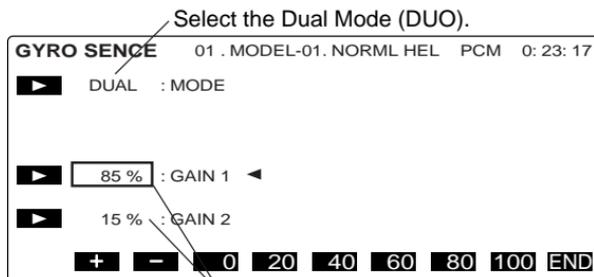
- Relationship between transmitter and gyro setting

Transmitter settings	GAIN1 GAIN2	0%	-	50%	-	100%
GY501mode settings	NOR	Normal mode				
	AVC	AVCS mode				
	CMT	Normal mode (G2)			AVCS mode (G1)	
Actual gain		100%	-	0%	-	100%

(Setting Example)

Adjust the gyro gain at the Gyro Sense Mixing setup screen at each condition.

The following shows a setting example in the CMT mode.



Sensitivity rate

Choose the GAIN1 or GAIN2 by the CH5 switch.

Use the following values as the sensitivity setting standard:

CH5 switch



GAIN1
setting

Hovering

85%

Flight

70%

AVCS side



GAIN2
setting

15%

30%

Normal side

Actual gain

70%

40%

The GY501 sensitivity is 0% at 50%. When set over 50%, the GY501 operates in the AVCS mode and when set under 50%, the GY501 operates in the Normal mode. When setting is changed 1%, the gyro sensitivity is changed 2%.

When Using a T9Z Transmitter Programmable Mixing

The Programmable Mixing (PMX) function lets operator perform a gain adjustment at each condition. Set the sensitivity at all conditions.

[GY501 Settings]

Select the gyro operation mode at the GY501 Mode screen. (AVC, NOR, or CMT)

[Transmitter Settings]

Function Control:

Set the CH5 (GYR) switch to “NUL” at the transmitter Function Control (FNC) setup screen.

ATV function:

Adjust both the RATE A and RATE B rates to 120% at the transmitter ATV function setup screen.

Programmable Mixing function:

1. Select the “ACTIVE” mode (ACT) at the transmitter Programmable Mixing setup screen.
2. Set the mixing type to “OFS”.
3. Set the slave channel to “GYR”.
4. Set the sensitivity rate (RATE).

(The following page shows a setting example in the CMT mode.)

[Sensitivity Display]

The gain display indicates the actual gain at the GY501 G:1 and G:2 screen. The following shows the relationship between transmitter and gyro setting when GY501 sensitivity setting is 100% in both the G1 and G2 gain modes.

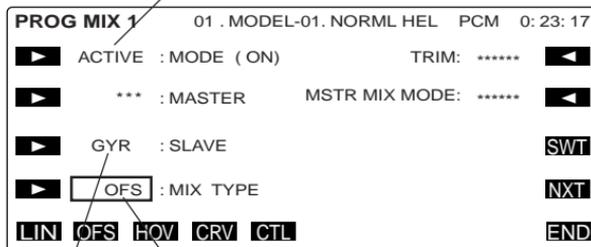
- Relationship between transmitter and gyro setting

Transmitter settings		-100%	-	0%	-	+100%	
GY501mode settings	NOR	Normal mode					
	AVC	AVCS mode					
	CMT	Normal mode (G2)		AVCS mode (G1)			
		Actual gain	100%	-	0%	-	100%

(Setting Example)

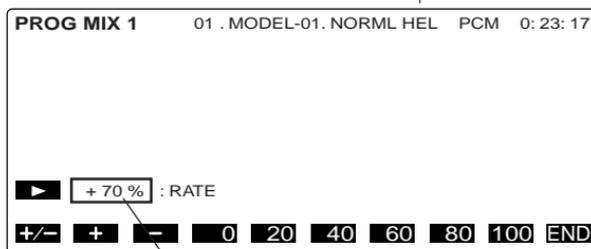
Adjust the gyro gain at the Programmable Mixing setup screen at each condition. The following shows a setting example in the CMT mode.

Select the "ACTIVE".



Select the "GYR".

Select the "OFS".



Sensitivity rate

Use the following values as the sensitivity setting standard:

	Hovering		Flight	
AVCS mode	_____	+70%	_____	+40%
Normal mode	_____	-70%	_____	-40%
Actual gain		70%		40%

When set over 0%, the GY501 operates in the AVCS mode and when set under 0%, the GY501 operates in the Normal mode.

When Using a T8Usuper Transmitter

The Gyro Mixing (GYRO) function lets operator perform a gain adjustment at each Idle-Up switch position.

[GY501 Settings]

Select the gyro operation mode at the GY501 Mode screen. (AVC, NOR, or CMT)

[Transmitter Settings]

Gyro Mixing function:

1. Select the "ON" mode at the transmitter Gyro Mixing (GYRO) setup screen.
2. Select the Idle-Up switch for the sensitivity selection.
3. Set the "NORM", "IDL1" and "IDL2" gains.

(The following page shows a setting example in the CMT mode.)

[Sensitivity Display]

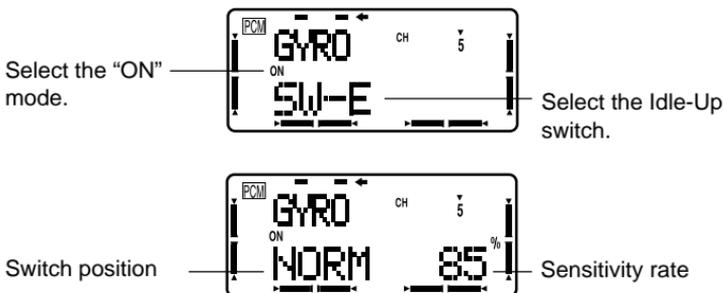
The gain display indicates the actual gain at the GY501 G:1 and G:2 screen. The following shows the relationship between transmitter and gyro setting when GY501 sensitivity setting is 100% in both the G1 and G2 gain modes.

- Relationship between transmitter and gyro setting

Transmitter settings	NORM	0%	-	50%	-	100%
	IDL1					
	IDL2					
GY501mode settings	NOR	Normal mode				
	AVC	AVCS mode				
	CMT	Normal mode	AVCS mode			
		(G2)	(G1)			
Actual gain	100%	-	0%	-	100%	

(Setting Example)

Adjust the gyro gain at each the Idle-Up switch position at the Gyro Mixing setup screen. The following shows a setting example in the CMT mode.



Set the "NORM", "IDL1" and "IDL2" gains at each setup screen.

Use the following values as the sensitivity setting standard:

	(NORM)	(IDL1)	(IDL2)
			
	Hovering	Flight	
AVCS mode	85%	70%	
Normal mode	15%	30%	
Actual gain	70%	40%	

When set over 50%, the GY501 operates in the AVCS mode and when set under 50%, the GY501 operates in the Normal mode.

When Using a Transmitter ATV Function

The ATV function lets operator perform a gain adjustment at each CH5 switch position.

[GY501 Settings]

Select the gyro operation mode at the GY501 Mode screen. (AVC, NOR, or CMT)

[Transmitter Settings]

ATV function:

Set the ATV rates at the transmitter CH5 ATV function.

[Sensitivity Display]

The gain display indicates the actual gain at the GY501 G:1 and G:2 screen.

The following shows the relationship between transmitter and gyro setting when GY501 sensitivity setting is 100% in both the G1 and G2 gain modes.

- Relationship between transmitter and gyro setting

Transmitter settings	ATV rates	CH5 Switch Forward side		CH5 Switch Front side	
		90%	0%	90%	0%
GY501mode settings	NOR	Normal mode	Normal mode	Normal mode	Normal mode
	AVC	AVCS mode	AVCS mode	AVCS mode	AVCS mode
	CMT	Normal mode	AVCS mode	AVCS mode	Normal mode
		(G2)		(G1)	
	Actual gain	100%	0%	0%	100%

When Using a GY501 Gyro Gain Adjustment Function

[Transmitter Settings]

Adjust both the ATV rates to 90% at the transmitter Ch5 ATV function.

[GY501 Settings]

Operation Mode Setting function:

Select the gyro operation mode at the GY501 Mode screen. (AVC, NOR, or CMT)

Gyro Gain Adjustment function:

Set the G:1 and G:2 gains at the GY501 G:x screen.

- Relationship between transmitter and gyro setting

Transmitter settings	ATV rates	CH5 Switch	CH5 Switch			
		Forward side	Front side			
		90% (Fixed)	90% (Fixed)			
GY501mode settings	NOR	Normal mode	Normal mode			
	AVC	AVCS mode	AVCS mode			
	CMT	Normal mode (G2)	AVCS mode (G1)			
	Actual gain	100%	-	0%	-	100%

Initialization

When the power switch is turned on, the GY501 automatically obtains the reference signal for AVCS function correction and initializes itself.

⚠ Caution

Precautions When Turning on the Power Switch

During initialization, the message ****INIT*** appears on the GY501 LCD screen.

- ⊘ **Do not move the helicopter until this message disappears (in about 5 seconds).**
- ⊘ **Also, do not move the transmitter rudder stick from the neutral position during this period.**

AVCS Mode Rudder Trim Reset Function

When the GY501 is used in the AVCS mode only, the AVCS function automatically detects the rudder neutral position and rudder trim is essentially unnecessary. However, when the GY501 is used in the Normal mode, the neutral position is set by conventional rudder trimming.

In the AVCS mode, the rudder stick position when the power was turned on is memorized as the neutral position and when the rudder is trimmed during flight, the neutral position will change.

In the normal mode, when the rudder neutral position was reset, and the GY501 was switched to the AVCS mode in this state, the neutral position will change. To correct the difference in the neutral position in the Normal mode and the AVCS mode, the GY501 reads the rudder signal at the point at which it was switched from the Normal mode to the AVCS mode as the neutral reference point. Therefore, when switching the GY501 from the Normal mode to the AVCS mode, the following precautions are necessary:

[At power ON]

- When the power was turned on in the Normal mode, the rudder neutral position already memorized in the GY501 is used.
- When the power was turned on in the AVCS mode, the rudder signal at that point is memorized and updated.

[During use]

- When using the GY501 in the AVCS mode, set revolution mixing to OFF.
- When the rudder was re-trimmed in the Normal mode and the new trim position also affects the AVC mode, the rudder trim neutral position must be memorized in the GY501. In this case, quickly switch (interval of within 1 second) the transmitter remote gain switch between the Normal and AVCS sides at least three times at

the neutral trim position set in the Normal mode. This memorizes the new rudder neutral position in the GY501. When the transmitter has a function that allows trim setting for each flight condition, such as the T9Z, the AVCS mode trim position is fixed and this operation is unnecessary.

Note: The rudder neutral position is memorized inside the GY501. When the rudder neutral position was changed by the linkage, the rudder neutral position in the AVCS mode must always be re-read before use.

Re-reading method

Turn on the transmitter in the AVCS mode, then turn on the gyro .

Or quickly switch (interval of within 1 second) the remote gain channel switch between the AVCS mode and Normal mode at least three times with the transmitter in the ON state. This memorizes the new rudder position inside the GY501.

Differences Between AVCS Gyro and Conventional Gyro

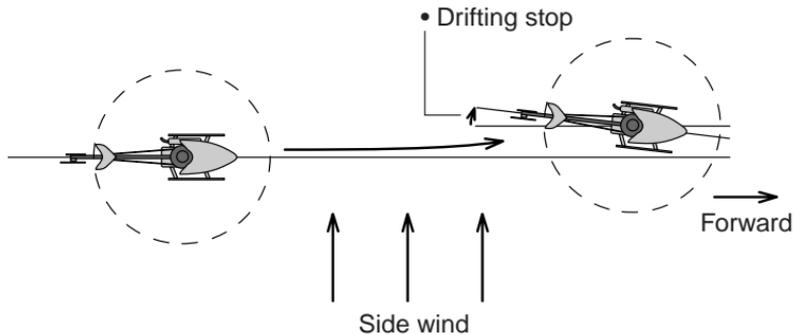
Compared to a conventional gyro, the AVCS gyro has a substantially improved tail control capacity. Gyro operation also differs from that of conventional systems in a number of ways.

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

Conventional gyro

The conventional gyro detects movement of the helicopter's tail and controls the rudder servo so that movement of the tail stops.

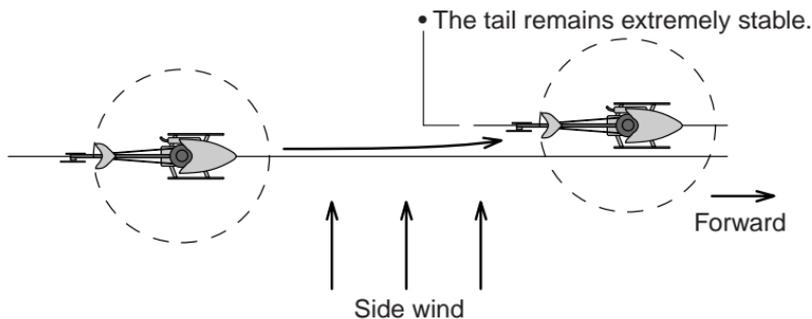
Now, consider hovering when the helicopter is exposed to a side wind, the tail drifts. When the tail drifts, the gyro detects the tail rotation angular velocity and operates the servo in the direction that stops the tail from moving. Drifting of the tail is stopped by control from the gyro. When the tail stops drifting, the control amount from the gyro becomes zero. Since the helicopter is always exposed to side wind, even in this state, the tail starts to drift again. When the tail drifts, the gyro tries to stop it again. The "drifting stop" operation is repeated and the tail continues to drift in the wind direction in this manner. The higher the gyro sensitivity, the smaller the amount of this drift. However, if the sensitivity is high, hunting will occur and, therefore, the sensitivity amp has a limit.



AVCS gyro

This following describes how the AVCS system works when the helicopter is exposed to a side wind while hovering, the same as the preceding item. When the helicopter is exposed to a side wind, the tail begins to drift. The gyro controls the servo so that the movement of the tail stops, the same as a conventional gyro. At the same time, a sensor is controlled so that the tail is rotated in the opposite direction (returns to the original position). In short, the conventional gyro performs an operation known as "drifting stop", but the AVCS system performs an operation that "stops drifting and returns to original position". The "return to original position" operation added to the AVCS system improves rudder trim operation. In other words, the gyro can automatically trim the rudder against side winds. This also applies to reverse flight. When a helicopter is flying in the forward and reverse directions, the rudder trim is changed to advance, but with the AVCS system, this trim change is performed automatically and instantaneously so that the tail remains extremely stable even during high-speed reverse flight.

The AVCS system requires a high-precision angular velocity sensor. The GY501 realizes a high-precision angular velocity detection function and extremely small output drift by using a new type of gyro sensor. This minimizes rudder neutral position drift during flight and eliminates the need to trim the rudder during flight.



Differences in rudder control method

The following describes the differences between conventional gyro and AVCS gyro rudder control.

The conventional gyro sends the rudder control signals from the transmitter to the rudder servo and starts to move the tail. When the tail moves, the gyro detects this movement and generates a signal to stop it. If the tail continues to move even in this state, a rudder control signal larger than the signal from the gyro must be applied from the transmitter. That is, the difference between the rudder control signal from the transmitter and the control signal that attempts to stop this from the gyro becomes the actual amount of movement of the tail. Ordinarily, the rudder control signal is amplified several times over by the gyro amp and is balanced with the gyro control signal so that the transmitter can be used at the normal steering angle.

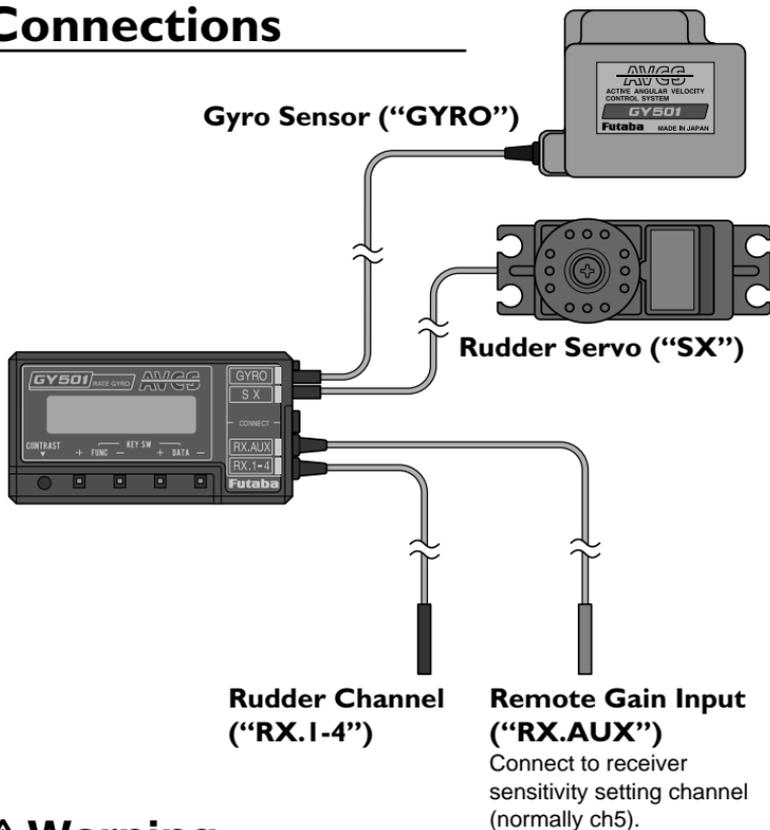
The AVCS system uses a different rudder control method. As described in the preceding section, it has additional functions that "attempt to return movement by external force to the original position" and that generate an angular velocity proportional to the rudder control signal. That is, it functionally controls the speed of rotation of the tail. The original AVCS (Angular Vector Control System) came from this. In the AVCS mode, when the transmitter rudder stick is moved when the helicopter was stopped, the rudder servo controls operation until the tail reaches the specified rotational speed. Trim deviation of the rudder control signal also becomes a signal that causes the tail to turn so that even a little trim deviation causes the tail to move. Therefore, the rudder trim is made the same in all flight states and must match the neutral reference signal at the gyro. The method of reading the rudder neutral signal at the gyro will be described separately. Since the rudder mixing signals from the transmitter also become a tail rotation signal, all the rudder mixing functions must be disabled.

In the AVCS mode, the gyro automatically trims the rudder so that linkage changes cannot be verified. Initially, the GY501 trims the rudder by flying in the Normal mode to take the rudder linkage neutral position. This centers the linkage. At this time, this rudder neutral reference point is read to the GY501.

Giving the gyro the rudder neutral reference signal and performing tail operation by referring to this signal in the AVCS mode in this way is how the AVCS system differs from the conventional system.

ASSEMBLY AND ADJUSTMENT

Connections



⚠ Warning

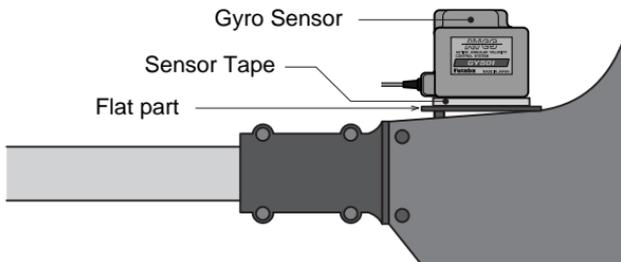
Connector Connection

- ❗ Insert the connectors fully and firmly.**

If vibration, etc. causes a connector to work loose during flight, the heli may crash.

Mounting the Gyro Sensor

The gyro sensor is extremely sensitive to vibrations. Always use the attached sensor tape to mount the gyro sensor. Stick the sensor tape to the center of bottom of the sensor and firmly stick the sensor to a flat part of the helicopter frame so that it does not touch the frame. Mount the sensor so that the bottom of the sensor is level with the rotating surface of the tail.



⚠ 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.
- ⊘ **Do not get fuel, waste oil, etc. on the gyro sensor.**
The special paint may dissolve.

Use

The following describes basic use of the GY501. Note that in the AVCS mode, operation is somewhat different than that of a conventional gyro.

Initial setting

- 1) Set the gyro operating direction at the GDir screen.

A rectangular LCD screen with a black background and white pixelated text. The text reads "GDir NOR".

(See page 39 for setting method)

- 2) Set the servo operation limit range at the Lmtx screen.

A rectangular LCD screen with a black background and white pixelated text. The text reads "Lmtx 100%".

(See page 42 for setting method)

- Adjust the servo travel so that it is within the linkage range.

- 3) Set the gyro operation mode at the Mode screen.

A rectangular LCD screen with a black background and white pixelated text. The text reads "Mode CMT".

(See page 42 for setting method)

- To use the GY501 in the Normal mode only, set to "Nor". To use the GY501 in the AVCS mode only, set to "AVC". When switching between the AVCS mode and Normal mode, set to "CMT".

- When using the GY501 in the "CMT" mode, the AVCS and Normal mode sensitivities must be set while hovering and during flight. Therefore, a transmitter (T9Z, T8UHsuper, etc.) with a gyro mixing function is necessary.

The following shows how to use the GY501 in the CMT mode.

- 4) Adjust the gyro gain.

A rectangular LCD screen with a black background and white pixelated text. The text reads "G: 1A 99%".

(See page 39 for setting method)

- The GY501 initial sensitivity is 100% for both the G1 and G2 gains.

When using a T9Z transmitter, set the sensitivity at the transmitter without changing the 100% reference value. Use the following values as the sensitivity setting standard:

- Call the T9Z GYR setup screen.
 - Adjust the sensitivity when hovering to 85% at the AVCS side and 15% at the normal side.
 - Set the sensitivity during flight to 70% and 30% in the AVCS and normal modes, respectively.
 - At this time, 70% is displayed on the GY501 sensitivity display when hovering and 40% is displayed on the GY501 sensitivity display during flight.
- *1: The GY501 sensitivity becomes 0% at 50%. When set over 50%, the GY501 operates in the AVCS mode and when set under 50%, the GY501 operates in the Normal mode. When setting is changed 1%, the gyro sensitivity is changed 2%.

When using a transmitter that does not have a gyro sensitivity switching function, connect the sensitivity setting connector to a vacant channel and display the GY501 sensitivity setup screen and set the G1 and G2 gains.

Sensitivity can also be fine adjusted using the transmitter ATV function.

5) Check the transmitter settings in the AVCS mode.

- Set all the rudder mixing functions to INH.
- Set the hovering and flight rudder trimmers to the same position.
- Make the rudder ATV 100% at all conditions.
- Set the T9Z condition delay function to INH.

Flight Adjustments

1) Turn on the transmitter power, then turn on the receiver power.

- Never move the model or rudder stick during the 5 seconds the "INIT" display blinks.

2) Hover in the Normal mode and adjust the rudder neutral position.

- In the AVCS mode, the rudder neutral position is automatically set, and linkage changes cannot be verified. First, perform rudder neutral adjustment in the Normal mode.
- Move the transmitter trim lever and reset the neutral position. When the rudder servo neutral position has changed considerably, readjust the linkage.

3) When the transmitter rudder trim was adjusted, the rudder neutral data must be read to the GY501. Therefore, always perform the following operations:

- Switch the transmitter sensitivity switch quickly (interval of within 1 second) between AVCS and Normal at least three times. "*****" is displayed on the LCD screen to show that data is being memorized. During this operation, never move the transmitter rudder stick from the neutral position for at least 1 second immediately after switching the switch in the state in which the model is on the ground. Memorization and updating is executed only when the sensitivity switch is in the AVCS mode position.

4) Set the sensitivity to the position at which hunting does not occur during hovering and flight.

- In the AVCS mode, when the sensitivity is lower than the suitable sensitivity, operation that resembles conventional hunting or operation that seems to be the opposite of operation of a conventional gyro, such as a slight drifting of the tail when the sensitivity is high may occur. Therefore, use a method that finds the suitable value by checking neutral suppression and pirouette stopping by raising and lowering the sensitivity.

5) Adjust the hovering and flight rudder effect using the transmitter's D/R or AFR function.

- Do not adjust with the ATV function. If the ATV function is used, trimming may change.

(If necessary)

6) When you sense a difference in the rudder effect between the AVCS and Normal modes, adjust using the GY501 rudder control linkage.

A rectangular LCD display with a black border showing the text "NCGA100%" in a pixelated font.

(See page 40 for setting method)

- Adjustment method

When the rudder effect in the AVCS is different from the rudder effect in the Normal mode after adjustment was performed using the transmitter's D/R or AFR function, adjust the difference using the NCGx parameter.

7) Adjust the left and right pirouette stopping state by control delay and tracking.

A rectangular LCD display with a black border showing the text "CD1A 0%" in a pixelated font.

(See page 40 for setting method)

A rectangular LCD display with a black border showing the text "Trk +0%" in a pixelated font.

(See page 41 for setting method)

- Adjustment using the delay function of the T9Z transmitter is also possible. Since the gyro gain also has a large effect on the stopping state, make this adjustment after adjusting the sensitivity.

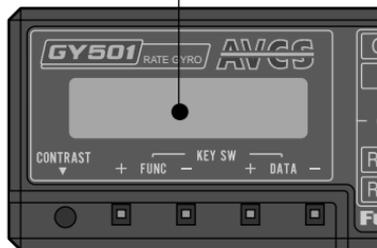
8) When you want to use rudder mixing in the Normal mode, set the transmitter so that rudder mixing is applied only during Normal mode operation. Never use rudder mixing in the AVCS mode.

DATA SETTING

LCD Display and Edit Keys

LCD display

Set data display and operation status monitoring are possible.



Edit keys

Setup screen call

The setup screens can be sequentially called with the FUNC+ or FUNC- key. For the order in which the setup screens are called, see the function map.

Data setting

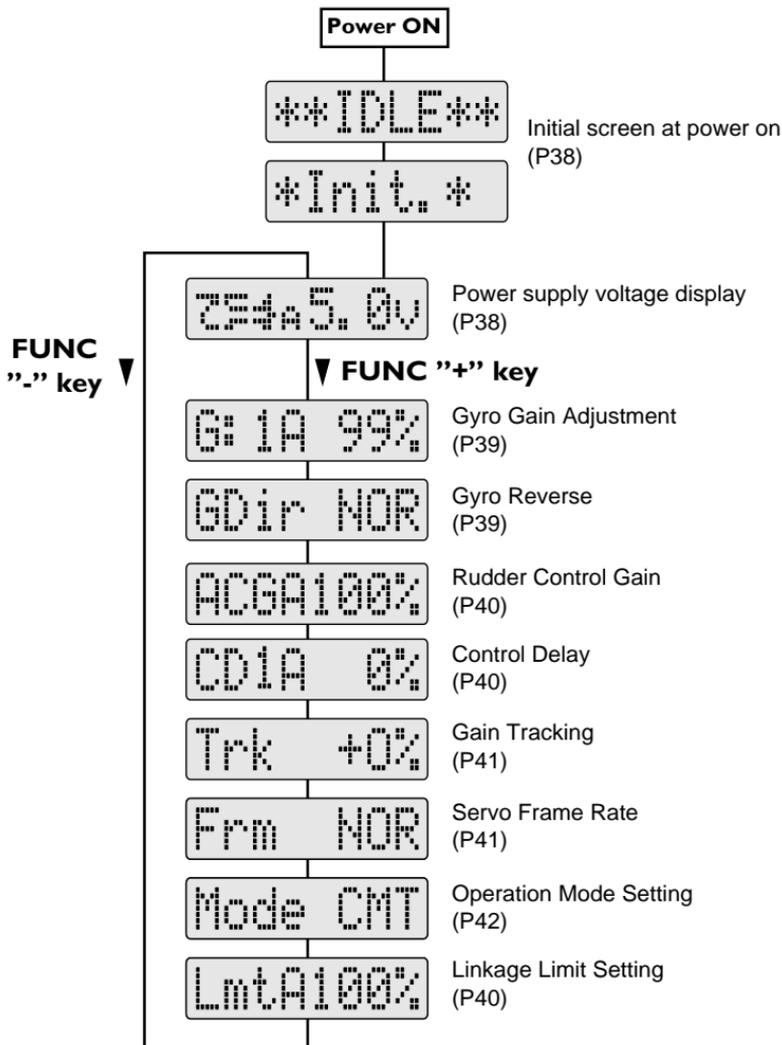
Perform data setting with the DATA+ or DATA- key. When setting a value, the data is increased when the DATA+ key is pressed and is decreased when the DATA- key is pressed. The mode can also be selected using either the DATA+ or the DATA- key.

Low Battery Alarm

When the power supply voltage drops to 3.8V, "LOW Batt" is displayed. When this message is displayed, quickly stop operation and charge the Nicd battery.

Low Batt

Function Map



Setting of Each Function

Initial screen at power on

IDLE

Init.

This is the initial screen at power on. When the transmitter power is off, "**IDLE**" is displayed until the transmitter power is turned on. After the transmitter power is turned on, "**INIT**" blinks for about 5 seconds to read the reference data. During this period, do not move the transmitter rudder stick or the helicopter. If the transmitter rudder stick or helicopter is moved by mistake, the rudder neutral position will change.

Operation screen display / Power supply voltage display

254 5.0v

Normal mode operation

Low Batt

Low battery alarm

254 ****

Rudder neutral memorization updating

254A 5.0v

AVCS mode operation

254# 5.0v

Rudder neutral deviation display

Displays the receiver power supply voltage. When the voltage drops to 3.8V, "LOW BAT" is displayed. In the AVCS mode, "A" is displayed. When the rudder neutral full reset operation was performed, the "*****" mark, which indicates execution, is displayed. In the AVCS mode, when there is a difference between the transmitter rudder neutral position and the GY501 neutral data, the " " mark is displayed.

Gyro Gain Adjustment

The image shows a rectangular LCD display with a black border. The text on the display is "G: 1A 99%" in a pixelated font. The "G:" is on the left, "1A" is in the middle, and "99%" is on the right.

Initial value: 100%

Performs gyro sensitivity adjustment. Two-point gain adjustment is possible. The setting range is 0 to 100%. When "A:" or "N" is displayed in accordance with operation mode setting, the GY501 operates in the AVC mode and Normal mode, respectively. The gain display indicates the actual gain, and changes with transmitter remotegainadjustment.

Gyro Reverse

The image shows a rectangular LCD display with a black border. The text on the display is "GDir NOR" in a pixelated font. "GDir" is on the left and "NOR" is on the right.

Initial value: NOR

Sets the direction of operation of the gyro.

Rudder Control Gain

A rectangular digital display with a black border showing the text "ACGA100%" in a pixelated font.

Initial value: ACG:100%, NCG:100%

Sets the rudder stick operation gain. The gain can be set independently for the AVCS mode and Normal mode. When the operation mode is AVCS, "ACGX" is displayed. In the Normal mode, "NCGX" is displayed. The display is automatically changed to "A" or "B" depending on the direction of the rudder stick. The gain of the set direction can be set. This setting is used in tracking the rudder operation sensitivity between the AVCS and Normal modes. The setting range is 30% to 200%.

Control Delay

A rectangular digital display with a black border showing the text "CD1A 0%" in a pixelated font.

Initial value: 0%

Sets the rudder stick operation delay. The delay amount can be set independently for left and right operation of the rudder stick. Adjust by checking the left and right directions pirouette stopping state. For instance, when pirouette stopping resembles hunting, increase the CDI of that direction. On the other hand, to stop drifting, decrease CDI. The setting range is 0 to 100%.

Gain Tracking

A rectangular LCD display with a black border. The text 'Trk' is on the left and '+0%' is on the right, both in a pixelated font.

Initial value: +0%

Adjusts left and right tail stopping. It is used at 0% as standard, but use this adjustment when pirouette stopping cannot be adjusted using the CDI parameter. For example, when pirouette stopping resembles hunting, or right turn pirouette stopping drifts, shift Trk in the + direction. In the reverse case, shift Trk in the - direction.

If Trk is large, a left and right pirouette speed difference will be produced. Therefore, adjust gain tracking with the smallest possible value. The setting range is -20% to +20%.

Servo Frame Rate

A rectangular LCD display with a black border. The text 'Frm' is on the left and 'NOR' is on the right, both in a pixelated font.

Initial value: NOR

Sets the servo output frame rate. The transmitter frame rate (Nor) or 1/2 the transmitter frame rate (High) can be set. Normally, use at "Nor".

Operation Mode Setting

A rectangular LCD display with a black border showing the text "Mode CMT" in a pixelated font.

Initial value: CMT

Sets the gyro operation mode. In the "NOR" mode, both G1 and G2 operate in the Normal mode. In the "AVC" mode, both G1 and G2 operate in the AVCS mode. In the "CMT" mode, G1 operates in the AVCS mode and G2 operates in the Normal mode. In the "Nor" mode, the GY501 operates the same as conventional gyros. In the "AVC" mode, the GY501 always operates in the AVCS mode. In the "CMT" mode, the GY501 can be used in both the AVCS and Normal modes.

Linkage Limit Setting

A rectangular LCD display with a black border showing the text "LmtA100%" in a pixelated font.

Initial value: 100%

Sets the rudder servo travel limit. The linkage limit can be adjusted by pressing the + and - keys so that the rudder stick is operated and the servo operates up to the maximum linkage position. When setting, rudder ATV automatically becomes 200% and the servo deflection becomes large so that limit setting can be easily performed. A or B is displayed depending on the right or left direction.

REFERENCE

Specifications

* Specifications are subject to change without prior notice.

GY501 Ratings

Yaw-axis stabilizer for helicopter (rate gyro)

Display device: 8-character dot matrix liquid crystal display

Operating voltage range: DC 3.8V to 6.0V

Current drain: 60mA (@4.8V, including sensor)

Operating temperature range: -10 to +50 degree C

Operating humidity range: 10 to 90%RH (no condensation)

Dimensions: 56.5 x 30.5 x 16mm (body)

Weight: 34g (body) + 55g (sensor)

S9205 Ratings

Speed: 0.11sec/60degree (@4.8V)

Torque: 5.5kg-cm (@4.8V)

Dimensions: 40.5 x 20 x 37.5mm

Weight: 53g

Definition of Abbreviations

The following defines the abbreviations and symbols used in this manual in alphabetical order. The function names are given on the description pages.

A		I	
ACGA/B	Rudder control gain (AVCS) p40	IDLE	Transmitter power OFF state. p38
AFR	AFR function.	INH	Use inhibited state.
ATV	ATV function. Steering angle adjustment function.	INIT	Initialize. Initialization. p38
AVC	AVCS mode.	L	
AVCS	AVCS system. AVCS mode.	LCD	Liquid crystal display screen.
C		LmtA/B	Linkage limit setting. p42
CD1A/B	Control delay. p40	LOW BAT	Low battery error display. p38
CMT	Normal/AVC switching mode.	M	
D		Mode	Operation mode setting. p42
D/R	Dual rate function.	N	
DUO	T9Z dual gain control mode.	NCGA/B	Rudder control gain (Normal) p40
F		NOR	Normal mode. Normal side.
Frm	Servo frame rate. p41	P	
G		PMIX	Programmable mixing.
G:1A/N	Gyro gain 1 side. p39	R	
G:2A/N	Gyro gain 2 side. p39	REV	Reverse side.
GDir	Gyro reverse. p39	T	
GYRO	T9Z gyro sense mixing.	Trk	Tracking. p41
H			
High	High side (frame rate 1/2 side).		

GY50I Parameters Sheet

* Copy and use.

Helicopter: _____

Date: _____

Parameter		Initial value	Set value	Remarks
G:xx	G:1	100%		0-100%
Gyro Gain Adjustment	G:2	100%		0-100%
GDir		NOR		NOR/REV
Gyro Reverse				
ACGx, NCGx	ACGA	100%		30-200%
Rudder Control Gain	ACGB	100%		30-200%
	NCGA	100%		30-200%
	NCGB	100%		30-200%
CDIx	CD1A	0%		0-100%
Control Delay	CD1B	0%		0-100%
Trk		+0%		-20--+20%
Gain Tracking				
Frm		NOR		NOR/High
Servo Frame Rate				
Mode		CMT		CMT/NOR/AVC
Operation Mode Setting				
Lmtx	LmtA	100%		
Linkage Limit Setting	LmtB	100%		

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.
- Dated Proof of Purchase (For Warranty Claims)

Please read the warranty card supplied with your system.

When requesting warranty, please send the card along with some type of dated proof of purchase.

If you have any questions regarding this product, please consult your local hobby dealer or contact the Futaba Service Center. The address and telephone number are listed below. (For U.S.A.) (Telephone inquiries are accepted from 8:30 AM to 5:00 PM PST daily, except on Saturday, Sunday and Holidays.)

Address(For U.S.A.)

Futaba Corp. of America

4Studebaker

Irvine, CA 92618 (949) 455-9888

FUTABA CORPORATION

Makuhari Techno Garden Bldg., B6F 1-3 Nakase, Mihama-ku, Chiba 261-8555, Japan
Phone: (043) 296-5118 Facsimile: (043) 296-5124