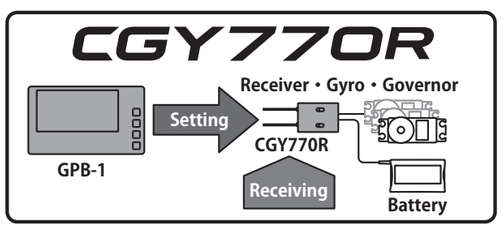
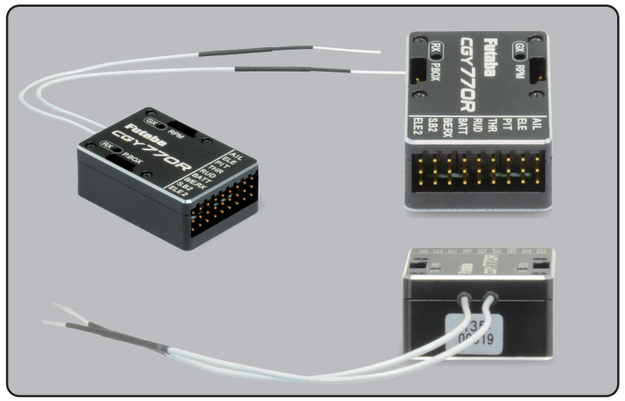
Futaba
1M23N40002

3-axis AVCS Gyro

Gyro/Receiver/Governor function integrated

Compatible with flybarless helicopters





Futaba CGY770R is gyro, 3-axis Stabilization System combining AVCS gyro and head speed governor and receiver in one box designed for flybarless helicopters. Its cutting edge MEMS (Micro Electro Mechanical System) sensor design, ultra high-speed processing speed, and advanced PID control algorithm put it a league of it's own ahead of all ahead of all other heading hold gyros in size, weight and performance.

FEATURES

- 3-Axis Gyro and Governor and Receiver in one box.
- High speed operation and extremely low latencies result in greater stability.
- Low profile, small size, and light weight.
- Easy set-up and tuning the gyro and governor program using the GPB-1.
- Settings divided into Basic and Expert menus. The basic setting is for initial setting and Expert setting is for more advanced settings.
- Firmware can be updated from a Windows based personal computer when used with the optional CIU-2 or CIU-3 interface.
- S.BUS 2 compatible.
- UR (ultra response) System compatible. When combined with the UR servo(for helicopter), ultra-high-speed response is achieved.

*Car UR servos cannot be used.

• Gyro section
- Advanced and adaptive PID control loop is utilized.
- Simultaneous control of 3-axes (roll, pitch, yaw).
- Compatible with 1520 µs Analog, 1520 µs Digital, 760 µs Digital and UR mode servos.

• Rudder (yaw) section:
- Capable of sensing angular velocity up to +/- 1,000 deg/sec.
- Feed Forward Option allows the CGY770R to consider other control functions during operation. This results in more accurate corrections and precise operation.
- Cutting edge control algorithm provides a consistent pirouette rate, precise operation, and smooth yaw control in any flight condition.

• Aileron, Elevator (roll, pitch) section:
- Developed specifically for flybarless helicopters.
- Supports H3-120, H3-140, H3-90, H4-00, and H4-45 swash plate types.

• Governor section
- Advanced and adaptive PID control loop is utilized.
- High speed operation and extremely low latencies provide a more consistent and accurate operation.
- Capable of governing head speeds from 700 rpm through 4,000 rpm
- Compatible with 1520 µs Analog and 1520 µs Digital throttle servo types.
- Feed Forward Option allows the CGY770R to consider other control functions during operation. This results in precise governing of the head speed.
- Governor or Revolution Limiter mode selectable.
- Supports gear ratios from 1.00 through 50.00.
- Cutting edge control algorithm provides more consistent RPM governing.
- Revolution sensor is compatible with the GV-1. The CGY770R also supports an optional back plate revolution sensor and brushless phase sensor.

• Receiver section
- Switch FASSTest - 2.4 GHz (18/12CH mode) system and T-FHSS - 2.4 GHz system using the Gyro Program Box GPB-1 system.
- By S.BUS 2 system compatibility, it is possible to transmit the battery voltage information of the receiver and the optional sensor information connected to the S.BUS 2 port of the receiver.
- Diversity antenna system.
- DUAL RX system.

• Other functions
- Maximum rpm memory.
- Cumulative engine operation timer.
- Integration function of engine operation time.

• Applicable systems
- Transmitter : Futaba FASSTest-2.4 GHz (18/12CH mode), T-FHSS Air-2.4 GHz

*Wireless tuning function is only supported by FASSTest.
*There are restrictions on wireless tuning depending on the item.

For details on how to use it, refer to the CGY770R manual on the Futaba website:

https://futabausa.com
https://www.rc.futaba.co.jp

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Percentage of Waste Paper pulp 80%

CONTENTS

● CGY770R/GPB-1 Set
• CGY770R • GPB-1 • CGY connection cable • Transmitter connection cable
• Mounting Pads × 3 • Dust Covers × 5 • Manual • Decal • Velcro

● CGY770R
• CGY770R • Mounting Pads × 3
• Dust Covers × 5 • Manual • Decal

● GPB-1
• GPB-1 • CGY connection cable • Transmitter connection cable
• Manual • Decal • Velcro

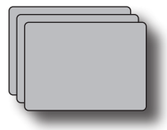
● CGY770R

● Dust Cover

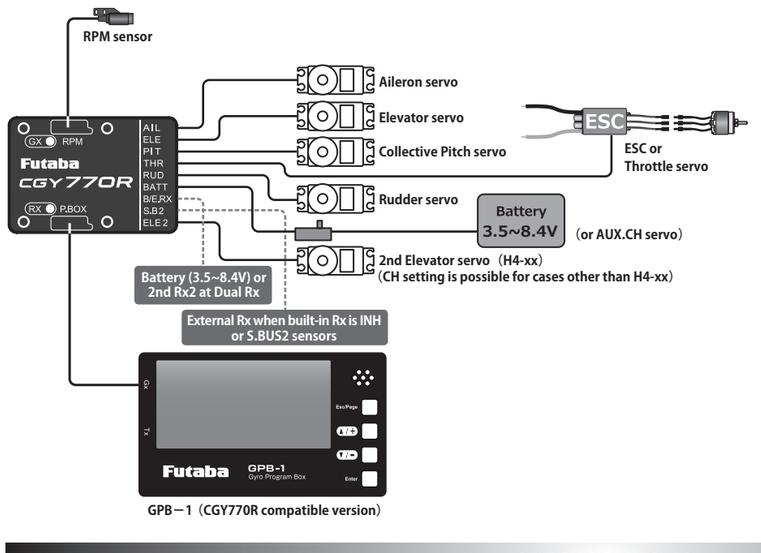
● GPB-1 Gyro Program Box

When setting up the gyro and the governor, connect it to the CGY770R and use it. Do not install it on the helicopter.

● Mounting Pads



CONNECTION



GPB−1 (CGY770R compatible version)

● CGY connection cable: 350 mm
It is used to connect the CGY770R and the Gyro Program Box GPB-1.

● Transmitter connection cable
It is used to connect the transmitter to the Gyro Program Box GPB-1 and use the transmitter to transfer the settings of GPB-1 to the CGY770R wirelessly.

SPECIFICATIONS

CGY770R2

Control System:	Digital advanced control
Angular Velocity Range:	±1,000 Degrees Per Second (Gyro)
Sensor:	Micro Electromechanical Systems (MEMS) Gyro Hall effect sensor
Governor Resolution:	0.1 Hz (6 rpm) (Engine RPM)
RPM Accuracy:	1%
Head Speed Range:	700-4,000 rpm
Selectable Servo Frame:	70 Hz, 280 Hz and 560 Hz (Rudder Gyro only) Rate
Center Pulse Width:	1520 µs (70 Hz & 280 Hz) 760 µs (560 Hz)
Receiving system:	FASSTest-2.4 GHz (18 CH/12 CH mode) / T-FHSS-2.4 GHz S.BUS2 / S.BUS Port and 6 Channels for Conventional System
Frequency band:	2.4 GHz band
RF power output:	12.589 mW
Anntena:	Dual antenna diversity
Rated voltage:	3.7 V to 7.4 V DC* (Operating Voltage:3.5 V to 8.4 V)
Current Drain:	85 mA (When receiving, no servo, no RPM sensor)
Operating Temperature:	14°F to 113°F (-10°C to +45°C)
Size (CGY770R) :	1.063 in. [27.0 mm](W) / 1.543 in. [39.2 mm](L) / 0.591 in. [15 mm](H)
Weight (CGY770R) :	0.787 oz [22.3 g]

GPB-1

Rated voltage:	3.7 V to 7.4 V DC* (Operating Voltage:3.5 V to 8.4 V)
Current Drain:	62 mA
Operating Temperature:	14°F to 113°F (-10°C to +45°C)
Display:	128 x 64 dot graphics
Size:	2.126 in. [54 mm](W)/3.543 in. [90 mm](L)/0.6102 in. [15.5 mm](H)
Weight(RPM sensor):	1.88 oz [53.3 g]

* The operating voltage shown only applies to the CGY770R and GPB-1. Always verify that your receiver, servos, tail rotor servo, switch and any other electronic components used in your installation are capable of operating at the voltage you plan to use.

WARRANTY & REPAIR SERVICE (IN U.S.A.)

If any difficulties are encountered while setting up or operating your gyro, please consult the instruction manual first. For further assistance you may also refer to your hobby dealer or contact the Futaba Service Center at the e-mail address, fax or telephone number listed below:

Phone:1-256-461-9399, FAX:1-256-461-1059
E-Mail: service@futabaUSA.com

If you are unable to resolve the issue, pack the system in its original container with a note enclosed and a thorough, accurate description of the difficulty. Include the following in your note:

- Symptoms (including when the problem occurred)
- System (Transmitter, Receiver, Servos and model numbers)
- Model (Model name)
- Your Name, Address and Telephone number

Send the respective items to the authorized Futaba Service Center Address below:

Futaba Corporation of America
2681 Wall Triana Hwy
Huntsville, AL 35824, U.S.A.

COMPLIANCE INFORMMMATION

Compliance Information Statement (for U.S.A.)

This device, trade name Futaba Corporation, model number CGY770R, complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.
CAUTION: To assure continued FCC compliance
1. Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.
2. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.
The responsible party of this device compliance is:
Futaba Service Center
2681 Wall Triana Hwy Huntsville, AL 35824, U.S.A.
TEL 1-256-461-9399 or E-mail: service@futabaUSA.com

Compliance Information Statement (for Canada)

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

French: Cet appareil radio est conforme au CNR-210 d'Industrie Canada. L'utilisation de ce dispositifest autorisée seulement aux deux conditions suivantes : (1) il ne doit pas produire de brouillage, et (2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même sice brouillage est susceptible de compromettre le fonctionnement du dispositif. Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé.
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Declaration of Conformity (for EU)

Hereby, Futaba Corporation declares that the radio equipment type is CGY770R in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address:

http://www.rc.futaba.co.jp/english/dl/declarations.html

低功率射頻器材技術規範警語

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

PRECAUTIONS

Meaning of Special Markings

Pay special attention to safety where indicated by the following marks:

⚠**DANGER** - Procedures which may lead to dangerous conditions and cause death/serious injury 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.

⃠ : Prohibited ❗ : Mandatory

⚠WARNING

Failure to follow these safety precautions may result in severe injury to yourself and others.

• Read through the entire manual before operating this product.

USAGE PRECAUTION:

* The FASSTest system is not compatible with the conventional FASST system.

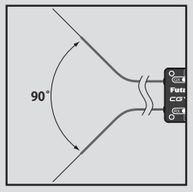
⚠CAUTION

⃠ Do not mount GPB-1 (Gyro Program Box) on the helicopter.
* It will be damaged by vibration.

ANTENNA INSTALLATION PRECAUTION:

⚠WARNING

❗ Be sure that the two antennas are placed at 90 degrees to each other.
*The CGY770R has two antennas. In order to maximize signal reception and promote safe modeling Futaba has adopted a diversity antenna system. This allows the receiver to obtain RF signals on both antennas and fly problem-free.



⃠ Do not cut or bundle the receiver antenna wire.

⃠ Do not bend the coaxial cable. It causes damage.

⃠ To prevent damage to the antenna, please exercise caution. Do not bend at the base of the antenna. Also, ensure that the unit is not subjected to impact damage.

❗ Keep the antenna as far away from the motor, ESC and other noise sources as you possibly can.

CARBON FUSELAGE PRECAUTION:

⚠WARNING

❗ You must leave 30 mm at the tip of the antenna fully exposed. The exposed antenna should be secured so that it can not move around or back inside of your aircraft.

CONNECTOR INSERTION PRECAUTION:

⚠WARNING

⃠ Do not connect the connector by mistake as shown on the right.

BEFORE EACH FLIGHT:

⚠WARNING

❗ Keep away from conductive materials to avoid short circuits.

❗ If it does not operate properly during operation test before use or use, stop using it.

❗ Always check the transmitter and receiver battery voltage to ensure they have enough remaining capacity to complete the flight.

❗ Confirm that the CGY770R is operating in the correct mode.

ABOUT BATTERIES:

⚠WARNING

❗ Newer high-end servos and other radio equipment are capable of placing large demands on the power systems in use today. When using a regulator you must ensure that the regulator is capable of supplying the current demands of the equipment you have selected. In addition to this make sure the wiring and switch you have selected are capable of handling high current draws.
*The servo current draw can be up to 50% higher on a flybarless helicopter. Always ensure your receiver battery is fully charged before each flight.

ABOUT CONNECTOR:

❗ Insert the connector such as sensor, servo, connection cable, battery etc., surely.
*If it is not securely inserted all the way in, it may come off due to vibration during flight and there is a danger of falling.

ABOUT WIRING:

❗ Please secure the wiring so that it does not rub against the helicopter frame or other such items that could cause wear. If it does so, we suggest covering these ares with fuel tubing (or similar) to prevent damage.

ABOUT VIBRATION ISOLATION AND WATERPROOFING:

❗ The CGY770R is fixed with a dedicated mounting pad with good condition and the helicopter performs sufficient anti-vibration measures so as not to receive strong vibration at the time of flight. Also, if there is a risk of the gyro getting wet, place it in a plastic bag and take waterproof measures.

ON FLIGHT PRECAUTION:

❗ Always exit programming mode before attempting to fly the model.

Gyro operating precautions: Gyro

⃠ The CGY770R requires 5-10 seconds to initialize when the power is turned on. Do not move the helicopter and do not move the tail rotor, aileron and elevator sticks during this initialization or the gyro may not initialize properly. Once the initialization process has been completed the swash servos and tail servo will move several times indicating that the CGY770R is now ready for flight.

❗ Verify that the gyros are operating and compensating in the correct direction before each flight. If the compensation direction is incorrect on any axis the model will become uncontrollable after takeoff.

❗ The servo type parameters within the CGY770R must match the type of servo you are using. Incorrect setting may damage the CGY770R or the servos, possibly resulting in a loss of control during flight.

❗ Always allow the gyro to adjust to the surrounding environmental temperature before flight. A large temperature change during use will cause drift and other operational issues.

❗ If you are switching between Normal Mode and AVCS Mode in flight, please keep in mind that you must have the gyro re-learn the center position after making a trim change within the transmitter. To memorize the new center position simply flip the gain switch on the transmitter three times between Normal Mode and AVCS Mode (Normal → AVCS → Normal → AVCS) within one second. The servo will center indicating that the new center position has been memorized.

❗ When operating the gyro in AVCS Mode, all compensation and revolution mixing must be disabled and any tail rotor or swash offsets for flight modes must be disabled.

❗ Do not drop the CGY770R onto a hard surface or subject the CGY770R sensor to a strong shock as this may damage the sensor.

❗ Verify that the gyro is operating in the desired mode.

❗ When the CGY770R is operated in AVCS mode the tail rotor or swash plate servos will not center when tail rotor, aileron or rudder stick is released. This is normal operation for AVCS mode. The servos may also move to the extent while the model is being carried out to the flight line. Before take off, you must visually center the tail rotor pitch slider and level the swash plate by using the transmitter control sticks. You can also center the servos by moving the tail rotor stick full left, then full right, back to full left and then allow the stick to center within one second; the same method applies for aileron and elevator servos.

⚠WARNING

⃠ Never turn off the CGY770R while the GX (gyro) LED is blinking green at high speed (about 5/sec).
*If the power is turned off while high-speed blinking, a data error will occur and all data will be initialized. It is very dangerous to fly as it is.

Governor operating precautions: Governor

❗ When the throttle servo is connected to the CGY770R, the battery fail-safe function within the CGY770R must be setup and enabled.

❗ Throttle fail safe function (transmitter setting): Use the fail safe function for the channel that turns the governor on and off to set the fail safe position to the point at which the governor is turned off. With this setting, when the system enters the fail safe state, the governor will be turned off, and the receiver throttle signal (fail safe position preset) will be output directly.

❗ When using the condition hold function on the transmitter, always set the throttle servo maximum operating point to less than the point at which the governor is activated. If this is not done the governor may activate while in condition hold.

❗ While preparing for flight or starting the engine, always ensure the throttle remains below the governor activation point and do not select any flight modes that may activate the governor.

❗ If you prefer to activate the governor while the model is still on the ground, always ensure that you have at least -1 degrees of pitch in the model before activating the governor. This negative pitch is necessary to prevent an unexpected lift off as the governor activates and the head speed increases to the desired RPM.

❗ Be sure to set the autorotation condition to the OFF side with the governor ON/OFF switch function.

❗ Periodically check the rpm sensor output to ensure proper governor operation. Due to the high level of vibration and centrifugal forces the magnet may come loose or the sensor alignment may change. Every 10th flight verify that the magnet and sensor are properly mounted.

❗ If abnormality such as vibration etc., is recognized on the aircraft side during operation, be prepared to turn off the governor immediately.

MACHINE MAINTENANCE:

⚠WARNING

❗ Even though the CGY770R is a high performance gyro and governor, it will be necessary to ensure that the helicopter mechanics are also in optimum operating condition. Please use the guidelines below and address all issues before installing and flying the CGY.

- The CGY must be used with a rigid tail rotor drive system. Any modern torque tube or belt drive system should be adequate. Do not attempt to fly the CGY using a wire driven tail rotor system.
- Always ensure the drive gears, torque tube, pulleys, belt, bearings and shafts are in proper working condition. If any of these items are damaged or worn they must be replaced.
- The linkage rod, tail rotor bell crank, pitch slider and tail rotor grips must operate without friction to obtain the best performance from the CGY. Binding in the tail rotor control linkage will decrease the performance of the CGY gyro and this may also shorten the servo lifespan. Please take the time now to ensure the tail rotor system on your helicopter is working correctly and without friction or binding.
- Vibration will affect the CGY's overall performance. All rotating components on the helicopter should be balanced to minimize vibrations in flight. Ensure that your engine or electric motor is running smoothly and that all vibrations have been addressed before installing and test flying the CGY.