- **USING REMOTE GAIN:** Remote gain is an extremely useful feature of the G100. When using the remote gain input to the G100, the gyro's gain can be controlled from the transmitter via an auxiliary channel on the receiver. Unlike most gyros on the market, the G100 remote gain is fully proportional.

  Setting Up For Remote Gain: To set the system up for remote gain, perform the following:

  a) Position the POT/RMT program dip switch to the RMT setting to defeat the gain control trim pot and enable the AUX input on the gyro.

  b) Plug the AUX lead into a proportional auxiliary channel. A switch channel such as landing gear can be used as long as the end-points are adjustable in the transmitter.

  Note: the simplest way to use the G100 with remote gain is to utilize an auxiliary channel that has variable gain. This way, gain can easily be controlled during flight by moving the transmitter knob. If the transmitter being used does not have a variable auxiliary channel, gyro operation can still be set up for remote gain operation using a switched type auxiliary channel such as landing gear. This setup will provide for two gain settings; the end-point adjustments in the transmitter can be used to set high and low gain values.

  c) With the radio system ON, move the model about the control axis while moving the gain channel knob or switch on the transmitter. You should notice the sensitivity of the gyro change as the auxiliary channel control is moved.

  With a computer, programmable transmitter, the versatility of the G100 can be realized to an even greater extent. For instance, the gain channel can be mixed with the flight mode switch so that two gain options are available, one setup for hover, and a different setup for forward flight. This setup is ideal because the gain required for hover will usually be greater than the gain required for forward flight as the forward motion of the helicopter tends to restrict tail rotation.

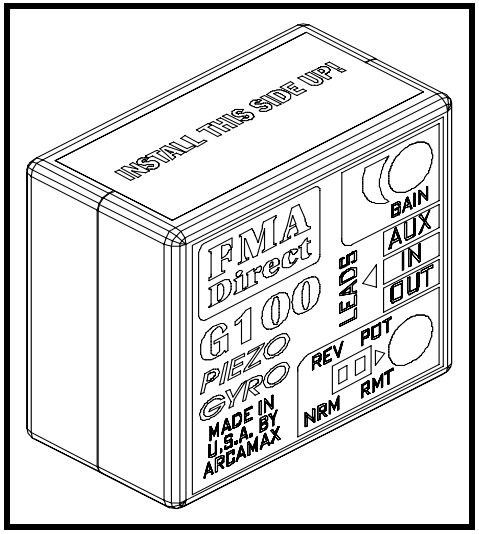
FLYING:

- **PRECAUTIONS:**
  1. It is extremely important that the model be at ambient temperature before the system is powered up for flight. Never take the aircraft out of a warm car on a cold day and power up the system right away. You must allow the model to sit for 10 to 15 minutes on the ground. In order to perform properly, the gyro must be at the same temperature as the air.
  2. After powering up the system, the aircraft must remain absolutely still for 5 seconds. If these precaution are not taken, trim changes could occur throughout the flight.
- **FIRST FLIGHT:** The gain should be set to 25% on the initial flight. Hover the helicopter for a short moment, then increase the gain. Repeat this procedure until a smooth hover is achieved. If the gain is turned up too high, the helicopter may start to oscillate back and forth rapidly. This condition is termed "hunting".

  Good luck and enjoy the high performance operation of your new G100!

IN CASE OF PROBLEMS:

1. The G100 gyro is designed and manufactured by Arcamax, Inc.
2. You may call Arcamax ((618) 453-4428) with technical questions or for issues of repair.



G100
PIEZO GYRO

OWNER'S MANUAL

NOTE: PLEASE READ MANUAL COMPLETELY BEFORE OPERATION

INTRODUCTION:

CONGRATULATIONS!!! Your decision to purchase the FMA Direct G100 piezo gyro assures you of the highest standards of design available to the R/C industry at an affordable price. The G100, designed by Arcamax, Inc., and distributed exclusively by FMA Direct, is designed for use in high performance helicopters and aircraft. Due to its solid state piezo sensor, unique temperature compensation circuitry, and precision switching voltage regulator, it offers performance unsurpassed by gyros from other manufacturers. The G100 operates as a standard "rate" gyro, or, if used in conjunction with a programmable transmitter, proper mixing setups will allow the G100 to be configured as a "stick priority" gyro.

Although intended primarily for helicopter use, the small size, low weight, low current consumption and high sensitivity make the G100 ideal for scale aircraft, ducted fan models, and experimental aircraft such as VTOL.

Piezo gyros are a significant technological advance over the old motor gyros. The absence of moving parts greatly decreases current consumption, extending both run time and the life of the gyro. Furthermore, their low mass increases responsiveness. ***It is important to understand that a piezo crystal is fragile. Special precautions should be taken when installing and using your new gyro.*** Please read the manual completely before attempting to install and fly your new G100.

SPECIFICATIONS:

SIZE:	**1.53" X 1.45" X .81"**
WEIGHT:	**1.0 OZ.**
OPERATING VOLTAGE:	**+4.0V TO +6.5V**
CURRENT DRAW:	**20 mA (max)**
OPERATING TEMP:	**23°F - 155°F (-5°C - 70°C)**
SERVO PULSE WIDTH:	**.75 - 2.25 mS**
SENSITIVITY:	**1/10° per second**

FMA, Inc.
5716A Industry Lane
Frederick, MD 21704
Sales: (800) 343-2934 -Technical: (301) 831-8980

FMA Direct

PACKAGE CONTENTS:

1. FMA Direct G100 Piezo Gyro. (See TABLE 1 below for system compatibility)
2. Owner's Manual.

TABLE 1 RECEIVER COMPATIBILITY / SERVO COMPATIBILITY

G100 Model #:	ACE	AIR	FUT	HITEC	JR	ACE	AIR	FUT	HITEC	JR
G100A		✓				NO!	YES	NO!	NO!	NO!
G100F	✓		✓			YES	NO!	YES	YES	YES
G100J				✓	✓	NO!	NO!	NO!	YES	YES
G100FJ	✓		✓	✓	✓	YES	NO!	YES	YES	YES

PREPARATION:

- **INSTALLATION, RECEIVER AND SERVO CONNECTION**

1. The G100 is several times more sensitive than standard motor gyros in terms of responsiveness. To realize this improved sensitivity in your model, FMA Direct recommends the use of a high quality, ball bearing servo with fast response. A good candidate is the FMA Direct model S700 servo. In addition, linkages between the servo and the control surfaces must have absolutely zero slop. Replace any ball links or horns that show indications of slop or fatigue. Care must be taken when installing the gyro to isolate the electronics from vibration as much as possible. The G100 should be installed with servo tape that is a minimum of 1/16" thick, 1/8" is preferred. The gyro mounting surfaces should be extremely rigid - mounting the gyro to a floppy object will cause reduced sensitivity or could cause failure of the product due to excess vibration. Never mount the gyro near any sources of heat such as the engine or the exhaust. An excellent location for mounting the gyro would be under the canopy next to the radio gear.
2. *IMPORTANT*: The top of the G100 is labeled "INSTALL THIS SIDE UP!". Care must be taken to install the gyro in accordance with this label. Failure to do so will prevent the gyro from operating. The sensitive axis of the gyro runs parallel to the face of the gyro (the side containing the color portion of the case label). The gyro will detect rotation on any axis parallel to the sensitive axis. When mounting the gyro in a helicopter to stabilize the yaw axis, the sensitive axis must be seen as cutting straight through the main rotor blades of the helicopter.
3. When hooking up the gyro to your servo and to your receiver, use TABLE 1 to check equipment compatibility. Note that it is possible to interface JR or Hitec servos with Futaba style channel leads. Be sure that the Brown or Black leads of each of the connectors are aligned to one another. Model G100FJ will allow for the maximum possibilities of interfacing the gyro to different equipment types. You may mix and match Futaba and JR servos, but neither may be used in combination with Airtronics servos as the voltage polarity is incompatible and a short circuit will be produced should the two be interfaced.
4. Connect the OUT lead to the servo, the IN lead to the desired channel on the receiver and, if desired, the AUX lead to an auxiliary channel on the receiver.

- **BENCH TESTING THE GYRO**

Referring to FIGURE 1, set the program mode dip switches as shown. The POT/RMT switch should be closer to POT and the REV/NRM switch should be closer to NRM. Use a small screw driver to change the settings on the dip switches if necessary. Bench test the gyro by turning on the transmitter and the receiver at this time. After 15 seconds, the servo connected to the gyro will center. **In normal operation, the model must be absolutely stationary for 5 seconds every time the receiver is powered up.** If this procedure is not followed, trim changes will result from flight to flight. Move the model about the sensitive axis (or control axis). The servo should move as the model is rotated.

If no movement is obtained:

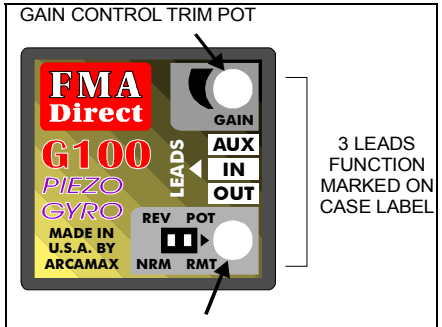


FIGURE 1

a) re-verify that the gyro is in "trim pot gain" mode (explained in detail later) by adjusting the dip switches as shown in FIGURE 1.
b) turn the gain control trim pot to maximum sensitivity (fully clockwise).

If still no movement occurs, check wiring and battery voltage. If still no movement occurs, contact FMA Direct customer service.

If movement occurs, move the model about the other axis. You may notice some movement in the servo but it should be substantially less than when moved about the sensitive axis.

- **SETTING THE DIRECTION**

Once you are satisfied that the gyro is operational, the correction direction must be set. With the radio on, move the model sharply about the control axis. Notice the movement in the control surface or tail rotor. The direction of the control surface should counteract the direction of rotation. If it does not, change the setting of the program dip switch marked REV/NRM. **This setting is extremely important as failure to set the direction switch will result in loss of control of your aircraft. If you are unsure about how to determine this setting, please talk to someone who can help you.**

MODES OF OPERATION:

- **TRIM POT GAIN MODE:** Trim pot gain is useful if several gyros are on a model or an auxiliary channel is not available. When using trim pot gain, the gain select dip switch must be in the POT position. The gyro's gain can now be controlled by adjusting the gain control trim pot. Turning the pot clockwise causes the gyro to be more sensitive. The AUX input has no effect when in this mode of operation and may be disconnected.
- **REMOTE GAIN MODE:** Remote gain mode is used whenever gain control is to be applied remotely from the transmitter. When using remote gain, the gain select dip switch must be in the RMT position. The gain control trim pot will be defeated in remote gain mode.
- **STICK PRIORITY:** Stick priority operation is easily established using a computer radio. A standard rate gyro at hover keeps the tail from swinging by applying negative feedback. The problem is when the pilot desires to spin the tail, the gyro senses this and tries to compensate by applying opposite tail rotor, thus canceling the pilot's command. The result is a slow rate of rotation about the axis. With a stick priority gyro, the gyro's effect is reduced when the pilot commands a turn, hence, forcing "stick priority". With a stick priority gyro, a helicopter can be set up to spin as fast as the pilot wants while still retaining 100% stability at hover. It is important to note at this time, that stick priority is not recommended for the beginning helicopter pilot because it makes the aircraft overly sensitive to stick motion.

Setting Up Stick Priority: To set up your transmitter for stick priority, perform the following:

a) Make sure that the G100 is programmed for Remote Gain operation by setting the POT/RMT dip switch to RMT setting.
b) Set up a mix so that as the stick is moved off center, the gain is reduced.
c) Make the rudder channel the master and the gain channel the slave.
d) Mix +100% for right rudder and -100% for left rudder.
e) Power up the radio and move the model about the control axis and notice the gyro sensitivity.
f) Continue moving the model about the control axis while at the same time adding rudder inputs via the transmitter stick. You should notice a reduction in gyro sensitivity as the stick approaches the limits in either direction.
g) If an opposite condition occurs (an increase in gyro sensitivity at stick limits), reverse the mixing percentages. That is, mix -100% for right rudder and +100% for left rudder.
h) You may wish to adjust the mix percentages to tailor performance to your specific requirements. The mixing percentages determine how "fast" the gain is reduced while the gain control knob or switch on the transmitter determines the total amount of gain.