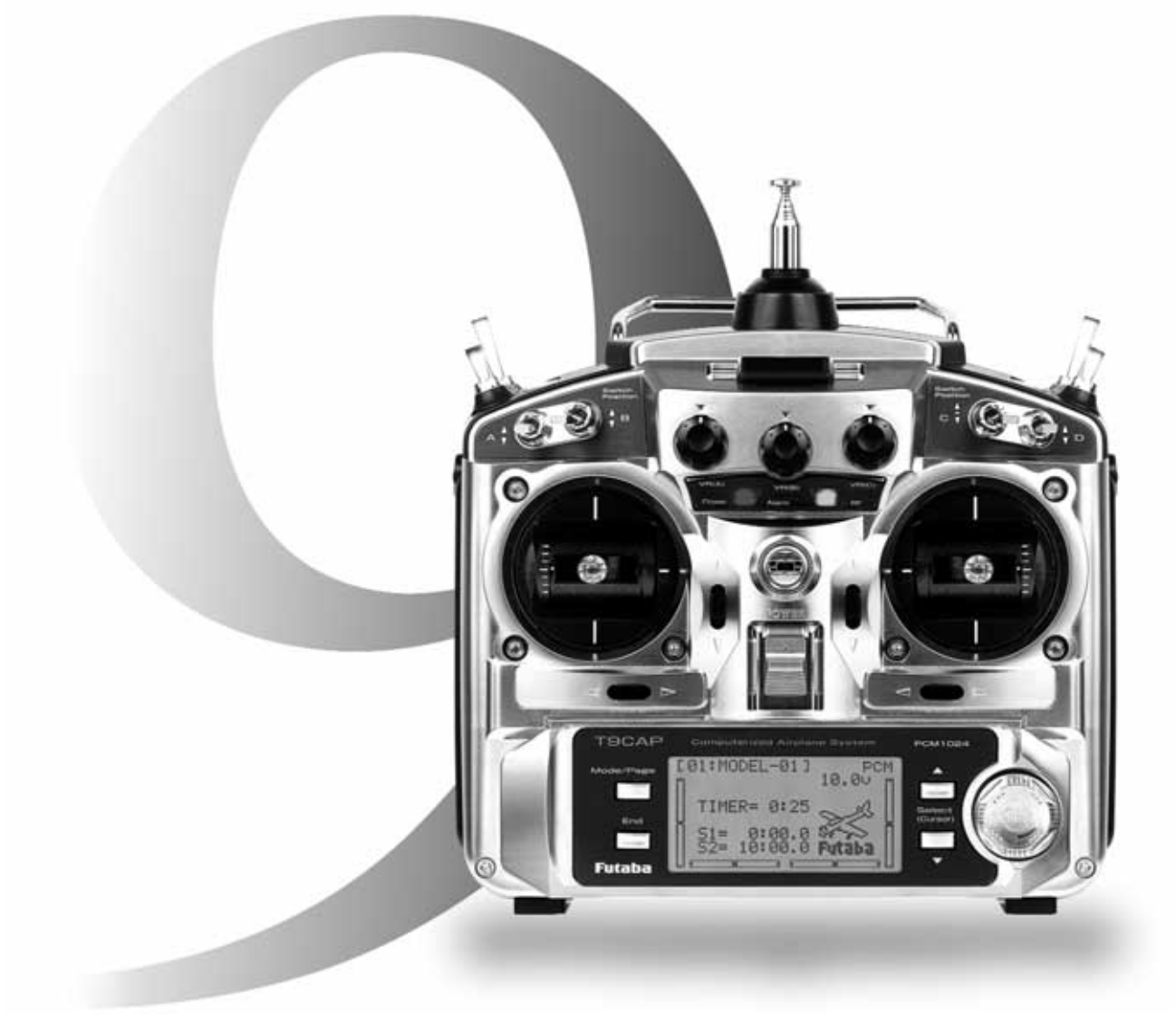
9CAP / 9CAF / 9CHP / 9CHF

9 CHANNEL RADIO CONTROL SYSTEM

INSTRUCTION MANUAL



Technical updates and additional programming examples available at: **http://www.futaba-rc.com/faq/faq-9c.html**

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Note that in the text of this manual, beginning at this point, any time we are using a feature's specialized name or abbreviation, as seen on the screen of the 9C, that name, feature, or abbreviation will be exactly as seen on the radio's screen, including capitalization and shown in a **DIFFERENT TYPE STYLE** *for clarity. Any time we mention a specific control on the radio itself, such as moving* ***SWITCH A***, ***KNOB VR(B)***, *or the* ***THROTTLE STICK***, *those words will be displayed as they are here.*

A QUICK INTRODUCTION TO THE 9C SYSTEM

Note that in the text of this manual, beginning at this point, any time we are using a feature's specialized name or abbreviation as seen on the screen of the 9C, that name, feature, or abbreviation will be exactly as seen on the radio's screen, including capitalization and shown in a **DIFFERENT TYPE STYLE** *for clarity. Any time we mention a specific control on the radio itself, such as moving* ***SWITCH A, KNOB VR(B),*** *or the* ***THROTTLE STICK****, those words will be displayed as they are here.*

TRANSMITTER:

- Large graphic liquid-crystal display panel with 4 buttons and an easy set up turn-and-press Dial for quick, easy setup.

- All transmitters include all 3 aircraft types with specialized programming for each, including:
  - **Airplane (ACRO)**
    - V-tail
    - **ELEVON**
    - **AIRBRAKE**
    - Twin Aileron Servos (**FLAPERON** and **AIL-DIFF**)
    - Twin Elevator Servos (**AILEVATOR**)
    - Snap Roll (4 separate directions available)

  - **Helicopter** (5 swashplate types, including CCPM, see page 77)(**HELI**)
    - 3 Idle Ups
    - Revo. Mixing
    - Delay
    - Throttle and Pitch Curves per Condition
    - Gyro Mixing including Separate Settings per Condition
    - Governor Mixing

  - **Sailplane/Glider** (2 wing types)(**GLID**)
    - V-tail
    - **ELEVON**
    - **START OFFSET**
    - Twin Ailerons (**FLAPERON** and **AIL-DIFF**)
    - Crow (**BUTTERFLY**)
    - **SPEED OFFSET**

- **BASIC** menu for quick, easy set up of less complex models.
- **ADVANCE** menu for more complex, unique setups.
- Four electronic ***TRIM LEVERS*** for rapid yet precise trim adjustment - no remembering to "store trims" between models and no more "bumped trims" during transport.
- **IDLE- DOWN (ACRO)** and **THR-CUT (ACRO/HELI)** (engine shut off) setups to allow precise engine control for taxi and landings.
- 8 complete model memories with 6 more per optional **CAM**Pac.
- New stick design with improved feel, adjustable length and tension.
- Triple rates available by setting dual rates to 3-position switches.
- Eight ***SWITCHES***, 3 ***DIALS*** and 2 ***SLIDERS;*** completely assignable in most applications.
- Trainer system includes the "functional" (**FUNC**) setting, which allows the student to use the 9C's mixing, helicopter, and other programming functions even with a 4-channel buddy box. (Optional trainer cord required.)
- Transmits in both FM (**PPM**) and **PCM** by selecting modulation/cycling transmitter. Requires receiver of proper modulation.
- Permanent memory storage via EEPROM with no backup battery to service or have fail.
- 9CA transmitter features airplane friendly switch layout, with the trainer switch at the left hand, and a notched throttle to minimize throttle changes with rudder input. Defaults to **ACRO MODEL TYPE**.
- 9CH transmitter features helicopter-friendly switch layout, with idle-up and throttle hold switches at the left hand, and a smooth, ratchet-less (unsprung) throttle for perfect hovering. Defaults to **HELI(SW1) MODEL TYPE**.
- Change transmitter mode from mode 2 to modes 1, 3, or 4. (See P. 15)

MODULE: 72TP-FM

- Module may be easily removed and a module on a different channel (or even band) reinserted to change the frequency on which the 9C transmits.
- Module transmits both FM (**PPM**) and **PCM**. No need for a second module.
- All transmission circuitry is included in the module, so no retuning is needed when changing channels or even bands.
- Frequency band is changed by inserting a module on the proper band, including for international or ground model use.
- ***In North America*** it is against FCC regulation to change **the crystal within the transmitter module** to a different channel. All such transmitter crystal changes must be performed by a certified radio technician. Failure to properly tune a system to its new channel may result in decreased range and may also result in interference to other types of frequency users on adjoining channels. Doing so also voids your AMA insurance.
- The FSS synthesized module for the 9Z family of radios is ***NOT*** compatible with the 9C.
- Radio system beeps and ***RF LIGHT*** goes out to indicate module is not installed and radio is not transmitting.
- Non-Futaba brand modules are not FCC certified for use with this radio and therefore are against FCC regulation to use. Doing so also voids your AMA insurance.
- TJ75FM modules may also be used with the 9C for ground use models such as robotics, rocketry, trains, cars, and boats.

RECEIVER: R138/R148/R149

- The R138 or R148 FM 8-channel or the R149 PCM 9-channel receiver included with your system is a high-sensitivity narrow-band dual-conversion receiver.
- Note that your 9C transmitter is capable of transmission on both PPM (FM) and PCM with just a simple programming change and just turning the transmitter off and back on. (See p. 28.)
- Any Futaba narrow band FM receiver (all produced after 1991) on the correct frequency band and frequency may be used with the 9C.
- Any Futaba PCM 1024 receiver on the right frequency band and frequency may be used with the 9C (all 1024 receivers say PCM1024; receivers which say PCM but not 1024 are 512 resolution and not compatible).

⃠ NEVER attempt to change a receiver's *band* by simply changing crystal (IE removing a 72MHz crystal and inserting a 75MHz crystal). A receiver that has a crystal installed from a different frequency band without retuning will ***not*** receive properly and will have dramatically decreased range.

- ***In North America*** the receiver included with this system may have its frequency changed by simply changing the crystal as long as it remains in the same half the band. A low band receiver between channels 11 and 35 may be changed to any other channel between 11 and 35 without requiring any tuning. A high band receiver between channels 36 and 60 may similarly be changed. Receivers being changed from a high band channel to a low band or vice versa require proper tuning and service by the Futaba Service Center.

SERVOS

- Please see technical specifications page for specifics on the servos included with your system.
- The included receiver is compatible with all J-plug Futaba servos, including retract, winch, and digital servos.

CONTENTS AND TECHNICAL SPECIFICATIONS

(Specifications and ratings are subject to change without notice.)

Your 9CAP or 9CHP (packaged with a 9-channel PCM receiver), 9CAF or 9CHF (packaged with an 8-channel FM receiver) system includes the following components:

- 9C Transmitter, including RF module[1] (TP)
- R148DF Receiver or R149DP Receiver
- Servos, S3004, S3001 or S9001, with mounting hardware and servo arm assortment
- Switch harness
- Aileron extension cord
- 110V wall charger (North America)
- Frequency Flag

Transmitter T9C
Operating system: 2-stick, 9 channels, PCM1024 system
Transmitting frequency: 50, 72 or 75 MHz bands
Modulation: FM/PPM or PCM, switchable
Power supply: 9.6V NT8S600B Ni-Cd battery
Current drain: 280 mA

Receiver R149DP
(PCM Dual conversion)
Receiving frequency: 50 or 72 MHz bands
Intermediate freq.: 10.7 MHz & 455 kHz
Power requirement: 4.8 - 6.0V Ni-Cd battery
Current drain: 14 mA
Size: 1.28 x 2.17 x 0.82 (32.6 x 55.0 x 20.8 mm)
Weight: 1.22 oz (34.5 g)
Channels: 9

Receiver R148DF
(FM Dual conversion)
Receiving frequency: 50 or 72 MHz bands
Intermediate freq.: 10.7MHz & 455 kHz
Power requirement: 4.8 - 6.0V Ni-Cd battery
Current drain: 14 mA
Size: 1" x 2.2" x .9" (25.4 x 55.8 x 22.9 mm)
Weight: 1.1 oz (31.18 g)
Channels: 8

Servo S9001 (Coreless motor)
Control system: Pulse width control, 1.52 ms neutral
Power requirement: 4.8 - 6.0V (from receiver)
Output torque: 54.2 oz-in(3.9 kg-cm) at 4.8V
Operating speed: 0.22 sec/60 at 4.8V
Size: 1.59 x 0.78 x 1.41 (40.4 x 19.8 x 36 mm)
Weight: 1.69 oz (48 g)

Servo S3001 (Standard, ball-bearing)
Control system: Pulse width control, 1.52 ms neutral
Power requirement: 4.8 - 6.0V (from receiver)
Output torque: 41.7 oz-in (3.0 kg-cm)
Operating speed: 0.22 sec/60
Size: 1.59 x 0.78 x 1.41 (40.4 x 19.8 x 36 mm)
Weight: 1.59 oz (45.1g)

Servo S3004 (Standard, ball-bearing)
Control system: Pulse width control, 1.52 ms neutral
Power requirement: 4.8 - 6.0V (from receiver)
Output torque: 44.4 oz-in (3.2 kg-cm)
Operating speed: 0.23 sec/60
Size: 1.59 x 0.78 x 1.41" (40.4 x 19.8 x 36 mm)
Weight: 1.30 oz (38 g)

[1] Transmitter band may only be changed by changing the module. Contact Futaba Service Center regarding adjustability of receiver band. Band *cannot* be changed by simply changing crystals.

The following additional accessories are available from your dealer. Refer to a Futaba catalog for more information:

- **CAM**Pac Memory module - the optional DP-16K **CAM**Pac increases your model storage capability (to 14 models from 8) and allows you to transfer programs to another 9C transmitter. Note that data cannot be transferred to/from any other model of transmitter (i.e. 8U, 9Z, etc).

⚠ **Insertion of a CAMPac containing data of a different transmitter type (ex: 9Z) will result in a complete CAMPac data reset and loss of all data.**

- NT8S Transmitter battery pack - the (600mAh) transmitter Ni-Cd battery pack may be easily exchanged with a fresh one to provide enough capacity for extended flying sessions.

- Trainer cord - the optional training cord may be used to help a beginning pilot learn to fly easily by placing the instructor on a separate transmitter. Note that the 9C transmitter may be connected to another 9C system, as well as to many other models of Futaba transmitters. The 9C transmitter uses the newer rectangular type cord plug. Both new-to-new and new-to-round plug style trainer cords are available.

- FTA8 Neckstrap - a neckstrap may be connected to your T9C system to make it easier to handle and improve your flying precision, since your hands won't need to support the transmitter's weight.

- Y-harnesses, servo extensions, etc - Genuine Futaba extensions and Y-harnesses, including a heavy-duty version with heavier wire, are available to aid in your larger model and other installations.

- 5-cell (6.0V) receiver battery packs - All Futaba airborne equipment (except that which is specifically labeled otherwise) is designed to work with 4.8V (Ni-Cd 4 cells) or 6.0V (Ni-Cd 5 cells or alkaline 4 cells). Using a 6.0V pack increases the current flow to the servos, which accelerates their rate of response and their torque. However, because of this faster current draw, a 5-cell battery pack of the same mAh rating will last approximately ¾ the time of a 4-cell pack.

- R309DPS - Synthesized receiver which can be changed to any 72MHz frequency with the turn of 2 dials, no tuning needed.

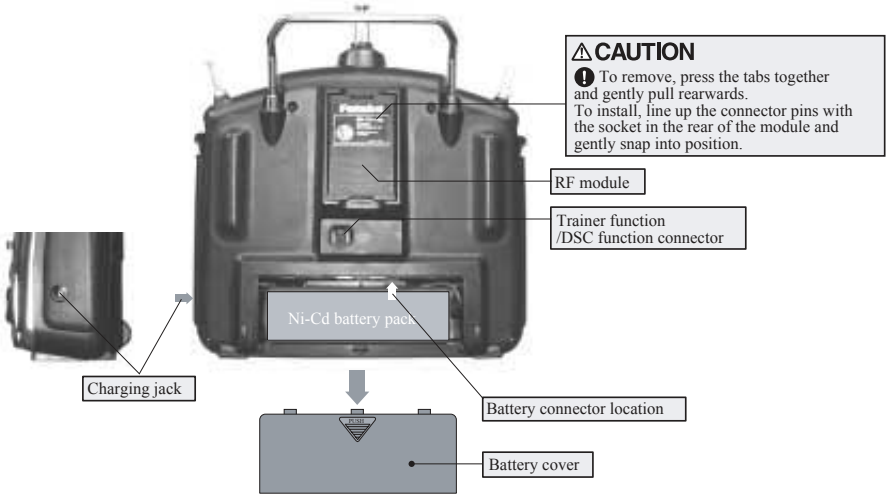
- Gyros - a variety of genuine Futaba gyros are available for your aircraft or helicopter needs. See p. 64 for aircraft or p. 89 for helicopter gyro information.

- Governor (GV1) - for helicopter use. Automatically adjusts throttle servo position to maintain a constant head speed regardless of blade pitch, load, weather, etc. See p. 89 for details.

- DSC Cord - allows setup and testing without transmitting. Requires DSC compatible receiver (R149DP or R309DPS) and DSC cord. With Transmitter and Receiver off, plug cord into trainer port then, into receiver battery slot. All programing and setup may be done in this manner without transmitting.

- TP72FM modules - additional modules on other frequencies within the 50MHz (licensed operators only) and 72 MHz bands may be purchased to utilize your transmitter with receivers on other frequencies. Additionally, the TK and TJ75MHz modules may be used with the 9C. (See p.8)

- Receivers - various models of receivers may be purchased for use in other models. (See p. 8.)



NOTE: If you need to remove or replace the transmitter battery, do not pull on its wires to remove it. Instead, gently pull on the connector's plastic housing where it plugs into the transmitter.

SWITCH ASSIGNMENT TABLE

- The factory default functions activated by the switches and knobs for a Mode 2 transmitter are shown below.
- Most 9C functions may be reassigned to non-default positions quickly and easily.
- Basic control assignments of channels 5-9 are quickly adjustable in **AUX-CH** (see pp. 39). For example, the channel 5 servo, which defaults to ***SWITCH E*** for retract use, can easily be unassigned (**NULL**) to allow for easy use as a second rudder servo in a mix, or to a slider or dial for bomb door or other control.
- Note that most functions need to be activated in the programming to operate.
- Mode 1 transmitter functions are similar but reverse certain switch commands. Always check that you have the desired switch assignment for each function during set up.

Switch/Knob A or H Tx.	Airplane (**ACRO**)	Sailplane/Glider (**GLID**)	Helicopter (**HELI**)
SWITCH A	elevator dual rate	elevator dual rate down = butterfly on	elevator dual rate
Switch ***B***	rudder dual rate	rudder dual rate	rudder dual rate
Switch ***C***	up = **ELE-FLP** on center/down = **IDLE-DOWN** down = **AIRBRAKE** on	up = **ELE-FLP** on center/down = **IDLE-DOWN**	governor/ch 7
SWITCH D	aileron dual rate	aileron dual rate	aileron dual rate
Switch ***E OR G****	landing gear/ch 5	**GLID1FLP** = gear	throttle hold
Switch ***F OF H****	snap roll/trainer	trainer	trainer**/THR-CUT**
SWITCH G OR E*	none	back = **SPEED OFFSET** fwd = **START OFFSET**	idle-up 1 and 2
SWITCH H OR F*	none	none	idle-up3/ch 5/gyro
KNOB A	flap/ch 6 (flap trim if **FLAPERON** on)	**GLID1FLP**: flap (flap trim if **FLAPERON** on) **GLID2FLP**: camber (flap trim if **FL-AIL** off)	**HOVERING PITCH**
KNOB B	ch 8	ch 8	ch 8
KNOB C	spoiler/ch 7 (disabled if **AIL-DIFF** on)	spoiler/ch 7 (disabled if **AIL-DIF** on)	**HOVERING THROTTLE**
SLIDER D	none	**GLID1FLP**: ch 5	none
SLIDER E	none	none	none

*On the 9CH transmitters, the ***TOP LEFT SWITCHES*** are spring-loaded and 3-position; on the 9CA, those switches are on the right side. For consistency, the switch position's designation remains the same (upper left is F, etc), but the functions are moved to match the switch type.

RECEIVER AND SERVO CONNECTIONS

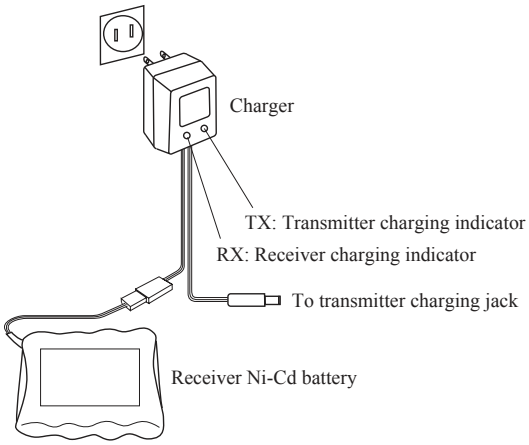
Receiver Output and Channel	Aircraft (**ACRO**) Glider (**GLID1FLP/GLID2FLP**)	Helicopter (**HELI**)
1	ailerons/right aileron[1]/combined right flap & aileron[1]	aileron (cyclic roll)
2	elevator	elevator (cyclic pitch)
3	throttle	throttle
4	rudder	rudder
5	spare/landing gear/left aileron[1,3]/combined left flap and aileron[2,3] right flap (**GLD2FLP**)	spare/gyro
6	spare/ flap(s)/combined left flap and aileron[2]	pitch (collective pitch)
7	spare/left aileron[1]	spare/governor
8	spare/second elevator servo[4]/mixture control	spare
9	spare	spare

[1]Aileron Differential mode (**AIL-DIFF**). (See p. 47).
[2]Flaperon mode. (See p. 45).
[3]Using Second Aileron option, second aileron servo output is sent to channels 5 and 6 to allow use of a 5-channel receiver. (**AIL-2**) (See p. 47)
[4]**AILEVATOR** (dual elevator) mode. (See p. 49).

CHARGING THE Ni-Cd BATTERIES

Charging Your System's Batteries

1. Connect the transmitter charging jack and airborne Ni-Cd batteries to the transmitter and receiver connectors of the charger.
2. Plug the charger into a wall socket.
3. Check that the charger LED lights.



The initial charge, and any charge after a complete discharge, should be at least 18 hours to ensure full charge. The batteries should be left on charge for about 15 hours when recharging the standard NR-4J, NR4F1500 and NT8S600B Ni-Cd batteries.

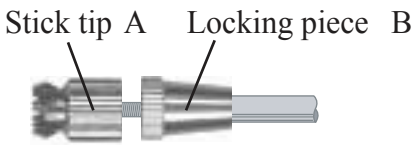
We recommend charging the batteries with the charger supplied with your system. Note that the use of a fast charger may damage the batteries by overheating and dramatically reduce their lifetime.

You should fully discharge your system's Ni-Cd batteries periodically to prevent a condition called memory. For example, if you only make two flights each session, or you regularly use only a small amount of the batteries capacity, the memory effect can reduce the actual capacity even if the battery is fully charged. You can cycle your batteries with a commercial cycling unit*, or by leaving the system on and exercising the servos by moving the transmitter sticks until the transmitter shuts itself off. Cycling should be done every four to eight weeks, even during the winter or periods of long storage. Keep track of the batteries capacity during cycling; if there is a noticeable change, you may need to replace the batteries.

*Note that the 9C transmitter system has electronic protection from overcharging and reverse polarity via a poli-switch. It does NOT have a diode in the charge circuit and may be discharged/peak charged with the battery in the transmitter.

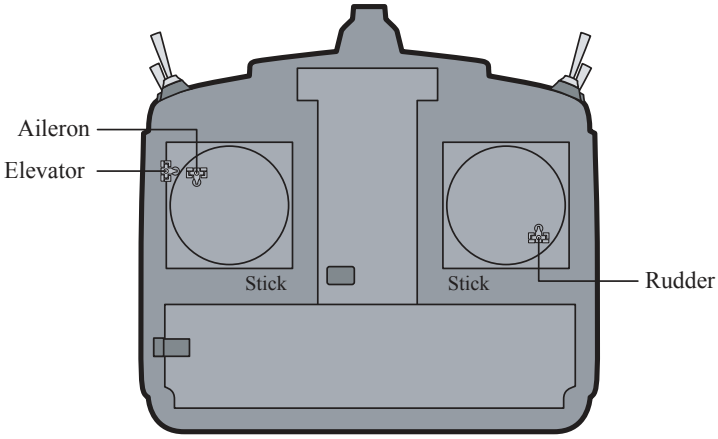
DO NOT attempt to charge your 8-cell transmitter pack on the 4-cell receiver plug of the wall charger!

Adjusting the length of the non-slip control sticks



You may change the length of the control sticks to make your transmitter more comfortable to hold and operate. To lengthen or shorten your transmitter's sticks, first unlock the stick tip by holding locking piece B and turning stick tip A counterclockwise. Next, move the locking piece B up or down (to lengthen or shorten). When the length feels comfortable, lock the position by turning locking piece B counterclockwise.

Stick lever tension adjustment



Mode 2 transmitter with rear cover removed.

You may adjust the tension of your sticks to provide the feel that you prefer for flying. To adjust your springs, you'll have to remove the rear case of the transmitter. First, remove the battery cover on the rear of the transmitter. Next, unplug the battery wire, and remove the battery and RF module from the transmitter. While you are removing the RF module, pay attention to the location of the pins that plug into the back of the module. Next, using a screwdriver, remove the four screws that hold the transmitter's rear cover in position, and put them in a safe place. Gently ease off the transmitter's rear cover. Now you'll see the view shown in the figure above.

Using a small Phillips screwdriver, rotate the adjusting screw for each stick for the desired spring tension. The tension increases when the adjusting screw is turned clockwise.

When you are satisfied with the spring tensions, reattach the transmitter's rear cover. Check that the upper printed circuit board is on its locating pins, then very carefully reinstall the rear cover being mindful to guide the RF module connector pins through the slot in the case. When the cover is properly in place, reinstall and tighten the four screws. Reinstall the battery, cover and module.

Adjusting Display Contrast

To adjust the display contrast, from the home menu press and hold the End button.
Turn the dial while still holding the menu button:

clockwise to brighten

counterclockwise to darken the display

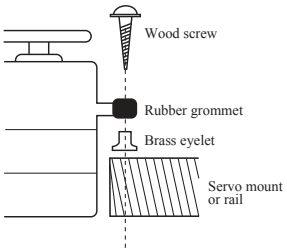
Let go of the dial and the button.

Changing Modes:

Hold down the **Mode** and **End** buttons while turning on the Transmitter. The screen reads "STK-MODE". Change this to the correct mode. Note that this will NOT change the throttle and elevator ratchets, etc. Those are mechanical changes that must be done by a service center.

RADIO INSTALLATION

While you are installing the battery, receiver, switch harness and servos into your model's fuselage, please pay attention to the following guidelines:



Use the supplied rubber grommets when you mount each servo. Be sure not to over-tighten the screws. If any portion of the servo case directly contacts the fuselage or the servo rails, the rubber grommets will not dampen the vibration, which can cause mechanical wear and servo failure.

Servo Throw

Once you have installed the servos, operate each one over its full travel and check that the pushrod and output arms do not bind or collide with each other, even at extreme trim settings. Check to see that each control linkage does not require undue force to move (if you hear a servo buzzing when there is no transmitter control motion, most likely there is too much friction in the control or pushrod). Even though the servo will tolerate loads, any unnecessary load applied to the servo arm will drain the battery pack quickly.

Switch Harness Installation

When you are ready to install the switch harness, remove the switch cover and use it as a template to cut screw holes and a rectangular hole slightly larger than the full stroke of the switch. Choose a switch location on the opposite side of the fuselage from the engine exhaust pipe, and pick a location where it can't be inadvertently turned on or off during handling or storage. Install the switch so it moves without restriction and snaps from ON to OFF and vice versa.

Receiver Antenna

It is normal for the receiver antenna to be longer than the fuselage.
DO NOT cut or fold it back on itself — cutting or folding changes the electrical length of the antenna and may reduce range. Secure the antenna to the top of the vertical fin, and let the excess wire length trail behind. You may run the antenna inside of a *non-metallic* housing within the fuselage, but range may suffer if the antenna is located near metal or carbon fiber pushrods or cables. Be sure to perform a range check before flying.

Receiver Notes

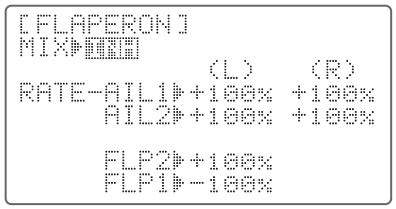
When you insert servo, switch or battery connectors into the receiver, note that each plastic housing has an alignment tab. Be sure the alignment tab is oriented properly before inserting the connector. To remove a connector from the receiver, pull on the connector housing rather than the wires.

If your aileron servo (or others) are too far away to plug into the receiver, use an aileron extension cord to extend the length of the servo lead. Additional Futaba extension cords of varying lengths are available from your hobby dealer. Always use an extension of the proper length. Avoid plugging multiple extensions together to attain your desired length. If distance is greater than 18" or multiple or high current draw servos are being used, use Futaba Heavy-Duty servo extensions.

Receiver Vibration and Waterproofing

The receiver contains precision electronic parts. Be sure to avoid vibration, shock, and temperature extremes.
For protection, wrap the receiver in foam rubber or other vibration-absorbing materials. It is also a good idea to waterproof the receiver by placing it in a plastic bag and securing the open end of the bag with a rubber band before wrapping it with foam rubber. If you accidentally get moisture or fuel inside the receiver, you may experience intermittent operation or a crash. If in doubt, send the receiver for service.

Using **FLAPERON** (**ACRO/GLID**):



The **FLAPERON** mixing function uses one servo on each of the two ailerons, *and* uses them for both aileron and flap function. For flap effect, the ailerons raise/lower simultaneously. Of course, aileron function (moving in opposite directions) is also performed.

Once **FLAPERON** is activated, any time you program CH6 or "flap" (ie. **FLAP-ELEVATOR** mixing), the radio commands both servos to operate as flaps. The amount of travel available as flaps is independently adjustable in **FLAPERON**. A trimming feature is also available (see **FLAP-TRIM**) to adjust both neutral positions together for straight-and-level flight or slight increases/decreases of the flap angle. **END POINT** and **SUB-TRIM** both still adjust each servo individually.

Adjustability:
- Each aileron servo's up travel can be set separate from its down travel, creating aileron differential. (See example).
- Each aileron servo's travel when actuated as a flap is separately adjustable.
- **AIL2** can be utilized to use a 5-channel receiver and still have flaperons. NOTE: The **AIL2** function only commands the channel 5 servo to operate with the aileron servo as ailerons, and to obey the primary flap control (travel adjusted in **FLAP-TRIM**.) It does not provide full flap mix capability as when using a 6+ channel receiver and channel 6.

NOTE: Activating flaperons only makes the ailerons work as ailerons and tells the radio how far you want them to move as flaps IF you then activate other programming that moves them as flaps.

FLAP-TRIM is the flap-trimming feature that allows the flaps to move in reaction to the channel 6 control. It is meant only for trimming the flaps' center but can also be used as full flap control. (See p. 46).

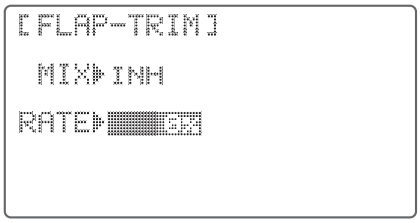
AIRBRAKE is a feature that drops flaperons as flaps, and also compensates with elevator if desired. (See p. 55).

FLAP-ELEVATOR would add elevator mixing into the flap movement from the flap dial after **FLAP-TRIM** is activated.

GOAL of EXAMPLE:	**STEPS:**	**INPUTS:**
Activate twin aileron servos, **FLAPERON**. Input 10% less down travel than up travel (aileron differential) within the **FLAPERON** programming. *(Decrease right aileron's down travel to* **90%***, decrease left aileron's down travel to* **90%***.)* Adjust total flap travel available to **50%** of aileron travel available.	Open the **FLAPERON** function.	MODE for 1 second. (If **basic**, MODE again.) to **FLAPERON.** PRESS *
	Activate the function.	CURSOR
	Optional: adjust the up/down travel separately for the 2 servos.(Ex: 90% down.)	CURSOR *AILERON STICK.* to **90%**. CURSOR *AILERON STICK.* to **90%**.
	Optional: adjust the aileron's travel so they move as flaps. (Ex: each servo flap travel to **50%***.)*	CURSOR to **50%**. CURSOR to **-50%**.
	Close menu.	END END
Where next?	Set **FLAP-TRIM**: see p. 46. Set up **AIRBRAKE** mix: see p. 55. Mix flaperon's flap motion to another inboard flap (plugged into aux1): see p. 54. View additional model setups on the internet: www.futaba-rc.com/faq/faq-9c.html	

* If you receive an error message that **OTHER WING MIXING IS ON**, you must deactivate **AIL-DIFF** or **ELEVON**. see p. 44.

Using **FLAP-TRIM** *(camber) to adjust flaperons:* (**ACRO/GLID**)

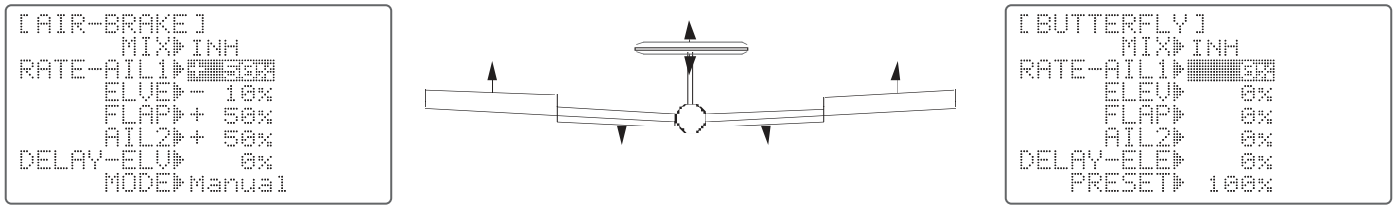


FLAP-TRIM assigns the primary flaperon control [defaults to ***VR(A)***] to allow trimming in flight of the flap action of flaperons. (*Note: even if* **FLAP-TRIM** *is made active with* **AIL-DIFF***, it will not have any effect. The ONLY function that allows control of the ailerons as flaps in the* **AIL-DIFF** *configuration is* **AIRBRAKE**.*)* Most modelers use **AIRBRAKE**, or programmable mixes, to move the flaps to a specified position via movement of a switch.

FLAP-TRIM may also be used as the primary flap control in flight. By doing so, you can assign CH6 to a 3-position switch, with a "spoileron", neutral, and "flaperon" position, and even adjust the percentage traveled as flaperon/spoileron by changing the Flap Trim travel. (Note that there is only one setting, not independent settings for up and down travel.)

Add **FLAP-TRIM** to allow the model's ailerons to be trimmed together as flaps at any time during the flight, with a maximum travel of **5%** of the total flap travel set in **FLAPERON**.	Open the **FLAP-TRIM** function.	MODE for 1 second.(If **basic**, MODE again.) to **FLAP-TRIM.** PRESS
	The function is automatically activated with **FLAPERON**; however, the default travel is **0**.	
	Adjust the travel available to the flaperons when turning the CH6 ***DIAL***. (Ex: **5%**).	to **5%.**
	Optional: Use as total flap control. Reassign CH6's primary control in **AUX-CH** *to your desired flap control. (Ex: right slider)*	to **50%.** END MODE to **AUX-CH**. PRESS CURSOR to **CH6**. to **Vr-E**.
	Close menu.	END END
Where next?	Adjust individual servo's **SUB-TRIM**s: see p. 41 and **END POINT**s: see p. 32. Set up **AIRBRAKE** mix: see p. 55 and **ELEV-FLAP** mix: see p. 54. Mix flaperon's flap movement to an additional inboard flap (plugged into aux1): see p. 54. View additional model setups on the internet: www.futaba-rc.com\faq\faq-9c.html.	

AIRBRAKE/BUTTERFLY (crow) *mixing* (**ACRO/GLID**):



Like **FLAPERON** and **AILEVATOR**, **AIRBRAKE** is one function that is really made up of a series of pre-programmed mixes all done for you within the radio. **AIRBRAKE** (often called "crow" or **BUTTERFLY** - see **GLID**, p. 69 for details) simultaneously moves the flap(s) (if installed), twin ailerons (if installed) and elevator(s), and is usually used to make steep descents or to limit increases in airspeed in dives.

This function is often used even on models without flaps as an easy way to use the flaperons and **FLAP-ELEVATOR** mixing together.

Adjustability:

- *Activation*: Proportional by moving the ***THROTTLE STICK***, or set positions by flipping ***SWITCH C*** (**ACRO** only).
- **Lnear** *(Inversely proportional to **THROTTLE STICK**)*: provides a proportional increase in amount of **AIRBRAKE** action as ***THROTTLE STICK*** is lowered (*when **SWITCH C** (**ACRO**) or **A** (**GLID**) is in down position)*. Provides gradually more **AIRBRAKE** as you slow the engine. Includes selectable stick position where **AIRBRAKE** begins, gradually increasing to the same setting as **MANUAL** as the ***THROTTLE STICK*** is lowered. If you would like to have the airbrake be directly proportional to throttle stick, you will need to reverse the **THR-REV** function. Note that this changes the throttle stick direction for all mmodels. See page 31 for instructions.
- **MANUAL** (**ACRO** only): Provides **AIRBRAKE** response immediately upon switch movement, going to a pre-set travel on each active channel without any means of in-flight adjustment. (**MANUAL** option not available in **GLID** modes.)
- *Delayed reaction*: You can suppress sudden changes in your model's attitude when **AIRBRAKE** is activated by setting the delay (**DELAY-ELE**) item, to slow down the elevator response, allowing the flaps/ailerons/elevator to all reach their desired end point together. A setting of **100%** slows the servo to take approximately one second to travel the prescribed distance.
- *Adjustable in flight*: Using the elevator trim lever in flight will adjust the elevator settings in your airbrake rather than adjusting the model's actual elevator trim. This allows easy adjustment for any ballooning while in flight. When the airbrake switch is moved to off the trims are again adjusting the normal elevator trim.
- *Channels controlled:* Elevator(s), twin ailerons and flap(s) may be set independently in **AIRBRAKE**, including set to **0** to have no effect.
  - *Twin aileron servos:* If **FLAPERON**, **ELEVON** and **AIL-DIFF** functions are inhibited, then **AIL1** and **AIL2** settings will have no effect.
    - If **FLAPERON** is active, the travel of the ailerons can be independently adjusted for the servos plugged into CH1 and CH6. The flap choice has no effect on the flaperons.
    - If **AIL-DIFF** is active, then CH1 and CH7 may be independently adjusted.
    - Normally both ailerons are raised equally in **AIRBRAKE**, and the elevator motion is set to maintain trim when the ailerons rise. Different amounts may be set for each aileron to correct for torque reactions and other unique characteristics of the model.

⚠ Be sure you understand what dropping ailerons will do when in **AIRBRAKE/BUTTERFLY**. Along with creating an enormous amount of drag (desirable for spot landings), this also creates "wash-in", a higher angle of attack where the ailerons are, and encourages tip stalling. If you are using this for aerobatic performance and not "sudden stops", consider raising the ailerons and dropping the flaps instead as shown in the diagram above.

  - *Twin elevator servos:*
    - If **AILEVATOR** is active, the **AIL1** and **AIL2** settings still only affect **FLAPERON** or **AIL-DIFF** servos, NOT the elevator servos. (they would have the **AIL3** and **AIL4** settings.)

GOAL of EXAMPLE:	STEPS:	INPUTS:
Activate **AIRBRAKE** on a **FLAPERON** model. Adjust the flaperon travel to **75%**, with negative elevator (push) of **25%**.	Confirm **FLAPERON** is active.	see **FLAPERON** instructions.
	Open the **AIRBRAKE** function.	MODE for 1 second.(If **basic**, MODE again.) to **AIRBRAKE**. PRESS
	Activate the function.	Switch C in up position. CURSOR to **OFF**. CURSOR
	Adjust the travels as needed. (Ex: Ailerons each **75%**, Elevator **–25%**.)	to **75%**. CURSOR to **–25%**. CURSOR CURSOR to **75%**.
	Optional: delay how quickly the elevator servo responds.	CURSOR to **25%**. CURSOR
	*Optional: change the mixing from full amount upon switch to proportional to the **THROTTLE STICK**'s proximity to idle.*	to **Lnear** (**0%**).a ***THROTTLE STICK*** to desired **0** point. PRESS for 1 sec., until beeps (display changes if new setting is different from prior setting).
	Close menu.	END END
Where next?	Adjust flaperons' total flap travel available (**FLAPERON**): see p. 44. Set up **ELEV-FLAP** mixing: see p. 54. Set up programmable mixes, for example, **FLAP-ELEVATOR**: see p. 59. View additional model setups on the internet: www.futaba-rc.com\faq\faq-9c.html.	

Rudder-to-throttle mix: (**HELI**) adds throttle to counter the added load from increasing pitch of the tail blades, maintaining a constant head-speed with rudder. (This is a minor effect and is not critical in most helicopters.) Not a preprogrammed mix. See ***Programmable mix***.

Rx: receiver.

SAFE MODE: feature in snap roll programming that does not allow a snap roll if landing gear is lowered. See ***Snap roll***.

Sailplane: glider, non-powered model aircraft type. See **GLID** / **MODEL TYPE**.

Select (cursor) buttons: controls used in various ways during programming. 11

Select a model: see **MODEL SELECT.**

Service Center. 3

SERVO: bar graph display on screen to show real time movement/commands sent to servos by transmitter in response to user movements. Also includes a servo test feature. 42

Servo reversing: see **REVERSE.**

Servo Slow: see ***Channel delay***.

Servo testing, servo display: See **SERVO.**

SET: to accept. Usually done by pressing and holding the dial when instructed.

Slave: channel that moves in response to the command of the master. See ***Programmable mix***.

Slaving servos: see programmable mix, p. 59.

Slider assignability: sliders on side of radio, known as ***VR(D)*** and ***VR(E)*** in programming, may be assigned to control channels 5-8 in **AUX-CH**, used as the primary control of a mix in programmable mixes, etc.

Slow: see ***Channel delay***.

Smoke system: injects a specialized smoke oil into the hot exhaust to create air-show like smoke trails. 64

SNAP ROLL: (**ACRO**) combines rudder, elevator and aileron movement to cause the aircraft to snap or spin at the flip of a switch. 9C offers 4 separate snaps with 1 or 2 switches used for selection. 51

Speed Flaps: main flaps on a 5-servo glider.

SPEED OFS (**GLID**): speed run offset programming. Offsets aileron/elevator/rudder settings to provide minimum drag for high speed flight. 71

START OFS (**GLID**): start offset programming. Offsets aileron/elevator/rudder settings to provide for maximum lift during launch. 71

Stick adjustments: change stick tension and height. 15

STk-THR: assigned to ***Throttle Stick***. See **AIRBRAKE** for example.

SUB-TRIM: used to fine tune the center or neutral point of each servo. Allows full trim function from the trim sliders for flight trimming. 41

SWASH AFR: (**HELI,** CCPM types only) adjustment of the travel of all servos involved in the particular control's movement *only* during the movement of that control. Ex: reverse the direction of movement of collective pitch while not affecting the direction of movement of either cyclic control. 79

Swashplate type: (**HELI**). Part of the model type selection process. Selects specific heli swashplate geometry, such as one of four available types of "CCPM." 77

Switch programmability: MOST features are reassignable to a variety of switches, including simply moving an auxiliary control such as flaps from the stock dial to a switch or other location. See **AUX-CH.**

Synthesized module/receiver: The 9C is compatible with the R309DPS Futaba synthesized receiver that can be used on any 72MHz channel. There is not a synthesized transmitter module that is safe/FCC certified/approved for use with the 9C at the time of this printing. 10

Technical Specifications. 9

Thermal hunting setup: using specific programming setups to have the model respond noticeably to the lift of a thermal. Not a preprogrammed mix. See ***Programmable mix***.

THR-DELAY: (**ACRO**) throttle delay, slows engine servo response to imitate the spool-up action of a turbine engine. May also be used creatively to create a delayed servo on a different function (see www.futaba-rc.com\faq\faq-9c.html.) 57

THR-REV: reverses the throttle trim function to the top of the ***THROTTLE STICK***. 31

THROTTLE-NEEDLE: (**ACRO** / **HELI**) curve mix that adjusts a second servo, controlling the engine's mixture, to get optimum RPM and performance from the engine at all settings. 56

Throttle-to-rudder mix: used to compensate with rudder when throttle is applied on take off. Not a preprogrammed mix. See ***Programmable mix***. This is the default setting of a mix in **ACRO** and **GLID**.

THROTTLE CURVE: (**HELI**) adjusts how the servo responds to the ***THROTTLE STICK*** position along a 5 point curve. Separate curves available for each idle-up and normal. For simplicity, normal curve may be edited from **BASIC** menu. All curves may be edited together in the **ADVANCE** menu. Activating an idle-up's throttle curve is what activates that idle-up. .81,84

Throttle cut or throttle kill: **THR-CUT**. (**ACRO** / **HELI**) Offset mix which closes the throttle servo to a set position when the assigned switch is moved to shut the engine off without having to fiddle with trim settings. 33

THROTTLE HOLD: (**HELI**) makes the throttle servo non-responsive to ***THROTTLE STICK*** position, and moves the throttle to idle. Used to practice autorotations. NOTE: **THR-HOLD** must be activated, then the default pitch curve adjusted properly. 83

Throttle trim adjustment: see **ATL** to change throttle trim from "idle only" to full trim control like all other channels. See **THR-REV** to reverse ***THROTTLE STICK*** completely, including moving trim to the top of the ***THROTTLE STICK***. See also ***Idle management*** for details on idle down and throttle cut functions.

TIMER: adjust the timer functions, used to keep track of flight time on a tank of fuel, etc. The "trigger" to turn timers on/off may be programmed. 38

TP-FM: single-frequency module. See ***Module***.

TRAINER: software that allows 2 radios to be connected via trainer cord, giving student control of all or some of the channels of the aircraft at the flip of a switch. **FUNC** trainer mode allows student to use mixing in the master transmitter, for example dual rates, exponential, fly a 5-channel helicopter with a 4-channel buddy box, etc. 40

Trainer box: stripped-down radio system which does not have the ability to transmit, is used only as a student's radio when instructing while using a trainer cord and the trainer programming.

Trainer cord: cord used to connect two compatible radios to use for flight instruction. See ***Accessories***.

TRIM menu: adjusts rate at which the trim responds to movement of the trim sliders. Also has a reset function to reset the model's electronic trims to zero. 41

TRIM OFFSET: (**HELI**) sets an offset or adjustment of trim when switching between conditions. See ***OFFSET***.

TRIM option in mixes: ability to adjust the slave servo's center when the master servo's center is adjusted using the trim sliders (for example when using two separate flap servos). See ***Programmable mix.*** 53

Triple rate: 3rd control travel setting available in flight. See **D/R,EXP.**

Twin aileron servos: use of 2 or more servos on separate channels to control aileron action. Includes flaperon, aileron differential, and elevon. 44

Twin elevator servos: use of 2 or more servos on separate channels to control the elevator of a model. Includes elevon, ailevator, V-tail. 49

Tx: transmitter.

Voltmeter, voltage reading: displays transmitter voltage on home screen. 18

VR(A-E): variable rate controls. Knobs and sliders on the radio. See switch assignment chart for default assignments.