G460T

Sport Tail Lock™/Rate Gyro Instructions

For Heli and Airplane Use
JRPG460T

FEATURES

- Compact integrated design for easy installation/connection
- No moving parts for a nearly unlimited service life
- Linear dynamic range up to 720 degrees per second
- Tail Lock™ and Rate modes
- Manual gain control for easy setup
- Patented offset drift canceler
- Silver/chrome finish to isolate RF & dissipate heat
- Compatible with JR and other brand radio systems

SPECIFICATIONS

Operating Voltage:	4.8V–6.0V
Operating Current:	20mAh
Dimensions:	24.5H x 30W x 30L
Weight:	22g
Gyro Gain:	Remote adjustable
Tail Lock/Rate Modes:	Manual on/off

INTRODUCTION

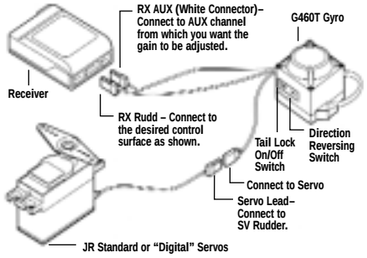
JR's latest Piezo gyro, the G460T, utilizes a new state-of-the-art integrated design for easy installation, while retaining the same performance levels found in the previous JR NEJ-G450.

It is important to note that the operational features of the G460T are very different than that of other gyro systems. Many current settings, including the travel volume, exponential, dual rates, and tail rotor revolution mixing values must all be changed from their previous normal settings in order to achieve the correct tail rotor/control surface response and maximum performance that the G460T has to offer.

JR's new G460T features manually selectable Rate and Tail Lock™ mode options. Tail Lock mode is highly recommended for use in helicopters as it will hold the tail of the model in position without the need for Revolution mixing. The G460T's Rate mode is ideal for airplane use to control either the rudder, elevator, or aileron axis. The G460T ***should not*** be used in airplanes while in the Tail Lock mode.

Carefully read these instructions so you will fully understand and become comfortable with the functions and operating characteristics of the G460T prior to installation and initial test flights.

CONNECTIONS



**For airplane use in Rate mode only.*

*Receiver Channel Connections

Rudd - Rudder/Tail Rotor Control (airplane/helicopter)
Aile - Aileron Control (airplane only)
Elev - Elevator Control (airplane only)

Radio Type Polarity Connections

JR®	Futaba/HRC	Airtronics Z
red to red	red to red	red to red
brown to brown	brown to black	brown to black
orange to orange	orange to white	orange to white

Please note that if the system is connected incorrectly, the G460T will not function, but no damage will occur to any of the radio components. After successful connection, secure the gyro to the servo connection with a small piece of tape to prevent possible disconnection during use.

Servo Selection: Heli

In general, the quicker the transit time and the more accurate the centering tendencies of the servo, the better the gyro will perform.

If a servo with a slow transit time is used, the G460T may become too quick for the servo, resulting in a "wag" or "hunting" situation which will require the user to reduce the percentage of gain. This reduction in gain will also reduce the holding power and, therefore, the performance of the G460T.

INSTALLATION & HOOKUP

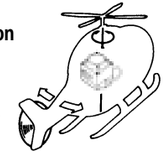
The Gyro Sensing Unit should be mounted as close to the center of gravity (normally the main shaft or wing C.G.) as possible. Many helicopters provide mounting bases near the main shaft. Use them only if they are positioned away from heat-generating sources. If it is not possible to locate the sensor near the main shaft, an alternate location to consider is up front on the servo tray.

Installing the G460T

Refer to the following diagrams for proper gyro positioning. This is based upon the desired control function for which the G460T is intended to be used.

Helicopter Installation (Tail Rotor/Rudder)

Mount the G460T with the label facing upward as shown in the diagram at right.



INSTALLATION & HOOKUP (cont'd)

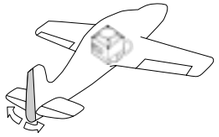
Airplane Installation

Be sure to thoroughly clean the G460T's mounting area and the aircraft's mounting location with rubbing alcohol prior to attachment.

Note: Never install/mount the amplifier unit directly to bare wood as it is possible for it to loosen during flight. Always seal the wood surface with paint, epoxy, or CA adhesive prior to mounting.

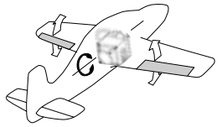
(Rudder Channel)

Mount the G460T with the label facing upward (or downward) as shown in the diagram at right. Please note that the unit must be mounted so the sides of the unit are 90° to the center line of the fuselage.



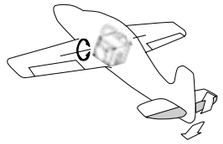
(Aileron Channel)

Mount the G460T so that the label faces either the front or back of the model as shown at right. Be sure to attach the servo mounting tape to the side of the unit opposite that of the direction reversing switch.



(Elevator Channel)

Mount the G460T so the label faces either the left or right side of the model as shown at right. Be sure to attach the servo mounting tape to the side of the unit opposite that of the direction reversing switch.



INSTALLATION & HOOKUP (cont'd)

Final Connections

Step 1: Insert the AUX connector (white) to the AUX channel on the receiver from which you would like the gain control to be activated.

For example, if you would like the gain to be adjustable from a rotary or 2 position switch, connect the AUX connector to the appropriate AUX channel on the receiver. If you are using a PCM-10, 10S, 10SX, 10SxII or 10X and would like to make sure of the Code 44 gyro sensitivity adjustment feature, connect the AUX connector into AUX channel 3 of the receiver.

Step 2: Connect the RX Rudd connector to the desired channel/function.

CHANNEL	FUNCTION
Rudd	Rudder/Tail Rotor (airplane & helicopter)
Aile	Aileron Control (airplane only)
Elev	Elevator Control (airplane only)

If the G460T is located away from the receiver, an optional servo extension (purchased separately) may be used.

Step 3: Connect the desired servo to be used into the SV Rudd jack. If multiple servos on the same channel are to be used (e.g., 2 aileron servos, 2 elevator servos, etc.) or the servo lead is not long enough, an optional servo extension or Y-harnesses can be used.

SETUP & ADJUSTMENT

Following is the setup and adjustment procedure that must be followed to achieve the highest level of performance from your system.

Setup

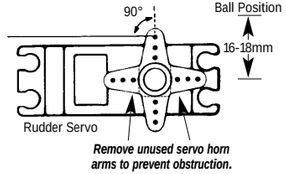
Step 1: Set the Tail Lock™ switch located on the side of the G460T to the "off" position

Step 2: Unhook the control linkage from your servo and swing the servo arm out of the way. Lightly grasp the pushrod at the servo end and run the linkage through its entire travel. The linkage should move through its entire range smoothly with very little friction and no rough spots. Work on the linkage system until this is achieved.

Step 3: On your transmitter, set all trimmers (sub-trim, trim offset, mechanical trim, etc.) to zero. For heli, set the throttle/pitch stick at exactly the hover position (standard hover position is 50%). Turn off or zero out both the revolution mixing up and down and the acceleration mixing.

Step 4: Turn on your receiver and allow the model to remain totally motionless for 3 seconds. This procedure is necessary to allow the G460T time to establish and record the center or neutral positions.

Step 5: Remove the servo arm and replace it so that it is exactly 90° to the tail rotor pushrod (see diagram). You may find that the splines in the screw output shaft are just offset enough on your servo arm so as to not allow 90° positioning. Rotate the servo arm to another arm and try again. Find the arm that is closest to 90° and secure it in place with the provided screw.



Remove unused servo horn arms to prevent obstruction.

Step 6 (Heli only): Move the Tail Lock™ switch back to the "on" position. When in tail lock mode, the servo arm may "creep" or move slightly. This movement is normal, and can be corrected by changing the sub trim value for the rudder channel.

CONTROL BALL PLACEMENT: HELI ONLY

For best performance, attach the tail control rod ball to the servo arm at a distance of approximately 16–18mm from the center mounting screw of the servo arm. The performance of the G460T will be greatly reduced if the tail control rod ball is attached at a distance of less than 16mm, as this position will not make full use of the G460T's sensing abilities.

Initial Transmitter Settings

		Heli	Airplane
Travel Adjust	Left Rudder	150%	150%
	Right Rudder	150%	150%
Dual Rates	Hover Mode/Low Rate	80%	Adjust as needed for proper control surface throws
	Stunt Mode/High Rate	100%	
Exponential Values	Hover Mode/Low Rate	30%	20%
	Stunt Mode/High Rate	40%	30%
Gyro Gain Values	Hover Mode/High Rate	80%	65%
	Stunt Mode/Low Rate	50%	0-20%
Revolution Mixing (Rate Mode/Heli Only)	Hover Mode	5%L	5%R
	Stunt Mode	5%L	5%R

After some experience and flight time is gained, these values can be adjusted to suit your preference.

TRAVEL ADJUSTMENTS & REMOTE GAIN CONTROL SETUP

Travel Adjustments: Airplane

Once your G460T gyro has been installed and connected to the desired channel/surface, it will be necessary to fine tune the travel adjust values for this surface. As with most gyros, the G460T will amplify or increase the travel of the servo slightly. Please check the overall control surface travel and adjust as needed.

Remote Gain Control Setup: All

JR PCM-10/10S/10SX/10SxII/10X (Helicopter)

The Remote Gain Controller allows adjustments to be made from the transmitter. when using a JR PCM-10 Series radio, plug the Remote Gain controller's AUX connector into the receiver's AUX 3 jack. This will allow gain control adjustments to be made in Code 44 of your transmitter. (See the radio's instruction manual, Code 44 for more information.)

JR P8103: Helicopter Mode

When using this feature, connect the remote gain controller AUX connector (white) into the AUX 2 channel of the receiver. Next, select either the manual or automatic gyro sensitivity feature and adjust the gyro rate values as shown below:

XP8103 Airplane Mode/JR XP642/XP652

The gain value of the G460T can be accessed and adjusted by connecting the white AUX connector to the gear channel of the receiver. Gain values can then be adjusted through the travel adjust valves for the gear channel.

When using a switched channel for gain control, the gain adjustment is achieved by adjusting the endpoints of that switched channel.

Switch position #1:	Gain is adjustable from 50% to 100% using the travel volume. 100% Travel volume = 100% gain 0% Travel volume = 50% gain

Switch position #2:	Gain is adjustable from 0% to 50% using the travel volume. 100% Travel volume = 0% gain 0% Travel volume = 50% gain

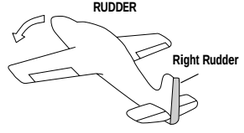
Note: In switch position #1, increasing the travel volume value increases the gain. In switch position #2, increasing the travel volume value decreases the gain. Depending on the position of the AUX channel's reversing switch, the switch position #1 and #2 may work in reverse.

CONFIRMING GYRO/SERVO DIRECTION (cont'd)

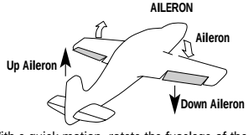
Airplane

To verify that the G460T is functioning, simply rotate or turn the model while watching the control surface or servo that it is to be controlling. If any movement of the servo arm or control surface is detected, the G460T is functioning.

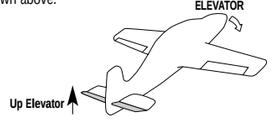
To determine the correct compensation direction, it will be necessary to again move the model while watching the servo arm or control surface, noting the correct compensation direction as shown below:



With a quick motion, move the nose of the aircraft to the left, the rudder should deflect to the right as shown above.



With a quick motion, rotate the fuselage of the model to the right, the ailerons should give a "left control" input as shown above.



With a quick motion, rotate the nose of the fuselage down as shown above. The elevator should give an "up" control input as shown above.

To reverse the direction of the gyro compensation, simply move the reversing switch located on the gyro to the opposite position.

REMOTE GAIN CONTROL SETUP: AIRPLANE

Figure 1 Position 0 "Maneuvering Mode"

Figure 2 Position 1 "Torque Roll Mode"

Stick Priority Mixing: JR 10SX, 10SxII, 10X

A radio that has curve-type mixing must be used in order to make the gyro function as "stick priority." This is recommended for all aerobatic flying and for all applications where a gyro is used on elevator function. Install the rudder gyro with the remote gain control plugged into the AUX 2 and the elevator's (or aileron) gyro into AUX 3. Enter Code 56, then set up a mix curve as in Figure 1 and designate channel 4 (rudder) as the master channel and AUX 2 as the slave. You'll want to set up two curves — one for flying maneuvers (Figure 1), and one for hovers and torque rolls (Figure 2). For flying maneuvers, the top of the curve needs to be lower because less gain is needed. If the curve is too high (too much gain), the tail will oscillate, indicating that gain should be reduced. For hovering and torque rolling maneuvers you need maximum setting for more gyro authority. Program these two curves to be selected via a convenient switch (the same switch can be used for both) then, when you're ready to enter a torque roll, flip to high gain. Flip back to low gain for flying maneuvers.

To program the elevator (or aileron) gyro, enter Code 57 and repeat the same process, except designate the appropriate channel as the master and AUX 3 as the slave. Then enter Code 17 and inhibit AUX 2 and AUX 3. Lastly, you'll find that the gyro creates some deadband in the stick. This is undesirable when using stick priority mixing. Enter Code 12 and reduce travel for the rudder and elevator (or aileron) until servo movement is achieved through the entire stick travel. Normally this happens at 55% to 65% travel adjustment.

Note: It is normal to see a slight change in neutral position when the gain is switched from low to high. This will not cause any problems in flight.

ADVANCED SETUP AND ADJUSTMENT

Gain Value Adjustments

Helicopter

On initial test flights it will be necessary to adjust the mechanical control linkage/tail rotor blade pitch so the helicopter will have no tendency to rotate while in the hover position. Minor "fine tuning" adjustments can be made using sub trim. Once this has been achieved, increase the hover gain until the helicopter starts to oscillate (hunt). Back down the value just below the hunting point. The value should be between 65 and 95%. If so, proceed to the next step. If not, do the following:

Hunting occurs at less than 65% gain in hover—move the rudder pushrod connection at the servo inward one hole on the servo arm.

No hunting occurs even at 100% gain in hover—move the rudder pushrod connection at the servo outward one hole on the servo arm.

Next, fly the helicopter in fast forward flight and increase the low gyro gain value until oscillation (hunting) occurs. Reduce the value slightly, just below the point of hunting. Try a few rolls and see if hunting occurs. Reduce the gain if necessary.

Airplane

On initial test flights, it will be necessary to adjust the control surface/pushrod mechanical linkage so that the model flies straight and level without any stick control inputs. Minor "fine tuning" adjustments can be made with the radio trim levers. For the first test flights it is recommended the the gyro gain be set to a low setting of 0 to 20% and a high setting of 65%. For the first takeoff be sure the gyro gain switch used is set to the low gain position. this will ensure the gain adjustment selected will not be too high, causing the gyro to oscillate (hunt), causing erratic control on that particular control surface and/or override the stick input causing insufficient control authority to fly the model.

Once sufficient altitude has been achieved, the gain may then be switched to the high gain position for testing at a safe altitude. Increase/decrease the gyro gain as necessary until the desired compensation rate and control feel has been achieved. For maximum gyro compensation, gradually increase the gain until the control surface begins to oscillate while the model is flying at full speed. Then slightly decrease the gain from that setting. The maximum gain value will vary depending on the particular model's speed and control surface authority. A low gain setting can be used for full speed flight and a higher gain for lower speed flight.

CONFIRMING GYRO/SERVO DIRECTION

Helicopter

Step 1: Be sure the rudder servo is moving in the proper direction. A right servo command should move the nose to the right (if you're unsure, seek help from someone more experienced). Reverse the servo direction in the transmitter if necessary.

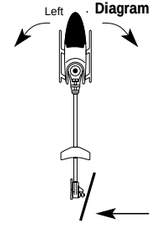
Step 2: Give a right rudder command and note the direction the rudder servo moves (clockwise or counter-clockwise). Now pick up the helicopter and quickly move the nose to the left. The servo should move in the same direction. If it moves in the opposite direction, switch the small reverse switch located on the gyro sensor/amplifier in the opposite direction.

Step 3: To verify that the G460T is compensating in the correct direction, please refer to the diagram at right.

With a quick motion, rotate the nose of the helicopter to the left while viewing the servo arm/tail rotor blades. If correct, the leading edge (front) of the tail rotor blades should pitch to the left as shown. Reverse the direction of the gyro compensation if necessary using the Direction Reversing Switch located on the gyro unit.

Note: When the reversing switch on the gyro is changed, this will also reverse the direction of the tail servo. If the gyro reversing switch is changed, it will be neccessary to reverse the direction of the servo using the transmitter's servo reversing function.

Step 3 Diagram



Right Rudder Command
(tail blades pitch left)

WARRANTY COVERAGE

Your new equipment is warranted to the original purchaser against manufacturer defects in material and workmanship for 1 year from the date of purchase. During this period, Horizon Service Center will repair or replace, at our discretion, any component that is found to be factory defective at no cost to the purchaser. This warranty is limited to the original purchaser of the unit and is not transferable.

This warranty does not apply to any unit which has been improperly installed, mishandled, abused, or damaged in a crash, or to any unit which has been repaired or altered by any unauthorized agencies. Under no circumstances will the buyer be entitled to consequential or incidental damages. This limited warranty gives you specific legal rights; you also have other rights which may vary from state to state. As with all fine electronic equipment, do not subject your unit to extreme temperatures, humidity or moisture. Do not leave it in direct sunlight for long periods of time.

REPAIR SERVICE INSTRUCTIONS

Warranty Repairs. To receive warranty service you must include a legible photocopy of your original dated sales receipt to verify your proof-of-purchase date. Providing that warranty conditions have been met, your equipment will be repaired without charge.

Normal Non-Warranty Repairs. Should your repair cost exceed 50% of the retail purchase cost, you will be provided with an estimate advising you of your options.

Within your letter, advise us of the payment method you prefer to use. Horizon Service Center accepts VISA or MasterCard. Please include your card number and expiration date. Mail your system to:

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