G5000T

EXTREME TAIL LOCK™ GYRO SYSTEM

INSTRUCTIONS

JRPG5000T
For helicopter use only
For use with JR Super or Digital Servos only

Revised 4/2000

FEATURES

- **Extreme Tail Lock:** The G5000T features both a normal "rate" mode, as well as an "extreme tail lock" mode. The 5000T's extreme tail lock mode is designed to provide the 3D pilot with the highest performance heading hold system available.
- **Outstanding Rate Mode:** The G5000T's design is based from the previous G3000, which is known world over as the highest performance rate gyro ever produced.
- **M.P.C. (Multi Pulse Control) System:** The high frequency output pulse of the G5000T is three times faster than existing electronic gyros for unmatched performance.
- **Angular Velocity Command Control System:** The G5000T's Angular Velocity System creates an exceptionally constant pirouette rate, even in the most extreme wind conditions.
- **Super Servo or Digital Servo Use:** The G5000T is designed exclusively for JR's 8700G Super or 8417 Digital Servos.
- **Over Travel Limiter:** Prevents servo over-travel.
- **Offset Drift Canceling:** Circuitry for superior neutral stability.
- **Remote gain contr ol:** Provides remote adjustment of the gain values, as well as access to rate and tail lock modes.
- **Lightweight Piezo Sensor w/ D ampening:** New double action suspension dampening and lightweight Piezo crystal — total sensor weighs only 18 grams!
- Compatible with all JR, Futaba®, and other radio systems.

SPECIFICATIONS

Operating Voltage: 4.8V only
Operating Current: 50mA (not including servo)
Dimensions
Gyro Sensor: 32 x 30 x 36 mm
Amplifier: 38 x 19 x 53 mm
Weight
Gyro Sensor: 18 grams
Amplifier: 33 grams
Total Weight: 51 grams (1.8 oz)

INTRODUCTION

JR's new G5000T Extreme Tail Lock Gyro represents the very latest in both heading hold and rate gyro technology. Based from JR's outstanding G3000, the G5000T incorporates the same contest winning rate gyro technology, while adding the new "extreme tail lock" heading hold mode. This new "tail lock" provides the 3D helicopter pilot with a heading hold system that will allow the pilot to push both their flying skills, as well as their equipment to the extreme.

The G5000T, combined with JR's 8700G Super Servo, offers superior "holding power" in all conditions and is unequaled by any other gyro system. The G5000T's advanced M.P.C. (Multi Pulse Control) system has a high frequency output that allows the G5000T to react up to three times faster than current Piezo gyro systems on the market.

SERVO SELECTION

JR's G5000T **must** be used in conjunction with JR's 8700G Super Servo or 8417 Digital servos. These servos feature an ultra-quick response and transit time, and their total travel is specifically matched to give the best possible resolution when used with the G5000T. These servos also feature special "alloy" servo gears designed to handle the extreme torque loads that the G5000T can produce during flight. It is not recommended that plastic geared servos be used, as these gears can possibly fail during flight due to the extreme demands the G5000T.

HELICOPTER TAIL ROTOR SYSTEM

Important: Because of the highly active/aggressive characteristics of this G5000T, heavier than normal loads are placed on the tail rotor drive train. Take special note to ensure that the main drive gear system and tail rotor gear box is in good working order with the correct gear mesh and unworn teeth. Be sure it is properly greased with all screws secured with Locktite®, etc.

On Miniature Aircraft X-Cell series of helicopters, a heavy-duty front tail rotor tune up kit is recommended (part # MIN0832). When using the G5000T in a JR belt-driven tail rotor helicopter such as the Ergo 60 or Vigor, it is recommended that the optional JR aluminum tail pulleys be installed for maximum performance (JRP960322 front, JRP960323 rear). The use of aluminum pulleys will greatly reduce tail belt slippage as compared to the standard plastic pulleys. It is recommended that the tail belt be checked after each flying session. If worn or missing teeth are discovered, replace the tail belt as needed.

Please also note that due to the G5000T's aggressive nature, the G5000T should **not** be installed in a model that utilizes a "PIANO WIRE" tail drive system, as failure can occur.

MAXIMIZING THE G5000T

Note: The G5000T Piezo gyro's operational features and functions are very different from any other type of gyro. The adjustments, including travel adjust, exponential, dual rates, tail rotor compensation values, gain values, and endpoint limits will be very different from your previous normal settings. Do not install the G5000T in your helicopter using your current setup. The capabilities of this gyro are much greater; therefore, the adjustment values will be different, and you must adjust them correctly to realize the system's full potential.

Carefully read this instruction manual and be sure you fully understand and follow each segment before your first flight.

INSTALLATION

When deciding where to mount the gyro sensor, consider the criteria below:

Vibration

JR's G5000T is as much as 30 times more sensitive and responsive than other gyros. Because vibration is motion, the G5000T Gyro senses even minute vibrations and acts upon them, sending the rudder servo an opposing command. For optimum results, it's imperative that your helicopter is as vibration-free as possible. All rotating components (e.g., main gear, head, tail rotor, blades, clutch, etc.) should be in perfect balance. Equally important, the engine should run smoothly and consistently. Spending the extra time to ensure that your machine is running perfectly will allow the gyro gain to be turned up higher, more effectively holding the tail.

Temperatur e

The Piezo sensor is sensitive to drastic changes in temperature. Note that the case features a matte chrome finish that is designed to reflect heat. When mounting the gyro sensing unit, be sure that it is located away from the engine and exhaust system so the heat does not transfer to the sensing unit. Also, when subjecting your helicopter to temperature changes (e.g., going from your warm car to the cold outdoors), allow the gyro's temperature to stabilize for about 10 minutes before flying.

Installing the Gyro Sensor

Thoroughly clean the bottom of the gyro sensor and the mounting area with rubbing alcohol. Use one layer of the supplied double-sided tape to securely mount the sensor in position.

Note: Do not use thick foam tape or multiply layers of double-sided tape as is common practice with other gyros. The G5000T's sensor is vibration/shock mounted inside its case via a rubber/air dampening system, and no further vibration isolation is necessary.

Installing the Amplifier

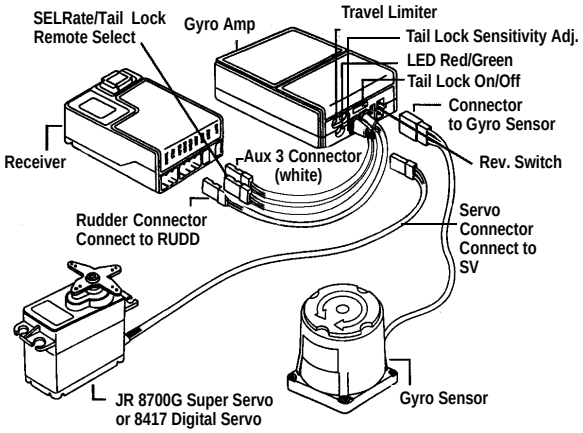
Using the 1/4" or thicker foam, wrap the amplifier and the receiver together, making sure that at least one thickness of foam is between the receiver and amplifier. Fasten the receiver and amplifier to the radio tray using rubber bands, making sure they are securely held in place. If space restrictions don't permit the amplifier and receiver to be mounted together, wrap them individually in foam and mount each in a convenient location. Use an optional servo extension lead if necessary.

CONNECTIONS

Step 1: On the gyro amplifier, locate the lead marked "RUDD". Connect this lead to the rudder channel in the receiver.

Step 2: On the amplifier, locate the lead marked "AUX 3." Note that it has a white connector for identification. When using a JRPCM-10, 10S, 10SX, 10SXF or 10X radio system, connect this lead to the Aux 3-channel in the receiver. For JR 8103 systems, connect this lead to the Aux 2-channel.

Note: When using this gyro with other radios like the JRXP652 the Aux 3 lead must be connected to the appropriate channel — the one you use to alter the gain. For example, if you want to use the gear switch to alter the gain, plug the Aux 3 lead into the gear channel and use the travel adjust and sub-trim function to achieve the desired gain in both switch positions.



Step 3: On the amplifier, locate the SV (Servo) receptacle. Plug the rudder servo into this receptacle, noting the correct polarity as indicated by the shape of the plug, as well as the wire color.

Tail Lock™ Selection/Connection

The G5000T offers several methods to access and use the tail lock function.

Note: If you're using a 6- or 7-channel system, you must install the G5000T as detailed in Option 1.

Option 1: Tail Lock Mode or Rate Mode Always On

If you choose to have the G5000T function in either tail lock or late mode only, simply move the tail lock switch located on the amplifier to the desired position(On for tail lock, OFF for rate mode). With this option, it is not necessary to connect the black SEL Aux 2 connector. Please note that with this method, it is not possible to access both the tail lock and rate modes as only one Aux channel is being used.

Quick Start

Option 1 is a quick way to get up and flying with your G5000T, as it's the easiest to set up. If you select the option to have the tail lock mode on, it will not be necessary to use any form of tail rotor compensation, further simplifying the initial setup.

Option 2: Remote Rate and Tail Lock Mode Access

Connect the black SEL Aux 2 connector from the amplifier to the following channel on your receiver:

JR PCM 10 series (9- and 10-channel systems): Gear (Channel 5)

JR XP8103 series (8-channel systems): Gear (Channel 5)

This option will allow both the standard rate and tail lock modes of the G5000T to be remotely selected during flight via the gear switch.

This method will also allow for the use of an optional program mix that will allow the G5000T's modes to be selected via the Aux 3 gyro gain function. This method will also enable the G5000T's modes to be linked to the flight mode switch.

INITIAL RADIO SETUP

The G5000T Gyro is much more responsive than a standard piezo gyro, and it can sense and correct for rotation rates at over 720˚ per second (standard gyros are limited to approximately 250˚ per second). Because of this, the travel adjust and exponential values can be much different than they are with other gyros to obtain the optimum feel and rotation rates.

Travel Adjust

Set the rudder's travel adjustment to maximum right and left. If you're using a JR PCM-10/10S/10SX, set the travel adjustment to 150% left and 150% right.

Dual Rates

The recommended starting points for dual rates are:

Flight Mode	Maneuver	Dual Rate Value
Normal	Hovering	60%
Flight Mode 1	540 stall turns	100%
Flight Mode 2	Standard aerobatics	60%

Exponential

Because a very large stroke is used (150%), the control sensitivity around neutral is high. Exponential is necessary to reduce the sensitivity around neutral. The recommended starting points of exponential are:

Flight Mode	Maneuver	Exponential Value
Normal	Hovering	60%
Normal	Hovering	40%
Flight Mode 1	540 stall turns	60%
Flight Mode 2	Standard aerobatics	60%

Note: After you have gained some experience and flight time, you can alter travel adjust, dual rate, and exponential values to suit your flying style.

SETUP AND ADJUSTMENT

The G5000T Piezo gyro gives true linear feedback response of rotation rates from as little as 1˚ per minute up to over 720˚ per second. Because of its high response rate and authority, the adjustment values (e.g., travel adjust, exponential, tail rotor compensation, etc.) will be very different from what you're used to.

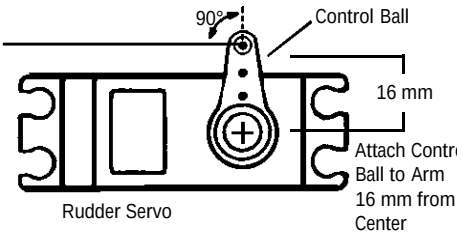
Following is the step-by-step procedure that must be followed to achieve the highest level of performance from your gyro system.

Step 1: Unhook the tail rotor linkage at the rudder servo and swing the servo arm out of the way. Lightly grasp the tail rotor pushrod at the servo end and move the tail rotor throughout its entire stroke. The tail rotor linkage should move through its full range smoothly with very little friction and no rough spots. Work on the linkage system until this is achieved.

Step 2: On your transmitter, reset all the rudder trimmers (sub-trim, trim offset, stunt trim, mechanical trim lever, etc.) to zero or center. Set the throttle/pitch stick at exactly the hover position (normally 50%). Turn off or zero out both the revolution mixing (up and down) and the acceleration mixing.

Step 3: Turn on your receiver and allow the helicopter to remain totally motionless for three seconds. A bright LED light on the amplifier will come on after three seconds, indicating the gyro has digitally stored the zero rotation value.

Step 4: Install the servo arm 90˚ to the tail rotor pushrod (see diagram). You may find that the splines are slightly offset on your servo, not allowing an exact 90˚ positioning. If so, rotate the servo arm to another arm position and try again. Secure the arm in place with the screw provided. Attach the pushrod to the arm at approximately 16 mm out from the center. Later, we will optimize this distance through flight testing.



Step 5: Be sure the rudder servo is moving in the correct direction. A right servo command should move the nose of the helicopter to the right. (If you're unsure, seek help from someone with more experience.) Reverse the servo direction in the transmitter's programming if necessary.

Step 6: Give a right rudder command and note the direction the rudder servo moves (clockwise or counterclockwise). Then pick up the helicopter and quickly rotate the nose to the left. The servo should move in the same direction as it did when you applied right rudder (clockwise or counterclockwise). If the rudder servo rotates in the opposite direction, move the reverse switch located on the amplifier in the opposite direction.

Step 7: With the G5000T in tail lock mode (green LED), check to insure that the servo will remain in the neutral (centered) position. If the servo "Drifts" or slowly moves in either direction, enter the sub trim function of your radio system and add a sub trim value as needed until the servo will remain in the neutral position, with no tendency to drift in either direction.

TAIL ROTOR LINKAGE ADJUSTMENT

With the servo arm positioned at 90° degrees to the control rod, adjust the overall length of the tail control rod so that the tail pitch mechanism is at the center of its travel limits. It's also necessary to insure that the tail rotor blades have the proper degree of pitch in the neutral position to maintain a stationary hover. Approximately 5° is a good starting point. The final pitch of the tail blades will need to be fine tuned during test flights by adjusting the tail linkage mechanically.

Adjusting the Endpoint Limiters

With the travel adjust set to 150%, you will notice that moving the rudder stick to its extremes may bind (over-stroke) the tail rotor linkage. JR's G5000T has a unique feature that electronically limits the maximum servo travel, preventing binding/over-stroking of the rudder linkage — but it has no effect on the maximum control authority during high speed pirouettes.

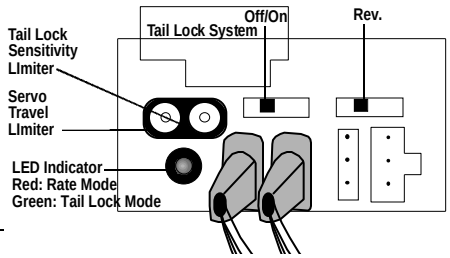
Note: Locate the tail lock switch on the G5000T amplifier, and move the switch to the OFF position. This will allow for proper servo end point travel adjustment. Reset the switch to the desired position once the endpoint limiter has been adjusted.

With your radio system on, give a full right rudder command. Using a small straight screwdriver, adjust the servo travel limiter while noticing the rudder servo. Adjust the pot until the servo has maximum available travel but no binding occurs.

Give a full left rudder command and adjust the limiter as needed to the point just before the servo binds. This sets the maximum available travel and eliminates linkage binding/over-stroking while the helicopter is on the ground.

Note: You will notice that with the travel limiters adjusted, it appears that the rudder stick only works the servo throughout half its stroke. This is normal! During flight, the gyro provides feedback to the servo that combines information about its rotation rate and the gain setting that gives proportional rotation rates throughout the rudder's stick travel.

Important: When properly adjusted, it's normal for the rudder stick to only affect the rudder's position around the center half of its stroke. During flight, the gyro senses the rotation rate of the helicopter, and the rudder servo works normally throughout its total stroke.



RATE/TAIL LOCK MODE SELECTION

There are two setup options available when installing the G5000T.

Note: While in tail lock mode, a slight change in the neutral position of the servo may occur while the model is in a stationary position. In addition, when the servo is moved to the extreme left/right position and released, the servo will slowly move back to the neutral position.

These movements are completely normal and are caused by the Angular Velocity Command Control System of the G5000T. These movements only occur while the model is stationary. In flight, these movements do not occur.

OPTION 1: Tail Lock or Rate Mode Always On

(Mandatory with 6-channel systems)

Step 1: Move the tail lock switch on the gyro amplifier to the desired position (ON for tail lock mode, OFF for rate mode).

Step 2: Turn the radio system on and confirm that the G5000T is in the desired mode (red LED: rate mode, green LED: tail lock mode).

Note: If the tail lock mode is selected, make sure that all tail rotor mixing values in the radio program have been reset to the factory default (0) position.

OPTION 2: Remote Tail Lock and Rate Mode Access

(Available only with 8 and 10 channel systems)

Step 1: Move the tail lock switch on the gyro amplifier to the on position.

Step 2: Verify that the mode remote select lead from the amplifier is connected to the desired Aux channel (Aux 2 or Gear).

TAIL LOCK/ RATE MODE PROGRAMMING

Tail Lock Mode Programming(Option 2)

The programming shown below only applies if Option 2 was selected from the previous sections. The programming indicated in this section only applies to 8- and 10-channel systems.

If you have selected Option 1 with tail lock always ON, proceed to the flight trimming section.

If you have selected Option 1 with rate mode always ON, proceed to the Gyro Gain section of these instructions.

JR 10 Series Systems

Step 1: Access a standard program mix (code 51-54) and assign a mix from Aux 3 (Ch 8) to Gear (Ch 5). This will make Aux 3 the master and Gear the slave channel. Press "ENTER" and select "NO" for servo hold.

Step 2: While at the second screen, press the "PAGE" key to access the third screen. Select the desired flight modes for the Tail Lock function to be active by pressing the "SEL" key below each flight mode box as shown below.

In this example, we have selected flight modes 1 and 2 to be in tail lock mode. All other modes, unless activated, will be set to the standard rate mode.

Note: Check to insure that all tail rotor mixing values have been reset to 0 for the flight modes that tail lock mode will be used.

Step 3: Press the "PAGE" key again to return to the second screen. Set the mix value located in the shaded box to - 100 as shown at right.

Next, activate the G5000 and while watching the LED indicator on the amplifier, move the flight mode and throttle hold switch through their positions to check that the G5000T is changing to the desired modes (red for rate, green for tail lock).

If the G5000T does not move to the desired modes, check to insure that the proper modes have been selected in the previous screen. If this information is correct, try reversing the value in the shaded box from -100 to +100 and retest.

On JR 10 series systems, please also check to insure that the gear switch has been inhibited through code 17 function select. If the gear switch is active, the G5000T will not change modes correctly as described.

JR 8103 Systems

Step 1: Access Program Mix 3 from the function mode and set the values as shown in the screen at right.

Make sure that the switch position (SW) is set to F-S12. This indicates that the mix will be activated when the flight mode switch is moved to positions 1 or 2 only.

Note: For proper operation, check to insure that all tail rotor mixing values have been reset to 0 for the flight modes that tail lock mode will be used.

Step 2: Turn the system on and while watching the LED indicator on the amplifier, move the flight mode switch. The LED should change from red (rate) to green (tail lock) as the flight mode switch is moved. Set the rate or tail lock modes to the desired flight modes. Our example shows the selection of rate mode for hover and throttle hold, and tail lock mode for stunt modes 1 and 2.

GYRO GAIN SETTINGS

Adjust the gyro gain of your radio system as follows:

JR 10 Series systems

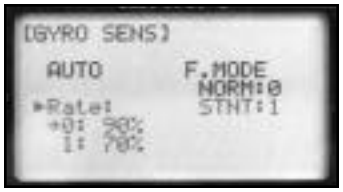
Step 1: Access the gyro gain function (code 44).

Step 2: Press "SEL" until "Auto" appears on the screen.

Step 3: Set the gain values as shown:

Note: For this example, gain value 2 will not be used.

Step 4: Press "PAGE" and select the gain values for each flight mode as shown.



JR 8103 Series Systems

Step 1: Access the gyro gain (Gyro Sens) function from the function mode.

Step 2: Press the + or - key until "AUTO" appears on the screen.

Step 3: Press "SEL" twice and select the following: NORM:0, STUNT:1

Step 4: Set the gain value as shown in the screen.

All other radio systems (JR 622,642, non JR systems)

Step 1: Access the travel adjust function of your system.

Step 2: Confirm the gear switch position as compared to the travel adjust values on the screen, and set the travel values for the Gear channel (5) as follows:
Position 1 (Hover Gain): +90, Position 2 (Stunt Gain): -20

Step 3: Turn the system on and verify that the gain value increased and decreases when the gain switch is moved.

Note: All gain values shown in this section are initial starting values only. Gain values can sometimes vary greatly due to the particular model, gear ratios, etc. Final gain values can only be established after test flying. Please refer to the flight trimming section of these instructions for more information.

TAIL ROTOR MIXING (RATE MODE ONLY)

Tail Rotor Mixing

While in rate mode **only**, the G5000T requires a small amount of tail totor mixing to achieve maximum performance. Tail Rotor Mixing should **never** be used with the G5000T in tail lock mode, as this mixing will cause the G5000T to be unable to achieve and locate the correct neutral position for the servo.

Note: Due to the many variables involved with each different helicopter (engine, blades, gear ratios, rotor rpm, etc), the values shown are initial starting values only. Final mixing values can only be achieved by test flying the model.

JR 10 Series Systems

Normal (Hover) Mode

PCM10/10S/10SX, 10SXII

Normal (Hover) Up 5% Down 5%

PCM10X

Normal (Hover)

Stunt (Flight) Mode

PCM10/10S/10SX

Stunt (Flight) Up +P2 Down -P2

-3 0 -5

PCM10SXII/10X

-10 -5 0 -5 -10

JR 8103 Systems

Please refer to the screen at right for the proper starting values.

JR XP652 and Other Systems:

Up Mix (RVU): +/- 5%
Down Mix (RVD): +/- 5%

Change the mixing values from + to - to establish the correct mixing direction.

Note: It is only necessary to assign tail rotor mixing values to the flight modes that the G5000T will be used in standard rate mode.

FLIGHT TRIMMING

Tail Rotor Trim Adjustment

If you have chosen to use the G5000T in tail lock mode only, proceed to the gyro gain adjustment section.

On the first test flight, it may be necessary to adjust the trim of the tail rotor if the model pirouettes slowly in either direction and to hover the model with the G5000T in the standard rate mode.

As with all heading hold type gyros, make any tail trim adjustments in rate mode by adjusting the tail rotor control rod mechanically.

Do not use sub trim or the transmitter trim to make these fine trim adjustments, as this will cause an out of trim situation when the tail lock mode is in use.

Adjust the tail trim by lifting the model into a stationary hover, and note the direction the mode pirouettes. Land the model and adjust the tail control rod length as needed. Continue this procedure until the heli will remain in a stationary hover, with the tail remaining straight. Once this adjustment has been made, the G5000T can be returned to tail lock mode if desired.

Note: While in tail lock mode, the G5000T will automatically establish the correct neutral position of the tail rotor, without the need to re-adjust the linkage.

GAIN ADJUSTMENT

Hover

Lift the Heli into a stationary hover, while looking for any side to side movement (hunting) of the tail rotor (yaw axis). If the model displays a Hunting tendency, reduce the gain value by 5% and retest. Reduce the gain as needed until the model will maintain in a stationary hover without hunting.

If the gain value is below 70% in hover, move the control ball in 1 hole on the tail rotor servo arm and retest. If the gain value reaches 100% and no hunting occurs, move the control ball out 1 hole on the servo arm and retest.

The ideal gain setting when using a rotor rpm of between 1300 and 1400 rpm is in the range of 90-95% gain. This will indicate that the control system has been set to the optimum mechanical settings.

Forward Flight (Stunt)

From a hover of at least 15' high, move the flight mode switch to the stunt position, and begin to transition into a very slow forward flight. If hunting occurs, move the flight mode switch back to the normal position and land the model. Reduce the Gain by 5% and re-test. Continue this procedure until all hunting is removed with the model at full forward speed. The final gain value should be in the range of 55-80%. If the gain value is below 50%, move the control ball in 1 hole on the tail servo arm and retest. If the gain value is above 80%, move the control ball out 1 hole on the tail servo arm and retest. These values are based on a main rotor rpm in the range of 1650 — 1750 rpm.

PIROUETTE RATE BALANCING

(Experienced pilots only)

Lift the model into a stationary hover. If you are comfortable, perform a full stick pirouette to the left, and then to the right while noting the speed in which the model rotates. If the model rotates more quickly in one direction that the other, adjust the travel adjust down on the fast side and retest. When completed, the model should pirouette at an equal rate in both directions.

Tail Rotor Blade Length

In most cases, choosing the correct tail rotor blade length can play a big part in the overall performance of a Gyro.

As a starting point, a 60-size heli with a 4.93 to 5.18 tail gear ratio performs very well with a tail rotor blade length of approximately. 95 mm. We recommend NHP tail rotor blades (NOH195) for their superior rigid and overall performance.

When stopping after a pirouette, if the model displays a "rebounding" motion in one or both directions, this is generally caused by the tail blade length. Lengthen or shorten the tail blades until this rebounding is removed. Since there are many variables that can also cause rebounding (rigidity of the helicopter frame and tail boom, etc), proper adjustment can only be achieved through test flying.

TAIL LOCK VOLUME ADJUSTMENT

Located on the G5000T amplifier you will find a pot in the tail lock system section labeled "ADJ." This pot is used to maximize the efficiency of the Tail Lock mode for your particular model and installation. This pot comes factory preset to the 50% position, which works well for most models.

After all flight trimming has been completed and you become comfortable with the flight performance of the G5000T, you can alter the settings of this pot to further maximize performance. Moving the pot counterclockwise reduces the tail lock sensitivity, while clockwise increases the sensitivity.

This pot only provides an extremely fine adjustment of the tail lock system. These changes will be difficult to detect until you become very familiar with the flight performance of the G5000T after many flights.

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.

REPAIR SERVICE INSTRUCTIONS

1. Return your system components only. Do not return your system installed in a model helicopter, plane, etc.
2. Use the original carton/packaging (molded foam container) or equivalent to ship your unit. Do not use the carton itself as a shipping carton; you should package the equipment carton within a sturdy shipping container using additional packing material to safeguard against damage during transit. Include your complete name and address information inside the carton, as well as clearly writing it on the outer label/return address area. Ship your equipment fully insured and prepaid. Horizon Service Center is not responsible for any damages incurred during shipping.
3. Include detailed information explaining your operation of the equipment and problem(s) encountered. Provide an itemized list of equipment enclosed and identify any particular area/function which may better assist our technicians in addressing your concerns. Date your correspondence and include your name, mailing address, and a phone number where you can be reached during the business day. 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.
4. **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.
5. **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.

Mail your system to:
Horizon Service Center
4105 Fieldstone Road
Champaign, IL 61822
(217) 355-9511
www.horizonhobby.com