Futaba

T8J-2.4G

8-CHANNEL RADIO CONTROL SYSTEM

INSTRUCTION MANUAL

TABLE OF CONTENTS

INTRODUCTION

Thank you for purchasing a Futaba® S-FHSS-2.4GHz* 8J series digital proportional R/C system. This system is extremely versatile and may be used by beginners and pros alike. In order for you to make the best use of your system and to fly safely, please read this manual carefully. If you have any difficulties while using your system, please consult the manual, our online Frequently Asked Questions (on the web pages referenced below), your hobby dealer, or the Futaba Service Center.

*S-FHSS: Super- Futaba Frequency Hopping Spread Spectrum

Owner's Manual and Additional Technical Help

This manual has been carefully written to be as helpful to you, the new owner, as possible. There are many pages of setup procedures and examples. However, it need not be your sole resource of setup guidelines for your 8J. For example, pages 27-29 include setup instructions for a basic 4-channel airplane. The Frequently Asked Questions web page referenced below includes this type of step-by-step setup instructions for a variety of other model types, including multi-engine, complex gear installation, 7-servo aerobatic models, 140 degree CCPM, etc.

http://www.futaba-rc.com/faq

Due to unforeseen changes in production procedures, the information contained in this manual is subject to change without notice.

Support and Service: It is recommended to have your Futaba equipment serviced annually during your hobby's "off season" to ensure safe operation.

IN NORTH AMERICA

Please feel free to contact the Futaba Service Center for assistance in operation, use and programming. Please be sure to regularly visit the 8J Frequently Asked Questions web site at www.futaba-rc.com/faq/. This page includes extensive programming, use, set up and safety information on the 8J radio system and is updated regularly. Any technical updates and US manual corrections will be available on this web page. If you do not find the answers to your questions there, please see the end of our F.A.Q. area for information on contacting us via email for the most rapid and convenient response.

Don't have Internet access? Internet access is available at no charge at most public libraries, schools, and other public resources. We find internet support to be a fabulous reference for many modelers as items can be printed and saved for future reference, and can be accessed at any hour of the day, night, weekend or holiday. If you do not wish to access the internet for information, however, don't worry. Our support teams are available Monday through Friday 8-5 Central time to assist you.

FOR SERVICE ONLY:
Futaba Service Center

3002 N. Apollo Drive, Suite 1	Please start here for answers to most questions:
Champaign, IL 61822	www.futaba-rc.com/faq/
Phone: 217-398-0007	FACSIMILE: 217-398-7721
www.futaba-rc.com/service.html	PHONE: 217-398-8970 option 2
Email: service@futaba-rc.com	

FOR SUPPORT :   **OUTSIDE NORTH AMERICA**
(PROGRAMMING AND USER QUESTIONS)

Please contact your Futaba importer in your region of the world to assist you with any questions, problems or service needs.

Please recognize that all information in this manual, and all support availability, is based upon the systems sold in North America only. Products purchased elsewhere may vary. Always contact your region's support center for assistance.

Application, Export, and Modification

1. This product may be used for model airplane or surface (boat, car, robot) use. It is not intended for use in any application other than the control of models for hobby and recreational purposes. The product is subject to regulations of the Ministry of Radio/Telecommunications and is restricted under Japanese law to such purposes.

2. Exportation precautions:

(a) When this product is exported from the country of manufacture, its use is to be approved by the laws governing the country of destination which govern devices that emit radio frequencies. If this product is then re-exported to other countries, it may be subject to restrictions on such export. Prior approval of the appropriate government authorities may be required. If you have purchased this product from an exporter outside your country, and not the authorized Futaba distributor in your country, please contact the seller immediately to determine if such export regulations have been met.

(b) Use of this product with other than models may be restricted by Export and Trade Control Regulations, and an application for export approval must be submitted. This equipment must not be utilized to operate equipment other than radio controlled models.

3. Modification, adjustment, and replacement of parts: Futaba is not responsible for unauthorized modification, adjustment, and replacement of parts on this product. Any such changes may void the warranty.

Federal Communications Commission Interference Statement (for U.S.A.)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

--Reorient or relocate the receiving antenna.

--Increase the separation between the equipment and receiver.

--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

--Consult the dealer or an experienced radio/TV technician for help.

CAUTION:

To assure continued FCC compliance:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

Exposure to Radio Frequency Radiation

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20cm must be maintained between the antenna of this device and all persons.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.

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

This device, trade name Futaba Corporation of America, model number R2008SB, complies with part15 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.

The responsible party of this device compliance is:

Futaba Service Center

3002 N Apollo Drive Suite 1, Champaign, IL 61822 U.S.A.

TEL (217)398-8970 or E-mail: support@futaba-rc.com (Support)

TEL (217)398-0007 or E-mail: service@futaba-rc.com (Service)

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.

$\bigcirc$ = Prohibited ❗ = Mandatory

Warning: Always keep electrical components away from small children.

FLYING SAFETY

⚠ **WARNING**

To ensure the safety of yourself and others, please observe the following precautions:

❗**Have regular maintenance performed.** Although your 8J protects the model memories with non-volatile EEPROM memory (which does not require periodic replacement) and not a battery, the transmitter still should have regular checkups for wear and tear. We recommend sending your system to the Futaba Service Center annually during your non-flying-season for a complete checkup and service.

NiCd Battery

❗ **Charge the batteries!** (See Charging the NiCd batteries, p. 15, for details.) Always recharge the transmitter and receiver batteries for at least 8 hours before each flying session. A low battery will soon die, potentially causing loss of control and a crash. When you begin your flying session, reset your 8J's built-in timer, and during the session pay attention to the duration of usage.

❗ **Stop flying long before your batteries become low on charge. Do not rely on your radio's low battery warning systems, intended only as a precaution, to tell you when to recharge. Always check your transmitter and receiver batteries prior to each flight.**

Where to Fly

We recommend that you fly at a recognized model airplane flying field. You can find model clubs and fields by asking your nearest hobby dealer, or in the US by contacting the Academy of Model Aeronautics.

You can also contact the national Academy of Model Aeronautics (AMA), which has more than 2,500 chartered clubs across the country. Through any one of them, instructor training programs and insured newcomer training are available. Contact the AMA at the address or toll-free phone number below.
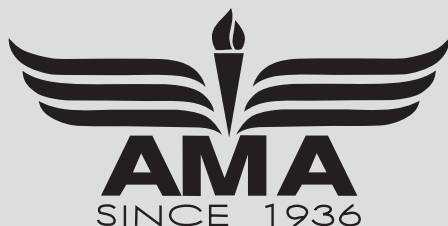
Academy of Model Aeronautics
5161 East Memorial Drive
Muncie, IN 47302
Tele. (800) 435-9262
Fax (765) 289-4248
or via the Internet at http:\\www.modelaircraft.org

❗ Always pay particular attention to the flying field's rules, as well as the presence and location of spectators, the wind direction, and any obstacles on the field. Be very careful flying in areas near power lines, tall buildings, or communication facilities as there may be radio interference in their vicinity.

If you must fly away from a club field, be sure there are no other modelers flying within a **three-to-five-mile range**, or you may lose control of your aircraft or cause someone else to lose control.

At the flying field

To prevent possible damage to your radio gear, turn the power switches on and off in the proper sequence:

1. Pull throttle stick to idle position, or otherwise disarm your motor/engine.
2. Turn on the transmitter power and allow your transmitter to reach its home screen.
3. Confirm the proper model memory has been selected.
4. Turn on your receiver power.
5. Test all controls. If a servo operates abnormally, don't attempt to fly until you determine the cause of the problem.
   Test to ensure that the Failsafe settings are correct. After adjusting, turn the transmitter off and confirm the proper surface/throttle movements. Then turn the transmitter back on.
6. Start your engine.
7. Complete a full range check (see p. 22).
8. After flying, bring your throttle stick to idle position, engage any kill switches or otherwise disarm your motor/engine.
9. Turn off receiver power.
10. Turn off transmitter power.

If you do not turn on your system in this order, you may damage your servos or control surfaces, flood your engine, or in the case of electric-powered or gasoline-powered models, the engine may unexpectedly turn on and cause a severe injury.

❗ While you are getting ready to fly, if you place your transmitter on the ground, be sure that the wind won't tip it over. If it is knocked over, the throttle stick may be accidentally moved, causing the engine to speed up. Also, damage to your transmitter may occur.

❗ In order to maintain complete control of your aircraft it is important that **it remains visible at all times**. Flying behind large objects such as buildings, grain bins, etc. is not suggested. Doing so may result in the reduction of the quality of the radio frequency link to the model.

🚫 Do not cover/hold the built-in antenna part of T8J-2.4G transmitter by your hand during flying. Do not put any conductive plate/sticker on the antenna part. Otherwise, the operating range may become shorter.

❗ As with all radio frequency transmissions, the strongest area of signal transmission is from the sides of the transmitter's antenna. As such, the antenna should not be pointed directly at the model. If your flying style creates this situation, easily move the antenna to correct this situation.

🚫 Don't fly in the rain! Water or moisture may enter the transmitter through the antenna or stick openings and cause erratic operation or loss of control. If you must fly in wet weather during a contest, be sure to cover your transmitter with a plastic bag or waterproof barrier. Never fly if lightning is expected.

A QUICK INTRODUCTION TO THE 8J 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 8J, 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*, *VR*, or the *THROTTLE STICK*, those words will be displayed as they are here.

TRANSMITTER:

• Large graphic liquid-crystal display panel with three buttons, an easy set up turn-and-press jog-key for quick, easy setup.

• All transmitters include both aircraft types with specialized programming for each, including:

- Airplane (**ACRO**)
  - **V-TAIL** • Twin Aileron Servos (**FLAPERON** and **AIL-DIFF**) • Gyro Mixing
  - **ELEVON** • Twin Elevator Servos (**AILEVATOR**)
  - **AIRBRAKE** • Snap Roll (4 separate directions available)

- Helicopter (8 swashplate types, including CCPM, see page 93)(**HELI**)
  - 3 Idle Ups • Throttle and Pitch Curves per Condition
  - Revo. Mixing • Gyro Mixing including Separate Settings per Condition
  - Delay • Governor Mixing

• 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**), **THR-CUT** (**ACRO**/**HELI**) (engine shut off), setups to allow precise engine/motor control for taxi and landings.

• 20 complete model memories.

• New stick design with improved feel, adjustable length and tension.

• Two rates available by setting dual rates to 3-position switches.

• Eight *SWITCHES*, and *DIAL*; completely assignable in most applications.

• Trainer system includes the "functional" (**FUNC**) setting, which allows the student to use the 8J's mixing, helicopter, and other programming functions even with a 4-channel buddy box. (Optional trainer cord required.)

• Permanent memory storage via EEPROM with no backup battery to service or have fail.

• 8JA transmitter features airplane friendly switch layout, with the trainer switch at the left hand (Mode 2), and a notched throttle to minimize throttle changes with rudder input. Defaults to **ACRO** model type.

• 8JH 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**(**H-1** swashplate type) model type.

• Change transmitter mode from mode 2 to modes 1, 3, or 4. (See P. 91)

• The built-in antenna which puts the antenna within the transmitter case.

• The diversity system which has 2 antennas in the inside of a transmitter.

RECEIVER: R2008SB

•The R2008SB has an S.BUS system output port and a conventional system channel outputs. It can also be used with conventional system servos, etc. in addition to S.BUS system compatible servos and gyros, etc.
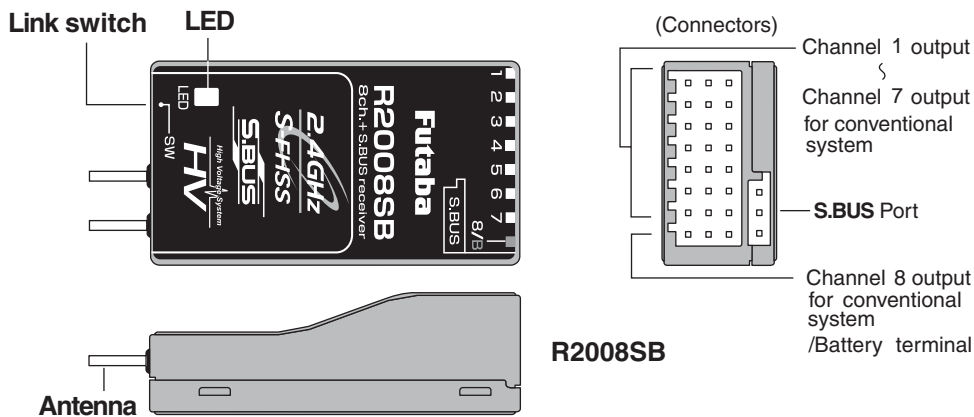
SERVOS

• Please see technical specifications page for specifics on the servos.

•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 8J system includes the following components:

• T8J Transmitter
• R2008SB Receiver
• Switch harness
• Aileron extension cord
• Neck strap
* The set contents depend on the type of set.

Transmitter T8J
(2-stick, 8-channel, S-FHSS system, Built-in Dual Antenna Diversity)
Transmitting frequency: 2.4GHz band
Power supply: 4-AA 1.2V Dry Cell batteries; 4.8V
  total (sold separately)
or HT5F1700B Ni-MH battery (option)
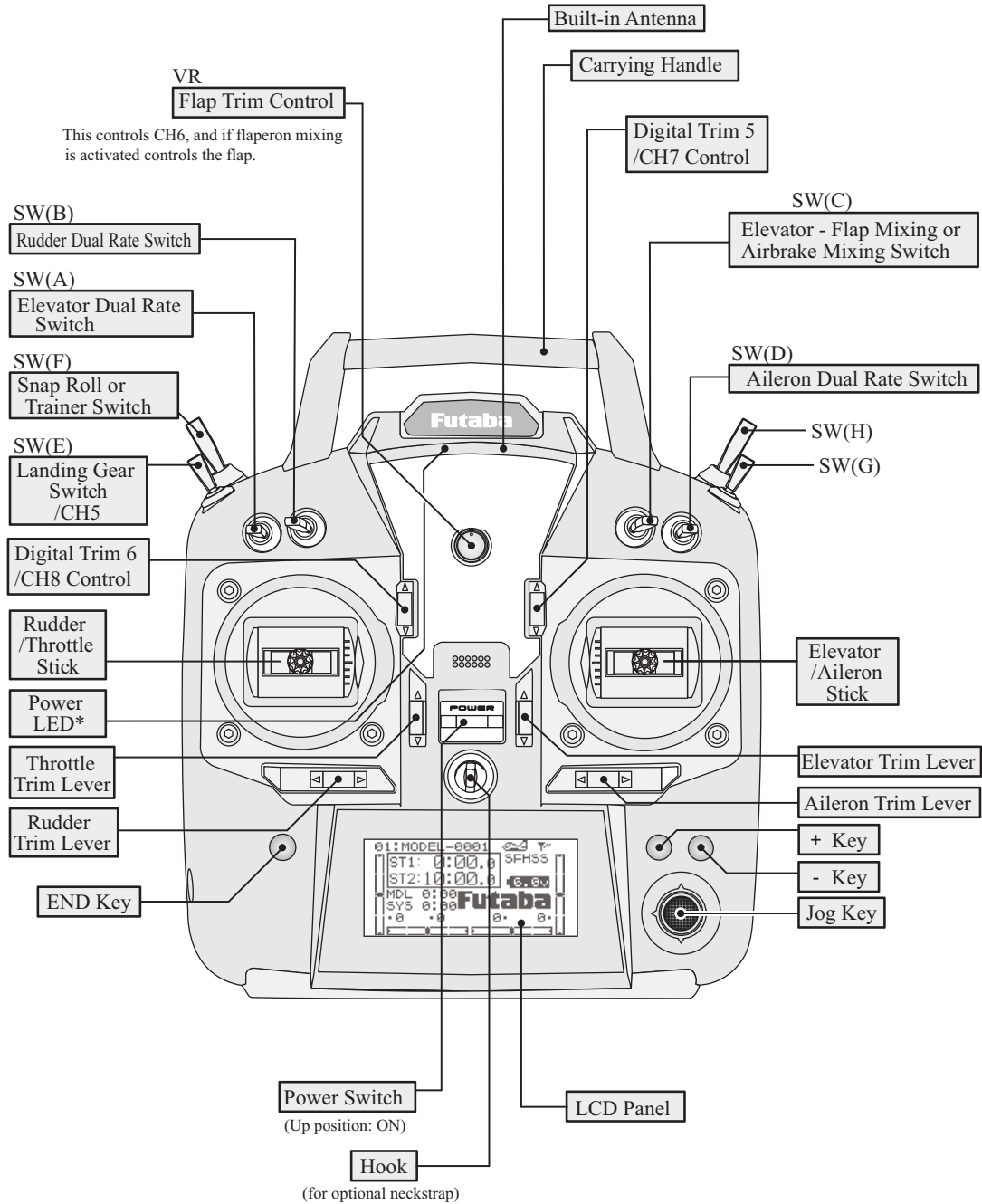or FT2F2100B Li-Fe battery (option)

Receiver R2008SB
(Dual Antenna Diversity)
Power requirement: 4.8V to 7.4V battery or regulated output from ESC, etc. [*1]
Size: 0.98 x 1.69 x 0.55 in. (24.9 x 42.8 x 14.0 mm)
Weight: 0.34 oz. (9.5g)

[*1] Be sure that when using ESC's regulated output the capacity of the ESC must meet your usage condition.

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

• HT5F1700B/FT2F2100B Transmitter battery pack - the transmitter battery pack may be easily exchanged with a fresh one to provide enough capacity for extended flying sessions.

• Trainer cord - the optional trainer cord may be used to help a beginning pilot learn to fly easily by placing the instructor on a separate transmitter. Note that the 8J transmitter may be connected to another 8J system, as well as to many other models of Futaba transmitters. The 8J transmitter uses the newer micro (rectangular type) cord plug. Both new-to-new and new-to-round plug style trainer cords are available.

• Neckstrap - a neckstrap may be connected to your T8J 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, hub, 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 3/4 the time of a 4-cell pack.

• Gyros - a variety of genuine Futaba gyros are available for your aircraft or helicopter needs.

• Governor (GV1,GY701,CGY750) - for helicopter use. Automatically adjusts throttle servo position to maintain a constant head speed regardless of blade pitch, load, weather, etc.

• Receivers - various models of receivers may be purchased for use in other models. (Only 2.4GHz S-FHSS/FHSS Type)

TRANSMITTER CONTROLS - AIRPLANE

Built-in Antenna

Carrying Handle

VR
Flap Trim Control

This controls CH6, and if flaperon mixing is activated controls the flap.

Digital Trim 5 /CH7 Control

SW(B)
Rudder Dual Rate Switch

SW(C)
Elevator - Flap Mixing or Airbrake Mixing Switch

SW(A)
Elevator Dual Rate Switch

SW(D)
Aileron Dual Rate Switch

SW(F)
Snap Roll or Trainer Switch

SW(H)

SW(E)
Landing Gear Switch /CH5

SW(G)

Digital Trim 6 /CH8 Control

Rudder /Throttle Stick

Elevator /Aileron Stick

Power LED*

Throttle Trim Lever

Elevator Trim Lever

Rudder Trim Lever

Aileron Trim Lever

Key

Key

END Key

Jog Key

Power Switch

(Up position: ON)

LCD Panel

Hook

(for optional neckstrap)

This figure shows the default switch assignments for a 8JA Mode 2 system as supplied by the factory. You can change many of the switch positions or functions by selecting a new position within the setting menu for the function you wish to move.

TRANSMITTER CONTROLS - HELI

Built-in Antenna

Carrying Handle

Digital Trim 5

VR
CH8 Knob

SW(B)
Rudder Dual Rate Switch

SW(C)
Governor Switch/CH7

SW(A)
Elevator Dual Rate Switch

SW(F)
Idle-up 3 Switch /Gyro/CH5

SW(D)
Aileron Dual Rate Switch

SW(H)
Trainer Switch

SW(E)
Idle-up 1&2 Switch

SW(G)
Throttle - Hold Switch

Digital Trim 6

Throttle/Collective Pitch & Rudder Stick

Elevator /Aileron Stick

Power LED

Throttle/Collective Pitch Trim Lever

Elevator Trim Lever

Rudder Trim Lever

Aileron Trim Lever

Key

Key

END Key

Jog Key

```
11:MODEL-0011      SFHSS
ST1: 0:00.0
ST2:10:00.0  6.0v
MDL 0:26
SYS 2:02 Futaba T8J
 0    0     120   0
```

Power Switch
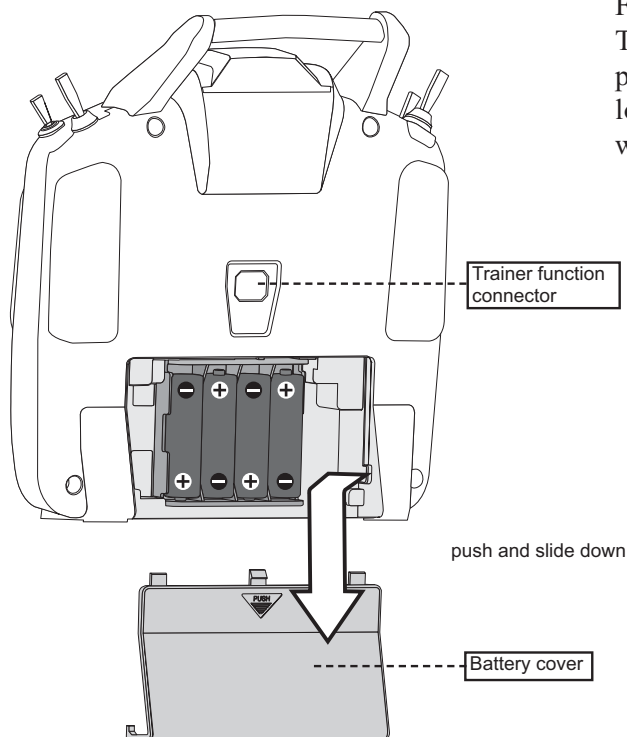(Up position: ON)

LCD Panel

Hook
(for optional neckstrap)

This figure shows the default switch assignments for a 8JH Mode 2 system as supplied by the factory. You can change many of the switch positions or functions by selecting a new position within the setting menu for the function you wish to move.

11

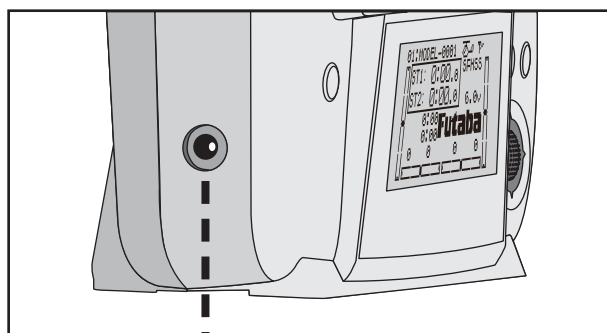## INSTALLATION AND REMOVAL OF THE TRANSMITTER BATTERY

The T8J transmitter is designed to work with either four (4) AA alkaline dry cell batteries, or HT5F1700B/FR2F2100B battery pack, both available separately. The transmitter batteries used are a matter of personal preference. AA Alkaline batteries are available at any local hobby shop, grocery store, etc. A battery pack will need to be purchased from a hobby shop.

Trainer function connector

push and slide down

Battery cover
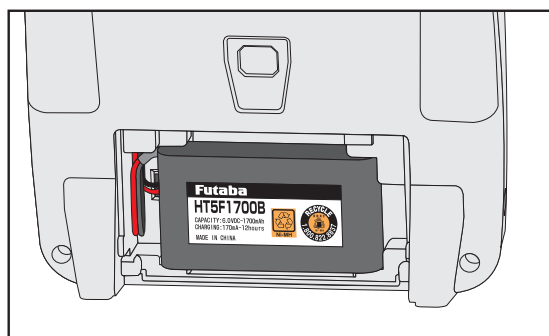
Remove the battery BOX if you choose to use the optional HT5F1700B/FR2F2100B battery pack, which can be recharged from the transmitter.
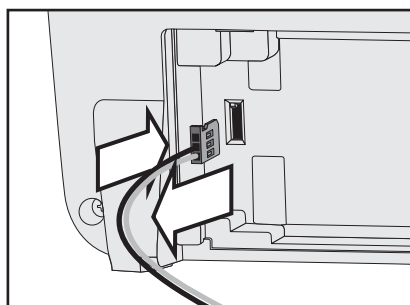
NOTE: If you need to remove or replace the transmitter battery, do not pull strongly on the battery wires to remove it. Insert the connector straight as shown.

⚠ WARNING

🚫 **Be careful not to drop the battery.**

🚫 **Never disconnect the battery connector from the T8J transmitter after turning off the power until the screen is completely blank and the transmitter has shut down completely.**

* Internal devices such as memories may be damaged.

* If there is any problem, the message "Backup Error" will be shown the next time when you turn on the power of the transmitter. Do not use the transmitter as it is. Send it to the Futaba Service Center.

⚠ WARNING

🚫 **Do not connect any other chargers except the special charger to this charging connector.**

*If you take out the Ni-MH battery HT5F1700B from the transmitter, you can use the optional quick charger CR-2000 corresponding to Ni-MH battery.

NOTE: This plug is for charging HT5F1700B. The other battery cannot be charged. FT2F2100B is removed from a transmitter, and charges with an exclusive charger(LBC-4E5).

12

SWITCH ASSIGNMENT TABLE

• The factory default functions activated by the switches and VR for an 8J Mode 2 transmitter are shown below.

• Most 8J functions may be reassigned to non-default positions quickly and easily.

• Basic control assignments of channels 5-8 are quickly adjustable in **AUX-CH**.

• Note that most functions need to be activated in the programming to operate.

• 8J Mode 1, 8JH, and 8J 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/VR A or H	Airplane (**ACRO**)	Helicopter (**HELI**)
SWITCH A	elevator dual rate	elevator dual rate
SWITCH B	rudder dual rate	rudder dual rate
SWITCH C	up = **ELE-FLP** on center/down = **IDLE-DOWN** down = **AIRBRAKE** on	governor
SWITCH D	aileron dual rate	aileron dual rate
SWITCH E or G*	landing gear/ch 5	throttle hold/ch5
SWITCH F or H*	snap roll/trainer	trainer/**THR-CUT**
SWITCH G or E*	none	idle-up 1 and 2
SWITCH H or F*	none	idle-up3/gyro
VR	flap/ch 6 (flap trim if **FLAPERON** on)	CH8

*On the 8JA Mode 2 transmitters, the TOP LEFT *SWITCHES* are spring-loaded and 2-position; on the 8JA Mode 1, 8JH, 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.

TO TURN ON THE 8J SYSTEM

First make sure the throttle stick is in the low throttle position.

Push up to turn on
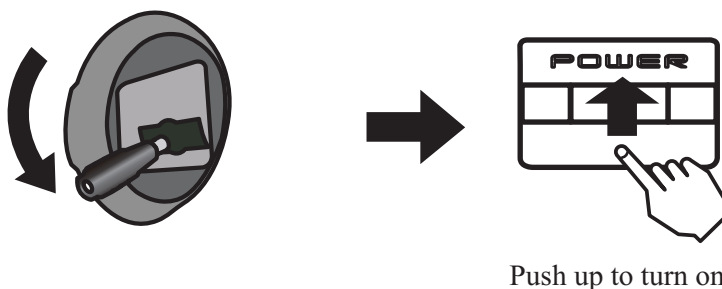
*If the throttle stick is not in the low position,
  you'll have an alarm until the stick is in the low position.

RECEIVER AND SERVO CONNECTIONS

(Wing Type)

Receiver Output and Channel	Aircraft (**ACRO**)
1	ailerons/aileron-1[1]/combined flap-2 & aileron-1[2]
2	elevator
3	throttle
4	rudder
5	spare/landing gear/aileron-2[1,3]/combined flap-1 and aileron-2[2,3]
6	spare/ flap(s)/combined flap-1 and aileron-2[2]
7	spare/aileron-2[1]
8	spare/elevator-2[4]/mixture control
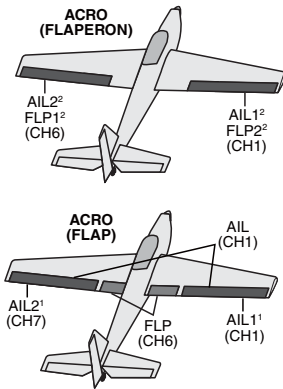
[1] Aileron Differential mode (**AILE-DIFF**).

[2] Flaperon mode.

[3] Using Second Aileron option, second aileron servo output is sent to channels 5 and 6. (**AILE-2**)

[4] **AILEVATOR** (dual elevator) mode.

(Tail Type)
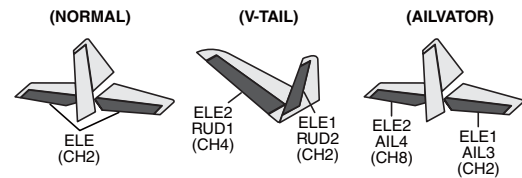
Receiver Output and Channel	Helicopter (**HELI**)
1	aileron (cyclic roll)
2	elevator (cyclic pitch)
3	throttle
4	rudder
5	spare/gyro
6	pitch (collective pitch)
7	spare/governor
8	spare/mixture control

(Swash Type)

14
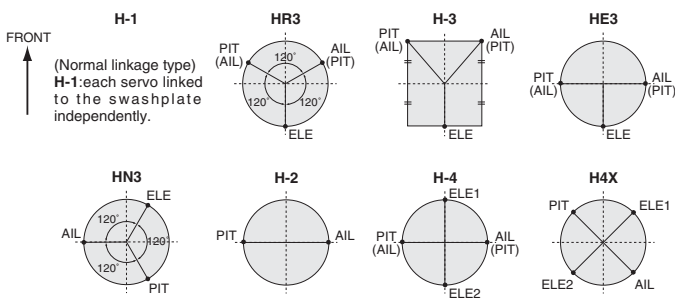
CHARGING THE BATTERIES (When the rechargeable battery option is used)
Charging Your System's Batteries
1. Connect the transmitter charging jack and batteries to the transmitter and receiver connectors of the charger.
2. Plug the charger into a wall socket.
3. Check that the charger LED lights.

Charger

TX: Transmitter charging indicator
RX: Receiver charging indicator

To transmitter charging jack

Receiver battery

According to the description of the battery to be used and its exclusive charger, please use it after carrying out full charge.
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.

When HT5F1700B is chosen, HBC-3A (4) is recommended. When charging FT2F2100B, Please make sure to remove the battery from the system to charge it. Charger for this battery is recommended to use LBC-4E5.
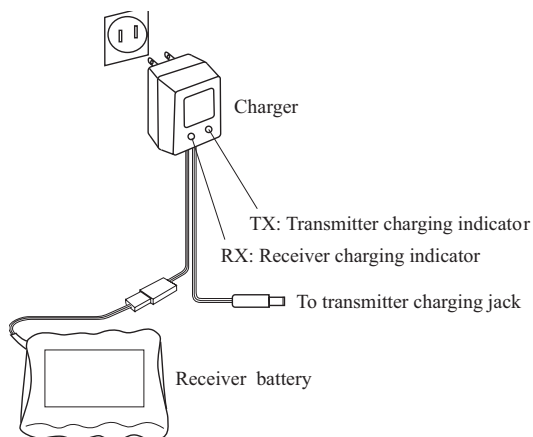
Battery Care and Precautions

Below you will find some general rules and guidelines which should be adhered to when charging transmitter and/or receiver battery packs. These are included to serve only as general guidelines, and are not intended to replace or supersede the information provided by the battery and/or charger manufacturer. For complete information, please refer to the instructions that are included with the battery pack(s) and/or chargers that accompany the products purchased.

- Do not allow children to charge battery packs without adult supervision.
- Do not charge battery packs that have been damaged in any way. We strongly suggest frequent inspection of the battery packs to ensure that no damage has occurred.
- Do not to allow batteries to overheat! If overheated, disconnect the battery from the charger immediately and allow to cool.
- Do not mix cells- all cells should be of the same material, configuration, etc.
- Do not deep cycle NiMH batteries as permanent damage could result.
- Never charge batteries on a surface that may become hot, or may be impacted by the heat.
- Immediately end the charging procedure if either the batteries or charger itself become overly hot.
- NiMH cells do not exhibit the "memory effect" like NiCd cells, so little cycling is needed. Store NiMH packs with some voltage remaining on the cells (refer to battery supplier).
- NiMH cells have a self-discharge rate of approximately 20-25% (compared to 15% for NiCd batteries). It is important to recharge NiMH batteries immediately prior to use.
- Never connect the battery in reverse. Reverse connection will cause the battery to overheat or will damage the inside of the charger.
- Do not add an additional charge after charging.
- Never charge with a current exceeding the nominal capacity (lC) of the rechargeable battery.
- If a battery is charged with a current exceeding 1C, the battery will overheat and deteriorate.
- Do not connect two battery packs or more to one output terminal.
- Avoid extremely cold and hot places and the direct sunlight when you charge batteries.
- It is recommended to perform charging within the 10 ~ 30°C (50-85°F) range. Otherwise, it may cause abnormal charging and overheat.

ADJUSTING THE IENGTH OF THE CONTROL STICKS

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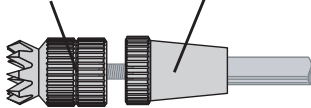
You may change the length of the control sticks to make your transmitter more comfortable to hold and operate. To lengthen or shorten your transmitter's sticks, first unlock the stick tip by holding locking piece B and turning stick tip A counterclockwise. Next, move the locking piece B up or down (to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

Stick lever tension adjustment

Four screws are removed and rear case is removed.

Aileron

Elevator

Rudder
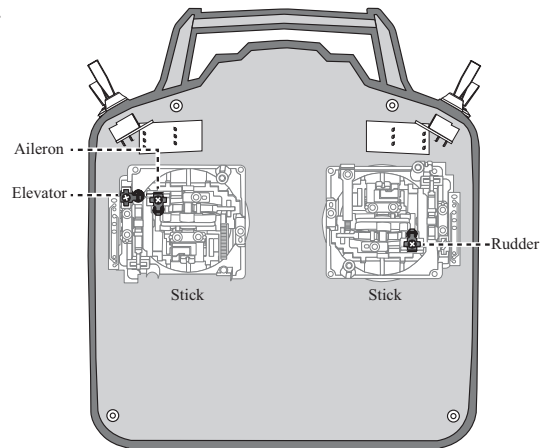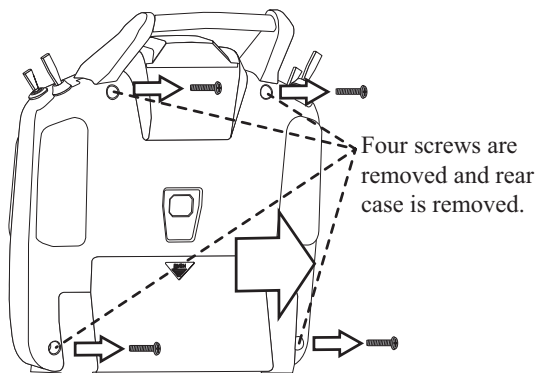
Stick   Stick

Mode 2 transmitter with rear case 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 from the transmitter. 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. When the cover is properly in place, reinstall and tighten the four screws. Reinstall the battery and cover.
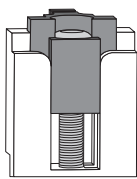
+ screw is clockwise.   + screw is counter-clockwise.

A screw is kept from coming out from a line.
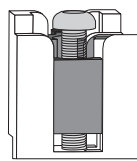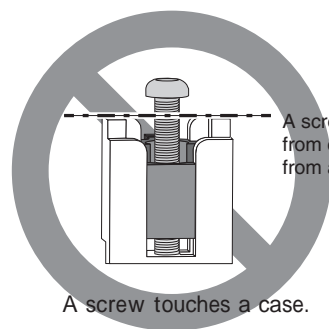
Stick tension maximum   Stick tension minimum   A screw touches a case.

ADJUSTING DISPLAY CONTRAST

To adjust the display contrast, from the home menu press and hold the *END BUTTON*.
Push the   *KEY* while still holding the *END BUTTON*:
        KEY to brighten
        KEY to darken the display

RANGE CHECK THE RADIO

A range check must be performed before the first flight of a new model. It is not necessary to do a range check before every flight (but is not a bad idea to perform a range check before the first flight of each day). A range check is the final opportunity to reveal any radio malfunctions, and to be certain the system has adequate operational range.

We have installed a special "Power Down Mode" in the T8J in order to perform an operational ground range check. During this mode, the RF power is reduced in order to test the operational range of the T8J.

To activate the Power Down Mode and Perform A Range Check:

1) To activate the "Power Down Mode" please hold down the *JOG KEY* and then turn the transmitter switch on. A power mode screen comes out. *JOG KEY* is pushed where Power Down is chosen. When this mode is active the Purple LED on the Lighting front of the transmitter will provide users with an audible and visual indication that the transmitter is in the "Power Down Mode".

```
POWER MODE
  ▶ Power Down
  ▶ OFF
  ▶ ON
```

Audibly, the transmitter will beep one time every three seconds. Visually, the LCD screen will display "POWER DOWN MODE". The words "POWER DOWN MODE" will blink as an additional reminder that the transmitter is in the "Power Down Mode".

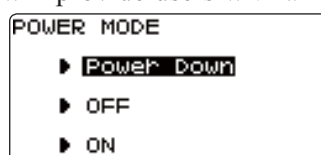2) With the "Power Down Mode" activated, walk away from the model while simultaneously operating the controls. Have an assistant stand by the model and signal what the controls are doing to confirm that they operate correctly. You should be able to walk approximately 30-50 paces from the model without losing control.

3) If everything operates correctly, return to the model. Push *END KEY* and complete power down mode. Set the transmitter in a safe yet accessible location so it will be within reach after starting the engine. Be certain the throttle stick is all the way down, and then start the engine. Perform another range check with your assistant holding the model and the engine running at various speeds.

If the servos jitter or move inadvertently, there may be a problem. Do NOT fly the aircraft! Look for loose servo connections or binding pushrods. Also be certain that the battery has been fully charged.

4) NEVER start flying when the "Power Down Mode" is active.

Servo test operation at the time of Power Down Mode:

During Power Down mode, you can use automatic servo testing to check the range of a specified servo (it moves to right and left slowly).

1) A "servo test" is chosen from a menu.
2) *JOG KEY* is moved to a side and 2 pages is called. Next, *JOG KEY* is moved down and CH is displayed.
3) CH of the servo which wants to operate is chosen. Then, the + *KEY* is pressed and it is made ACT.

The servo selected during Power Down mode operates alone, allowing you to check its operation.

*In the power down mode, the throttle servo does not operate. (Slow keeping)

*Helicopter mode, condition is fixed to NOR.

⚠ **DANGER**

🚫 **NEVER start flying when the "Power Down Mode" is active.**

*Control is impossible and your model crashes.

17

RADIO INSTALLATION

Follow these guidelines to properly mount the servos, receiver and battery.

• Make certain the **alignment tab** on the battery, switch and servo connectors is oriented correctly and "keys" into the corresponding notch in the receiver or connectors before plugging them in. When unplugging connectors, never pull on the wires. Always pull on the plastic connector instead.

• 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.

• Always mount the servos with the supplied **rubber grommets**. Do not over tighten the screws. No part of the servo casing should contact the mounting rails, servo tray or any other part of the airplane/helicopter structure. Otherwise, vibration will be transmitted to the servo, causing premature wear and/or servo failure.
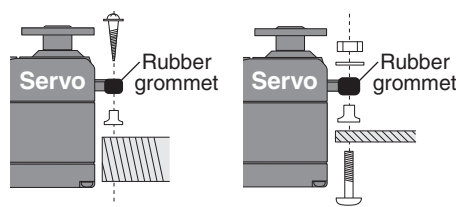
• Note the small numbers (1, 2, 3, 4) molded into each arm on the Futaba 4-arm servo arms. The numbers indicate how many degrees each arm is "off" from 90 degrees to correct for minute manufacturing deviations from servo to servo.
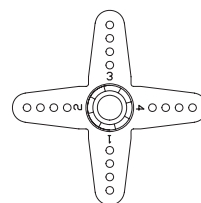
• To center the servos, connect them to the receiver and turn on the transmitter and receiver. Center the trims on the transmitter, then find the arm that will be perpendicular to the pushrod when placed on the servo.
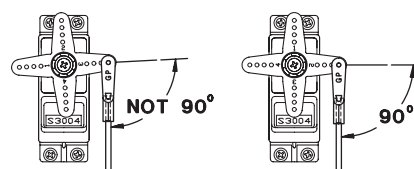
• After the servos are installed, operate each servo over its full travel and check that the pushrods and servo arms do not bind or contact each other. Also make sure the controls do not require excess force to operate. If there is an objectionable buzzing sound coming from a servo, there is probably too much resistance in the control. Find and correct the problem. Even if there is no servo damage, excess battery drain will result.

• Use the **mounting plate** from the receiver on/off switch as a template for the cutout and screw holes. Mount the switch on the side of the fuselage opposite the engine exhaust, and where it won't be inadvertently turned on or off during handling or storage. Be certain the switch moves without restriction and "snaps" from ON to OFF, and that the cutout allows full motion of the switch in both directions.

• When you install the switch harness to the helicopter, please use the switch cover. Generally sandwich the frame between the switch and switch cover and securely tighten the screws. Different models might require different installations. If so, please follow the model's instruction manual.

• To prevent the servo lead wires from being broken by vibration during flight, provide a slight amount of slack or extra so that the wire sticks out slightly and fasten it at suitable points. In addition, periodically check the wire during daily maintenance.

Margin in the lead wire.

Fasten about 5-10cm from the servo outlet so that the lead wire is neat.
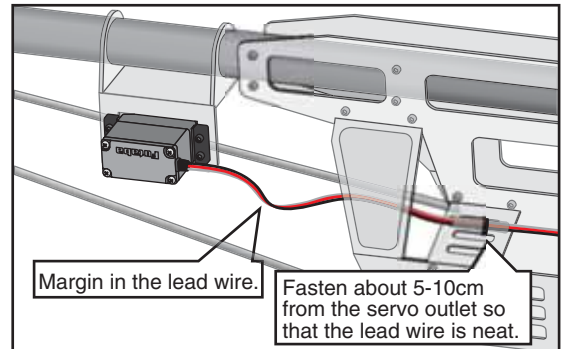
IMPORTANT: Since the 2.4GHz have different characteristics than that of the conventional 27MHz and 72MHz frequencies, please read this section carefully to maximize your enjoyment of the 2.4GHz system.

Receiver's Antenna Installation:

• You will note that the R2008SB differs in appearance from the standard Futaba receiver. These receivers incorporate two separate antennas into their design which enables them to receive the radio frequency transmission at two different locations.

Antenna ─┤   ├─ Coaxial cable

*Must be kept as straight as possible.

R2008SB Receiver
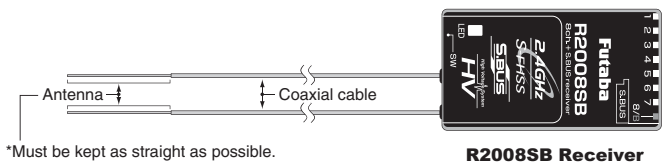
Futaba's dual antenna diversity then seamlessly selects the best signal reception between these antennas to ensure that there is no loss of signal.

• To obtain the best results of the diversity function, please refer to the following instructions:

1. The two antennas must be kept as straight as possible. Otherwise it will reduce the effective range.

2. The two antennas should be placed at 90 degrees to each other. This is not a critical figure, but the most important thing is to keep the antennas away from each other as much as possible. Larger models can have large metal objects that can attenuate the RF signal. In this case the antennas should be placed at both sides of the model. Then the best RF signal condition is obtained at any flying attitude.

3. The antennas must be kept away from conductive materials, such as metal, carbon and fuel tank by at least a half inch. The coaxial part of the antennas does not need to follow these guidelines, but do not bend it in a tight radius.

4. Keep the antennas away from the motor, ESC, and other noise sources as much as possible.

90°

90°
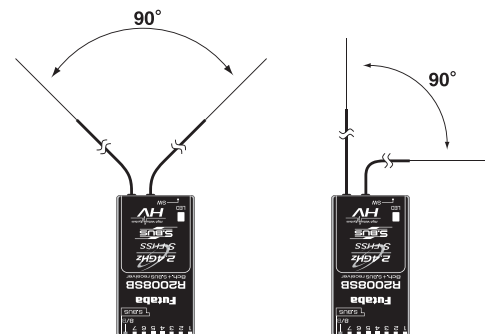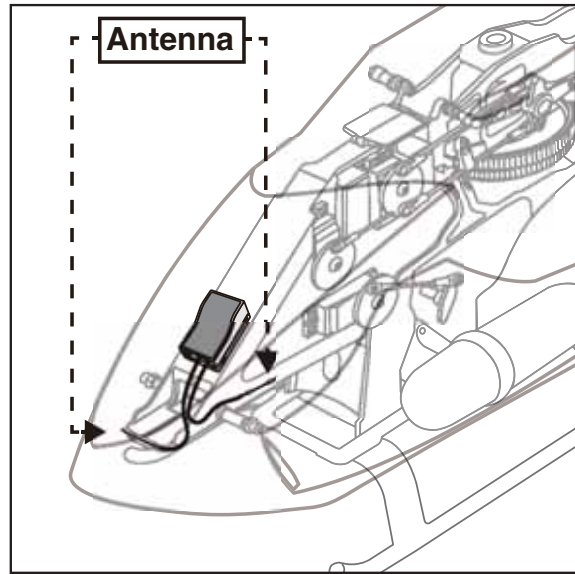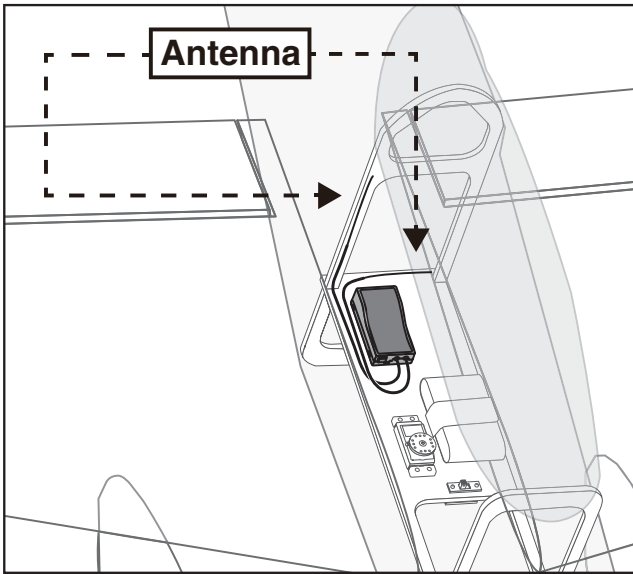
*The two antennas should be placed at 90 degrees to each other.
*The main purpose of the photo demonstrates how the antenna should be placed.

• 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, return the receiver to our service center for service.

LINK PROCEDURE (T8J transmitter/R2008SB):

Each transmitter has an individually assigned, unique ID code. In order to start operation, the receiver must be linked with the ID code of the transmitter with which it is being paired. Once the link is made, the ID code is stored in the receiver and no further linking is necessary unless the receiver is to be used with another transmitter. When you purchase additional R2008SB receivers, this procedure is necessary; otherwise the receiver will not work.

1. Bring the transmitter and the receiver close to each other, within 20 inches (half meter).
2. Turn on the transmitter.
3. Turn on the receiver.
4. Press and hold the Link switch more than two (2) seconds. When the link is complete, the LED in the receiver changes to solid green. When the ID cannot be read due to the surrounding environment, try reading it with the transmitter and receiver touched.

• If there are many S-FHSS/FHSS systems turned on in close proximity, your receiver might not link to your transmitter. In this case, even if the receiver's LED stays solid green, unfortunately the receiver might have established a link to one of other transmitters. This is very dangerous if you do not notice this situation. In order to avoid the problem, we strongly recommend you to doublecheck whether your receiver is really under control by your transmitter by giving the stick input and then checking the servo response.

Please refer the table below for LED status vs receiver's condition.

LED Indication

Green	Red	Status
Off	*Solid*	No signal reception
Solid	*Off*	Receiving signals
Blink	*Off*	Receiving signals but ID is unmatched
Alternate blink		Unrecoverable error (Memory, etc.)

⚠**WARNING**

❗ After the linking is done, please cycle receiver power and check if the receiver to be linked is really under the control by the transmitter to be linked.

🚫 Do not perform the linking procedure with motor's main wire connected or with the engine operating as it may result in serious injury.

S.BUS INSTALLATION

This set uses the S.BUS system. The wiring is as simplified and clean mounting as possible, even with models that use a large number of servos. In addition, the wings can be quickly installed to the fuselage without any erroneous wiring by the use of only one simple wire, even when there are a large number of servos used.

- ●When using S.BUS, special settings and mixes in your transmitter may be unnecessary.
- ●The S.BUS servos and S.BUS gyros memorize the number of channels themselves. (Settable with the SBC-1)
- ●The S.BUS system and conventional system (receiver conventional CH used) can be mixed.

Receiver

Battery

S.BUS Port (S.BUS)

Male to Male connectors.

Switch

Terminal box

S.BUS Servo

Since the channel number is memorized by the S.BUS itself, any connector can be used. When the SBD-1 (sold separately) is used, ordinary servos can be used with the S.BUS system.

Terminal box

Four connectors can be inserted

HUB

Orange

Three connectors can be inserted.

HUB

S.BUS Servo

Green

HUB

(Another power supply)
Used when using a separate power supply battery.

HUB
(Another power supply)

HUB   HUB

Battery

When separate power supply used

When a large number of servos is used or when high current servos are used, the servos can be driven by a separate power supply by using a separate Power Supply 3-way Hub.

S.BUS Servo

⚠ WARNING

🚫 Turn on the power on transmitter→receiver in order. In addition, always check the operation of all the servos before flight.

🚫 Do not insert or remove the servo connector while the receiver power is ON.

Since the S.BUS servo switches the operation mode automatically according to the type of signal (S.BUS signal/PWM signal) from the receiver, if the connector is inserted or removed while the power is ON, an S.BUS connected servo will be erroneously recognized and may stop.

🚫 Please make sure that you use a battery that can deliver enough capacity for the number and kind of servos used. Alkaline batteries cannot be used.

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, potentially leading to a crash.

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

Total timer display <TIMER>
Shows the cumulated ON time. (hours:minutes)
Up/down timer display <ST1.ST2>
(minutes:seconds)
Model timer display <MDL>
Shows the cumulated ON time for each model.(hours:minutes)
System timer display <SYS>
Shows the cumulated ON time.(hours:minutes)

Resetting timers:
Select the desired timer with JOG KEY. The timer display flashes. To reset the timer, press JOG KEY.

Model type
System "S-FHSS" "FHSS"
Output display
Battery voltage
Elevator trim display
key
key
Jog key

Timers
Model number and name
Throttle trim display
END Key

Rudder trim display
Aileron trim display
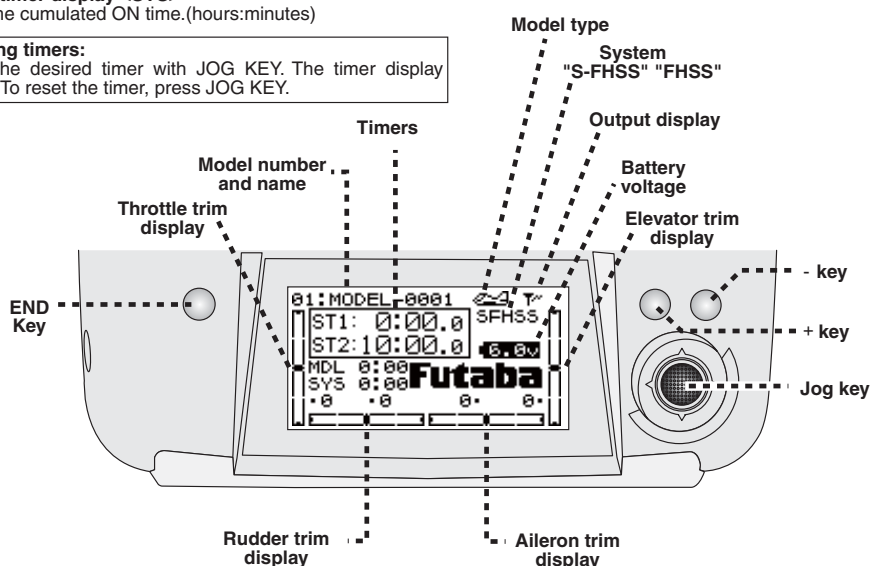
JOG KEY:

Control ***JOG KEY*** to scroll up/scroll down/scroll left/scroll right and select the option to edit within a function. When the menu has multiple pages, move the ***JOG KEY*** horizontally (left or right).
Press ***JOG KEY*** to select the actual function you wish to edit from the menu.
Press ***JOG KEY*** 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, condition of a helicopter setup is changed. An on screen inquiry will ask if you are sure.
Press ***JOG KEY*** again to accept the change.

KEY:

Press and hold   *KEY* for one second to open programming menus. It uses for change of a setup, or a numerical increase. Change of the page of a menu can also be performed.

KEY:

It is used for change of a setup, or reduction of a number. Change of the page of a menu can also be performed.

END BUTTON:

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

WARNING & ERROR DISPLAYS

An alarm or error indication may appear on the display of your transmitter for a number of reasons, including when the transmitter power switch is turned on, when the battery voltage is low, and several others. Each display has a unique sound associated with it, as described below.

LOW BATTERY ERROR: Warning sound: Continuous beep until transmitter is powered off.
The **LOW BATTERY** warning is displayed when the transmitter battery voltage drops below 4.1V. (5CELL mode 4.9V)

```
01:MODEL-0001   ⟡ ⦶ ⫏
║ST1:  0:00.0 ║SFHSS║
║ST2:10:00.0 ║  4.9v
▪MDL 1:20    LOW
║SYS 9:49  BATTERY ║
▪·0   ·0    0·   0·
```
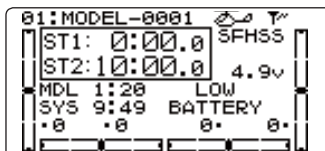
Land your model as soon as possible before loss of control due to a dead battery.

MIXING ALERT WARNING: Warning sound: 5 Beeps (repeated until problem resolved or overridden)

```
   **** WARNING ****

THR.CUT      AIR-BRK
IDLE DOWN    THR-STK
SNAP ROLL    CONDITION
```
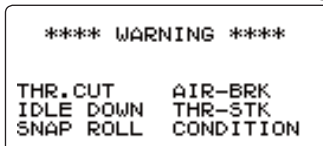
The **MIXING ALERT** warning is displayed to alert you whenever you turn on the transmitter with any of the mixing switches active. This warning will disappear when the offending switch or control is deactivated. Switches for which warnings will be issued at power-up are listed below. Throttle cut, idle-down, snap roll, airbrake, throttle-stick and condition. If turning a switch OFF does not stop the mixing warning: When the warning does not stop even when the mixing switch indicated by the warning display on the screen is turned off, the functions described previously probably use the same switch and the OFF direction setting is reversed. In short, one of the mixings described above is not in the OFF state. In this case, reset the warning display by pressing both   /   *KEY* at the same time. Next, change one of the switch settings of the duplicated mixings.

BACKUP ERROR: Warning sound: 4 beeps (repeated continuously)
The **BACKUP ERROR** warning occurs when the transmitter memory is lost for any reason. If this occurs, all of the data will be reset when the power is turned on again.

```
<< BACK UP ERROR >>

MEMORY INITIALIZE

▐████████      49%
```
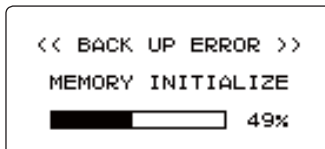
Do not fly when this message is displayed: all programming has been erased and is not available. Return your transmitter to Futaba for service.

AIRCRAFT (ACRO) MENU FUNCTIONS

MAP OF ACRO FUNCTIONS

(Startup screen)

```
01:MODEL-0001      ⟋⟍ T⌄
|ST1:  0:00.0  SFHSS
|ST2:10:00.0   6.0v
MDL 0:00 Futaba
SYS 0:00
 ·0    ·0      0·    0·
|▭▭▭▭▭▭▭|▭▭▭▭▭▭▭|
```

To return to the Startup screen,
press the End key. (END)

(+) To enter the Menu,
press the + key for one second.
(for one second)

ACRO Menu

(Menu 1/3)

```
MENU    ⟋⟍   (1/3)
▶MDL-SEL    ▶PARAMETER
▶MDL-NAME   ▶MDL-TRANS
            ▶REVERSE
▶D/R,EXPO   ▶THR.CUT
▶END POINT  ▶IDLE DOWN
▶SUB TRIM   ▶TRIM
```

◀(⊙)▶
or
⊖
(+)

(Menu 2/3)

```
MENU    ⟋⟍   (2/3)
▶FLAPERON   ▶SNAP ROLL
▶FLAP TRIM  ▶ELE→FLAP
▶AIL-DIFF   ▶AIR-BRK
▶V-TAIL     ▶AIL→RUD
▶ELEVON     ▶FLAP→ELE
▶AILVATOR   ▶GYRO SENS
```

◀(⊙)▶
or
⊖
(+)

(Menu 3/3)

```
MENU    ⟋⟍   (3/3)
▶P.MIX1-6   ▶AUX-CHAN
            ▶SERVO
▶THR-CURVE  ▶TIMER
▶PIT-CURVE  ▶TRAINER
▶THR DELAY
▶THR→NEEDL  ▶FAIL SAFE
```
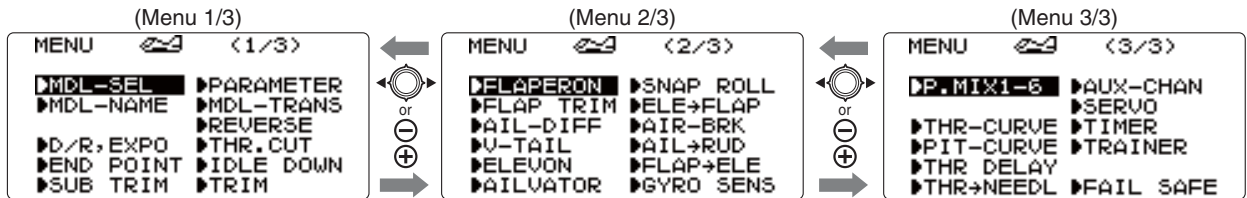
Press +－Key to page up and down through the 3 pages of screens
in each menu. Note that all functions which have more than one page have
a <1/3> indicator in the upper right hand corner to indicate page 1 of 3 or
page 2 of 3 / 3 of 3.

Use Jog Key to highlight function in Menu screen.
Then press the Dial to choose that function.

(⊙) **Jog Key Up/Down**	⬆ **Switch Up**	⊙ **Stick Up**
◀(⊙)▶ **Jog Key Left/Right**	⇅⊖ **Switch at Center**	⊕ **Stick Right**
(⊙) **Press Jog Key**	⬇ **Switch Down**	⊙ **Stick Down**
(+) **Press Key**	⊙ **Turn VR Right**	⊖ **Stick Left**
⊖ **Press Key**	⊙ **Turn VR Left**	
(END) **End Selection**		

26

A LOOK AT THE RADIO'S FUNCTIONS STEP BY STEP

MODEL SELECT *submenu:* includes three functions that manage model memory: **MODEL SELECT**, **MODEL COPY** and **MODEL RESET**. Since these functions are all related, and are all basic features used with most models, they are together in the **MODEL SELECT** submenu.

```
MDL-SEL

SELECT▶ 2      I        
            MODEL-0002
COPY▶  1→ 1
            MODEL-0001

RESET▶Execute
```
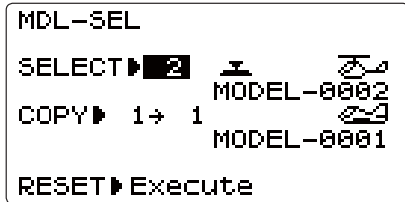
MODEL SELECT: This function selects which of the 20 model memories in the transmitter to set up or fly. For clarity the model's name and an image of its type are indicated after its number. (Each model memory may be a different model type from the other memories.)

flashing

```
01:MODEL-0001
ST1:  0:00.0  SFHSS
ST2:10:00.0   6.0v
MDL 0:00  Futaba
SYS 0:00
 ·0    ·0      0·    0·
```

NOTE: When you choose a new model in the **MODEL SELECT** function, if the new model is set to a different modulation, you must cycle the transmitter power to change modulations. If you do not cycle the power, the modulation type will flash on the home screen to remind you. Please note: You are still transmitting on the other modulation until you affect this change.

GOAL:	STEPS:	INPUTS:
Select Model #3. *NOTE: This is one of several functions for which the radio requires confirmation to make a change.*	Open the menu, then open **MODEL SELECT** submenu.	⊕ for 1 second. ◌ if required to **MODEL SELECT**.
	Choose Model #3.	⊕ to **3**.
	Confirm your change.	◌ for 1 second. **Sure?** displays. ◌
	Close.	(END) (END)
Confirm proper modulation of new model memory.	If **SFHSS/FHSS** is flashing in the upper right hand corner, then the new model is set for the other receiver type. Turn the transmitter off/on to change the modulation.	
Where next?	**MODEL NAME** the model: see p. 29. Change **MODEL TYPE** (aircraft, heli): see p. 30. Change modulation (**SFHSS** or **FHSS**): see p. 31. Utilize servo **REVERSE**: see p. 35. Adjust **END POINTs**: see p. 36. Set up **IDLE-DOWN** and **THR-CUT** for throttle management: see p. 37, 38.	

MODEL COPY: copies the current model data into another model memory in the transmitter. The name of the model memory you are copying into is displayed for clarity.

```
MDL-SEL

SELECT▶ 2      I        
            MODEL-0002
COPY▶  1→ 1
            MODEL-0001

RESET▶Execute
```
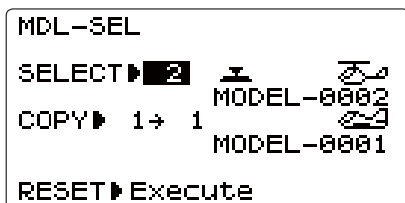
Notes:
• Any data in the model copied to will be written over and lost, including name, type and modulation. Upon completion, it cannot be recovered.

Examples:
• Create a new model that is similar to one you have already programmed.
• Copy the current model data into another model memory as a backup or before experimenting with new settings.
• Edit a copy of your model's data to fly the model in different conditions (ie. Helicopter using heavier weight blades; airplane model at extreme altitudes).

GOAL of EXAMPLE:	STEPS:	INPUTS:
Copy model 3 into model 5. *NOTE: This is one of several functions for which the radio requires confirmation to make a change.*	Open the menu, then open **MODEL SELECT** submenu.	⊕ for 1 second. ◈ if required to **MODEL SELECT**. ◌
	Confirm you are currently using the proper model memory. (Ex: 3)	If **SELECT** does not indicate **3**, use **MODEL SELECT**, p. 27.
	Go to **MODEL COPY** and choose the model to copy into. (Ex: 5)	◈ to **COPY**. ⊕ to **5**.
	Confirm your change.	⊕ for 1 second. **Sure?** displays. ◌ *
	Close.	(END) (END)
Where next?	**SELECT** the copy you just made: see p. 27. Rename it (it is currently named exactly the same as the model copied): see p. 29.	

*Radio will show "complete" and it shows that the copy was completed. Note that if the power switch is turned off prior to completion, the data will not be copied.

First it is important to clear out any old settings in the memory from prior use, using the **MODEL RESET**.
MODEL RESET: completely resets all data in the individual model you have currently selected. Don't worry - there is no way you can accidentally delete all models in your radio with this function. Only a service center can completely reset your radio's entire memory at once. To delete each model in your radio's memory (for example when selling), you must **SELECT** each model, reset that memory, then go **SELECT** the next memory, etc.

Note that when you **COPY** one model memory into another or change the model's type, you need not delete all existing data first by using this function. **COPY** completely overwrites anything in the existing model memory, including **MODEL NAME**. The **MODEL TYPE** function overwrites all data except name and **RX MODUL**.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Reset model memory 1. *NOTE: This is one of several functions for which the radio requires confirmation to make a change.*	Confirm you are currently using the proper model memory. (Ex: 1)	On home screen, check model name and number on top left. If it is not correct, use **MODEL SELECT**.
	Open the menu, then open **MODEL SELECT** submenu.	⊕ for 1 second. ◈ if required to **MODEL SELECT**. ◌
	Go to **MODEL RESET** and reset the memory.	◈ to **RESET**. ◌ for 1 second.
	Confirm the change.	**Sure?** displays. ◌ *
	Close.	(END) (END)
Where next?	Now that the memory is reset, name has returned to the default (Ex: **MODEL-0001**). **NAME** the model: p. 29. **COPY** a different model into this memory: p. 27. **SELECT** a different model to edit or delete: p. 27. Change the **MODEL TYPE** to airplane or helicopter: see p. 30. Change the receiver modulation [**SFHSS** or **FHSS**]: see p. 31. Utilize servo **REVERSE**: see p. 35. Adjust servo travel with **END POINT**: see p. 36. Set up dual/triple rates and exponential (**D/R,EXP**): see p. 39.	

*Radio will show a "complete" and it shows that the reset was completed. Note that if the power switch is turned off prior to completion, the data will not be reset.

MODEL NAME/USER NAME:

MODEL NAME assigns a name to the current model memory. By giving each model a name that is immediately recognizable, you can quickly select the correct model, and minimize the chance of flying the wrong model memory which could lead to a crash.

USER NAME assigns your transmitter's name which is displayed in the home screen.

```
MDL-NAME    RESET
            0123456789
(MDL NAME)  ABCDEFGHIJ
MODEL-0001  KLMNOPQRST
            UVWXYZ
(USR NAME)  abcdefghij
F:[ie>,▼+%  klmnopqrst
            uvwxyz
```

Adjustability and values:
• Up to 10 characters long.
• Each character may be a letter, number, blank, or a symbol.
• **MODEL NAME:** The default names assigned by the factory are in MODEL-xxxx format (**MODEL-0001** for first model memory, etc.)
• **USER NAME:** The default name assigned by the factory is the "Futaba" logo.

NOTE: When you **COPY** one model memory over another, **everything** is copied, including the model's name. Similarly, if you change **MODEL TYPE** or do a **MODEL RESET**, the entire memory is reset, including **MODEL NAME**. So the first thing you will want to do after you **COPY** a model, change its type, or start from scratch, is rename the new copy to avoid confusion.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Name model 3 "Cap-232_" (where the underline represents a blank space.)	Open **MODEL NAME** submenu.	⊕ for 1 second. ◇ to **MODEL NAME**. ◎
	Change the first character. (Ex: M to C)	◇ to **C**. ◎
	Change the next character. (Ex: O to a)	◇ to **a**. ◎ (note: lower case is available)
	Repeat the prior steps to complete naming the model.	Repeat.
	Close.	(END) (END)
Where next?	Change the **MODEL TYPE** to airplane or helicopter: see p. 30. Change modulation [**SFHSS** or **FHSS**]: see p. 31. Utilize servo **REVERSE**: see p. 35. Adjust servo travel with **END POINT**: see p. 36. Set up dual/triple rates and exponential (**D/R,EXP**): see p. 39.	

GOAL of EXAMPLE:	STEPS:	INPUTS:
Name **USER NAME** "Futaba".	Open **MODEL NAME** submenu.	⊕ for 1 second. ◇ to **MODEL NAME**. ◎
	Go to **USER NAME** and select the first character. (Ex: to F)	⊕ to the first character of **USER NAME**.
	Change the first character. (Ex: _ to F)	◇ to **F**. ◎
	Change the next character. (Ex: _ to u)	◇ to **U**. ◎ (note: lower case is available)
	Repeat the prior steps to complete naming the system.	Repeat.
	Close.	(END) (END)

*User name is not shown on the home/main screen. But can be done by setting under the Parameter Function on p. 33.

PARAMETER *submenu:* sets those parameters you would likely set once, and then not disturb again.

Once you have selected the correct model you wish to work with, the next step is setting up the proper parameters for this specific model:

```
PARAMETER      (1/3)

  RESET▶ Execute   ✈
   TYPE▶ ACROBATIC


     RX▶ S-FHSS
    ATL▶ ON
```
(ACRO)

```
PARAMETER      (1/3)

  RESET▶ Execute   ✈
   TYPE▶ HELICOPTER
 SWASH▶ H-1      Pure

     RX▶ S-FHSS
    ATL▶ ON        (1/2/6)
```
(HELI)

• What is the model's type?
• What type is the receiver's modulation [**SFHSS** or **FHSS**]?
• Does the model have a normal throttle on channel 3 or do you need full range trim on channel 3 (**ATL**)?

First it is important to clear out any old settings in the memory from prior use, using the **MODEL RESET**: see p. 28.

MODEL TYPE: sets the type of programming used for this model.

The T8J has 20 model memories, which can each support:
• one powered aircraft (**ACRO**) memory type (with multiple wing and tail configurations. See twin aileron servos, twin elevator servos, **ELEVON**, and **V-TAIL** for further information.)
• eight helicopter swashplate types, including CCPM. See Helicopter **MODEL TYPE** for details, p. 30.

Before doing anything else to set up your aircraft, first you must decide which **MODEL TYPE** best fits this particular aircraft. (Each model memory may be set to a different model type.) If your transmitter is a T8JA, the default is **ACRO**. If it is a T8JH, the default is **HELI(H1)**.

ACRO is the best choice for most powered airplanes:
> •**ACRO** adds:
>> •**SNAP-ROLL**
>> •**AILEVATOR** (twin elevator servo support)
>> •For fuel-powered airplanes: **IDLE-DOWN**, **THR-CUT**, **THROTTLE-NEEDLE** mixing and **THROTTLE DELAY** programming.

If you are using a heli **MODEL TYPE***, please go to that chapter now to select the proper model type and support your model setup. Note that changing* **MODEL TYPE** *resets all data for the model memory, including its name.*

GOAL of EXAMPLE:	STEPS:	INPUTS:
Select the proper **MODEL TYPE** for your model. Ex: **ACRO**.	Open the menu, then open the **PARAMETER** submenu.	⊕ for 1 second. ◈ to **PARAMETER**. ◎
[NOTE: This is one of several functions that requires confirmation to make a change. Only critical changes require additional keystrokes to accept the change.]	Go to **MODEL TYPE**.	◎ to **TYPE**.
	Select proper **MODEL TYPE**. Ex: **ACRO**. *Confirm the change.* *Close.*	⊕or⊖ to **ACROBATIC**. ◎ for 1 second. **Sure?** displays. ◎ to confirm. (END) (END)

Receiver modulation select (**RX**): sets the type of modulation transmitted.

The modulation of your receiver will determine whether you utilize **SFHSS** or **FHSS** setting in **RX** during transmission. Note that you have to turn your transmitter off and back on before a modulation change becomes effective. Be sure you understand and set the FailSafe (**F/S**) settings as you intended (see p. 48).

SFHSS/**FHSS** = FHSS-2.4GHz system (**SFHSS** mode/**FHSS** mode)

```
PARAMETER      (1/3)
RESET▶ Execute  ⊥
  TYPE▶ ACROBATIC

    RX▶ S-FHSS
   ATL▶ ON
```
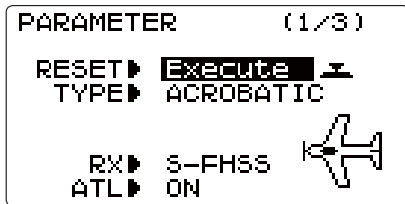
Adjustability:
• **SFHSS** setting for all Futaba SFHSS-2.4G mode receivers, regardless of number of channels.
• **FHSS** setting for all Futaba FHSS-2.4G mode receivers, regardless of number of channels.

NOTE: When you change models in **MODEL SELECT**, if the new model is set to the other modulation type, you must cycle the transmitter power to change modulations. The modulation will flash on the home screen to remind you until you do so. See p. 27, **MODEL SELECT**, for details.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Change model 1 from **SFHSS** to **FHSS**.	Confirm you are currently using the proper model memory (Ex: 1)	On home screen, check model name and number on top left and the modulation on top right. If it is not the correct model, use **MODEL SELECT**, p. 27.
	Open the menu, then open **PARAMETER** submenu.	⊕ for 1 second. ◆ to **PARAMETER**.
	Go to **RX** and change setting.	◆ to **RX**. ⊕or⊖ to **FHSS**. *cycle power flashes on screen.*
	Cycle power.	Cycle power.
Where next?	Now that the model is in the proper modulation, the T8J should communicate with the receiver. If it does not, confirm the type of the receiver. Change **MODEL TYPE** to airplane/helicopter: see p. 30. Set **F/S** settings for when **2.4G** receiver sees interference: see p. 48. Utilize servo **REVERSE**: see p. 35. Adjust servo travel with **END POINT**: see p. 36. Set up dual/triple rates and exponential (**D/R**,**EXP**): see p. 39.	

Adjustable travel limit (**ATL**): makes the channel 3 *TRIM LEVER* (*THROTTLE TRIM*) effective only at low throttle, disabling the trim at high throttle. This prevents pushrod jamming due to idling trim changes. This function defaults to **ON**. If you are not using channel 3 for throttle, you may want trim operation the same as on all other channels. To do so, set **ATL** to **OFF**. If you need the **ATL** to be effective at the top of the stick instead of the bottom, reverse the **THR-REV** setting. Note that this affects all models in the radio, not just the model you are currently editing. **THR-REV**, see p. 92.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Change **ATL** from **ON** to **OFF** for battling robots, tanks, airbrakes and other channel 3 uses.	Open the menu, then open **PARAMETER** submenu.	⊕ for 1 second. ◇ to **PARAMETER**. ◌
	Go to **ATL** and Change. (Ex: to **OFF**)	◇ to **ATL**. ⊕or⊖ to **OFF**.
	Close.	(END) (END)
Where next?	Set up **ELEVON** for tank-style control, throttle/steering on one STICK: see p. 53. Set up **IDLE-DOWN** and **THR-CUT** to adjust channel 3 servo at low-stick: see p. 37. Reassign auxiliary channels 5-8 (ex: from dial to switch/slider): see p. 43. Utilize servo **REVERSE**: see p. 35. Adjust servo travel with **END POINT**: see p. 36. Set up dual/triple rates and exponential(**D/R**,**EXP**): see p. 39.	

LCD screen adjustment (**CONTRAST/BACK-LIT/LIT-TIME/LIT-ADJS**):

```
PARAMETER      (2/3)

CONTRAST▶  ▇ 0
BACK-LIT▶  KEY-ON
LIT-TIME▶   10
LIT-ADJS▶   15

HOME-DSP▶  Futaba
```
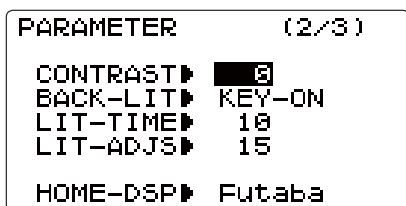
Adjustability:
The following LCD screen adjustments are possible.
• Contrast adjustment
• Backlighting mode
• Backlighting time
• Backlighting brightness adjustment

GOAL of EXAMPLE:	STEPS:	INPUTS:
Change **CONTRAST** from **0** to **+2**.	Open the menu, then open **PARAMETER** submenu.	⊕ for 1 second. ◇ to **PARAMETER**. ◌
	Go to **CONTRAST** and change setting. (Ex: **+2**)	◇ to **CONTRAST**. ⊕or⊖ to **+2**.
	Close.	(END) (END)

Home screen display mode selection (**HOME-DSP**): selects the display item in the home screen.

```
PARAMETER      (2/3)

CONTRAST▶    0
BACK-LIT▶  KEY-ON
LIT-TIME▶    10
LIT-ADJS▶    15

HOME-DSP▶  Futaba
```

```
11:MODEL-0011  🖥 📶
┌ST1:  0:00.0│SFHSS
│ST2:10:00.0│ 6.0v
│MDL 0:26
│SYS 2:02 Futaba T8J
│·0    ·0      120◀    0·
```
USER NAME mode

```
11:MODEL-0011  🖥 📶
┌ST1:  0:00.0│SFHSS
│ST2:10:00.0│ 6.0v
│MDL 0:26    DT5▶+  20%
│SYS 2:02    DT6▶−  36%
│·0    ·0      120◀    0·
```
DT5/DT6 mode
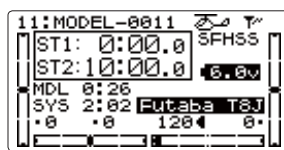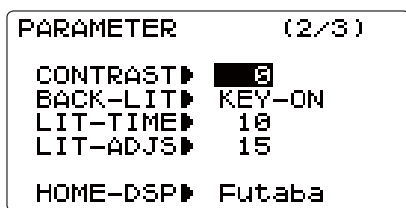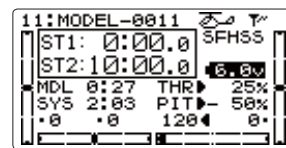
```
11:MODEL-0011  🖥 📶
┌ST1:  0:00.0│SFHSS
│ST2:10:00.0│ 6.0v
│MDL 0:27    THR▶   25%
│SYS 2:03    PIT▶−  50%
│·0    ·0      120◀    0·
```
THR/PIT mode

USER NAME: displays **USER NAME** in the home screen. (default)
The default **USER NAME** assigned by the factory is the "Futaba" logo: see p. 29.
DT5/DT6: displays the current DT5 and DT6 position in the home screen.
THR/PIT: displays the current throttle and pitch position in the home screen. (**HELI** only)

GOAL of EXAMPLE:	STEPS:	INPUTS:
Change the display mode from **USER NAME** to **THR/PIT**.	Open the menu, then open **PARAMETER** submenu.	⊕ for 1 second. ◈ to **PARAMETER**. ◉
	Go to **HOME-DSP** and change setting. (Ex: **THR/PIT**)	◈ to **HOME-DSP**. ⊕or⊖ to **THR/PIT**.
	Close.	(END) (END)

Transmitter battery type (**BATT TYP**), *LED adjustment* (**MAIN-LED/JOG-LED**):

```
PARAMETER      (3/3)

BATT TYP▶  4CELL
BUZ-TONE▶    92
MAIN-LED▶  BLUE
JOG-NAVI▶  ON
JOG-LIT ▶  KEY-ON
JOG-TIME▶    10
```
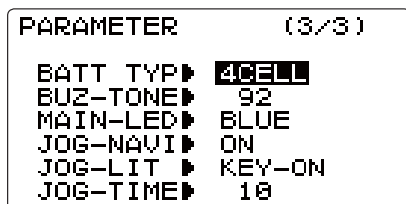
Adjustability:
The following transmitter adjustments are possible.
• Transmitter battery type setting
• Buzzer tone type setting(1:low   100:high)
• Power/RF LED display color selection (OFF, 7 colors)
• Jog key LED display mode selection

BATT TYPE: chooses the battery type (**5CELL**/**4CELL**). The T8J transmitter offers a programmable low voltage alarm that warns modelers when the transmitter voltage drops. If you are flying when this alarm sounds, please land as quickly and safely as possible to avoid any potential difficulties. **5CELL**: NiMH 5 cells or LiFe 2 cells, **4CELL**: Dry 4 cells
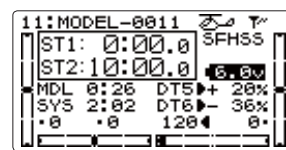Always set the battery type matched to the power source used. Especially, when using a Futaba rechargeable type battery (NiMH 5 cells or LiFe 2 cells), always set the battery type to "5CELL". If the T8J is used at "4CELL" setting, the time from low battery alarm to stopping of the system will become extremely short.
BUZ-TONE: chooses the Buzzer tone (1:low   100:high).
MAIN-LED: chooses the LED display color (BLUE/RED/PURPLE/GREEN/LIT-BLUE/YELLOW/WHITE/OFF).
JOG-NAVI: ON: The first blink shows the direction which jog-key can operate.
JOG-LIT: KEY-ON: The light on immediately after jog-key operation. ALWAYS:The light is always switched on. or OFF.
JOG-TIME: KEY-ON: Jog LED Lighting time.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Change **BATT TYPE** from **4CELL** to **5CELL**.	Open the menu, then open **PARAMETER** submenu.	⊕ for 1 second. ◇ to **PARAMETER**. ◎
	Go to **BATT TYPE** and change setting. (Ex: **5CELL**)	◇ to **BATT TYPE**. ⊕or⊖ to **5CELL**.
	Close.	(END) (END)

Model data transmission (**MDL-TRANS**): Transmission of model data is possible with T8J transmitters. Data transfer is performed on radio.

The present model is **MDL-TRANS** with each transmitter. As for a receiving side, the present model data is rewritten.

*T8J does not carry out normal operation during data transfer.

```
MDL-TRANS

    MODE ▶ TRANSFER

       ▶ Execute

No: 1  MODEL-0001 ➔➔➔➔
```

❗ **Always check servo direction prior to every flight as an additional precaution to confirm proper model date, hook ups, and radio function.**

NOTE: MDL-TRANS between two T8J radios should be performed within a 2-meter range.

GOAL of EXAMPLE:	STEPS:	INPUTS:
MDL-TRANS is performed.	Open **MDL-TRANS** function.	⊕ for 1 second. ◇ to **MDL-TRANS**. ◎
	The transmitting side is turned on.	⊕ Select **TRANSFER** or **RECEIVE**.
	Data is transmitted.	◇ to **Execute**. ◎ for 1 second .
	Data Trans is for 10 seconds.	T8J of a receiving side is set to **RECEIVE**, and the same procedure is followed. The completion of transmission **"Complete"** Transmission failure **"Failure"**
	Close.	(END) (END)
Where next?	**SELECT** a different model to edit or delete: p. 27. **NAME** the model: p. 29.	

MDL-TRANS

The direction of an antenna

Less than 2 meters

The direction of an antenna

[T8J of the transmits side]
1. The data of a model to send is called by MDL-SEL.
2. MODE of MDL-TRANS is set to "TRANSFER".
3. "Execute".

[T8J of the receives side]
*It receives for 10 seconds.
1. The clear model is called by MDL-SEL.
2. MODE of MDL-TRANS is set to "RECEIVE".
3. "Execute".
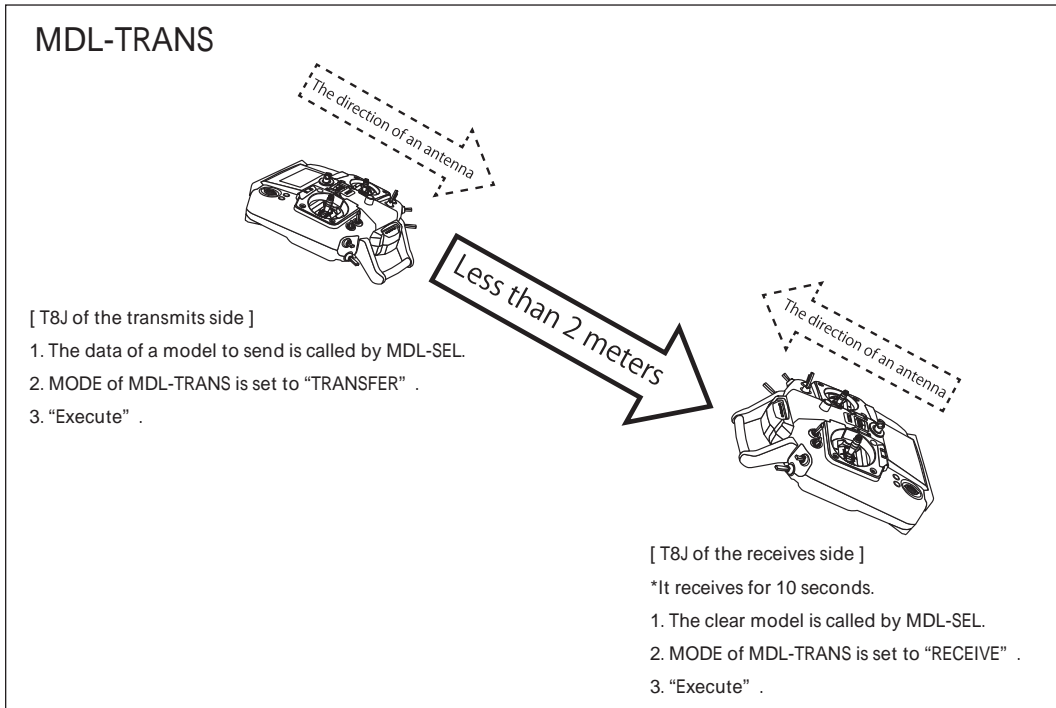
Servo reversing (**REVERSE**): changes the direction an individual servo responds to a *CONTROL STICK* motion.

For CCPM helicopters, be sure to read the section on **SWASH AFR** (p. 75) before reversing any servos.

With the exception of CCPM helicopters, always complete your servo reversing prior to any other programming.

When using **ACRO** functions that control multiple servos, such as **FLAPERON** or **V-TAIL**, it may be confusing to determine

whether the servo needs to be reversed or a setting in the function needs to be reversed. Refer to the instructions for each specialized function for further details.

❗ **Always check servo direction prior to every flight as an additional precaution to confirm proper model memory, hook ups, and radio function.**

NOTE: THR-REV is a special function that reverses the entire throttle control, including moving the trim functionality to the Stick's upper half. To use **THR-REV**: see p.92. This change affects all models in the radio.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Reverse the direction of the elevator servo.	Open **REVERSE** function.	⊕ for 1 second.
		to **REVERSE**.
	Choose proper channel and set direction. (Ex: **ELE REV**)	to **ELE**.
		for 1 second.
	Confirm your change.	**Sure?** displays.
	Close.	(END) (END)
Where next?	Adjust servo travel with **END POINT**: see p. 36. Set up dual/triple rates and exponential(**D/R**,**EXP**): see p. 39. Set up flight timers: see p. 42. Set up trainer functions: see p. 44.	

End Point of servo travel adjustment (**END POINT**): the most flexible version of travel adjustment available. It independently adjusts each end of each individual servo's travel, rather than one setting for the servo that affects both directions. Again, for CCPM helicopters, be sure to see **SWASH AFR** (see p. 75) prior to adjusting end points.

```
END        →1:AIL 100 ⁄100
  POINT      2:ELE 100 ⁄100
             3:THR 100 ⁄100
CH1:AIL      4:RUD 100 ⁄100
   ←    →    5:GER 100 ⁄100
 100  100    6:FLP 100 ⁄100
             7:AU1 100 ⁄100
             8:AU2 100 ⁄100
```

Adjustability:
• Can set each direction independently.
• Ranges from 0% (no servo movement at all) to 140%. At a 100% setting, the throw of the servo is approximately 40° for channels 1-4 and approximately 55° for channels 5-8.
• Reducing the percentage settings reduces the total servo throw in that direction.

Examples:
• Adjust the throttle high end to avoid binding at the carburetor, and low end to allow for proper carburetor closure.
• Adjust flap so up travel is only sufficient for straight and level flight trimming, with full down travel.
• **END POINT** may be adjusted to 0 to keep a servo from moving one direction, such as flaps not intended to also operate as spoilers.
• Retract servos are not proportional. Changing **END POINT** will not adjust the servo.

END POINT adjusts only the individual servo. It will have no effect on any other servo that is operated in conjunction with this servo via mix or preset programming such as **FLAPERON**, **AILEVATOR**, etc. This is so that each individual servo can be carefully fine-tuned to avoid binding and other conflicts. To adjust the total travel of a function such as **FLAPERON**, make the adjustments in that function's controls. For CCPM helicopters, adjust the total travel of the function, such as collective pitch, in **SWASH AFR**.

Adjust the linkage or the **END POINT**? It is nearly always best to adjust your linkages to get as close as possible prior to utilizing **END POINT**. The higher the **END POINT** setting, the better position accuracy and the more servo power available at nearly any position (except if using digital servos). Higher **END POINT** values also mean longer travel time to reach the desired position, as you are utilizing more of the servo's total travel. (For example, using 50% **END POINT** would give you only half the steps of servo travel, meaning every click of trim has twice the effect and the servo gets there in half the time).
• end point (and moving the linkage) = torque, accuracy, but transit time to get there.
• end point (instead of adjusting linkages) = travel time, but torque, accuracy.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Decrease the flap servo throw in the upward direction to 5% to allow trimming of level flight only and down travel to 85% to prevent binding.	Open **END POINT** function.	⊕ for 1 second. ⬦ to **END POINT**. ◌
	Choose proper channel and move stick or knob in direction you want to adjust and set servo throw. (Ex: flap up 5%, flap down 85%)	⬦ to **FLP**. ◎ flap control [default is *VR*]. ⊕or⊖ to **5%**.* ◎ *VR*. ⊕or⊖ to **85%**.*
	Close.	(END) (END)
Where next?	Go to **SERVO** display to confirm the desired end result: see p. 47. Set up **IDLE-DOWN** and **THR-CUT** to slow/cut the engine: see p. 37. Set up dual/triple rates and exponential(**D/R,EXP**): see p. 39. Set up flight timers: see p. 42. Set up trainer functions: see p. 44. Set up twin aileron servos: see p. 52. Set up twin elevator servos: see p. 54.	

*You can reset to the initial values by pressing the "+" and "-" keys for one second simultaneously.

Engine idle management: **IDLE-DOWN** and **THR-CUT**: functions which work with the digital *THROTTLE TRIM* to provide a simple, consistent means of engine operation. No more fussing with getting trim in just the right spot for landings or takeoffs! For additional engine adjustments, see **THROTTLE-NEEDLE** (p. 62) and **THROTTLE DELAY** (p. 63).

IDLE-DOWN (**ACRO** only): lowers the engine idle for: sitting on the runway prior to take off, stalls and spins, and landings. The normal idle setting is a little higher for easier starts and safe flights with less risk of dead sticks.

```
IDLE DOWN

 MIX ▶INH

 RATE▶  0%

 SW  ▶SwC
 POSI▶C&DN
```
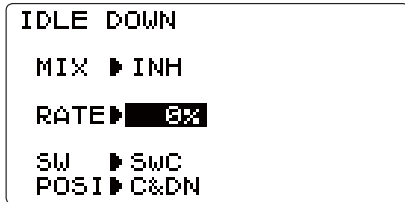
Important note: The **IDLE-DOWN** function is not normally used when starting the engine, and its accidental operation may keep your engine from starting. The 8J warns that **IDLE-DOWN** is on when the transmitter is turned on. Be sure to turn off the function, or override the warning by pressing the "+" and "-" keys for one second simultaneously.

This may be assigned to any switch/position. Some modelers accidentally assign **IDLE-DOWN** to one side of a switch and **THR-CUT** to the other. There is no "normal" setting to start the engine. By default **IDLE-DOWN** is set to *SWITCH C* center and down. This works well with **THR-CUT** also on *SWITCH C* down. The SWITCH up is normal flight/starting, center for slower maneuvers/landing, and down to cut the engine. If you assign **IDLE-DOWN** or **THR-CUT** to the spring-loaded **TRAINER** *SWITCH F* (8JA) or *H* (8JH), then use the trainer function, you may risk loss of throttle control or deadstick for your student.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Decrease the throttle setting to idle with the flip of a switch for spins and landings.	Open **IDLE-DOWN** function.	⊕ for 1 second.
		⬦ to **IDLE-DOWN**.
	Activate the function.	⬦ to **MIX**. ⊕or⊖ to **OFF**.
	With *THROTTLE STICK* at idle, adjust the rate until engine idles as desired.*	🎚 *THROTTLE STICK*.
		⬦ to **RATE**. ⊕or⊖ until engine idles as desired.
	Optional: change switch assignment. Choose desired switch and position.	⬦ to **SW**. ⊕or⊖ to desired *SWITCH*.
		⬦ to **POSI**. ⊕or⊖ to desired position.
	Close.	(END) (END)
Where next?	**THR-CUT**: see p. 38.	

*Normally a value of 10- 20%. Secure the fuselage, engine running. Set the *THROTTLE STICK* to idle. Adjust the **IDLE-DOWN** rate while flipping the switch ON and OFF until the desired idle is achieved. Be sure to throttle up periodically to allow the engine to "clean out" and idle reliably.

Throttle cut (**THR-CUT**): provides an easy way to stop the engine by flipping a switch (with *THROTTLE STICK* at idle). The movement is largest at idle and disappears at high throttle to avoid accidental dead sticks. In **HELI**, there is an additional setting, **THR-HOLD**. See p. 78.

```
THR.CUT

 MODE▶NOR
 MIX ▶INH
 RATE▶   0%

 SW  ▶SwA
 POSI▶NULL
```

The switch's location and direction must be chosen. It defaults to **NULL** to avoid accidentally assigning it to a switch, which might result in an unintentional dead stick in flight. Please see: **IDLE-DOWN** and **THR-CUT** on p. 37.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Decrease the throttle setting (at idle) to stop the engine with the flip of a switch. (Note that you MUST assign a switch. The default is **NULL**. We recommend *SWITCH C* in the down position, with **IDLE-DOWN** programmed to *SWITCH C* in the center and down positions.)	Open **THR-CUT** function.	⊕ for 1 second. ◈ to **THR-CUT**. ◌
	Activate the function. Choose desired switch, and the position which activates the function.	◈ to **MIX**. ⊕or⊖ to **OFF**. ◈ to **SW**. ⊕or⊖ to **SwC**. ◈ to **POSI**. ⊕or⊖ to **DOWN**.
	With *THROTTLE STICK* at idle, adjust the rate until the engine consistently shuts off but throttle linkage is not binding.*	⌐ *SwC* to down position. ⊚ *THROTTLE STICK*. ◈ to **RATE**. ⊕or⊖ until shuts off.
	Close.	(END) (END)
Where next?	Set up dual/triple rates and exponential (**D/R**,**EXP**): see p. 39. Set up **TRAINER** functions: see p. 44. Set up twin aileron servos: see p. 52. Set up twin elevator servos: see p. 54.	

*Normally, a setting of 10-20% is sufficient. Viewing the carburetor barrel until it fully closes is adequate to get an approximate setting; then test with engine running to confirm.

Throttle cut in the case of ESC use (**THR-CUT**): Sudden rotation may be carried out when releasing it using **THR-CHT** in the case of a motor. A setup of which a function is not canceled unless a throttle stick becomes a slow position, even if it releases.

```
THR.CUT

 MODE▶ESC
 MIX ▶OFF
 RATE▶  0%
 THR ▶ 15% (  0%)
 SW  ▶SwA
 POSI▶NULL
```

MODE is changed **ESC** from **NOR**.

GOAL of EXAMPLE:	STEPS:	INPUTS:
MODE is changed **ESC** from **NOR**. THR position released is made 0%.	Open **THR-CUT** function.	⊕ for 1 second. ◈ to **THR-CUT**. ◌
	MODE is changed **ESC** from **NOR**.	◈ to **MODE**. ⊕or⊖ to **ESC**.
	THR position released is made 0%.	◈ to **THR**. ⊚ *THROTTLE STICK*. ◌ for 1 second.
	Close.	(END) (END)

38

Dual/triple rates and exponential (**D/R**,**EXP**): assigns adjusted rates and exponential.

```
D/R,EXPO
CH▶ 1 2 3 4
    (SW:UP )
D/R←▶  100%
  →▶  100%
EXP←▶    0%
  →▶    0%
SW   ▶  SwD
```
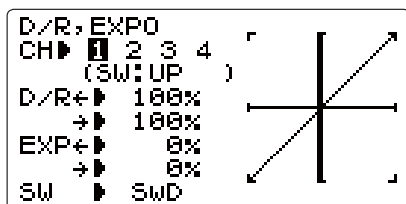
Dual/Triple Rates: reduce/increase the servo travel by flipping a switch. Dual rates affect the control listed, such as aileron, not just a single (ex: channel 1) servo. For example, adjusting aileron dual rate will affect both aileron servos when using **FLAPERON** or **AIL-DIF**, and both aileron and elevator servos' travel when using **AILEVATOR** or **ELEVON** or a CCPM helicopter.

Activation:
• Any ***SWITCH, A-H***. If you choose a 3-position switch, then that dual rate instantly becomes a triple rate (see example).

Adjustability:
• Range: 0 - 140% (0% would deactivate the control completely.) Initial value = 100%
• Adjustable for each direction (**ACRO**). (ie. Up/down, left/right) (Ex: Most models fly upright without any elevator trim, but require some down elevator when inverted just to maintain level flight. By increasing the down travel by the amount required to hold the model inverted, the model now has equal travel available from level upright or level inverted.)

Exponential: changes the response curve of the servos relative to the stick position to make flying more pleasant. You can make the servo movement less or more sensitive around neutral for rudder, aileron, elevator, and throttle (except **HELI** type - use **THROTTLE CURVE** instead). (**ACRO** type—throttle **EXP** and **THROTTLE CURVE** cannot be activated simultaneously). Why use expo? Many models require a large amount of travel to perform their best tricks. However, without exponential, they are "touchy" around neutral, making them unpleasant to fly and making small corrections very difficult. Additionally, by setting different exponentials for each rate, you can make the effectiveness of small corrections similar in each rate, as in our example below.

The best way to understand exponential is to try it:
• Having made no changes yet in the **D/R**,**EXP** screen, move ***SWITCH A*** to "down" (toward the ***THROTTLE/RUDDER STICK***).
• Cursor down to **EXP** and dial to -40%. Also need to move the stick controls to highlight the sides you want to set.
• Move ***SWITCH D*** up. Hold the ***RUDDER STICK*** at 1/4 stick and move ***SWITCH D*** down.
• Notice how much less travel there is.
• Go to 3/4 stick and repeat. Notice how the travel is much closer, if not identical.

Adjustability:
• More sensitivity around neutral. (positive exponential, see example)
• Less sensitivity around neutral. (negative exponential, see example)
• Adjustable for each direction. (**ACRO**)

For throttle, exponential is applied at the low end to help nitro and gasoline engines have a linear throttle response, so that 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 for each side of the servo's travel per switch position. Additionally, setting the **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 screen setting, allowing dual rates to be assigned with idle-up and other features on certain switches, and does not require putting the model in that condition to make modifications.

Special note for conditions: The helicopter programming 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 conditions, for a total of FIVE rates available.
Simply change the switch choice to **Cond** and then:
(HELI) press the ***JOG KEY*** to toggle through the 5 conditions while setting the rates.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up dual rates and exponential in a **HELI** model.	Open **D/R**,**EXP**.	⊕ for 1 second. ◄◊► to **D/R**,**EXP**. ◊
	Choose channel.	◄◊► to desired channel.
	Choose first switch position.	◄◊► to **No**. ⊕or⊖ to **UP**.
	Set rate and exponential (Ex: high rate = 95%, 0% exponential.)	◄◊► to **D/R**. ⊕or⊖ to **95%**. Confirm **0% EXP**.
	Go to 2nd switch position and set rate and exponential.	◄◊► to **No**. ⊕or⊖ to **DN**. Repeat above.
	Optional: if using a 3 position switch, set 3rd rate.	◄◊► to **No**. ⊕or⊖ to **CT**. Repeat above.
	Optional: assign dual rates to have one for each condition.	◄◊► to **SW**. ⊕or⊖ to **COND**. Repeat steps above to adjust for each condition.

EXP Examples:
• It is an example of a common airplane.
AIL: -30% ELE: -20% RUD: -20%
It may be better for a quick operation acrobatic-maneuver airplane to subtract greatly more.
Probably, 0% may be sufficient as a helicopter.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up aileron triple rates on *SWITCH C* with travel settings of 75% (normal), 25% (slow roll) and 140% (extreme aerobatics) and exponential settings of 0%, +15%, and -40% respectively in an **ACRO** model.	Open **D/R**,**EXP** function.	⊕ for 1 second. ◈ to **D/R**,**EXP**. ◉
	Choose the channel to change (Ex: aileron is already selected)	◈ to desired channel.
	Optional: change switch assignment.	◈ to **SW**. ⊕or⊖ to **SwC**.
NOTE: This normal rate has no exponential so it has a very linear, normal feel. This slow roll rate has positive exponential (the opposite of what most people normally use), which makes the servos more responsive around center. This makes the servos feel the same around center in the normal and low rates, but still gives a very slow roll rate at full stick.	Confirm switch is in desired position and set rate. (Ex: up = high rate, 75%).	◈ to **D/R**. ⤴ *C* to up position. ◉ *AILERON STICK*. ⊕or⊖ to 75%. ◉ *AILERON STICK*. ⊕or⊖ to 75%.
	Move *SWITCH* to 2nd rate position and set this particular rate. (Ex: center = low rate, 25%).	◉ *C* to center position. ◉ *AILERON STICK*. ⊕or⊖ to 25%. ◉ *AILERON STICK*. ⊕or⊖ to 25%.
The 3D rate (extreme aerobatics) has a very high distance of travel nearly twice that of the normal rate. Therefore, using a very high negative exponential setting softens how the servos respond around center stick. This makes the servos respond similarly around center stick for a more comfortable feel.	*Optional: if using a 3 position SWITCH, move SWITCH to 3rd position and set this rate (Ex: down = 3D rate, 140%).*	⤵ *C* to down position. ◉ *AILERON STICK*. ⊕or⊖ to 140%. ◉ *AILERON STICK*. ⊕or⊖ to 140%.
Many modelers like to set up all 3 triple rates on a single 3-position switch, creating a "slow and pretty mode", a "normal mode", and a "wild stunts mode" all with the flip of a single switch. To do so, simply set up rates for all 3 controls and assign all 3 to the same 3-position switch.	Set each rate's **EXP**. (Ex: 0%, +15%, -40%)	◈ to **EXP**. ⤴ *C* to up position. Confirm **EXP** reads 0. ⤵ *C* to down position. ◉ *AILERON STICK*. ⊕or⊖ to +15%. ◉ *AILERON STICK*. ⊕or⊖ to + 15%. ◉ *C* to center position. repeat to set low rate expo to -40%.
	Repeat above steps for elevator and rudder.	
	Close.	(END) (END)
Where next?		

TIMER *submenu* (stopwatch functions): controls two electronic clocks. For example, these clocks may be used to keep track of time remaining in a competition, flying time on a tank of fuel, and/or amount of time on a battery, etc.

```
TIMER<TMR1>  <TMR2>
       0:00.0 10:00.0
TIME ▶10:00  ▶10:00
MODE ▶UP     ▶DOWN
ON-SW▶SwA    ▶SwA
     ▶NULL   ▶NULL
RS-SW▶SwA    ▶SwA
     ▶NULL   ▶NULL
```

TIMER<1> →
TIMER<2> →

```
01:MODEL-0001
ST1: 0:00.0   SFHSS
ST2:10:00.0   6.0v
MDL 0:00
SYS 0:00  Futaba
 0    0     0    0
```

(Home screen)
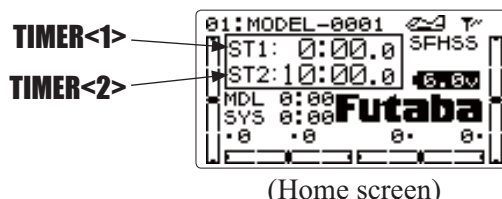
Adjustability:
• Count down timer: starts from the chosen time, displays time remaining. If the time is exceeded, it continues to count below 0.
• Count up timer: starts at 0 and displays the elapsed time up to 99 minutes 59 seconds.
• Count down timer (Stop type): starts from the chosen time, displays time remaining, and stops at 0.
• Independent to each model, and automatically updates with model change.
• In either **TIMER** mode, the timer beeps once each minute. During the last twenty seconds, there's a beep each two seconds. During the last ten seconds, there's 2 beeps each second. A long tone is emitted when the time selected is reached. (UP/DOWN **TIMER**)
• To Reset, choose the desired timer with *JOG* key (while at the startup screen), then press and hold *JOG* key for 1 second.
• Activation by either direction of *SWITCH A-H*, by *THROTTLE STICK* (**ST-THR**) (Using the *THROTTLE STICK* is convenient if you are keeping track of fuel remaining, or for an electric, how much battery is left), by the power SWITCH (**PWR-SW**).
• Also the reset switch can be assigned (*SWITCH A-H*)

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set timer 2 to count down 4-1/2minutes, being controlled by *THROTTLE STICK* position. This is utilized to keep track of actual throttle on time to better correlate with fuel/battery usage.	Open **TIMER** function.	⊕ for 1 second. ◇ to **TIMER**. ◯
	Go to **<TMR2>**.	◇ to **10** (**<TMR2>**).
	Adjust time to 4 min. 30 sec., count down.	⊖ to **4**. ◇ to **00** (**<TMR2>**). ⊕ to 30.
	Assign to *THROTTLE STICK* and set trigger point.	◇ to **ON-SW** (**<TMR2>**). ⊕or⊖ to **ST-THR**. ◇ to **NULL**. ⊖ to .(↓ is slow and is the timer ON.) ⊙ *THROTTLE STICK* to desired position (Ex: 1/4 stick). ◯ for 1 second to set.
	Close.	(END) (END)
Where next?	Adjust **END POINTS** after first flight test: see p. 36. Adjust auxiliary channel assignments (ex: move flaps to a switch): see p. 43. Set up **TRAINER** functions: see p. 44.	

Auxiliary channel function (**AUX-CH**): defines the relationship between the transmitter controls and the receiver output for channels 5-8.

```
AUX-CHAN

CH5▶ SWG
CH6▶ VR    (FLAP-TRM)
CH7▶ DT5
CH8▶ DT6
```

Adjustability:
• Channels 5-8 may be assigned to any *SWITCH (A-H)*, *TRIM LEVER (DT5 and DT6)*, or *KNOB* [*VR*].
• Multiple channels may be assigned to the same switch, trim or knob.
• Channels set to "NULL" are only controlled by mixes. (Ex: utilizing 2 channels for 2 rudder servos.)
• If **GYRO SENSE**, **GOVERNOR**, and **THR-NEEDLE** functions are activated, **AUX-CH** settings of related channels become invalid automatically.
    Related channels:
    GYRO SENSE (**ACRO/HELI**): ch. 5, 7, or 8: see p. 64 and p. 87
    GOVERNOR (**HELI**): ch. 7, or ch. 7 and 8: see p. 89.
    THR-NEEDLE (**ACRO/HELI**): ch. 8: see p. 62.

⚠ Remember that if you assign primary control of a channel to a switch which you later use for other functions (like dual/triple rates or airbrakes), every time you use that other function you will also be moving the auxiliary channel.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Assign flaps to the digital trim [*DT5*] and set channel 7 to **NULL** in preparation to use it as a smoke system control (the smoke system being activated later by a throttle-to-ch.-7 mix).	Open **AUX-CH** function.	⊕ for 1 second. ◇ to **AUX-CH**.
	Choose the channel to change. (ex: ch. 6.)	◇ to **Ch 6**.
	Change primary control. (ex: to digital trim [*DT5*].)	⊕or⊖ to **DT5**.
	Repeat as needed. (ex: ch. 7 to **NULL**.)	◇ to **Ch 7**. ⊕or⊖ to **NULL**.
	Close.	(END) (END)
Where next?	Programmable mixes: see p. 65. Set up dual/triple rates and exponential (**D/R,EXP**): see p. 39. Adjust **SUB-TRIM** of auxiliary channel to adjust center *SWITCH* position: see p. 46. Adjust **END POINTS** (sets end points of travel even when using a switch): see p. 36.	

⚠ WARNING

The priority of AUX

Don't assign two or more functions to one channel.

Priority may be given to a higher rank function and

a low rank function may be canceled.

higher rank ← Priority → low rank

ACRO
- CH5: PIT — GYRO — SW-G
- CH6: FLAP TRIM — FLAPERON — VR
- CH7: AIL-DIFF — GYRO — DT5
- CH8: AILVATOR — PIT — THR NEEDL — GYRO — DT6

HELI
- CH5: GYRO — SW-F
- CH6: PIT
- CH7: GYRO — GOVERNOR — SW-C
- CH8: ELE2 — THR NEEDL — GYRO — GOVERNOR — VR
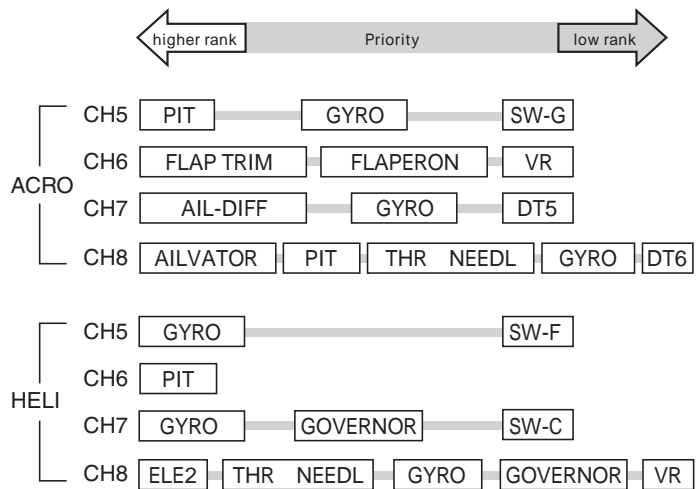
TRAINER: for training novice pilots with optional trainer cord connecting 2 transmitters. The instructor has several levels of controllability.

```
TRAINER      1:AIL FNC
             2:ELE FNC
▶ INH        3:THR FNC
             4:RUD FNC
CH1:AIL      5:GER OFF
  ▶ FNC      6:FLP OFF
             7:AU1 OFF
             8:AU2 OFF
```

Adjustability:

• **NOR**: When the *TRAINER SWITCH* is ON, the channel set to this mode can be controlled by the student. The set channel is controlled according to any programming set at the student's transmitter.

• **FNC**: When the *TRAINER SWITCH* is ON, the channel set to this mode can be controlled by the student, controlled according to any mixing set at the instructor's transmitter.

• **MIX**: When the *TRAINER SWITCH* is ON, the channel set to this mode can be controlled by both the student and the instructor, according to any mixing set at the instructor's transmitter. And the student's mixing rate is adjustable. (default 30%)

[Note] However, it becomes invalid even if the channel is not in a student's transmitter. The channel serves as operation by the instructor's transmitter automatically.

• **OFF**: The channel set to this mode cannot be controlled by the student even when the *TRAINER SWITCH* is ON. The set channel is controlled by the instructor only, even when the *TRAINER SWITCH* is ON.

• SWITCH: controlled by spring-loaded *SWITCH F* (8JA) or *H* (8JH) only. Not assignable.

• Compatibility: The 8J may be master or student with any Futaba transmitter compatible with the cord. Simply plug the optional trainer cord (for 8J series, sold separately) into the trainer connection on each transmitter, and follow the guidelines below.

Examples:

• When throttle/collective are set to **FNC**, 5-channel helicopter practice is possible with a 4-channel transmitter.

• Set up the model in a second transmitter and use **NOR** mode to quickly and safely check proper operation of all functions. Then, allow the student radio to fully fly the model.

• Using **NOR** mode, set lower throws, different exponentials, even different auxiliary channel settings on the student radio (if it has these features).

• To ease the learning curve, elevator and aileron may be set to the **NOR** or **FNC** mode, with the other channels set to OFF and controlled by the instructor.

Precautions:

• NEVER turn on the student's transmitter power.

• ALWAYS set the student transmitter modulation mode to **PPM**.
  As for a T8J transmitter, PPM signal is always sent by the trainer jack regardless of the modulation mode.

• BE SURE that the student and instructor transmitters have identical trim settings and control motions. Verify by switching back and forth while moving the control sticks.

• Always remove the student transmitter's RF module (if it is a module-type transmitter).

• When the **TRAINER** function is active, the snap roll function is deactivated. Other functions, such as **IDLE-DOWN** and **THR-CUT**, which have been assigned to the same switch, are not deactivated. Always double check your function assignments prior to utilizing the **TRAINER** function.

• When you select a different model, the **TRAINER** function is deactivated in the current model for safety reasons.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Turn on the **TRAINER** system and set up so student has: fully functional control of aileron and elevator to support **FLAPERON** and **AILEVATOR**; normal control of rudder to allow lowered travel; and no throttle channel control (with the instructor for safety).	Open **TRAINER** function.	⊕ for 1 second. ◇ to TRAINER.
	Activate **TRAINER**.	⊕ or ⊖ to **OFF**.
	Choose desired channel(s) and proper training type(s).	◇ past **AIL** and **ELE** (default OK). ◇ to **THR**, ⊕ or ⊖ to **OFF**. ◇ to **RUD**, ⊕ or ⊖ to **NOR**.
	Close.	(END) (END)
	TEST student radio function fully prior to attempting to fly!	
Where next?	Set up dual/triple rates and exponential (**D/R,EXP**) on student 8J: see p.39. Reset trims on student 8J: see p.45.	

TRIM *submenu*: resets and adjust effectiveness of digital trims.

```
TRIM
RESET▶Execute ▼
STEP AIL▶  4 (→   0)
     ELE▶  4 (↓   0)
     THR▶  4 (↓   0)
     RUD▶  4 (→   0)
     DT5▶  4 (↓   0)
     DT6▶  4 (↓   0)
```

The 8J has digital trims which are different from conventional mechanical trim sliders. Each *TRIM LEVER* is actually a two-directional switch. Each time the *TRIM LEVER* is pressed, the trim is changed a selected amount. When you hold the *TRIM LEVER*, the trim speed increases. The current trim position is graphically displayed on the start up screen. The **TRIM** submenu includes two functions that are used to manage the trim options.

HELI models only: **OFFSET** is available in the idle ups. If **OFFSET** is inhibited, adjustment of the *TRIM LEVERS* will adjust the trims for all flight conditions. If **OFFSET** is active, then moving the trims within any one condition will affect only that condition. See **OFFSET**, p. 83.

Trim reset (**RESET**): electronically centers the trims to their default values. Note that the **SUB-TRIM** settings and the trim **STEP** rate are not reset by this command.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Reset trims to neutral after having adjusted all linkages.	Open **TRIM** submenu.	⊕ for 1 second. ◈ to **TRIM**. ◎
	Reset trims to neutral.	◎ for 1 second. Beep sounds.
	Close.	(END) (END)
Where next?	Adjust **SUB-TRIM**s: see p.46. Adjust trim rate (**STEP**): see below. Adjust **END POINT**s: see p. 36. Set up dual/triple rates and exponential (**D/R,EXP**): see p. 39.	

Trim step (**STEP**): changes the rate at which the trim moves when the *TRIM LEVER* is activated. It may be set from 1 to 40 units, depending on the characteristics of the aircraft. Most ordinary aircraft do well at about 2 to 10 units. Generally larger trim steps are for models with large control throws or for first flights to ensure sufficient trim to properly correct the model. Smaller trim steps are later used to allow very fine adjustments in flight.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Double the sensitivity (larger step) of the *AILERON TRIM LEVERS* for a first flight of an aerobatic model to ensure sufficient range to trim the model for level flight.	Open **TRIM** submenu and choose the **STEP** you wish to change. (Ex: aileron)	⊕ for 1 second. ◈ to **TRIM**. ◎
	Adjust the size of the step. (Ex: incr. to **8**)	◈ to **AIL**. ⊕ to **8**.
	Repeat as desired for other channels.	◈ to **ELEV**. ⊕or⊖ to new setting. Repeat as needed.
	Close.	(END) (END)
Where next?	Adjust sub trims: see p. 46. Adjust **END POINT**s: see p. 36. Set up dual/triple rates and exponential (**D/R,EXP**): see p. 39.	

SUB-TRIM: makes small changes or corrections to the neutral position of each servo. Range is -120 to +120, with 0 setting, the default being no **SUB-TRIM**.

```
SUB TRIM    →1:AIL      0
             2:ELE      0
             3:THR      0
   CH1:AIL   4:RUD      0
             5:GER      0
       0     6:FLP      0
             7:AU1      0
             8:AU2      0
```

We recommend that you center the digital trims before making **SUB-TRIM** changes, and that you try to keep all of the **SUB-TRIM** values as small as possible. Larger **SUB-TRIM** values that affect the servo's range of travel are restricted on one side.

The recommended procedure is as follows:
• measure and record the desired surface position;
• zero out both the trims (**TRIM RESET** menu) and the **SUB-TRIMs** (this menu);
• mount servo arms and linkages so that the control surface's neutral is as correct as possible; and
• use a small amount of **SUB-TRIM** to make fine corrections.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Adjust the flap servo's **SUB-TRIM** until its center exactly matches the aileron servo's center, as they work together as flaperons.	Open **SUB-TRIM**.	⊕ for 1 second. ◇ to **SUB-TRIM**. ◯
	Choose the channel to adjust, and adjust the values until the surfaces match. (Ex: flap)	◇ to **FLP** ⊕or⊖ as needed. ◇ to each channel,
	Repeat the other channel values.	⊕or⊖ as needed.
	Close.	(END) (END)
Where next?	Adjust trim steps: see p. 45. Adjust **END POINTs**: see p. 36. Set up dual/triple rates and exponential(**D/R,EXP**): see p. 39.	

SERVO *display and cycle submenu:* displays radio's output to channels 1-8.

```
SERVO    (1/2) TEST
CH 1  2  3  4  5  6  7  8
```
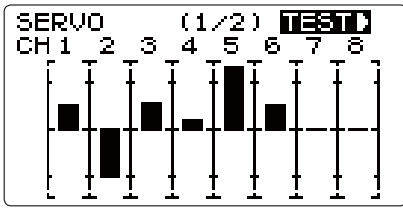
The servo submenu includes two features:
- **Real-time bar-graph display** to demonstrate exactly what commands the transmitter is sending to the servos. (This can be particularly handy in setting up models with complicated mixing functions, because the results of each stick, lever, knob, switch input and delay circuit may be immediately seen.)
- **Servo cycle function** to help locate servo problems prior to in-flight failures. (channels 1-8)

```
SERVO    (2/2) GRAF
           TYPE  LNR
TEST  ON     CYCL   10
           SPD   7
(■ACT □INH)
CH  1  2  3  4  5  6  7  8
       ■  □  □  □  □  □  □  □
```
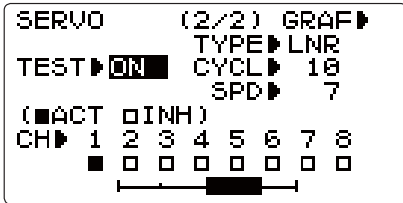
Adjustability:
- Can choose servos to be cycled.
- Cycle type: LNR(Linear mode)/JMP(Jump mode).
- Cycle: 1 to 100(slow), default; 10
- Servo speed: 1 to 100(fast), default; 7
- The servo checked here [■] carries out test operation at the time of Power Down Mode (except for CH3). This is for a distance check.

GOAL of EXAMPLE:	STEPS:	INPUTS:
View the result of reassigning channel 6 from **VR** knob to three-position **SWITCH C**.	Complete desired programming function. (Ex: in **AUX-CH**, move ch. 6 to **SWITCH C**)	See **AUX-CH** for details. (p. 43.)
	Open the **SERVO** function.	⊕ for 1 second. ◇ to **SERVO**.
	Move each control to see the operation. (Ex: **SWITCH C** in all positions)	⊜ **C** to center position. Note change in position of ch. 6 servo.
Cycle the channel 6 servo.	Prepare servos to be cycled.	Plug in servos. **POWER ON**.
	Open the servo cycle function.	◇ to **GRAF>**.
	Set up cycle mode. (Ex: **JMP** mode)	◇ to **TYPE**. ⊕or⊖ to **JMP**.
	Choose channels to be cycled. (Ex: ch. 6)	◇ to **CH6**. ⊕or⊖ to **ACT**.
	Cycle the channel 6 servo.	◇ to **TEST**. ⊕or⊖
	End cycling and close.	(END) (END)
Where next?	Set up dual/triple rates and exponential (**D/R**,**EXP**): see p. 39. Set up desired programmable mixes: see p. 65. Set up dual aileron servos: see p. 52. Set up dual elevator servos: see p. 54.	

FailSafe (loss of clean signal and low receiver battery) submenu (**F/S**): sets responses in case of loss of signal or low Rx battery.

FailSafe (**F/S**): instructs a 2.4G receiver what to do in the event radio interference is received.

```
FAIL SAFE (1/2) SFHSS
         ⊤
     MODE.POSI B-F/S
1:AIL▸ NOR    ---
2:ELE▸ NOR    ---
3:THR▸ F/S    20%   ACT
4:RUD▸ NOR    ---
         ▼
```
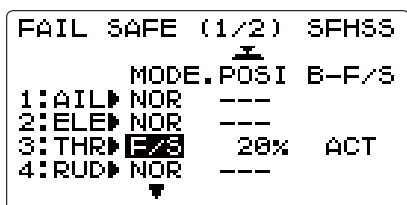
Adjustability:
• Each channel may be set independently. (**FHSS** mode: ch2 only)
• The **NOR** (normal) setting holds the servo in its last commanded position.
• The **F/S** (FailSafe) function moves each servo to a predetermined position.
• The setting of the **F/S** also applies to the Battery **F/S** (see below).
• NOTE: the setting of the throttle's **F/S** also applies to the Battery **F/S** (see below)

Examples:
• The **F/S** setting is used in certain competitions to prevent the aircraft from flying away and doing potential damage elsewhere. Conversely, the **F/S** setting may also be used to go to neutral on all servos, hopefully keeping the plane flying long enough to regain control.
• Competition modelers often maintain the **NOR** function so that brief interference will not affect their model's maneuver.
• Set the throttle channel so that the engine idles when there is interference (**ACRO**). This may give enough time to fly away from and recover from the radio interference and minimize damage if crashed.
• For helicopters, **NOR** is typically the safest choice.
• We also recommend setting a gasoline engine's electronic kill switch to the OFF position in the **F/S** function for safety reasons.

Updating **F/S** *Settings:* If you specify a **F/S** setting, the FailSafe data is automatically transmitted. When you choose the **F/S** mode, check that your settings are as desired by turning off the transmitter power switch and verifying that the servos move to the settings that you chose.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Change the receiver FailSafe command for channel 8 (gasoline engine kill switch) to a preset position. *NOTE: This is one of several functions for which the radio requires confirmation to make a change.*	Open **F/S** function.	⊕ for 1 second. ⬧ to **F/S**. ⟲
	Choose Channel to change. (ex: Ch. 8)	⬧ to Ch 8.
	Set and *confirm* fail safe command.	⬦⊖ that controls channel 8 to desired **OFF** position. ⟲ for 1 second to store.
	Repeat as desired.	
	Close.	(END) (END)
Where next?	Read below for information on Battery FailSafe. Adjust **END POINTS** to gain proper **F/S** responses if needed: see p. 36. Adjust **SUB-TRIM** to gain proper **F/S** responses if needed: see p. 46.	

Battery FailSafe (**F/S**): a second battery low warning feature (separate from the transmitter low voltage warning). When the airborne battery voltage drops below approximately 3.8V, the 2.4G receiver's battery **F/S** function moves the throttle to a predetermined position. When the Battery **F/S** function is activated, your engine will move to idle (if you haven't set a position) or a preset position. You should immediately land. You may temporarily reset the Battery **F/S** function by moving the *THROTTLE STICK* to idle. You will have about 30 seconds of throttle control before the battery function reactivates.

Adjustability:
• **NOR F/S** setting for throttle results in Battery **F/S** going to the servo position reached by moving *THROTTLE STICK* to the bottom with *TRIM LEVER* centered;
• **F/S** position setting for throttle results in Battery **F/S** also going to the same throttle servo position as the regular **F/S**.

⚠ If using a 6V (5-cell) receiver battery, it is very likely that your battery will be rapidly running out of charge before battery FailSafe takes over. It is not a good idea to count on battery FailSafe to protect your model at any time. This is especially true when using a 5-cell battery.

AIRPLANE FUNCTIONS:

Aircraft wing types (**ACRO**):
There are 3 basic wing types in aircraft models:
• Simple. Model uses one aileron servo (or multiple servos on a Y-harness into a single receiver channel) and has a tail. This is the default setup and requires no specialized wing programming.
• Twin Aileron Servos. Model uses 2 aileron servos and has a tail. See Twin Aileron Servos.
• Tail-less model (flying wing). Model uses 2 wing servos working together to create both roll and pitch control. See **ELEVON**.

Twin Aileron Servos (with a tail) (**ACRO**): Many current generation models use two aileron servos, plugged into two separate receiver channels. (If your model is a flying wing without separate elevators, see **ELEVON**, p. 53.)

Benefits:
• Ability to adjust each servo's center and end points for perfectly matched travel.
• Redundancy, for example in case of a servo failure or mid-air collision.
• Ease of assembly and more torque per surface by not requiring torque rods for a single servo to drive 2 surfaces.
• Having more up aileron travel than down travel for straighter rolls. See aileron differential.
• Using the two ailerons not only as ailerons but also as flaps, in which case they are called flaperons.
• Set a negative percentage to reverse the operation of one of the servos.

Options:
• **FLAPERON**:
    •Uses CH6 for the second servo.
    •Allows flap action as well as aileron action from the ailerons.
    •Provides **FLAP-TRIM** function to adjust the neutral point of the flaperons for level flight.
    •Also allows aileron differential in its own programming (instead of activating **AIL-DIFF**).
• Aileron Differential (**AIL-DIFF**):
    •Uses CH7 for the 2nd servo.
    •Leaves CH6 free for flap operation, such as flaperon and flap action together, in **AIRBRAKE**. (see p. 61).
    •Allows for more up aileron travel than down for straighter rolls.

You will need to choose either of **FLAPERON** or **AIL-DIFF** for your model's setup. If you need the ailerons to also operate as flaps, you will most likely want to use **FLAPERON**. If your model has 2 aileron servos and flaps, then **AIL-DIFF** is probably the easiest choice. (For details on setting up a complex aerobatic plane, please visit our FAQ at www.futaba-rc.com\faq\. Many other setup examples are also available at this site.)

NOTE: Only one of the three wing-type functions (**FLAPERON**, **AIL-DIFF**, and **ELEVON**) can be used at a time. All three functions cannot be activated simultaneously. To activate a different wing type, the first must be deactivated.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Deactivate **FLAPERON** so that **AIL-DIFF** or **ELEVON** can be activated.	Open the **FLAPERON** function.	⊕ for 1 second. ◇ to **FLAPERON**. ◌
	Deactivate the function.	◇ to **MIX**. ⊕or⊖ to **INH**.
	Close function.	(END) (END)
Where next?	Set up **AILE-DIFF** (see p. 52) or **ELEVON** (see p. 53).	

49

Using **FLAPERON** (**ACRO**):

```
FLAPERON
MIX ▶INH
            (L)    (R)
RATE-AIL1▶+100% +100%
     AIL2▶+100% +100%

     FLP2▶+100%
     FLP1▶-100%
```

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" (i.e. **ELEVATOR-FLAP** 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.

NOTE: Activating flaperons only makes the ailerons work as ailerons and tells the radio how far you want them to move as flaps. If desired, 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. 51).
AIRBRAKE is a feature that drops flaperons as flap, and also compensates with elevator if desired. (See p. 61).
ELEVATOR-FLAP 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 is 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.	⊕ for 1 second. ◈ to **FLAPERON**. ◔ *
	Activate the function.	◈ to **MIX**. ⊕or⊖ to **ACT**.
	Optional: adjust the up/down travel separately for the 2 servos.(Ex: 90% down.)	◈ to **AIL1**. ⊞ ⊟ *AILERON STICK*. ⊕or⊖ to **90%**. ◈ to **AIL2**. ⊞ ⊟ *AILERON STICK*. ⊕or⊖ to **90%**.
	*Optional: adjust the aileron's travel so they move as flaps.(Ex: each servo flap travel to **50%**.)*	◈ to **FLP2**. ⊕or⊖ to **+50**%. ◈ to **FLP1**. ⊕or⊖ to **-50**%.
	Close menu.	(END) (END)
Where next?	Set **FLAP-TRIM**: see p. 51. Set up **AIRBRAKE** mix: see p. 61. View additional model setups on the internet: www.futaba-rc.com/faq/	

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

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

```
FLAP TRIM

MIX ▶INH

RATE▶████ 5%
```

FLAP-TRIM assigns the primary flaperon control [*VR*] 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.

GOAL of EXAMPLE:	STEPS:	INPUTS:
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.	⊕ for 1 second. ◈ to **FLAP-TRIM**.
	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%**).	⊕or⊖ to +**5%**.
	Close menu.	(END) (END)
Where next?	Adjust individual servo's **SUB-TRIMs**: see p. 46 and **END POINTs**: see p. 36. Set up **AIRBRAKE** mix: see p. 61 and **ELE-FLAP** mix: see p. 59. View additional model setups on the internet: www.futaba-rc.com\faq\.	

Using Aileron Differential (**AILE-DIFF**)(**ACRO**):

```
AIL-DIFF

MIX  ▶INH
             (L)    (R)
RATE-AIL1▶ +100%  +100%
      AIL2▶ +100%  +100%
```

Aileron differential is primarily used on 3 or 4-servo wings, with one servo(s) operating inboard flap(s) on CH6, and **AILE-DIFF** controlling proper aileron operation of 2 aileron servos, plugged into CH1 and CH7. The ailerons can not be moved like flaps when using **AILE-DIFF**, except if using **AIRBRAKE** (Note that even if you make **FLAP-TRIM** active while using **AILE-DIFF**, it will not have any effect. ONLY **AIRBRAKE** controls the ailerons as flaps in the **AILE-DIFF** configuration .)

GOAL of EXAMPLE:	STEPS:	INPUTS:
Activate twin aileron servos using **AIL-DIFF**. Note that the function defaults to no difference in down travel vs. up travel. If you want differential travel, simply adjust each side. (Ex: 90%)	Open the **AIL-DIFF** function.	⊕ for 1 second. ⟐ to **AIL-DIFF**. ⟐ *
	Activate the function.	⟐ to **MIX**. ⊕or⊖ to **ACT**.
	Optional: adjust the up/down travel separately for the two servos. (Ex: adjust to **90%**.)	⟐ to **AIL1**. ⟐ ⟐ *AILERON STICK*.
		⊕or⊖ to **90%**.
		⟐ to **AIL2**. ⟐ ⟐ *AILERON STICK*.
		⊕or⊖ to **90%**.
	Close menu.	(END) (END)
Where next?	Adjust individual servo's **SUB-TRIMs**: see p. 46 and **END POINTs**: see p. 36. Set up **AIRBRAKE** mix: see p. 61. Set up **ELE-FLAP** mix (only if model has a flap servo in CH6): see p. 59. Set up **SNAP-ROLL** Function: see p. 56. View additional model setups: www.futaba-rc.com\faq\.	

*If you receive an error message that **OTHER WING MIXING "ON"**, you must deactivate **ELEVON** or **FLAPERON**.

Aircraft tail types (**ACRO**):

There are 4 basic tail types in aircraft models:
    • Simple. Model uses one elevator servo and one rudder servo (or multiple servos on a Y-harness). This is the default.
    • Dual Elevator servos. Model uses 2 elevator servos. see **AILVATOR** p. 54.
    • Tail-less model. Model uses 2 wing servos together to create roll and pitch control. see **ELEVON**. p. 53.
    • **V-TAIL**. Model uses 2 surfaces, at an angle, together to create yaw and pitch control. see **V-TAIL**. p. 55.

Note: Only one of the three tail-type functions (**AILEVATOR**, **V-TAIL**, and **ELEVON**) can be used at a time. The radio provides a warning and will not allow the activation of another tail type until the first is deactivated. An error message of **OTHER WING MIXING "ON"** will display.

Using **ELEVON**(**ACRO**): used with delta wings, flying wings, and other tailless aircraft that combine aileron and elevator functions, using two servos, one on each elevon. The aileron/elevator responses of each servo can be adjusted independently. This is also popular for ground model use, such as tanks, which drive two motors together for forward, and one motor forward/one backward for turning.

```
ELEVON
MIX ▶INH
            (L)    (R)
RATE-AIL1▶+100% +100%
     AIL2▶+100% +100%

     ELE2▶+100%
     ELE1▶-100%
```

Adjustability:
• Requires use of CH1 and CH2.
• Independently adjustable aileron travel allows aileron differential.
• Independently adjustable elevator travel allows for differences in up vs. down travel.

NOTE: If **ELEVON** is active, you cannot activate **FLAPERON**, **AILE-DIFF**, or **AILEVATOR**. An error message **OTHER WING MIXING "ON"** displays and you must deactivate the last function to activate **ELEVON**.

NOTE: Be sure to move the elevator and aileron sticks to full deflection during setup. If large travels are specified, when the *AILERON* and *ELEVATOR STICKS* are moved at the same time the controls may bind or run out of travel.

(For details on setting up a complex aerobatic plane, please visit www.futaba-rc.com\faq\. Many other setup examples are also available at this location.)

GOAL of EXAMPLE:	STEPS:	INPUTS:
Activate **ELEVON**. Adjust aileron down travel to **90%** of up travel, creating aileron differential.	Open the **ELEVON** function.	⊕ for 1 second. ◈ to **ELEVON**. ◌ *
	Activate the function.	◈ to **MIX**. ⊕or⊖ to **ACT**.
	*Optional: adjust the up/down travel separately for the servos as ailerons. (Ex: down to **90%**.)*	◈ to **AIL1**. 🔄 *AILERON STICK*. ⊕or⊖ to **90%**. ◈ to **AIL2**. 🔄 *AILERON STICK*. ⊕or⊖ to **90%**.
	*Optional: adjust the elevator travel of each servo. (Ex: right servo elev. travel to **98%**, left to **105%**.)*	◈ to **ELE2**. ⊕or⊖ to **98**%. ◈ to **ELE1**. ⊕or⊖ to **105**%.
	Close menu.	(END) (END)
Where next?	Adjust individual servo's **SUB-TRIMs**: see p. 46 and **END POINTs**: see p. 36. Set up dual/triple rates and exponential(**D/R**,**EXP**): see p. 39. View additional model setups on the internet: www.futaba-rc.com\faq.html

Dual Elevator Servos (with a rudder) (**AILEVATOR**) (**ACRO**): Many models use two elevator servos, plugged in separate receiver channels. (Flying wings without a separate aileron control use **ELEVON**. V-shaped tail models use **V-TAIL**, p. 55.)

```
AILVATOR
MIX ▶INH

RATE-AIL3▶- 50%
     AIL4▶- 50%

     ELE2▶-100%
     ELE1▶+100%
```

Benefits:
- Ability to adjust each servo's center and end points for perfectly matched travel.
- Ease of assembly, not requiring torque rods for a single servo to drive 2 surfaces.
- Elevators acting also as ailerons for extreme stunt flying or more realistic jet flying (optional).
- Redundancy, in case of a servo failure or mid-air collision.

Adjustability:
- CH2 and CH8 only. (With programmable mixing, could utilize CH5 as the 2nd elevator servo.) **THROTTLE-NEEDLE** uses CH8 and cannot be active simultaneously.
- Direction of each servo's travel may be reversed in **REVERSE** or the set percentages may be reversed here.
- Elevator travels independently adjustable (both directions and percent).
- Optional action as ailerons (defaults to **50%** response). This response cannot be activated/deactivated in flight. Setting **AIL3** and **4** to **0** disables this feature. Note: if you want this, but controlled with a switch, set **AIL3** and **4** to **0** here, and use 2 mixes . **AIL-to-ELEV** and **AIL-to-AUX2** (link/trim off, assign a switch). to get aileron action from the elevator servos when the assigned switch is on.

(For details on setting up a complex aerobatic plane, please visit www.futaba-rc.com\faq\. Many other setups are also available.)

The **AILEVATOR** mixing function uses one servo on each of the two elevators, and combines the elevator function with the aileron function (unless aileron travel is set to **0**). For aileron effect, the elevators are raised and lowered opposite of one another in conjunction with the ailerons.

Once **AILEVATOR** is activated, unless you zero out the aileron values (see below), any time you move your ailerons or any programming moves your ailerons (ie. RUDDER-AILERON mixing), the radio automatically commands both elevator servos to also operate as ailerons. To deactivate this action, simply set the 2 aileron travel settings to **0** in the **AILEVATOR** function. This way the elevators will work only as elevators.

If using the elevators as ailerons as well, be sure to move the elevator/aileron stick while checking the servo motions. If a large travel is specified, when the sticks are moved at the same time, controls may bind or run out of travel.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Activate twin elevator servos. Deactivate the elevator-acting-as-ailerons portion of this function.	Open the **AILEVATOR** function.	⊕ for 1 second. ◈ to **AILEVATOR**.
	Activate the function.	◈ to **MIX**. ⊕or⊖ to **ACT**.
Note: Depending upon your model's geometry, you may need to reverse one servo or set a negative percentage here.	*Optional: adjust up/down travel when operating as ailerons. (Ex: **0**.)*	◈ to **AIL3**. ⊕or⊖ to **0%**. ◈ to **AIL4**. ⊕or⊖ to **0%**.
	*Optional: adjust total elevator travel of each servo. (Ex: right servo elevator travel to **98%**, left to **96%**.)*	◈ to **ELE2**. ⊕or⊖ to **98%**. ◈ to **ELE1**. ⊕or⊖ to **96%**.
	Close menu.	(END) (END)
Where next?	Adjust individual servo's **SUB-TRIMs**: see p. 46 and **END POINTs**: see p. 36. Set up **AIRBRAKE** mix: see p. 61.	

Using **V-TAIL** (**ACRO**):

```
V-TAIL
MIX  ▶INH

RATE-ELE1▶[+ 50%]
      ELE2▶- 50%

      RUD2▶+ 50%
      RUD1▶+ 50%
```

V-TAIL mixing is used with v-tail aircraft so that both elevator and rudder functions are combined for the two tail surfaces. Both elevator and rudder travel can be adjusted independently on each surface.

NOTE: If **V-TAIL** is active, you cannot activate **ELEVON** or **AILEVATOR** functions. If one of these functions is active, an error message will be displayed and you must deactivate the last function prior to activating **V-TAIL**.

NOTE: Be sure to move the elevator and rudder sticks regularly while checking the servo motions. If a large value of travel is specified, when the sticks are moved at the same time, the controls may bind or run out of travel. Decrease the travel until no binding occurs.

Adjustability:
• Requires use of CH2 and CH4.
• Independently adjustable travels allow for differences in servo travels.
• Rudder differential is not available. (To create rudder differential, set **RUD1** and **2** to **0**. Next, use two programmable mixes, **RUD-ELE** and **RUD-RUD**, setting different percentages for up and down. These are your new rudder travels. Trim off and switch assignment null so you can't accidentally turn off rudder. See **PROG.MIX**, p. 65.)

(For details on setting up a complex plane, please visit our FAQ at www.futaba-rc.com\faq\. Many other setup examples are available at this location.)

GOAL of EXAMPLE:	STEPS:	INPUTS:
Activate **V-TAIL**. Adjust left elevator servo to **95%** travel to match to right servo's travel.	Open the **V-TAIL** function.	⊕ for 1 second. ◈ to **V-TAIL**. ◌
	Activate the function.	◒ to **MIX**. ⊕or⊖ to **ACT**.
	optional: adjust the travels separately for the 2 servos as elevators. (Ex: set left to 95%.)	◒ to **ELE1**. ⊕or⊖ to **95%**. Repeat as necessary for other servos.
	Close menu.	(END) (END)
Where next?	Adjust **END POINT**s: see p. 36 and **SUB-TRIM**s: see p. 46. Set up dual/triple rates and exponential(**D/R,EXP**): see p. 39. Set up **ELE-FLAP** mix: see p. 59. View additional model setups on the internet: www.futaba-rc.com\faq\.	

*Snap Rolls at the flick of a switch (**SNAP-ROLL**) (**ACRO**):*

```
SNAP ROLL    (1:R/U)

    -rate-    MIX▶INH
AIL▶+100%  SAFE-
ELE▶+100%   MODE▶FREE
RUD▶+100%  DIRC-
             SW1▶NULL
             SW2▶NULL
```

This function allows you to execute snap rolls by flipping a switch, providing the same input every time. It also removes the need to change dual rates on the 3 channels prior to performing a snap, as **SNAP-ROLL** always takes the servos to the same position, regardless of dual rates, inputs held during the snap, etc.

Note: Every aircraft snaps differently due to its C.G., control throws, moments, etc. Some models snap without aileron; others snap on elevator alone. Most models snap most precisely with a combination of all 3 surfaces. Additionally, rate of speed and acceleration when using the snap switch will affect how the model snaps.

Adjustability:
• *Travel:* Adjust the amount of elevator, aileron and rudder travel automatically applied.
• *Range:* -120 to +120 on all 3 channels. Default is **100%** of range of all 3 channels.
• *Directions:* Up to 4 separate snaps may be set up, one for each of the 4 direction choices (up/right, down/right, up/left, down/left). Each snap is fully adjustable regarding travels and direction on each of the 3 channels.
  Note: for simplicity, the radio refers to snaps that use "UP" or positive elevator as "U" or "UP" snaps. This is more commonly referred to as a positive or inside snap. "D" or "DOWN" snaps are more commonly referred to as negative or outside snaps.
• **R/U** = Right positive   **R/D** = Right negative   **L/U** = Left positive   **L/D** = Left negative snap roll
• Assignment of the 2 switches (**DIRC-SW1/2**) to change snap directions is fully adjustable and optional. If you wish to have only one snap, leave the switches as **NULL**. (If assigned, **SW1** = up/down, **SW2** = left/right.)
• Caution: it is critical that you remember if you assigned switches to select the three additional snaps.
  • For example, assign SWITCH A for U/D snap direction, and then also assign SWITCH A for elevator dual rates. While flying on elevator low rate (SWITCH A DOWN) you pull your snap SWITCH. The model will: use the throws set in the snap programming (the low rate elevator has no effect); and be a down (negative/outside) snap, not an up (positive/inside) snap.
  • Both of these may come as a great surprise and risk crashing if you are unprepared.
• Safety Switch (**SAFE-MODE**): a safety may be set up on your landing gear *SWITCH*, preventing accidental snap rolls while the landing gear is down. The safety switch is turned on and off with the landing gear *SWITCH*.
  • **CH5+/CH5-**: the safety mechanism is activated when the landing gear SWITCH is in the same position when this feature is changed to ON position (**CH5+** or **CH5-**). Snap rolls will not be commanded even if the snap roll *SWITCH* is turned on with the gear *SWITCH* in this position. When the landing gear *SWITCH* is moved to the opposite position, snap rolls may be commanded.
  • **FREE**: the safety mechanism is completely turned off. Snaps can be commanded regardless of the gear *SWITCH POSITION*.
  Note: The location of the safety switch always follows channel 5. If channel 5 is reassigned to switch C, for example, switch C is now the safety. If channel 5 is nulled, the safety function will not be available.
• Trainer Safety: **SNAP-ROLL** is automatically disabled when the trainer function is activated.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Activate **SNAP-ROLL**. Adjust aileron to **105%**, elevator travel to **95%**, rudder travel to **120%** in the right/up snap. Activate **SAFE-MODE** so snaps cannot be performed when gear is down. Adjust rudder travel in the left/down snap to **105%**. *(Note: using negative percents can change any of the 4 snap directions. For example, change snap 1 to "down" by changing the elevator percent to* **-100%**.)	Open the **SNAP-ROLL** function.	⊕ for 1 second. ◈ to **SNAP-ROLL**. ◌
	Activate the function.	◈ to **MIX**. ⊕or⊖ to **OFF** or **ON**.
	Adjust the travels as needed. (Ex: aileron to **105%**, *elevator to* **95%**, *rudder to* **120%**.)	◈ to **AIL**. ⊕or⊖ to **105%**. ◈ to **ELE**. ⊕or⊖ to **95%**. ◈ to **RUD**. ⊕or⊖ to **120%**.
	Optional: Activate **SAFE-MODE**. *[Ex: ON when* **SWITCH E** *(8JA) or* **G** *(8JH) is down, meaning snap function is deactivated when that switch is in the down position.]*	⬆ *E* or *G* up. ◈ to **SAFE-MODE** ⊕or⊖ to **CH-**. ⬇ snap switch. Notice **MIX** reading is still **OFF**. ⬇ *E* or *G* down. Notice **MIX** reading changes to **ON**.
	Optional: Assign switches to up/down and left/right. (Ex: Change to the left/down snap and adjust rudder to **105%**.)	◈ to **SW1**. ⊕or⊖ to **SwA**. ◈ to **SW2**. ⊕or⊖ to **SwB**. ⬇ *SwA* down *SwB* down. Repeat steps above to set percentages.
	Close menu.	(END) (END)
Where next?	Set up programmable mixes: see p. 65. View additional setups on the internet:www.futaba-rc.com\faq\.	

MIXES: *the backbone of nearly every function*

Mixes are special programs within the radio that command one or more channels to act together with input from only one source, such as a stick, slider or knob.

There are a variety of types of mixes.

Types:

• *Linear:* Most mixes are linear. A 100% linear mix tells the slave servo to do exactly what the master servo is doing, using 100% of the slave channel's range to do so. An example is **FLAPERON**. When aileron stick is moved, the flap servo is told to move exactly the same amount. A 50% linear mix would tell the slave servo, for example, to move to 50% of its range when the master's control is moved 100%. (see p. 50.)

• *Offset:* An **OFFSET** mix is a special type of linear mix. When the mix is turned on (usually a flip of a switch), the slave servo is moved to a set percentage of its range. An example of this is **AIRBRAKE**, moving flaps, flaperons, and elevator all to a set position at the flip of a switch.

• *Curve:* Curve mixes are mostly used in helicopters, but may also be used in airplanes and gliders. An example is **THROTTLE-NEEDLE** mixing, where the in-flight needle's servo is moved, changing the mixture, as the throttle servo is moved. (see p. 62.)

• Delay: Delay mixes are part of a few very special functions that make the servo move to its desired range more slowly. **THROTTLE DELAY** (simulates turbine engines, p. 63) and the elevator delay in **AIRBRAKE** are two examples of this (see p. 61). **DELAY** in **HELI** (see p. 84) is another example that slows the servo movement to the trim settings for the other conditions.

Essentially every feature in the radio's programming is really a mix, with all assignments/programming set up and ready to use. Additionally, the 8J **ACRO** programs both provide 4 linear and 2 curve fully-programmable mixes (**HELI** provides 4 linear and 2 curve) that allow you to set up special mixes to resolve flight difficulties, activate additional functions, etc.

Let's look quickly at a few examples that are features we've already covered. This may help to clarify the mix types and the importance of mixes.

Additional examples:

• Exponential is a preprogrammed curve mix that makes the servo's response more (+) or less (-) sensitive around center stick (works in conjunction with dual rate, a linear mix that adjusts the total range). see **D/R**,**EXP**, p. 39.

• **IDLE-DOWN** and **THR-CUT** are two **OFFSET** pre-programmed mixes. These tell the throttle servo, when below a certain point, to move toward idle an additional set percentage to help close the carburetor.

• **ELE-TO-FLAP** mixing is a pre-programmed linear mix to move the flaps proportionally to elevator control, helping the model loop even tighter than it can on elevator alone. (see p. 59.)

• **THROTTLE-NEEDLE** mixing is a curve mix (like **PROG.MIX 5** to **6**) for proper in-flight needle setup. (see p. 62.)

• **THROTTLE DELAY** mixing is a pre-programmed delay mix that slows down the response of the CH3 servo. (see p. 63.)

Next, we'll get an in-depth look at some pre-programmed mixes (*mixes whose channels are predefined by Futaba for simplicity*) , and last, look at the fully-programmable mix types.

ELEV-FLAP *mixing* (**ACRO**):

```
ELE→FLAP
  MIX ▶INH

RATE↑▶ + 50%
RATE↓▶ + 50%

   SW▶SwC
 POSI▶UP
```

ELEV-FLAP mixing is the first pre-programmed mix we'll cover. This mix makes the flaps drop or rise whenever the *ELEVATOR STICK* is moved. It is most commonly used to make tighter pylon turns or squarer corners in maneuvers. In most cases, the flaps droop (are lowered) when up elevator is commanded.

Adjustability:
- *Rate*: -100% (full up flap) to +100 (full down flap), with a default of +50% (one-half of the flap range is achieved when the *ELEVATOR STICK* is pulled to provide full up elevator.)
- *Switch*: fully assignable. (*SwA to H*)
  *IF you set it to **NULL**, the mix does not work.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Activate **ELEV-FLAP** mixing. Adjust flap travel to **0%** flaps with negative elevator (push) and **45%** flaps with positive elevator.	Open the **ELEV-FLAP** function.	⊕ for 1 second. ◇ to **ELEV-FLAP**.
	Activate the function.	◇ to **MIX**. ⊕or⊖ to **ACT**.
	Adjust the travels as needed. (Ex: **0%**,to **45%**.)	◇ to **RATE**. ⊚ *ELEVATOR STICK*. ⊕or⊖ to **0%**. ⊚ *ELEVATOR STICK*. ⊕or⊖ to **45%**.
	Close menu.	(END) (END)
Where next?	Adjust flaperons' flap travel available (**FLAPERON**): see p. 50. Set up **AIRBRAKE**(crow/butterfly): see p. 61. View additional setups on the internet: www.futaba-rc.com\faq\.	

AIRBRAKE *mixing* (**ACRO**):


```
AIR-BRK
      -rate-  CH3▶ ----
AIL1▶▬▬▬▬▬ MIX▶ INH
ELEV▶ - 10%  SW▶ SWC
FLAP▶ + 50%     ▶ DOWN
AIL2▶ -----  MOD▶ OFST
      -delay-    ▶ ----
ELEV▶    0%
```
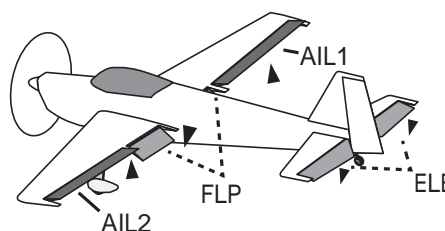
Like **FLAPERON** and **AILEVATOR**, **AIRBRAKE** is one function that is really made up of a series of pre-programmed mixes all done for you within the radio. **AIRBRAKE** simultaneously moves the flap(s) (if installed), twin ailerons (if installed) and elevator(s), and is usually used to make steep 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 the assigned switch.
• *Switch:* Mix **SWITCH** is selectable.
• **LINR**(Linear/*Inversely proportional to* **THROTTLE STICK**): provides a proportional increase in amount of **AIRBRAKE** action as **THROTTLE STICK** is lowered and assigned switch is on. Provides gradually more **AIRBRAKE** as you slow the engine. Includes selectable stick position where **AIRBRAKE** begins, gradually increasing to the same setting as the **THROTTLE STICK** is lowered.
• **OFST**(Offset): Provides **AIRBRAKE** response immediately upon switch movement, going to a pre-set travel on each active channel without any means of in-flight adjustment.
• *Delayed reaction*: You can suppress sudden changes in your model's attitude when **AIRBRAKE** is activated by setting the delay (**delay-ELEV**) item, to slow down the elevator response, allowing the flaps/ailerons/elevator to all reach their desired end point together.
• *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**. 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.	⊕ for 1 second. ◈ to **AIRBRAKE**. ◌
	Activate the function.	Switch C in up position. ◈ to **MIX**. ⊕or⊖ to **OFF**.
	SW selection. A position is turned ON by down with a center.	◈ to **SW**. ⊕or⊖ to **SWC**. ◈ to **DOWN**. ⊕or⊖ to **CT&DN**.
	Adjust the travels as needed. (Ex:Ailerons each **75%**, Elevator **-25%**.)	◈ to **AIL1**. ⊕or⊖ to **75%**. ◈ to **ELEV**. ⊕or⊖ to **-25%**. ◈ to **FLAP**. ⊕or⊖ to **75%**.
	Optional: delay how quickly the elevator servo responds.	◈ to delay-**ELEV**. ⊕or⊖ to **25%**.
	Optional: change the mixing from full amount upon switch to proportional to the *THROTTLE STICK*'s proximity to idle.	◈ to **MODE**. ⊕or⊖ to **LINR** (**0%**). ◈ to **0%**. *THROTTLE STICK* to desired point. ◌ 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. 50. Set up **ELE-FLAP** mixing: see p. 59. View additional model setups on the internet: www.futaba-rc.com\faq\.	

THROTTLE-NEEDLE *mixing* (**ACRO**/**HELI**):

```
THR→NEEDL
   MIX▶INH
 P-5)100.0%
 P-4) 75.0%
 P-3) 50.0%
 P-2) 25.0%
 P-1▶   0.0%
 ACC▶    0%
```
(**ACRO**)
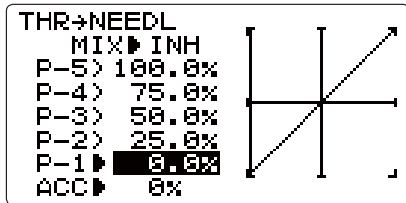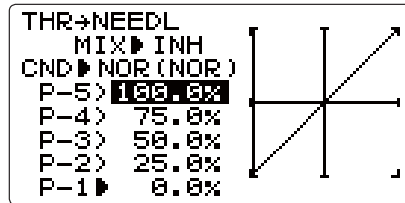
```
THR→NEEDL
   MIX▶INH
 CND▶NOR(NOR)
 P-5)100.0%
 P-4) 75.0%
 P-3) 50.0%
 P-2) 25.0%
 P-1▶   0.0%
```
(**HELI**)

THROTTLE-NEEDLE is a pre-programmed mix that automatically moves an in-flight mixture servo (CH8) in response to the *THROTTLE STICK* inputs for perfect engine tuning at all throttle settings. This function is particularly popular with contest pilots who fly in a large variety of locations, needing regular engine tuning adjustments, and requiring perfect engine response at all times and in all maneuvers. Also popular to minimize flooding at idle of inverted engine installations or installations with a high tank position. Not needed for fuel injection engines, which do this automatically.

Adjustability:
• Five-point curve allows adjustment of engine mixture at varied throttle settings.
• The in-flight mixture servo must connect to receiver CH8.
• Throttle cut feature also moves the in flight needle servo.
• Because both use CH8, this function cannot be used simultaneously with **AILEVATOR**.
• An acceleration (**ACC**) function (**ACRO** only) helps the engine compensate for sudden, large amounts of throttle input by making the mixture suddenly richer, then easing it back to the proper adjustment for that throttle setting. This function requires some adjustment to best fit your engine and your flying style. Adjust engine's response until no hesitation occurs on rapid throttle input.
• Separate curves are available (**HELI** only) for normal, idle-ups 1 and 2 combined, and idle-up 3. Immediately below **MIX** the radio displays the curve you are editing; ex: **>NOR**; and then which condition is currently active by your switches ex: (**ID1/2**). Note that you can edit the mix for a different condition without being in that condition, to allow editing without having to shut off the helicopter's engine every time. Be sure you are editing the proper curve by checking the name after the > and not the one in parentheses.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Activate **THROTTLE-NEEDLE** mixing. Adjust the points as follows to resolve a slight lean midrange problem: **1: 40%** **2: 45%** **3: 65%** **4: 55%** **5: 40%**	Open the **THROTTLE-NEEDLE** function.	⊕ for 1 second. ◇ to **THROTTLE-NEEDLE**.
	Activate the function.	◇ to **MIX**. ⊕or⊖ to **ACT**.
	HELI only. Select the condition to edit.	◇ to **CND**. ⊕or⊖ to **NOR** or (**I12/ID3**)
	Adjust the travels as needed to match your engine by slowly moving the stick to each of the 5 points, then adjusting the percentage at that point until the engine is properly tuned.	**ACRO**-cursor movement at **THR Stick** **HELI**-cursor movement at **JOG KEY** ◇ to **P-1**. ⊕or⊖ to **40%**. ◇ to **P-2**. ⊕or⊖ to **45%**. ◇ to **P-3**. ⊕or⊖ to **65%**. ◇ to **P-4**. ⊕or⊖ to **55%**. ◇ to **P-5**. ⊕or⊖ to **40%**.
	ACRO only. Optional: increase mixture when throttle is applied rapidly-**ACC**.	◇ to **ACC**. ⊕or⊖ as needed.
	HELI only: set curves for other conditions.	◇ to condition name. ⊕or⊖ to next condition to edit. Repeat above steps as needed.
	Close menu.	(END) (END)

Where next?	Set up **THROTTLE DELAY** to imitate a jet engine's lag: see p. 63. Adjust throttle and Ch8 **END POINTs**: see p. 36. Set up programmable mixes, for example, **AILERON-to-RUDDER**: see p. 65. View additional model setups on the www.futaba-rc.com\faq\.

Throttle delay function **THR-DELAY** (**ACRO**):

```
THR DELAY

MIX ▶ INH

RATE▶█  0%
```
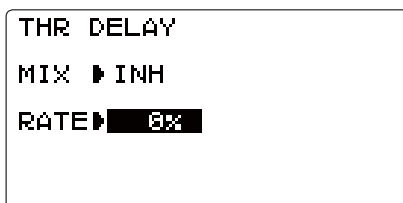
The **THR-DELAY** function is used to slow the response of the throttle servo to simulate the slow response of a turbine engine. A **40%** delay setting corresponds to about a one-second delay, while a **100%** delay takes about eight seconds to respond. For helicopters, see **DELAYS**, p. 84.

This function may also be used to create a "slowed servo" on a channel other than throttle. This is accomplished by plugging the desired servo (Ex: gear doors) into CH3 (**THR**), throttle into an auxiliary channel such as 8, and then using some creative mixes. Please see our Frequently Asked Questions area at www.futaba-rc.com\faq\ for this specific example.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Activate **THR-DELAY** for a ducted-fan replica of a turbine-powered aircraft. Slow the servo response by one second.	Open the **THR-DELAY** function.	⊕ for 1 second. ◇ to **THR-DELAY**.
	Activate the function.	◇ to **MIX**. ⊕or⊖ to **ACT**.
	Adjust the **RATE** to match the desired servo speed. (Ex: **40%**.)	◇ to **RATE**. ⊕or⊖ to **40%**.
	Close menu.	(END) (END)
Where next?	Set up **THROTTLE-NEEDLE** mixing: see p. 62. Adjust throttle's **END POINT**: see p. 36. Adjust throttle exponential (**D/R,EXP**): see p. 39. Set up **AILEVATOR**: see p. 54. Set up programmable mixes, for example, **RUDDER-AILERON**: see p. 65. View additional model setups on the internet: www.futaba-rc.com\faq\

Throttle curve (**THR-CURVE**)(**ACRO**):

```
THR-CURVE
    MIX▶INH
SW ▶SwE (UP)
 P-5)100.0%
 P-4) 75.0%
 P-3) 50.0%
 P-2) 25.0%
 P-1▶  0.0%
```
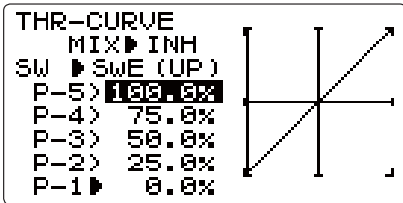
This function adjusts the throttle operation curve for optimum engine response to throttle stick movement.

NOTE: If the throttle **EXP** function is activated, you cannot use **THR-CURVE** function simultaneously.

Adjustability:
• Separate curves for each position are available.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Adjust throttle curve until engine idles reliably.	Open the **THR-CURVE** function.	⊕ for 1 second. ◌ to **THR-CURVE**. ◌
	Activate the function.	◌ to **MIX**. ⊕or⊖ to **ON**.
	Adjust the point 1-5 for each switch position.	⬆ *Switch E* in up position. ◌ to point 1 (**P-1**). ⊕or⊖ to desired throttle servo position. Repeat above steps.
	Adjust the next switch position.	Repeat above steps.
	Optional: Assign the switch.	◌ to **SW**. ⊕or⊖ to desired switch.
	Close.	(END) (END)

Pit curve (**PIT-CURVE**)(**ACRO**):

```
PIT-CURVE
MIX▶INH CH▶8
SW ▶SwE (UP)
 P-5)+100%
 P-4)+ 50%
 P-3)   0%
 P-2)- 50%
 P-1▶-100%
```
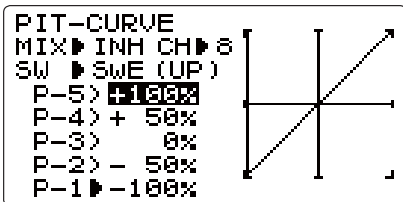
This function is an object for the variable pitch propellers of an airplane. The curve of five points can be set up.

NOTE: CH of a pitch can be set to 8CH or 5CH.

Adjustability:
• Separate curves for each position are available.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Adjust pit curve until engine idles .	Open the **PIT-CURVE** function.	⊕ for 1 second. ◌ to **PIT-CURVE**. ◌
	Activate the function.	◌ to **MIX**. ⊕or⊖ to **ON**.
	Adjust the point 1-5 for each switch position.	⬆ *Switch E* in up position. ◌ to point 1 (**P-1**). ⊕or⊖ to desired Pit position. Repeat above steps.
	Adjust the next switch position.	Repeat above steps.
	Optional: Assign the switch.	◌ to **SW**. ⊕or⊖ to desired switch.
	Close.	(END) (END)

LINEAR PROGRAMMABLE MIXES (**PROG.MIX1-4**):

```
P.MIX1-6

NOR:  1▶AIL→RUD
      2▶INH
      3▶FLP→ELE
      4▶INH
CRV:  5▶RUD→AIL
      6▶RUD→AIL
```

```
P.MIX1

RATE←▶    8%   MIX▶ INH
    →▶    0%
OFFST▶    0%   TRM▶ OFF
    (     0%)
MASTR▶ AIL    SW▶ SwB
SLAVE▶ RUD   POSI▶ NULL
```
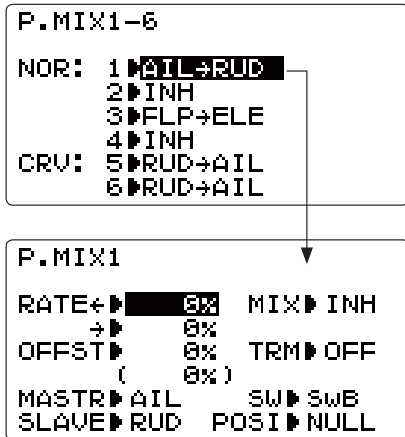
Your 8J contains four separate linear programmable mixes. (Note that P.Mixing 5 & 6 mixing rates are set with a 5-point curve. See CURVE MIXES.)

There are a variety of reasons you might want to use these mixes. A few are listed here. All of the adjustable parameters are listed below, but don't let them scare you. For your first few times experimenting with mixes, just turn on the default mixes, adjust them how you think they need to be, then use the servo screen to check and see if you were correct. As with all functions, a sample setup follows, step by step, to assist you.

Sample reasons to use linear programmable mixes:
• To correct bad tendencies of the aircraft (such as rolling in response to rudder input).
• To operate 2 or more servos for a single axis (such as two rudder servos).
• To automatically correct for a particular action (such as lowering elevator when flaps are lowered).
• To operate a second channel in response to movement in a first channel (such as increasing the amount of smoke oil in response to more throttle application, but only when the smoke switch is active).
• To turn off response of a primary control in certain circumstances (such as simulating one engine flaming-out on a twin, or throttle-assisted rudder turns, also with a twin).

Adjustability:
• Defaults: The 4 programmable mixes default to the most frequently used mixes for simplicity. If you want to use one of these mixes, simply select that mix number so that the master and slave servos are already selected for you.
  • **PROG.MIX1** aileron-to-rudder for coordinated turns
  • **PROG.MIX2** elevator-to-flap for tighter loops (**HELI** mixes default to elev-to-pitch.)
  • **PROG.MIX3** flap-to-elevator to compensate pitching with flaps (**HELI** mixes default to pitch-to-elev.)
  • **PROG.MIX4** throttle-to-rudder ground handling compensation

•*Channels available to mix:* All four mixes may use any combination of CH1-8. Offset and dial (include DT5, DT6) may also be set to the master channels. (see below.)

•*Master:* the controlling channel. The channel whose movement is followed by the slave channel.
  •*Another channel:* Most mixes follow a control channel. (Ex: rudder-to-ailerons, 25%, no switch, corrects roll coupling.)

MASTER	SLAVE	TRIM	SWITCH	POSITION	RATE	OFFSET
RUDD	**AIL**	**OFF**	ANY	**NULL**	**25%**	**0**

  •*Offset as master:* To create an **OFFSET** mix, set the master as OFS. (Ex: move flaperons as flaps 20% of their total throw when *SWITCH C* is in down position.)

MASTER	SLAVE	TRIM	SWITCH	POSITION	RATE	OFFSET
OFS	**FLP**	N/A	**C**	**DOWN**	**20%**	N/A

  • *Dial as master:* To directly affect one servo's position by moving a dial, set the master as the desired dial. (Ex: create a second throttle trim on DT6 lever.)

MASTER	SLAVE	TRIM	SWITCH	POSITION	RATE	OFFSET
DT6	**THR**	N/A	ANY	**NULL**	**5%**	N/A

•*Slave:* the controlled channel. The channel that is moved automatically in response to the movement of the master channel. The second channel in a mix's name (i.e. aileron-to-rudder).
•*Trim:* master's trim affects slave. Not displayed if master is not CH 1-4, because 5-8 have no trim. Ex: two rudder servos. With **TRIM OFF**, rudder trim would bind the two servos. **TRIM ON** resolves this.

• *On/off choices:*
  • ***SWITCH:*** Any of the positions of any of the 8 switches may be used to activate a mix. **UP&CT**, **CT&DN** options allow the mix to be **ON** in 2 of the 3 positions of a 3-position ***SWITCH***.
  • **NULL**: No ***SWITCH*** can turn this mix **OFF**. This mix is active at all times.
  • **THR**: Turned on/off by ***THROTTLE STICK*** movement. Trigger point/direction are selectable. Ex: **OFS**-to-(gear doors) mix to open gear doors at idle, which is only active if throttle is below half.

MASTER	SLAVE	TRIM	SWITCH	POSITION	RATE	OFFSET
OFS	**AU2**	N/A	**THR**	**Stick at 1/2, for 1 sec.**	**100%**	N/A

• *Rate:* the percentage of the slave's range it will move upon maximum input from the master channel. Ex: **RUDDER-AILERON** mix, 50%. When rudder is moved full right, ailerons move 1/2".

MASTER	SLAVE	TRIM	SWITCH	POSITION	RATE	OFFSET
RUD	**AIL**	**OFF**	ANY	**NULL**	**50%**	**0**

• *Offset:* Offsets the slave's center relative to the master. Ex: Smoke valve opens wider per throttle servo position when smoke ***SWITCH*** is **ON**. Smoke servo's neutral is moved down from ***THROTTLE STICK*** center to the bottom.
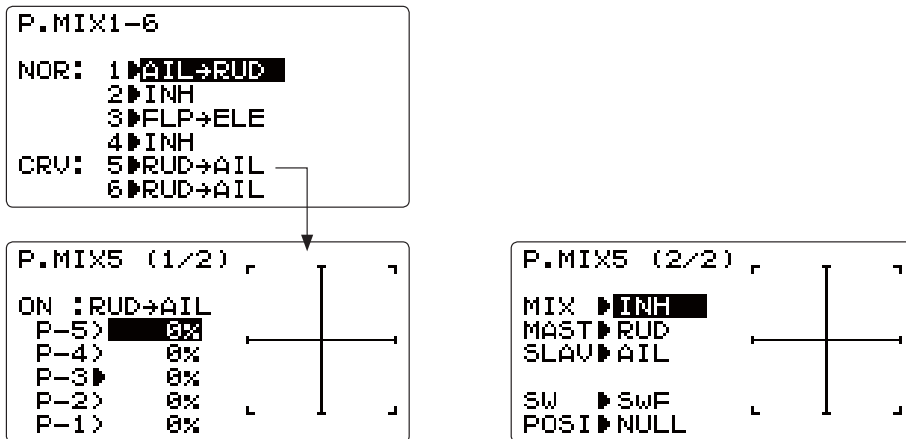
MASTER	SLAVE	TRIM	SWITCH	POSITION	RATE	OFFSET
THR	**AU2**	**OFF**	**E**	**DOWN**	**100%**	**100%**

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up a **FLAP-ELEV** mix: **ON** when *SWITCH C* is in the down position. No elevator movement when flaps move up (spoilers), 5% elevator movement when flaps move down, *(Flap has no trim lever, so* **TRIM** *is not an option.)*	Open an unused programmable mix. (Ex: use **P.MIX3** since it is already set-up for **FLAP-ELEVATOR**.)	⊕ for 1 second. ◇ to **P.MIX1-6**. ◌ ◇ to **3** ◌
	Activate the function.	◇ to **MIX**. ⊕or⊖ to **ON**.
	Choose master and slave channels. (Ex: no need to change **MASTER/SLAVE**.)	already **FLP** already **ELE**
	Optional: set Master as **OFS**, **DT5**, **DT6** *or* **VR**. *See above for details.*	◇ to **MASTER**. ⊕or⊖ to desired choice.
	Set TRIM as needed. (Ex: leave **TRIM** not available.)	
	Assign *SWITCH* and position. (Ex: change to **C**, **DOWN**.)	◇ to **SW**. ⊕or⊖ to **C**. ◇ to **POSI**. ⊕or⊖ to **DOWN**.
	Optional: set switch to **THR** *to activate mix with THROTTLE STICK. (See above for details.)*	◇ to **SW**. ⊕or⊖ to **THR**. ◇ to **POSI**. ⊙ *THROTTLE STICK* to desired point. ◌ for 1 second to set.
	Optional: set switch position to **NULL**. *Makes mix active at all times. Not compatible with* **THR**.	◇ to **POSI**. ⊕or⊖ to **NULL**.
	Set rates. (Ex: Lo=**0%**, Hi=**5%**.)	◇ to **RATE**. ◐ *VR* past center. Leave at **0%**. ◑ *VR* past center. ⊕or⊖ to **5%**.
	Set **OFFST**, if needed. (Ex: **0**.)	◇ to **OFFST**. Leave at **0%**.
	Close menu.	(END) (END)
Where next?	Adjust servo **END POINTs**: see p. 36. Setup dual/triple rates and exponential (**D/R**,**EXP**): see p. 39. Set up additional programmable mixes, ex: **RUDDER-AILERON**: see p. 65. View numerous additional mix setups: www.futaba-rc.com\faq\	

Other Examples:
• **RUD-ELEV** (**ACRO**) mix: Compensate for pitching up or down when rudder is applied.
• **AIL-RUD** (**ACRO**): Coordinate turns by applying rudder automatically with aileron input. All model types.
• **ELEV-PIT** (**HELI**) mix: compensate for the loss of lift of tilting the model.

CURVE PROGRAMMABLE MIXES (**PROG.MIX5-6**):

```
P.MIX1-6

NOR:  1▶AIL→RUD
      2▶INH
      3▶FLP→ELE
      4▶INH
CRV:  5▶RUD→AIL
      6▶RUD→AIL
```

```
P.MIX5 (1/2)

ON :RUD→AIL
  P-5)    0%
  P-4)    0%
  P-3)▶   0%
  P-2)    0%
  P-1)    0%
```

```
P.MIX5 (2/2)

MIX ▶INH
MAST▶RUD
SLAV▶AIL

SW  ▶SwF
POSI▶NULL
```

Your 8J's **ACRO**/**HELI** programs contain two separate curve programmable mixes. There are a variety of reasons you might want curve mixes; for example, when a linear mix doesn't fit your needs along the whole range. One pre-programmed curve mix is the **THROTTLE-NEEDLE** function. This curve is adjustable at 5 points, allowing you to adjust the motor's tuning at 5 points along its RPM range.

One programmable curve mix defaults to **RUDDER-AILERON**. A linear mix that keeps the model from rolling in knife-edge is probably too much aileron when rudder is applied in level flight. Create a curve mix and set all 5 points to match the linear mix. Inhibit the linear mix, then adjust the curve to get the right response all along the rudder channel's travel.

Adjustability: for detailed definitions, see Linear Programmable Mixes and Glossary.
• **ACRO** *Defaults:* The 2 programmable curve mixes default to the most frequent choices, but can be set to any channel.
    • **P.MIX5** rudder-to-aileron for roll coupling compensation
    • **P.MIX6** rudder-to-aileron for roll coupling compensation
• **HELI** *Defaults:*
    • **P.MIX5** aileron-to-elevator for coordinated turns
    • **P.MIX6** aileron-to-elevator for coordinated turns
• *Master:* The controlling channel can only be a channel. Cannot be **OFFSET** or dial.
• *Trim:* not available in curve mixes.
• *Offset:* not available in curve mixes.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up a **RUDD-ELEV** curve mix on a model that pitches down severely at full rudder and not at all with minimal rudder input, and pitches worse on right rudder than left: **P-1: 25%** **P-2: 8%** **P-3: 0%** **P-4: 10%** **P-5: 28%** **ON** when *SWITCH C* is down. (Note that point 3 is 0%. Otherwise, the elevator would be retrimmed when the mix is active and no rudder input is given.)	Open an unused curve programmable mix. (Ex: use **PROG.MIX6** since it is already set-up for **RUDDER-ELEV**.)	⊕ for 1 second. ◈ to **P.MIX1-6**. ◌ ◈ to **6**. ◌
	Activate the function.	◈ to **MIX**. ⊕or⊖ to **ON**.
	Choose master and slave channels. (Ex: do not change **MAS** or **SLV**).	already **RUDD** already **ELEV**
	Assign *SWITCH* and position. (Ex: change to **C**, **DOWN**.)	◈ to **SW**. ⊕or⊖ to **C**. ◈ to **POSI**. ⊕or⊖ to **DOWN**.
	Optional: set switch to **THR** to activate mix with *THROTTLE STICK*. (See above for details.)	◈ to **SW**. ⊕or⊖ to **THR**. ◈ to **POSI**. ⊙ *THROTTLE STICK* to desired point. ◌ for 1 second to set.
	Optional: set switch position to **NULL**. *Makes mix active at all times. Not compatible with* **THR**.	◈ to **POSI**. ⊕or⊖ to **NULL**.
	Set desired percent at the stick points. (Ex: listed at left.)	◈ to **P-1**. ⊕or⊖ to **25%**. Repeat for points 2-5.
	Close menu.	(END) (END)
Where next?	Adjust servo **END POINTs**: see p. 36. Set up **AILEVATOR**: see p. 54. View numerous mix setups: www.futaba-rc.com\faq\	

GYA gyro mixing

GYA series gyros:
GYA series gyros are a high performance, compact, and light weight AVCS gyros developed for model airplanes. An integrated sensor and control circuit make them easy to mount.
• GYA350: for airplane aileron, elevator, or rudder.
• GYA351: for airplane ailerons, especially two servos such as when using **FLAPERON**.
• GYA352: for airplane aileron, elevator, or rudder control. Two of these surfaces (axis) can be controlled by GYA352.

GYA series gyro operation modes:
The GYA gyros have two operations modes: AVCS mode and Normal mode.
• Normal mode: This mode performs general proportional control operation. For instance, it controls the gyro so that changes are countered when the attitude of the aircraft is changed by cross-wind, etc.
• AVCS mode: This mode performs both proportional and integrated control operation. The difference between Normal mode and AVCS mode operation is that whereas the Normal mode only counters changes in attitude, the AVCS mode returns to the original controlled variable simultaneously with countering changes in attitude. For example, during knife edge flying, aileron and elevator combining rudder input is normally necessary, but in the AVCS mode, adding rudder input is performed automatically by the gyro.

```
GYRO SENS
 MIX▶INH    SW▶SwG
 CH ▶CH5/CH7/CH8
    ▶UP   (UP)
      type   rate
CH5▶GY    ▶      0%
CH7▶STD   ▶  50.0%
CH8▶STD   ▶  50.0%
```

Adjustability:
• Plug the gyro's sensitivity adjustment to channel 5, 7, and/or 8 of the receiver. (selectable)
• Full switch assignability (***SWITCH A-H***)
• Each rate setting may be set from 0 to NOR100% or AVC100% gain.
  NOR: Normal mode gain. **AVC**: AVCS mode gain
• Larger percentages indicate more gain, or gyro responsiveness.
• Gyro type selectable. **GY**: Futaba GYA gyros, **STD**: Other than GYA gyros

Gyro gain adjustment:
• When the servo hunts, the gyro gain is too high. Lower the gain until the hunting stops.
• The gyro will display best performance at a gain just before hunting occurs. Perform adjusting by flying the aircraft repeatedly.

Precautions:
• When taking off and landing, always switch to the Normal mode. Taking off and landing in the AVCS mode is dangerous.
• We recommend that you use the rudder control gyro in the Normal mode. In the AVCS mode, rudder operation is necessary when turning because the weathervane effect is lost. Use the gyro in the Normal mode unless you are an expert in rudder operation.
• And we recommend that you also set to off (0%) mode for safety as follows.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up a GYA gyro setting.	Open and activate the **GYRO SENSE** function.	⊕ for 1 second. ◄◌► to **GYRO SENSE**.
	Activate the function.	◌ to **MIX**. ⊕or⊖ to **ON**.
	Change channel assignment. Ex: select **CH5**/**CH7**/**CH8**.	◌ to **CH**. ⊕or⊖ to **CH5**/**CH7**/**CH8**.
	Change gyro type. Ex: select **GY**.	◌ to **type**. ⊕or⊖ to **GY**.
	Optional: change switch assignment. Ex: select **E**.	◄◌► to **SW**. ⊕or⊖ to **E**.
	Adjust gyro rates as needed. (Ex:**UP** to **NOR70%**, **CNTR** to **0% (off)**, **DOWN** to **AVC70%** as starting points.)	◄◌► to **UP / CNTR / DOWN**. ◄◌► to **rate**.to ⊕or⊖ **NOR70%/ 0% / AVC70%**.("+" for AVC "-" for NOR)
	Close menu.	(END) (END)

Special Additions, Functions, And Added Equipment Commonly Used On Powered Aircraft

Gyros: Just as torque rotates an aircraft on the runway during take-off, helicopters struggle with torque twisting the model every time throttle is applied. For many years gyroscopes have been used on model helicopters to control this. In competition aerobatics and scale aircraft competition alike, the usefulness of gyros has recently come to light. For in-depth information on gyro types, please see p. 70.

For aerobatics, gyros on rudder and elevator fix over-rotation of snaps and spins as well as tail wagging in stall turns. (Futaba offers a twin-axis gyro, GYA-352, that controls two axes with a single gyro.) For 3D aerobatics (below stall speed, such as torque rolls), heading-hold/AVCS gyros on rudder and elevator dramatically simplify these maneuvers. For scale models, gyros are frequently used to simplify take-offs and landings by keeping the model straight during throttle application.

⚠ Always be careful if using a heading-hold/AVCS gyro, as it will correct any change in yaw that is not caused by movement of the rudder (like making a turn with just aileron and elevator). Typically, modelers use heading-hold/AVCS settings only for specific maneuvers, such as take-offs and torque rolls, then switch to normal mode or OFF for the remainder of the flight to avoid this risk.

Retracts: Retractable landing gear is often used on scale models for increased realism and on high performance models to decrease drag. The gear servo is typically plugged into CH5, which defaults to a 2-position switch for simplicity.

⚠ Mechanical retracts require the use of a specialized non-proportional retract servo. Retract servos go from full travel one direction to full travel the other direction, then mechanically hold the gear into the locked position. A regular servo used for mechanical retracts will continue to draw full power the entire time, prematurely draining the battery and risking crash of your model. End point will not adjust a retract servo.

Pneumatic (air driven) retracts use a standard servo to control an air valve which directs air into or out of the retract units, moving the gear up or down. Pneumatics are easier to install but require added maintenance of the air system.

Gear Doors: Some scale models with retracts also have separate gear doors to cover the scale gear. For one example of how to operate the gear doors separately from the retracts, please visit our website: www.futaba-rc.com\faq\.

Smoke Systems: Many scale and aerobatic models use smoke systems to provide increased realism or a more impressive demonstration. There are many smoke systems available, with varying types of control. Most use a servo to increase/decrease the flow of smoke fluid into the specialized smoke muffler. The oil is heated in the muffler, creating smoke.

It is a good practice to set up a "safety" that shuts off the smoke oil if the throttle is lowered below half-stick. For a detailed example of a smoke system setup, please visit our website: www.futaba-rc.com\faq\.

Kill Switches: For safety reasons, it is strongly recommended that an electronic kill switch be installed in all gasoline-powered aircraft. In case of any type of in-flight problem (such as prop failure, exhaust vibrating off, throttle servo failure, radio interference), the modeler can shut the engine off quickly and safely in flight. Additionally, FailSafe (F/S) settings are recommended to shut the engine off in case of sufficient interference to trigger the FailSafe settings.

Lastly, an electronic kill switch set to "off" prior to the aircraft's power being shut off adds an additional safety should someone accidentally turn on the mechanical kill switch on the exterior of the model.

Bomb Drops, Paratroopers, and other Released Items: Many sport and scale models include one or more of these fun add-ons. Typically, all are controlled by a simple micro-switch plugged into AUX channels. The switch is assigned in **AUX-CH**.

HELICOPTER MODEL FUNCTIONS

HELI-SPECIFIC MENU FUNCTIONS

MODEL TYPE: This function of the **PARAMETER** submenu is used to select the type of model programming to be used. Before doing anything else to set up your model, first you must decide which **MODEL TYPE** best fits your aircraft. If your transmitter is an 8JA, the default is **ACRO**. If it is an 8JH, the default is **HELI**(**H-1**).

```
PARAMETER        (1/3)
RESET▶ Execute  ⊥
 TYPE▶ HELICOPTER
SWASH▶ H-1        Pure
   RX▶ S-FHSS
  ATL▶ ON        (1/2/6)
```

HELICOPTER SWASHPLATE TYPES:

The 8J radios support 8 basic swashplate setups, including "single servo" (**H-1**-many helicopters use this type) and 7 types of CCPM (cyclic and collective pitch mixing). A "single servo" swashplate uses one servo for each axis: aileron, elevator (cyclic pitch), and collective pitch. CCPM helicopters utilize a combination of servos working together to achieve the 3 axes of motion. There are 7 basic CCPM types, displayed below. CCPM has several advantages, the most obvious of which is far less mechanical complexity to properly move the swashplate of the helicopter. Additionally, several servos working in unison (ex: HR3, all 3 servos together create elevator movement) dramatically increases the torque available as well as the precision and centering.

Please note that some helicopters are type **HR3** or **HN3**, except off by 180 degrees. For example, the Kyosho® Caliber is **HR3** but with the 2 parallel servos to the rear of the helicopter, not front. If your model's swashplate is off by 180 degrees, you will still use that swashplate type, but also use **SWASH AFR** to adjust the functions as needed until it operates properly. Additionally, different angles of CCPM may also be created utilizing the fully assignable programmable mixes. (See our Frequently Asked Questions area at www.futaba-rc.com\faq\.)

Not operating quite like you expected? In many CCPM installations you need to either reverse the direction of a specific function (**SWASH AFR**) or reverse a single servo's direction (**REVERSE**). See **SWASH AFR** for details.

Swashplate Types

GOAL of EXAMPLE:	STEPS:	INPUTS:
Change the **MODEL TYPE** and **SWASH TYPE** of model #3 from aircraft to 120 degree CCPM with 2 servos working in unison for collective pitch and aileron [**HELI(HR3)**].	Confirm you are currently using the proper model memory. (example: 3)	On home screen, check model name and # on top left. If it is not the correct model (example:3), see **MODEL SELECT**.
	Open **PARAMETER** submenu.	⊕ for 1 second. ◈ to **PARAMETER**. ◎
	Select proper **TYPE**. (**HELICOPTER**) *Confirm the change.*	◇ to **TYPE**. ⊕ to **HELICOPTER**. ◎ for 1 second. **Are you sure?** displays. ◎ to confirm.[1]
	Change to the desired **SWASH TYPE** (example: HR3.) *Confirm the change.*	◇ to **SWASH**. ⊕ to **HR3**. ◎ for 1 second. **Are you sure?** displays. ◎ to confirm.
	Close.	(END) (END)
Where next?	If a single servo is not operating properly, **REVERSE**: see p. 35. If a control is operating backwards (i.e. Elevator), see **SWASH AFR**, p. 75. If unsure see **SWASH AFR**.	

[1] Radio emits a repeating "beep" and shows progress on screen as the model type is being changed. Note that if the power switch is turned off prior to completion, the model type will not be changed.

SWASH AFR (not in **SWH1**):

```
 ┌─────────────────────────┐
 │ SWASH AFR               │
 │                         │
 │ RATE-AIL▶ + 50%         │
 │                         │
 │      ELE▶ + 50%         │
 │                         │
 │      PIT▶ + 50%         │
 └─────────────────────────┘
```

Swashplate function rate settings (**SWASH AFR**) reduce/increase/reverse the rate (travel) of the aileron, elevator (except **H-2**) and collective pitch functions, adjusting or reversing the motion of all servos involved in that function, only when using that function. Since these types utilize multiple servos together to create the controls, simply adjusting a servo's **REVERSE** or **END POINT** would not properly correct the travel of any one control. Since **H-1** uses one servo for each function, there is no need for AFR in **H-1**.

This is fairly hard to explain but easy to see, so let's set up Kyosho® Caliber's swashplate settings as an example. With everything installed per factory instructions, set the model to **HELI(HR3)**. Now let's adjust the swashplate properly.

Since aileron always uses no more than 2 servos, check it first. Either both operate properly (no change needed), both operate backwards (reverse the whole function), or one servo operates backwards (reverse that servo alone).
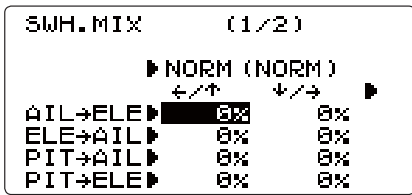
Next check elevator. Remember, the aileron servo(s) operate correctly, so if elevator does not, we should only have 2 choices left—the whole function needs to be reversed, or the servo(s) not shared with aileron need to be reversed.

Last is collective. If the aileron and elevator controls are working properly, the only thing that could be wrong is the direction in which the collective operates (reverse the whole function). In our example, **HR3** is 180 degrees off from the swashplate of the Caliber. Therefore, it is very likely that several functions will not operate properly. The collective pitch operation is backwards; but reversing all three servos would also reverse the aileron and elevator operations. Changing the collective pitch rate, however, from **+50%** to **-50%**, will reverse the collective pitch without affecting the aileron action.

CHECKING FOR PROPER MOTION ON AN **HR3** SWASHPLATE			
HR3 Swash Type	PROPER MOTION	WRONG MOTION	HOW TO FIX
AILERON STICK.	Swashplate tilts right.	Swashplate tilts left.	Reverse **AIL** setting in **SWASH** to **-50%**.
		Back of swashplate moves up.	Ch6 servo moves incorrectly; **REVERSE**.
		Back of Swashplate moves down.	Ch1 servo moves incorrectly; **REVERSE**.
ELEVATOR STICK.	Front of swash plate moves down; back of swashplate moves up.	Swashplate moves the opposite.	Reverse **ELE** setting in **SWASH**. (ex: **+50** to **-50**)
		Entire swashplate moves up.	Ch2 servo moves incorrectly; **REVERSE**.
RUDDER STICK.	The leading edges of tail blades rotate left.	Blades rotated right.	**REVERSE** the rudder servo.
THROTTLE STICK.	Entire Swashplate lifts.	Swashplate lowers.	Reverse **PIT** setting in **SWASH**.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Adjust the travel of the collective pitch from **+50%** to **-23%**, reversing the travel of all 3 servos and decreasing their travel in collective pitch only, on an **HR3 SWASH TYPE**.	Open **SWASH AFR** function.	⊕ for 1 second. ◈ to **SWASH AFR**. ◌
	Adjust **PIT** travel to **-23%**.	◈ to **PIT**. ⊖ to **-23%**.
	Close the menu.	(END) (END)
Where next?	Confirm the swashplate is level at 0 travel at neutral. Adjust arms if needed. Apply full collective and check that the swashplate remained level. If not, adjust servo's travels as needed to correct. **END POINT**: see p. 36. Set up the normal condition: (**THR-CURV/NOR, PIT-CURV/NOR, REVO./NORM**): see p. 78. Set up **D/R,EXP**: see p. 39.	

Swash Mixing (**SWH MIX**):

```
SWH.MIX      (1/2)

        ▶NORM (NORM)
         ←/↑     ↓/→     ▶
AIL→ELE▶    0%       0%
ELE→AIL▶    0%       0%
PIT→AIL▶    0%       0%
PIT→ELE▶    0%       0%
```

This function can be set for each flight condition, and is used to correct the tendency of the model to change when the rotor is tilted by aileron, elevator, and rudder controls.

Adjustability:
• Mixing may be set from -100 to 100% for each flight condition.

GOAL of EXAMPLE:	STEPS:	INPUTS:
When the right roll is carried out, an elevator is down and an adjustment is needed.	Open **SWH MIX** function.	⊕ for 1 second. ◈ to **SWH MIX**. ◌
	Activate the function.	◌ to 2/2 page **AIL→ELE MIX** ⊕ to **ON**.
	Adjust the rate. Ex: **IDL1** (AIL to ELE) -10%	◌ to 1/2 page ◌ to **IDL1** ◈ to **AIL ELE, / ⊖ to -10%**.
	Repeat as needed.	
	Close the menu.	(END) (END)

*Actually move a model and check a direction well.

Throttle Mixing (**THROTTLE MIX**):

```
THR-MIX

    MIX▶INH
       ▶NORM(NORM)

  AIL→THR▶   0.0%
  ELE→THR▶   0.0%
  RUD→THR▶    0%
```

This function can be set for each flight condition, and is used to correct the tendency of the model to change altitude when the rotor is tilted by aileron, elevator, and rudder controls.

Adjustability:
• Mixing may be set from 0 to 100% for each flight condition.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Correct the tendency of the model to change altitude.	Open **THROTTLE MIX** function.	⊕ for 1 second. ⬙ to **THROTTLE MIX**. ⊙
	Activate the function.	⬙ to **MIX** ⊕ to **ON**.
	Adjust the rate. Ex: **IDL1** (AIL to TH) 10%	⬙ to **IDL1** ⬙ to **AIL THR** ⊕ to **10%**.
	Repeat as needed.	
	Close the menu.	(END) (END)
Where next?	**HI/LOW-PIT** : see p. 86. **GOVERNOR** set up: see p. 89.	

Swash Ring (**SWASH RING**): limits the swash plate travel to a fixed range.

```
SWH.RING

  MIX ▶INH

  RATE▶ 100%

    AIL=→   0%
    ELE=↓   0%
```

This function limits the swash travel to prevent damaging the swash linkage by simultaneous operation of the ailerons and elevators. It is effective in 3D aerobatics which use a large amount of travel.

•Swash travel by simultaneous operation of the ailerons and elevators is limited within the circle(**SWASH RING** rate).
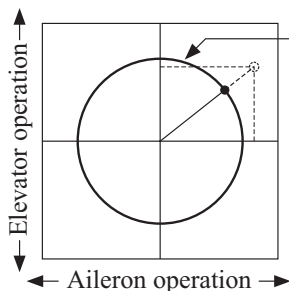
Adjustability:
• Initial value: 100%.
• Adjustment range: 50 to 200%.

GOAL of EXAMPLE:	STEPS:	INPUTS:
To prevent damaging the swash linkage by simultaneous operation of the ailerons and elevators, set the limit point where swash throw stops. *Adjust the rate at the maximum swash tilt by simultaneous operation of the ailerons and elevators	Open **SWASH RING** function.	⊕ for 1 second. ⬙ to **SWASH RING**. ⊙
	Activate the function.	⬙ to **MIX** ⊕ to **ON**.
	Adjust the rate. Ex: 90%	⬙ to **RATE** ⊕ to **90%**.
	Close the menu.	(END) (END)

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.

Note that the normal throttle, pitch and revo curves are all available. These may also be updated later in the 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. 82. For throttle hold, see p. 80.
•**THR-CURV/NOR**: inputs the normal (**NORM**) throttle curve, which is usually not a linear response to *THROTTLE STICK*
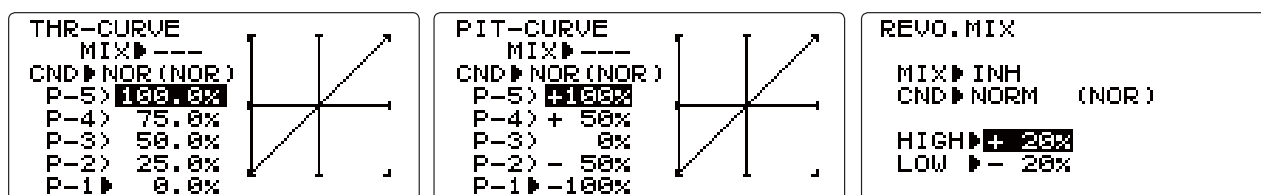
motion. Adjusting point 3 of the curve adjusts the engine's RPM at the *THROTTLE STICK* midpoint, the desired position for hovering. The other 4 points are then adjusted to create the desired idle and maximum engine speed, and a smooth transition in-between. For more on throttle curves, see p. 81.

•**PIT-CURV/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 P-3 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 angles relative to *THROTTLE STICK* movement. For more on collective pitch curves, see p. 81.

•**REVO./NORM**: 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**). Never use revo. mixing in conjunction with heading-hold/AVCS gyros. For details on revo, including default points for clockwise and counter clockwise rotating rotors, see p. 81.

*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.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up Normal Flight Condition Throttle/Collective Pitch Curves and Revo. *Base point:* Adjust base point of throttle curve until engine idles reliably on the ground. Adjust base point of collective pitch curve to achieve -4 degrees of blade pitch. Apply throttle until the model sits 'light' on its skids. Adjust base point of **REVO**. until model does not rotate its nose at all.	Open the **THR-CURV/NOR** function. Adjust the first point. (Ex: **5%**.)	⊕ for 1 second. ◇ to **THR-CURV/NOR**. ◇ ◇ to **POINT-1**. ⊕ to **5%**. (END)
	Open the **PIT-CURV/NOR** function. Adjust the first point. (Ex: **8%**.)	◇ to **PIT-CURV/NOR**. ◇ ◇ to **POINT-1**. ⊕ to **8%**. (END)
	Open the **REVO./NORM** function. Adjust the high point. (Ex: **4%**.)	◇ to **REVO./NORM**. ◇ ◇ to **MIX**. ⊕ to **ON**. ◇ to **HIGH**. ⊕ to **4%**. (END)
Hover point: Adjust collective pitch curve to +5 degrees. Ease heli into a hover. Land/shut engine off. Adjust throttle curves and rudder trim. Repeat until model hovers smoothly at half throttle. Rapidly apply throttle from 1/4 to 1/2 stick. Adjust **REVO**. until the nose does not change heading.	Adjust **THR-CURV/NOR**.	Repeat above as needed.
	Adjust **PIT-CURV/NOR**.	Repeat above as needed.
	Adjust **REVO./NORM**.	Repeat above as needed.
High point: Adjust collective pitch curve to +8 to +10 degrees. From hover, throttle up rapidly. If engine bogs, increase the throttle curve. If engine over-revs, increase the collective pitch curve at points 4 or 5. Apply full throttle while hovering, then descend back to a hover. Adjust **REVO**. until the nose does not change heading.	Adjust **THR-CURV/NOR**.	Repeat above as needed.
	Adjust **PIT-CURV/NOR**.	Repeat above as needed.
	Adjust **REVO./NORM**.	Repeat above as needed.
Where next?	**GYRO** function: see p. 87. Adjust **HOV-THR** and **HOV-PIT** if needed: see p. 85. Setting up Throttle Hold: see p. 80. **GOVERNOR** function: see p. 89. **D/R,EXP**: see p. 39.	

THROTTLE CUT:

The **THROTTLE-CUT** function is used to kill the engine at the end of a flight. The engine can be stopped with one touch of any switch, eliminating the need to move the trim to kill the engine and then readjust prior to each flight. The helicopter

```
THR.CUT

 MODE▶NOR
 MIX ▶INH
 RATE▶  5%

 SW  ▶SWA
 POSI▶NULL
```

THROTTLE-CUT includes an ON/OFF throttle position (normally a little above idle). You must move the ***THROTTLE STICK*** back below the set point before the **THROTTLE-CUT** function can be reset, to avoid sudden engine acceleration. For a detailed example of throttle cut setup, see **ACRO** p. 38.

THR-HOLD: This function holds the engine in the idling position and disengages it from the ***THROTTLE STICK*** when ***SWITCH E*** (8JH) or G (8JA) is moved. It is commonly used to practice auto-rotation.

```
┌─────────────────────────┐
│ THR HOLD                │
│                         │
│ MIX ▶INH                │
│                         │
│ RATE▶▢▢▢▢▦▦             │
└─────────────────────────┘
```

Prior to setting up **THR-HOLD**, hook up the throttle linkage so that the carburetor is opened fully at high throttle. Then, use the digital trim to adjust the engine idle position. To have **THR- HOLD** maintain idle, move the ***THROTTLE STICK*** to the idle position. Then, move the hold SWITCH on and off and keep changing the offset value until the servo does not move. To lower the engine idle speed, or if you want to shut the engine off, input a higher negative number.

Adjustability:
• *Idling position:* Range of **-50%** to **+50%** centered about the throttle idle position to get the desired engine RPM.
• *Switch assignment:* Assigned to ***SWITCH G*** (8JA) or ***E*** (8JH) down.
  Adjustable in the **CONDITION SELECT** (**THR-HOLD** item).
  (2-position type switch only)

```
┌─────────────────────────┐
│ CONDITION               │
│                         │
│ IDLE-UP                 │
│   1▶INH  ▶SWE  ▶CNTR    │
│   2▶INH  ▶SWE  ▶DOWN    │
│   3▶INH  ▶SWF  ▶DOWN    │
│ THR-HOLD                │
│    ▶INH  ▶SWG  ▶DOWN    │
└─────────────────────────┘
```

• *Throttle curve:* Since the throttle is moved to a single preset position, no curve is available for **THR-HOLD**.
• *Collective pitch curve:* Independent curve, typically adjusted to create a blade pitch range of -4° to +10° to +12° , is automatically activated with **THR-HOLD**.
• *Revo. mix:* Since revo. mix adjusts for torque from the engine, no revo. mix is available for **THR-HOLD**.
• *Priority:* The throttle hold function has priority over idle-up. Be sure that the throttle hold and idle-up ***SWITCHES*** are in the desired positions before trying to start the engine. (We recommend starting your engine in throttle hold for safety reasons.)
• *Gyro:* Gyro programming includes an option to have a separate gyro setting for each condition, including **THR-HOLD**. This avoids the potential problem of the user being in the wrong gyro setting when going to **THR-HOLD**, resulting in an improper rudder offset and the model pirouetting.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up throttle hold.	Open **THR-HOLD** function.	⊕ for 1 second.
		⬦ to **THR-HOLD**.
Determine desired throttle position of the idling engine, turn on **THR-HOLD**, and adjust percentage as required to reach the desired running point.	Activate the function.	⬦ to **MIX**. ⊕ to **OFF**.
	Set desired engine position.	⬦ to **RATE**. ⊕ to desired percent.
	Close.	(END) (END)
Where next?	**PIT-CURVE** for THR-HOLD: see p. 81.

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. 78) 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, 57.5,100%.
- 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, 70, 50, 70, 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:
- Automatically selected with the proper condition.
- The idle-up curves are programmed to maintain constant RPM even when the collective pitch is reduced during flight (including inverted).
- To change which condition's curve is being edited, cursor up to **COND** and change the curve named. Conditions can also be chosen by pushing(long time *JOG KEY.*
- For clarity, the name of the condition currently active (switched on in the radio) is shown in parentheses behind the name of the 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.)
- *Copying the curve*: To copy the current curve onto another condition's curve, cursor up to **COND** and press the *JOG KEY* for one second. Then select to desired condition and press the *KEY*.
- Idle-ups and throttle hold pitch curves may be edited even before the conditions have been made active. Activating their throttle curves activates these conditions.

REVO. MIX: This mix adds opposite rudder input to counteract the changes in torque when the speed and collective pitch of the blades is changed.
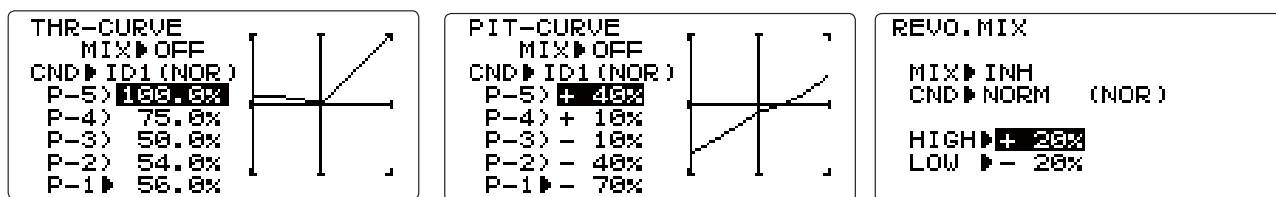
Adjustability:
- Three separate curves available: normal for hovering; idle-ups 1 and 2 combined; and idle-3.
- Correct mix is automatically selected in-flight with each condition and automatically activated when the throttle setup for that condition is activated in the programming (i.e. **THROTTLE HOLD** or **THR-CURVE**.)
- To change which condition's curve is being edited, cursor up above **POINT5** 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 set up of HIGH and LOW can be performed. 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 (-) and vice-versa. Suggested defaults:

Clockwise rotation: HIGH>-20, LOW> +20%
Counterclockwise rotation: HIGH>+20, LOW> -20%
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 is setup to allow the helicopter to 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 8J provides 3 idle-ups to allow the modeler 3 additional setups along with the normal flight condition.

Adjustability:
• *SWITCH G* (8JA) or *E* (8JH) is programmed for normal (**NORM**), idle-up 1 (**IDLE-UP1**), and idle-up 2 (**IDLE-UP2**) curves.
  Adjustable in the **CONDITION SELECT** (**IDLE-UP1/2**, **IDLE-UP3** items).
  (**IDLE-UP1/2** 3-position type switch only, **IDL3** 2-position type switch only)
• 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.
• Activating **OFFSET** makes the *TRIM LEVERS* adjust the trim separately in each of the idle-up conditions.

```
CONDITION

IDLE-UP
 1▶ INH ▶ SWE ▶ CNTR
 2▶ INH ▶ SWE ▶ DOWN
 3▶ INH ▶ SWF ▶ DOWN
THR-HOLD
   ▶ INH ▶ SWG ▶ DOWN
```

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 transitioning from hover to flying at high speed, a clockwise-rotation rotor helicopter tends to drift to the right at high speeds, 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.

```
OFFSET
MIX▶INH
CND▶IDL1 (NORM)

RATE-AIL▶█████ 8%
      ELE▶    0%
      RUD▶    0%
       SW▶Cond
```

Adjustability:
- Complete switch assignability, plus a **CONDITION SELECT** 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.)
- 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.

*During **OFFSET** operation, the aileron, elevator, and rudder travels are displayed on each trim display in the Startup screen.

NOTE: Remember, offsets and revo. mixes are not recommended when using heading-hold/AVCS gyros 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.	⊕ for 1 second. ◈ to **OFFSET**. ◌
	Activate the function.	◈ to **MIX**. ⊕ to **OFF** or **ON**.
	Change switch setting to **Cond**. (No need to change **SW**.)	already **Cond**.
	Select **IDL2**.	◈ to **No**. ⊕ to **IDL2**. or ◌ for 1 second to **IDL2**.
	Adjust trim settings as needed. (Ex:rudder to **+8%**.)	◈ to **RUDD**. ⊕ to **+8%**.
	Close menus and confirm difference in trims between normal and idle-up 2.	(END) (END) ◌ *E* (T8JH) or *G* (T8JA) from **NORMAL** to **IDL2**. Check that rudder trim changes.
Where next?	**DELAY**: see p. 84. **THR-HOLD**: see p. 80. Setting up the Idle-Ups: Throttle and Collective pitch Curves and Revo. Mixing (**THR-CURVE, PIT-CURVE, REVO. MIX**) for idle-ups: see p. 81.	

DELAY: The Delay function provides a smooth transition between the trim positions whenever **OFFSET**, **REVO. MIXING**, or **THROTTLE HOLD** functions are turned on and off.

```
DELAY

RATE-AIL▶ 8% (OFF)
     ELE▶ 0% (OFF)
     RUD▶ 0% (OFF)

     THR▶ 0% (OFF)
     PIT▶ 0% (OFF)
```
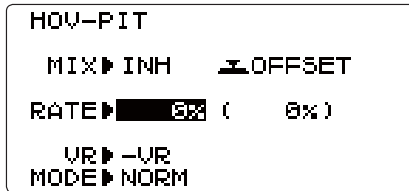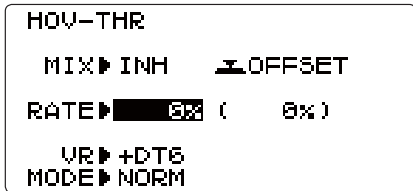
Adjustability:
• Separate delay times are available for aileron, elevator, rudder, throttle, and pitch.
• With a 50% delay setting, the servo takes about a half-second to move to its new position...quite a long time.
• In general, delays of approximately 10-15% are sufficient.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up a delay on all channels to ease the transition from one flight condition to another so there are no "hard jumps."	Open the **DELAY** function.	⊕ for 1 second. ◈ to **DELAY**. ◒
	Adjust **AILE** response as needed. (Ex: aileron to **+8%**.)	⊕ to **+8%**.
	Repeat for other channels.	◈ to **ELEV**. Repeat step above.
	Close menus and confirm slowed transitions.	(END) (END) ⬆ *E* (T8JH) or *G* (T8JA) from **NORMAL** to **IDL2**. Check that servos move gradually to new positions.
Where next?	**THR-HOLD**: see p. 80. Setting up the Idle-Ups: Throttle and Collective pitch Curves and Revo. Mixing (**THR-CURVE, PIT-CURVE, REVO. MIX**) for idle-ups: see p. 82.	

HOVERING ADJUSTMENTS (HOV-THR and HOV-PIT):

Hovering throttle and hovering pitch are fine-tuning adjustments for the throttle and collective pitch curves individually, affecting performance only around the center point and only in the normal condition. They allow in-flight tweaking of the curves for ideal setup.

```
HOV-THR                  HOV-PIT

  MIX▶INH    ⏚OFFSET       MIX▶INH    ⏚OFFSET

 RATE▶▉▉▉▉5▉ (    0%)     RATE▶▉▉▉▉5▉ (    0%)


    VR▶+DT6                  VR▶-VR
 MODE▶NORM                MODE▶NORM
```

Adjustability:
• Rotor speed changes caused by temp., humidity, altitude or other changes in flying conditions are easily accommodated.
• Both adjustments may be inhibited if not desired.
• Both adjustments may also be set to **NULL**, temporarily turning off the knob but maintaining the last memorized setting.
• Adjustments may be memorized and then the knobs returned to center point to use that amount of adjustment. Allows easy use of the trimming knobs for multiple models. (Note that when memorization is repeated with the knob offset from center, the trim value accumulates.)
• Adjustments are quickly reset to the initial value by turning the dial until the trim reads 0%, memorizing, then returning the knob to its center position.
• Note that all functions, including these, assume the model hovers at half stick.
• Available in normal (**NORM**) or normal/idle-up 1 (**NORM/IDL1**) condition only.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Fine-tune hovering with the hovering adjustments. Remember these affect only the hovering (normal) condition. Adjust throttle and collective pitch curves until the model hovers nicely. In flight, adjust collective pitch and throttle curves near hover point independently with **HOV-THR** and **HOV-PIT** knobs. Store new settings after flight.	Open the **HOV-PIT** function.	⊕ for 1 second. ◈ to **HOV-PIT**. ⟳
	*Optional: change which knob adjusts each hovering curve. **NULL** locks in curve in last stored position.*	◯ to **MIX**. ⊕ to ON ◯ to -**VR**. (Select +VR, -VR, +DT5, -DT5, +DT6, -DT6 or NULL) ⊕ to desired knob and direction.
	Store the current dial settings prior to selecting another model.	◈ to **RATE**. ◯ or ◯ *VR* to setting. ⟳ to store. ◯ or ◯ *VR* to center.
	Close.	(END)
	Open the **HOV-PIT** function.	◈ to **HOV-PIT**. ⟳
	Store the current dial settings prior to selecting another model.	◈ to **RATE**. ◯ or ◯ *VR* to setting. ⟳ for one second to store. ◯ or ◯ *VR* to center.
	Close.	(END) (END)
Where next?	**THR-HOLD**: see p. 80. Setting up the Idle-Ups: Throttle and Collective pitch Curves and Revo. Mixing (**TH-CURVE, PIT-CURVE, REVO. MIX**) for idle-ups: see p. 81. **D/R,EXP**: see p. 39.	

HIGH/LOW PITCH (*HI/LO-PIT*):

This function may be used to adjust the curves' high and low side individually for each flight condition (normal, idle-up 1, idle-up 2, idle-up 3, throttle hold).

```
HI/LO-PIT
      ▶NORM (NORM)

HI-PIT▶100%
   ADJ▶OFF  TYP▶-DT5

LO-PIT▶100%
   ADJ▶OFF  TYP▶-DT6
```

Adjustability:
• You may define high and low side rate trim knobs (the high side pitch trim control is defined as the DT5 at initial setting).
• The conditions are activated in the **CONDITION SELECT** function (p.78).
• Both adjustments may be set to **MANUAL**, temporarily turning off the knob.
• Adjustments may be memorized. Then, the knobs can be returned to the center point to use that amount of adjustment. Allows easy use of the trimming knobs for multiple models.

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up a high pitch curve in the idle-up 1 condition.	Open the **HI/LO-PIT** function.	⊕ for 1 second. ◇ to **HI/LO-PIT**. ◎
	A function is turned on.	◇ to **ADJ**. ⊕
Store new settings after flight.	Select the idle-up 1 condition.	◇ to **NORM**. ⊕ to **IDL1**. or ◎ for 1 second to **IDL1**.
	Set the rate. (Ex: **80%**)	◇ to **HI-PIT**. ⊖ to **80%**.
	Optional: change which knob adjusts high pitch curve.	◇ to **+DT5 or -DT5**. ⊕ to desired knob or trim and direction.
	Close.	(END) (END)
Where next?	**PIT-CURVE**: see p. 81. **HOV-PIT**: see p. 85.	

GYROS and GOVERNORS: Using electronics to take some of the complexity out of setups and flight.

What is a gyro? A gyroscope is an electronic unit that senses motion and corrects for it. For example, if the wind blows your helicopter's tail to the left, a gyro will sense that motion (confirming that no input was given) and will correct for it.

How does it help in helicopter setup? A good gyro will totally eliminate the need for revo. mixing. The gyro will sense and correct the unwanted motion for you, so you don't have to spend time to get a complex curve operating properly.

Gyro sensor types: There are many different kinds of gyros. Early gyros were mechanical, with a spinning drum similar to a child's gyroscopic toy. The next generation utilized a special type of crystal, called piezoelectric, which sensed the motion and provided an electrical pulse. The finest gyros at the time of this writing are MEMS (Micro Electro Mechanical System) technology. These sensors, or computer chips, sense the motion. MEMS is far more accurate and less susceptible to inaccuracies caused by temperature changes, etc.

Types of gyro responses:
• Normal: sense motion and dampen it (if the gyro rotates off course for 2 seconds, it corrects for 2 seconds).
• Heading-hold/AVCS: calculate the angle of rotation (by tracking the time/rate of change) and then provide correction until the same rotation is achieved.
• Stick priority: a feature on most high-end gyros. The more input given on the channel the gyro controls, the less sensitive the gain is automatically. This way, if you give a large input for a stall turn, for example, the gyro turns itself off and does not fight the stall turn. As you ease off the rudder, the gain increases again, minimizing tail wag and keeping the model straight. (If your gyro does not include stick priority, you can manually create it. Please see www.futaba-rc.com\faq\.)

Choosing the right gyro for your skills, your helicopter, and your budget:
• Mechanical: some are still available. They are very challenging to set up and not as reliable as piezo or SMM.
• Non-Heading-Hold Piezo: these are now inexpensive gyros that are reliable and easy to set up. Some have dual rates and remote gain control to adjust sensitivity in flight. They do, however, lack heading-hold capabilities for precision flying.
• Heading-Hold Piezo: Until recently, the cream of the crop. Expensive, and more complex to set up. Adds GPS-like heading recognition. Exhibits minor difficulties with temperature drift (position setting varying with unit's temperature).
• Heading-Hold SMM: 21st Century gyro technology. Computer chip technology. Expensive, easier set up, higher durability. Significant decrease in temperature sensitivity. Many include frame rate settings to allow faster response when using specialized digital servos. Examples:
    • GY401: Simpler set up. Ideal for learning aerobatics through 3D.
    • GY502: Better centering than 401 for more advanced aerobatics. Ideal through Class III competition.
    • GY701: Exceptional center. Extremely fast response time. Requires specialized servo. With governor function.
    • CGY750: Exceptional center. Extremely fast response time. Requires specialized servo. With governor function. It corresponds to 3 axes and the best for Flybarless Machines.
• Heading-Hold MEMS: GY520 is the smallest and lightest heading hold AVCS gyro available today. Its cutting-edge MEMS (Micro Electro Mechanical System) sensor design, ultra high-speed processing speed and advanced PID control algorithm put it a quantum leap ahead of all other heading hold gyros in size, weight and performance. The GY520 has been optimized to work with small electric models and larger nitro (.30 through .91) sized helicopters.

GYRO: simplifies adjusting/selecting the gyro sensitivity, and can provide more than two gyro gain settings. (The higher the gain, the more correction the gyro provides and the "softer" or less responsive the helicopter feels.) This function makes the best possible use of the inflight adjustable gain of most gyros.
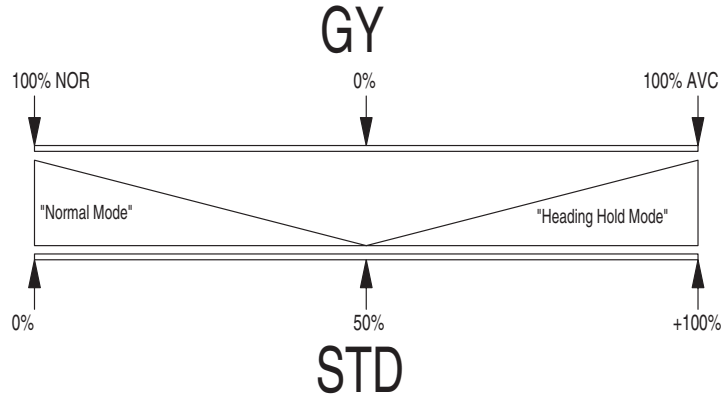
Adjustability:
• Plug the gyro's sensitivity adjustment to channel 5 of the receiver. (not assignable)
• **STD** and AVCS/Heading-hold (**GY**) setup types available to simplify adjustments for AVCS/Heading-hold gyros.
• Full switch assignability or may select **Cond.** option.
• **Cond.** option provides separate gyro settings, one for each condition, automatically selected with the condition. Allows changes in gain to meet the specific needs of each flight condition.
• Each gyro setting may be set from 0 to +100 (**NOR**100% to **AVC**100%) gain, equating to ATV settings of -100% to +100%.
• Dual mode gyros (heading-hold/AVCS and normal) are easily triggered to each mode by changing the gyro setting's sign. Negative settings trigger normal mode; positive settings are AVCS mode.

• Larger percentages indicate more gain, or gyro responsiveness.

• Tail wagging or shaking indicates excessive gain settings. Turn down gyro setting until wag stops.

• 2 axes of 3 axes of setup of gyro can be chosen by **CH**.
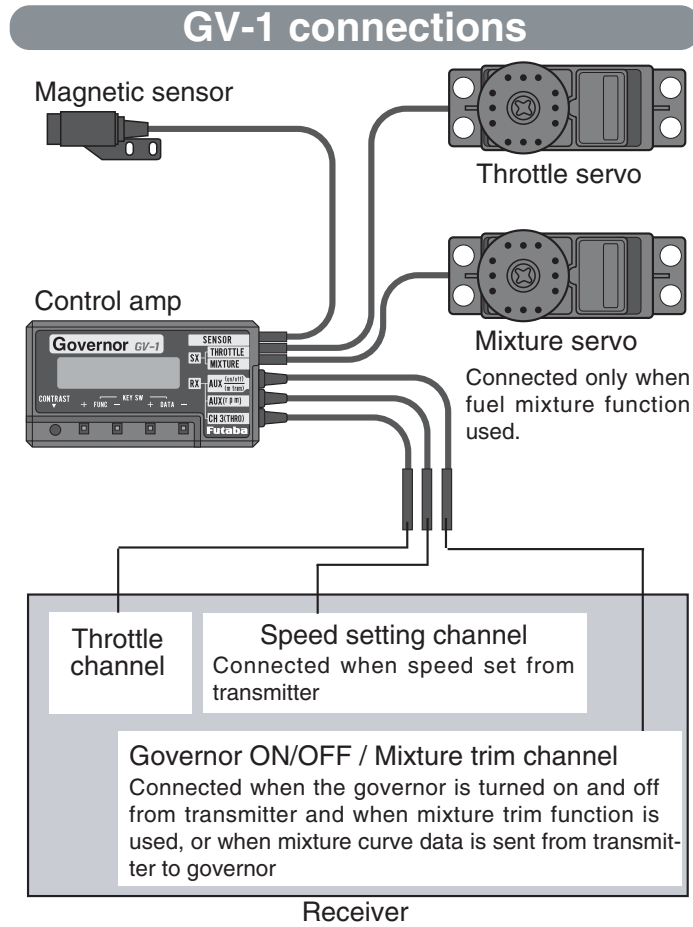
*Gain Example for AVCS/Heading-hold Gyros (**GY**)*

```
GYRO SENS
 MIX▶ON
 CH ▶RUD UP ▶ 50.0%
     (CH5) CNT▶ ------
 TYP▶STD DWN▶ 50.0%
 SW▶ SwF
     (UP )
```

GY

| 100% NOR | 0% | 100% AVC |

"Normal Mode"   "Heading Hold Mode"

| 0% | 50% | +100% |

STD

GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up a heading-hold/AVCS gyro with heading-hold/AVCS setting in idle-ups 1 and 2 and normal mode setting in idle-up 3 and normal.	Open and activate the **GYRO SENSE** function.	⊕ for 1 second. ◈ to **GYRO SENSE**.
	Activate the function.	◈ to **MIX**. ⊕ to **ON**.
	*Optional: change gyro type to Heading-hold (**GY**).*	◈ to **TYP**. ⊕ to **GY**.
	*Optional: change switch assignment. Ex: select **Cond**.*	◈ to **SW**. ⊕ to **Cond**.
	Adjust gyro rates as needed. (Ex: **NORM**, **IDL3** to **NOR 50%**. **IDL1** and **2** to **AVC 50%** as starting points.)	◈ to **NORM**. ⊖ to **NOR 50%**. ◈ to **IDL1**. ⊕ to **AVC 50%**. Repeat.
	Close the function.	(END) (END)
Where next?	**GOVERNOR**: see p. 89. **D/R,EXP**: see p. 39. **DELAY**: see p. 84.	

GOVERNORS:

GV-1 connections

Magnetic sensor

Throttle servo

Control amp

Mixture servo

Connected only when fuel mixture function used.

Throttle channel

Speed setting channel
Connected when speed set from transmitter

Governor ON/OFF / Mixture trim channel
Connected when the governor is turned on and off from transmitter and when mixture trim function is used, or when mixture curve data is sent from transmitter to governor

Receiver

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,GY701,CGY750 (Governor) speed settings (rS1, rS2, rS3) from the transmitter. (If you are using a different governor, follow the manufacturer's instructions.)

```
GOVERNOR
MIX ▶INH      OFF-CTRL
MODE▶Cond       ▶CH8
→NORM▶  0.0%  SW▶SwB
  IDL1▶ 50.0%POS▶DOWN
  IDL2▶100.0%
  IDL3▶100.0%
  HOLD▶OFF
```

Adjustability:
- On/off may be separated from rotor speed by plugging the governor on/off into ch7 and changing CUT-CH setting.
- If using separate on/off, switch assignment is totally adjustable. Be careful not to assign governor off to a condition switch if you want the governor to function in that condition.
- Speed switching and governor ON/OFF may be together using one switch or ON/OFF switching may be performed using an independent switch/channel.
- In-flight adjustment of the head speed (for easy adjustment during tuning) may be created using an additional channel and a programmable mix. See www. futaba-rc.com\faq\ for details.

The governor controls throttle when it is active, so the throttle will not obey any FailSafe setting presets for throttle in the transmitter. Always set the FailSafe setting for the governor's on/off channel to OFF. This way the governor is shut off and the throttle obeys the FailSafe throttle commands.

> **Expert Tip:** Mounting the governor to the counter gear instead of the fan dramatically simplifies installation in many models.
> Futaba's **BPS-1** RPM Sensor which attaches a sensor to an exclusive engine directly is simpler.

Setting example: When speed and ON/OFF are using one switch:

Governor Speed	Switch Position (*Switch C* or Cond.)	Rate (%)	Adjustment from Tx.
RS1: OFF	**UP** or **NORM**	**0**	Use up to 0%. (Governor speed display reads "off".)
RS2: 1400	**CNTR** or **IDL1**	**50**	Speed adjusted by raising and lowering rate.
RS3: 1700	**DOWN** or **IDL2**	**100**	Speed adjusted by lowering rate.

*The relationship of the governor speed setting rS1~rS3 and the switch positions conforms to the table above.
*In throttle hold, always check that the governor is off.
*If the speed value rises when the cut switch is activated, reverse the "**DIR**" setting from **UP** to **DOWN** or vice versa.

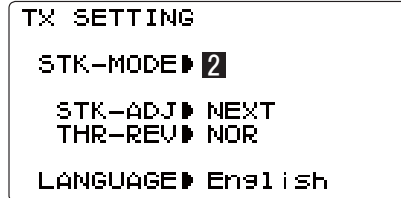| GOAL of EXAMPLE:	STEPS:	INPUTS:
Set up a GV-1 governor to use both channels into the receiver and switch between the governor settings automatically when changing conditions. Consider setting the battery FailSafe settings and other helpful functions on the GV-1 itself.	Open and activate the **GOVERNOR** function.	⊕ for 1 second. ◇ to **GOVERNOR**. ⊙
	Activate the function.	◇ to **MIX**. ⊕ to **CH7**.
	Optional: change cut-off channel to channel 7 and assign switch and direction for on/off (channel 7).	◇ to cut-**MIX** ⊕ to **CH7**. ◇ to OFF-CTRL-**SW**. ⊕ to desired **SWITCH**.
	Optional: change switch assignment to select governor settings. *Ex: select switch that adjusts the conditions.*	◇ to **MODE**. ⊕ to **Cond**.
	Adjust governor speed settings per switch position or condition as needed. (Ex: defaults are fine.) Allows head speed adjustment from transmitter.	◇ to each **Cond** position. ⊕ or ⊖ as needed. ◇ to next **Cond** position. Repeat.
	Close the function.	(END) (END)
Where next?	**GYRO**: see p. 87. Adjust FailSafe (**F/S**) settings (p. 48). Adjust idle-up 3 collective pitch curve for same rates of climb upright/inverted. See p. 78. Adjust elevator/aileron response to fit your flying style: see **D/R,EXP** and **END POINT**/**SWASH AFR**: p. 39, 36, 75.	

TX SETTING

This is not usually used. Please do not use unless necessary.
This setup can be performed in Stick Mode, Stick ADJ (calibration), Throttle stick reverse, and Language.
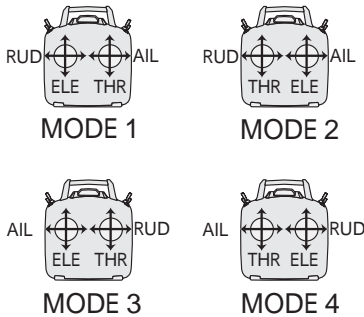
```
TX SETTING
  STK-MODE▶ 2

   STK-ADJ▶ NEXT
   THR-REV▶ NOR

  LANGUAGE▶ English
```
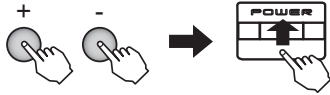
1.Simultaneously depress the   and   keys, and then turn on the power.

2. TX SETTING It is displayed.

STK-MODE

RUD⊕ELE THR⊕AIL
MODE 1

RUD⊕THR ELE⊕AIL
MODE 2

AIL⊕ELE THR⊕RUD
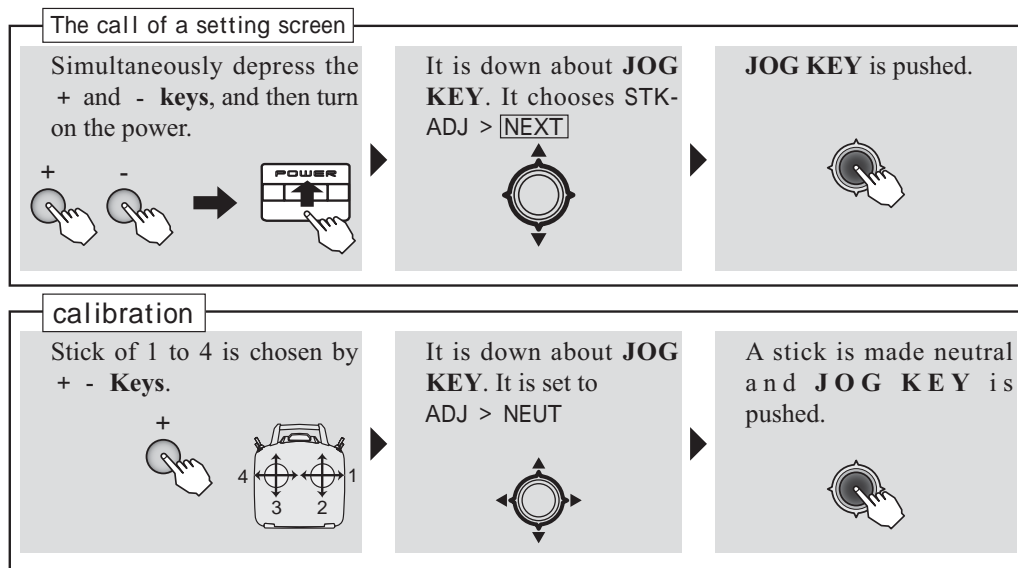**MODE 3**

AIL⊕THR ELE⊕RUD
MODE 4

The transmitter may be operated in four different stick "modes" (1, 2, 3 and 4). The modes determine the functions that will be operated by control sticks. Currently, the transmitter is in "Mode 2" and should be left in Mode 2 unless you are an experienced flyer and have learned to fly in a different mode. In mode 2, the right control stick operates the aileron and elevator and the left stick operates the rudder and throttle. This is how 99% of Americans fly their models.
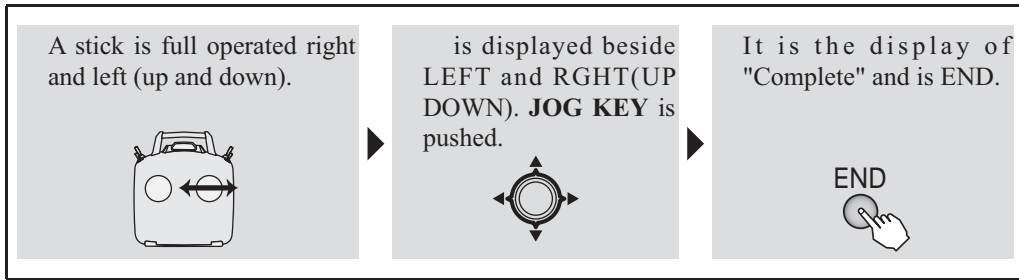
The mode can be chosen by   **KEY** from "**STK-MODE**" of the **TX SETTING** screen. The throttle detent mechanism will have to be moved as well. This can be done by the Futaba Service Center.

STK-ADJ (calibration)

Usually, this calibration is unnecessary.
Please perform this calibration only if a change at the center of a stick should arise after prolonged use.

The call of a setting screen		
Simultaneously depress the and **keys**, and then turn on the power.	It is down about **JOG KEY**. It chooses STK-ADJ NEXT	**JOG KEY** is pushed.

calibration		
Stick of 1 to 4 is chosen by **Keys**. 4⊕⊕1 3 2	It is down about **JOG KEY**. It is set to ADJ NEUT	A stick is made neutral and **JOG KEY** is pushed.

91

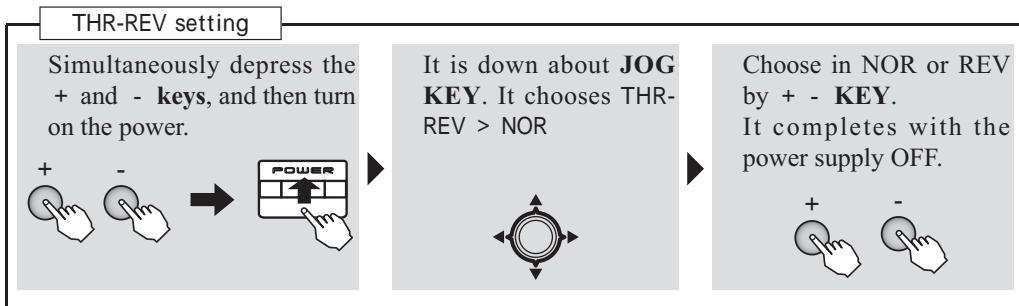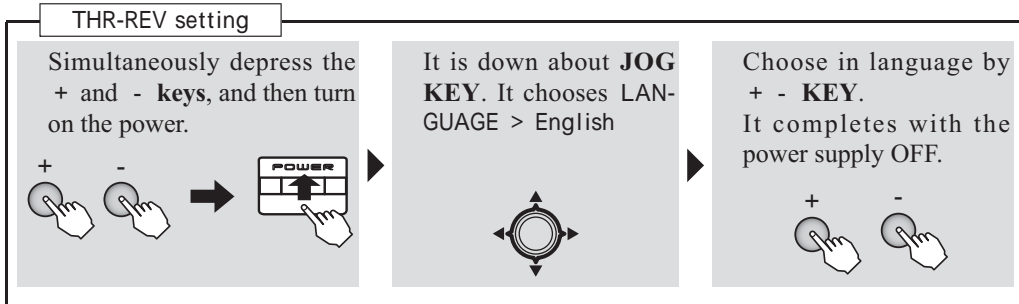|		
A stick is full operated right and left (up and down).	is displayed beside LEFT and RGHT(UP DOWN). **JOG KEY** is pushed.	It is the display of "Complete" and is END. END

THR-REV

Usually, this THR-REV is unnecessary. It is used when you desire throttle stick operation contrary to usual.(stick is the bottom→engine high, stick is the top→Idling)

Reversal of the throttle servo in linkage is usually performed by reverse of a menu. When this THR-REV is used, it is slow and a trim stop.
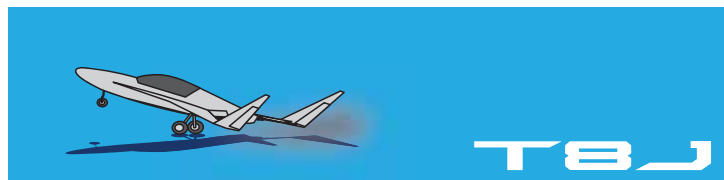
THR-REV setting

Simultaneously depress the and **keys**, and then turn on the power.	It is down about **JOG KEY**. It chooses THR-REV NOR	Choose in NOR or REV by **KEY**. It completes with the power supply OFF.

LANGUAGE

The language displayed can be chosen from seven languages.

THR-REV setting

Simultaneously depress the and **keys**, and then turn on the power.	It is down about **JOG KEY**. It chooses LANGUAGE English	Choose in language by **KEY**. It completes with the power supply OFF.

It is the reboot of a power supply which is returned to a normal screen from TX SETTING.