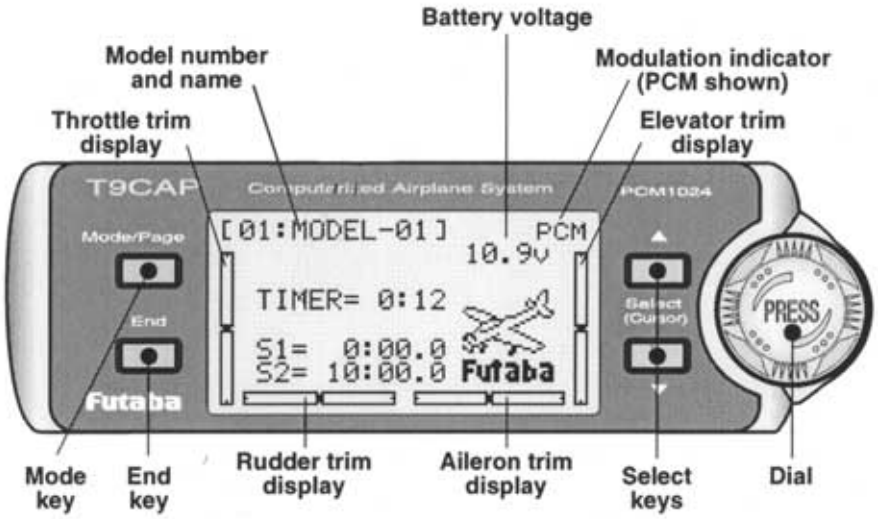
The following frequencies and channel numbers may be used for flying aircraft in the United States:

TRANSMITTER DISPLAYS & BUTTONS

When you first turn on your transmitter, a confirmation double beep sounds, and the screen shown below appears. Before flying, or even starting the engine, **be sure** that the model type and name appearing on the display matches the model that you are about to fly! If you are in the wrong model memory, servos may be reversed, and travels and trims will be wrong, leading to an immediate crash.

Edit buttons and Start-up Screen (appears when system is first turned on):



***MODE/PAGE BUTTON:* (key)**

MODE Press and hold ***MODE BUTTON*** for one second to open programming menus. Press ***MODE BUTTON*** to switch between **BASIC** and **ADVANCE** menus. **HELI** only: Press ***MODE BUTTON*** to scroll between conditions in certain functions.

***END BUTTON*: (key)**

END Press ***END BUTTON*** to return to previous screen. Closes functions back to menus, closes menus to start-up screen.

***SELECT/CURSOR BUTTONS*: (key)**

CURSOR CURSOR Press ***SELECT/CURSOR BUTTON*** to scroll through and select the option to edit within a function.

CURSOR CURSOR Press ***SELECT/CURSOR BUTTON*** to page up/page down within **BASIC** or **ADVANCE** menu.

Turn Dial:

Turn ***DIAL*** clockwise or counterclockwise to quickly scroll through functions within each menu.

Turn ***DIAL*** clockwise or counterclockwise to scroll through choices within an option of a function (for example, to select which switch controls dual/triple rates).

Press Dial:

PRESS Press ***DIAL*** to select the actual function you wish to edit from the menu.

PRESS Press ***DIAL*** and hold one second to confirm major decisions, such as the decision to: select a different model from memory, copy one model memory over another, trim reset, store channel position in FailSafe, change model type, reset entire model. System will ask if you are sure. PRESS Press ***DIAL*** again to accept change.

Adjustability:

- More sensitive around neutral. (positive exponential, see example)
- Less sensitive around neutral. (negative exponential, see example)
- Adjustable for each direction (ACRO/GLIDER)

For throttle, exponential is applied at the low end to help nitro and gasoline engines have a linear throttle response, so each 1/4 stick increases engine RPM 25% of the available range. (In most engines this ranges from 5-60%.)

Special note for helicopters: Helicopter model types have just a single rate for each switch position rather than a rate fo each side of the servo's travel per switch position. Additionally, setting D/R, EXP for each switch position requires cursoring back to the No. setting and changing the switch position here. Just flipping the switch does not affect the scree setting, allowing dual rates to be assigned with idle-up and other features on certain switches, and does not require pu the model in that condition to make modifications.

The helicopter programming also offers you the choice of Cond. This option allows you to have a separate rate for each of the 3 controls automatically selected when changing from normal/throttle hold to any of the idle ups, for a total of FOU rates available. Simply change the switch choice to Cond and then use the ***MODE/PAGE BUTTON*** to toggle through the 4 conditions while setting the rates.

GOAL of EXAMPLE:	**STEPS:**	**INPUTS:**
Set up dual rates and exponential in a HELI model.	Open D/R, EXP.	MODE for 1 second. (If ADVANCE MODE again.) to D/R, EXP PRESS
	Choose channel.	CURSOR CURSOR to desired channel.
	Choose first switch position.	CURSOR to UP.
	Set rate and exponential (Ex: high rate = 95%, 0% exponential.)	to 95%. CURSOR Confirm 0% EXP.
	Go to 2nd switch position and set rate and exponential.	CURSOR to DN CURSOR Repeat above.
	Optional: if using a 3 position switch, set 3rd rate.	CURSOR to CT CURSOR Repeat above.
	Optional: assign dual rates to have one for each condition.	CURSOR CURSOR to COND Repeat steps above to adjust for each condition.

GETTING STARTED WITH A BASIC HELICOPTER

This guideline is intended to help you set up a basic (**SWH1**) heli, to get acquainted with the radio, to give you a jump start on using your new radio, and to give you some ideas and direction on how to do even more with this powerful system than you may have already considered. It follows our basic format of all programming pages - a big picture overview of what we're trying to accomplish; a "by name" description of the steps to help acquaint you with the radio; and then a step-by-step instruction to leave out the mystery and challenge of setting up your model.

Briefly, the typical helicopter's controls are as follows:

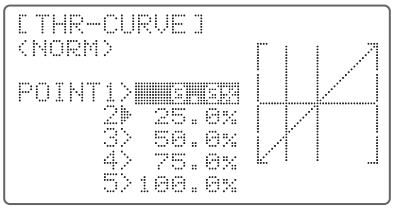
- Aileron: changes cyclic lateral (roll) . Rolls the helicopter. Tilts the swashplate to the left or right. CH1.
- Elevator: changes cyclic pitch. Changes the helicopter's angle of attack (nose up or nose down). Tilts the entire swashplate fore and aft. CH2.
- Rudder: changes the angle of the tail rotor. Yaws the helicopter left or right. CH4.
- Collective Pitch: adjusts main rotor collective [angle of the paddles], changing the main blades' pitch. Increased collective pitch (with throttle) causes the helicopter to rise. Moves in conjunction with throttle on the ***THROTTLE STICK***. CH6.
- Throttle: opens/closes carburetor. Moves in conjunction with collective pitch on the ***THROTTLE STICK***. CH3.
- REVO: mix that adds rudder in conjunction with pitch. This helps compensate for rotation of the helicopter caused by the increased engine torque. (Never use revo. mixing with a heading-hold/AVCS gyro setting which is in heading-hold/AVCS mode. However, revo. mixing is still used when a heading-hold/AVCS gyro is in normal mode.)

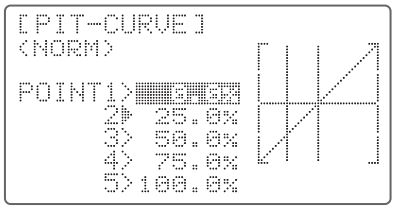
For additional details, see that function's section in this manual — the page numbers are indicated in the first column for you..

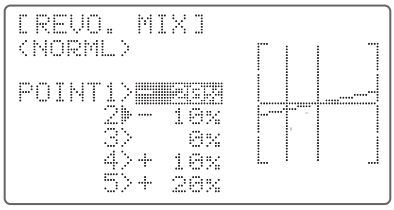
GOAL of EXAMPLE:	STEPS:	INPUTS:
Prepare your helicopter.	Install all servos, switches, receiver per your model's instructions. Set all trims, dials and sliders to neutral. Confirm all control linkages are 90 degrees (or per instructions) from the servo horn to the ball link for proper geometry and that no slop is present. Mechanically adjust all linkages to get as close as possible to proper control throws and minimize binding prior to radio set up.	
Select the proper **MODEL TYPE** for your model. Ex: **HELI (SWH1)**. See p. 77. *[NOTE: This is one of several functions for which the radio requires confirmation to make a change. Only critical changes require additional keystrokes to accept the change.]* (If the correct model type was already displayed, be sure to do a model reset to discard any unwanted settings.)	In the **BASIC** menu, open the **PARAMETER** submenu.	Turn on the transmitter. MODE for 1 second.(If **ADVANCE**, MODE again.) CURSOR then ⟳ to highlight **PARAMETER**. PRESS to choose **PARAMETER**.
	Go to **MODEL TYPE**.	CURSOR to **TYPE**.
	Select proper **MODEL TYPE**. Ex: **HELI(SWH1)**. *Confirm the change.* Close **PARAMETER**.	⟳ to **HELI(SWH1)**. PRESS for 1 second. **sure**? displays. PRESS to confirm. END to return to **BASIC** menu.
Then, **NAME** the model. P. 25. *(You do not need to do anything to "save" or store this data.)*	In the **BASIC** menu, open the **MODEL** submenu.	⟳ as needed to highlight **MODEL**. PRESS to choose **MODEL**.
	Go to **MODEL NAME**.	CURSOR CURSOR (First character of model's name is highlighted.)
	Input aircraft's name. Close the **MODEL** submenu when done.	⟳ to change first character. When proper character is displayed, CURSOR to move to next character. Repeat. END to return to **BASIC** menu.

Setting up the Normal Flight Condition: The Normal flight condition is typically utilized for hovering. The throttle and collective pitch curves are adjusted to provide consistent engine RPM despite the increase/decrease in collective pitch of the blades. This keeps the engine from "bogging down" under excessive load (like trying to accelerate a car on a steep hill in 5th gear) or excessive RPM under insufficient load (like flooring the throttle while in neutral), risking engine damage. As the 2 curves and revo. mixing are all interrelated, we will discuss all three first, then complete a sample setup.

Note that the normal throttle, pitch and revo curves are all available in the **BASIC** menu for simplicity. These may also be updated later in the **ADVANCE** menu with the settings for the other 4 conditions [idle-up 1 (**IDL1**), idle-up 2 (**IDL2**) and idle-up 3 (**IDL3**), plus throttle hold (**HOLD**)]. *Note*: The throttle and pitch curves for the normal condition are always on. They cannot be inhibited. The other four conditions are activated with their throttle curves or throttle hold. For idle-ups, see p. 85. For throttle hold, see p. 83.







- **TH-CV/NOR**: inputs the normal (**NORM**) throttle curve, which is usually not a linear response to ***THROTTLE STICK*** motion. Adjusting point 3 of the curve adjusts the engine's RPM at the ***THROTTLE STICK*** midpoint – the desired position for hovering. The other 4 points are then adjusted to create the desired idle and maximum engine speed, and a smooth transition in-between. For more on throttle curves, see p. 85.

- **PI-CV/NOR:** inputs the normal (**NORM**) collective pitch curve, the collective pitch curve for flight near hover. The normal collective pitch curve is adjusted to match the throttle curve, providing the best vertical performance at a constant engine speed, with a starting curve of –4 base, +5 neutral, and +8 to +10 degrees of blade pitch maximum*. You can program the response over a 5-point curve for the best collective pitch angle relative to ***THROTTLE STICK*** movement. For more on collective pitch curves, see p. 85.

- **REVO./NOR**: mixes collective pitch commands to the rudder (a PITCH-RUDDER mix) to suppress the torque generated by changes in the main rotor's collective pitch angle, keeping the model from yawing when throttle is applied. **REVO.** is extremely helpful in "taming the tail" of models not using heading-hold/AVCS gyros. NOTE: There are three revo. mixes available: normal (**NORM**), idle-up 1 / 2 (**IDL1/2**), and idle-up 3 (**IDL3**). All 3 are adjustable in the **ADVANCE** menu. Never use revo. mixing in conjunction with a heading-hold/AVCS gyro while in heading-hold/AVCS mode. Revo. mixing is still used with these gyros while set to the normal mode. For details on revo, including default points for clockwise and counterclockwise rotating rotors, see p. 85.

*These default recommendations assume you are doing forward flight. If you are just learning, please follow your instructor's guidance. Some instructors like a +1 base point for training so that the helicopter comes down very slowly, even if your instincts pull the throttle/collective stick to the bottom in a hurry.

THR-CURVE and **PIT-CURVE**: These 5-point curves are utilized to best match the blade collective pitch to the engine RPM for consistent load on the engine. Curves are separately adjustable for normal, idle-up 1, idle-up 2, and idle-up 3. In addition, a separate collective pitch curve is available for throttle hold. Sample curves are displayed in the appropriate setup types (ex: normal flight condition, p. 81) for clarity.

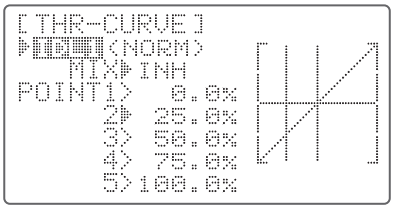
Suggested defaults:

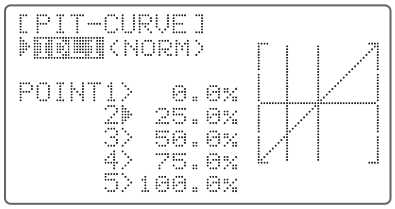
- *Normal*: Collective pitch curve that results in points 1, 3 and 5 providing –4, +5, (+8 to +10)* degrees pitch. A throttle curve setting of 0, 30, 50, 70, 100%.
- *Idle-ups 1 & 2*: Idle-ups 1 and 2 are typically the same except for the gyro settings, with one being heading-hold/AVCS and the other being normal mode. The pitch curve will likely be similar to the normal curve above.
- *Idle-up 3*: Collective pitch curve that results in points 1, 3 and 5 providing (–8 to –10), 0, (+8 to +10) degrees. A throttle curve of 100, 75, 50, 75, 100 to provide full throttle for inverted maneuvers.
- *Throttle Hold pitch curve*: Start with the normal pitch curve (for inverted autos, start from the idle-up 3 pitch curve), but increase the last point approximately 1-2°, if available, to ensure sufficient pitch at landing.

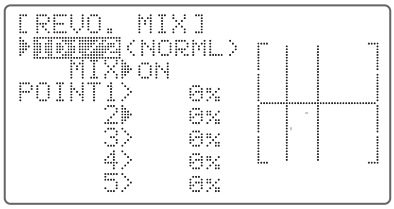
*(These default recommendations assume you are doing forward flight. If you are just learning, please follow your instructor's guidance. Some instructors like a +1 base point for training so that the helicopter comes down very slowly, even if your instincts pull the throttle/collective stick to the bottom in a hurry.)

Adjustability:

- Normal condition curves are editable in the **BASIC** menu for convenience.
- All curves may be adjusted in the **ADVANCE** menu.
- Automatically selected with the proper condition.
- The idle-up curves are adjusted by the modeler to maintain constant RPM even when the collective pitch is reduced during flight (including inverted).
- To change which condition's curve is being edited, simply press the ***MODE/PAGE BUTTON*** to scroll through the curves available, or cursor up above point 1 and change the curve named.
- For clarity, the name of the condition currently active (switched on in the radio) is shown in parentheses behind name of condition whose curve is being edited. (Example: see curve displays below. Note that the normal condition is active but the idle-up 1 condition's curves are currently being edited).
- Idle-ups and throttle hold pitch curves may be edited even before the conditions have been made active or while they are active but not selected. Activating their throttle curves activates these conditions.







REVO. MIX: This 5-point curve mix adds opposite rudder input to counteract the changes in torque when the speed and collective pitch of the blades is changed.

Adjustability:

- Three separate curves available: normal for hovering; idle-ups 1 and 2 combined; and idle-3.
- Normal condition curves are editable in the **BASIC** menu for convenience.
- All curves may be adjusted in the **ADVANCE** menu.
- Correct mix is automatically selected in-flight with each condition and automatically activated when the throttle setup for that condition is activated in the programming (i.e. **THROTTLE HOLD** or **THR-CURVE**.)
- To change which condition's curve is being edited, simply press the ***MODE/PAGE BUTTON*** or cursor up above **POINT1** and select. For clarity, the name of the condition currently active (switched on at the radio) is shown in parentheses behind the name of the condition whose curve is being edited.

- Revo. mixing rates are 5-point curves. For a clockwise-turning rotor, the rudder is mixed in the clockwise direction when collective pitch is increased; for counterclockwise-turning, the opposite. Change the operating direction setting by changing the signs of the numbers in the curve from plus (+) to minus (C) and vice versa. Suggested defaults:
  - Clockwise rotation: -20, -10, 0, +10, +20% from low throttle to high.
  - Counterclockwise rotation: +20, +10, 0, -10, -20% from low throttle to high.
  - Adjust to the actual values that work best for your model.
- Revo. curves for idle-ups are often v-shaped to provide proper rudder input with negative pitch and increased throttle during inverted flight. (Rudder is needed to counter the reaction whenever there is increased torque. In inverted flight, throttle stick below half has increased throttle and negative pitch, therefore increasing torque and rotating the helicopter unless the revo. mix is also increasing appropriately.)

IDLE-UPS: additional flight conditions available specifically for helicopters. These additional flight conditions contain different throttle curves, collective pitch curves, revo. mixing, and trims (except **IDLE-3**) to make the helicopter perform certain maneuvers more easily. Lastly, the gyro and dual rate functions may be set to provide separate rates per condition selected, including one for each idle-up.

One of the most common flight conditions can easily flip from upright to inverted and back. To do so, the pitch curve is set to 0 pitch at half stick, positive pitch (climb upright) above half, and negative pitch (climb when inverted) below half stick. The throttle curve is adjusted to allow the engine to run consistently throughout the changes in pitch.

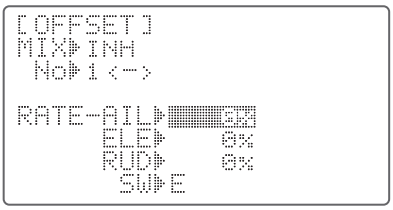
Additional idle-ups may be used to maximize the helicopter's flight characteristics in certain types of flight (i.e. fast forward motion, backward) or maneuvers (loops, rolls, stall turns), or even the same maneuver but changing from heading-hold/AVCS gyro mode to normal gyro mode. The 9C provides 3 idle-ups to allow the modeler 3 additional setups along with the normal flight condition.

Adjustability:

- ***SWITCH G*** (9CA) or ***E*** (9CH) is programmed for normal (**NORM**), idle-up 1 (**IDL1**), and idle-up 2 (**IDL2**) curves. This switch/position assignment is *not* adjustable.
- Activated with the throttle curve for that condition in **THR-CURVE**.
- Curves are adjusted to maintain constant RPM even when the collective pitch is negative (inverted).
- Note that **REVO.** mixing has one curve for idle-ups 1 and 2 and a second curve just for idle-up3.
- Gyro settings may be set separately for each idle-up. (See p. 89.)
- Governor settings may be set up to follow each idle-up automatically. (See p. 89.)
- Activating **OFFSET** makes the ***TRIM LEVERS*** adjust the trim separately in each of the idle-up conditions.
- Dual rates may be set up to allow QUADRUPLE rates — a rate for each of the 3 primary controls in normal/throttle hold and one for each of the 3 idle up conditions..

For an example of throttle and pitch curves and revo, please see *Normal Flight Condition Setup*, p. 81.

OFFSET: Optional separate trims in addition to those for the normal condition. This function is used to automatically change the trim of a helicopter, for example, when transitioned from hover to flying at high speed. A clockwise-rotation rotor helicopter tends to drift to the right at high speed, so an aileron offset may be applied to offset the helicopter to the left. The necessary elevator offset varies with model geometry, so it must be determined by noting collective pitch changes at high speed. The rudder offset is affected by both revo. mixing and trim lever movement while in the offset function.



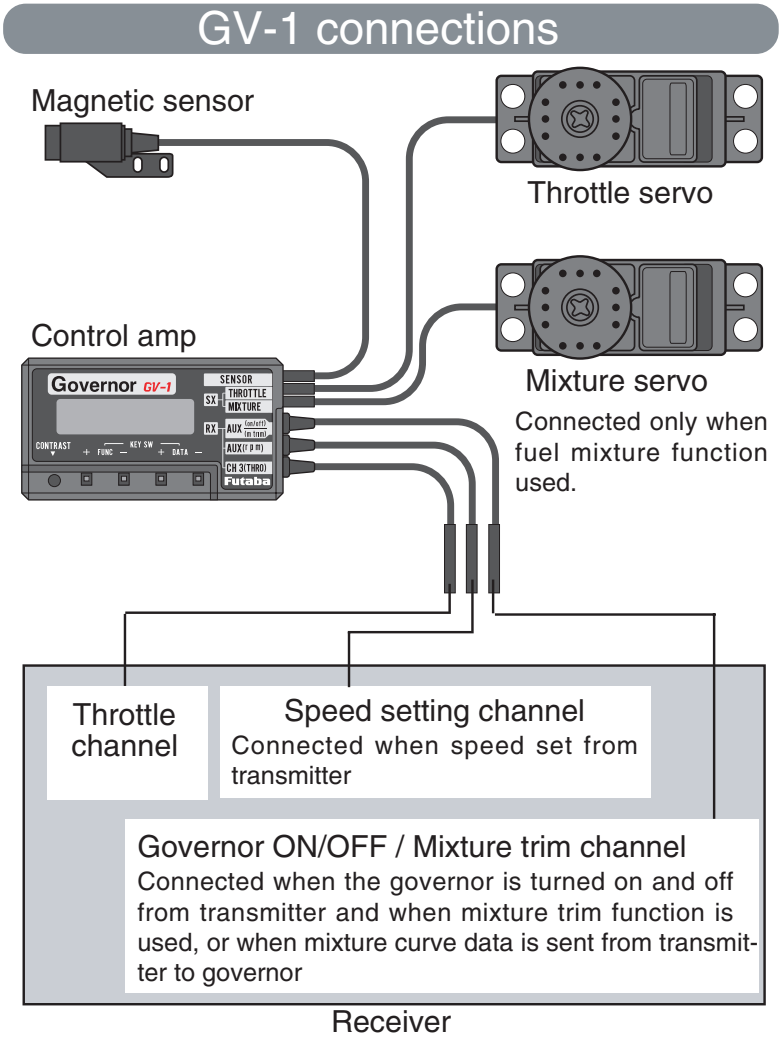
Adjustability:

- Complete switch assignability, plus a **CONDITION** option that creates/switches between individual trims for each of the idle-ups.
- When **OFFSET** is active (its switch is on), moving the ***TRIM LEVERS*** adjusts the stored offset, *not* the trims in the normal condition.
- When **OFFSET** is inactive (its switch is off), the **OFFSET** and any trim adjustments to it have no effect (model obeys the trim settings of the currently-active flight condition.)
- Defaults to **ON**.
- When **OFFSET** is inhibited, trim adjustments made in any flight condition affect all flight conditions.
- Rapid jumps caused by large offsets can be slowed using the **DELAY** function.

NOTE: Remember, offsets and revo. mixes are not recommended when using heading-hold/AVCS gyros in AVCS mode because they conflict with the automatic corrections to trim and torque that AVCS provides.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up separate trims for each of the three idle-up conditions. Adjust the idle-up 2 rudder trim to correct for torque at high speeds.	Open the **OFFSET** function.	MODE for 1 second.(If **basic**, MODE again.) to **OFFSET.** PRESS
	Change switch setting to **COND**	CURSOR CURSOR CURSOR to **COND.**
	Select **IDL2**.	CURSOR CURSOR to **IDL2**.
	Adjust trim settings as needed. (Ex: rudder to +8%.)	CURSOR CURSOR CURSOR to +8%.
	Close menus and confirm difference in trims between normal and idle-up 2.	END END ***E*** (9CH) or ***G*** (9CA) from **NORMAL** to **IDL2**. Check that rudder trim changes.
Where next?	**DELAY**: see p. 87. **THR-HOLD**: see p. 83. Setting up the Idle-Ups: Throttle and Collective pitch Curves and Revo. Mixing (**TH-CURVE, PIT-CURVE, REVO. MIXING** for idle-ups: see p. 85.	

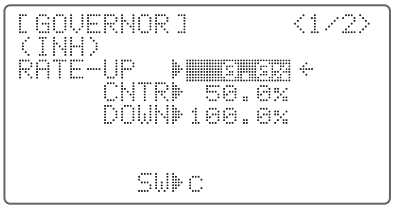
GOVERNORS:

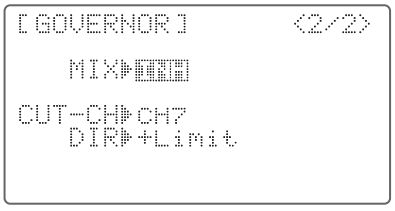


What is a governor? A governor is made up of a set of sensors which read the RPM of the helicopter's head, and a control unit that automatically adjusts the throttle setting to maintain a constant head speed regardless of changes in pitch of blades, weather conditions, etc. Governors are extremely popular in competition helicopters due to the consistency provided.

How does it help in helicopter setup? The governor eliminates the need to spend large amounts of time setting up throttle curves, as it automatically adjusts the engine's RPM to maintain the desired head speed.

GOVERNOR: The Governor mixing function is used to adjust the GV-1 (Governor) speed settings (rS1, rS2, rS3) from the transmitter. (If you are using a different governor, follow the manufacturer's instructions.)





Adjustability:

- On/off may be separate from speed switching by plugging governor on/off into ch8 and changing **CUT-CH** setting.
- If using separate on/off, switch assignment is totally adjustable, including a **Cond** option to automatically switch between 4 governor settings when switching conditions. Be *careful* not to assign governor off to a condition switch if you want the governor to function in that condition.