U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

May 5, 2015

Exemption No. 11492
Regulatory Docket No. FAA–2015–0322

Mr. Joshua L. Vilches
C.E.T. Aviation
20 West Gilbert Road
Southbury, CT 06488

Dear Mr. Vilches:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

By letter dated February 6, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of C.E.T. Aviation (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial filming and photography that will support the needs of the advertising and marketing in a variety of industries.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

Airworthiness Certification

The UAS proposed by the petitioner is a DJI Flame Wheel F550.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates,* and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for aerial data collection[1]. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, C.E.T. Aviation is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the

[1] Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, C.E.T. Aviation is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the DJI Flame Wheel F550 when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

2. Operations for the purpose of closed-set motion picture and television filming are not permitted.

3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.

4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.

5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.

6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the

Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS−80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g., replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.

12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.

19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.

21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N−Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

24. The UA must remain clear and give way to all manned aviation operations and activities at all times.

25. The UAS may not be operated by the PIC from any moving device or vehicle.

26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

    The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS−80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.

30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
    a. Dates and times for all flights;
    b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
    c. Name and phone number of the person responsible for the on-scene operation of the UAS;
    d. Make, model, and serial or N−Number of UAS to be used;
    e. Name and certificate number of UAS PICs involved in the aerial filming;
    f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
    g. Signature of exemption holder or representative; and
    h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.

31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on May 31, 2017, unless sooner superseded or rescinded.

Sincerely,
/s/
John S. Duncan
Director, Flight Standards Service

Enclosures

Petition for Exemption Under Section 333

February 6, 2015

Joshua L. Vilches
C.E.T. Aviation
20 West Gilbert Rd.
Southbury, Connecticut 06488
(646) 483-0110
jvilches@cetaviation.com

U.S. Department of Transportation, Docket Operations
West Building Ground Floor, Room w12-140
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Sir or Madam,

C.E.T. Aviation is requesting that the FAA review and approve this petition for exemption under section 333 of the FAA Modernization and Reform Act of 2012 from certain regulations, specified in this letter, within Title 14 Code of Federal Regulations (14 CFR) to allow for the commercial operation of a small Unmanned Aircraft System in the National Airspace System (NAS), for the purpose of providing aerial filming and photography that will support the needs of advertising and marketing in a variety of industries.

C.E.T. Aviation understands the FAA's concern in the regulation of Unmanned Aircraft operating in the National Airspace System and believes a level of safety and efficiency can coexist with both manned and unmanned aircraft if certain regulations and guidelines are followed. C.E.T. Aviation has developed a Flight Operations Manual that will be used as guidance to conduct a safe operation using a risk based approach. A copy of this manual has been included in this petition package for your reference. This manual describes the physical specifications and performance data of the UAS and explains how flight operations will be conducted in greater detail. This manual also defines persons authorized to pilot the UAS as well as maintain it. We have also included manufacturer owner/user manuals for the components that are installed in the UAS for review. These documents provide information on how to install, operate, troubleshoot and maintain the UAS. These documents also contain FCC compliance statements for the components that transmit a radio signal. You will also find copies of the pilot's certificates and a photograph of the Unmanned Aircraft System.

Name and Address of the Applicant

Joshua Larry Vilches
C.E.T. Aviation
20 West Gilbert Rd.
Southbury, C.T. 06488
Tel: 646-483-0110
jvilches@cetaviation.com

Unmanned Aircraft System

1. The small UAS that will be operated by C.E.T. Aviation is called a DJI Flame Wheel F550 and is distributed by DJI Innovations to a dealer network. The DJI Flame Wheel F550 arrives at its dealers in kit form and can be custom assembled by the end user. One such kit was assembled by RC Hobbies & More in Winsted, Connecticut and was purchased by C.E.T. Aviation. Its airframe, motors and propellers have been serialized. This particular UAS design is a vertical takeoff and landing hexa-copter, using six electric motors, each driving a respective propeller for thrust propulsion and flight control maneuverability. Its maximum takeoff weight is 5.29 pounds. Its operational flight speed is from 0 to 30 mph. Its payload is a video camera gimbal assembly and a small high definition video camera. The flight time is 12 minutes plus an additional 25% energy reserve for a fully charged battery. The onboard flight control system assists in the flight attitude stabilization of the UAS; provides telemetry information such as altitude and battery capacity; provides position location for failsafe modes through the use of GPS and accelerometers and initiates the failsafe modes (return to home auto-land) for lost control link. Additional failsafe modes also includes 2 levels low battery capacity warnings and thrust equalization in the event of a failed thrust motor. Please refer to the C.E.T. Aviation Flight Operations Manual and supporting manuals and documents for additional detailed information regarding the UAS specifications and performance.

2. C.E.T. Aviation has developed preflight, postflight and emergency checklists to be used during UAS operations. A maintenance program has also been developed for the UAS and the identification of persons authorized to perform maintenance has been determined. Detailed information pertaining to checklists and maintenance of the UAS can be found in the C.E.T. Aviation Flight Operations Manual.

3. This DJI Flame Wheel F550 is controlled by the PIC, at a ground station, using a radio control transmitter that transmits on 2.4 GHz radio frequency. The radio control transmitter conforms to FCC Part 15 regulations as stated in its instruction manual. There is a live video camera feed that is shown on a video display monitor located at this ground station. This link is handled by a wireless video transmission system that transmits low power on 5.8 GHz radio frequency and it conforms to FCC Part 15 regulations as stated in its supporting documents. Please refer to the C.E.T. Aviation

Flight Operations Manual and supporting manuals and documents for additional detailed information regarding UAS operation and regulatory compliance statements.

Unmanned Aircraft Pilot in Command (PIC) and Visual Observer (VO)

4. The small UAS will be operated by a pilot in command (PIC), Joshua Vilches, and a visual observer (VO), Ryan Voight, who will both ensure that a constant visual line of sight is maintained and that the environment surrounding the intended flight path of the UAS is unobstructed and will not pose a danger to persons or property. Both the PIC and VO have been training together using the procedures and guidelines contained in the C.E.T. Aviation Flight Operations Manual. The PIC intends to pilot the UAS for at least 25 hours of flight time before conducting commercial flight operations in order to become familiar with normal and emergency procedures applicable to operating the small UAS.
    - Joshua Vilches (PIC) holds a Private's Pilot's certificate (#3461547) with 220 hours of total flight time primarily in fixed wing, single engine aircraft and 5 hours in rotor wing aircraft and maintains Flight Review currency. He also holds an Airframe and Powerplant certificate (#3461547) with Inspection Authorization and has been actively maintaining full size aircraft for the past 17 years. Joshua has graduated with a Bachelors of Science degree in Aircraft Maintenance Technology from Pennsylvania College of Technology. He is proficient in flying fixed wing, rotor wing, and multi-rotor, radio controlled model aircraft for the past 22 years and has approximately 1,000 hours of flight time. This has included fixed wing model aircraft aerobatic competition. He is also an amateur hang gliding enthusiast and has been piloting weight shift hang gliders for 4 years.
    - Ryan Voight (VO) has approximately 65 hours operating quad-copter type Unmanned Aircraft Systems that weigh under 5 lbs for recreation. He also has 20 years of experience operating radio controlled model sailplanes and is a professional hang gliding instructor who has been piloting weight shift hang gliders for more than 20 years. His hang gliding rating class and abilities to fly cross country has required him to be tested on aeronautical and airspace knowledge. Ryan attended Marist College and majored in Communications specifically radio, television and film.

5. Joshua Vilches (PIC) holds a valid Third Class Medical. Refer to the supporting documents contained in this petition package.

Operation of the Unmanned Aircraft

6. C.E.T. Aviation will ensure flight operations are conducted safely by following established regulations, guidelines and procedures in order to mitigate risk. The PIC will maintain flight currency with the UAS as outlined in the C.E.T. Aviation Flight Operations Manual; the PIC will be responsible for notifying the applicable FAA Flight Standards

District Office of the intended flight operation 3 days prior; the PIC and/or VO will gather current and forecasted weather information for the day(s) of the flight operations; the PIC will ensure the UAS is in serviceable condition and will use preflight, postflight, and emergency checklists. The PIC shall not operate the UAS more than an altitude of 400 feet above the ground (AGL) and no more than 1,000 feet laterally from the UAS ground control station. More detailed information regarding UAS flight operation policies and procedures can be found in the C.E.T. Aviation Flight Operations Manual. These policies and procedures along with FAA Regulations will ensure a safe and efficient entry into the National Airspace System.

7. The small UAS operated by C.E.T. Aviation has a maximum speed of 30mph (26kts) and shall not be operated more than 400 feet above the ground. The PIC and VO will ensure that the UAS is not operated when the flight visibility is 3 statute miles or less and will maintain cloud clearances of 500 feet below and 2,000 feet horizontal. The UAS is never to be flown above any cloud line therefore no cloud clearance from above is given. Flying in inclement weather such as visible precipitation and local lightning strikes, and winds greater than 15 mph or 13 knots as measured at the ground, is prohibited. Flying at night is prohibited.

8. Operating close to the ground and within tight quarters may impose potential hazards. The small UAS operated by C.E.T. Aviation has the ability to hover and its flight attitude is stabilized through the use of an onboard flight control system independent of GPS signal. There are also built in fail safe modes in the event of lost GPS signal, lost control link, failed motor and weak battery levels. The UAS has the ability to autonomously return to the take off position and will reduce power settings in the event of a weak battery. The VO shall be responsible in ensuring non-essential, non-participating personnel do not interfere with the PIC and will monitor the UAS altitude information so that the PIC does not operate the UAS higher than 400 feet AGL. C.E.T. Aviation will not conduct any flight operations near, in or over stadiums; or over large gatherings of personnel. Personnel that are non-essential to the closed-set filming operations area are not allowed within 500 feet. This may be reduced to 200 feet if it would not adversely affect safety and the Administrator has approved it.

9. C.E.T. Aviation will not conduct any flight operations at any publicly open, towered or non-towered airport. The PIC shall ensure that flight operations are restricted to greater than 5 nautical miles of the geographic center of all publicly open, towered or non-towered airports as denoted on a current FAA published aeronautical charts. The UAS may not operate in Class B, C, or D surface airspace.

10. Regarding the FAA's concern with visual line-of-sight (VLOS), at least one crew member of the operating flight crew will maintain unobstructed (corrective lenses and sunglasses allowed), visual line of sight of the UAS at all times. Sometimes it is necessary for the PIC to momentarily view a separate, "live feed" monitor linked to the onboard camera to keep the recorded subject matter in view. When this occurs, the PIC will call out, "Clear

to look down?" The VO will maintain line of sight to the UAS and ensure that it will not be in danger of flying into any obstructions. The VO shall respond with "I see the aircraft, clear". Once the PIC looks back up to the UAS, he or she shall respond with "I see the aircraft". The use of First Person View goggles by the PIC or VO is strictly prohibited.

11. C.E.T. Aviation has established a preflight checklist as outlined in the Flight Operations Manual. This checklist ensures flight planning has been performed and ensures the UAS is in serviceable condition before flight operations are conducted.

12. The PIC will be responsible for notifying the local governing FAA Flight Standards District Office (FSDO) at least 3 days prior to the scheduled day of flight. This will be in the form of a written Plan of Activities which will include at least the following information:

    A) Dates and times of all flights
    B) Name and phone number of the operator of the UAS
    C) Name and phone number of the person responsible for the on-scene operation of the UAS
    D) Make, model, serial number and N-number of the UAS to be used
    E) Name and certificate number of UAS PICs involved in the flight operations event
    F) A statement that the operator has obtained permission from property owners and/or local officials to conduct the flight operations even; the list of those who gave permission must be made available to the inspector upon request
    G) Signature of exemption-holder or representative
    H) A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which flight operations will be conducted and the altitudes essential to accomplish the operation

Public Interest and National Security

C.E.T. Aviation intends to service the needs of aerial filming and photography for the purposes of movie making, advertising and marketing in a variety of industries. Traditional methods of aerial filming and photography are handled by full sized, fixed and rotor wing aircraft which are no longer competitive when compared to the low acquisition and operating costs of small unmanned aircraft systems. These cost savings can be transferred to the advertiser then ultimately to the consumer to promote competitiveness in the market place. Full sized aircraft have a greater environmental impact. They are significantly louder to operate than small, fully electric unmanned aircraft systems and carry a much larger "carbon footprint" adding to the growing concern of the emissions of greenhouse gases. Being all electric is beneficial in that it is significantly quieter and less likely to disrupt the peace of the surrounding flight operations area. Full sized aircraft carry flammable fuels and flight crew and/or passengers. There is a great deal of danger imposed to the flight crew and/or passengers and to those on the ground in the event of an emergency with regard to full size aircraft. This danger is considerably less in

comparison with the UAS due to its small size, maximum forward speed and lack of flammable fuels. Because C.E.T. Aviation will have a public presence for commercial UAS aerial filming and photography, we will be available and willing to assist in disaster relief.

There is no threat to National Security due to the Transportation Security Administration security screening of certificated airmen. Both the PIC and VO are U.S. Citizens and are greatly concerned in ensuring the public maintains their right to privacy.

We believe that because of advancing technologies, small unmanned aircraft systems are much less expensive to acquire, easier to operate, and less demanding to maintain when compared to full size aircraft. UAS aerial services, such as filming, surveying, inspection and surveillance will undoubtedly promote public interest. As C.E.T. Aviation becomes experienced in aerial filming and photography, it will look to further service other industries that would benefit from the use of unmanned aircraft systems.

Relief Sought By Petitioner (14 CFR)

CET Aviation is requesting exemption from the following regulations as they are written in 14 CFR: Part 21; Part 45.29; Part 61.113(a)&(b); Part 91.7(a); Part 91.9(b) and (2); Part 91.103; Part 91.109(a); Part 91.119(c)(d); Part 91.121(a)(1); Part 91.151(a); Part 91.203(a) and (b); Part 91.405(a); Part 91.407(a)(1); Part 91.409(a)(2); and Part 91.417(a) and (b).

Part 21 – Certification of Procedures for Products and Parts
This part prescribes the procedural requirements for issuing and changing design approvals; production approvals; airworthiness certificates; and airworthiness approvals.

Part 45.29 – Size of Marks
This part prescribes

(a) Except as provided in paragraph (f) of this section, each operator of an aircraft must display marks on the aircraft meeting the size requirements of this section.

(b) *Height.* Except as provided in paragraph (h) of this part, the nationality and registration marks must be of equal height and on—

(1) Fixed-wing aircraft, must be at least 12 inches high, except that:

(i) An aircraft displaying marks at least 2 inches high before November 1, 1981 and an aircraft manufactured after November 2, 1981, but before January 1, 1983, may display those marks until the aircraft is repainted or the marks are repainted, restored, or changed;

(ii) Marks at least 3 inches high may be displayed on a glider;

(iii) Marks at least 3 inches high may be displayed on an aircraft for which the FAA has issued an experimental certificate under §21.191 (d), §21.191 (g), or §21.191 (i) of this chapter to operate as an exhibition aircraft, an amateur-built aircraft, or a light-sport aircraft when the maximum cruising speed of the aircraft does not exceed 180 knots CAS; and

(iv) Marks may be displayed on an exhibition, antique, or other aircraft in accordance with §45.22.

(2) Airships, spherical balloons, nonspherical balloons, powered parachutes, and weight-shift-control aircraft must be at least 3 inches high; and

(3) Rotorcraft, must be at least 12 inches high, except that rotorcraft displaying before April 18, 1983, marks required by §45.29(b)(3) in effect on April 17, 1983, and rotorcraft manufactured on or after April 18, 1983, but before December 31, 1983, may display those marks until the aircraft is repainted or the marks are repainted, restored, or changed.

(c) *Width.* Characters must be two-thirds as wide as they are high, except the number "1", which must be one-sixth as wide as it is high, and the letters "M" and "W" which may be as wide as they are high.

(d) *Thickness.* Characters must be formed by solid lines one-sixth as thick as the character is high.

(e) *Spacing.* The space between each character may not be less than one-fourth of the character width.

(f) If either one of the surfaces authorized for displaying required marks under §45.25 is large enough for display of marks meeting the size requirements of this section and the other is not, full size marks must be placed on the larger surface. If neither surface is large enough for full-size marks, marks as large as practicable must be displayed on the larger of the two surfaces. If no surface authorized to be marked by §45.27 is large enough for full-size marks, marks as large as practicable must be placed on the largest of the authorized surfaces. However, powered parachutes and weight-shift-control aircraft must display marks at least 3 inches high.

(g) *Uniformity.* The marks required by this part for fixed-wing aircraft must have the same height, width, thickness, and spacing on both sides of the aircraft.

(h) After March 7, 1988, each operator of an aircraft penetrating an ADIZ or DEWIZ must display on that aircraft temporary or permanent nationality and registration marks at least 12 inches high.

<u>Part 61.113(a)&(b) – Private Pilot Privileges and Limitations: Pilot in Command</u>

-Section (a) prescribes that no person who holds a private pilot certificate may act as pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.

-Section (b) of this part prescribes that a private pilot may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment if:

1) The flight is only incidental to that business or employment; and
2) The aircraft does not carry passengers or property for compensation or hire.

<u>Part 91.7(a) – Civil Aircraft Airworthiness</u>

Section (a) prescribes that no person may operate a civil aircraft unless it is in an airworthy condition.

<u>Part 91.9(b)(2) – Civil Aircraft Flight Manual, Marking, and Placard Requirements</u>

Section (b)(2) prescribes that no person may operate a U.S.-registered civil aircraft for which an Airplane or Rotorcraft Flight Manual is not required by § 21.5 of this chapter, unless there is

available in the aircraft a current, approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

Part 91.103(b) – Preflight Action

Section (b) prescribes that each pilot in command shall, before beginning a flight, become familiar with runway lengths at airports of intended use, and the following takeoff and landing distance information.

Part 91.109(a) – Flight Instruction; Simulated Instrument Flight and Certain Flight Tests

-Section (a) prescribes that no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls. However, instrument flight instruction may be given in an airplane that is equipped with a single, functioning throw over control wheel that controls the elevator and ailerons, in place of fixed, dual controls, when:

1) The instructor has determined that flight can be conducted safely; and
2) The person manipulating the controls has at least a private pilot certificate with appropriate category and class ratings.

Part 91.119(c)(d) – Minimum Safe Altitudes; General

Section 91.119 prescribes that no person may operate an aircraft, except when necessary for takeoff or landing, below the following altitudes:

(c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

(d) Helicopters, powered parachutes, and weight-shift-control aircraft. If the operation is conducted without hazard to persons or property on the surface –

(1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA; and
(2) A powered parachute or weight-shift-control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.

Part 91.121(a)(1) – Altimeter Settings

Section (a)(1) of this part prescribes that each person operating an aircraft shall maintain cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating:

1) Below 18,000 feet MSL, to –
(i) The current reported altimeter setting of a station along the route and within 100 nautical miles of the aircraft;
(ii) If there is no station within the area prescribed in paragraph (a)(1)(i) of this section, the current reported altimeter setting of an appropriate available station; or
(iii) In the case of an aircraft not equipped with a radio, the elevation of the departure airport or an appropriate altimeter setting available before departure.

Part 91.151(a) – Fuel Requirements for Flight in VFR Conditions

Section (a) of this part prescribes no person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed:

1) During the day, to fly after that for at least 30 minutes; or
2) At night, to fly after that for at least 45 minutes.

Part 91.203(a)&(b) – Civil Aircraft: Certifications Required

Section (a) of the part prescribes no person may operate a civil aircraft, except as provided in §91.715, unless it has within it the following:

1) An appropriate and current airworthiness certificate. Each U.S. airworthiness certificate used to comply with this subparagraph (except a special flight permit, a copy of the applicable operations specifications issued under §21.197(c) of this chapter, appropriate sections of the air carrier manual required by parts 121 and 135 of this chapter containing that portion of the operations specifications issued under §21.197(c), or an authorization under §91.611) must have on it the registration number assigned to the aircraft under part 47 of this chapter. However, the airworthiness certificate need not have on it an assigned special identification number before 10 days after that number is first affixed to the aircraft. A revised airworthiness certificate having on it an assigned special identification number, that has been affixed to an aircraft, may only obtained upon application to an FAA Flight Standards district office.
2) An effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft registration Application as provided for in §47.31(c), or a registration certification issued under the laws of a foreign country.

Section (b) of this part prescribes that no person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under §91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

Part 91.405(a) – Maintenance Required

Section (a) of this part prescribes that each owner or operator of an aircraft shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter.

Part 91.407(a)(1) – Operation After Maintenance, Preventative Maintenance, Rebuilding or Alteration

Section (a)(1) of this part prescribes that no person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless it has been approved for return to service by a person authorized under §43.7 of this chapter.

Part 91.409(a)(2) – Inspections

Section (a)(2) of this part prescribes that no person may operate an aircraft unless, within the preceding 12 calendar months, it has had an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

Part 91.417(a)&(b) – Maintenance Records

Section (a) of this part prescribes that each registered owner or operator shall keep the following records, except for work performed in accordance with §§91.411 and 91.413, for the periods specified in paragraph (b) of this section:

1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include:

(i)A description (or reference to data acceptable to the Administrator) of the work performed; and

(ii)The date of completion of the work performed; and

(iii)The signature and certificate number of the person approving the aircraft for return to service.

2) Records containing the following information:

(i) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD of safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by §43.9(d) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

Section (b) of this part prescribes that the owner or operator shall retain the following records for the periods prescribed:

1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.

2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.

3) A list of defects furnished to a registered owner or operator under §43.11 of this chapter shall be retained until defects are repaired and the aircraft is approved for return to service.

Reasons for relief

Part 21 – Certification of Procedures for Products and Parts-
C.E.T. Aviation requests relief from 14 CFR part 21 "Certification procedures for products and parts" based on the UAS small size, weight, speed, limited operating area, limited flight time and inability to carry crew or passengers. A Flight Operations Manual has been established that will be a guideline for conducting safe operations as well as identify persons authorized to pilot and maintain the UAS. For these reasons, operating the UAS without an Airworthiness Certificate would meet an equivalent level of safety.

Part 45.29 – Size of Marks-
C.E.T. Aviation requests relief from 14 CFR part 45.29 "Size of marks" due to the physical size and space available to properly display the Roman capital "N" and assigned registration number on the UAS at the minimum requirement height. C.E.T. Aviation will display such marks and numbers as large as possible and in contrasting color, on the UAS using the available space both under and above the airframe once the registration number has been assigned.

Part 61.113(a)&(b) – Private Pilot Privileges and Limitations: Pilot in Command-
C.E.T. Aviation requests relief from 14 CFR part 61.113(a)&(b) which limits private pilots to non-commercial flight operations. Because the small UAS cannot carry crew or passengers, has a limited operational range and limited flight time, an equivalent level of safety can be guaranteed by using the established procedures and guidelines contained in the C.E.T. Aviation Flight Operations Manual. The PIC does possess a Private's Pilots Certificate, has a current Third Class Medical Certificate, is current in his Flight Review requirements and has considerable experience operating fixed wing, rotor wing, and multi-rotor radio controlled aircraft.

Part 91.7(a) – Civil Aircraft Airworthiness-
C.E.T. Aviation requests relief from 14 CFR part 91.7(a) which requires that no one operate an aircraft unless it is in airworthy condition. There are currently no airworthiness standards for small UAS, nor is C.E.T. Aviation seeking an "Experimental" airworthiness certificate. Given the size, weight, speed and limited operational range and flight time of the UAS; and the maintenance guidelines and flight operational procedures and limitations established in the C.E.T. Aviation Flight Operations Manual, and all available UAS component manuals and/or guides, an equivalent level of safety can be established.

Part 91.9(b)(2) – Civil Aircraft Flight Manual, Marking, and Placard Requirements-
C.E.T. Aviation requests relief from 14 CFR part 91.9(b)(2) which requires that no one operate a U.S. -registered civil aircraft unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards. The small UAS does not have the capacity to carry crewmembers and flight and/or approved manuals. The PIC of the UAS shall have available the C.E.T. Aviation Flight Operations manual and checklists, and all available UAS component manuals and/or guides, located at the ground control station at all times during flight operations.

Part 91.103 – Preflight Action-
C.E.T. Aviation requests relief from 14 CFR part 91.103 which requires the pilot in command, before a flight, to become familiar with all information concerning that flight. Because the small UAS cannot carry crew or passengers, has a limited operational range and limited flight time, and will not have approved manuals, an equivalent level of safety can be maintained by the use of established procedures and guidelines contained in the C.E.T. Aviation Flight Operations manual, which requires the PIC to conduct a preflight action. The PIC shall be responsible for FSDO notification, weather forecasts, the serviceability of the UAS, battery capacities and battery serviceability, and the proper training and flight currency requirements. For these reasons, an equivalent level of safety can be met.

Part 91.109(a) – Flight Instruction; Simulated Instrument Flight and Certain Flight Tests-
C.E.T. Aviation requests relief from 14 CFR part 91.109(a) which requires that no one may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls. The small UAS in its design does not utilize conventional controls. It is remotely operated by the PIC through the use of a radio control transmitter at the ground control station and the UAS onboard radio receiver. This transmitter/receiver system has the ability to connect to a second radio control transmitter (known as a "buddy box") using an electrical cable connection that allows for training a student pilot. The buddy box is always slaved to the PIC's radio control transmitter allowing for immediate take over from the student pilot.

Part 91.119 – Minimum Safe Altitudes; General-
C.E.T. Aviation requests relief from 14 CFR part 91.119 which establishes safe altitudes for aircraft in the event of a power unit failure. The PIC shall keep all UAS flight altitudes restricted to no higher than 400 feet above the ground (AGL). This will significantly reduce the potential of a midair collision with full sized aircraft operating at higher altitudes. The small UAS shall only be operated in a sterile, confined flight operations area that is restricted to a maximum perimeter of 400 feet AGL and 1,000 feet latterly from the ground control station. Both the PIC and VO shall listen for approaching aircraft near the UAS flight operations area and will terminate the flight if there is a threat of a midair collision. Also, given the size, weight, speed, limited operational range and limited flight time of the UAS, an equivalent level of safety will be achieved.

Part 91.121(a)(1) – Altimeter Settings-
C.E.T. Aviation requests relief from 14 CFR part 91.121(a)(1) which requires each person operating an aircraft maintain cruising altitude or flight level of that aircraft by reference to an altimeter that is set to the current reported altimeter setting along the route or adjusted to the elevation of the departure airport. The small UAS is not equipped with a barometric altimeter but instead uses a GPS signal for sensing altitude above the ground. This information is transmitted to a video monitor display for viewing by the PIC and/or VO. This altitude information will be verified during the initial calibration procedure during the preflight action. For these reasons and equivalent level of safety can be met.

Part 91.151(a) – Fuel Requirements for Flight in VFR Conditions-
C.E.T. Aviation requests relief from 14 CFR part 91.151(a) which requires that no person may begin a flight in an airplane under daylight VFR conditions unless there is enough fuel to fly to the first point of intended landing and after that for another 30 minutes. The small UAS has a maximum flight time of 16 minutes per fully charged battery; however the PIC shall restrict cumulative flight time for each fully charged battery to no more than 12 minutes. This allows for a 25% power reserve. After the 12 minutes is consumed, the battery will be recharged to 100% capacity. The UAS built in failsafe modes also allow for pilot notification of low battery power through the use of a flashing red LED indicator on the UAS. The next level of failsafe would trigger the automatic reduction of available power. This signals the pilot to land the aircraft as soon as possible allowing for an equivalent level of safety.

Part 91.203(a)&(b) – Civil Aircraft: Certifications Required-
C.E.T. Aviation requests relief from 14 CFR part 91.203(a)&(b) which requires that no person operate a civil aircraft unless it has within it a current airworthiness certificate and a U.S. registration certificate displayed at the cabin or cockpit entrance. There are no current airworthiness certification standards for small unmanned aircraft systems nor is C.E.T. Aviation seeking an airworthiness certificate for its UAS under the "Experimental" category. The PIC shall ensure the UAS is properly registered and marked as appropriately, however he is unable to display the U.S. registration certificate in the UAS as it does not have a cabin or cockpit. The PIC will maintain such documents at the ground control station.

Part 91.405(a) – Maintenance Required-
C.E.T. Aviation requests relief from 14 CFR part 91.405(a) which requires that each owner or operator of an aircraft have that aircraft inspected as prescribed in Subpart E and shall between required inspections have discrepancies repaired as prescribed in part 45. Because the small UAS does not have an airworthiness certificate or a manufacturer designated maintenance program, every effort shall be made by the PIC to ensure the UAS is in serviceable condition. Supporting component manufacturer documents are available and maintenance guidelines have been published in the C.E.T. Aviation Flight Operations Manual to ensure the serviceability of the UAS.

Part 91.407(a)(1) – Operation After Maintenance, Preventative Maintenance, Rebuilding or Alteration-
C.E.T. Aviation requests relief from 14 CFR part 91.407(a)(1) which requires that no person may operate an aircraft that has undergone maintenance, preventative maintenance, rebuilding or alteration unless it has been approved for return to service by an authorized person. The small UAS will not have an airworthiness certificate and persons authorized to perform maintenance have not yet been established by the FAA. C.E.T. Aviation has defined persons authorized to perform maintenance on the UAS in its Flight Operations Manual. The PIC shall ensure the UAS is in serviceable condition, is maintained accordingly by authorized personnel, and such maintenance is documented in the UAS maintenance logbook.

Part 91.409(a)(2) – Inspections-
C.E.T. Aviation requests relief from 14 CFR part 91.409(a)(2) which requires that no person may operate an aircraft unless within the previous 12 calendar months it has an inspection for the issuance of an airworthiness certificate. There are currently no airworthiness standards for small UAS nor is C.E.T. Aviation seeking an airworthiness certificate in the "Experimental" category. A maintenance program for the UAS has been established and is identified in the C.E.T. Aviation Flight Operations Manual. This includes an annual or 100 hour inspection, as applicable, and a 10 hour progressive inspection that will ensure serviceability of the UAS. This will ensure that an equivalent level of safety will be met.

Part 91.417(a)&(b) – Maintenance Records-
C.E.T. Aviation requests relief from 14 CFR part 91.417(a)&(b) which requires each registered owner or operator keep maintenance, alteration and inspection records and keep those records for the time prescribed in the §(b) of this part. The small UAS will not have an airworthiness certificate and no maintenance authority for UAS has been established by the FAA therefore the certificate number of the person or entity to perform the UAS maintenance cannot be provided. C.E.T. Aviation has determined persons authorized to perform maintenance, alterations and inspections and shall document such work in the aircraft maintenance logbook. Such maintenance entries shall be retained for 7 years after the transfer of ownership of that particular UAS.

Foreign Operations

C.E.T. Aviation does intend to service the aerial filming and photography needs outside of the United States as required by the customer. Certain landscapes and backgrounds are not available here is the United States and such geographic features found in other countries would greatly enhance the captured filming and photography's emotional impact for the viewer, providing a uniqueness to the subject matter. We will take the same measures and precautions as stated in our Flight Operations Manual both domestically and abroad. We will research and obtain appropriate authorizations from those foreign governing agencies and will not operate if such requested authorization is not granted. C.E.T. Aviation will always be headquartered in the U.S. and it anticipates that 95% of its operation will be located domestically.

Conclusion

C.E.T. Aviation looks forward to your response. We are very excited to be part of advancing technologies in aeronautics. Unmanned aircraft systems will undoubtedly be here to stay as it is in human nature to progress forward. With your exemption, we will make safety our number one priority. We will continuously look for ways to improve operations and comment on ways to make unmanned aircraft systems safer.

Thank you,

Joshua L. 2/6/2015

Joshua L. Vilches
C.E.T. Aviation

State of CONNECTICUT County of LITCHFIELD
Subscribed and sworn before me on 2/6/2015 (Date)
Elaine L Gist
(Notary Signature)

C.E.T. Aviation

Aerial Filming and Photography

20 West Gilbert Road
Southbury, Connecticut 06488

Small Unmanned Aircraft System

Flight Operations Manual

Basic Issue
February, 2015

Table of Contents

Table of Contents

Abbreviations and Definitions

Unmanned Aircraft System (UAS) – An unmanned aircraft and its associated elements, including communication links and the components that control the unmanned aircraft, that are required for the pilot in command to operate safely and efficiently in the national airspace system.

National Airspace System (NAS) - The common network of U.S. airspace, air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material.

Pilot in Command (PIC) - The person who has final authority and responsibility for the operation and safety of the flight; has been designated as PIC before or during the flight; and holds the appropriate category class and type-rating, as required, for the conduct of the flight.

Visual Observer (VO) - A trained person who assists the pilot in command with duties associated with environmental awareness, collision avoidance, and navigational awareness of the unmanned aircraft system through electronic and/or visual means.

Flight Operations Area - An area of air space that the pilot in command has designated to be a sterile and safe environment for the unmanned aircraft system to be flown while maintaining the restrictions and limitations set forth in this manual.

Ground Control Station – The physical location at which the pilot in command and the visual observer are located during the flight operations of the small unmanned aircraft system.

Telemetry – The ground speed, altitude and battery capacity information that is transmitted from the unmanned aircraft system to the ground station video monitor.

Visual Line of Sight (VLOS) – Unaided visual contact (corrective lenses and/or sunglasses exempted) between a pilot in command and an unmanned aircraft sufficient to maintain safe operational control of the aircraft, know its location, and be able to scan the airspace in which it is operating to see and avoid other air traffic or objects aloft or on the ground.

Lost Link – The loss of command-and-control link contact with the unmanned aircraft system and the remote pilot in command in which the pilot can no longer manage the unmanned aircraft's flight.

Certificate of Waiver or Authorization (COA) – An authorization that is issued by the Air Traffic Organization to a public operator for a specific unmanned aircraft activity.

Emergency Response Plan (ERP) – A course of action that is developed, practiced, and executed to effectively respond to accidents or emergencies.

Pilot and Visual Observer Information

Pilot in Command
Joshua L. Vilches
20 West Gilbert Rd.
Southbury, C.T. 06488
646-483-0110
FAA Certificate # 3461547

Visual Observer
Ryan Voight
Ellenville, NY
801-599-2555

Aircraft General Information

The aircraft being operated by C.E.T. Aviation is considered to be a small, Unmanned Aircraft System (UAS) in which there will be no provisions to carry flight crew, passengers or payload other than a small video camera. The UAS was assembled from a kit which was manufactured by DJI Innovations and assembled by RC Hobbies & More in Winsted, Connecticut.

DJI Flame Wheel F550 consists of:

- Frame assembly and four fixed landing gear legs. The airframe has been serialized and is numbered HEX 1
- Six -- electric motors, each driving one propeller, provide control thrust for maneuverability. These motors have been serialized and are numbered P0-0001 through P0-0006
- Six -- 10 inch diameter by 3.8 pitch propellers or optional 8 inch diameter by 4.5 pitch propellers. These propellers have been serialized and are numbered P0-0001 through P0-0006
- Six -- electronic speed controllers (ESC) which adjust the speed of the electric motors (one ESC per thrust motor) based on operator control input.
- A radio receiver which receives control inputs by the pilot operated transmitter.
- An electronic flight control system that provides 3-axis attitude stability in flight; fail safe modes for low battery and failed motor; return-to-home mode in the event of a lost communications link; camera gimbal operation; GPS position, and telemetry data.
- A camera gimbal assembly designed to carry and stabilize a small video camera
- A wireless video transmission module that transmits the onboard video camera's live feed to a video monitor at the ground control station.
- Battery pack that provides power to the entire UAS and its components.

Aircraft Specifications for the DJI Flame Wheel F550

- Frame Weight: 1.05 pounds
- Maximum Takeoff Weight: 5.29 pounds
- Diagonal Wheelbase: 1.8 feet (550mm)
- Motors: Six, DJI Innovations, 22 x 12mm (Stator Size) electric motors operating @ 920rpm/V
- Propellers: Six, DJI Innovations, 10 x 3.8in (@3S); Optional 8 x 4.5in (@4S)
- Electronic Speed Control (ESC): Six, DJI Innovations ESCs; Current = 15A; Signal Frequency = 30Hz-450Hz
- Flight Control Radio Transmitter & Receiver: Futaba 14SG 2.4GHz 14 channel radio (FCC compliant, see user manual)
- Flight Stability/Telemetry Computer: DJI Innovations, Naza M V2 (FCC compliant, see user manual)
- Wireless Video Transmission System: FlySight Black Pearl Video Monitor w/ FatShark 5.8GHz TX (FCC compliant, see user manual)
- Camera Gimbal Assembly: DJI Innovations H3-2D Gimbal
- Battery: 4S LiPo (Lithium Polymer) 6600mA
- Payload: One "GoPro" HD video camera (wireless transmission of this device will not be used; the live video feed is transmitted by the FatShark 5.8GHz TX)

Aircraft Performance Data for the DJI Flame Wheel F550

Maximum forward speed: 30mph (26 kts)
Minimum forward speed: 0mph (0 kts)
Climb Rate: 900 ft/min
Descent Rate: 900 ft/min
Turn Rate @ 30mph & 30° bank angle: 104.7ft turn radius / 3.7seconds per 90° of turn
Approach Speed: 0mph (0 kts) to 30mph (26 kts)
Launch/Recovery Method: Vertical Takeoff and Vertical Landing
Flight Time: 12 minutes plus an additional 25% as a reserve.

Standard Operating Procedures

The unmanned aircraft systems standard operating procedures (SOPs) are used by C.E.T. Aviation to standardize and clarify the responsibilities, procedures and actions to be used by UAS operating flight crew to achieve the highest level of safety through all aspects of flight operations.

It is impossible to describe and publish a standard procedure for every aspect of flight operations and a situation may arise that is not covered in a published SOP. The UAS operating flight crew, working as a team, will determine a safe and appropriate course of action.

However, the Pilot in Command (PIC) shall have the final authority as to the operation of the aircraft.

Pilot in Command Authority

The pilot in command of each flight has the final authority and responsibility to make any decision concerning the safe and efficient operation of the UAS. Under no circumstances will safety be compromised.
The pilot in command has the sole authority to deviate from any planned take off, flight path or intended landing zone based on their judgment regarding operational and safety issues.
In emergency situations, the pilot in command is authorized to deviate from prescribed rules to the extent that safety is not compromised.

Operational Policy

The UAS operating flight crew shall comply with all normal and emergency operating procedures set forth within this manual.
The following general policies are published to present guidelines within which UAS operating flight crews are expected to operate.

Flight Operations Area – A sterile, closed-set environment shall be established by the PIC prior to any commercial flight operations. Written consent shall be obtained from the land and/or property owner or their representative as well as the end customer seeking services by C.E.T. Aviation. This will be in the form of a Service Authorization document signed by the customer. Written consent shall be established for any personnel that are required to be on-set for the particular flight operation. Every effort shall be made to ensure the safety of participating and non-participating personnel during flight operations. The UAS may not be operated directly over any personnel unless they are essential to production or filming operation. Personnel that are non-essential to the closed-set filming operations area are not allowed within 500 feet. This may be reduced to 200 feet if it would not adversely affect safety and the Administrator has approved it. An equivalent level of safety may be determined by an aviation safety inspector's evaluation of the operations area to note terrain features, obstructions, buildings, safety barriers, etc. Such barriers may protect non-participating personnel from debris in the event of an accident. Warning signs and temporary barriers, such as posts and "Caution Tape", shall be used to inform any non-essential personnel from entering the closed-set filming operations area if the potential exists. This may not be required if flight operations are conducted in a remote, un-populated area.

UAS Control – One pilot shall always be dedicated exclusively to controlling the aircraft. The second crew member shall be considered the Visual Observer (VO) which is dedicated to assisting the pilot in command (PIC) in maintaining direct visual line of sight to the UAS at all times. The VO shall inform the PIC of any environmental obstructions that may interfere with

the planned flight path of the UAS. Altitude information will be relayed verbally to the PIC by the VO when instructed to do so. The VO shall also notify the PIC if the UAS is approaching the maximum altitude ceiling of 400 feet above the ground. The VO shall be aware and notify the PIC of declining weather in the vicinity of the flight operations.

Flight Phases – To ensure that both UAS flight crewmembers are always aware of the UAS phase of flight and to promote the concept of resource management, the PIC shall callout verbally his or her intended phase of flight. Example: "taking off, climbing, descending, moving left, moving right, moving away, moving toward us, and landing". The VO shall always check the intended flight path for obstructions and reply with "Clear or not clear".

UAS Ground Control Station – Both the PIC and VO will remain at a fixed location on the ground at all times during all phases of flight. Operating from a moving vehicle or platform, floating platform or while standing in water is strictly prohibited. The PIC and VO will not walk away from this designated ground control station unless an emergency has been established. The VO will not be more than an arm's reach from the PIC during all flight operations. If the PIC determines that there is an emergency and it is necessary to walk toward the UAS in order to maintain a visual line of sight, the PIC will call out "loosing visual" and the VO will hold the arm of the PIC and will ensure that the PIC will not trip over any hazards while walking toward the UAS. In this case, every effort shall be made to maintain full or partial control of the UAS to avoid harm to personnel and/or property. The flight crew will utilize the ability to link the live video camera feed to a video display monitor located at the ground control station during flight operations, however this equipment is considered nonessential to flight operations.

Visual Line of Sight Rules – At least one crew member of the operating flight crew will maintain unobstructed (corrective lenses and sunglasses allowed), visual line of sight of the UAS at all times. Sometimes it is necessary for the PIC to momentarily view a separate, "live feed" monitor linked to the onboard camera to keep the recorded subject matter in view. When this occurs, the PIC will call out, "Clear to look down?" The VO will maintain line of sight to the UAS and ensure that it will not be in danger of flying into any obstructions. The VO shall respond with "I see the aircraft, clear". Once the PIC looks back up to the UAS, he or she shall respond with "I see the aircraft". The use of First Person View goggles by the PIC or VO is strictly prohibited.

Flight Operations Limitations

- Battery levels will be continually monitored by the PIC and VO by means of a remote visual indicator and use of a flight timer as a backup. Total flight duration for a fully charged battery shall not exceed 12 minutes cumulative. These 12 minutes account for a 25% battery power reserve. After the battery has been replaced with a fully charged battery, this flight time counter will reset. The UAS Flight Control System has a built in safe mode to prevent the complete depletion of battery levels, however it is to goal to land before this mode is activated to prevent unsafe landing conditions.

- Flying at night is prohibited. Night is defined as the time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time.
- Flying in inclement weather such as visible precipitation and local lightning strikes, and winds greater than 15 mph or 13 knots as measured at the ground, is prohibited.
- The PIC and VO will ensure that the UAS is not operated above 400 feet above the ground and 1,000 feet laterally from the PIC and VO who shall both be located at a fixed ground control station.
- The PIC and VO will ensure that the UAS is not operated when the flight visibility is 3 statute miles or less and will maintain cloud clearances of 500 feet below and 2,000 feet horizontal. The UAS is never to be flown above any cloud line therefore no cloud clearance from above is given.
- It is the responsibility of the PIC to ensure weather reports are current and are received from reliable sources such as, but not limited to 1-800-WX-BRIEF (992-7433), www.intellicast.com for the city in which the flight operation is being conducted, or www.aviationweather.gov/adds/metars/ for the closest reporting airport to the UAS flight operations area.
- C.E.T. Aviation will not conduct any flight operations near, in or over stadiums; or over large gathering of persons.
- C.E.T. Aviation will not conduct any flight operations at any publicly open, towered or non-towered airport. The PIC shall ensure that flight operations are restricted to greater than 5 nautical miles of the geographic center of all publicly open, towered or non-towered airports as denoted on a current FAA published aeronautical charts.
- The UAS may not operate in Class B, C, or D surface airspace.
- The UAS must remain clear and yield the right of way to all other manned operations and activities at all times (including, but not limited to, agricultural aircraft, rotor-wing aircraft, ultralight vehicles, parachute activities, parasailing activities, hang gliders, etc.)
- If the PIC and/or VO hears the sound of an approaching aircraft, such as a low flying manned rotor-wing or fixed wing aircraft, and there is concern that the approaching aircraft may penetrate the designated flight operations area, the UAS flight will be terminated until that approaching aircraft has passed and the threat of a potential mid-air collision is alleviated.
- If the UAS loses communications (Lost Link) the UAS must return to a predetermined location within the security perimeter and land or be recovered. The UAS has a built-in ability to "return-to-home" if there is a Lost Link. This ability will be tested on a regular basis as outlined in the maintenance section of this manual. The purpose of the onboard GPS receiver is to provide the operator with telemetry information such as ground speed and altitude and increased precision in locating the return-to-home position during failsafe modes.
- Under no circumstances shall the UAS be operated autonomously during normal flight operations. The PIC must maintain operational control via the UAS's radio transmitter at all times. Programming of flights or any means of an autopilot

function is strictly prohibited, unless the UAS itself or operator has initiated one of the fail safe modes due to an in-flight failure. In this case, it is the goal to have the UAS autonomously land or be recovered safely.

Privacy Policy

C.E.T. Aviation will not interfere with the privacy of any non-consenting, non-participating personnel. C.E.T. Aviation believes the public is entitled to their privacy and therefore will not record video or take photographs of individuals and/or private property without the consent of that person and/or property owner for commercial purposes. C.E.T. Aviation shall not film or photograph non-consenting persons who are located on private property during commercial or non-commercial flight operations.

Safety Policy

Safety is the basic building block to our success as an Unmanned Aircraft System Flight Organization. All members must be committed to this goal for continuous improvement to our safety programs and enhancement of our positive culture toward safety. The safety of our employees, customers, ground personnel and property is of primary concern and we must focus on the prevention of mishaps, accidents and injuries. We expect each member of C.E.T. Aviation to adopt a leadership role in the safety program. Strong leadership at all levels, knowledge of and attention to standards and the integration of risk management into all of our day-to-day activities are critical. Our safety program goals do not exist separate from, but are directly tied to our daily operational responsibilities.

Safety performance is an appropriate factor to integrate into the employee evaluation process. This integration begins with the daily application of process-based procedures, down to the lowest levels. Additionally, our organization will have several mechanisms for involvement, including but not limited to, risk assessments, hazard reporting programs, and an open communication policy designed to combat potentially hazard conditions. Our commitment will include the necessary training, financial resources, time resources and personnel available to support our commitment to safety. It is the responsibility of all employees to identify and communicate any potential risk factors that will jeopardize safety to each other which will ultimately raise the standards a safety conscientious environment and promotes improvement. Our organization demands that all employees take immediate, decisive action when standards are violated, without fear of retribution. Our goal is to promote an atmosphere that can result in immediate and positive action when standards are compromised. This manual is a requirement to operate safely in all day-to-day activities. This critical document ensures errors and missed procedures are corrected prior to flights and unsafe actions.

Lithium Polymer Battery Safety

- Lithium Polymer (LiPo) Batteries have been known to fail and catch fire. Most of the battery failures have occurred due to improper recharging which leads to a cell imbalance. A good indicator that a LiPo Battery is about to fail is to look at its physical appearance. The battery may start to swell and grow in size and if not removed from service, will lead to the battery's failure. This condition is the result of a "thermal run-away", in which the battery will become very hot and likely catch fire. When this occurs, it is important not touch the battery until its temperature is reduced. The best method of preventing or eliminating LiPo Battery fires is to drown the battery with significant amounts of water. The PIC will ensure there is enough water located at the ground control station to react to a failing battery. The PIC will also ensure that all LiPo Batteries are properly disposed of in accordance with local and national codes. Battery manufacturer recommended safe handling practices shall be followed at all times.
- C.E.T. Aviation will not transport Lithium batteries aboard passenger carrying aircraft. If travel is required by use of an Airline to a jobsite, the Lithium batteries are to be shipped using services such as a UPS or FedEx store location. These couriers will be responsible for safe packaging and shipment of these batteries as it may be considered Hazardous Materials.

General Operating Flight Crew Requirements

- Only the PIC shall be required to maintain a valid Pilot's License (Private, Commercial or ATP) issued by the FAA as prescribed by 14 CFR part 61. The PIC shall maintain his or her Flight Review currency requirements as per 14 CFR part 61.56 and 3rd, 2nd, or 1st Class Medical Certificate as prescribed by 14 CFR part 67.
- Prior to any UAS flight, the PIC shall be trained in all aspects of flight operations. Training will include, but is not limited to; Personal Computer Flight Simulation that is similar to the flight characteristics and control of the UAS to be used; actual flight training with the UAS to be used in a designated flight area such as at the property of C.E.T. Aviation, an FAA designated UAS test site, or a flying site location as sanctioned by the Academy of Model Aviation (AMA) with prior permission of the landowner and/or governing organization of that location (AMA membership is required by the PIC for this training location).
- Prior to any commercial flight operations, the PIC shall have accrued at least 25 hours of documented flight time with the UAS being operated by C.E.T. Aviation. The PIC and VO shall train together during this time to practice and become familiar with all normal and emergency procedures and call-outs as identified in this manual. The VO is not required to be present at all 25 hours of flight training; however, it is the responsibility of the PIC to determine if the VO has a thorough understanding of how to conduct flight operations safely and competently as outlined in this manual. Retraining with the VO may be necessary to maintain competency.
- Prior to any commercial flight operations, demonstration of complete control of the UAS shall be maintained. The PIC shall verify that he or she has completed at least 3 take offs

and 3 landings within the preceding 90 days with the UAS to be used. These proficiency flights shall include all normal flight maneuvers such as takeoff; a figure "8" coordinated turn flight pattern; and landing.

- UAS flight crewmembers are required to demonstrate the ability to speak and understand the English Language to the proficiency level required by ICAO Annex 1. This is accomplished by means of formal and informal interviewing during the hiring process.
- Neither the PIC or VO shall participate in any flight operations, whether it be proficiency flights or revenue generating flights, if the blood alcohol concentration (BAC) level is 0.04% or higher, within 8 hours of having consumed any alcohol, while under the influence of alcohol, while under the influence of illegal, prescribed or over the counter drugs that would impair the ability to safely operate the UAS as prescribed in 14 CFR Part 91.17. It is the responsibility of the PIC and VO to police each self and each other.
- The UAS flight crewmembers shall not participate in any phone calls, phone conversations or operation of a two-way radio during flight operations. All proposed flight paths and flight operations will be discussed by C.E.T. Aviation and the customer prior to any flights in order to avoid unnecessary distractions. Only concise communications are allowed between authorized flight operations area personnel and the UAS flight crewmembers. Every effort shall be made to prevent non-essential personnel from interfering with the PIC and VO in any way during flight operations.
- All applicable licenses, certificates, permits, authorizations, waivers, exemption letters, flight and maintenance logbooks, personal identifications, and this Operations Manual shall be made available to any law enforcing, State or National Government Entity at any C.E.T. Aviation active UAS flight operations area and at C.E.T. Aviation Headquarters.

Recordkeeping

Training qualifications and record keeping are maintained and tracked for the pilot in command and visual observer. The PIC is responsible for the management of all training, maintenance and flight records. Records shall include the following, as appropriate to the crew position; copies of certificates and ratings, copy of current Medical Certificate and flight training logs. Maintenance records may include the following; the printed and signed name of the person performing the maintenance and if applicable, the printed name of the organization of which that person represents, a description of the type of work that was accomplished, the UAS make, model and serial number, the total flight time of the UAS, if any serialized components are replaced, the part name and both the removed and installed serial numbers and a separate signed entry of a satisfactory flight test of the UAS after maintenance before entry into service is allowed. All records shall be kept for 7 years, unless otherwise directed by the Administrator, in a safe, climate controlled area which is available to personnel for immediate viewing. Maintenance records shall remain with the UAS when ownership is transferred.

Government Access to Records

Operational and Maintenance records may be made available for inspection by the Federal Aviation Administration, other government officials or a representative of the NTSB. A request for examination of any records should be made in writing to PIC of C.E.T. Aviation for proper coordination of the delivery and/or production of records. UAS operating flight crew are required to comply with any reasonable request made by an appropriate government official conducting a flight operations inspection. The FAA Administrator and/or designated representatives have the authority to conduct inspections and tests as may be deemed necessary to determine the degree and quality of compliance with applicable regulations. This could include PIC checks that are either oral or flight test at the discretion of the FAA inspectors for any allegations or violations or events that may have brought the PIC's knowledge or skills into question. All employees will cooperate with request from the FAA to conduct inspections. When properly certified FAA personnel wish to conduct a flight operations area inspection of the UAS and operating flight crew, the following policies will apply:

- The person conduction the flight operations area inspection must show credentials indicating the inspector is from the FAA
- The PIC should be prepared to show any documents required for that particular flight operation and to discuss the conduct of the flight in any areas of operating flight crew duties.

The flight crewmembers are expected to remain courteous at all times during the flight operations area inspection and, if need be, explain the time constraints of any film production related schedules unless such action is justifiable to both C.E.T. Aviation and to the FAA because safety is or could be compromised.

Occupational Health and Safety Laws and Requirements

The PIC will identify and ensure compliance with all national and local occupation health and safety laws and requirements affecting C.E.T. Aviation. This includes compliance with fire safety, first aid and sanitary requirements. The health and safety of all employees and non-employees are of critical concern.

- To this end, C.E.T. Aviation must rely upon its employees to ensure that work areas are kept safe and free of hazardous conditions.
- Keep files and desk drawers closed when not in use. Never open more than one file drawer at a time. Take care not to overload the top drawer of unsecured file cabinets.
- All overhead cabinets at individual workstations must remain locked when not in use.
- Use an adequate stepladder for reaching overhead objects. Never use chairs, desks or other furniture as a makeshift ladder.
- Do not attempt to lift an object that is heavier than you are capable of lifting.
- Do not allow books, files or other materials to be piled in high places where they may fall.
- Look before walking. Make sure the path is clear.

- Keep doorways, aisles and stairways free from obstructions.
- Secure electrical cords and wires away from walkways.
- Immediately clean up all spills and pick up any items found on the floor, such as pens, paper, clips, etc.
- Avoid bending, twisting or leaning backwards while seated.
- Keep desk and work areas clean and orderly.
- Be careful when using scissors, paper cutters, staplers and paper itself for they are often causes of painful minor cuts and injuries.
- Ensure all electrical equipment is properly grounded and routinely inspect the condition of all electrical cords.
- Be very cautious when approaching a door that can be opened in one direction. For safety of others, open such doors slowly.
- Walk, don't run. Use handrails when walking up and down stairs.
- Arrange ergonomically friendly workstations to minimize strain on all parts of the body.
- Avoid repetitive motion injuries by taking appropriate rest breaks.
- Employees should be conscientious about workplace safety, including proper operating methods known as dangerous conditions or hazards.
- Employees should report an unsafe conditions or potential hazards immediately, even if they believe the problem has been corrected.
- If a concealed danger is suspected to be present, it is to be brought to the attention of everyone in the immediate area and shall be corrected as soon as possible. If necessary contact local authorities.

Periodically, C.E.T. Aviation may issue rules and guidelines governing workplace safety and health. All employees should familiarize themselves with these rules and guidelines, as strict compliance will be expected. The PIC should be contacted for copies of current rules and guidelines. Failure to comply with rules and guidelines regarding health and safety or negligent work performance that endangers health and safety will not be tolerated.

Any workplace injury, accident, or illness must be reported to the PIC as soon as possible, regardless of the severity of the injury or accident. All personnel are encouraged to monitor each other and visitors to ensure everyone is adhering to the guidance and requirements. The PIC will identify and ensure compliance with all national and local environmental laws and requirements affecting C.E.T. Aviation. These may include, but are not limited to, the proper disposal of lithium polymer, nickel cadmium and/or nickel metal hydride batteries; and any other types of hazardous waste materials.

Operating Procedures

An operational control system has the following components: 1) An exercise of authority over the preparation and amendment of the C.E.T. Aviation flight log. 2) A proposed flight plan has been verbally communicated with all participating parties. 3) Safety is ensured throughout all phases of the flight operation.

It is the responsibility of the pilot in command to execute the operational control system. The PIC will collaborate with the VO to conduct a risk assessment and analysis for the requested flight. This will be considered as part of the preflight briefing. Once all risks are reduced to the lowest level possible, a proposed flight plan may be executed. A flight release is granted when the PIC has determined that:

- The flight may be conducted in accordance with the CFRs, CFR exemptions, applicable State Regulations and C.E.T. Aviation standards.
- The validity of all required licenses, permits and certificates has been verified and the required documents and manuals are available for immediate access.
- All required UAS maintenance work has been completed and that the UAS is in a safe, serviceable, flight worthy condition.
- All required equipment, assemblies, subassemblies onboard are functional.
- The meteorological conditions are such that the flight can be conducted safely and within State and International regulations and standards.
- Preparation for every flight shall include a review of available current weather reports and forecasts.

Flight Operation Notification - The filing of a proposed flight operation is the responsibility of the PIC. Appropriate notification to the local governing FAA Flight Standards District Office (FSDO) shall be notified at least 3 days prior to the scheduled day of flight. This will be in the form of a written Plan of Activities, which must include at least the following information:

A) Dates and times of all flights
B) Name and phone number of the operator of the UAS
C) Name and phone number of the person responsible for the on-scene operation of the UAS
D) Make, model, serial number and N-number of the UAS to be used
E) Name and certificate number of UAS PICs involved in the flight operations event
F) A statement that the operator has obtained permission from property owners and/or local officials to conduct the flight operations even; the list of those who gave permission must be made available to the inspector upon request
G) Signature of exemption-holder or representative
H) A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which flight operations will be conducted and the altitudes essential to accomplish the operation

Accident and Incident Reporting - Any incident, accident or flight operation that transgresses the lateral or vertical boundaries of the flight operations area as defined by the applicable Certificate of Waiver or Authorization (COA) must be reported to the FAA UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB website: www.ntsb.gov. Further flight operations may not be conducted until the incident, accident or transgression is reviewed by AFS-80 and authorization to resume operations is provided.

Training Requirements -- The PIC shall be trained in all aspects of flight operations. Training will include, but is not limited to:

- Personal Computer Flight Simulation that is similar to the flight characteristics and control of the UAS to be used. Simulation is essential prior to actual flight with the UAS
- Actual flight training with the UAS to be used in a designated flight area such as at the property of C.E.T. Aviation, an FAA designated UAS test site, or a flying site location as sanctioned by the Academy of Model Aviation (AMA) with prior permission of the landowner and/or governing organization of that location (AMA membership is required by the PIC for this training location).

Prior to any commercial flight operations, the PIC shall have accrued at least 25 hours of documented flight time with the UAS being operated by C.E.T. Aviation. The PIC and VO shall train together during this time to practice and become familiar with all normal and emergency procedures and call-outs as identified in this manual. It is the responsibility of the PIC to determine if the VO has a thorough understanding of how to conduct flight operations safely and competently as outlined in this manual. Retraining with the VO may be necessary to maintain competency.

Responsibilities of the Pilot in Command – the PIC shall have exclusive and final authority as to whether or not the UAS shall undertake any flight. The PIC shall not be overruled by the VO or the customer nor disciplined for well-considered decisions having to do with weather, mechanical condition of the UAS or other hazards. The PIC should utilize all available resources in making decisions related to flight. The VO should be brought into all discussions concerning the operation of the aircraft as it relates to weather, mechanical condition or other hazards. In emergency situations, the PIC is authorized to deviate from prescribed rules to the extent that safety is not compromised. In addition to the above mentioned, the PIC is responsible for the following items:

- The safety of all persons surrounding the flight operations area
- The operational safety of the UAS once it has started its motors for the purpose of taking off until the moment it finally comes to rest at the end of the flight and the motors used as primary propulsion units are shut down
- Ensuring that checklists are complied with in detail
- Ensuring the flight time is recorded and documented on the appropriate UAS flight logbook
- Ensuring the UAS is free of defects and is ready for flight
- Ensuring the UAS is operated within the environmental limitations set forth in this manual, such as wind, precipitation, cloud clearances, etc.
- Ensuring the UAS weight and balance are within operating limits
- Ensuring the UAS battery packs have sufficient capacity, and are in serviceable condition
- Recording all known or suspected defects for the UAS on the maintenance logbook at the termination of the flight of which the defect occurred
- Appropriate notification to the local governing FAA Flight Standards District Office (FSDO) of the intended flight operation

- Ensuring that the flight will not be commenced if a flight crewmember is incapacitated from performing duties by any cause such as injury, sickness, fatigue or the effects of any psychoactive substance
- The security of the UAS during its operation
- Notifying the appropriate authority within 24 hours of an incident, accident or flight operation that transgresses the lateral or vertical boundaries of the operational area (except where the PIC is incapacitated, when it will become the responsibility of the VO)
- Reporting any act of unlawful interference to the FAA or State (Mandatory Occurrence Report), as appropriate, and the designated local authority.

Responsibilities of the Visual Observer – the VO is responsible to assist the PIC in flight operations and the proper execution of flight. The VO will be prepared to assume the responsibility of safely landing and/or recovering the UAS in the event of which the PIC becomes physically incapacitated. The following tasks will be accomplished by the VO:

- Assist in prepping the UAS for flight
- Assist in the preflight inspection of the UAS
- Assist in the post flight inspection of the UAS
- Assist in breaking-down the UAS for the purpose of transporting it in a vehicle
- Starting and stopping the flight timer for the purpose of recording flight times and monitoring battery capacity levels
- Monitoring altitude and battery capacity levels on the ground control station display
- Logging the total flight time of each flight of the UAS
- Ensuring that a constant visual line of sight, unobstructed, except with the use of corrective lenses and/or sunglasses, to the UAS is maintained throughout its flight
- Maintain situational awareness of the UAS flight operations area
- Ensure no unauthorized personnel are allowed within the UAS flight operations area
- Observing the live camera feed to the ground control station when visual line of sight to the UAS is not required

Environmental Restrictions – It is the responsibility of the PIC to examine the current weather reports and forecasts of the weather conditions on the proposed flight operations area in order to determine whether a threat of exceeding the flight limitations of the UAS prevail, or are likely to prevail, during any part of the flight. The PIC shall ensure weather reports are current and are received from reliable sources such as, but not limited to 1-800-WX-BRIEF (992-7433), www.intellicast.com for the city in which the flight operation is being conducted and/or www.aviationweather.gov/adds/metars/ for the closest reporting airport to the UAS flight operations area. Flying in inclement weather such as visible precipitation and local lightning strikes, and winds greater than 15 mph or 13 knots as measured at the ground, is prohibited. Flying at night is prohibited. Night is defined as the time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time. The PIC and VO will ensure that the UAS is not operated when the flight visibility is 3 statute miles or less and will maintain cloud clearances of 500 feet below and 2,000 feet horizontal. The UAS is never to be flown above any cloud line therefore no cloud clearance from above is given.

Checklists

Checklists for normal and emergency UAS procedures have been established for C.E.T. Aviation UAS. Each checklist shall contain the date of the last revision to ensure the most current data is used at all times. Checklists are to be used during each flight operation and are considered to be a required document for the safe operation of the UAS. Some checklist actions must be accomplished from memory when full attention is required by the PIC and VO such as certain items listed in the emergency checklist. Critical emergency situations often require certain immediate actions to be accomplished without taking time to read from a checklist. It is because of this, the PIC and VO are required to become familiar with emergency procedures from memory. Whenever actions are accomplished early or from memory, however, the checklist will be verbally completed by the step by step accomplishment of a challenge and response. This procedure serves as a "double check" on all required actions and ensures that no items were missed.

<u>Preflight Checklist</u>

- FSDO notification complete at least 3 days prior to flight
- Weather information reviewed
- Flight briefing with all participating personnel complete
- Ensure UAS battery is in serviceable condition and has sufficient capacity Note: If capacity of the battery is questionable, it is to be fully charged before initial use.
- Install UAS battery onboard UAS but DO NOT connect its connector
- Ensure UAS battery is secure
- Perform a general visual inspection of the UAS
- Check propellers for damage and security
- Check motors for security
- Check all electrical wiring for security
- Check camera and camera gimbal for security – pay close attention to rubber mounts
- Perform a Center of Gravity Check of UAS
- Set GoPro video camera power switch to ON
- Ensure GoPro video camera wireless transmitter is OFF (Note: to remain OFF during all flight operations)
- Visually inspect all ground control station equipment for serviceability and power ON
- Ensure the power lever on pilot operated radio control transmitter is fully DOWN
- Set pilot operated radio control transmitter power switch to ON
- Ensure pilot operated radio control transmitter has sufficient battery capacity
- Connect the UAS battery connector to the UAS power connector
- Initialize UAS (refer to compass calibration procedures in Naza M2 Quick Start Guide)
- Verify altitude information on video monitor display reads 0 feet.
- Allow all motors to rotate at idle to ensure correct operation – count all six motors

Postflight Checklist

- Stop flight timer
- Visually examine UAS battery for any signs of swelling
- Disconnect UAS battery connector from the UAS power connector
- Set GoPro video camera power switch to OFF
- Set radio control transmitter power switch to OFF
- Perform a general visual inspection of the UAS
- Check airframe for damage
- Check landing gear legs for damage
- Record flight on appropriate logbook

Emergency Checklist

- **Lost link** – confirm loss of control input – try regaining control during the "return-to-home" failsafe mode – wait for UAS to land – if previously in GPS mode switch to Attitude mode to regain control. Note: Return-to-home still available in Attitude mode.
- **Thrust motor failure** – aircraft may have a tendency to rotate – control is possible for a limited time – land safely as soon as possible.
- **Battery capacity low** – confirm constant flashing red LED – fly aircraft toward the home point or to a safe landing area – if power is automatically reduced – land safely as soon as possible.

Emergency Response Plan

The Emergency Response Plan (ERP) shall be carried out in the event of an accident, incident, or any other emergency involving the UAS, private or public property, and participating and/or non-participating personnel. Initial notification of an accident or emergency is to be directed to the on-site customer representative and to the local authorities. The ERP will be located directly behind the Emergency Checklist document and is considered to be part of the required publications necessary for UAS Flight Operations. The PIC and VO shall be familiar with the ERP and will discuss roles played as part of the preflight briefing.

Any accidents, incidents or emergencies must be reported to the FAA UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB website: www.ntsb.gov. Further flight operations may not be conducted until the incident, accident or emergency is reviewed by AFS-80 and authorization to resume operations is provided.

The PIC will review the NTSB Part 830.5 "Immediate Notification List" to confirm that a reportable accident / incident has occurred. If an accident / incident is reportable, the PIC will complete the NTSB Form 6120.1 Pilot / Operator Aircraft / Accident Report.

- A telephone call to the NTSB Communications Center (202-314-6000 or 800-683-9369) is sufficient to start the immediate notification process; however, Form 6120.1 is still required. www.ntsb.gov/report.html

- In addition, the appropriate authorities of the State and/or local jurisdiction where the accident occurred will be notified.

In the event of an accident, the UAS and its components shall not be moved or otherwise disturbed (except to prevent destruction by fire or other cause or to avoid danger to any person or property) without approval of the NTSB investigation authority in which the accident occurred. The ERP will be activated in the event of an accident or when otherwise appropriate. The PIC and/or VO is/are required to notify C.E.T. Aviation's Insurance Provider and appointed legal counsel once the accident, incident or emergency has been mitigated.

Elements of UAS Maintenance

The pilot in command determines the airworthiness of the UAS before accepting the aircraft for flight. A preflight checklist we be completed before the first flight of the day. A post flight inspection shall be conducted after each battery replacement. In the post flight inspection, the condition of the UAS is evaluated. It is performed before the subsequent flight and serves as an opportunity to ensure airworthiness for the next flight.

A detailed inspection of the UAS should be performed after the last flight of each day at home base. Manufacturer's inspection criteria and servicing specifications are to be addressed during the post flight detailed maintenance inspection. A formalized checklist should be used that covers all required items along with a review and disposition of all maintenance discrepancies.

Maintenance Authority – The manufacturer of certain component(s) used on the UAS shall have the authority to repair that particular component it produces. Most components of the UAS being operated by C.E.T. Aviation are modular in design. The replacement of these modular components is considered maintenance and shall be performed by appropriate persons. Persons authorized to perform maintenance, alteration and inspection of the UAS has not yet been established by current FAA regulations and therefore will either be conducted and/or supervised by the PIC for C.E.T. Aviation, who is an FAA certificated Airframe & Powerplant Technician and/or by RC Hobbies & More of Winsted, Connecticut, who is the kit assembler of the small UAS operated by C.E.T. Aviation. The PIC is allowed to supervise work performed on the small UAS by another individual(s), but shall have the final authority of returning the UAS back to service.

Inspections – The UAS operated by C.E.T. Aviation is required to receive an annual or 100-hour inspection, whichever occurs first. Persons authorized to perform maintenance shall use the guidelines set forth in CFR 14 Appendix D to Part 43 – Scope and Detail of Items (As Applicable to the Particular Aircraft) To Be Included In Annual and 100-Hour Inspections. Annual or 100-hour inspections are to be documented in the UAS maintenance logbook.

Functional Check Flights – Whenever any component of the UAS is changed, replaced, or repaired in any way that might involve its operating characteristics, the UAS should be flight tested for normal operation at a training location before the aircraft is released for commercial flight operations. Such flights must be recorded by the PIC, in the UAS flight and maintenance logbooks, indicating that the functional check flight was accomplished and that the UAS is ready for normal flight operations. Vigilance and extreme care must be exercised by all personnel involved with functional check flights. The potential for serious injury exists when the aircraft has had any of its components, related to flight control, replaced.

Maintenance Logbook – Immediately upon finding a defect in the UAS, or upon completing any maintenance on a UAS, the person discovering the defect or performing the maintenance shall enter details of the event in the UAS Maintenance logbook. Records of maintenance, preventative maintenance, and alterations, and any required inspections by the manufacturer of airframe, motor(s), propeller(s), rotor(s), battery, radio equipment or any flight critical component(s) of the UAS shall include a description of the work performed; component name and if available, model or part number; serial number if available; date of completion of the work performed; the total flight time of the UAS; and the signature of the person authorized to perform the work who is also approving the UAS' return to service.
Note: The UAS airframe, all six electric motors, and all six propellers have been serialized. The airframe has been given the serial number HEX 1 and the electric motors and propellers have been given serial numbers P0-0001 through P0-0006. Any replacement of serialized components are to be given the next sequential serial number in series for that component group. The serial number off and on shall be noted in the maintenance logbook signoff for the component removal.

Maintenance Technical Guidance – Authorized persons performing maintenance on the UAS shall use all available technical guidelines, owners and operators manuals, and/or quick start manuals as published by the individual component manufacturer or the UAS kit manufacturer. All components of the UAS are considered "on condition" and will be replaced when such components have been damaged to the point in which it effects the operation of that component or the component has completely failed. When maintenance tasks become questionable due to lack of supporting technical information, the UAS maintainer shall verbally consult with the manufacturer.

10 Hour Progressive Inspection – The integrity of the Return-To-Home function is critical to safe operation of the UAS. Therefore this feature shall be tested on a routine basis and documented in the UAS maintenance logbook. It is the responsibility of the PIC to ensure the Return-To-Home operational checks are performed every 10 hours of flight time, with an allowable window of plus or minus 1 hour of flight time. In addition to this Return-To-Home flight check the following items shall be closely inspected every 10 hours of flight time, with an allowable window of plus or minus 1 hour of flight time, by a person(s) authorized to perform maintenance and documented in the UAS maintenance logbook:

- Inspect all electric motors – Pay particular close attention to outer case separation.
- Inspect all propellers for looseness, cracks, nicks and blend repair as necessary.

- Check all components for security of mounting.
- Inspect airframe for damage.
- Inspect landing gear legs for damage.
- Inspect all UAS batteries for damage and swelling.
- Inspect the radio control transmitter for damage.
- Inspect the radio control transmitter battery for damage and swelling.
- Perform a center of gravity check with gimbal assembly, video camera, and battery pack installed. Note: the battery is not required to be connected to perform this check.

ınt

_____ Date _____
_____ Expiration _____

ınt

_____ Date _____
_____ Expiration _____

ENDORSEMENTS

Flight Review: §61.56

Joshua L. Vilches [First name, MI, Last name], holder of pilot certificate # 141840852 [certificate number], has satisfactorily completed the flight review required by §61.56 on 8/02/02 [date].

Signed [signature] ROBERTO CATTENATI Date 08/02/02
CFI # 2635469 Expiration 09/30/03

Flight Review: §61.56

Joshua L. Vilches [First name, MI, Last name], holder of pilot certificate # 141840852 [certificate number], has satisfactorily completed the flight review required by §61.56 on 04/21/2013 [date].

Signed [signature] Date 04/21/2013
CFI # 3003532CF1 Expiration 01/13

Flight Review: §61.56

Joshua Vilches [First name, MI, Last name], holder of pilot certificate # 141840852 [certificate number], has satisfactorily completed the flight review required by §61.56 on 12-28-04 [date].

Signed Roberto Villada Date 12-28-04
CFI # 2714613 Expiration 03/05

Flight Review: §61.56

_____ [First name, MI, Last name], holder of pilot certificate # _____ [certificate number], has satisfactorily completed the flight review required by §61.56 on _____ [date].

Signed _____ Date _____
CFI # _____ Expiration _____

Flight Review: §61.56

Joshua Vilches [First name, MI, Last name], holder of pilot certificate # 141840852 [certificate number], has satisfactorily completed the flight review required by §61.56 on 10/16-06 [date].

Signed [signature] Date 10/16-06
CFI # 3126471 CFI Expiration 08/08

Flight Review: §61.56

_____ [First name, MI, Last name], holder of pilot certificate # _____ [certificate number], has satisfactorily completed the flight review required by §61.56 on _____ [date].

Signed _____ Date _____
CFI # _____ Expiration _____

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

INSPECTION AUTHORIZATION

This certifies that **JOSHUA LARRY VILCHES**

holder of Mechanic Certificate No. **3461547**
has been authorized to exercise the privileges of Federal Aviation Regulation 65.95.

This authority expires March 31, **2015** unless sooner revoked by the Administrator of the Federal Aviation Administration or extended by endorsement on the reverse of this card.

DATE ISSUED	SIGNATURE OF FSDO INSPECTOR
03/19/2014	**STEVEN L. LEVINE**

SIGNATURE OF AUTHORIZED MECHANIC

FAA FORM 8310-5 (8-80) SUPERSEDES PREVIOUS EDITION

FlameWheel550
User Manual

V 1.9

2013.03.13 Revision

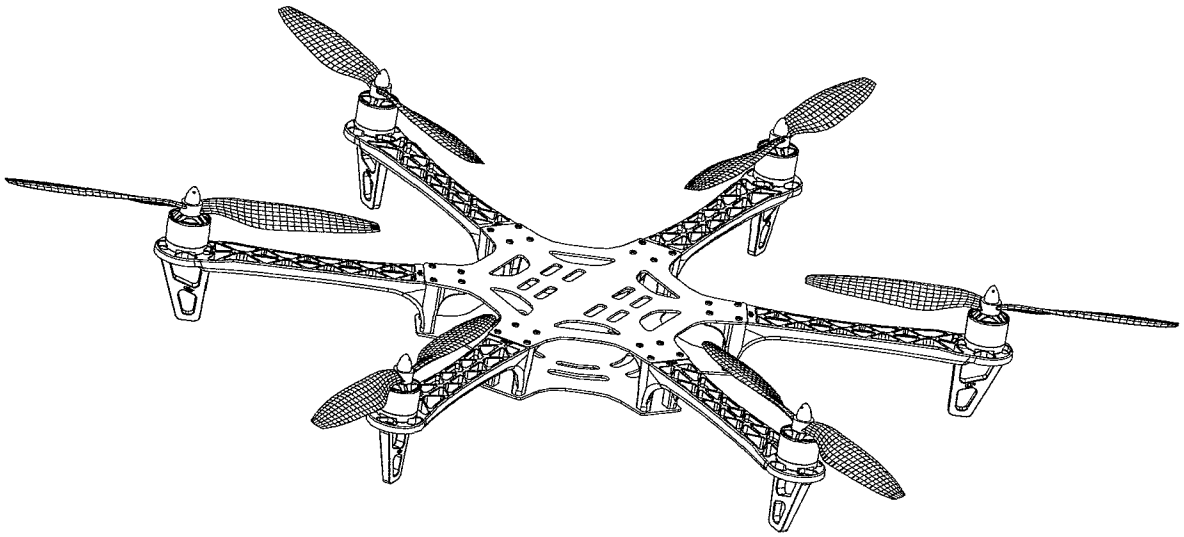
www.dji-innovations.com

Disclaimer

Read this disclaimer carefully before using FlameWheel550. By using this product, you hereby agree to this disclaimer and signify that you have read them fully. FlameWheel550 is an excellent multi-rotor. With a good autopilot, it will even offer tremendous flight features for low altitude flight working in restricted space. Despite the controller of autopilot operates in the safest manner when the main power battery is connected, we strongly recommend customers to remove all propellers, use power supply from R/C system or flight pack battery, and keep children away during system calibration and parameter setup. Please respect the AMA's National Model Aircraft Safety Code. DJI Innovations assumes no liability for damage(s) or injuries incurred directly or indirectly from the use of this product.

F550 Profile

FlameWheel550 (F550) is a multi-rotor designed for all pilots for fun or AP. With DJI WKM or NAZA autopilot system, it can achieve hovering, cruising, even rolling and other flight elements. It can be applied for entertainment, aerial photography, FPV and other aero-modeling activities.



Contents

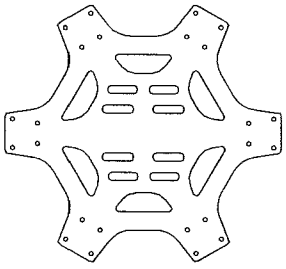
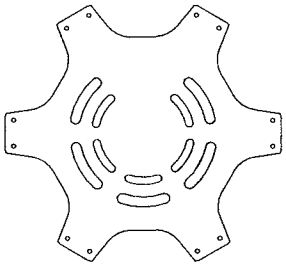
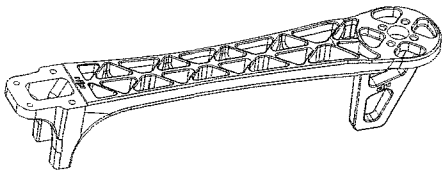
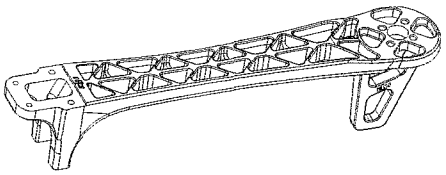
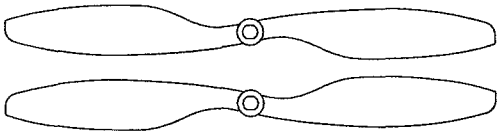
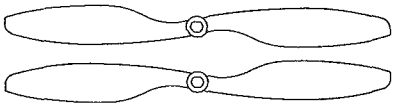
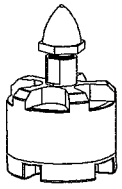
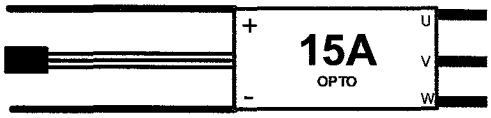
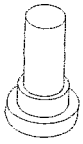
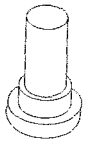
Product Usage Cautions

When flying, the fast rotating propellers of FlameWheel550 will cause serious damage and injury. Therefore, please fly with a high safety consciousness.

1. **Keep flying multi-rotor away from objects, such as obstacles, children, human beings, high-voltage lines and so on.**
2. **Do not get close to or even touch the working motors and propellers, which will cause serious injury.**
3. **Do not over load the multi-rotor.**
4. **Check that the propellers and the motors are installed correctly and firmly before flight.**
5. **Make sure the rotation direction of each propeller is correct**
6. **Check whether all parts of multi-rotor are in good condition before flight. Do not fly with old or broken parts.**
7. **Use DJI parts as much as possible.**

If you have any problem you cannot solve during installation, please contact our customer service.

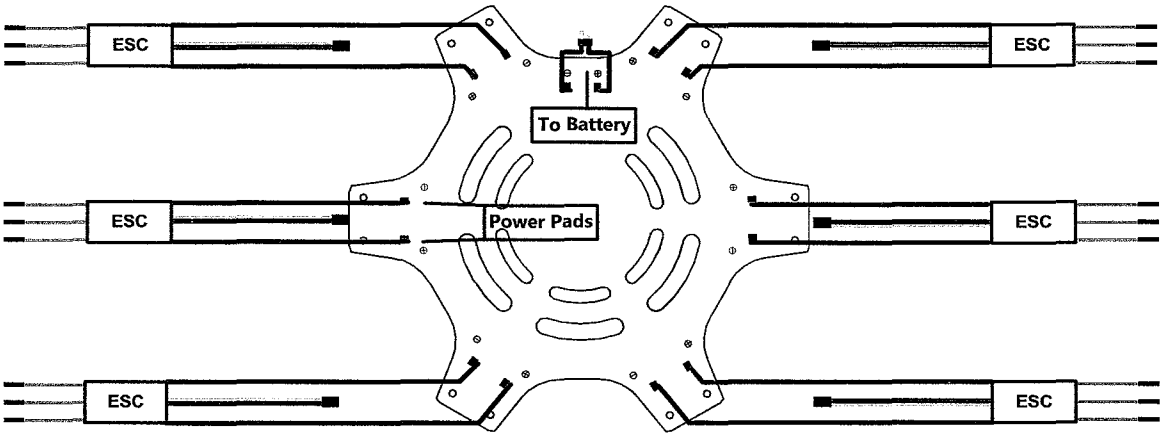
In Box

Top Board 550FBT ×1	Bottom Board 550FBB ×1
	
Arms 550FAC ×4	550FAW ×2
	
10in Propeller Pairs 550P10×4	8in Propeller Pairs 550P08×4
	
Motors 550MOT ×6	ESC 550ESC ×6
	
Screws 550-M3×8 ×24	Screws 550-M2.5×6 ×36
	
Magic Strap 550MSX ×1, Battery Band 550BBX ×1, Power Line Pair 550PLP ×1	

Tools Needed

2.0mm Hex Wrench	For frame and motors installation.
Screw Glue	For fastening screws.
Nylon Cable Tie	
Scissors	For binding devices and wires.
Diagonal Cutting Pliers	
Foam Double Sided Adhesive Tape	For fixing receiver, controller and other modules.
Soldering-iron & Wires	For connecting ESCs' power cables to bottom board.

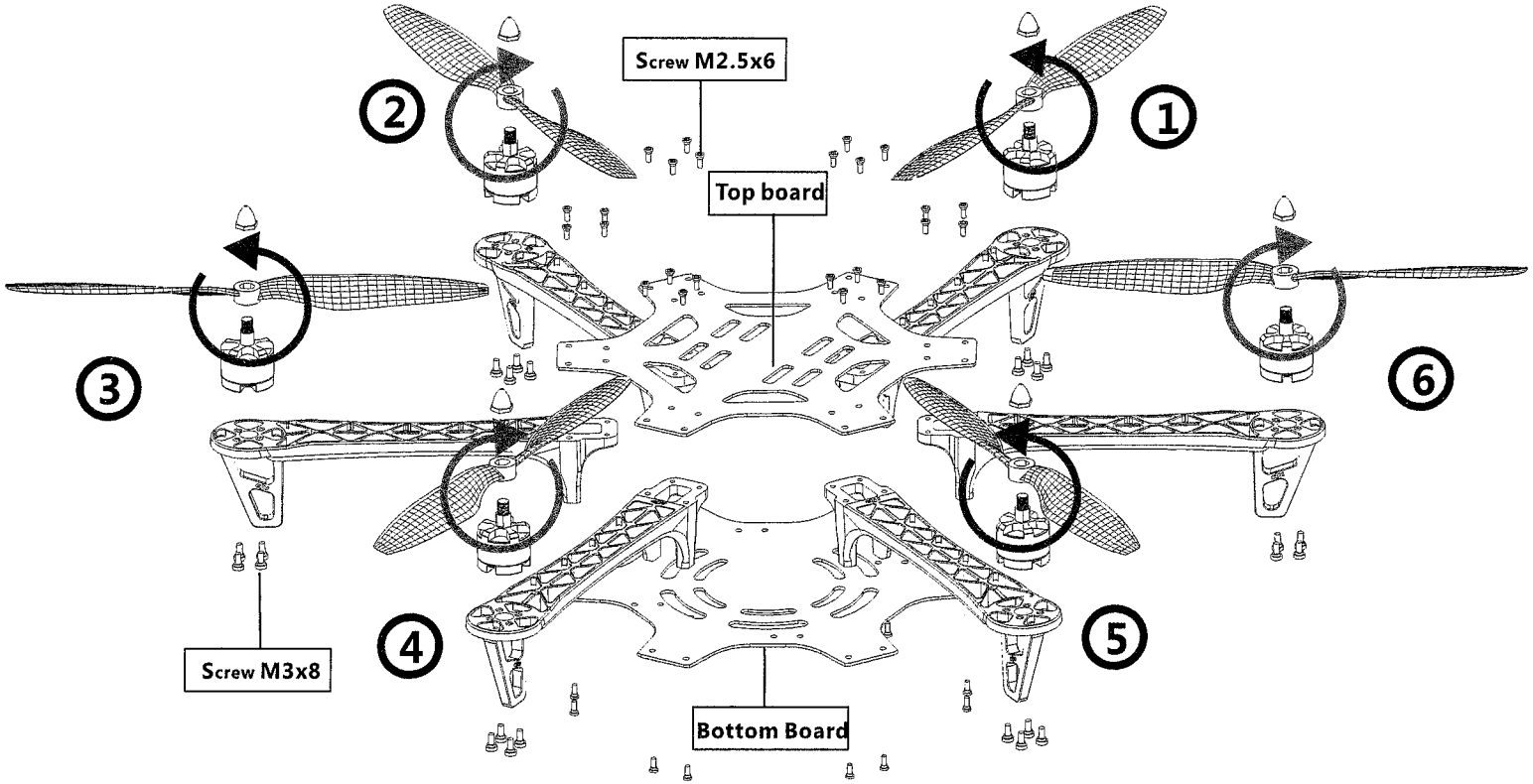
ESC Wiring



Important

- Please solder ESCs to power pads on bottom board as the figure shows.
- Use any insulating method at all soldering spots. Make sure there is no short or open circuit.
- Make sure the side of power pads is upward.
- Make sure the rotation direction of each motor is the same as the way in the figure of "***Assembly***" shows. If not, switch any of two wire connections of the incorrect motor to change its rotation direction.

Assembly



Step 1 Install bottom board → **Step 2** Install autopilot system → **Step 3** Install motors, ESCs → **Step 4** Install top board → **Step 5** Install propellers

- Install screws by appropriate force to prevent breaking threads.
- Use adequate screw glue for installing screws.

- Please wire neatly. Make sure wires will not be cut by frame boards and propellers.
- Smooth out the boards edge if necessary.

- Please install propellers after autopilot system configuration procedure.
- Make sure the rotation direction of propellers are the same as the figure shows.
- When mounting the propellers, do not use any thread locker, just tighten the nuts to the end manually then use the wrench to tighten it about 50°.

In up figure, arms front of craft, arms are back of craft. See from top, motors on arms rotate counter-clock wise, use propellers 1038; motors on arms rotate clock wise, use propellers 1038R.

ESC Sound Introduction

ESC State	Sound
Ready	♪1234567
Throttle stick is not at bottom	BBBBBB...
Input signal abnormal	B-------B-------B...
Input voltage abnormal	BB---BB---BB---BB...

Tips:

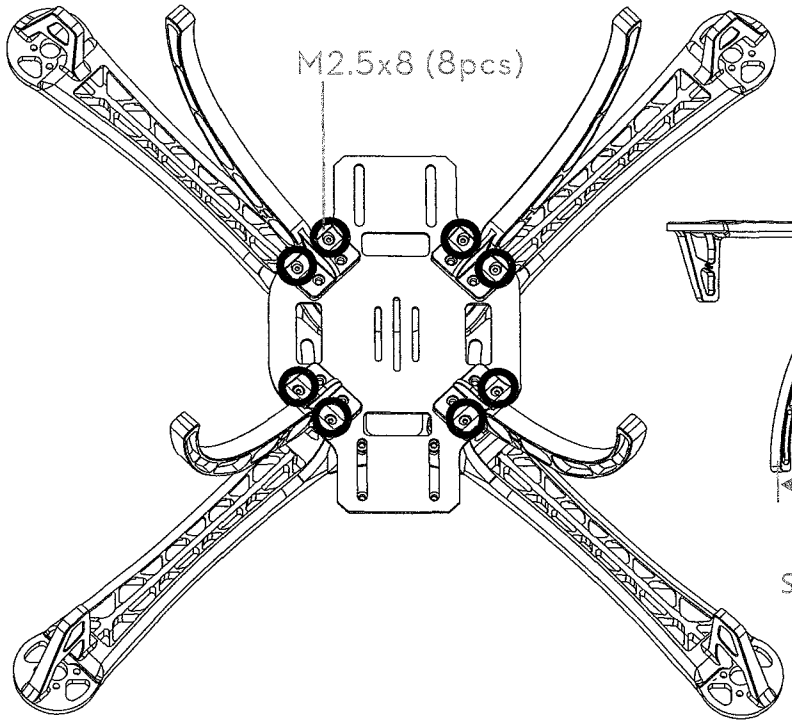
DJI ESCs are specially designed for multi-rotors. When use with DJI autopilot systems, you do not have to setup any parameters or calibrate travel range.

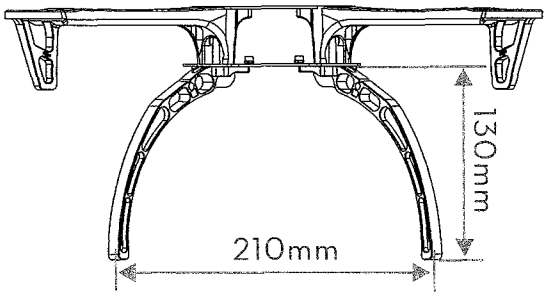
Specifications

Frame	
Diagonal Wheelbase	550mm
Frame Weight	478g
Takeoff Weight	1200g ~ 2400g
ESC	
Current	15A OPTO
Signal Frequency	30Hz ~ 450Hz
Battery	3S ~ 4S LiPo
Motor	
Stator size	22×12mm
KV	920rpm/V
Propeller	10 × 3.8in (@3S); (Optional 8 × 4.5in (@4S))

Landing Gear For Flame Wheel Instruction
风火轮起落架说明

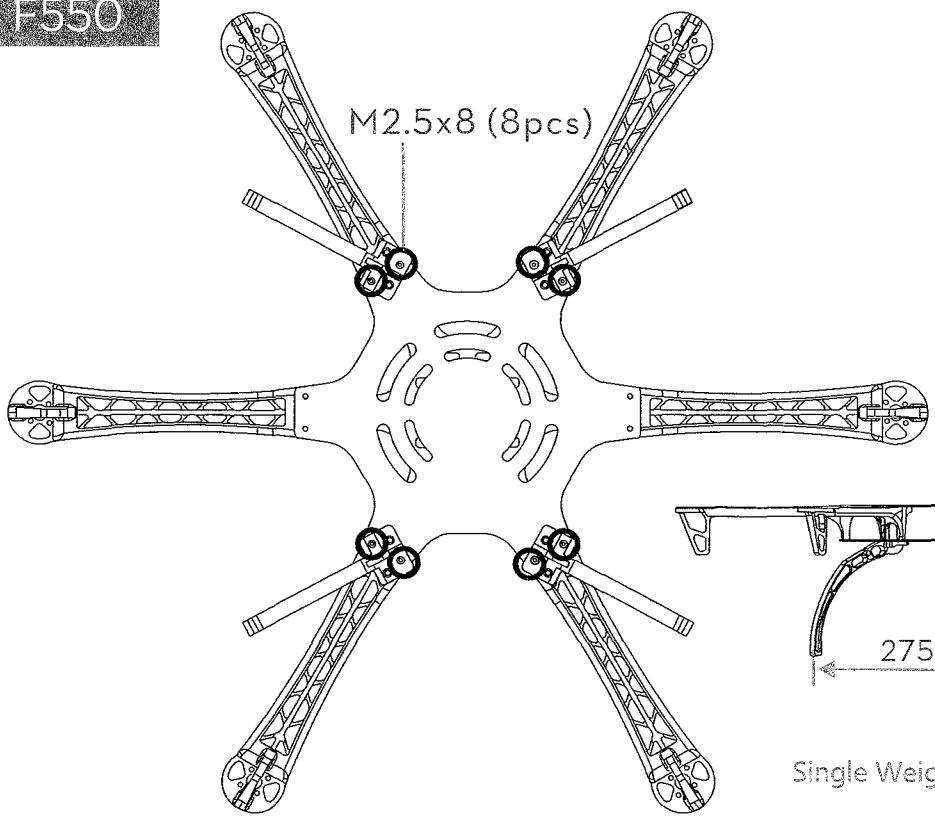
F450

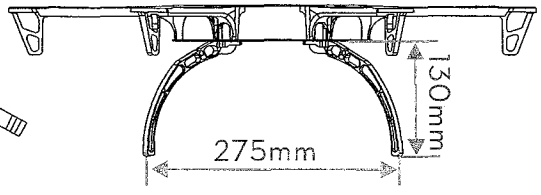




Single Weight / 单个重量：15g

F550





Single Weight / 单个重量：15g

Naza - M V2

Quick Start Guide V 1.26

2014.05.12 Revision

For Firmware Version V4.02 or above

& Assistant Software Version V2.20 or above

Thank you for purchasing this DJI product. Please strictly follow these steps to mount and connect this system on your aircraft, as well as to install the Assistant Software on your computer.

Please regularly check the web page of corresponding product* at our website **www.dji.com**, which is updated regularly. Product information, technical updates and manual corrections will be available on this web page. Due to unforeseen changes or product upgrades, the information contained in this manual is subject to change without notice.

* **Important:** Naza-M, Naza-M V2 and PHANTOM control system are different in hardware parts, but their configurations and functions are the same when using the same Assistant Software and Firmware Version, so they use the same Guide. Unless stated, the following instruction is basic on Naza-M V2. If you use the Naza-M, please make sure to read the "Instruction of V1 (also known as Naza-M)" section; if you use the PHANTOM, download the other corresponding manuals on the PHANTOM web page.

This manual is only for basic assembly and configuration; you can obtain more details and advanced instructions when using the assistant software. To assure you have the latest information, please visit our website and download the latest manual and current software version.

If you have any problem that you cannot solve during usage, please contact your authorized dealer.

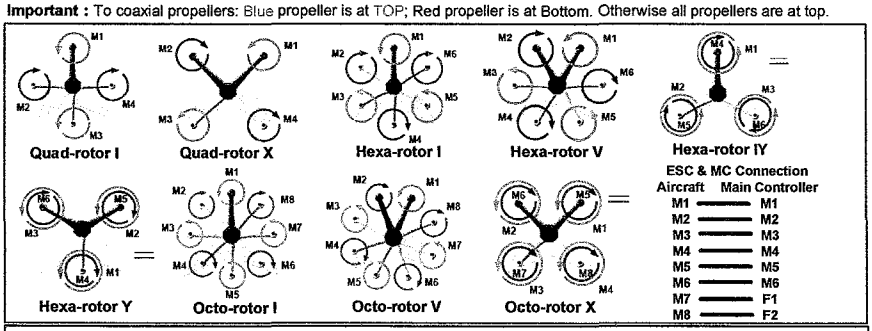
Index

Step2 Assembly & Connection

Step1 Prepare an aircraft, supported the following **Mixed Types**.

The direction of the arrow in diagram indicates the rotation direction of the motor/propeller.

Important : To coaxial propellers: Blue propeller is at TOP; Red propeller is at Bottom. Otherwise all propellers are at top.



Note: The NAZA-M V2 flight control system doesn't support Gimbal function when used on the Octo-rotor aircraft. For big aircraft that is larger than 650 or with heavy load, WKM is recommended.

Step2 Assembly and Connection

Main Controller(MC)

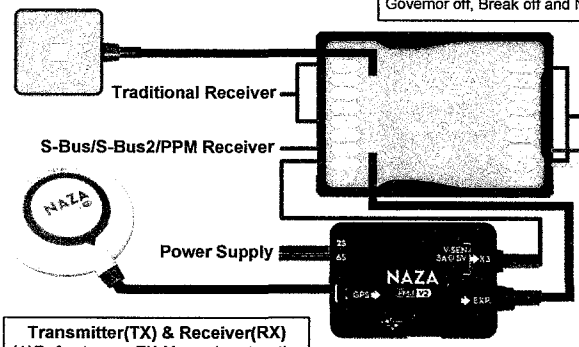
Mount : (1)The DJI logo should face the sky, DO NOT mount the MC upside-down. (2)The MC sides should be parallel to the aircraft body. (3)The arrow should point to the nose direction of aircraft. (4)he MC is best positioned near the aircraft's center of gravity. Make sure all ports are accessible.

Tip : It is recommended to fix the MC until all wirings and configurations are completed, using 3M gummed paper provided to fix the MC.

ESCs & Motors

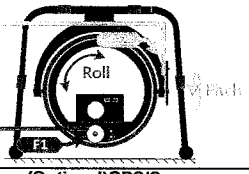
Please use the ESCs and motors recommended by the manufacturer of your aircraft. We recommend you use DJI motors and ESCs (Refer to its manual for details). Connect all ESCs to MC by the motor numbering method introduced in mixed types Supported .

Important : If you use 3rd party ESCs, make sure the ESCs travel midpoint is at 1520us. DO NOT use 700us travel midpoint ESC, as it may lead aircraft to fly away or cause injury and damage. After ESCs connection , calibrate ESCs one by one through the receiver directly before connect them to your MC, Make sure program all of them into Governor off, Break off and Normal Start up to get best experience.



Gimbal

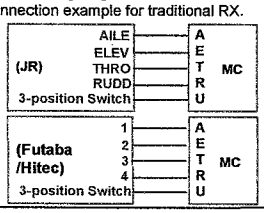
Connect the gimbal servos to the ports of F1 and F2 if a gimbal is used, and use the software for configurations.



Transmitter(TX) & Receiver(RX)

(1)Refer to you TX Manual, setup the Aileron, Elevator, Throttle, Rudder channels on your TX first, and choose a 3-position switch as control mode switch.

(2)Attach the matched RX to aircraft, then connect your RX to the right ports on MC. The following diagram shows the connection example for traditional RX.



PMU Module

Mount : DO NOT attach the PMU on other device. Sufficient air flow over the PMU is highly recommended.

Tip : If use with DJI multi-rotor, you can solder the power cable to power pads on frame bottom board. Please refer to DJI multi-rotor manual for details. If use with 3rd part aircraft, you can make a connecter by yourself to connect PMU and battery.

LED Module

Mount : Make sure You can see the light during the flight. Leave the USB interface to be accessible. Use the 3M gummed paper provided to fix.

(Optional)GPS/Compass

Mount : GPS/Compass is sensitive to magnetic interference, should be far away from any electronic devices. If you use your own mounting rod, make sure it is NOT magnetic!

Procedures :

(1)You should use epoxy resin AB glue to assemble the GPS bracket first. Mount the bracket on the center plate of craft. Position the bracket at least 10 cm from any propeller.

(2)The DJI logo marked on the GPS should face the sky, with the orientation arrow pointing directly forward. then fix the GPS on the plate of the bracket (by 3M glue provided).

Tip : The GPS/Compass is packaged with a special indication line for mounting for the first time.

Step3 Double Check

In this step, turn on the transmitter, connect the battery to the PMU, and then watch the LED, if you can see the LED blinks (●●○●●●○●●○●●●●), the system is working.

Instruction

Disclaimer & Warning

Please read this disclaimer carefully before using the product. By using this product, you hereby agree to this disclaimer and signify that you have read them fully. THIS PRODUCT IS NOT SUITABLE FOR PEOPLE UNDER THE AGE OF 18.

This product is an autopilot system designed for serious multi-rotor enthusiasts providing excellent self-leveling and altitude holding, which completely takes the stress out of flying RC multi-rotors for both professional and hobby applications. Despite the system having a built-in autopilot system and our efforts in making the operation of the controller as safe as possible when the main power battery is connected, we strongly recommend users to remove all propellers when calibrating and setting parameters. Make sure all connections are good, and keep children and animals away during firmware upgrade, system calibration and parameter setup. DJI Innovations accepts no liability for damage(s) or injuries incurred directly or indirectly from the use of this product in the following conditions:

1. Damage(s) or injuries incurred when users are drunk, taking drugs, drug anesthesia, dizziness, fatigue, nausea and any other conditions no matter physically or mentally that could impair your ability.
2. Damage(s) or injuries caused by subjective intentional operations. Any mental damage compensation caused by accident.
3. Failure to follow the guidance of the manual to assemble or operate.
4. Malfunctions caused by refit or replacement with non-DJI accessories and parts.
5. Damage(s) or injuries caused by using third party products or fake DJI products.
6. Damage(s) or injuries caused by mis-operation or subjective mis-judgment.
7. Damage(s) or injuries caused by mechanical failures due to erosion, aging.
8. Damage(s) or injuries caused by continued flying after low voltage protection alarm is triggered.
9. Damage(s) or injuries caused by knowingly flying the aircraft in abnormal condition (such as water, oil, soil, sand and other unknown material ingress into the aircraft or the assembly is not completed, the main components have obvious faults, obvious defect or missing accessories).
10. Damage(s) or injuries caused by flying in the following situations such as the aircraft in magnetic interference area, radio interference area, government regulated no-fly zones or the pilot is in backlight, blocked, fuzzy sight, and poor eyesight is not suitable for operating and other conditions not suitable for operating.
11. Damage(s) or injuries caused by using in bad weather, such as a rainy day or windy (more than moderate breeze), snow, hail, lightning, tornadoes, hurricanes etc.
12. Damage(s) or injuries caused when the aircraft is in the following situations: collision, fire, explosion, floods, tsunamis, subsidence, ice trapped, avalanche, debris flow, landslide, earthquake, etc.
13. Damage(s) or injuries caused by infringement such as any data, audio or video material recorded by the use of aircraft.
14. Damage(s) or injuries caused by the misuse of the battery, protection circuit, RC model and battery chargers.
15. Other losses that are not covered by the scope of DJI Innovations liability.

Trademark

DJI and Naza-M are registered trademarks of DJI Innovations. Names of product, brand, etc., appearing in this manual are trademarks or registered trademarks of their respective owner companies. This product and manual are copyrighted by DJI Innovations with all rights reserved. No part of this product or manual shall be reproduced in any form without the prior written consent or authorization of DJI Innovations. No patent liability is assumed with respect to the use of the product or information contained herein.

Certifications

This product is approved with quality standards such as CE, FCC and RoHS.

Symbol Instruction

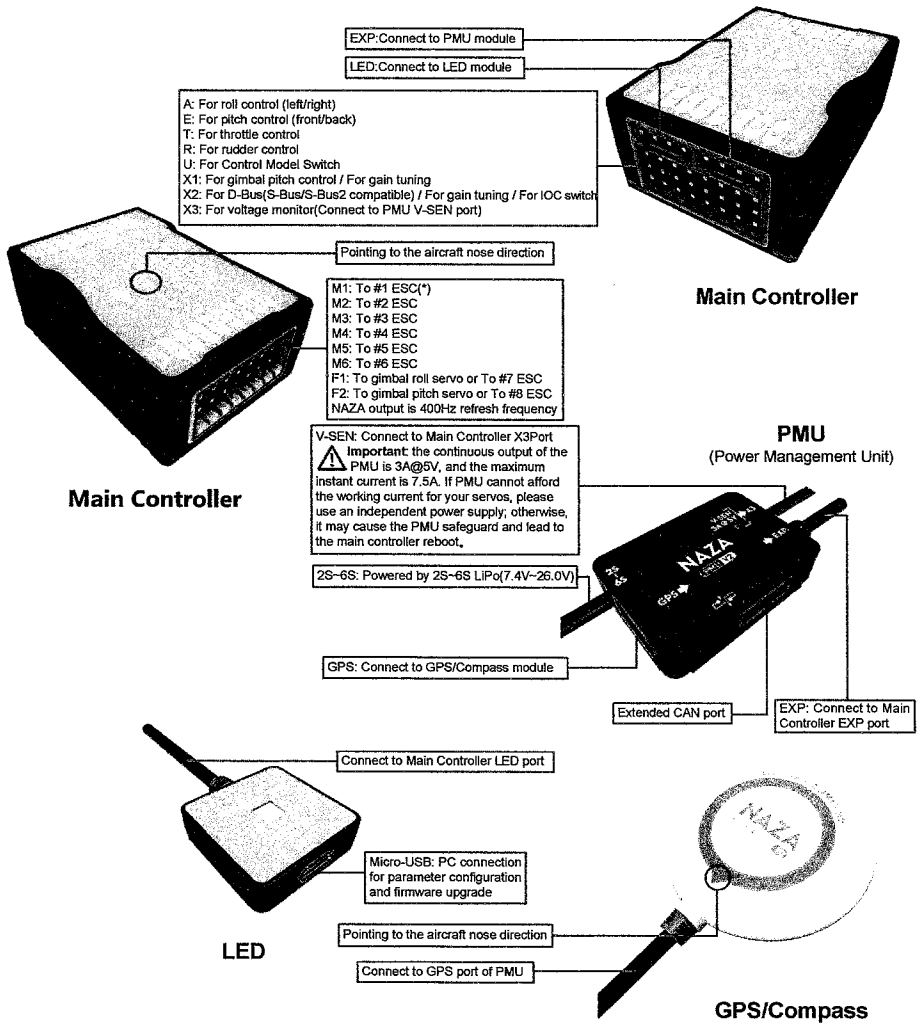
 Forbidden(Important)  Cautions  Tip  Reference

Assembly & Connection

In the Box:

Main controller X1, PMU X1, GPS X1, GPS Bracket X1, LED X1, Servo Cable X8, Micro-USB Cable X1, 3M Adhesive Tape.

Step1 Port Description



*ESC: Electronic Speed Controller

Assistant Software Installation and Configuration

Step1 Software and Driver Installation

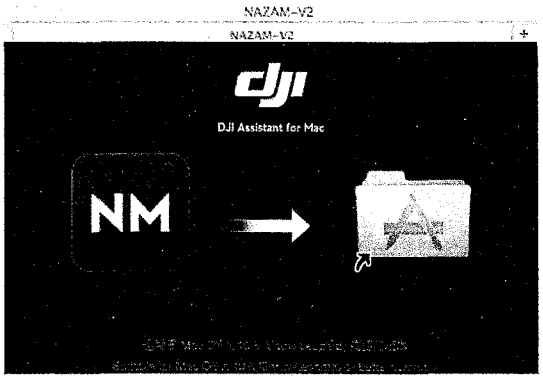
Installing and running on Windows

1. Please download the driver and the Assistant installation software in EXE format from www.dji.com.
2. Switch on the transmitter and then power on your autopilot system.
3. Connect your autopilot system and PC via a Micro-USB cable.
4. Open the driver installation software and follow the instructions to complete installation.
5. Run the Assistant installation software and follow the instructions to complete installation.

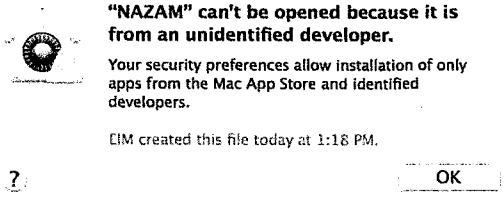
⚠ The installer in EXE format is supported on Win XP, Win7, Win8 (32 or 64 bit).

Installing and running on Mac OS X

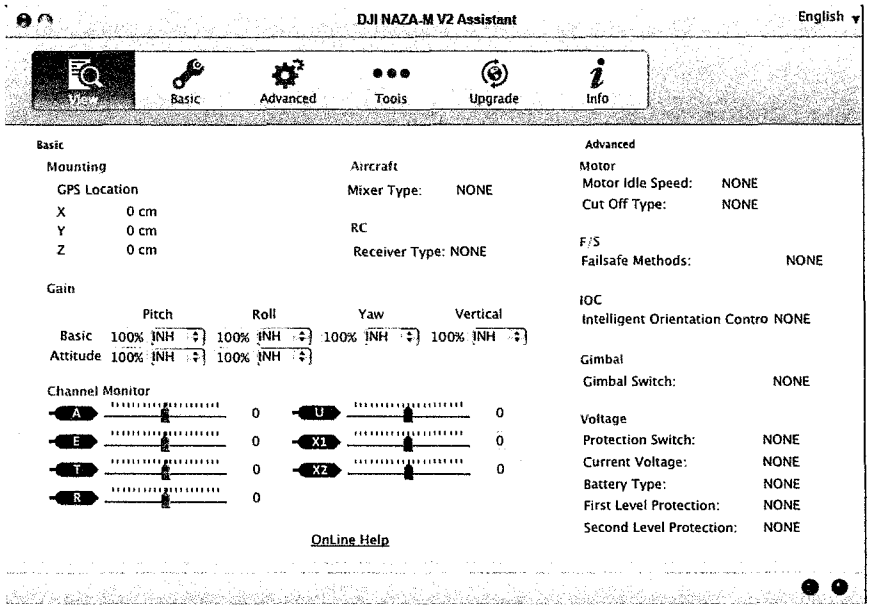
1. Download the Assistant installer in DMG format from the download page of NAZA-M V2 on the DJI website.
2. Run the installation software and follow the prompts to finish installation.



3. When launching for the first time if use Launchpad to run the NAZA-M V2 Assistant Software, Launchpad won't allow access because the software has not been reviewed by Mac App Store.



4. Locate the NAZA-M V2 icon in the Finder and open the file by Control or right clicking the icon and selecting "Open" from the menu.
5. After the first successful launch, double-clicking the NAZA-M V2 icon in the Finder or using Launchpad will open the application.



Installer in DMG format is supported on Mac OS X 10.6 or above.

The NAZA-M V2 Assistant on Mac OS X and Windows are exactly the same. The Assistant appear in other places of this manual is based on Windows version.

Step2 Configuration by Assistant on a PC

1. Power on the PC. Make sure your computer is connected to the Internet for the first time you use.
2. Switch on the transmitter first, and then power on the autopilot system. Connect the autopilot system to the PC with a Micro-USB cable. DO NOT break the connection until setup is finished.
3. Run the Assistant Software.
4. Observe the indicators on the left bottom of the software. (They are the connection indicator and communication indicator in order.) If the communication indicator is blinking, that the software is ready, please go to next step.
5. Select the "Info" option. Check the software firmware version. If the upgrade is available, you may update the assistant software.

6. Select the "Upgrade" option. Check the Main Controller, GPS and IMU firmware version.
7. Select the "Basic" option. Please follow step-by-step for your first-time-configuration. Basic configuration is necessary, including Mixer Type, Mounting, RC, and Gain settings.
8. You can click the "Advanced" option for more parameter settings. Advanced setting is optional. There are settings of Motor, FailSafe, Intelligent Orientation Control (IOC), Gimbal, Low-Voltage Alert, and Flight Limits. Read the instruction in the assistant software to obtain more details.
9. Select the "Viewer" option to check all parameters.
10. Then break the Micro-USB cable, power off the aircraft. Finished.

(1) You may be required to fill register information for your first-time-usage.
(2) If the communication indicator is blue on, please double check the connections.
(3) Basic configuration is necessary before you go to the "Basic Flying Test".
(4) Users are required to install a Windows system, since the software can only run on Windows system .

(1) If the firmware upgrade is available, please upgrade it by referring to the Firmware Upgrade in the Appendix.
(2) This step is required to use together with the assistant software to obtain more details.

Recommended Parameters

Recommended Settings for using F330/F450/F550

	Configuration Information					Basic Gain				Attitude Gain	
	Motor	ESC	Propeller	Battery	Weight	Pitch	Roll	Yaw	Vertical	Pitch	Roll
F330	DJI-2212	DJI-18A	DJI-8 Inch	3S-2200	790 g	140	140	100	110	140	140
F450	DJI-2212	DJI-30A	DJI-8 Inch	3S-2200	890 g	150	150	100	105	150	150
F550	DJI-2212	DJI-30A	DJI-8 Inch	4S-3300	1530 g	170	170	150	140	170	170

Basic Flying

Control Mode Knowledge

Please read the Control Mode Knowledge clearly before usage, to know how to control the aircraft.

Different control modes will give you different flight performances. Please make sure you understand the features and differences of the three control modes.

<table>
<tr><th></th><th>GPS ATTI. Mode
(With GPS Module)</th><th>ATTI. Mode</th><th>Manual Mode</th></tr>
<tr><td>Rudder Angular Velocity</td><td colspan="3">Maximum rudder angular velocity is 150°/s</td></tr>
<tr><td>Command Linearity</td><td colspan="3">YES</td></tr>
<tr><td>Command Stick Meaning</td><td colspan="2">Multi attitude control; Stick center position for 0° attitude, its endpoint is 35°.</td><td>Max-angular velocity is 150°/s. No attitude angle limitation and vertical velocity locking.</td></tr>
<tr><td>Altitude Lock</td><td colspan="2">Maintain the altitude best above 1 meter from ground.</td><td>NO</td></tr>
<tr><td>Stick Released</td><td>Lock position if GPS signal is adequate.</td><td>Only attitude stabilizing.</td><td>NOT Recommend</td></tr>
<tr><td>GPS Lost</td><td>When GPS signal has been lost for 3s, system enters ATTI. Mode automatically.</td><td>Only performing attitude stabilizing without position lock.</td><td>---</td></tr>
<tr><td rowspan="3">Safety</td><td colspan="2">Attitude & speed mixture control ensures stability</td><td rowspan="2">Depends on experience.</td></tr>
<tr><td>Enhanced Fail-Safe(Position lock when hovering)</td><td>Auto Level Fail-Safe (Attitude stabilizing)</td></tr>
<tr><td colspan="3">With GPS/Compass module and the failsafe requirements are satisfied, in each Control Mode (including GPS Mode, ATTI. Mode, Manual Mode and IOC Mode), the aircraft will enter the failsafe Mode.</td></tr>
<tr><td>Applications</td><td>AP work</td><td>Sports flying.</td><td>---</td></tr>
</table>

Start & Stop Motor Knowledge

(1) Both Immediately Mode and Intelligent Mode are available in the Assistant Software: Advanced->Motor->Stop Type.

(2) Stop Motor method is defaulted to Immediately Mode.

Please get to know well about this section before flying.

1 **Start Motor**: Pushing throttle stick before takeoff will not start the motors. You have to execute any one of following four Combination Stick Commands (CSC) to start the motors:

2 **Stop Motor:** We provide two options to stop motors in the assistant software: Immediately and Intelligent.

(1) **Immediately Mode:** If you select this mode, in any control mode, once motors start and throttle stick is over 10%, motors will not stop immediately only when throttle stick is back under 10% the motors will stop. In this case, if you push the throttle stick over 10% within 5 seconds after motors stop, motors will re-start, CSC is not needed. If you don't push throttle stick after motors start in three seconds, motors will stop automatically.

(2) **Intelligent Mode:** By using this mode, different control mode has different way of stopping motors. In Manual Mode, only executing CSC can stop motors. In ATTI. Mode or GPS ATTI. Mode, any one of following four cases will stop motors:

a) You don't push throttle stick after motors start within three seconds;

b) Executing CSC;

c) Throttle stick under 10%, and after landing for more than 3 seconds.

d) If the angle of multi-rotor is over 70°, and throttle stick under 10%.

Notes of Intelligent Mode

(1) In ATTI. / GPS ATTI. Mode, it has landing judgment, which will stop motors.

(2) Start motors in ATTI. / GPS ATTI. Mode, you have to execute CSC and then push throttle stick over 10% in 3 seconds, otherwise motors will stop after 3 seconds.

(3) During normal flight, only pull throttle stick under 10% will not stop motors in any control mode.

(4) For safety reason, when the slope angle of multi-rotor is over 70° during the flight in ATTI. / GPS ATTI. Mode (may be caused by collision, motor and ESC error or propeller broken down), and throttle stick is under 10%, motors will stop automatically.

Notes of Intelligent Mode & Immediately Mode

(1) If you choose the Immediately Mode, you should not pull throttle stick under 10% during flight, because it will stop motors. If you do it accidentally, you should push the throttle stick over 10% in 5s to re-start motors.

(2) DO NOT execute the CSC during normal flight without any reason, or it will stop motors at once.

(1) If you choose the Intelligent mode, and the throttle stick is under 10%, this will trigger the landing Procedure, in any control mode. In this judgment, pitch, roll and yaw controls are denied except the throttle, but multi-rotor will still auto level.

(2) In any control mode, DO NOT pull throttle stick under 10% during normal flight without any reason.

(1) Any of these two cut off types will only work properly if TX calibration is correct done.

(2) In failed-safe, CSC is denied by the main controller, motors will hold their state.

Step1 Compass Calibration

Without GPS module, please skip this step. If you use with GPS module, follow step-by-step for calibration.

(1) DO NOT calibrate your compass where there is magnetic interference, such as magnetite, car park, and steel reinforcement under the ground.

(2) DO NOT carry ferromagnetic materials with you during calibration, such as keys or cell phones.

(3) Compass module CANNOT work in the polar circle.

(4) Compass Calibration is very important, otherwise the system will work abnormal.

Calibration Procedures

1. Switch on the transmitter, and then power on autopilot system!
2. Quickly switch the control mode switch from ***GPS Mode*** to ***Manual Mode*** and back to ***GPS Mode*** (or from ***GPS Mode*** to ***ATTI. Mode*** and back to ***GPS Mode***) for more than 5 times, The LED indicator will turn on constantly yellow so that the aircraft is ready for the calibration.
3. (Fig.1) Hold your Multi-rotor horizontal and rotate it around the gravitational force line (about 360°) until the LED changes to constant green, and then go to the next step.
4. (Fig.2)Hold your Multi-rotor vertically and rotate it (its nose is downward) around the gravitational force line (about 360°) until the LED turns off, meaning the calibration is finished.

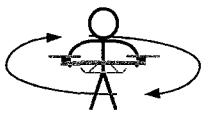


Fig.1

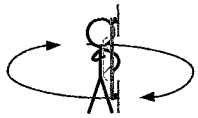


Fig.2

5. If the calibration was successful, calibration mode will exit automatically. If the LED keeps flashing quickly Red, the calibration has failed. Switch the control mode switch one time to cancel the calibration, and then re-start from step 2.

1. When the GPS is abnormal, the Main controller will tell you by the LED blinking Red and Yellow alternately (), disable the GPS Module, and automatically enter the aircraft into the ATTI. Mode.
2. You don't need to rotate your multi-rotor on a precise horizontal or vertical surface, but keep at least 45° difference between horizontal and vertical calibration.
3. If you keep having calibration failure, it might suggest that there is very strong magnetic interference around the GPS /Compass module, please avoid flying in this area.
4. When to do re-calibration

(1) The flight field is changed.

(2) When the multi-rotor mechanical setup has changed:

a) If the GPS/Compass module is re-positioned.

b) If electronic devices are added/removed/ re-positioned (Main Controller, servos, batteries, etc.).

c) When the mechanical structure of the multi-rotor is changed.

(3) If the flight direction appears to be shifting (meaning the multi-rotor doesn't "fly straight").

(4) The LED indicator often indicates abnormality blinking when the multi-rotor spins. (It is normal for this to happen only occasionally)

Step2 Assembly Checking List

Please check each item, to make sure for safety.

⊘	Any of the following mistakes will lead to a dangerous accident, double check all these items: (1) Rotation direction of motor is opposite (2) Infirm connection between the motor and the ESC (3) Wrong or infirm installation of Main controller (4) Wrong or infirm connection between the main controller and ESC. (5) Propeller installation mistake (6) Magnetization of the compass
⚠	**Make sure the following items are correct.** (1) Make sure you have assembled your multi-rotor correctly. (2) Make sure you have done the configuration procedure correctly. (3) Make sure all connections are in good condition. (4) Make sure batteries are fully charged for your transmitter, autopilot system and all devices.

Step3 Before Flight

Carry out the following procedures (is based on Intelligent Mode of Motor Stop) to make sure all configurations are correct. Refer to the Appendix->LED Description for more LED details.

1. Always switch on the transmitter first, then power on multi-rotor!
2. Keep the aircraft stationary until the system start and self-check has finished (●●○●●○●●○●●●●). After that, the LED may blink Yellow 4 times quickly (○○○○). Start motor is disable during LED blinking Yellow 4 times quickly (○○○○), as the system is warming up.
3. After the 4 times Yellow LED disappears, toggle the control mode switch on your transmitter to make sure it is working properly. For example, LED blinks (○ ●●●), which means the system is in ATTI. Mode and the GPS signal is worst Check it with LED indicator to specify the current working mode for MC. See following table for details about LED indicator;
   (1) There are Manual Mode and ATTI. Mode without a GPS/Compass module, no GPS signal status LED indicator.
   (2) After connecting to the GPS/Compass module, GPS ATTI. Mode is available, and GPS signal status LED indicator is available.

Control Mode LED Indicator	GPS Signal Status LED Indicator
Manual Mode: NO LED ATTI. Mode: ○ (○○ indicates that is stick(s) not at center) GPS Mode: ● (●● indicates that is stick(s) not at center)	Signal is best (GPS satellites > 6) : NO LED Signal is well (GPS satellites = 6) : ● Signal is bad(GPS satellites = 5) : ●● Signal is worst (GPS satellites< 5) : ●●●

4. Keep the aircraft stationary, and then push both sticks to the left bottom or right bottom (shown as the following chart, defined as Combination Stick Commands (CSC)), to start the motors.

5. Release the yaw, roll and pitch sticks and keep them at the mid point, and the throttle stick under the mid point. Then check whether all propellers are rotating correctly.
6. Stop motors, power off the Multi-rotor.
7. Make sure all settings and configurations are correct and then you can take off you aircraft.

After power on, if abnormal LED indicator occurs, please refer to the Abnormal LED instruction in the FAQ and aids troubleshooting.

Step4 Flying Test

1. Choose an open space without obstruction, tall buildings and crowds as flying filed. Place the aircraft 3 meters away from you and others, to avoid accidental injury.
2. If in GPS ATTI. Mode, place the aircraft in an open space without buildings or trees. Take off the aircraft after 6 or more GPS satellites are found (Red LED blinks once or no blinking). If in Manual Mode or ATTI. Mode, you can skip this step.
3. Start-up
   (1) Switch on the transmitter first, then power on multi-rotor! Keep the aircraft stationary until the system start and self-check has finished.
   (2) Please wait for the system to warm up gradually with the LED blinks Yellow 4 times quickly (OOOO). You should not start the motors until the blinking disappears.
   (3) Keep the aircraft stationary, and execute the CSC to start the motors.
   (4) Release the yaw, roll and pitch sticks and keep them at the mid point, at the same time raise the throttle stick from the bottom. The motors will stop if you do not push the throttle stick from the bottom within 3 sec and you will need to re-start the motors.
   (5) Keep raising the throttle stick until all the rotors are working, push the throttle stick to the mid point and then take-off your multi-rotor gently, pay attention not to push the stick excessively.
   (6) Pay attention to the aircraft movement at any time when flying, and use the sticks to adjust the aircraft's position. Keep the yaw, roll, pitch and throttle sticks at the mid point to hover the aircraft at the desired height.
4. Lower the aircraft slowly. Pull the throttle stick to the bottom and then execute the CSC to stop the motors after landing.
5. Please always power off the Multi-rotor first, and then switch off the transmitter after landing.

FLYING NOTES(VERY IMPORTANT) !!!

(1) If the warm up waiting is longer than 2 minutes (the 4 times Yellow blink continues), please power off for 10 minutes, cold start, and then connect the assistant software, enter the "Tools" - > IMU calibration, carry out the Advanced calibration.

(2) If you enable the Immediately Mode of Motor Stop; you should not pull throttle stick under 10% during flight, because it will stop motors. If you do it accidentally, you should push the throttle stick over 10% in 5s to re-start motors.

(3) DO NOT execute the CSC during normal flight without any reason, or it will stop motors at once.

(4) Pay attention to the GPS satellite status LED indicator. Bad GPS signal may lead the aircraft to drift when hovering.

(5) DO NOT fly near to ferromagnetic substances, to avoid strong magnetic interference with the GPS.

(6) Please avoid using GPS ATTI. Mode in the areas, where GPS signal is most likely bad.

(7) If the LED flashes quickly Red then this indicates battery voltage is low, land ASAP.

(8) If the transmitter indicates low-battery alarm, please land ASAP. In this condition the transmitter may cause the aircraft to go out of control or even crash.

(9) In GPS ATTI. Mode, make sure that the home point is recorded when the GPS signal is well; otherwise the home point recording may be not so precise.

(1) In ATTI Mode, throttle stick center position is for 0m/s along the vertical direction. You should keep the position of throttle stick higher than 10% from cut-throttle during the flight! In any control mode, DO NOT pull throttle stick under 10% during normal flight without any reason.

(2) It is recommended to land the aircraft slowly, to prevent the aircraft from damage when landing.

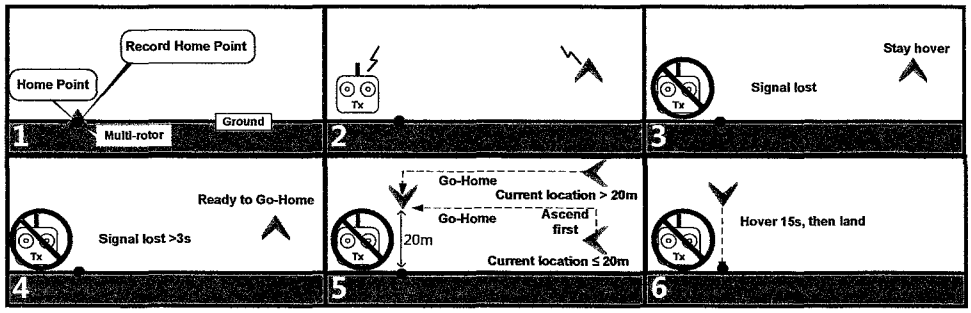
(3) If Low-Voltage Alarm is set, the aircraft will act according to the configuration of the Assistant Software once Low-Voltage Alarm is triggered. Make sure you remember what you have set before.

(4) If Fail-Safe function is set, the aircraft will act according to the configuration of the Assistant Software once Fail-Safe is triggered. Make sure you remember what you have set before.

Advanced Functions

A1 FailSafe

An introduction of Go-Home and Landing.



Home-point: Before takeoff, current position of multi-rotor will be saved as home-point by MC automatically when you start the motors for the first time after 6 or more GPS satellites are found (red light blinks once or no blinking) for 10 seconds.

Note	1. Please make sure to record the home-point before takeoff, and clearly know where it is. 2. During go-home the nose direction of the aircraft is facing toward the home-point, the aircraft is flying directly from the current position to the home-point. 3. You can regain the control during the aircraft is hovering 15 seconds.

The flowchart of failsafe and how to regain control

This section will demonstrate the working logic of failsafe and how to regain control.
The following description is effective only when:
1. The aircraft is in flight.
2. The GPS works normally and signal is good (≥6 satellite, the LED blinks a single red light or no red light).

- What triggered failsafe
- The aircraft behavior after failsafe
- How to regain control
- Precautions

(1) The aircraft flies far away, TX is on but the signal is weak.

- Attitude Mode: (1) the aircraft will level its attitude immediately (2) 3 seconds later, failsafe is triggered and aircraft will start to go home. (3) If signal is regained during (1) or (2), it will resume normal flight immediately.
  → Attitude Mode: In Attitude Mode as soon as you get signal you can regain control.
- GPS Mode: (1) the aircraft will slow down and hover. (2) if the signal is restored within 3 seconds (TX and receiver connected), the system will immediately return to normal operation; does not enter failsafe. (3) if not reconnected within 3sec, the system will enter failsafe, then even if the signal is restored, the system will not exit failsafe.
  → GPS Mode: switch the TX mode switch to ATTI, if the receiver is connected, then you will regain control.

(2)Turn off the TX (we assume you want to trigger failsafe)

→ In this case, the behavior of the aircraft is the same as in the above condition.
If you want the aircraft to Return Home, please do not turn the TX back on within 3 seconds*, otherwise the aircraft will exit failsafe mode immediately.

→ If you choose to turn off the TX, you must be pretty sure that you know how to regain control. Here we offer a method, please read carefully.

We strongly recommend you DO NOT try this, because there are three types of risk:
(1) You must be pretty clear whether the Home-point is OK for landing or not. (You have to understand the definition of Home-point well and the working process of failsafe)
(2) If there are tall buildings around, the aircraft may be obstructed on the way.
(3) When GPS signal is bad or GPS is not working, failsafe will not work.

When you turn off the TX, use the following method to regain control:
(1) Switch the TX switch to GPS.
(2) and then put throttle to the center position(greater than 3sec after switching off, important), you can now turn the TX back on.
(3) then you can switch the TX Control mode switch to ATTI to regain control.

Note: if you start the motors, but do not push the throttle to take-off the aircraft, in this case it is very dangerous to turn off the TX, because the aircraft will take off automatically, so do not try this.

* If signal lost for more than 3 seconds failsafe will be triggered, if signal regained within 3 seconds it will exit failsafe immediately.

A2 Low-Voltage Alert

In order to prevent your multi-rotor from a crash or other harmful consequences caused by low battery voltage, there are two levels of low voltage protection available to use. You can choose to use or not to use them; however we strongly recommend using the protections if available! Low-Voltage Alert is to indicate that the battery cannot provide enough power for the aircraft, in order to warn you to land the aircraft ASAP. You can configure this function in the assistant software, and please read the text in the software carefully before your flight. Make sure to carry out the Current Voltage Calibration.

There are both first level and second level protections. The first level protection has LED warning. During second level protection the aircraft will land automatically with LED warning. Meanwhile the center point of throttle stick will move up slowly to 90% of endpoint, you should land ASAP to prevent your aircraft from crashing!

It is not for fun, you should land your aircraft ASAP to prevent your aircraft from crashing or other harmful consequences!!!

(1) Configure the FailSafe function in the **assistant software -> "Advanced" -> "F/S"** and read the instruction thoroughly and carefully.

(2) Configure the Low-Voltage Alert function in the **assistant software -> "Advanced" -> "Voltage"** and read the instruction thoroughly and carefully.

A3 Intelligent Orientation Control (IOC) Flight (with GPS module)

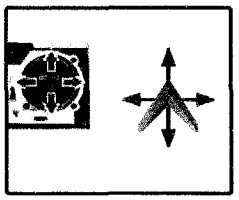
Definition of Forward Direction:

Multi -rotor will fly along this direction when you push the elevator stick (➡).

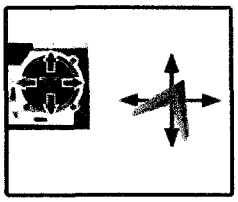
Step 1 Before You Start

Usually, the forward direction of a flying multi-rotor is the same as the nose direction. By using IOC, wherever the nose points, the forward direction has nothing to do with nose direction. The red and blue arrows on the transmitter are corresponding to pitch and roll operations in the following diagram.

- In course lock flying, the forward direction is the same as a recorded nose direction. All the following requirements are met: the autopilot system is in ATTI. Mode or GPS ATTI. Mode.

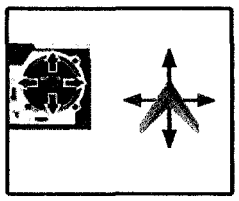


Normal flying

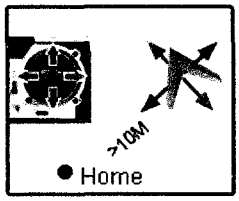


Course Lock Flying

- In home lock flying, the forward direction is the same as the direction from home point to multi-rotor. All the following requirements are met: 6 or more GPS satellites are found, in GPS ATTI. Mode, and the aircraft is further than 10m away from the home point.



Normal flying



Home Lock Flying

Step 2 IOC Switch Setting

Before using the IOC function, you have to choose a 3-position switch on your transmitter as the IOC switch, which is also used for recording the orientation, home position in corresponding modes. Refer to the assistant software; click the "Advanced" to find the "IOC".

IOC Switch			
IOC Function	OFF	Course Lock	Home Lock

The above table is for example. The function of the switch position may be reversed since the normal/reversed setting of the switch channel. Toggle the switch and observe the slider position of channel X2 on the assistant software screen, the corresponding area should turn blue.

Step3 Method of Forward Direction and Home Point Recording

If you use the IOC function, **please be aware of the Forward Direction of Course Lock Flying, and the home point of Home Lock Flying.** There are two ways to record the forward direction and the home point: Manually and Automatically. You may choose any one record method. The LED will blink Green quickly if successfully recorded.

	Course Lock	Home Lock
Automatically	30 seconds after you power on the autopilot system.	Before takeoff, the current position of the aircraft will be saved as home point when you start the motors for the first time after 6 or more GPS satellites have been found for 10 seconds.
Manually	30 seconds after you power on the autopilot system. Toggle the IOC switch from Off to Course Lock, and back to Off quickly 3 to 5 times.	After 6 or more GPS satellites have been found. And the aircraft can be hovering. Toggle the IOC switch from Course Lock to Home Lock, and back to Course Lock quickly 3 to 5 times.
⚠	DO NOT toggle the switch between Off to Home Lock, since it may change the recording of the **Forward Direction of Course Lock.**	

Step4 IOC Flying Test

Then you can do **Course Lock and Home Lock flying test.**

Carry out an IOC flight by the following procedure. The Control Mode LED will blink Yellow and Green alternatively (○●) to indicate the IOC mode only when the main controller is really to fly in Course Lock, Home Lock modes.

During the same flight	STEP1: Record	STEP2: ON	STEP3: OFF	STEP4: ON again
Course Lock				
Switch Setting	Record the Forward Direction	Set Control Mode switch at GPS or ATTI. position, Toggle IOC switch from OFF to Course Lock position	Toggle IOC switch to OFF position	Toggle IOC switch from OFF to Course Lock position
Home Lock				
Switch Setting	Record the Home Point	Set Control Mode switch at GPS position, Toggle IOC switch from OFF to Home Lock position	Toggle IOC switch to OFF position	Toggle IOC switch from OFF to Home Lock position

⟶ Aircraft moving direction when pull pitch stick ⟹ Aircraft moving direction when pull roll stick

●Home point ➤ Aircraft (the arrow is pointing to the direction of the aircraft nose)

IOC FLYING NOTES !!!

(1) When Multi-rotor is flying by home lock far away from you and the home point, please DO NOT toggle the IOC switch many times quickly so as to avoid the change of home point without your attention.

(1) Home lock flying requires that 6 or more GPS satellites are found and the aircraft is further than 10m away from the home point.

(2) If the IOC flying requirement is not satisfied, the autopilot system will quit IOC control mode. Please be aware of the LED indicator, to know the current control mode of the autopilot system.

(1) Blinking indications of IOC ○● are:

a) Before motors start: ○● **blink**, all sticks (except throttle stick) return to center; ○●● **blink**, stick(s) (except throttle stick) not at center.

b) After motors start and throttle stick is over 10% in 3 seconds: ○● **blink**, all sticks return to center; ○●● **blink**, stick(s) not at center.

(2) Before you do the home lock flight, you have to fly the aircraft out of the 10m range around home point, and then flip the IOC switch to Home Lock position to fly in home lock when all the requirements are met. If you have already toggled the IOC switch to Home Lock position when the aircraft is still in 10m range around home point, and this is the first time you are going to fly in home lock during the current flight, then if all the requirements are met, the main controller will change into home lock automatically when Multi-rotor flies out the 10m range around home point.

(1) When flying in Home Lock mode, if any of the following situations happen, then the system will quit Home Lock flying and automatically enter Course Lock flying. The aircraft will fly in Course Lock using the earlier forward direction.

a) The aircraft fly's within 10m range of the home point.

b) You toggle the control mode switch to the ATTI. Mode.

c) The GPS signal becomes bad (The GPS signal LED is blinking Red twice or three times).

(2) We suggest that you should know clearly which flight lock method you are going to fly, and you know the locked forward direction or home point, before you switch on IOC mode during the flight.

A4 Receiver Advanced Protection Function

You are asked to enable this function by connecting to the Assistant Software, please set it at the section of Basic->R/C-> Receiver Advanced Protection.

If you choose enable it, the FailSafe will be triggered if the following situations occur during flight.

According to the difference of the aircraft height, there are two situations.

a) Lower than 100m, the A/E/R channel is not at the mid point.

b) Higher than 100m, the A/E/R channel is not at the mid point or the throttle stick is above the mid point.

In the GPS Mode or ATTI. Mode, if the requirement a) or b) is satisfied, and the output data of four channels A/E/R/T have not changed for 20 seconds, then the aircraft will hover automatically. After that, if the output data of four channels A/E/R/T still do not any changes and last for 10 seconds, the autopilot system will think that the data from receiver is abnormal, and then enter the FailSafe Mode.

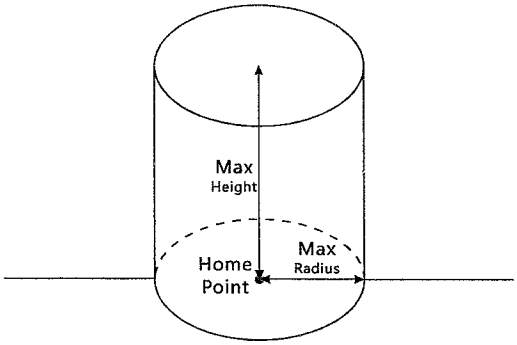
Brief introduction of how to quit the FailSafe Mode

If there is any command change from the receiver, the autopilot system thinks that the receiver is regained. In ATTI. Mode and Manual Mode, it will quit the FailSafe Mode automatically. In GPS Mode, please toggle the control mode switch to the ATTI. Mode and Manual Mode position to regain the control. Refer to the FailSafe section for more details.

A5 Flight Limits

The flight limits function is default enabled in the NAZA-M Flight control system, it's aimed to restrict the flying height and distance of the aircraft. The Max Height restricts the vertical distance between the aircraft and the Home point, the Max Radius restricts the horizontal distance between the aircraft and the Home point.

The default Max Height is 2000m and Max Radius is 2000m. Users can write the values of the Max Height and Max Radius in the Assistant software, the range of the Max Height is 10m-100000m, the range of the Max Radius is the same. So that the aircraft will fly in the entered range, which is a cylinder space above the Home point.



(1) Height Limit works when the control mode is GPS or ATTI. Mode. Radius Limit works when the control mode is GPS and the satellite number ≥6.

(2) If the aircraft flies out of the limits, it's still controllable except flying further away.

(3) If the control mode is changed to GPS when the aircraft is out of Max Radius, the aircraft will fly back within the entered range.

(4) The Failsafe and the Ground Station operations are not restricted to the Flight Limits.

Appendix

Specifications

General

Built-In Functions	(1) Three Modes of Autopilot	(4)S-Bus/S-Bus2 Receiver Support
	(2)Enhanced Fail Safe	(5)PPM Receiver Support
	(3)Low Voltage Protection	(6)2-axle Gimbal Support

Peripheral

Supported Multi-rotor	• Quad-rotor I4, X4; • Hexa-rotor I 6, X6, IY6, Y6. • Octo- rotor I8, V8, X8
Supported ESC output	400Hz refresh frequency.
Recommended Transmitter	PCM or 2.4GHz with a minimum 4 channels.
Assistant Software System Requirement	Windows XP SP3; Windows 7; Windows 8

Electrical & Mechanical

Working Voltage Range	• MC: 4.8V ~ 5.5 V • PMU Input: 7.4V ~ 26.0 V (recommend 2S ~ 6S LiPo) Output(V-SEN port red wire): 3A@5V Output(V-SEN port red wire)burst current:7.5A
Power Consumption	• MAX: 1.5W(0.3A@5V) • Normal: 0.6W(0.12A@5V)
Operating Temperature	-10°C ~ 50°C (14F ~122F)
Weight	• MC: 27g • GPS/Compass: 27g • PMU: 28g • LED: 13g
Dimensions	• MC: 45.5mm × 32.5mm × 18.5mm • GPS/Compass: 46mm (diameter) x 10mm • PMU : 39.5mm × 27.5mm × 10.0mm • LED : 25mm × 25mm × 7.0mm

Flight Performance (can be effected by mechanical performance and payloads)

Hovering Accuracy (GPS Mode)	• Vertical: ± 0.8m • Horizontal: ±2.5m
Max Yaw Angular Velocity	200°/s
Max Tilt Angle	35°
Max Ascent / Descent Speed	**Ascent :** 6m/s, **Descent:** 4.5 m/s

MC/PMU Firmware Upgrade

Please follow the procedure for software and firmware upgrade; otherwise the system might not work properly. For SAFETY REASONS, DO NOT use power battery during firmware upgrade.

1. Make sure your computer is connected to the Internet.
2. Please close all the other applications during the firmware upgrade, including anti-virus software and firewall.
3. Make sure the power supply is securely connected. DO NOT un-plug the power supply until firmware upgrade has finished.
4. Connect system to PC with Micro-USB cable, DO NOT break connection until firmware upgrade is finished.
5. Run Software and wait for connection.
6. Select Upgrade option→Check the MC and PMU Firmware Version.
7. DJI server will check your current firmware version, and get the latest firmware prepared for the unit.
8. If there is a firmware version more up-to-date than your current version, you will be able to click to update them.
9. Wait until Assistant software shows "finished".
10. Click OK and power cycle the unit after at least 5 seconds.
11. Your unit is now up-to-date.

(1) After firmware upgrade, please re-configure the system using Assistant software.

(2) If firmware upgrade failed, the system will enter waiting for firmware upgrade status automatically, please try again with the above procedures.

(3) Select Upgrade option→Check the GPS Firmware Version, online upgrade is disable.

LED Description

System Status	LED Flashing
System start and self-check	
IMU abnormal data or need advanced calibration*	
Warm up after power on	
The aircraft is moved or bias of sensors too big	
Compass error too big, need recalibration.	
Transmitter (TX) signal lost, enter the FailSafe.	
TX stick(s) mid point error too big	
Low voltage alert or other abnormal alert* (e.g. Configuration error, TX data error, Enable low voltage protection without PMU, SN error or Compass abnormal work.)	
Record forward direction or home point	
Control Mode Indictor	Manual Mode: None ATTI. Mode:  (stick(s) not at center ) GPS Mode:  (stick(s) not at center ) IOC Mode:  (stick(s) not at center )
GPS Signal State Indicator (GPS/Compass Module is necessary)	GPS Signal is Best(GPS Satellite number > 6): None GPS Signal is Well(GPS Satellite number = 6):  GPS Signal is Bad (GPS Satellite number = 5) :  GPS Signal is Worst (GPS Satellite number < 5): 

Compass Calibration	LED Flashing
Begin horizontal calibration	
Begin vertical calibration	
Calibration or others error	

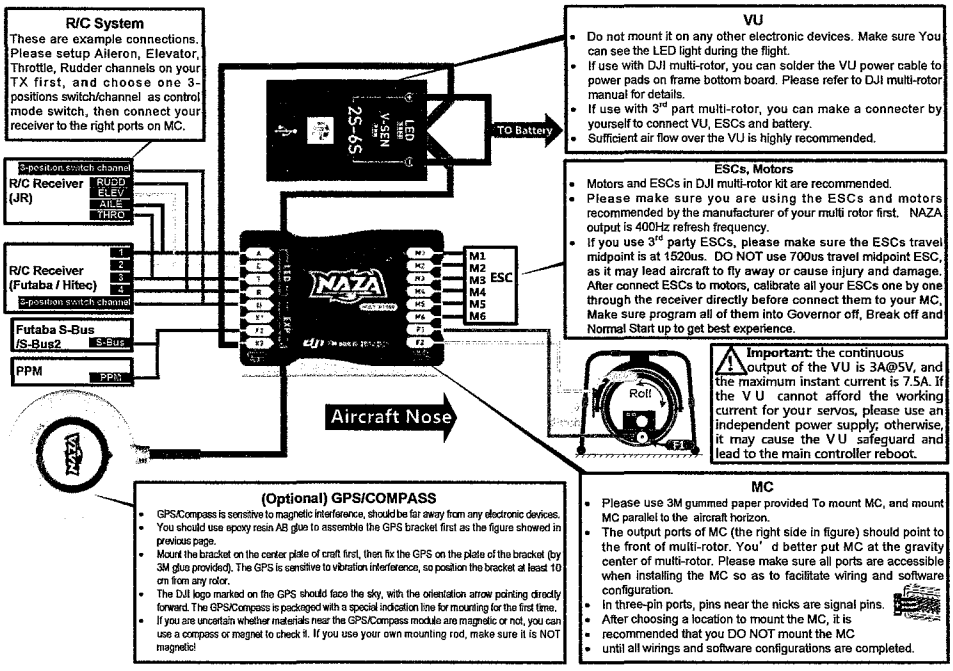
*You can figure out the error by connecting the autopilot system to the assistant software.

Instruction of V1 (also known as NAZA-M)

V1 (also known as NAZA-M) system is different from V2 system, if you are V1 system user, please read the following text carefully, and refer to the other text in this Guide for usage details (including **Assistant Software Configuration, Basic flying, Advanced Function Appendix and FAQ, etc.**).

V1 Assembly and Connection

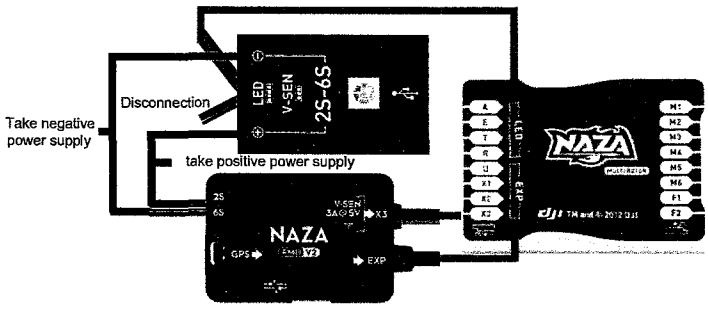
Connect the V1 system according to the following chart.



V1 is compatible with the PMU V2 (Accessory of Naza-M V2)

V1 system is compatible with the PMU V2 of V2 system; please carry out the following connection. The other modules connection is the same as before.

Important: You are asked to upgrade your Firmware version of V1 MC to V3.10 or above, as the PUM V2 can only work with the MC of version 3.10 or above.



V1 Port Description

Please remember the function of each port, which may help you to use the Naza-M efficiently.

Main Controller

A	For roll control (left/right)		
E	For pitch control (front/back)		
T	For throttle control		
R	For rudder control		
U	For Control Mode Switch		
X1	For gimbal pitch control	Or for gain tuning	
X2	For D-Bus (S-Bus/ S-Bus2 compatible)	Or for gain tuning	Or for IOC switch
X3	For voltage monitor (Connect with VU V-SEN port)		
M1	To #1 rotor		
M2	To #2 rotor		
M3	To #3 rotor		
M4	To #4 rotor		
M5	To #5 rotor		
M6	To #6 rotor		
F1	To gimbal roll servo	Or to #7 rotor (Upgrade the MC Firmware to V3.10 or above)	
F2	To gimbal pitch servo	Or to #8 rotor (Upgrade the MC Firmware to V3.10 or above)	
LED	LED port, for LED wire connection from Versatile Unit		
EXP.	GPS port, for GPS module wire connection.		

(In three-pin ports, pins near the nicks are signal pins.)

Versatile Unit

V-SEN V-SEN port: To the X3 port of the main controller, for monitoring battery voltage and supplying power

- Orange wire (signal wire) output: ±3.3V
- Red wire (power wire) output: 3A@5V

LED LED wire, to LED port of the main controller.

USB port: PC connection for configuration and firmware upgrades.

GPS & Compass

Connect to the EXP. port.

V1 Specification

General

Built-In Functions	• Three Modes of Autopilot • Enhanced Fail Safe • Low Voltage Protection • S-Bus/ S-Bus2 Receiver Support • PPM Receiver Support • 2-axle Gimbal Support

Peripheral

Supported Multi-rotor	• Quad-rotor I4, X4; • Hexa-rotor I 6, X6, IY6, Y6. • Octo-rotor I8, V8, X8 (Upgrade the MC Firmware to V3.10 or above)
Supported ESC output	400Hz refresh frequency.
Recommended Transmitter	PCM or 2.4GHz with a minimum 4 channels.
Assistant Software System Requirement	Windows XP SP3; Windows 7

Electrical & Mechanical

Working Voltage Range	• MC: 4.8V ~ 5.5 V • VU Input: 7.2V ~ 26.0 V (recommend 2S ~ 6S LiPo) Output(V-SEN port red wire): 3A@5V Output(V-SEN port red wire)burst current:7.5A
Power Consumption	• MAX: 1.5W(0.3A@5V) • Normal: 0.6W(0.12A@5V)
Operating Temperature	-10°C ~ 50°C(14F ~122F)
Weight	• MC: 25g • GPS: 21.3g • VU: 20g
Dimensions	• MC: 45.5mm × 31.5mm × 18.5mm • GPS & Compass: 46mm (diameter) x 9mm • VU: 32.2mm × 21.1mm × 7.7mm

Flight Performance (can be effected by mechanical performance and payloads)

Hovering Accuracy (GPS Mode)	• Vertical: ± 0.8m • Horizontal: ± 2.5m
Max Yaw Angular Velocity	200°/s
Max Tilt Angle	45°
Max Ascent / Descent Speed	6m/s

FAQ

Abnormal LED Indication List

During the Checking Procedure, if abnormal LED Indicator occurs or even the system cannot work normally, please refer to the following list and aids troubleshooting.

(1) "System initializing and self-checking LED flashes" are not correct (●●○●●○●●○●●●● Red LED appears in the last four green flashes). The autopilot system works abnormally. Please contact your dealer.

(2) LED blinks Yellow 4 times quickly (○○○○). The system is warming up. You cannot start the motors until the 4 rapid yellow flashes disappear. If the warm up waiting is longer than 2 minutes, please power off for 5 minutes, cold start, and then connect the assistant software, enter the "Tools" - > IMU calibration, carry out the Advanced calibration.

(3) After the system start and self-checking has finished, if the LED blinks Red, Green and Yellow (●●○) continually. Sensor error is too big. Please connect the assistant software, enter the "Tools" - > IMU calibration, carry out calibration.

(4) At the first motors start, the system will check the sensors Bias and you are asked to keep the aircraft stationary (no need of horizontal level). If you cannot start the motors and the LED blinks Green 6 times quickly (●●●●●●), it means that the sensor error is too big. Please connect the assistant software, enter the "Tools" - > IMU calibration, carry out basic calibration.

Note: after the first successful motors start, this checking will be disabled and it is no need any more to keep the aircraft stationary during starting motors.

(5) The system blinks Red LED quickly during flying. Low-voltage protection is triggered. Please land the aircraft ASAP.

(6) The system blinks Yellow LED quickly during flying. FailSafe Mode is triggered. Pay attention that there is no tall buildings and trees to block your aircraft during go-home.

(7) The LED blinks Red and Yellow alternately (▬▭). Compass error is too big.

a) There may be a ferromagnetic substance close to the Phantom. Lift the aircraft up about 1m from the ground, if there is no Red and Yellow flashing, then it will not affect the flight.

b) Otherwise, re-calibrate the compass.

c) If re-calibration does not work, please connect to the Assistant Software, select the "Tools" and follow the tips to carry out the required operation.

Fix the TBE (Toilet Bowl Effect) Problem

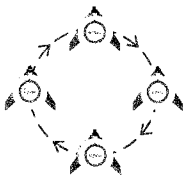
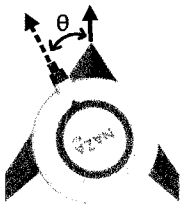
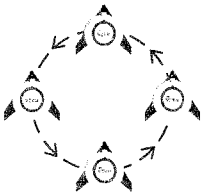
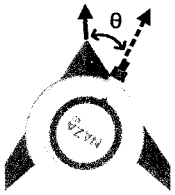
When flying in GPS ATTI. Mode and the compass calibration has been done correctly, should you find the aircraft rotating (Toilet bowl effect), or drifting when hovering. Please check the GPS module mounting orientation and then

re-do the compass calibration. Carry out the following procedure to re-mount the GPS module.

In the following diagram (view from the top), the aircraft can appear to be rotating in both clockwise and counter-clockwise direction, please re-mount the GPS module correspondingly.

is the rotating direction of aircraft, is the nose direction of aircraft,

is the arrow direction on the GPS module, θ is the offset angle for GPS re-mounting(about 10~30°)

Clockwise rotating	GPS re-mounting	Counter Clockwise rotating	GPS re-mounting
			

Should you find the multi-rotor does not track straight in forward flight.

Please carry out several more courses, the system will fix it automatically.

Motors Start failure caused by TX stick(s) mid point error too big

If the TX stick(s) mid point error is too big, Motors Start will fail when you execute the Combination Stick Commands (CSC) and lead to the aircraft will not takeoff.. And the LED will blink Red four times per second continually to warn you.

TX stick(s) mid point error too big can be caused by the following reasons:

(1) There is TX stick (except the throttle stick) not at center when power on the autopilot system.

(2) The TX sticks has been trimmed, which leads to the large deviation of mid point. For example, the SUB-TRIM has been adjusted for Futaba transmitter.

(3) The TX stick(s) travel has larger asymmetry.

For the reason (1), please put all TX sticks at the mid point, and then power cycle the autopilot system to re-record the mid point. If the problem continues, that can be caused by the reason (2) or reason (3), yo u need to adjust the output range of your TX, and then use the Assistant Software to redo the TX cali bration. Please carry out the following procedures.

(1) Connect to the Assistant software, click Basic-› R/C-› Command Sticks Calibration, and push all TX sticks throughout their complete travel range to see if any stick cannot reach its largest position.

(2) Adjust the largest travel of TX stick until the cursor on the Assistant software can reach both end positions, according to your TX manual.

(3) Power cycle the autopilot system, note that power cycle is required.

(4) Redo the TX calibration according to the Assistant software.

Attitude Controllable When One Motor Output is Failed

For Hexa-rotor, including Hexa-rotor I, Hexa-rotor V, Hexa-rotor IY and Hexa-rotor Y, aircraft is attitude controllable when one motor output is failed.

The NAZA-M can still control the attitude of the Hexa-rotor for a safe landing when one motor output of the Hexa-rotor has failed, for example, one motor is stopped or one propeller is broken, etc.

The control mode of NAZA-M should be in Atti. Mode or GPS Atti. Mode. The aircraft will rotate, due to an imbalance of torque; however, it can still be controlled by the Transmitter.

Select Course lock or home lock mode for flying the aircraft into a safe area to land when the aircraft is far away or the attitude can't be recognized. Even when the multi rotor is rotating, using Course lock or home lock mode will allow you to move the multi rotor in the corresponding Transmitter stick direction.

When used with other DJI products

The NAZA-M system communicates with other DJI products (e.g. H3-2D gimbal, BTU module, iOSD mini and iOSD Mark II) via the CAN-Bus port ( ) of the NAZA PMU V2. You can plug new DJI products into any spare CAN-Bus port, since CAN-Bus ports on NAZA-M, CAN HUB, GCU, iOSD mini, iOSD Mark II and 2.4G Bluetooth Datalink are the same for the communications.

When there are not enough CAN-Bus ports for additional DJI products, then a DJI CAN HUB module is recommended. The following diagram is for your connection reference.

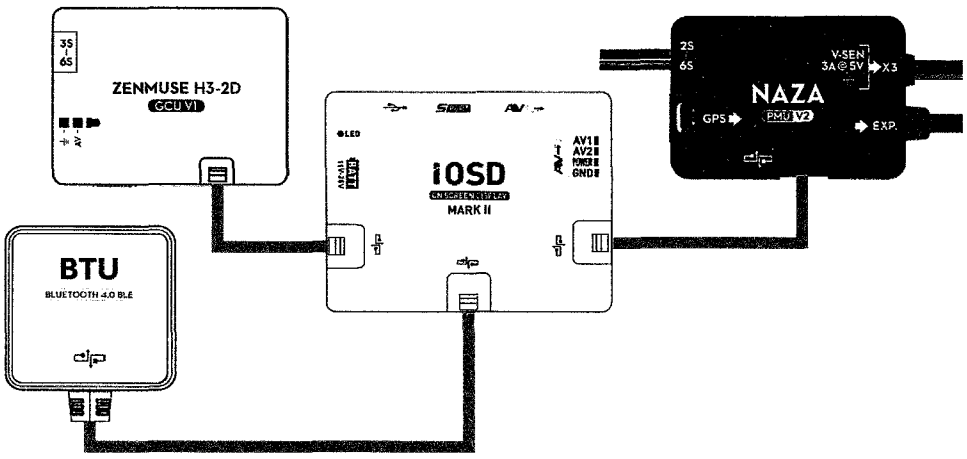


Fig.1 Used with iOSD Mark II

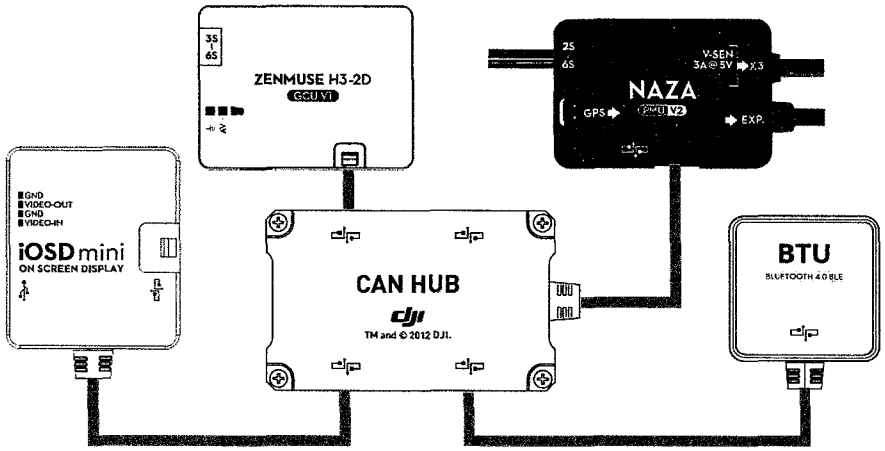


Fig.2 Used with CAN HUB

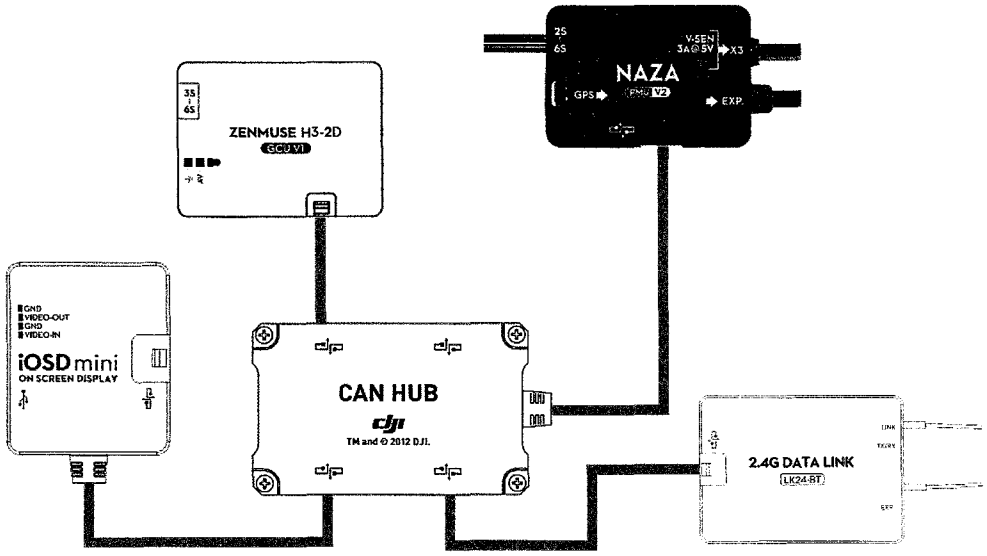


Fig.3 Use a CAN HUB to connect the 2.4G Bluetooth Datalink

	(1)	Users can use the NM Assistant on the mobile device when a BTU module is connecting with the Ground end of the2.4G Bluetooth Datalink (No need to connect another BTU module to the Flight control system).

DJI E300 Multirotor Propulsion System

User Manual v 1.00

2013.11.20 Revision

Disclaimer

Read this disclaimer carefully before using this product. By using this product, you hereby agree to this disclaimer and signify that you have read them fully. DJI Innovations assumes no liability for damage(s) or injuries incurred directly or indirectly from the use of this product.

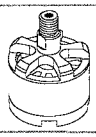
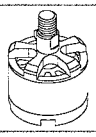
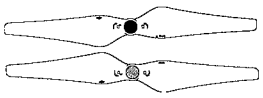
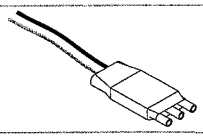
Cautions

When flying, the fast rotating propellers will cause serious damage and injury. Therefore, please fly with a nigh safety consciousness.

1. Keep flying multi-rotor away from obstacles, human beings, high-voltage lines and so on.
2. Do not get close to or touch the working motors and propellers, which will cause serious injury.
3. Make sure there is no short or open circuit.
4. Check that the propellers and the motors are installed correctly and firmly before flight.
5. Check whether all parts of multi-rotor are in good condition before flight. Do not fly with old or broken parts.
6. Use DJI parts as much as possible.

If you have any problem you cannot solve, please contact your dealer or DJI customer service.

In the Box

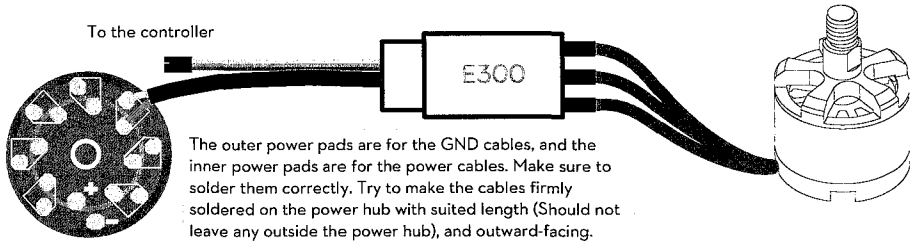
Motor(Clock-wise rotation)	Motor(Counter clock-wise rotation)	Propeller Pair
		
ESC	**Accessories Pack**	
	**Power Hub,** **Screws (M2.5*Φ5*1.3*1) , Screws (M3*Φ4.9*6.8), Screws (M3*Φ5.5*4.5),** **Wrench for propeller fix, 2.0mm hexagonal wrench, Double side tape, etc.**	

Tools Needed

Tool	Function
Electric Soldering Iron & Soldering Tin	Connects the ESCs' power cables to the power hub.

Soldering the ESC

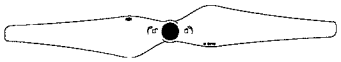
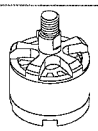
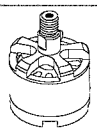
1. Please solder the ESC to the power pads on the power hub as the figure shows. Make sure the welding spot is firmly attached on the power pads and no short circuit. Do not damage the protector of the red cable to avoid short circuit.
2. Connect the signal cable to your controller.
3. Connect the motor to the ESC. Make sure the rotation direction of each motor is the same as the way of defined rotation direction. If not, switch any of two cables that connecting the motor and the ESC to change its rotation direction.



The outer power pads are for the GND cables, and the inner power pads are for the power cables. Make sure to solder them correctly. Try to make the cables firmly soldered on the power hub with suited length (Should not leave any outside the power hub), and outward-facing.

!	Make sure there is no short or open circuit.
	It is recommended to solder a power connector on the power hub.

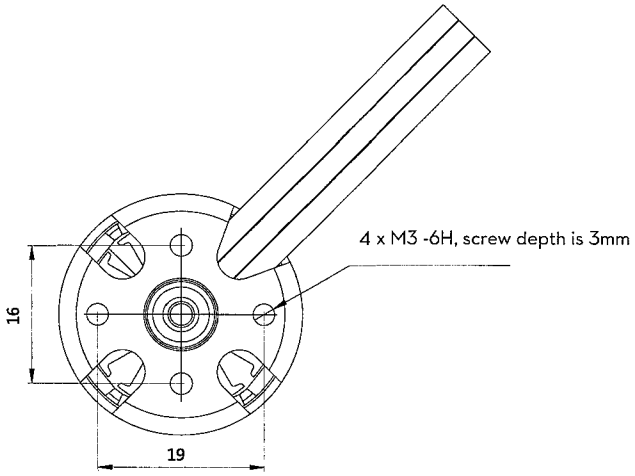
Assembling the Propellers

Propeller	Silver nut (9443)	Black nut (9443 R)
Diagram		
Assembly Location	 Motor(Counter clock-wise rotation)	 Motor(Clock-wise rotation)
Fastening/Un-fastening Instructions	Lock: Tighten the propeller in this direction. Unlock: Remove the propeller in this direction.	

1. Tighten the propellers by following the instructions. Propellers are self tightening during flight.
2. Keep the motor deadlocked in place and remove the propeller according to the instructions.
DO NOT use any thread locker on the threads.

Assembling the Motors

Assemble the motor to a frame arm according to the size of the assembly hole.



(1)	The screw hole is M3 with the depth of 3mm. Assemble them with appropriate screws.
(2)	Oversized screw may damage the motor.

ESC Sound Description

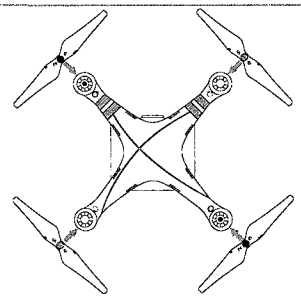
Normal	Description
♪1234567	Ready.
Abnormal	**Description**
BBBBBB...	Throttle stick is not at bottom.
B--------B--------B...	Input signal is abnormal.
BB---BB---BB---BB...	Input voltage is abnormal
You can know the working status according to the sound of the ESC.	

Specifications

Working Temperature	-5°C ~ 40°C
ESC	
Current	15A OPTO
Signal Frequency	30Hz~450Hz
Voltage	11.1V~14.8V
Battery	3S~4S LiPo
Motor	
Stator Size	22×12mm
KV	920rpm/V
Weight	50g
Propeller	
Diameter / Thread Pitch	24x11cm

Used Together with DJI Product

Product list and assembly diagram
DJI F450
DJI F550
PHANTOM
PHANTOM 2 VISION



Used Together with PHANTOM 2 VISION

14 CHANNEL COMPUTER SYSTEM

14SG

S.BUS2™

2.4GHz FASSTest Extended System Telemetry™

INSTRUCTION MANUAL

Futaba®

Digital Proportional R/C System

CE0682①

1M23N27902

14 CHANNEL COMPUTER SYSTEM

14SG

INSTRUCTION MANUAL

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

TABLE OF CONTENTS

INTRODUCTION

Thank you for purchasing a Futaba® FASSTest-2.4GHz* 14SG 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.

*FASSTest: Futaba Advanced Spread Spectrum Technology extend system telemetry

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 14SG Frequently Asked Questions web site at www.futaba-rc.com/faq/. This page includes extensive programming, use, set up and safety information on the 14SG 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
Champaign, IL 61822
Phone: 217-398-0007
www.futaba-rc.com/service.html
Email: service@futaba-rc.com

FOR SUPPORT :
(PROGRAMMING AND USER QUESTIONS)
Please start here for answers to most questions:
www.futaba-rc.com/faq/
Fax: 217-398-7721
Phone: 217-398-8970 option 2

OUTSIDE NORTH AMERICA

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.

Compliance Information Statement (for U.S.A.)
This device, trade name Futaba Corporation of America, model number R7008SB, complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

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)

(for USA)

The RBRC. SEAL on the nickel-cadmium battery contained in Futaba products indicates that Futaba Corporation of America is voluntarily participating in an industry-wide program to collect and recycle these batteries at the end of their useful lives, when taken out of service within the United States. The RBRC. program provides a convenient alternative to placing used nickel-cadmium batteries into the trash or municipal waste system, which is illegal in some areas.

You may contact your local recycling center for information on where to return the spent battery. Please call 1-800-8BATTERY for information on NiCd battery recycling in your area. Futaba Corporation of America's involvement in this program is part of its commitment to protecting our environment and conserving natural resources.

*RBRC is a trademark of the Rechargeable Battery Recycling Corporation.

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.
--Consult the dealer or your Futaba Serivce center 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.

Meaning of Special Markings
Pay special attention to safety where indicated by the following marks:

⚠**DANGER** - Procedures which may lead to dangerous conditions and cause death/serious injury if not carried out properly.

⚠**WARNING** - Procedures which may lead to a dangerous condition or cause death or serious injury to the user if not carried out properly, or procedures where the probability of superficial injury or physical damage is high.

⚠**CAUTION** - Procedures where the possibility of serious injury to the user is small, but there is a danger of injury, or physical damage, if not carried out properly.

⃠= Prohibited ❗= Mandatory

Warning: 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 14SG 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.

NiMH/NiCd Battery

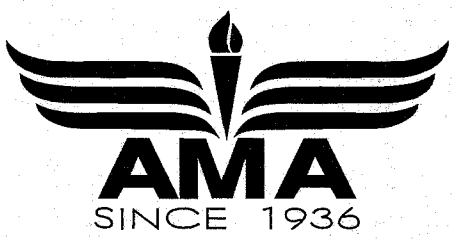
- **Charge the batteries!** (See Charging the NiCd batteries, for details.) Always recharge the transmitter and receiver batteries before each flying session. A low battery will soon die potentially, causing loss of control and a crash. When you begin your flying session, reset your T14SG's built-in 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.

NiMH/NiCd Battery Safety and Handling instructions

IMPORTANT!
Use only the **Futaba special charger** included with this set or other chargers approved by Futaba to charge the NiMH batteries in the T14SG transmitter included with this set.

It is important to understand the operating characteristics of NiMH/NiCd batteries.Always read the specifications printed on the label of your NiMH/NiCd battery and charger prior to use. Failure to follow the proceeding precautions can quickly result in severe, permanent damage to the batteries and its surroundings and possibly result in a **FIRE!**

IMPORTANT PRECAUTIONS

- ⊘ Do not attempt to disassemble NiMH/NiCd packs or cells.
- ⊘ Do not allow NiMH/NiCd cells to come in contact with moisture or water at any time.
- ❗ Always provide adequate ventilation around NiMH/NiCd batteries during charge, discharge, while in use, and during storage.
- ⊘ Do not leave a NiMH/NiCd battery unattended at any time while being charged or discharged.
- ⊘ Do not attempt to charge NiMH/NiCd batteries with a charger that is NOT designed for NiMH/NiCd batteries, as permanent damage to the battery and charger could result.
- ❗ Always charge NiMH/NiCd batteries in a fireproof location. Do not charge or discharge NiMH/NiCd batteries on carpet, a cluttered workbench, near paper, plastic, vinyl, leather or wood, or inside an R/C model or full-sized automobile! Monitor the charge area with a smoke or fire alarm.
- ⊘ Do not charge NiMH/NiCd batteries at currents greater than the "1C" rating of the battery ("C" equals the rated capacity of the battery).
- ⊘ Do not allow NiMH/NiCd cells to overheat at any time! Cells which reach greater than 140 degrees Fahrenheit (60°C) should be placed in a fireproof location.
- ❗ NiMH/NiCd cells will not charge fully when too cold or show full charge.
- ❗ It is normal for the batteries to become warm during charging, but if the charger or battery becomes excessively hot disconnect the battery from the charger immediately!! Always inspect a battery which has previously overheated for potential damage, and do not re-use if you suspect it has been damaged in any way.
- ⊘ Do not use a NiMH/NiCd battery if you suspect physical damage has occurred to the pack. Carefully inspect the battery for even the smallest of dents, cracks, splits, punctures or damage to the wiring and connectors. DO NOT allow the battery's internal electrolyte to get into eyes or on skin—wash affected areas immediately if they come in contact with the electrolyte. If in doubt, place the battery in a fire-proof location for at least 30 minutes.
- ⊘ Do not store batteries near an open flame or heater.
- ⊘ Do not discharge NiMH/NiCd batteries at currents which exceed the discharge current rating of the battery.
- ❗ Always store NiMH/NiCd cells/packs in a secure location away from children.

Secure Digital (SD) Memory Card Handling Instructions
(SD card is not included with this set)

- ⊘ Never remove the SD card or turn off power while entering data.
- ⊘ Never store the SD card where it may be subject to strong static electricity or magnetic fields.
- ⊘ Do not expose the SD card to direct sunlight, excessive humidity or corrosive environments.
- ⊘ Do not expose the SD card to dirt, moisture, water or fluids of any kind.
- ❗ Always hold the SD card by the edges during installation and removal.
- ❗ Be certain to insert the SD card in the correct direction.

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 them. Turn the transmitter off and confirm the proper surface/throttle movements. Turn the transmitter back on.
6. Start your engine.
7. Complete a full range check.
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 grasp the transmitter's antenna during flight.** Doing so may degrade the quality of the radio frequency transmission.
- 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.

Features

FASSTest system

The T14SG transmitter has adopted the newly developed bidirectional communication system "FASSTest".Data from the receiver can be checked in your transmitter. FASSTest is a maximum 14 channels (linear 12 channels + switch 2 channels) 2.4GHz dedicated system.

S.BUS2 system

By using the S.BUS2 system multiple servos, gyros and telemetry sensors are easily installed with a minimum amount of cables.

Model types

Six swash types are available for helicopters. Six types of main wings and three types of tail wings are available for airplanes and gliders. Functions and mixing functions necessary for each model type are set in advance at the factory.

Data input

Large graphic LCD and new type Touch Sensor substantially improve ease of setup.

Stick

Improved feel, adjustable length and tension.

Ni-MH battery

T14SG is operated by a 6.0 V/1,800 mAh Nickel-Metal Hydride battery.

SD card (Secure Digital memory card) (Not included)

Model data can be saved to an SD card (SD:32MB-2GB SDHC:4GB-32GB). When T14SG transmitter software files are released, the software can be updated by using an SD card update.

Edit button

Two edit buttons are provided, and the operating screen can be immediately "Returned" to the HOME screen during operation. Setting operation can be performed easily by combining this button with a touch sensor.

Vibration function

Selects a function that alerts the operator to various alarms and timers by vibrating the transmitter in addition to sounding a buzzer.

Contents and Technical Specifications

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

Your 14SG includes the following components:

- T14SG transmitter for airplanes or helicopters
- R7008SB Receiver
- HT5F1800B NiMH battery & Charger
- Li-Fe spacer for optional FT2F2100B/FT2F1700B LiFe battery pack.
- Switch harness
- Neck strap

*The set contents depend on the type of set.

Transmitter T14SG

(2-stick, 14-channel, FASSTest-2.4G system)
Transmitting frequency: 2.4GHz band
System: FASSTest14CH, FASSTest12CH, FASST MULT, FASST 7CH, S-FHSS, switchable
Power supply: 6.0V HT5F1800B NiMH battery

Receiver R7008SB

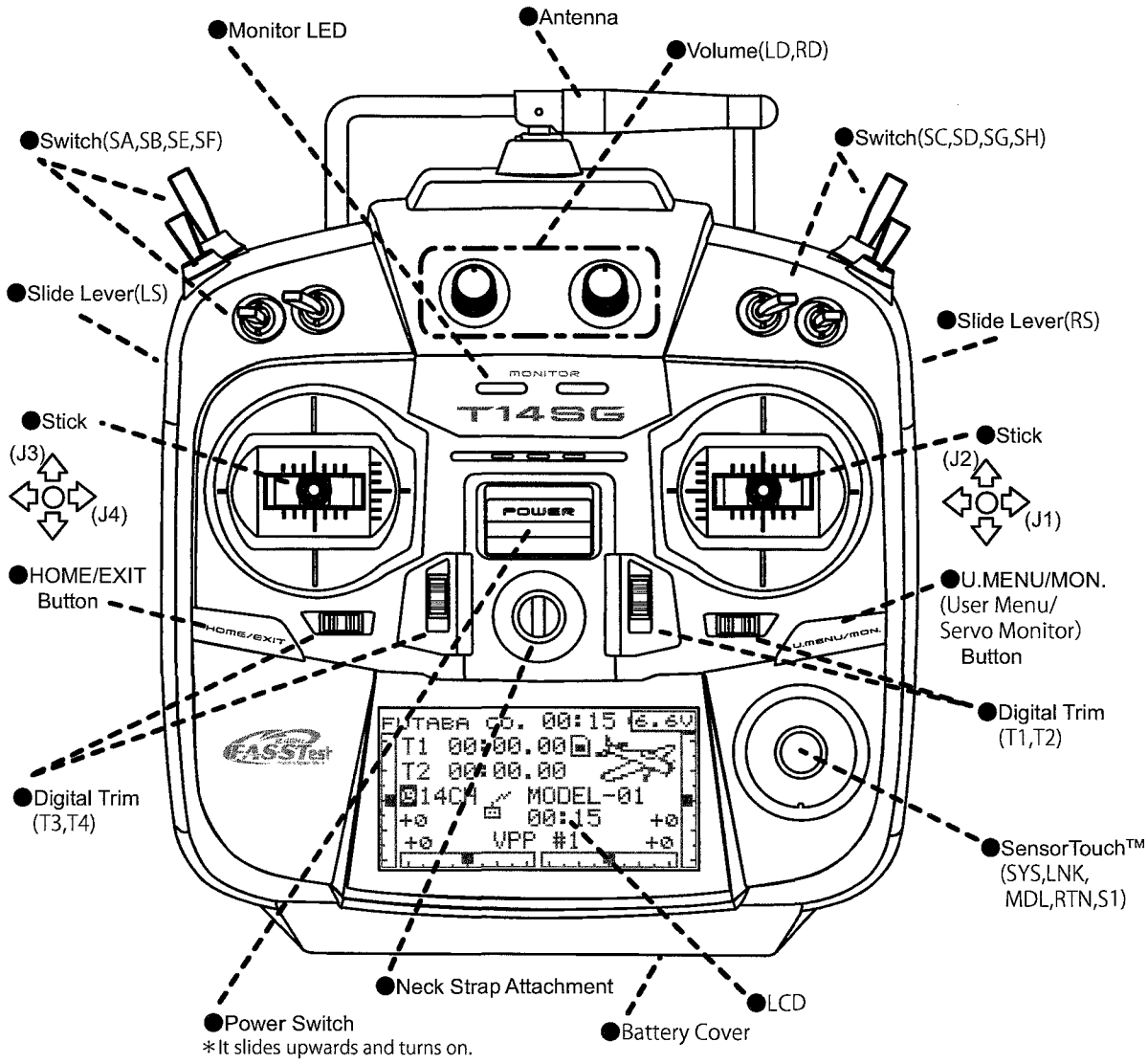
(FASSTest-2.4G system, dual antenna diversity, S.BUS system)
Power requirement: 3.7V~7.4V battery or regulated output from ESC, etc. (*1)
Size: 0.98 x 1.86 x 0.56 in. (24.9 x 47.3 x 14.3 mm)
Weight: 0.38 oz. (10.9g)
(*1) When using ESC's make sure that the regulated output capacity meets your usage application.

Note: The battery in the T14SG transmitter is not connected to the battery connector at initial. Please connect the battery connector before use.

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

- HT5F1800B Transmitter battery pack - the (1800mAh) transmitter NiMH battery pack may be easily exchanged with a fresh one to provide enough capacity for extended flying sessions.
- FT2F2100B/FT2F1700B Transmitter LiFe battery pack can also be used by using an exclusive spacer. However, charge with the charger only for LiFe.
- Trainer cord - the optional training cord may be used to help a beginning pilot learn to fly easily by placing the instructor on a separate transmitter. Note that the T14SG transmitter may be connected to another T14SG system, as well as to any other models of Futaba transmitters. The T14SG transmitter uses one of the three cord plug types according to the transmitter connected. (Refer to the description at the TRAINER function instructions). The part number of this cord is: FUTM4405.
- Servos - there are various kinds of servos. Please choose from the servos of Futaba what suited the model and the purpose of using you. If you utilize a S.BUS system, you should choose a S.BUS servo. An analog servo cannot be used if "FASSTest12CH mode" is used.
- Telemetry sensor - please purchase an optional sensor, in order to utilize bidirectional communication system and to acquire the information from a model high up in the sky. [Temperature sensor : SBS-01T] [Altitude sensor : SBS-01A] [RPM sensor magnet type : SBS-01RM][RPM sensor optical type : SBS-01RO] [GPS sensor : SBS-01G] [Voltage sensor : SBS-01V]
- Neckstrap - a neckstrap may be connected to your T14SG 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.
- Gyros - a variety of genuine Futaba gyros is available for your aircraft or helicopter needs.
- Governor - 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 Futaba receivers may be purchased for use in other models. (Receivers for FASSTest and FASST,S-FHSS types are available.)
- Optional Charger - Futaba CR-2000 NiMH/NiCd Transmitter/Receiver Battery Charger.

Transmitter controls

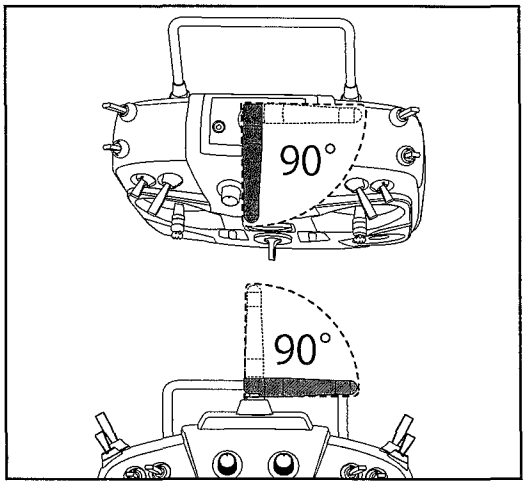


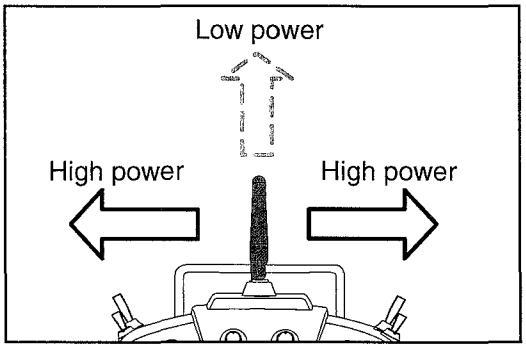
Transmitter's Antenna:

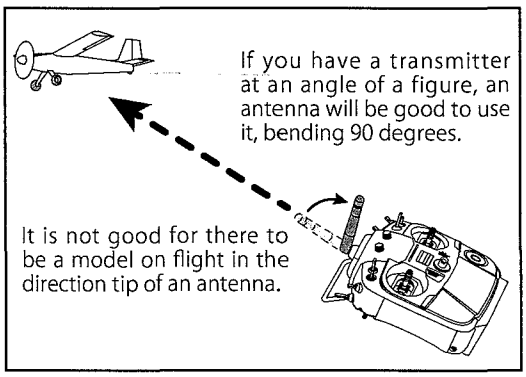
As with all radio frequency transmissions, the strongest area of signal transmission is from the sides of the transmitter's antenna. As such, the antenna should not be pointed directly at the model. If your flying style creates this situation, easily move the antenna to correct this situation.

•Rotating antenna

The antenna can be rotated 90 degrees and angled 90 degrees. Forcing the antenna further than this can damage it. The antenna is not removable.







⚠ Caution

❗ Please do not grasp the transmitter's antenna during flight.

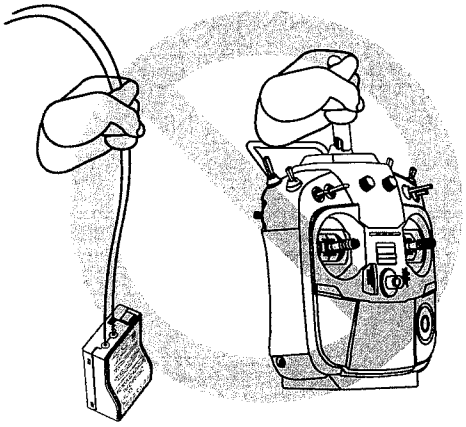
Doing so may degrade the quality of the RF transmission to the model

⃠ Do not carry the transmitter by the antenna.

There is the danger that the antenna wire will break and operation will become impossible.

⃠ Do not pull the antenna forcefully.

There is the danger that the antenna wire will break and operation will become impossible.



Monitor LED display

The status of the transmitter is displayed by LED at the bottom left and right sides of the "T14SG" logo.

LED (Left)

Displays the "non-default condition" warning.

- Blinking

  Power switch is turned on when any condition switch is activated (in the ON state).

LED (Right)

Displays the state of radio frequency transmission.

- Off

  Radio waves are in the OFF state.
- On

  Radio waves are being transmitted.
- Blinking

  Range check mode.

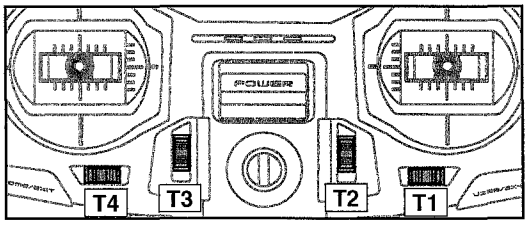
Switch (SA-SH)

(Switch Type)

- SA : 3 positions; Alternate; Short lever
- SB : 3 positions; Alternate; Long lever
- SC : 3 positions; Alternate; Long lever
- SD : 3 positions; Alternate; Short lever
- SE : 3 positions; Alternate; Short lever
- SF : 2 positions; Alternate; Long lever
- SG : 3 positions; Alternate; Short lever
- SH : 2 positions; Momentary; Long lever

*You can choose switch and set the ON/OFF-direction in the setting screen of the mixing functions.

Digital Trim



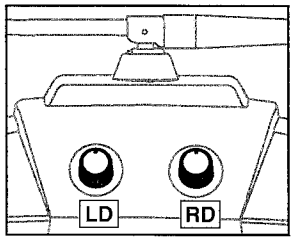
Digital Trim T1, T2, T3 and T4:

This transmitter is equipped with four (4) digital trims. Each time you press a trim button, the trim position moves one step. If you continue pressing it, the trim position starts to move faster. In addition, when the trim position returns to the center, the tone will change. You can always monitor trim positions by referencing the LCD screen.

*You can select the trim step amount and the display unit on the home screen on the T1-T4 setting screen within the linkage menu.

Note: The trim positions you have set will be stored in the non-volatile memory and will remain there.

Volume



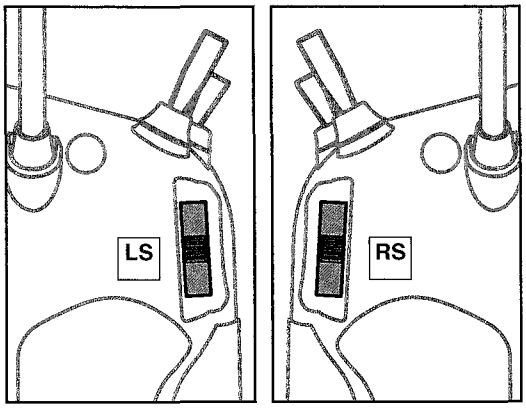
Volume LD and RD:

The volume LD and RD knobs allow for analog input.

*The T14SG transmitter beeps when the volume knob reaches the center position.

*You can use each setting screen of the mixing functions to select volumes and define the direction of a movement.

Slide Lever



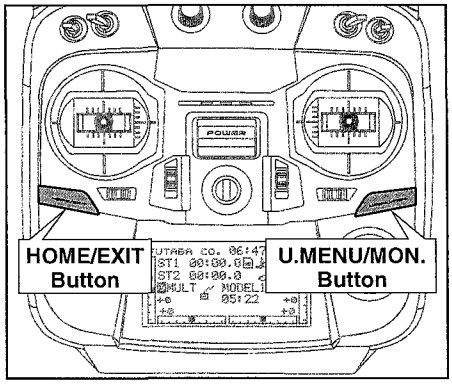
LS (Left), RS (right):

The slide lever LS and RS offer analog input.

*The T14SG transmitter beeps when the lever comes to the center.

*You can select a slide lever and set the movement direction on the setting screen of mixing functions.

HOME/EXIT and U.MENU/MON. Button



HOME/EXIT:

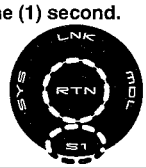
Press	Return to the previous screen
Press and hold	Return to the Home screen
It pushes from HOME screen.	To TELEMETRY display
Push and hold for one (1) second from HOME screen.	Key lock On or Off

U.MENU/MON.:

Press	To SERVO MONITOR display
Press and hold	To User Menu display

Touch sensor operation

Data input operation is performed using the touch sensor.

SensorTouch™ operation		Condition	Working
• Short 'tap' 	S1	If the screen has more than one page. (Ex. P-MIX screen)	The cursor moves to the top of next page.
		If the screen have only one (1) page.	The cursor moves to the top of page.
		If inputting data while the cursor is blinking.	The input data is canceled.
	RTN	At the moving cursor mode.	Change to the input data mode.
		While in the data input mode.	Changes to the moving cursor mode.
		While inputting data while cursor is blinking.	The data is entered.
• Two short 'taps' 	SYS	At all screens	Jump to **System Menu** screen directly.
	LNK	At all screens	Jump to **Linkage Menu** screen directly.
	MDL	At all screens	Jump to **Model Menu** screen directly.
• Touch and hold for one (1) second. 	S1	At the HOME screen	Key lock On or Off
	RTN	While inputting data with no blinking cursor.	Reset to the initialized value.
• Scrolling 	Outline of "RTN"	Lightly circling the outside edge of the RTN button.	The cursor moves accordingly.
		During the data input mode.	Increases or decreases values accordingly.

Movement of cursor, value input or mode selection:

Movement of the cursor on the menu screen and movement of the cursor among items on a setup screen can be controlled by scrolling your finger to the left and right in the direction of the arrow in the scrolling diagram above. You can also go to the next page, if there is a next page.

This scrolling technique is also used for data input, value input, mode selection, and similar operations. Examples include: Value, ON, OFF, INH, ACT, etc.

RTN button:

Touch the RTN button when you want to open a setup screen or to switch between cursor move mode (reverse display) and data input mode (box display).

This button can also be used as the enter button when a confirmation message is displayed on the screen, etc.

S1 button:

When there is a next page on a menu screen or setup screen, you can go to that page by touching the S1 button. In this case, the cursor moves to the screen title item of the page.

Exiting setup screen:

To end the operation on a setup screen and return to the menu screen, move the cursor to the screen title item and touch the RTN button.

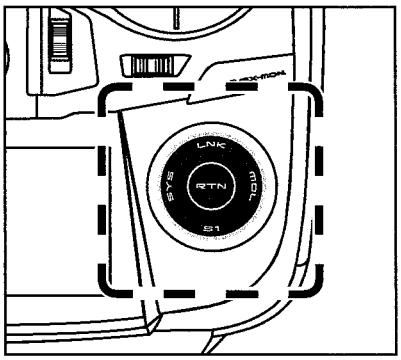
To return to home screen directly, touch the S1 button for 1 second.

Alternatively, move the cursor to the screen title item and touch the RTN button to return to the home screen from a menu screen.

Note:

*Scroll operation: Circle your finger on the outside edge of the RTN button. The sensors may mis-read your touch as a reverse rotation if the circle is smaller, or performed on the inside edge of the RTN button.

* The SensorTouch™ may not operate smoothly if your hand is touching the surrounding case parts. Please make sure that the tip of your finger is actually operating the SensorTouch™.



*If the SensorTouch™ does not register your input, please try again after lightly tapping your finger on the sensor once again.

*Do not operate the SensorTouch™ while wearing gloves. The SensorTouch™ may not work correctly.

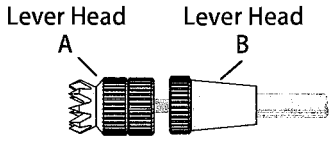
⚠ Caution

The touch sensor may not operate correctly if spark noise is generated from a gasoline engine, etc. Please remove the transmitter to a location away from the noise source.

Stick Adjustment

Adjustment of the stick lever length

You can adjust the length of stick levers, as you like. It is recommended to adjust the length of the sticks in line with your hand size.

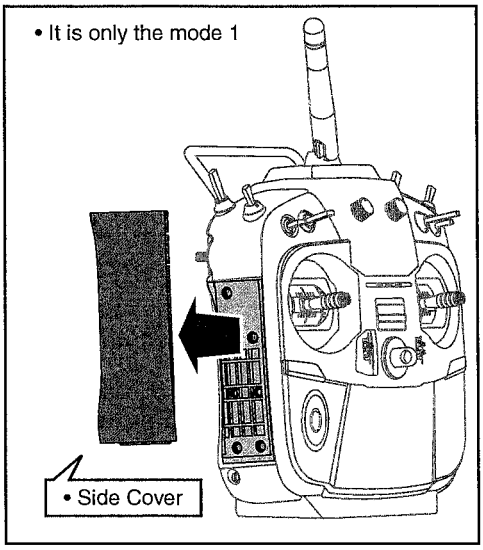


1. Hold the lever head "B" and turn the lever head "A" counter-clockwise. The lock will be released.
2. Turn the lever-head "A" clockwise as you hold the lever-head "B" after placing it as you like.

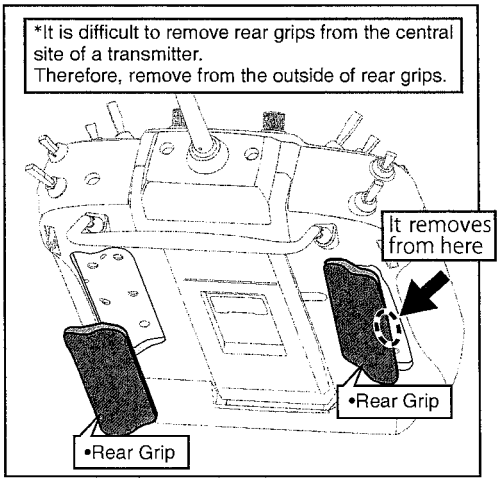
Adjustment of stick lever tension

The tension of the self-return type stick lever can be adjusted.

1. First, Remove the battery cover on the bottom of the transmitter. Next, unplug the battery wire and remove the battery from the transmitter.
2. Next, using a hand, remove the transmitter's side cover (rubber). When using Mode 1, you will need to remove the side cover to expose the tension screw.



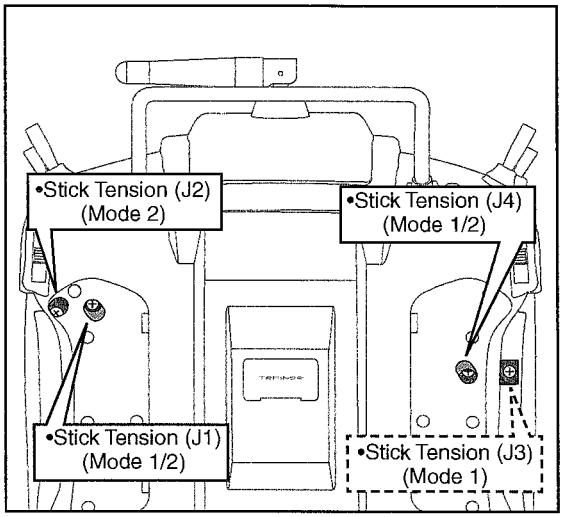
3. Using your hand remove the transmitters rear rubber grips.



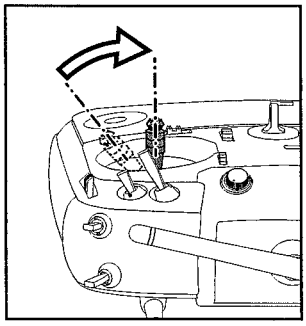
4. Use a small Phillips screwdriver to adjust the spring strength as you prefer by turning the adjusting screw of the stick you want to adjust.

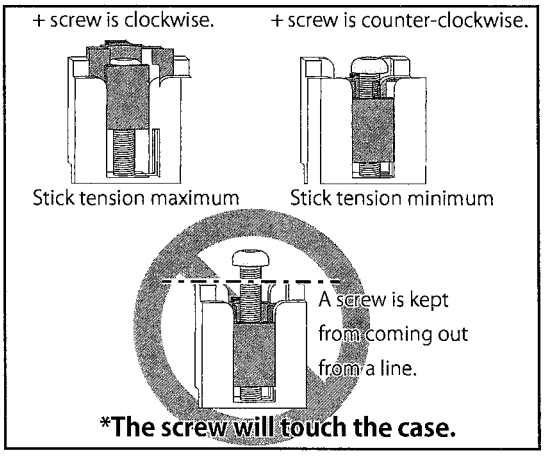
*Turning the screw clockwise increases the tension.

CAUTION: If you loosen the screw too much, it can interfere with the operation of the sticks internally.



The stick can be adjusted to how quickly it returns to neutral.

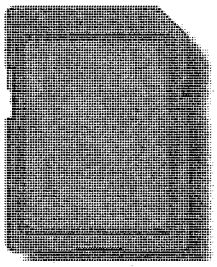




5. At the end of adjustment, re-install the side cover and rear grips.

SD Card (Secure Digital memory card) (Not included)

The T14SG transmitter model data can be stored by using any commonly found SD card. When T14SG transmitter update software is released, the software is updated using an SD card. The T14SG is capable of using SD cards with a memory size SD : 32MB-2GB SDHC : 4GB-32GB.



⚠ Caution

Be sure to turn off the power to the transmitter before inserting or removing the SD card.

As the SD card is a precision device, do not use excessive force when inserting.

Restrictions when using an SD card

The following restrictions apply when using an SD card:

*The SD card must first be initialized using the T14SG dedicated format. The SD card cannot be used as is without formatting to the T14SG.

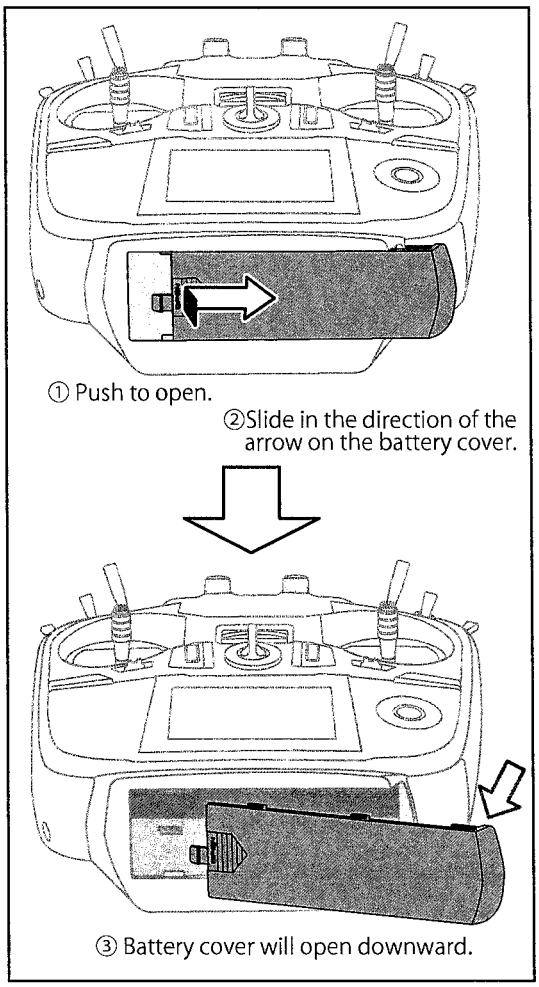
*Initializing destroys all the data previously saved on the card.

*An SD card formatted to the T14SG cannot be written directly from a PC by Windows Explorer, etc. The files must be converted and written by the Futaba File System software. Files are identified by number instead of name. This special conversion software can be downloaded from Futaba's web site at:

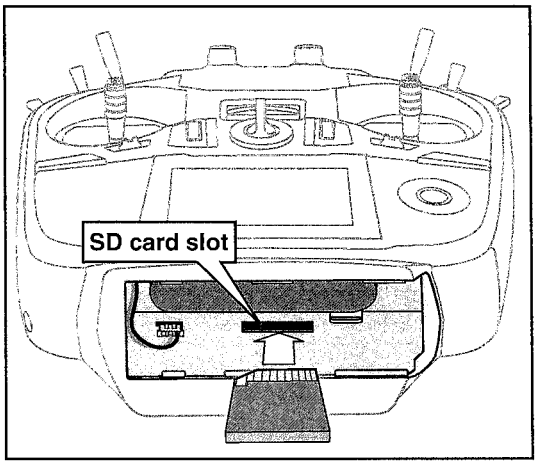
http://www.futaba-rc.com/software-updates.html

Inserting/removing the SD card

1. Turn off the transmitter power and then open the battery cover at the bottom of the transmitter.



2. The SD card slot is show here in the figure below.



[Inserting the card]

Turn the SD card so that the front of the card faces the rear of the transmitter and slide the card into the card slot.

*Push in the card until it is firmly seated in the card slot.

[Removing the card]

When the SD card is pressed in once again, the card will be released from the card slot. and can be removed.

3. Close the battery cover.

SD card initialization

To use an SD card with the T14SG, the card must first be formatted. Once formatted, the card does not have to be reformatted. Formatting is performed by the T14SG.

[IMPORTANT] When an SD card is formatted for the T14SG, all pre-existing data is destroyed. **Do not format a card containing important data.**

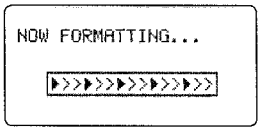
[Formatting procedure]

1. Insert the SD card into the SD card slot of the T14SG.
2. Turn on the T14SG power. When an unformatted card is inserted into the T14SG, the screen shown below appears.

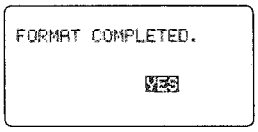
3. If the T14SG is ready to format, move the cursor to [FORMAT] and touch the RTN button. (To cancel formatting, move the cursor to [CANCEL] and touch the RTN button.)

4. Move the cursor to [YES] and touch the RTN button.

*Formatting starts. During formatting, the [NOW FORMATTING...] message is displayed.



*When formatting is completed, The [FORMAT COMPLETED] message is displayed. Depending on the card capacity and speed, formatting may take as long as several minutes.



[IMPORTANT] Do not turn off the power until the [FORMAT COMPLETED] message is displayed.

5. End formatting by touching the RTN button.

SD card reader/writer

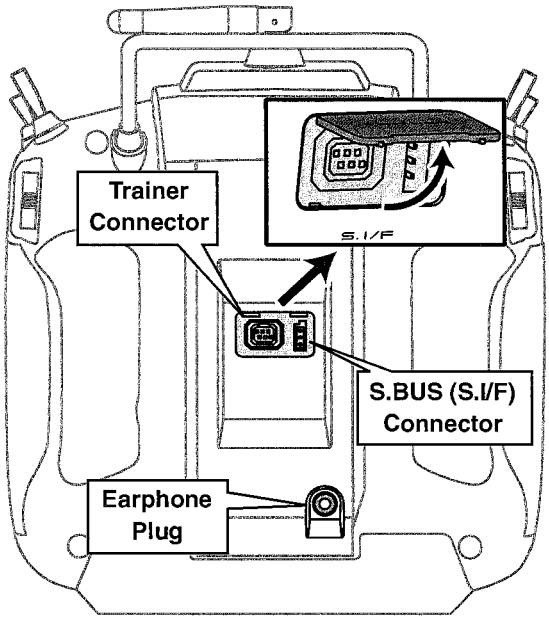
Saving model data and update files (released from Futaba) to the SD card from your own PC, you can transfer those file to your T14SG transmitter. Equipment for reading and writing SD cards is available at most electronics stores.

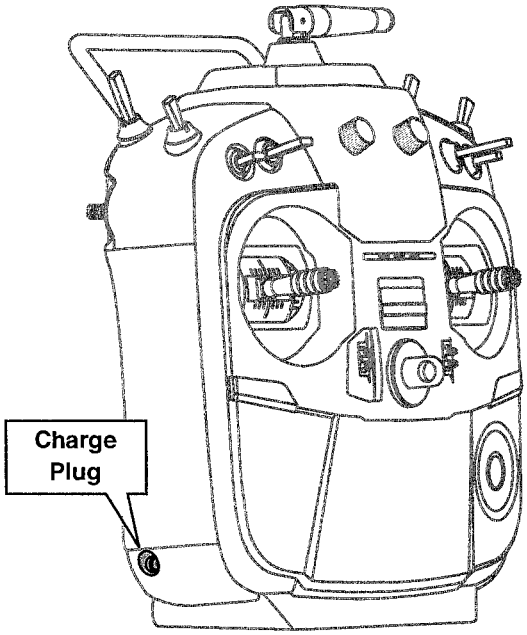
Stored data

If you have a problem saving or reading data after a long period of use, we suggest obtaining a new SD card to avoid further difficulties.

*Futaba is not responsible for compensating any failure or damage to the data stored in the memory card. As such, we suggest that you maintain a backup of your important data contained on your SD card.

Connector/Plug





Connector for trainer function

When you use the trainer function, connect the optional trainer cable between the transmitters for teacher and student.

*You can set the trainer function on the Trainer Function screen in the System menu.

S.BUS connector (S.I/F)

When setting an S.BUS servo and telemetry sensor, connect them both here.

(Supply power by 3-way hub or Y-harnesses.)

Earphone plug

It is not used now. (The function after upgrade)

Connector for battery charger

This is the connector for charging the NiMH battery HT5F1800B that is installed in the transmitter. Do not use any other chargers except the attached special charger corresponding to NiMH battery.

⚠ Warning

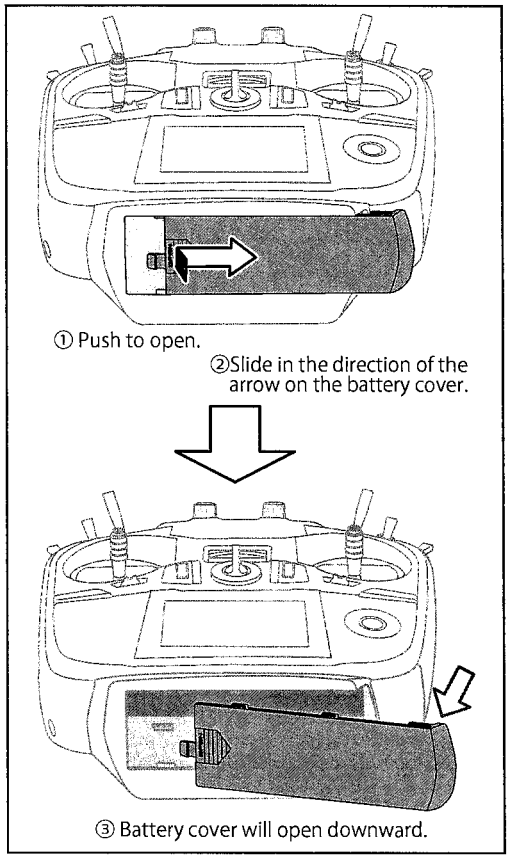
⊘ Do not connect any other chargers except the special charger to this charging connector.

*If you take out the NiMH battery HT5F1800B from the transmitter, you can use the optional quick charger CR-2000 corresponding to NiMH battery.

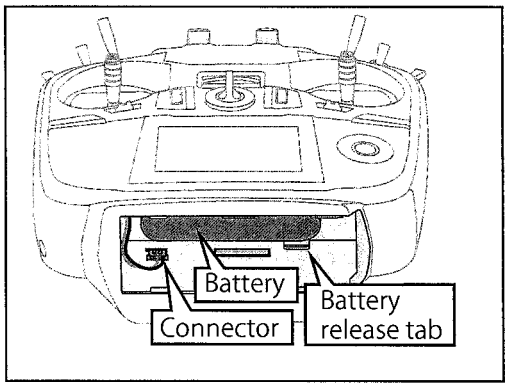
Installation and Removal of the HT5F1800B Transmitter Battery

Attachment of the battery

1. Slide the battery cover on the bottom of the transmitter toward the right side and open it.



2. Install the battery in the holder.
3. Connect the battery connector.



4. Close the battery cover completely.

Battery Removal

Note: If you remove the battery while the power is on, the data you have set will not be saved.

1. Open the battery cover.
2. Disconnect the battery connector.
3. Press on the battery release tab and pull the battery downwards to remove.
4. Close the battery cover completely.

⚠ Warning

❗ Be careful not to drop the battery.

⃠ Never disconnect the battery connector from the T14SG transmitter after turning off the power until the screen is completely blank and the transmitter has shut down completely.

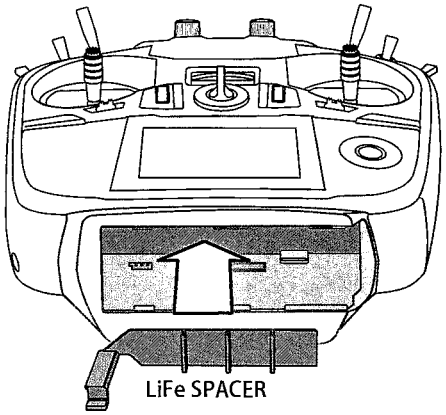
* Internal devices such as memories may be damaged.

* 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.

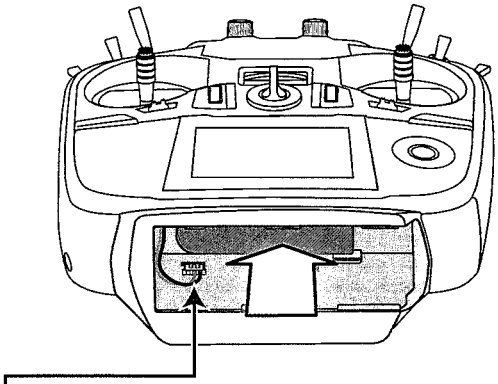
When exchanging for the LiFe battery (FT2F2100B/FT2F1700B) of an option.

Attachment of the battery

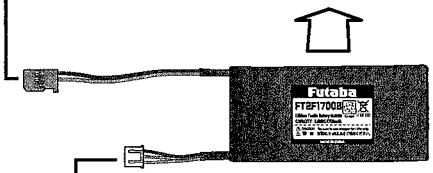
1. T14SG to HT5F1800B is removed.
2. A LiFe spacer (14SG attachment) is inserted as shown in a figure.



3. A LiFe battery (option) is inserted as shown in a figure.



4. 2P connector of a LiFe battery is connected.

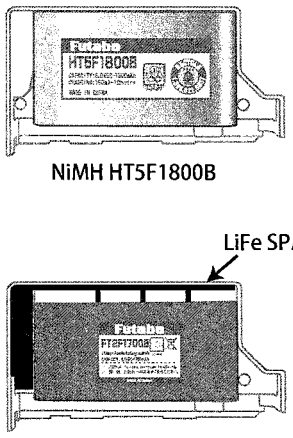


The balance charge connector is not connected in the state where the battery is set to a transmitter.

5. Close the battery cover completely.
6. **T14SG is turned on and [LINKAGE MENU]=>[WARNING]=>[LOW BATTERY] is called.**
7. **It changes into 6.0V from 5.6V.**

*About low battery voltage, all the models included in one transmitter are changed in common. It cannot set to different voltage for every model. Moreover, data reset is not carried out.

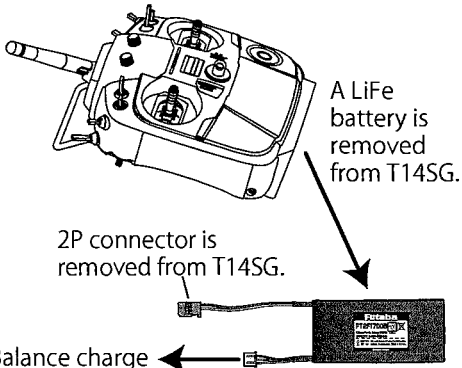
The battery state inside T14SG



Charge of a LiFe battery

Note: LiFe battery cannot be charged with the charger of 14SG attachment.

Be sure to remove a battery from T14SG and to charge from the charger only for LiFe.



⚠ Warning

Follow the manual of a LiFe battery.

Don't charge the LiFe battery with the NiMH charger of 14SG attachment.

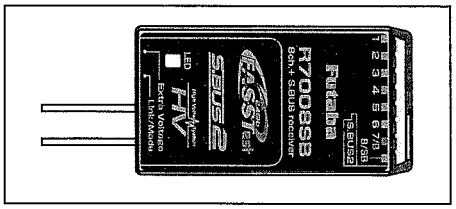
* Be sure to remove from T14SG and to charge with the charger only for LiFe.

Be sure to change the voltage of LOW BATTERY WARNING into 6.0V from 5.6V

Receiver nomenclature

Before using the receiver, be sure to read the precautions listed in the following pages.

Receiver R7008SB



Connector

"1 through 6": outputs for the channels 1 through 6

"7/B": outputs of 7 channels and power.

"8/SB": outputs of 8 channels or S.BUS port.

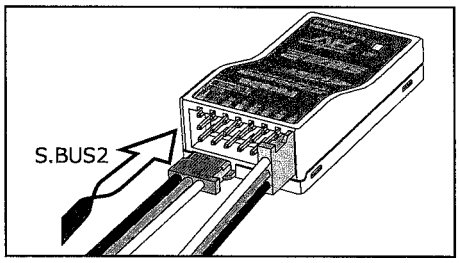
[S.BUS Servo S.BUS Gyro]

*When using 8/SB as S.BUS, you have to set CH MODE of the following page to mode B or mode D.

"S.BUS2": outputs of S.BUS2 port.

[S.BUS2 Servo S.BUS2 Gyro Telemetry Sensor]

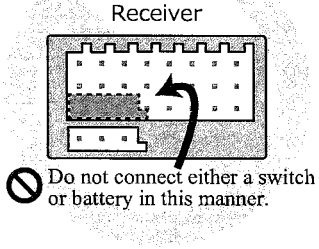
*When using 9 or more channels, use an S.BUS function or use a second R7008SB and link both to your transmitter.



Connector insertion

Firmly insert the connector in the direction shown in the figure. Insert the S.BUS2 by turning it 90 degrees.

⚠ Danger



⚠ Danger

Don't connect a connector, as shown in a before figure.

*It will short-circuit, if it connected in this way. A short circuit across the battery terminals may cause abnormal heating, fire and burns.

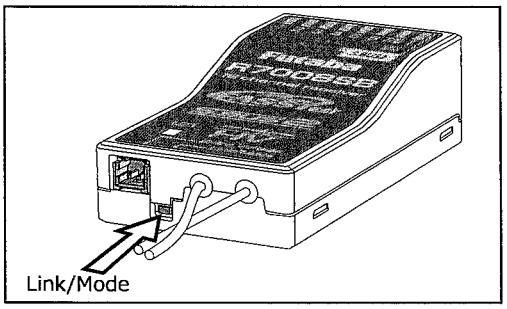
⚠ Warning

S.BUS2 connectors

Don't connect an S.BUS servo / gyro to S.BUS2 connector.

LED Monitor

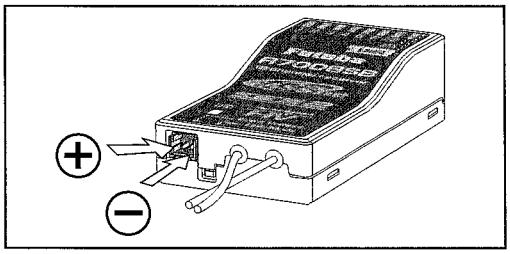
This monitor is used to check the CH mode of the receiver.



Link/Mode Switch

Use the small plastic screw driver that was included with your receiver.

The Link/Mode Switch is also used for the CH mode selection.



Extra Voltage Connector

Use this connector when using a voltage telemetry device to send the battery voltage (DC0 ~ 70V) from the receiver to the transmitter.

You will need to purchase the optional External Voltage input cable (CA-RVIN-700) FUTM5551.

You can then make a cable with an extra connector to the External voltage connector.

⚠ Danger

⊘ Don't touch wiring.

* There is a danger of receiving an electric shock.

⊘ Do not short-circuit the battery terminals.

* A short circuit across the battery terminals may cause abnormal heating, fire and burns.

⊘ Please double check your polarity (+ and −) when hooking up your connectors.

* If + and − of wiring are mistaken, it will damage, ignite and explode.

⊘ Don't connection to Extra Voltage before turning on a receiver power supply.

R7008SB CH Mode

The R7008SB receiver is a very versatile unit. It has 8 PWM outputs, S.BUS and S.BUS2 outputs. Additionally the PWM outputs can be changed from channels 1-8 to channels 9-14. If you only desire to use it as an 8 channel receiver (without S.BUS), it can be used without any setting changes.

The T14SG has the ability to link to two R7008SB receivers. One of them outputting channels 1-8 and the other outputting channels 9-14 giving you 14 PWM channels. Instructions for this configuration and S.BUS operation follow.

[How to change the R7008SB Channel mode.]

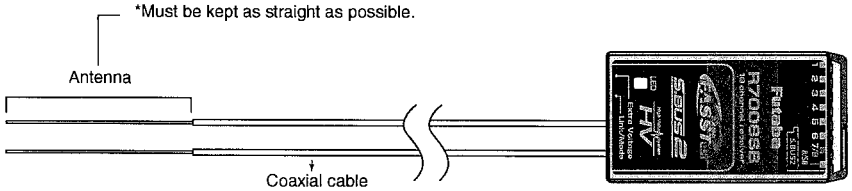
1. Press and hold down the Link/Mode button on the R7008SB receiver.
2. Turn the receiver on while holding down the Link/Mode button. when the LED begins to blink green/red the button may be released.
3. The LED should now be blinking red in one of the patterns described by the chart below.
4. Each press of the Mode/Link button advances the receiver to the next mode.
5. When you reach the mode that you wish to operate in, press and hold the Mode/ Link button for more than 2 seconds.
6. Once locked into the correct mode the LED will change to a solid color.
7. Please cycle the receiver(s) power off and back on again after changing the Channel Mode.

R7008SB CH MODE TABLE

Receiver connector	Setting channel			
	Mode A 1 ~ 8CH	**Mode B** 1 ~ 7CH	**Mode C** 9 ~ 14CH	**Mode D** 9 ~ 14CH
1	1	1	9	9
2	2	2	10	10
3	3	3	11	11
4	4	4	12	12
5	5	5	13	13
6	6	6	14	14
7/B	7	7	-	-
8/SB	8	S.BUS	-	S.BUS
Red LED blink	1time	2time	3time	4time

Receiver's Antenna Installation

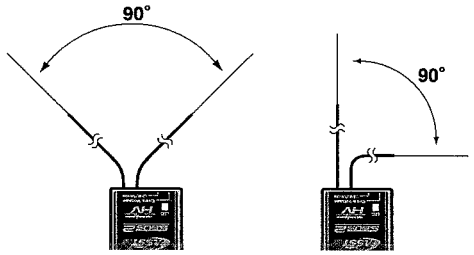
The R7008SB has two antennas. In order to maximize signal reception and promote safe modeling Futaba has adopted a diversity antenna system. This allows the receiver to obtain RF signals on both antennas and fly problem-free.



R7008SB Receiver

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

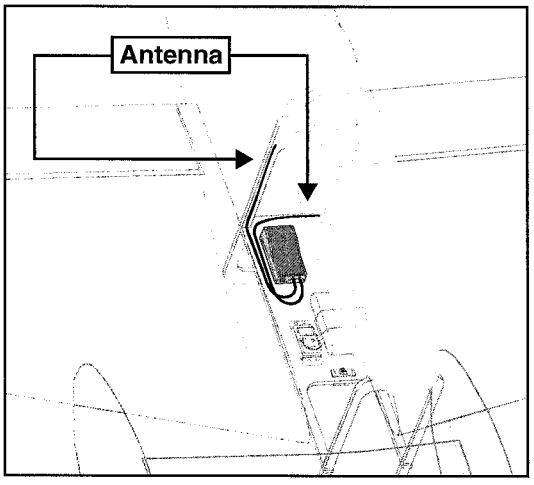
1. The two antennas must be kept as straight as possible. Otherwise it will reduce the effective range.
2. The two antennas should be placed at 90 degrees to each other.

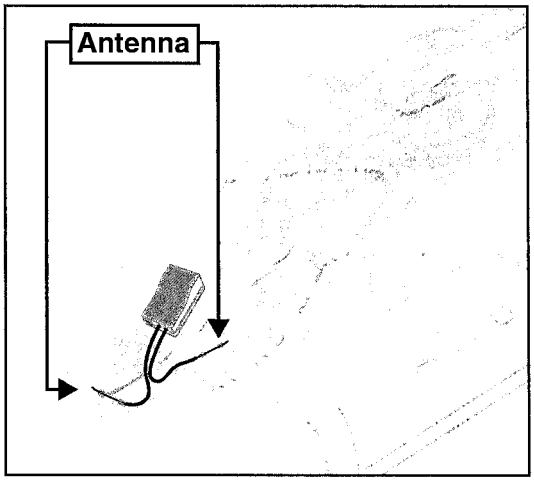


This is not a critical figure, but the most important thing is to keep the antennas away from each other as much as possible.

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.



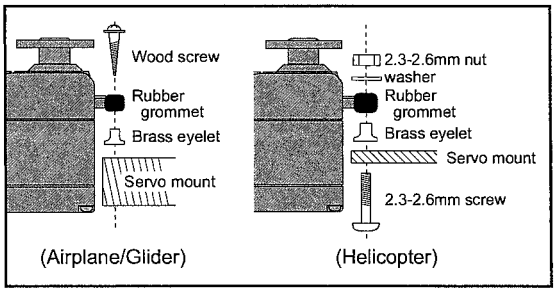


*The two antennas should be placed at 90 degrees to each other.

*The Illustration demonstrates how the antenna should be placed.

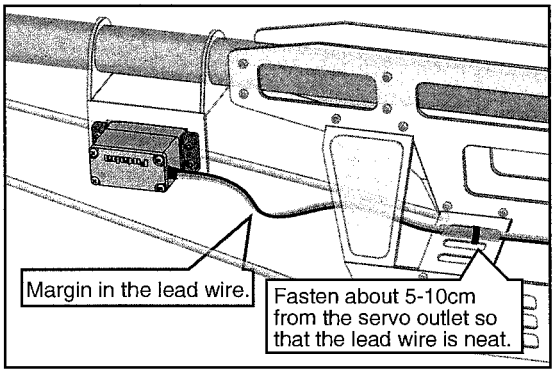
*Receiver Vibration and Waterproofing: The receiver contains precision electronic parts. Be sure to avoid vibration, shock, and temperature extremes. For protection, wrap the receiver in foam rubber or other vibration-absorbing materials. It is also a good idea to waterproof the receiver by placing it 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.

Mounting the Servo



Servo lead wires

To prevent the servo lead cable from being broken by vibration during flight, provide a little slack in the cable and fasten it at suitable points. Periodically check the cable during daily maintenance.



Mounting the power switch

When mounting a power switch to an airframe, make a rectangular hole that is a little larger than the total stroke of the switch so that you can turn the switch ON/OFF without binding.

Avoid mounting the switch where it can be covered by engine oil and dust. In general, it is recommended to mount the power switch on the side of the fuselage that is opposite the muffler.

Safety precautions when you install receiver and servos

⚠Warning

Connecting connectors

❗ Be sure to insert the connector until it stops at the deepest point.

How to protect the receiver from vibration and water

❗ Wrap the receiver with something soft such as foam rubber to avoid vibration. If there is a chance of getting wet, put the receiver in a waterproof bag or balloon to avoid water.

Receiver's antenna

⃠ Never cut the receiver's antenna. Do not bind the receiver's antenna with the cables for servos.

❗ Locate the receiver's antenna as far as possible from metals or carbon fiber components such as frames, cables, etc.

*Cutting or binding the receiver's antenna will reduce the radio reception sensitivity and range, and may cause a crash.

Servo throw

❗ Adjust your system so that pushrods will not bind or sag when operating the servos to the full extent.

*If excessive force is continuously applied to a servo, the servo could be damaged due to force on the gear train and/or power consumption causing rapid battery drain.

Mounting servos

❗ Use a vibration-proof rubber (such as rubber grommet) under a servo when mounting the servo on a servo mount. And be sure that the servo cases do not touch directly to the metal parts such as servo mount.

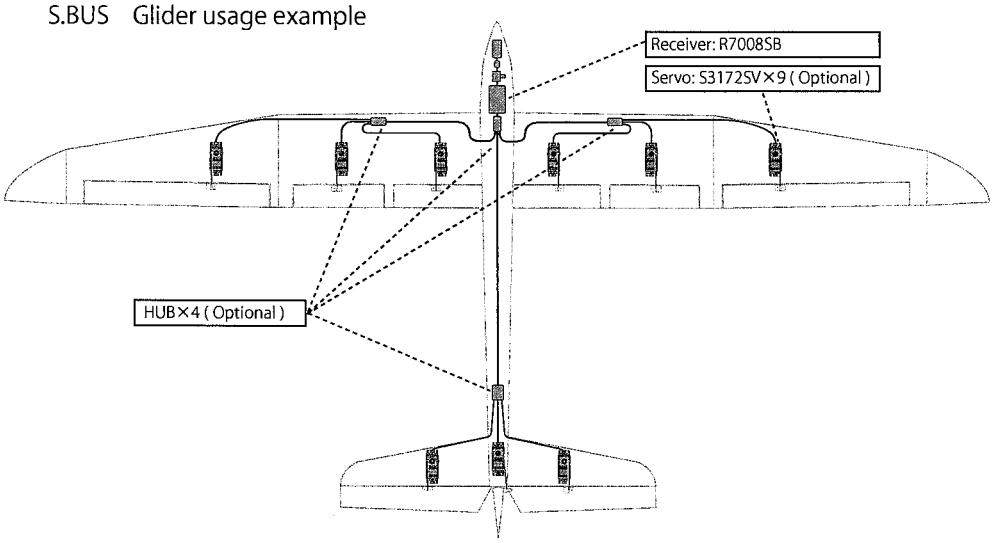
*If the servo case contacts the airframe directly, vibration will travel to and possibly damage the servo.

S.BUS/S.BUS2 Installation

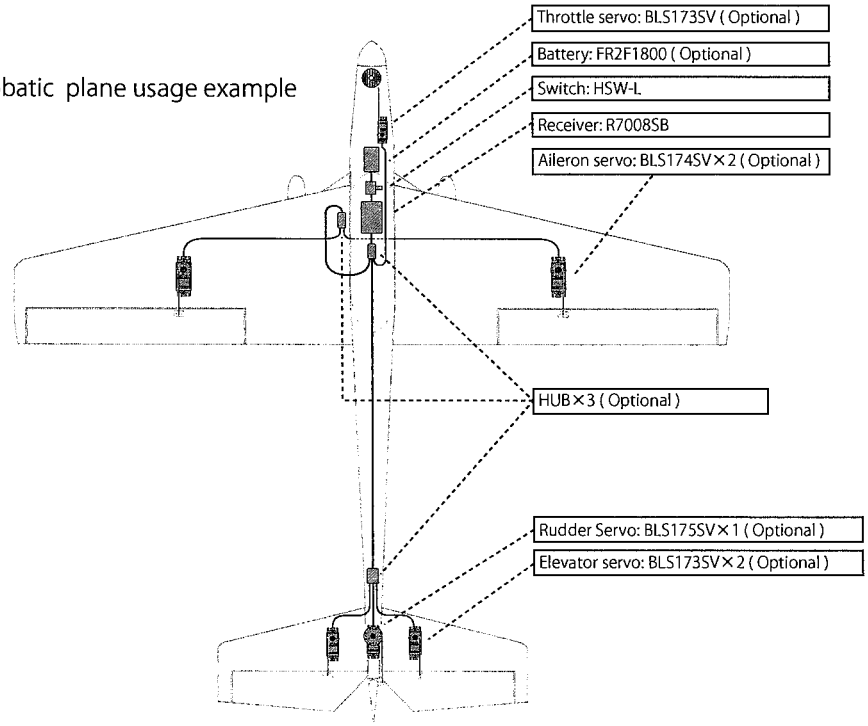
This set uses the S.BUS/S.BUS2 system. The wiring is as simplified and clean mounting as possible, even with models that use a large number of servos. In addition, the wings can be quickly installed to the fuselage without any erroneous wiring by the use of only one simple wire, even when there are a large number of servos used.

- When using S.BUS/S.BUS2, special settings and mixes in your transmitter may be unnecessary.
- The S.BUS/S.BUS2 servos memorize the number of channels themselves. (Settable with the T14SG)
- The S.BUS/S.BUS2 system and conventional system (receiver conventional CH used) can be mixed.

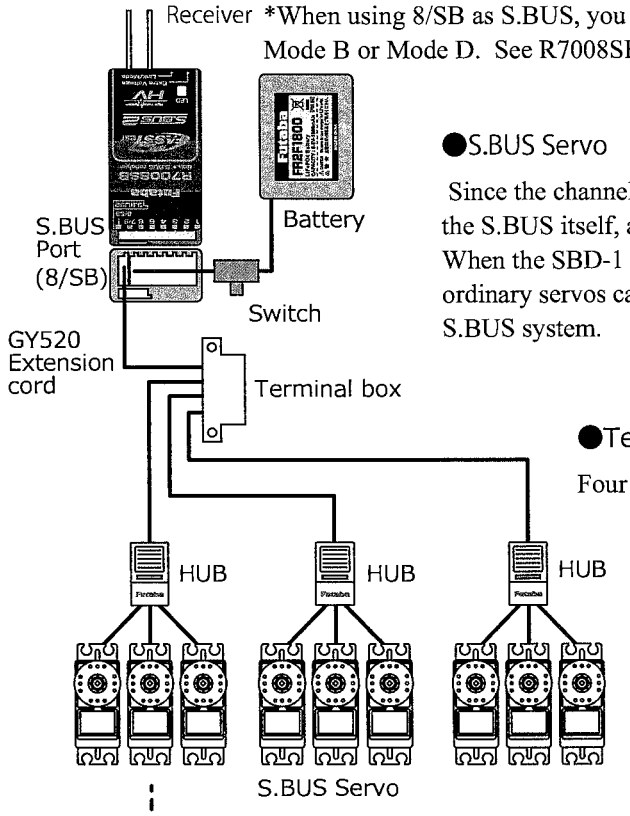
S.BUS Glider usage example



S.BUS Aerobatic plane usage example



S.BUS Wiring example



*When using 8/SB as S.BUS, you must set the receiver to Mode B or Mode D. See R7008SB CH MODE TABLE.

●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

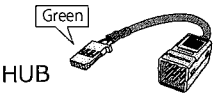
⚠Warning

Power supply

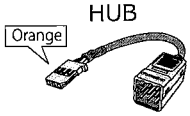
Please make sure that you use a battery that can deliver enough capacity for the number and kind of servos used. Alkaline batteries cannot be used.

●When separate power supply used

When a large number of servos are 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.



Used when using a separate power supply battery.



Three connectors can be inserted.

S.BUS2 System

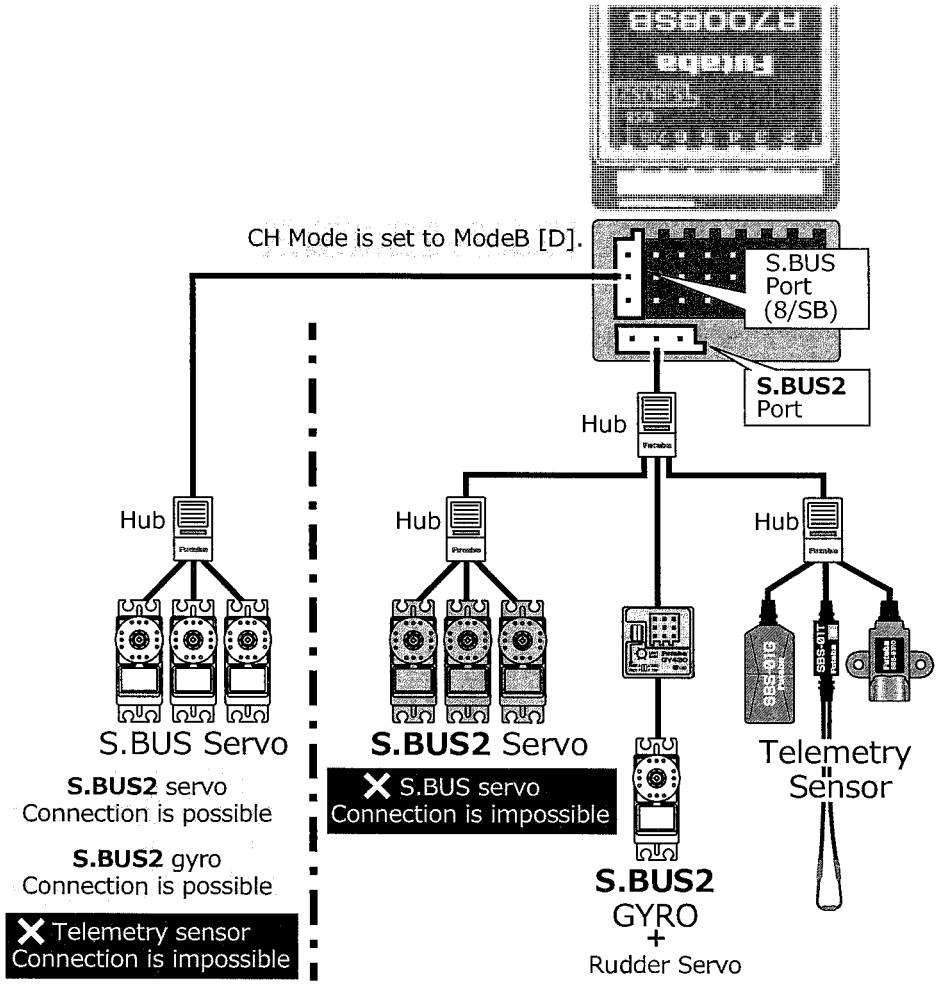
When using the S.BUS2 port, an impressive array of telemetry sensors may be utilized.

S.BUS2 TABLE

Receiver port	S.BUS Servo S.BUS Gyro	**S.BUS2** Servo **S.BUS2** Gyro	Telemetry sensor
S.BUS	○	○	×
S.BUS2	× (※)	○	○

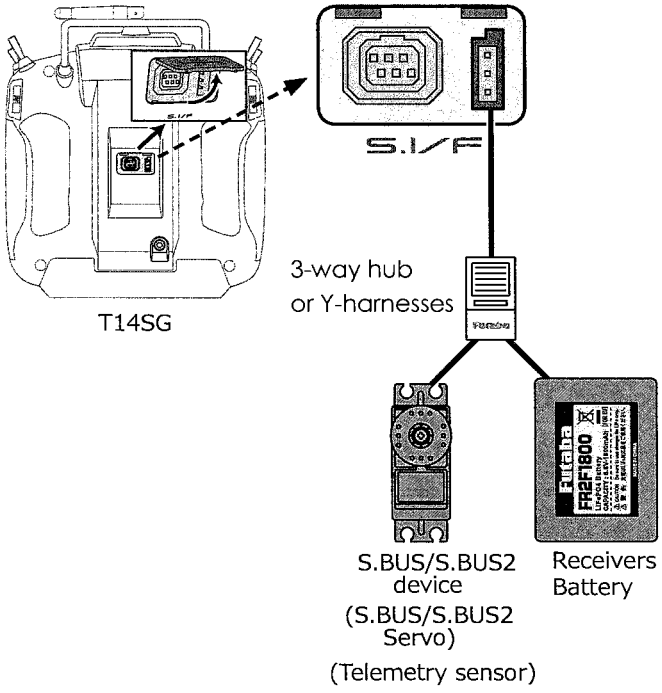
(※) Don't connect S.BUS Servo,
S.BUS Gyro to S.BUS2 connector.

S.BUS servos and gyros and S.BUS2 servos and gyros must be used in the correct receiver ports. Please refer to the instruction manual to make sure you connect to the correct one.



S.BUS/S.BUS2 device setting

S.BUS/S.BUS2 servos or a telemetry sensor can be connected directly to the T14SG. Channel setting and other data can be entered for the S.BUS/S.BUS2 servos or sensors.

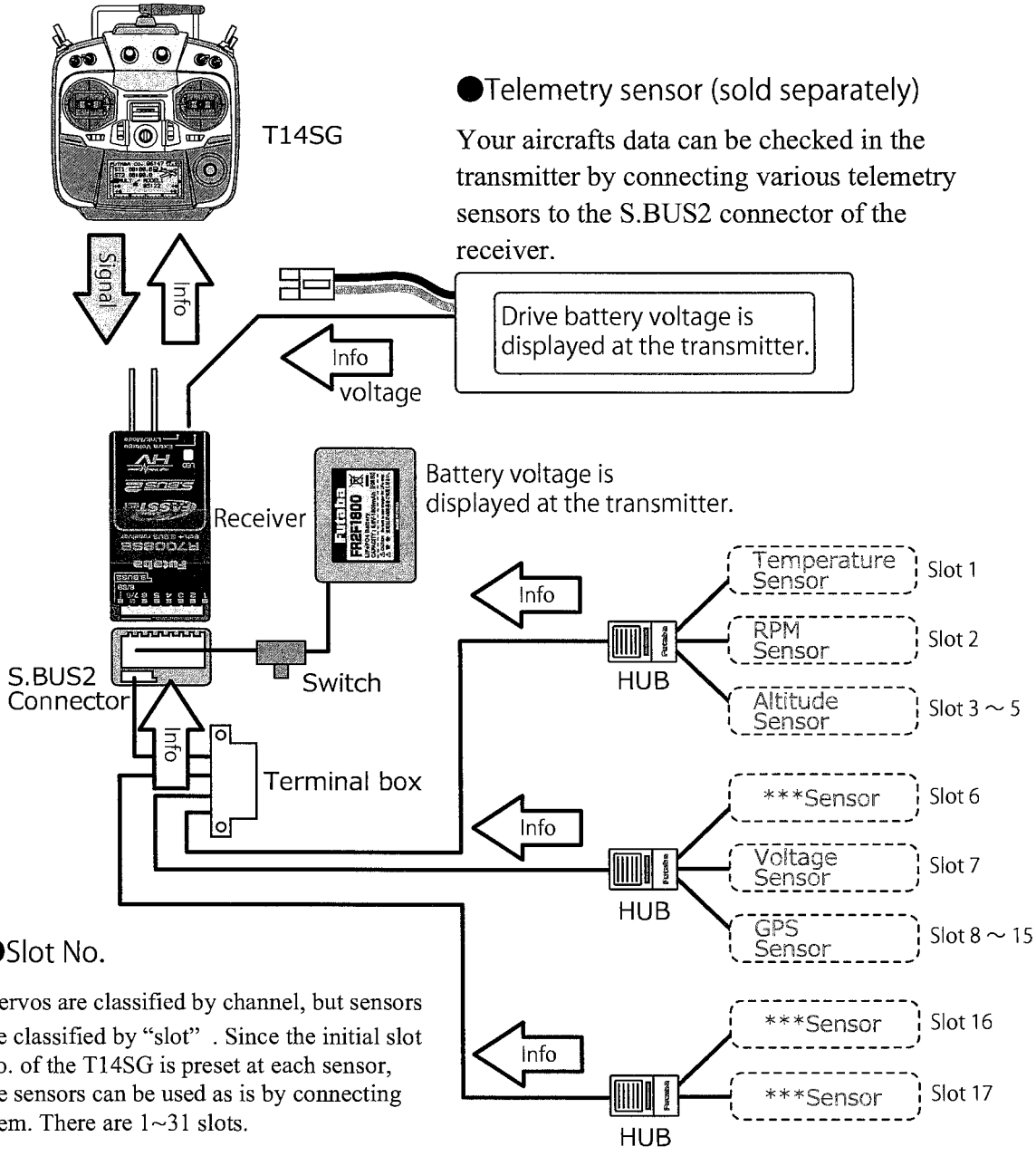


1. Connect the S.BUS device and battery you want to set with a 3-way hub or Y-harnesses as shown in the figure.
2. Turn on the transmitter power.
3. Call the setup screen.
   Servo: System Menu → S.BUS Servo
   Sensor: Linkage Menu → Sensor
4. Perform setting in accordance with each screen.
5. This sets the channel and other data for each S.BUS servo, or telemetry device to be used with the S.BUS device or receiver.

Telemetry System

The R7008SB receiver features bi-directional communication with a FASSTest Futaba transmitter using the S.BUS2 port. Using the S.BUS2 port an impressive array of telemetry sensors may be utilized. It also includes both standard PWM output ports and S.BUS output ports.

* Telemetry is available only in the FASSTest 14CH mode. (12CH mode displays only Receiver battery voltage and Extra battery voltage.)
* The telemetry function requires the corresponding receiver (R7008SB).
* The T14SG will enter and keep the ID number of the R7008SB that it is linked to.



●Telemetry sensor (sold separately)

Your aircrafts data can be checked in the transmitter by connecting various telemetry sensors to the S.BUS2 connector of the receiver.

●Slot No.

Servos are classified by channel, but sensors are classified by "slot" . Since the initial slot No. of the T14SG is preset at each sensor, the sensors can be used as is by connecting them. There are 1~31 slots.

Battery Charging

Before charging batteries, read the "Cautions for handling battery and battery charger" in the section "NiMH/NiCd Battery Safety and Handling Instructions".

How to charge the NiMH battery HT5F1800B for the transmitter

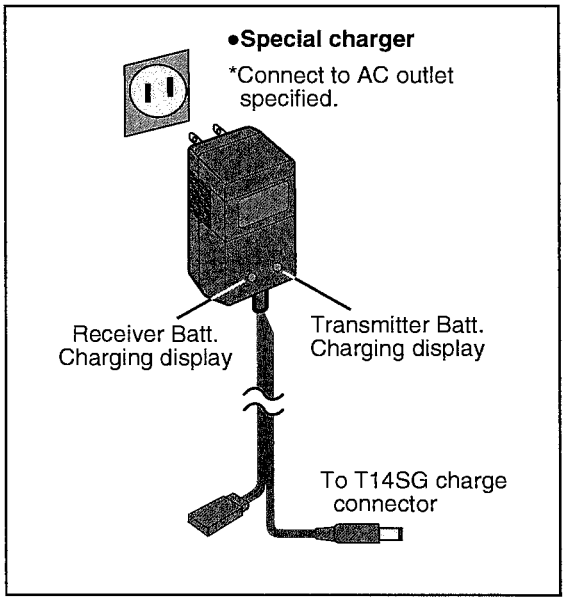
⚠ Danger

⊘ The NiMH battery HT5F1800B is only for your T14SG. Do not use this battery for other equipment.

❗ Be sure to use the attached special charger to charge the battery.

*If you take the NiMH battery HT5F1800B out of the transmitter, you can use the optional quick charger CR-2000 corresponding to NiMH battery.

[Method of charging battery]



1. Connect the special charger to the wall socket (AC outlet).
2. Connect the connectors to the T14SG charging jack.
   *Confirm that the charging indicator, LED lamp, is on.
   *Turn off the transmitter while charging the battery.
3. Remove the battery after 15 hours.

*Battery charging will not automatically stop. Remove the battery and transmitter from the charger and remove the charger from the wall socket.

*It is recommended to reactivate the battery by cycling several times if the battery has not been used for a long period.

*In the case of NiMH/NiCd batteries, you may find poor performance of the battery if you have used the battery only for a short period or if you repeat charging while the battery is not fully discharged. It is suggested to discharge the battery to the recommended level after use. It is also recommended to charge the battery just before use.

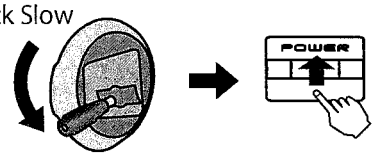
How to turn transmitter power ON/OFF

When turning on the power, the T14SG transmitter will begin emmiting RF automatically after it confirms the surrounding RF conditions.

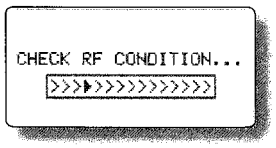
The T14SG transmitter also offers the ability to auto shut-down.

When turning on the power of the transmitter

THR Stick Slow



1. Turn on the power switch of the transmitter.
   *The message "CHECK RF CONDITION" is displayed for a moment. At the same time the left LED monitor blinks.



2. Then, you will see the home screen and the transmitter begins to emit radio waves.
   *The left and right LED monitors will change to solid red.

How to stop the transmitter

1. Turn off the power switch of the transmitter.
   *The transmitter shuts down at once.

Low battery alarm and auto shut-down

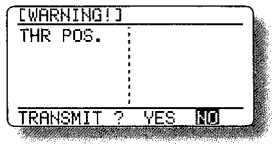
When the battery voltage reaches 5.2V, an audible alarm will sound. Land your aircraft immediately.

When the battery voltage reaches 3.9V, the transmitter will be turned off automatically.

*If you do not operate the transmitter (or move a stick, knob, switch or digital trim) for 30 minutes, the message "PLEASE TURN OFF POWER SWITCH" is displayed and an audible alarm will sound.

Warning display at power ON (Airplane/ Helicopter)

When the throttle stick during Power On is at the high side (or over 1/3 stick) a warning will be displayed.



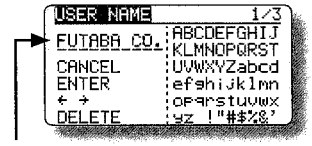
*below 1/3 stick, the warning display goes off.

Registration of the user's name

If so desired, the T14SG transmitter can indicate the owner's name.

User's name setup screen

1. Turn on the power of the transmitter.
   *The home screen appears.
2. Lightly touch the SYS button twice rapidly and the System menu appears.
3. Select [USER NAME] in the System menu and touch the RTN button.
   *The user name set up screen appears.



Input Box

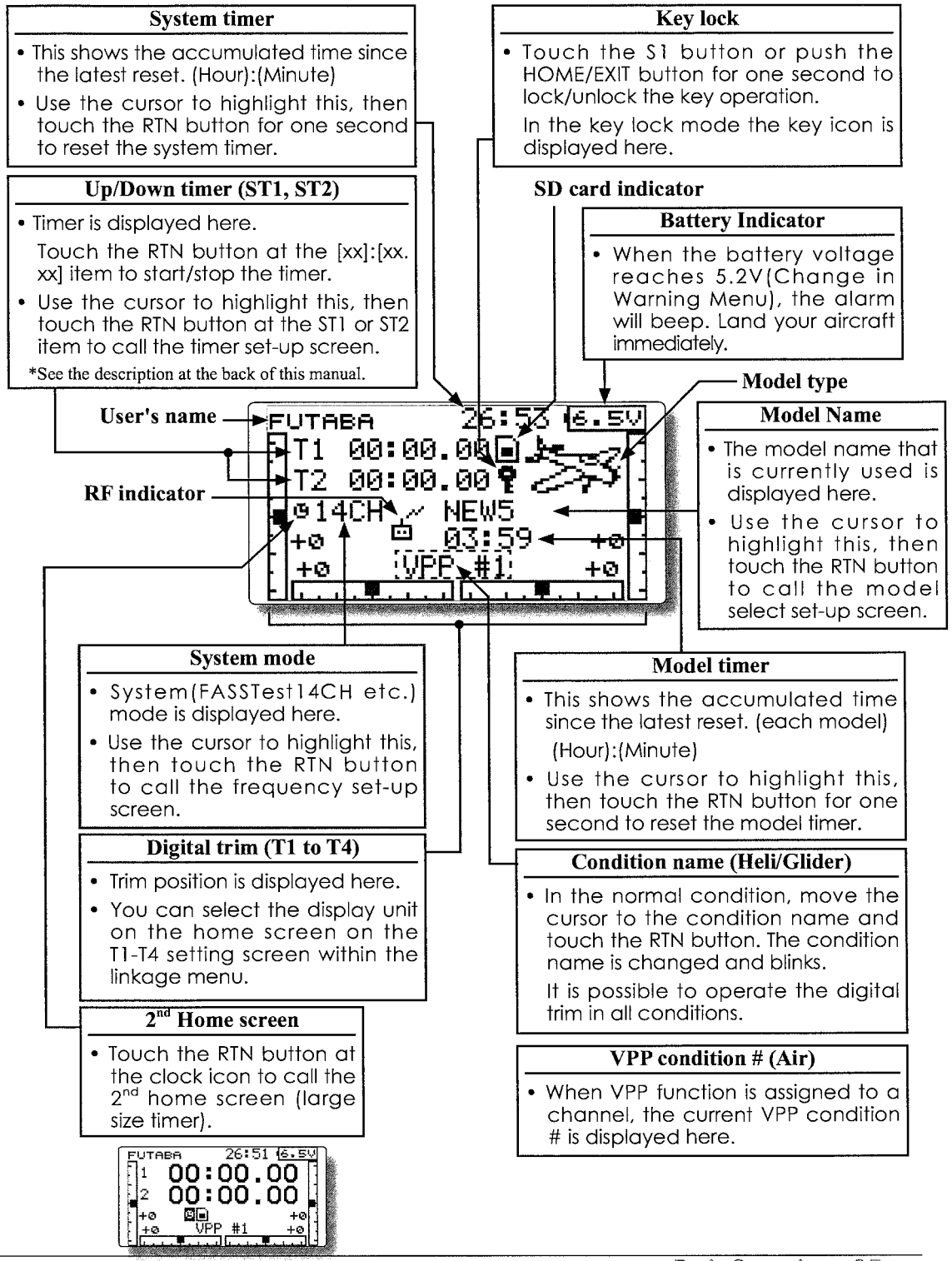
*Current user name is displayed.

Changing the user name

1. Change the user name as described below:
   [Moving cursor in input box]
   Select [←] or [→], and touch the RTN button.
   [Deleting a character]
   When [DELETE] is selected and the RTN button is touched, the character immediately after the cursor is deleted.
   [Adding a character]
   When a character is selected from the character list and the RTN button is touched, that character is added at the position immediately after the cursor.
   *A name of up to 10 characters long can be entered as the user name. (A space is also counted as one character.)
2. At the end of input, select [ENTER] and tuoch the RTN button. (To terminate input and return to the original state, select [CANCEL] and touch the RTN button.)

Home screen

Use the touch sensor to select the following display area to call each setting screen, and touch the RTN button. The setting screen appears.

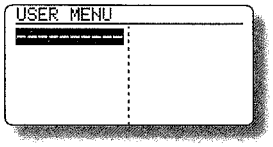


User Menu

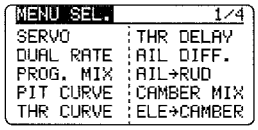
A user menu which allows the user to customize and display frequently used functions has been added.

1. When the "U.MENU" button is pushed for two seconds, the user menu appears.

*Return to the home screen by touching the EXIT button while the user menu is being displayed.



2. When the cursor highlights the dotted line, "----------" and the RTN button is touched, the menu selection screen appears.



3. When the cursor is moved to the setting that you to set to the user menu and the RTN button is touched, that setting screen is added to the user menu.
4. The registered setting screen can be called by moving the cursor to it and touching the RTN button.

*When you want to delete an added screen from the user menu, highlight item you wish to delete, press and hold the RTN button for one second.

⚠ Warning

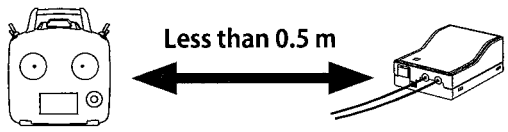
- Be sure to confirm the model name before flying your aircraft.
- Check the battery voltage as often as possible and try to charge the battery earlier. If the battery alarm makes a sound, land your aircraft immediately.

Link procedure (T14SG/R7008SB)

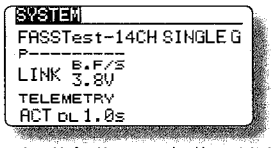
Each transmitter has an individually assigned, unique ID code. In order to start operation, the receiver must be linked with the ID code of the transmitter with which it is being paired. Once the link is made, the ID code is stored in the receiver and no further linking is necessary unless the receiver is to be used with another transmitter. When you purchase additional R7008SB receivers, this procedure is necessary; otherwise the receiver will not work.

Link procedure

1. Place the transmitter and the receiver close to each other within half (0.5m) meter.



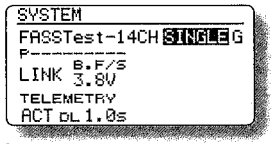
2. Turn on the transmitter.
3. Select [SYSTEM] at the Linkage menu and access the setup screen shown below by touching the RTN button.



:You can do this through the LINKAGE Menu and scroll to System and press RTN.

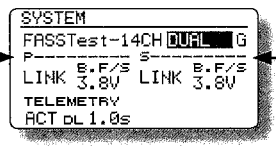
4. When you use two receivers on one model, you must change from [SINGLE] to [DUAL].

*Only two receivers can be used. In "DUAL", two setting items come out. Input, respectively.



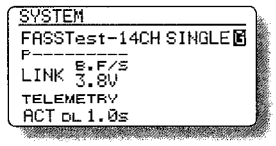
ID of a Primary receiver displays.

ID of a Secondary receiver displays.



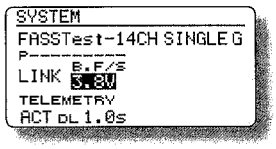
In DUAL, a primary receiver is link previously. Next, a secondary receiver is link.

5. "F" will be chosen if it is used in France. others "G" general.

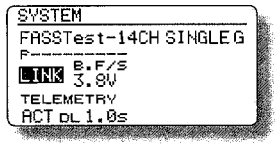


6. When changing battery fail-safe voltage from the initial value 3.8V, voltage is changed here.

* Only in FASSTest Mode.

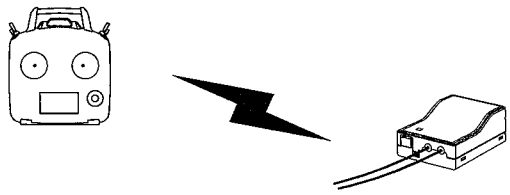


7. [LINK] is chosen by scrolling and the RTN button is pushed. The transmitter will emit a chime as it starts the linking process.



8. When the transmitter starts to chime, power on the receiver. The receiver should link to the transmitter within about 1 second.

In "Link" Mode

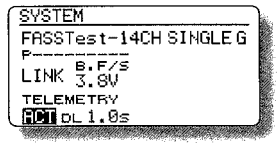


Receiver ON

9. If linking fails, an error message is displayed. Bring the transmitter closer to the receiver and repeat the procedure above from Step 2.

10. ACT will be chosen if telemetry is used.

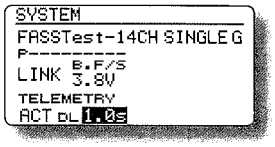
It is INH when not using it.



11. When a telemetry function is enabled, the receiving interval (down-link interval) of sensor data can be changed. If a DL interval is increased, the response of the sensor data display becomes slower, but stick response will improve.

Initial value: 1.0s

Adjustment range: 0.1s~2.0s



*If there are many FASSTest systems turned on around your receiver, it 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.

*Do not perform the linking operation when the drive motor is connected or the engine is running.

* When you use two receivers, please be sure to setup a "primary" and "secondary" in the "dual" mode.

*Since two sets of receivers cannot be individually recognized without using a "primary" and "secondary" setup, it is impossible to receive telemetry data correctly.

* You must link one receiver at a time. If both power supplies to the receivers are switched on simultaneously, data is received incorrectly by the transmitter.

* If a dual receiver function is used, in order to receive sensor information correctly by both sets, telemetry data will be slower compared to a single receiver setup.

* You cannot link three receivers.

* Link is required when a system type is changed.

* Linking is required whenever a new model is made.

* Link is required when a system type is changed.

⚠ Warning

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

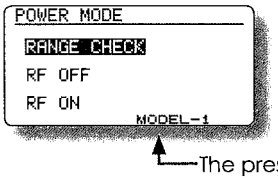
⃠ Do not perform the linking procedure with motor's main wire connected or with the engine operating as it may result in serious injury.

Range Testing Your R/C System

It is extremely important to range check your models prior to each flying session. This enables you to ensure that everything is functioning as it should and to obtain maximum enjoyment from your time flying. The T14SG transmitter incorporates a system that reduces its power output and allows you to perform such a range check.

Range check mode

We have installed a special "Range check mode" for doing a ground range check. To access the "Range check mode" touch and hold the RTN button while turning on the transmitter. Doing so will bring up POWER MODE menu.



To activate the "Range check mode" touch the RTN button and the range check mode screen will appear.

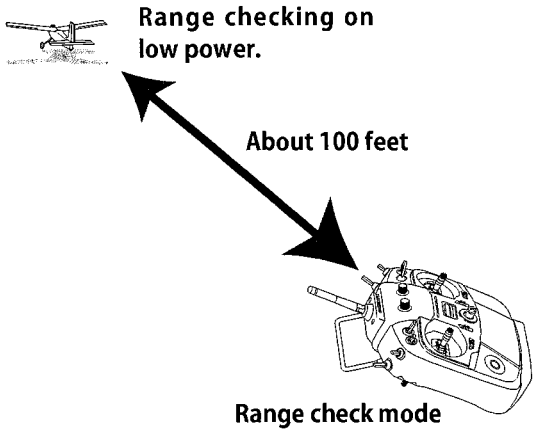
During this mode, the RF power output is reduced so the range test can be performed. In addition, when this mode is activated the right LED on the front of the transmitter starts blinking and the transmitter gives users a warning with a beeping sound every 3 seconds.

The "Range check mode" continues for 90 seconds and after that the power will return to the normal level. To exit the "Range check mode" before the 90 seconds, select the "RANGE CHECK" at the top of the screen and touch the RTN button again. This mode is available one time only so if you need to re-use this function the transmitter power must be cycled. NEVER start flying when the "Range check mode" is active.

Should you require additional time to perform a range check, highlight Restart before your time expires and press the RTN button one time.

Range check procedure

1. With the "Range check mode" on, walk away from the model while simultaneously operating the controls. Have an assistant stand by the model to confirm that all controls are completely and correctly operational. You should be able to walk approximately 30-50 paces from the model without losing control.
2. If everything operates correctly, return to the model. Set the transmitter in a safe, yet accessible, location so it will be within reach after starting the engine or motor. Be certain the throttle stick is in the low throttle position, then start the engine or motor. Perform another range check with your assistant holding the aircraft with the engine running at various speeds. If the servos jitter or move inadvertently, there may be a problem. We would strongly suggest you do not fly until the source of the difficulty has been determined. Look for loose servo connections or binding pushrods. Also, be certain that the battery has been fully charged.



⚠ Warning

❗ Do not fly in the range check mode.

*Since the range of the radio waves is short, if the model is too far from the transmitter, control will be lost and the model will crash.

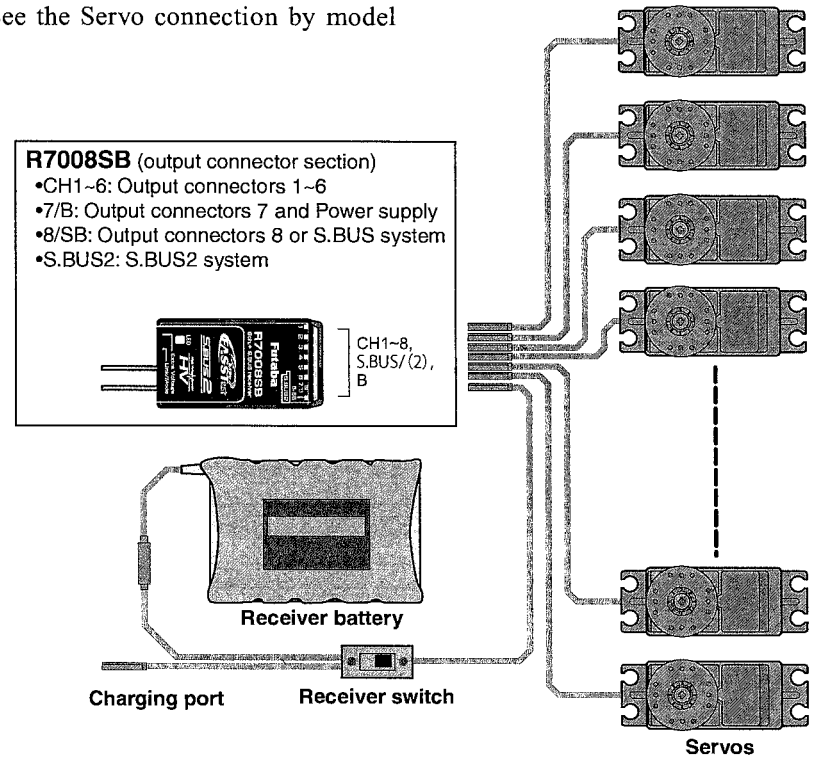
Receiver and servos connection

Connect the receiver and servos in accordance with the connection diagram shown below. Always read the section [Before using]. When mounting the receiver and servos to the fuselage, connect the necessary points in accordance with the model's instruction manual.

Receiver and servos connection diagram

Always connect the necessary number of servos.

The receiver channel assignment depends on the model type. See the Servo connection by model type tables.



Servo connection by model type

The T14SG transmitter channels are automatically assigned for optimal combination according to the type selected with the Model Type function of the Linkage Menu. The channel assignment (initial setting) for each model type is shown below. Connect the receiver and servos to match the type used.

*The set channels can be checked at the Function screen of the Linkage Menu. The channel assignments can also be changed. For more information, read the description of the Function menu.

Airplane/glider

Normal wing and V-tail

RX CH	1Aileron		2Aileron		2Aileron+1FLAP		2Aileron+2FLAP		2Aileron+4FLAP		4Aileron+2FLAP	
	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider
1	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron
2	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator
3	Throttle	Motor	Throttle	Motor	Throttle	Motor	Throttle	Motor	Rudder	Rudder	Rudder	Rudder
4	Rudder	Rudder	Rudder	Rudder	Rudder	Rudder	Rudder	Rudder	Aileron2	Aileron2	Aileron2	Aileron2
5	Gear	AUX7	Gear	AUX7	Gear	AUX6	Gear	AUX5	Flap	Flap	Aileron3	Aileron3
6	VPP	AUX6	Aileron2	Aileron2	Flap	Flap	Aileron2	Aileron2	Flap2	Flap2	Aileron4	Aileron4
7	AUX5	AUX5	VPP	AUX6	Aileron2	Aileron2	Flap	Flap	Flap3	Flap3	Flap	Flap
8	AUX4	AUX4	AUX5	AUX5	VPP	AUX5	Flap2	Flap2	Flap4	Flap4	Flap2	Flap2
9	AUX1	AUX1	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber
10	AUX1	AUX1	AUX1	Butterfly	AUX1	Butterfly	VPP	Butterfly	Gear	Butterfly	Gear	Butterfly
11	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	Throttle	Motor	Throttle	Motor
12	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	VPP	AUX1	VPP	AUX1
DG1	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
DG2	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW

The output CH of each system

FASST 7CH
S-FHSS
FASSTest 12CH
FASSTest 14CH
FASST MULT

Ailvator (Dual Elevator)

RX CH	1Aileron		2Aileron		2Aileron+1FLAP		2Aileron+2FLAP		2Aileron+4FLAP		4Aileron+2FLAP	
	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider
1	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron
2	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator
3	Throttle	Motor	Throttle	Motor	Throttle	Motor	Throttle	Motor	Rudder	Rudder	Rudder	Rudder
4	Rudder	Rudder	Rudder	Rudder	Rudder	Rudder	Rudder	Rudder	Aileron2	Aileron2	Aileron2	Aileron2
5	Gear	AUX7	Gear	AUX7	Gear	AUX6	Elevator2	Elevator2	Flap	Flap	Aileron3	Aileron3
6	VPP	AUX6	Aileron2	Aileron2	Flap	Flap	Aileron2	Aileron2	Flap2	Flap2	Aileron4	Aileron4
7	Elevator2	Elevator2	Elevator2	Elevator2	Aileron2	Aileron2	Flap	Flap	Flap3	Flap3	Flap	Flap
8	AUX4	AUX4	VPP	AUX5	Elevator2	Elevator2	Flap2	Flap2	Flap4	Flap4	Flap2	Flap2
9	AUX1	AUX1	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber
10	AUX1	AUX1	AUX1	Butterfly	VPP	Butterfly	Gear	Butterfly	Gear	Butterfly	Gear	Butterfly
11	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	VPP	AUX1	Throttle	Motor	Throttle	Motor
12	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	Elevator2	Elevator2	Elevator2	Elevator2
DG1	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
DG2	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW

The output CH of each system

FASST 7CH
S-FHSS
FASSTest 12CH
FASSTest 14CH
FASST MULT

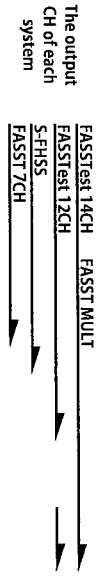
Airplane/glider

Flying wing, Delta wing

RX CH	2Aileron		2Aileron+1FLAP		2Aileron+2FLAP		2Aileron+4FLAP		4Aileron+2FLAP	
	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider
1	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron
2	VPP	AUX4	VPP	AUX4	VPP	AUX4	Aileron2	Aileron2	Aileron2	Aileron2
3	Throttle	Motor	Throttle	Motor	Throttle	Motor	Rudder	Rudder	Aileron3	Aileron3
4	Rudder	Rudder	Rudder	Rudder	Rudder	Rudder	VPP	AUX4	Aileron4	Aileron4
5	Gear	AUX7	Gear	AUX6	Gear	AUX6	Flap	Flap	Rudder	Rudder
6	Aileron2	Aileron2	Flap	Flap	Flap	Flap	Flap2	Flap2	VPP	AUX4
7	AUX6	AUX6	Aileron2	Aileron2	Aileron2	Aileron2	Flap3	Flap3	Flap	Flap
8	AUX5	AUX5	AUX5	AUX5	Flap2	Flap2	Flap4	Flap4	Flap2	Flap2
9	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator
10	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber
11	AUX1	AUX1	AUX1	Butterfly	AUX1	Butterfly	Gear	Butterfly	Gear	Butterfly
12	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	Throttle	Motor	Throttle	Motor
DG1	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
DG2	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW

Flying wing, Delta wing (Winglet 2 Rudder)

RX CH	2Aileron		2Aileron+1FLAP		2Aileron+2FLAP		2Aileron+4FLAP		4Aileron+2FLAP	
	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider	Airplane	Glider
1	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron	Aileron
2	Rudder2	Rudder2	Rudder2	Rudder2	Rudder2	Rudder2	Aileron2	Aileron2	Aileron2	Aileron2
3	Throttle	Motor	Throttle	Motor	Throttle	Motor	Rudder	Rudder	Aileron3	Aileron3
4	Rudder	Rudder	Rudder	Rudder	Rudder	Rudder	Rudder2	Rudder2	Aileron4	Aileron4
5	Gear	AUX7	Gear	AUX6	Gear	AUX6	Flap	Flap	Rudder	Rudder
6	Aileron2	Aileron2	Flap	Flap	Flap	Flap	Flap2	Flap2	Rudder2	Rudder2
7	VPP	AUX6	Aileron2	Aileron2	Aileron2	Aileron2	Flap3	Flap3	Flap	Flap
8	AUX5	AUX5	VPP	AUX5	Flap2	Flap2	Flap4	Flap4	Flap2	Flap2
9	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator	Elevator
10	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber	Camber
11	AUX1	AUX1	AUX1	Butterfly	VPP	Butterfly	Gear	Butterfly	Gear	Butterfly
12	AUX1	AUX1	AUX1	AUX1	AUX1	AUX1	Throttle	Motor	Throttle	Motor
DG1	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
DG2	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW



* Output channels differ by each system of a table. When using a system with few channels, there is a wing type which cannot be used. It cannot be used when there is a function required out of the range of the arrow of a figure.

● FASSTest14CH/FASST MULTI/FASST 7CH/S-FHSS

CH	All Other	H-4, H4X Swash
1	Aileron	Aileron
2	Elevator	Elevator
3	Throttle	Throttle
4	Rudder	Rudder
5	Gyro/RUD	Gyro/RUD
6	Pitch	Pitch
7	Governor	Governor
8	Needle	Elevator2
9	Gyro2/AIL	Gyro2/AIL
10	Gyro3/ELE	Gyro3/ELE
11	AUX1	AUX1
12	AUX1	AUX1
DG1	SW	SW
DG2	SW	SW

The output CH of each system
FASST 7CH
S-FHSS
FASSTest 14CH
FASST MULT

● FASSTest12CH

CH	All Other	H-4, H4X Swash
1	Aileron	Aileron
2	Elevator	Elevator
3	Throttle	Throttle
4	Rudder	Elevator2
5	Pitch	Pitch
6	Gyro/RUD	Gyro/RUD
7	Governor	Governor
8	Governor 2	Rudder
9	Gyro2/AIL	Gyro2/AIL
10	Gyro3/ELE	Gyro3/ELE
DG1	SW	SW
DG2	SW	SW

The output CH of each system
FASSTest 12CH

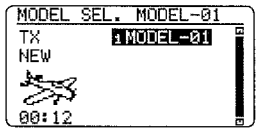
- Since the ch8 doesn't work on the 7-ch mode, please assign the elevator2 (H-4, H4X) or the needle (all other) to 7 channnel if the governor is not used.

MODEL BASIC SETTING PROCEDURE

Airplane/glider basic setting procedure

1. Model addition and selection

Initially, the T14SG assigns the first model to model-01 in the transmitter. The Model Select function of the Linkage Menu is used to add models and to select amongst models which are already set.

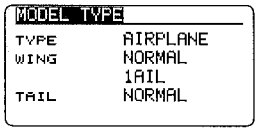


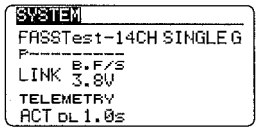
The T14SG is capable of storing data for up to 30 models in its internal memory. Additional model data can also be saved to an optional SD card.

The currently selected model name is displayed in the center of the home screen. Before flying and before changing any settings, always confirm the model name.

When a new model is added, the Model type select screen and System mode setup screen automatically appear. Please be aware that the transmitter will stop transmitting temporarily when you change the model.

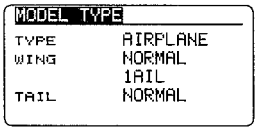
When a new model is added, you will need to re-link the receiver.





2. Model type selection

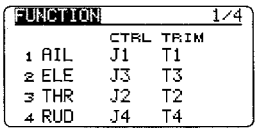
Select the model type matched to the aircraft with the Model Type select function of the Linkage Menu. For an airplane, select the model type from among the 2 types: airplane and glider. And then select the wing type and the tail type matched to the aircraft.



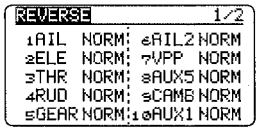
3. Fuselage linkage

Connect the ailerons, elevators, throttle, rudder, etc. in accordance with the model's instruction manual. For a description of the connection method, see the Receiver and Servos Connection.

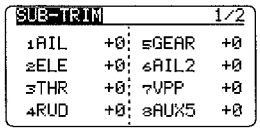
Note that even for the same "airplane model", when the wing type and tail type are different, the channel assignment may be different. (The channel assigned to each function can be checked at the Function menu of the Linkage Menu.)

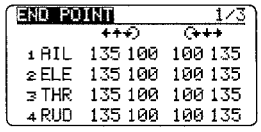


- If the direction of the servo is incorrect, adjust the direction with the Reverse function of the Linkage Menu.



- Adjust the neutral position and control surface angle with the linkage, and fine tune them with the Sub-Trim and End Point functions (angle adjustment). To protect the linkage, a limit position can also be set with the End Point function. The End Point function can adjust the amount of up/down and left/right movement and limit of each channel.



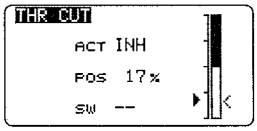


4. Throttle cut setting (Airplane)

Throttle cut can be performed with one touch by a switch without changing the throttle trim position.

Set throttle cut with the Throttle Cut function of the Linkage Menu. After activating the throttle cut function and selecting the switch, adjust the throttle position so that the carburetor becomes fully closed. For safety, the throttle cut function operates the

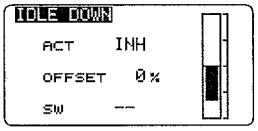
throttle stick in the 1/3 or less (slow side) position.



5. Idle down setting (Airplane)

The idling speed can be lowered with one touch by a switch without changing the throttle trim position. Perform this setting with the Idle Down function of the Linkage Menu. After activating the Idle Down function and selecting the switch, adjust the idle down speed. For safety, the idle down function acts only when the throttle stick is in the lowest part of its throw.

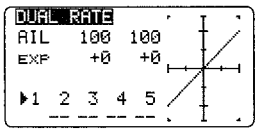
*While the Throttle Cut function is in operation, the Idle Down function does not work.



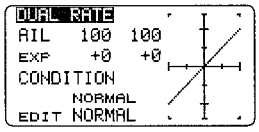
6. D/R function

D/R function is used to adjust the throw and operation curve of the stick functions (aileron, elevator, rudder and throttle) for each switch position (airplane) or each flight condition (glider). This is normally used after the modeler has defined the maximum throw directions in the End Point settings.

(Airplane)



(Glider)

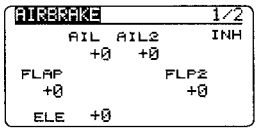


7. Airbrake (Airplane)

This function is used when an airbrake is necessary when taking off or diving, etc. Please note: this menu item is only available under certain wing configurations. For example, it will not appear if a single aileron wing type has been selected.

The pre-set elevator and flap offset amount can be activated by a switch.

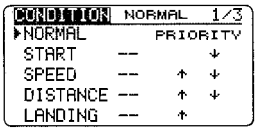
The offset amount of the aileron, elevator, and flap servos can be adjusted as needed. Also the speed of the aileron, elevator, and flap servos can be adjusted. You can also set the Auto Mode, which will link Airbrake to a stick, switch, or dial. A separate stick switch or dial can also be set as the ON/OFF switch.



8. Addition of flight conditions (Glider)

The Condition Select function automatically allocates the normal condition (NORMAL) for each model. NORMAL is the default condition and is the only one active when a new model type is defined.

If you want to add flight conditions, please refer to a description of the CONDITION function.



*The NORMAL is always on, and remains on until other conditions are activated by switches, stick positions, etc. Please refer to the section entitled Switch Selection Method for additional information on how to do so.

*It is possible to customize the activation of the flight conditions.

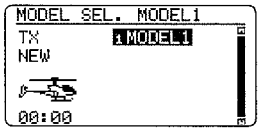
*The Condition Delay can be programmed for each channel. The Condition Delay is used to change the servo throw smoothly when switching conditions.

Helicopter basic setting procedure

This section outlines examples of use of the helicopter functions of the T14SG. Adjust the actual values, etc. to match the fuselage used.

1. Model addition and selection

Initially, the T14SG assigns the first model to model-01 in the transmitter. To add new models or to select a model already programmed, use the Model Select function of the Linkage Menu.

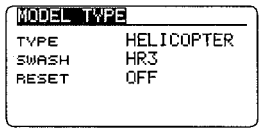


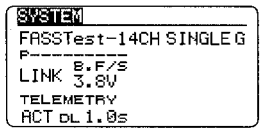
This is convenient when selecting a model after entering the model's names in advance. The T14SG is capable of storing up to 30 models in the transmitter's internal memory. Additional models can also be stored in an optional SD card.

The currently selected model is displayed in the middle of the screen. Before flying and before changing any settings, always confirm the model name.

When a new model is added, the Model Type select screen and system mode setup screen automatically appear. Change, or check that they match the swash type and receiver type of the model used.

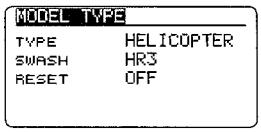
When a new model is added, you will need to re-link the receiver.





2. Model type and swash type selection

If a different model type is already selected, select helicopter with the Model Type function of the Linkage Menu, and then select the swash type matched to the helicopter.

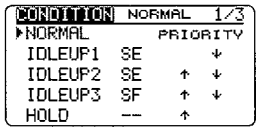


*The Model Type function automatically selects the appropriate output channels, control functions, and mixing functions for the chosen model type. Six swash types are available for helicopters.

*For a description of the swash type selection, refer to the MODEL TYPE function.

3. Flight condition addition

The transmitter offers up to five flight conditions per model.



The Condition Select function automatically allocates five conditions for helicopters.

(Initial setting)

- NORMAL
- IDLE UP1 (SW-E)
- IDLE UP2 (SW-E)
- IDLE UP3 (SW-F)
- HOLD (Hold switch is not assigned initially)

Note: Since you may accidentally activate a condition that not previously setup during flight which could cause a crash, we suggest deleting conditions that are not used.

*For a description of the condition deletion, refer to the Condition Select function.

The NORMAL condition is always on, and remains on until other conditions are activated by switches.

The priority is throttle hold/idle up 3/idle up 2/ idle up 1/normal. Throttle hold has the highest priority.

The Condition Delay can be programmed for each channel and condition. The Condition Delay is used to change the servo throw smoothly when switching conditions.

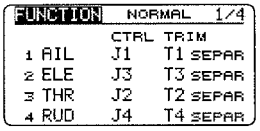
(General flight condition setting example)

- Normal: (Use initial setting conditions/operate when switch OFF)
  Use from engine starting to hovering.
- Idle up 1: (Operate at SW-E center)
  Use in stall turn, loop, and other maneuvers.
- Idle up 2: (Operate at SW-E forward side)
  Use in rolls.
- Throttle hold: (Operate at SW-G forward side)
  Use in auto rotation.

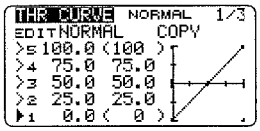
4. Servo Connection

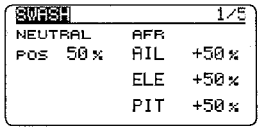
Connect the throttle rudder, aileron, elevator, pitch, and other servos in accordance with the kit instruction manual. For a description of the connection method, see "Receiver and Servos Connection".

Note: The channel assigned to each function can be checked at the Function menu of the Linkage Menu.

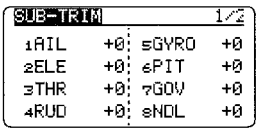


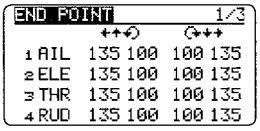
- If the direction of operation of the servo is incorrect, use the Reverse function of the Linkage Menu. Also use the swash AFR function in other than the H-1 mode.





- Adjust the direction of operation of the gyro. (Gyro side function)
- Connect the throttle linkage so that the carburetor can fully close at full trim throttle cut.
- Adjust the neutral position at the linkage side and fine tune with the Sub-Trim function and End Point function. To protect the linkage, a limit position can also be set with the End Point function.



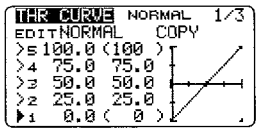


- Swash plate correction (Except H-1 mode)

*If any interactions are noticed, for a description of the linkage correction function, please refer to the SWASH function.

5. Throttle/Pitch curve setting

This function adjusts the throttle or pitch operation curve in relation to the movement of the throttle stick for each condition.



<Throttle curve setting example>

Activate the throttle curve of each condition with the condition select switch.

- Normal curve adjustment

Normal curve creates a basic throttle curve centered near hovering. This curve is adjusted together with the pitch curve (Normal) so that the engine speed is constant and up/down control is easiest.

- Idle up curve adjustment

The low side Throttle curve creates a curve matched for aerobatics (loop, roll, 3D, etc.).

- Throttle hold curve adjustment

Confirm that the rate of the slowest position (0%) of the stick is 0% (initial setting).

<Example of pitch curve setting>

Activate the pitch curve of each condition with the condition select switch.

- Pitch curve (Normal)

Make the pitch at hovering approximately +5°~6°.

Set the pitch at hovering with the stick position at the 50% point as the standard.

*Stability at hovering may be connected to the throttle curve. Adjustment is easy by using the hovering throttle function and hovering pitch function together.

- Pitch curve (Idle up 1)

The idle up 1 pitch curve function creates a curve matched to airborne flight.

Set to -7°~+12° as standard.

- Pitch curve (Idle up 2)

The high side pitch setting is less than idle up 1.

The standard is +8°.

- Pitch curve (Hold)

At auto rotation, use the maximum pitch at both the high and low sides.

[Pitch angle setting example]

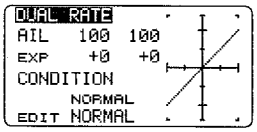
Throttle hold: -7°~+12°

6. D/R function

D/R function is used to adjust the throw and operation curve of aileron, elevator and rudder for each condition.

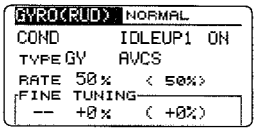
*For throttle and pitch curve settings, refer to the aforementioned "Throttle/Pitch curve setting"

This is normally used after End Point has defined the maximum throw directions.



7. Gyro sensitivity and mode switching

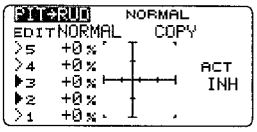
The gyro sensitivity and mode switching function is utilized to adjust the gyro mixing of the model, and can be set for each condition.



- Normal condition (hovering): Gyro sensitivity maximum
- Idle up 1/Idle up 2/Throttle hold: Gyro sensitivity minimum
- However, during auto rotations with a tail-driven helicopter, this function may not have any effect on the high gyro sensitivity.

8. Pitch to RUD mixing setting

Note: When using a Futaba GY Gyro, or other heading hold gyro, this Pitch to RUD mixing should not be used. The reaction torque is corrected by the gyro. When operating the gyro in the AVCS mode, the mixed signal will cause neutral deviation symptoms and the gyro will not operate normally.



Use this function when you want to suppress the torque generated by the changes in the pitch and speed of the main rotor during pitch operation. Adjust it so that the nose does not swing in the rudder direction. However, when using a heading hold gyro like those shown above, do not use Pitch to rudder mixing.

Activate the Pitch to rudder (Pit -->RUD) mixing function from the Model Menu, and set the curve for each condition. (At initial setting, this function is in the "INH" state. To use it, set it to the "ON" state.)

<Setting example>

Activate the mixing curve of each condition with the condition select switch.

A curve setting example is shown below.

- Pitch to RUD mixing curve (Normal)

  Use the hovering system and set this curve to match take off and landing and vertical climb at a constant speed.

- Pitch to RUD mixing (Idle up 1)

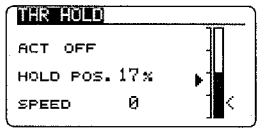
  Use this curve in stall turn, loop, and adjust it so the fuselage is facing straight ahead when heading into the wind.

- Pitch to RUD mixing (Hold)

  This function is set so that the fuselage is facing straight ahead at straight line auto rotation. The pitch of the tail rotor becomes nearly 0°.

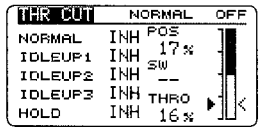
9. Throttle hold setting

*If throttle hold is necessary, please refer to the THR HOLD function.



10. Throttle cut setting

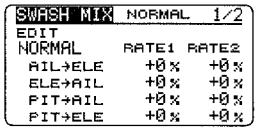
Throttle cut provides an easy way to stop the engine, by flipping a switch with the throttle stick at idle. The action is not functional at high throttle to avoid accidental dead sticks. The switch's location and direction must be chosen, as it defaults to NULL.



*With throttle stick at idle, adjust the cut position until the engine consistently shuts off, but throttle linkage is not binding.

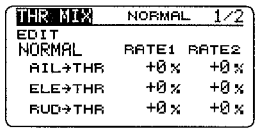
11. Swash Mix corrects aileron, elevator and pitch interaction

The swash mix function is used to correct the swash plate in the aileron (Left/Right Cyclic) and elevator (Forward/Aft Cyclic) direction corresponding to each operation of each condition.



12. Throttle mixing setting

*If throttle mixing is necessary for a compensation for slowing of engine speed caused by swash plate operation during aileron or elevator operation, please refer to the THROTTLE MIX function.



13. Other special mixings

- Pitch to Needle mixing

This mixing is used with engines with a design which allows needle control during flight (fuel-air mixture adjustment). A needle curve can be set.

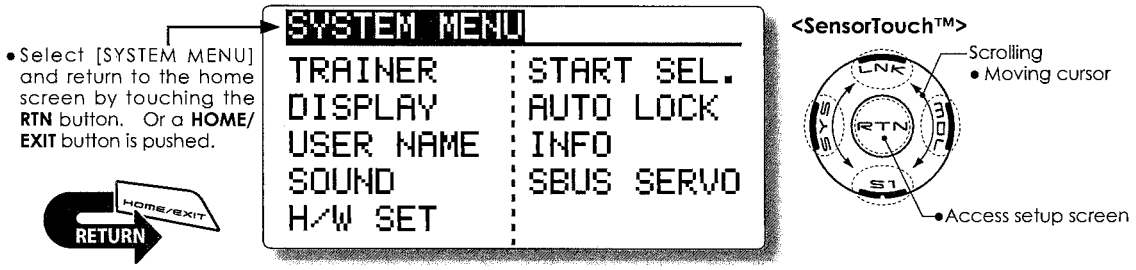
- Governor mixing

This mixing is dedicated governor mixing when a governor is used.

SYSTEM MENU

The System Menu sets up functions of the transmitter: This does not set up any model data.

- Call the system menu shown below by touching the SYS button twice at the home screen, etc.



- Select the function you want to set and call the setup screen by touching the RTN button.

System Menu functions table

[TRAINER]: Starts and sets the trainer system.

[DISPLAY]: LCD and back-light adjustment

[USER NAME]: User name registration

[SOUND]: Turns off the buzzer.

[H/W SET]: H/W reverse, calibration and stick mode

[START SEL.]: Immediately, a model selection can be performed

[AUTO LOCK]: The automatic lock function of two kinds of touch sensors

[INFO]: Displays the program version, SD card information, product ID, and language selection.

[SBUS SERVO]: S.BUS servo setting.

T14SG trainer system makes it possible for the instructor to chose which channels and operation modes that can be used in the students transmitter. The function and rate of each channel can be set, the training method can also be matched to the student's skill level. Two transmitters must be connected by an optional Trainer Cord, and the Instructors' transmitter should be programmed for trainer operation, as described below.

When the Instructor activates the trainer switch, the student has control of the aircraft (if MIX/FUNC/NORM mode is turned on, the Instructor can make corrections while the student has control). When the switch is released the Instructor regains control. This is very useful if the student gets the aircraft into an undesirable situation.

- Setting data are stored to model data.
- Student rate can be adjusted at MIX/FUNC/NORM mode.
- Activated student channels can be selected by switches.

NOTE: This trainer system can be used in the following manner;

1. **With the T14SG transmitter and a conventional transmitter, if the channel order is different, it is necessary to match the channel order before using this function.**

   You can select the channel of input data from student's transmitter in the "FUNC" or "MIX" mode.

2. **When the T14SG is used as the instructor's transmitter, set the modulation mode of the student's transmitter to PPM.**

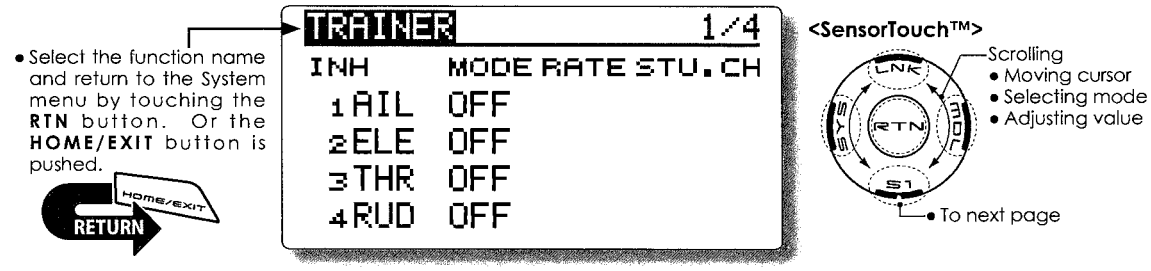
   If being used as the student, T14SG can be connected to the instructor's transmitter which the PPM mode as the student's modulation mode is required. T14SG always sends PPM mode signal from the trainer jack.

3. **Be sure that all channels work correctly in both transmitters before flying.**

Corresponding types of transmitters and trainer mode settings:

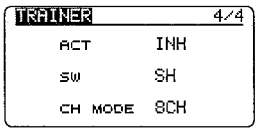
Types of transmitters		Instructor's transmitter settings		Student's transmitter settings			Trainer Cords
		System Type	Trainer setting	System Type	Trainer setting		
Instructor	Student	Mod. mode	CH mode	Mod. mode	CH mode	Mod. mode	
T14SG/T18MZ	T14SG/T18MZ	Arbitrary	14CH/16CH	Arbitrary	14CH/16CH	-	T12FG (FUTM4405) and 9C (FUTM4415) Trainer Cords
T14SG	T14MZ, FX-40, T12Z, T12FG, FX-30	Arbitrary	12CH	PCM-G3 2.4G	12CH	PPM	
T14SG	T8FG, FX-20	Arbitrary	12CH	FASST-MLT2	-	-	
			8CH	FASST-MULT			
T14SG	T10C, T9C, T7C,T6EX, T4EX	Arbitrary	8CH	PPM	-	-	T12FG (FUTM4405)
T14SG	T10CG,T7C	Arbitrary	8CH	Arbitrary	-	-	T12FG (FUTM4405)
T14SG	T8J,T6J	Arbitrary	8CH	Arbitrary	-	-	T12FG (FUTM4405) and 9C (FUTM4415) Trainer Cords
T14MZ, FX-40, T12Z, T12FG, FX-30	T14SG	Arbitrary	12CH	Arbitrary	12CH	-	
T8FG, FX-20	T14SG	Arbitrary	12CH	Arbitrary	12CH	-	
T10C, T10CG, T9C, T7C, T7C,T8J	T14SG	Arbitrary	-	Arbitrary	8CH	-	

• Select [TRAINER] in the System menu and enter the setup screen shown below by touching the RTN button.



Mode and switch selection

1. Access the setup screen page 4 shown below by touching the S1 button three times.



2. Move the cursor to the [ACT] or [12/8CH] item and touch the RTN button to switch to the data input mode.
3. Select the mode by scrolling the touch sensor. The display blinks. Touch the RTN button to change the mode. (To terminate the mode change, touch the S1 button.)

"ACT": Enable operation by changing to [OFF] or [ON].

"12/8 CH": When the student uses the T14SG, T14MZ, T12Z, T12FG or FX-40, select [12CH]. Otherwise select [8CH].

If changing the trainer switch:

4. Move the cursor to the [SW] item and touch the RTN button to access the switch setup screen.

(See "Switch selection method" at the end of this manual for selection method details.)

"SW": Select the desired switch.

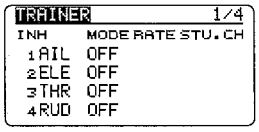
Initial setting: SH

*The switch mode can also be selected when setting the ON position on the switch setup screen. When [ALTERNATE OFF] is selected, normal ON/OFF operation is performed. When [ALTERNATE ON] is selected, the trainer function is alternately turned on and off each time the switch is operated. This allows alternate ON/OFF switching even when a momentary switch (SH) is used.

Note: The trainer function won't be turned on unless the Instructor's transmitter receives signals from the student's transmitter. Be sure to confirm this after connecting your trainer cable.

Operating mode selection

(Setup screen page 1-3)



1. Move the cursor to the [MODE] item of the channel you want to change and touch the RTN button to switch to the data input mode.
2. Select the mode by scrolling the touch sensor. The display blinks. Touch the RTN button to change the mode. (To terminate the mode change, touch the S1 button.)

"MODE": Select the desired operation mode for each channel.

NORM: The model is controlled by signals from the student transmitter.

MIX mode: The model is controlled by signals from the instructor and student transmitters. (Reset the student's model data to the default condition.)

FUNC mode (function mode): The model is controlled by signals from the student transmitter with the instructor 's setting. (Reset the student's model data to the default condition.)

OFF: Only the instructor side operates.

Adjusting the student's rate.

*This can be adjusted for students who may need lower rates than a more experienced student.

1. Move the cursor to the [RATE] item of the channel you want to change and touch the RTN button to switch to the data input mode.
2. Adjust the rate by scrolling the touch sensor.

   "RATE": Adjust the desired rate.

   Setting range: 0~100%

   Initial value: 100%

   *When you want to reset the value to the initial state, touch the RTN button for one second.

3. To end adjustment, touch the RTN button and return to the cursor mode.

Changing the student's channel

*The setting above allows setting of the channel assignment of student side when [MIX] or [FUNC] was selected.

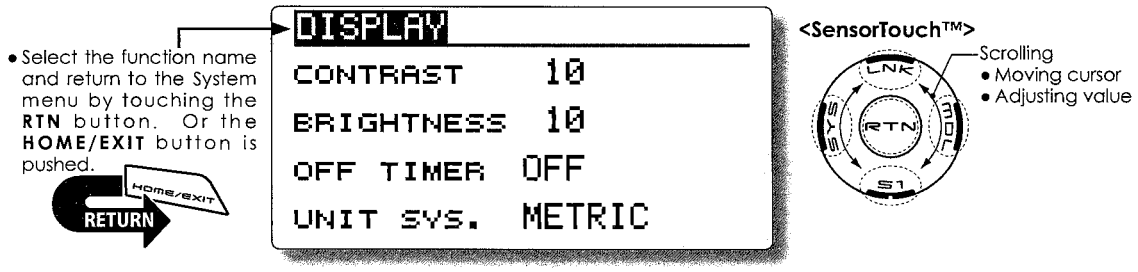
1. Move the cursor to the [STU. CH] item of the channel you want to change and touch the RTN button to switch to the data input mode.
2. Select the channel by scrolling the touch sensor. The display blinks. Touch the RTN button to change the channel. (To terminate the mode change, touch the S1 button.)

   "STU. CH": Match the channel order of the Instructor's and student's transmitter. This function will help if both transmitters are in different modes, or the Master has a different wing type set up. The student can be set to match the Master without any physical changes being made.

LCD contrast, back-light brightness and back-light off-timer adjustment are possible:

Moreover, a display unit can be chosen from the metric system or yard/pound.

- Select [DISPLAY] at the system menu and access the setup screen shown below by touching the RTN button.



LCD contrast adjustment

1. Select "CONTRAST" and touch the RTN button to switch to the data input mode and adjust the contrast by scrolling the touch sensor.

   "CONTRAST": Adjust the contrast to the desired value while watching the screen display.

   Setting range: (Lighter) 0 to 15 (Darker)

   Initial value: 5

   *When you want to reset the value to the initial state, touch the RTN button for one second.

2. Touch the RTN button to end adjustment and return to the cursor mode.

Back-light brightness adjustment

1. Select "BRIGHTNESS" and touch the RTN button to switch to the data input mode and adjust the back-light brightness by scrolling the touch sensor.

   "BRIGHTNESS": Adjust the brightness to the desired value while watching the screen display.

   Setting range: OFF, 1 to 20(Lighter)

   Initial value: 10

   *When you want to reset the value to the initial state, touch the RTN button for one second.

2. Touch the RTN button to end adjustment and return to the cursor mode.

Back-light off-timer

1. Select "OFF TIMER" and touch the RTN button to switch to the data input mode and adjust the back-light off-timer by scrolling the touch sensor.

   "OFF TIMER": Adjust the time when the back-light turns off after operating the touch sensor.

   Setting range: 10 to 240 sec (each 10 sec), OFF (always on)

   Initial value: 10 sec

   *When you want to reset the value to the initial state, touch the RTN button for one second.

2. Touch the RTN button to end adjustment and return to the cursor mode.

Unit system adjustment

1. Select "UNIT SYS." and touch the RTN button to switch to the data input mode and adjust the unit by scrolling the touch sensor.

   Setting range: (METRIC) or (YARD/POUND)

2. Touch the RTN button to end adjustment and return to the cursor mode.

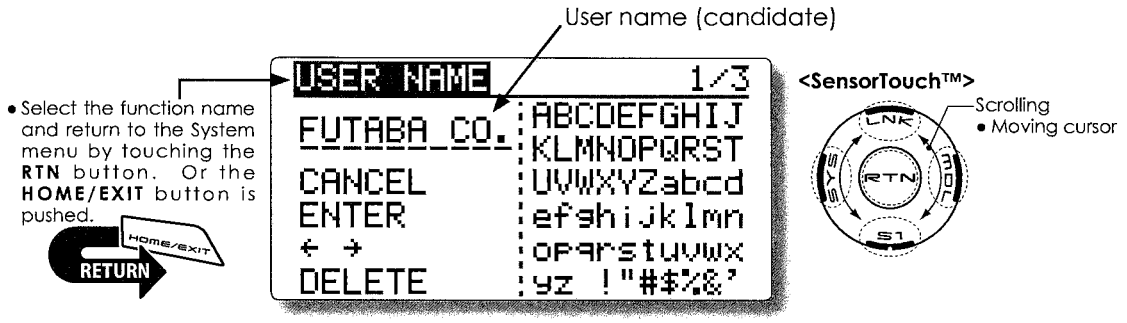
USER NAME

User name registration

This function allows the modelers to change the T14SG user name.

*A name of up to 10 characters can be entered as the user name. Please note that a space is also counted as one character.

- Select [USER NAME] at the System menu and access the setup screen shown below by touching the RTN button.



User name registration

1. Change the user name as described below:

   [Moving cursor in user name (candidate)]
   Select [←] or [→], and touch the RTN button.

   [Deleting a character]
   When [DELETE] is selected and the RTN button is touched, the character immediately after the cursor is deleted.

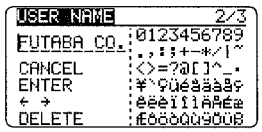
   [Adding a character]
   When a character is selected from the character list and the RTN button is touched, that character is added at the position immediately after the cursor.

   *A name of up to 10 characters long can be entered as the user name. (A space is also counted as 1 character.)

2. Upon completing the input, select [ENTER] and touch the RTN button. (To terminate input and return to the original state, select [CANCEL] and touch the RTN button.)

(Character list 1/3)

(Character list 2/3)



(Character list 3/3)

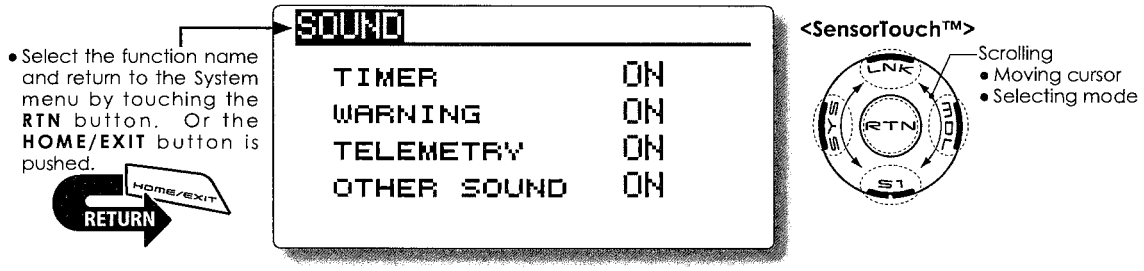
SOUND

Turns off the buzzer.

The warning sound and other sounds of the T14SG transmitter can be turned off.

*When "WARNING" was set to OFF, the no operation alarm (30 minutes), mixing warning sound, and low battery alarm sounds also turned off.

- Select [SOUND] at the system menu and access the setup screen shown below by touching the RTN button.



On/off operation

1. Move the cursor to the [TIMER][WARNING] or [OTHER SOUND] item and touch the RTN button to switch to the data input mode.
2. Select the ON or OFF by scrolling the touch sensor.
   *The display blinks.
3. Touch the RTN button.

H/W reverse

This function reverses the operation direction of the sticks, switches, trimmer levers, and knobs.

Note: This setting reverses the actual operation signal, but does not change the display indicators. Use the Normal mode as long as there is no special reason to use the Reverse mode.

Stick mode

This function changes the stick mode of transmitter.

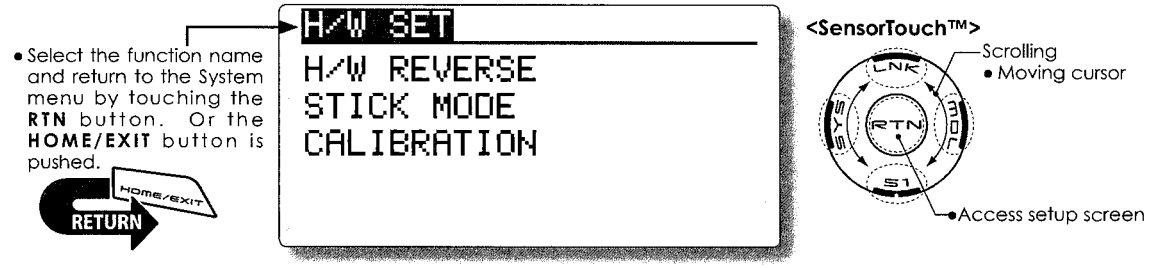
Note: This will not change the throttle ratchet, etc. Those are mechanical changes that must be performed by a Futaba service center.

Note: After changing the mode, these changes are only applied to new models. It is not applied to an existing model.

Stick calibration

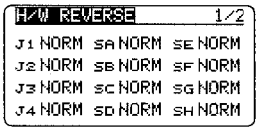
J1-J4 stick correction can be performed.

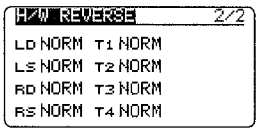
- Select [H/W SET] at the system menu and access the setup screen shown below by touching the RTN button.



Operation direction reversal method

1. Select [H/W REVERSE] and access the setup screen shown below by touching the RTN button.





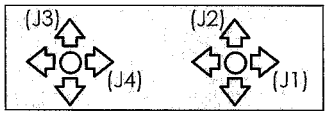
2. Move the cursor to the item corresponding to the H/W (hardware) you want to reverse and touch the RTN button to switch to the data input mode.
3. Select the mode by scrolling the touch sensor. The display blinks. When the RTN button is touched, the operation direction is reversed. (To terminate the mode change, touch the S1 button.)

"NORM": Normal operation direction
"REV" : Operation direction is reversed.

Changing stick mode

1. Select [STICK MODE] and access the setup screen shown below by touching the RTN button.

2. Move the cursor to the "STICK MODE" item and touch the RTN button to switch to the data input mode.
3. Select the mode. The display blinks. When the RTN button is touched, the stick mode is changed. (To terminate the mode change, touch the S1 button.)

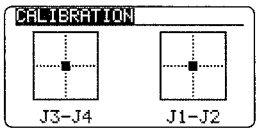


Mode	J1	J2	J3	J4
1	Aileron	Throttle	Elevator	Rudder
2	Aileron	Elevator	Throttle	Rudder
3	Rudder	Throttle	Elevator	Aileron
4	Rudder	Elevator	Throttle	Aileron

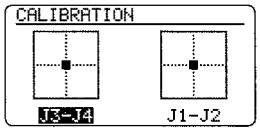
Stick calibration method

*J3 and J4 correction is described below. J1 and J2 corrections are performed using the same procedure.

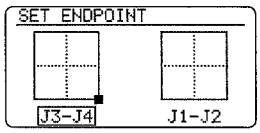
1.Select [CALIBRATION] and access the setup screen shown below by touching the RTN button.



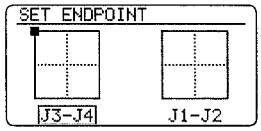
2.Move the cursor to the J3-J4 button and touch the RTN button.



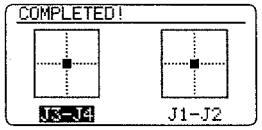
3.Move the J3 or J4 sticks to the neutral position and press the RTN button for one second.



4.Set the J3 and J4 sticks fully to the bottom right and wait until the buzzer sounds.



5.Set the J3 and J4 sticks fully to the top left and wait until the buzzer sounds.



6.The above completes the correction operation. Operate and check if stick correction was performed normally.

START SEL is a function which starts and can perform a model selection immediately.

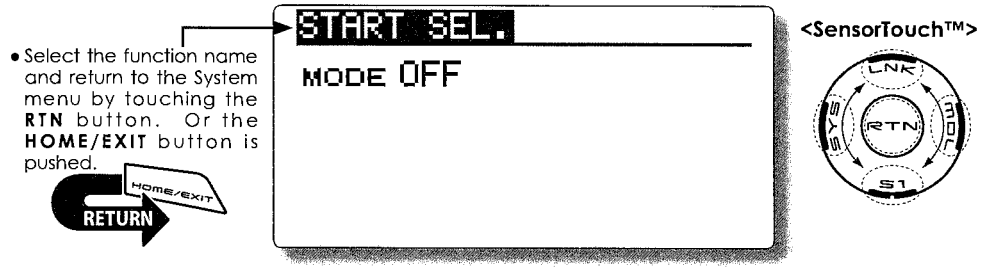
Each time, it is convenient for the modeler which is enjoying two or more models by one of a transmitter.

Quick Select Screen

As the name suggests, the Quick Model Select Function enables the modeler to change the selected models rapidly each time the transmitter is turned ON. With a few quick touches, it is possible to change models whereas before it would require a multi-step process. The T14SG stores up to four models in the Quick Select offerings.

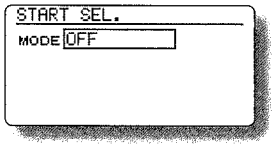
Model Select Screen

When the transmitter is turned on, it will open to the Model Selection Screen immediately.

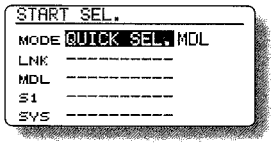


Setting Up and Adjusting the Quick Select Models

1. The Start Selection (START SEL.) menu is accessed through the T14SG System Menu. Turn the transmitter ON and then press the SYS (System) button two times. Use the SensorTouch™ to highlight the Start Selection (START SEL.) and then press the Return (RTN) button to confirm the selection.

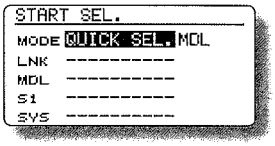


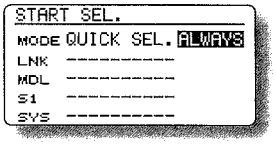
2. The Start Selection (START SEL.) menu option defaults to OFF meaning that Quick Select and Model Select are not applicable. To activate the Quick Select or Model Select, use the SensorTouch to scroll to the OFF setting as denoted in the image. With the OFF indication highlighted, press the Return (RTN) button and rotate the SensorTouch once again to scroll amongst the options. With the Quick Select (QUICK SEL.) indicated, press the Return (RTN) button once again to make the desired selection as indicated.



Quick Select Activation:

With the Quick Select (QUICK SEL.) option activated, there are two additional options available for customization; ALWAYS and MDL (Model). These options determine if/when the Quick Select information will appear on-screen. ALWAYS, as the name suggests, indicates that each time the transmitter is powered-up, the Quick Select information will appear on-screen. The MDL (Model) setting indicates that the Quick Select information will appear on-screen only when the MDL button is pressed simultaneously as the transmitter is turned ON. With the Quick Select mode highlighted, use the SensorTouch to move to the activation setting options. Model (MDL) is the default setting. Press the Return (RTN) button to bring forth the options, then scroll to the ALWAYS setting using the SensorTouch pad. Press the Return (RTN) button once again to finalize the selection.

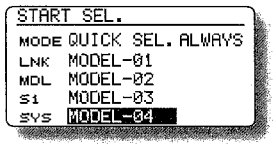




Assigning models to the sensor buttons:

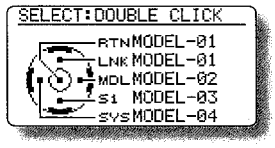
There are four sensors/buttons that correspond with the SensorTouch: Link (LNK), Model (MDL) System (SYS) and S1. As such, it is possible to offer up to four models available through the Quick Select function. We suggest using the models that you fly most often.

1. Use the SensorTouch, scroll to the desired sensor/button for the first model; for example, Link (LNK).
2. With the input next to the desired sensor highlighted, press the Return (RTN) button one time.
3. Using the SensorTouch, scroll through the available models. To select the desired model, press the Return (RTN) button.
4. Repeat as desired for the remaining sensors.



Using the sensors to select the model:

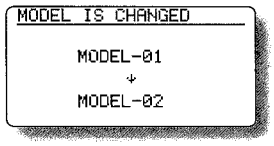
1. Turn ON the transmitter, activating the Quick Select screen. If Model (MDL) has been selected, please be sure to press the Model (MDL) sensor when powering up the transmitter.



*Please note: Even if the Quick Select function is active, the Power Mode screen will appear when the transmitter is turned ON while simultaneously pressing the Return (RTN) button.

2. To select the model assigned to a particular sensor, double-click the desired sensor. For example, MODEL- 03 is assigned to S1, double-click S1 to bring forth all settings, etc. for Model -03. The T14SG offers an audible and visual confirmation as the selected model memory is changed accordingly.

*If the Return (RTN) button is double-clicked, the T14SG the current model is selected as indicated on the display. That is, the model that was used prior to the last time the transmitter was turned OFF.



Model Select Screen

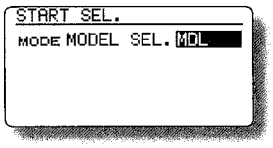
This allows the Model Select screen to be accessed immediately upon turning ON the transmitter.

*Please note: this function cannot be utilized at the same time as the Quick Select function. If more than four models are flown regularly, we suggest that the Model Select function be utilized as it will save time when selecting the desired aircraft. If four, or fewer, models are flown, the Quick Select option would be the best choice.

*Please note: the Model Select function does not allow access to the RENAME, COPY or DELETE options. To utilize one of these options, please access the Model Select screen in the typical manner as described in the complete instruction manual.

1. The Start Selection (START SEL.) menu is accessed through the T14SG's System Menu. Turn the transmitter ON and then press the SYS (System) button two times. Use the SensorTouch™ to highlight the Start Selection (START SEL.) and then press the Return (RTN) button to confirm the selection.

2. The Start Selection (START SEL.) menu option defaults to OFF meaning that Quick Select and Model Select are not applicable. To activate the Quick Select or Model Select, use the SensorTouch to scroll to the OFF setting as denoted in the image. With the OFF indication highlighted, press the Return (RTN) button and rotate the SensorTouch once again to scroll to the Model Select (MODEL SEL.). Press the Return (RTN) button once again to activate Model Select as indicated.

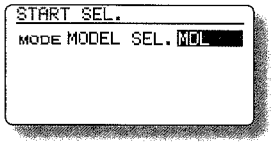


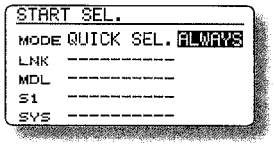
Model Select Activation:

With the Model Select (MODEL SEL.) option activated, there are two additional options available for customization; ALWAYS and MDL (Model). These options determine if/when the Model Select information will appear on-screen. ALWAYS, as the name suggests, indicates that each time the transmitter is powered-up, the Model Select information will appear on-screen. The MDL (Model) setting indicates that the Model Select information will appear on-screen only when the MDL button is pressed simultaneously as the transmitter is turned ON.

With the Model Select mode highlighted, use the

SensorTouch to move to the activation setting options. Model (MDL) is the default setting. Press the Return (RTN) button to bring forth the options, then scroll to the ALWAYS setting using the SensorTouch pad. Press the Return (RTN) button once again to finalize the selection.



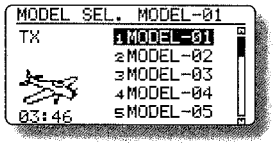


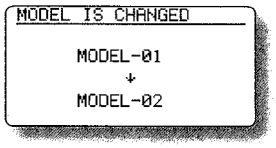
Using the Model Select Function:

1. Turn ON the transmitter, activating the Model Select screen. If Model (MDL) has been selected, please be sure to press the Model (MDL) sensor when powering up the transmitter.

   *Please note: Even if the Model Select function is active, the Power Mode screen will appear when the transmitter is turned ON while simultaneously pressing the Return (RTN) button.

2. The SensorTouch is used to select amongst the on-screen models. The current model will automatically be highlighted when the transmitter is turned ON. If a different model is desired, use the SensorTouch to scroll through the available options; each highlighted accordingly. Again, to select a model, press the Return (RTN) button accordingly. The T14SG offers an audible and visual confirmation as the selected model memory is changed.





AUTO LOCK

The automatic lock function of two kinds of SensorTouch

The Auto Lock function makes it possible to lock the transmitter to prevent any unwanted input from your hands while flying.

The auto lock function can be set in two ways.

LOCK TIMER

Auto Lock functions automatically when there is no operation from the HOME screen display for a chosen number of seconds.

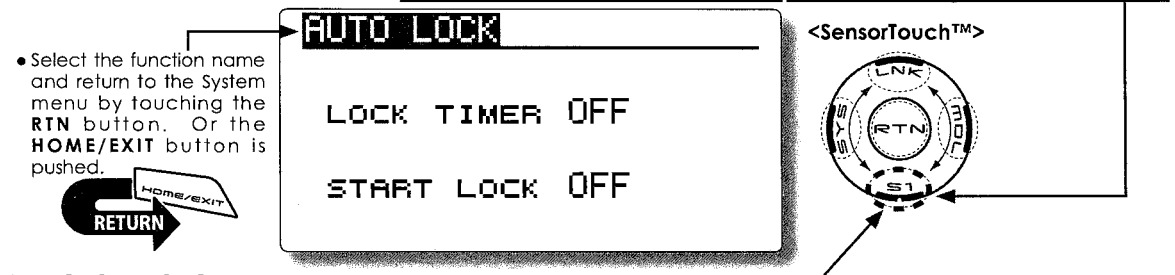
START LOCK

Auto Lock functions automatically when the model changes or power is turned on.

*To temporarily allow access to the T14SG programming press and hold the S1 or HOME/EXIT bitton for one second. Please note, the Auto Lock function timer will resume immediately once again.

● Manual lock
If **HOME/EXIT** button is touched **1 s**econd or more from a **HOME** screen, a **SensorTouch locks** manually.

● Manual lock
If **S1** button is touched **1 s**econd or more from a **HOME** screen, a **SensorTouch locks** manually.

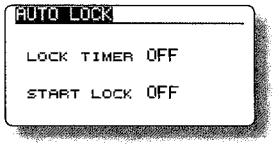


● Lock release
Every lock function's touch [**1 s**econd or more] of **S1** button will **release** the **lock**.

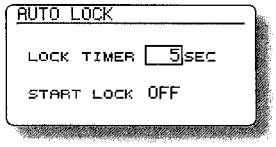
● Lock release
Every lock function's touch [**1 s**econd or more] of **HOME/EXIT** button will **release** the **lock**.

Auto lock method

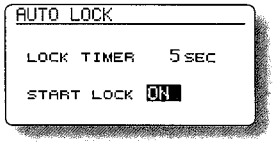
1. Open the Auto lock screen in the system menu.



2. Adjust the activation timer for the Auto Lock function. The timer will begin counting immediately when the HOME screen is not used. The timer is adjustable in one second increments up to 30 seconds. If the timer value is OFF, this function is not applicable.



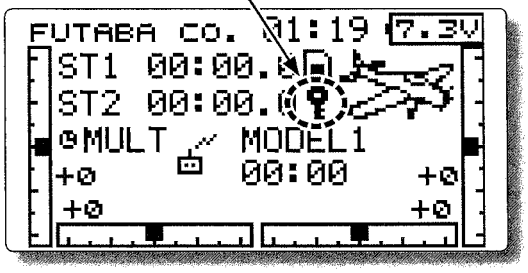
3. The Start Lock setting will, if enabled, automatically lock the T14SG when the transmitter is powered up. To allow access to the transmitter's functions, press and hold the S1 key for one second.



*If neither the Lock Timer or Start Lock functions are active (OFF), then the key lock remains even if the power is turned off.

*If the Lock Timer is enabled and the Start Lock is off, the key lock status is canceled each time the T14SG is turned on.

● Display of a lock
If locked, there will be sound and the **icon of a key** will come out.



⚠ Danger

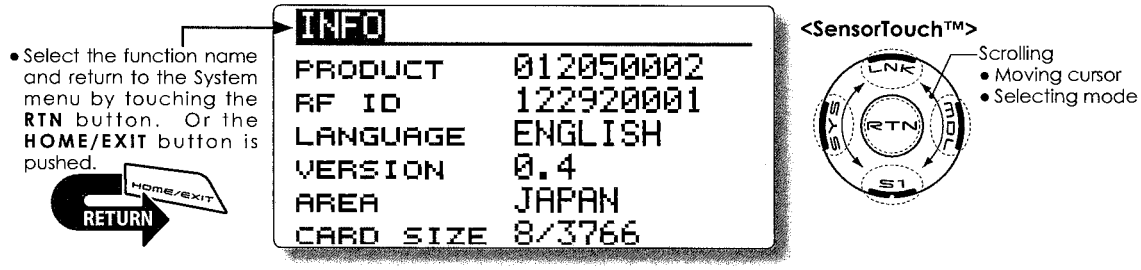
❗ It is recommended to Lock the SensorTouch during flight, to prevent any accidental touches which could change settings and cause an accident.

The T14SG system program version information, SD card information (current and maximum number of model data and other files), and product ID are displayed on the Information screen.

*When the SD card is not inserted, the SD card information is not displayed.

The language displayed in home, menu, and setup screen is selectable.

- Select [INFO] at the system menu and access the setup screen shown below by touching the RTN button.



Information

"PRODUCT": Product ID number

"RF ID": RF ID number

"LANGUAGE": The language used in T14SG

"VERSION": T14SG system program version information

"AREA": Area which can use T14SG

"CARD SIZE": Current/Maximum number of model data and other files (SD card)

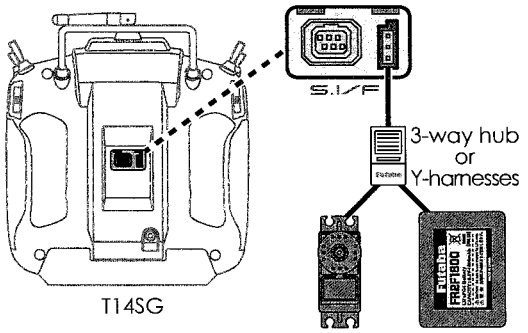
Language selection

1. Move the cursor to the "LANGUAGE" item and touch the RTN button to switch to the data input mode.
2. Change the language by scrolling the touch sensor. The display blinks. When the RTN button is touched, the language is changed. (To terminate the change, turn the EDIT dial or push the S1 button.)

SBUS SERVO

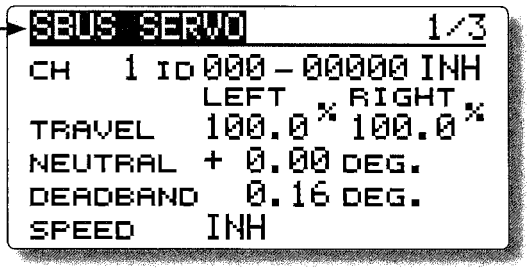
SBUS servo setting.

An S.BUS servo can memorize the channel and various settings you input. Servo setting can be performed on the T14SG screen by wiring the servo as shown in the figure.

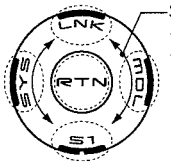


- Select [SOUND] at the system menu and access the setup screen shown below by touching the RTN button.

- Select the function name and return to the System menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



<SensorTouch™>



Scrolling
- Moving cursor
- Selecting mode

Servo ID number

Individual ID numbers are memorized for your S.BUS(2) servos in your T14SG. When a servo is used, the servo ID number is automatically read by the transmitter. If you use multiple S.BUS(2) servos and do not want to change the settings on all that are mounted in a fuselage, only the desired servo in the group can be set by entering the ID of that specific servo.

* S9070SB cannot be arranged by T14SG.

* With some S.BUS(2) servos, there are some functions with cannot be used. If a function cannot be used, the display screen will change.

(Only the function which can be used by a servo is displayed.)

Procedure for changing S.BUS servo setting

1. Select [SBUS SERVO] of the System Menu.
2. Wire the servo as shown in the figure above.
3. Press [RECALL] on page 3(S1 is pushed twice). The ID and current setting of that servo are displayed. ([RECALL] is chosen ⇒ RTN is pushed ⇒ RTN is pushed for 1 second)
4. When multiple servos are connected change [INH] at the right side of the ID number on the screen to [ACT] and enter the ID of the servo you want to set.
5. Set each item. (Please see the next page.)
6. Press [WRITE] on page 3([WRITE] is chosen ⇒ RTN is pushed ⇒ RTN is pushed for 1 second). The settings are changed.

* After reading completion, with connection of the above figure, if a stick is moved, the test of operation of the servo can be operated and carried out.

Push [INIT.], if you would like to initialize a setup of a servo. ([INIT.] is chosen ⇒ RTN is pushed ⇒ RTN is pushed for 1 second)

S.BUS Servo Description of function of each parameter

*There are a function which can be used according to the kind of servo, and an impossible function.

- **ID**

  Displays the ID of the servo whose parameters are to be read. It cannot be changed.

- **Channel**

  Channel of the **S.BUS** system assigned to the servo. Always assign a channel before use.

- **Reverse**

  The direction in which the servo rotates can be changed.

- **Servo type**

  When "Retractable" is selected and the servo has been continuously stopped for 30 seconds, the dead band expands and unnecessary hold current due to external force is eliminated. When a new control signal enters, normal operation is resumed. When using the servo as a landing gear servo, select "Retractable". Also adjust the servo travel to match the landing gear movement range.

- **Soft Start**

  Restricts operation in the specified direction the instant the power is turned on. By using this setting, the first initial movement when the power is turned on slowly moves the servo to the specified position.

- **Stop Mode**

  The state of the servo when the servo input signal is lost can be specified. The "Hold" mode setting holds the servo in its last commanded position even if using AM or FM system.

- **Smoother**

  This function changes smoothness of the servo operation relative to stick movement changes. Smooth setting is used for normal flight. Select the "OFF" mode when quick operation is necessary such as 3D.

- **Neutral Offset**

  The neutral position can be changed. When the neutral offset is large value, the servo's range of travel is restricted on one side.

- **Speed Control**

  Speeds can be matched by specifying the operating speed. The speed of multiple servos can be matched without being affected by motor fluctuations. This is effective for load torques below the maximum torque.

  However, note that the maximum speed will not be exceed what the servo is capable of even if the servos operating voltage is increased.

- **Dead band**

  The dead band angle at stopping can be specified.

  [Relationship between dead band set value and servo operation]

  Small → Dead band angle is small and the servo is immediately operated by a small signal change.

  Large → Dead band angle is large and the servo does not operate at small signal changes.

  (Note) If the dead band angle is too small, the servo will operate continuously and the current consumption will increase and the life of the servo will be shortened.

- **Travel Adjust**

  The left and right travels centered about the neutral position can be set independently.

- **Boost**

  The minimum current applied to the internal motor when starting the servo can be set. Since a small travel does not start the motor, it essentially feels like the dead band was expanded. The motor can be immediately started by adjusting the minimum current which can start the motor.

  [Relationship between boost set value and servo operation]

  Small → Motor reacts to a minute current and operation becomes smooth.

  Large → Initial response improves and output torque increases. However, if the torque is too large, operation will become rough.

- **Boost ON/OFF**

  OFF : It is the boost ON at the time of low-speed operation.(In the case of usual)

  ON : It is always the boost ON.(When quick operation is hope)

- **Damper**

  The characteristic when the servo is stopped can be set.

  When smaller than the standard value, the characteristic becomes an overshoot characteristic. If the value is larger than the standard value, the brake is applied before the stop position.

  Especially, when a large load is applied, overshoot, etc. are suppressed by inertia and hunting may occur, depending on the conditions. If hunting (phenomena which cause the servo to oscillate) occurs even though the Dead Band, Stretcher, Boost and other parameters are suitable, adjust this parameter to a value larger than the initial value.

  [Relationship between damper set value and servo operation]

  Small → When you want to overshoot. Set so that hunting does not occur.

  Large → When you want to operate so that braking is not applied. However, it will feel like the servo response has worsened.

  (Note) If used in the hunting state, not only will the current consumption increase, but the life of the servo will also be shortened.

- **Stretcher**

  The servo hold characteristic can be set. The torque which attempts to return the servo to the target position when the current servo position has deviated from the target position can be adjusted.

  This is used when stopping hunting, etc., but the holding characteristic changes as shown below.

  [Relationship between stretcher and servo operation]

  Small → Servo holding force becomes weaker.

  Large → Servo holding force becomes stronger.

  (Note) When this parameter is large, the current consumption increases.

- **Buzzer**

  When the power supply of a servo is previously turned on at the time of a power supply injection without taking transmit of a transmitter, the buzzer sound of about 2.5 Hz continues sounding from a servo.

  (Even when the transmit of a transmitter is taken out previously, a buzzer becomes until the signal of a servo is outputted normally, but it is not unusual.)

  The transmitter has been turned OFF ahead of a servo power supply → The buzzer sound of about 1.25 Hz continues sounding as servo power supply end failure alarm.

  (Do not insert or remove the servo connector while the receiver power is ON. A buzzer may sound by incorrect recognition.)

  * Buzzer sound is generated by vibrating the motor of a servo.

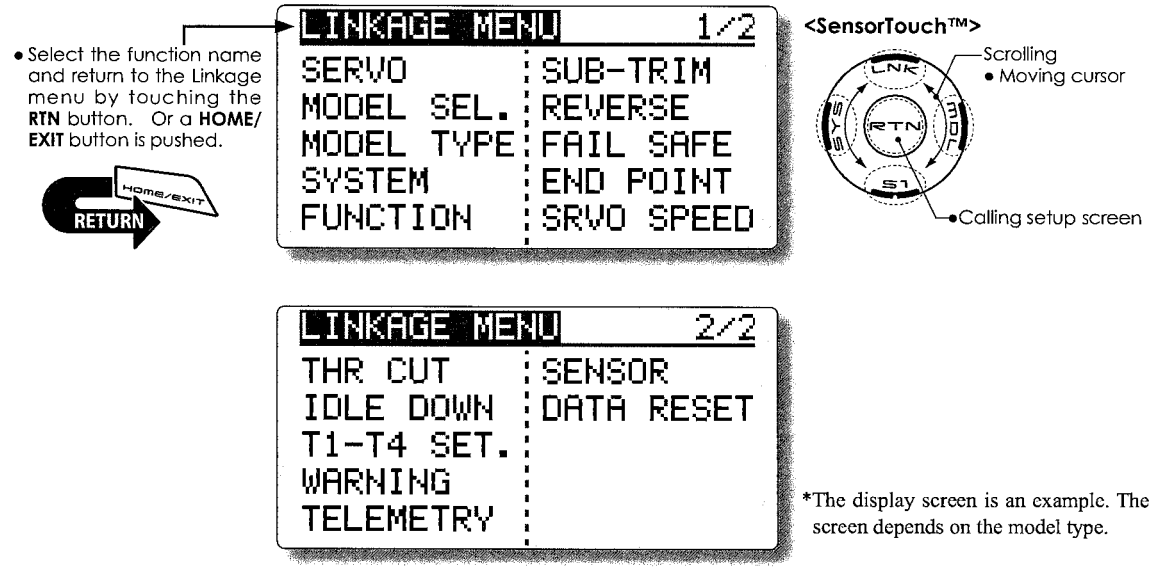
  Since current is consumed and a servo generates heat, please do not operate the number more than needed or do not continue sounding a buzzer for a long time.

FUNCTIONS OF LINKAGE MENU

The Linkage Menu is made up of functions which perform model addition, model type selection, system type, end point setting, and other model basic settings.

The functions which can be selected depend on the model type. A typical menu screen is shown below.

- Access the Linkage menu shown below by tapping the LNK button two times.



*The display screen is an example. The screen depends on the model type.

- Select the function you want to set and call the setup screen by touching the RTN button.

Linkage Menu functions table

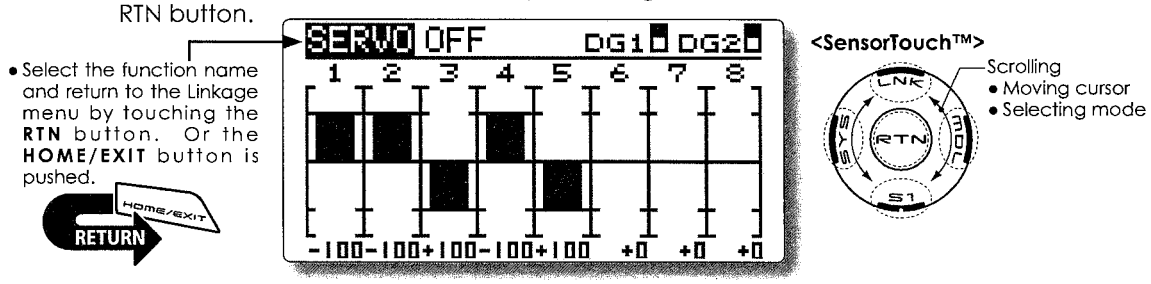
[SERVO]: Displays the servo test and operation position
[MODEL SEL]: Model addition, call, deletion, copy, model name setting
[MODEL TYPE]: Model type, wing type, swash type, etc. selection
[SYSTEM]: System mode selection, link of a transmitter and receiver, area mode selection
[FUNCTION]: Channel assignment of each function can be changed
[SUB-TRIM]: Adjusts the neutral position of each servo
[REVERSE]: Reverses the servo travel direction
[FAIL SAFE]: Fail safe function and battery fail safe function setting
[END POINT]: Servo travel adjustment and limit setting
[SERVO SPEED]: Speed setup of a servo
[THR CUT]: Stops the engine safely and easily (airplane and helicopter only)
[IDLE DOWN]: Lowers the idle speed of the engine (airplane only)
[SWASH RING]: Limits the swash plate travel to within a fixed range. (helicopter only)
[SWASH]: Swash AFR and linkage correction function (helicopter only)
[T1-T4 SET.]: Control step amount and mode selection of the digital trim
[WARNING]: Mixing warning normal reset
[TELEMETRY]: Displays various data sent from the receiver.
[SENSOR]: Various telemetry sensors setting
[DATA RESET]: Model memory set data reset

This is used for testing servo movement. "Moving Test" (repetition mode) and "Neutral Test" (fixed position mode) are available.

The "Neutral Test" is good for finding the neutral position of a servo horn.

In order to prevent any potential difficulties, the servo test function will be inoperable, or inaccessible, under certain conditions. Specifically, the Servo Test function is not operational if the Throttle Cut is ON in either airplane or helicopter modes; or if the Throttle Hold is ON in Helicopter mode.

- A [U.MENU/MON.] button is pushed once from a home screen.
- Select [SERVO] in the Linkage menu and access the setup screen shown below by touching the RTN button.



Servo test operation

1. Move the cursor to the [OFF] item and touch the RTN button to switch to the data input mode.

   Select the test mode by scrolling the touch sensor and touch the RTN button. The display blinks. Touch the RTN button to change the mode. (To terminate mode change, touch the S1 button.)

   [MOVING]: Mode which repeats operation of each servo

   [NEUTRAL]: Mode which locks each servo in the neutral position

2. Move the cursor to the [MOVING] or [NEUTRAL] item and touch the RTN button to switch to the data input mode.

   Select the [OFF] by scrolling the touch sensor and touch the RTN button. Testing is stopped.

MODEL SELECT

The Model Selection function performs model addition, selection, deletion, copy, and model name setting.

This function is used to load the settings of the desired model into the T14SG's memory.

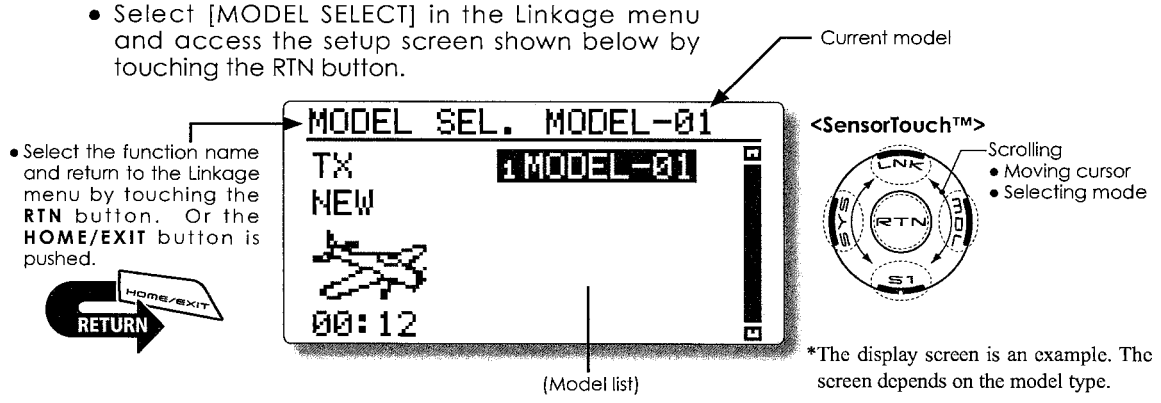
The settings may be selected from either the transmitter's internal memory or an SD card. Remember that up to 30 model memories are available in the transmitter.

The name of the model stored in the transmitter and the SD card may be changed. This can be very useful to tell different models settings apart. Each model name can be as long as 10 characters, and the model name always appears in the display screen.

The Copy function is used to copy parameters, settings, etc. from one model data into a second memory. It may be used for getting a head-start on setting up models with almost the same settings (only differences need to be modified, instead of entering the complete model from scratch). Also, this function may be used to make a backup copy of a model setup before any changes are made.

*T14SG can use the model data of T8FGS for SD card, copying it. However, the model data of T14SG cannot be used by T8SG (S).

- Select [MODEL SELECT] in the Linkage menu and access the setup screen shown below by touching the RTN button.

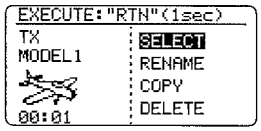


*The display screen is an example. The screen depends on the model type.

Model selection

*Model data saved on the transmitter memory other than the model currently used can be selected.

1. Move the cursor to the save destination display ("TX" or "CARD") and touch the RTN button to switch to the data input mode.
   Select the save destination by scrolling the touch sensor and touch the RTN button.
   [TX]: Transmitter memory
   [CARD]: SD card
2. After moving the cursor to the desired model in the model list, touch the RTN button.
3. Move to [SELECT].
4. Touch the RTN button. A confirmation message is displayed. Touch the RTN button for one second and selection is complete.

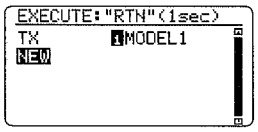


*Transmission stops and then starts in the new model.

Model addition

*A new model can be added to the transmitter memory. It can not be added to the SD card.

1. Move the cursor to [NEW].
2. Touch the RTN button. A confirmation message appears. Touch the RTN button for one second.



*The model type setup screen and frequency setup screen are automatically displayed. Confirm or change the model type and SYSTEM mode.

*Transmission stops and then starts in the new model.

*The added model appears in the model list of the model select setup screen.

***Link is required when a new model is made from a model selection.**

Model deletion

*The model stored in the transmitter memory or an SD card can be deleted.

*The current model can not be deleted.

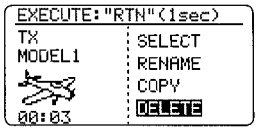
1. Move the cursor to the save destination display ("TX" or "CARD") and touch the RTN button to switch to the data input mode.

   Select the save destination by scrolling the touch sensor and touch the RTN button.

   [TX]: Transmitter memory

   [CARD]: SD card

2. Move the cursor to the model you want to delete in the model list and then touch the RTN button.
3. Move the cursor to [DELETE].
4. Touch the RTN button. When a confirmation message is displayed and the RTN button is touched for one second, the model is deleted.



Model name change

*The model name of the model stored in the transmitter memory or a SD card can be changed.

1. If changing the location:

   Move the cursor to the save destination display ("TX" or "CARD") and touch the RTN button to switch to the data input mode.

   Select the save destination by scrolling the touch sensor and touch the RTN button.

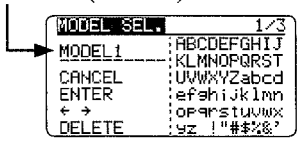
   [TX]: Transmitter memory

   [CARD]: SD card

2. Move the cursor to the model you want to change in the model list and then touch the RTN button.
3. Move to [RENAME].
4. Touch the RTN button.

*The model name setup screen is displayed.

User name (candidate)



5. Change the model name as described below:

   [Moving cursor in the user name (candidate)]

   Select [←] or [→], and touch the RTN button.

   [Deleting a character]

   When [DELETE] is selected and the RTN button is touched, the character immediately after the cursor is deleted.

   [Adding a character]

   When a character is selected from the character list and the RTN button is touched, that character is added at the position immediately after the cursor.

   *A name of up to 10 characters long can be entered as the model name. (A space is also counted as one character.)

6. After the desired information has been input, select [ENTER] and touch the RTN button. (To terminate input and return to the original state, select [CANCEL] and touch the RTN button.)

Model copy

*A copy can be made of the model stored in the transmitter memory or an SD card.

1. If changing the location:

   Move the cursor to the save destination display ("TX" or "CARD") and touch the RTN button to switch to the data input mode.

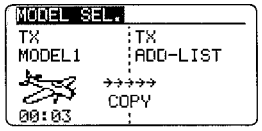
   Select the save destination by scrolling the touch sensor and touch the RTN button.

   [TX]: Transmitter memory

   [CARD]: SD card

2. Select the model you want to copy in the model list and then touch the RTN button.
3. Move to [COPY].
4. Touch the RTN button.

*The copy screen appears.



5. If replacing the model stored in the transmitter memory:

   Move to [ADD-LIST] and touch the RTN button to switch to the data input mode.

   Select the destination model by scrolling the touch sensor and touch the RTN button.

   [ADD-LIST]: adding the model to the list

   [(model name)]: replacing the model

   *The model stored in the SD card can be replaced.

   If changing the location:

   Move the cursor to the copy destination display ("TX" or "CARD") and touch the RTN button to switch to the data input mode.

   Select the save destination by scrolling the touch sensor and touch the RTN button.

6. Move to [COPY].
7. Touch the RTN button. When a confirmation message is displayed and the RTN button is touched for one second, the model data is copied.

MODEL TYPE

This function selects the model type from among airplane, helicopter, and glider.

Six swash types are available for helicopters. Six types of main wings and three types of tail wings are available for airplanes and gliders. Functions and mixing functions necessary for each model type are set in advance at the factory.

Note: The Model Type function automatically selects the appropriate output channels, control functions, and mixing functions for the chosen model type.

When the Model Type selection command is accessed, all of the data in the active memory is cleared (except the following swash type.) Be sure that you don't mind losing this data, or back it up to another memory using the copying functions.

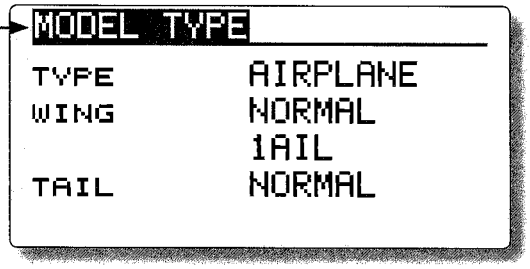
When changing the helicopter swash type within the following groups, you can leave the settings other than the SWASH function. However, this is initialized when you change the swash type to the other swash type group.

Swash type group A:
H-1, H-3, HR3, and HE3

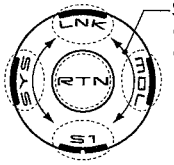
Swash type group B:
H-4, H-4X

- Select [MODEL TYPE] in the Linkage menu and access the setup screen shown below by touching the RTN button.

• Select the function name and return to the Linkage menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



<SensorTouch™>



Scrolling
• Moving cursor
• Selecting mode

(The display screen is an example. The screen depends on the model type.)

Model type selection

1. Move the cursor to the item you want to change and touch the RTN button to switch to the data input mode.

   Select the desired type by scrolling the touch sensor and touch the RTN button. A confirmation message appears. Touch the RTN button for one second.

   Move to [YES] and Touch the RTN button for one second.

   (To terminate input and return to the original state, touch the S1 button or select [NO] and touch the RTN button.)

   "TYPE": Model type

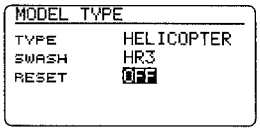
   "WING " (airplane/glider): Wing type

   "TAIL" (airplane/glider): Tail type

   "SWASH" (helicopter): Swash type

*The wing types which can be selected depend on the mode; FASST, Multi-ch, or 7ch, etc.

2. If resetting the data when changing the helicopter swash type:



(Helicopter)

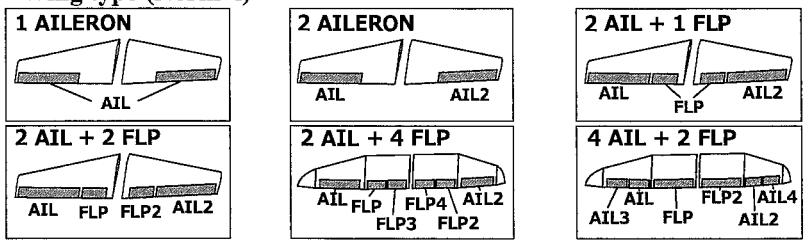
Move the cursor to [OFF] and touch the RTN button to switch to the data input mode.

Select [ON] by scrolling the touch sensor and touch the RTN button. A confirmation message appears. Touch the RTN button.

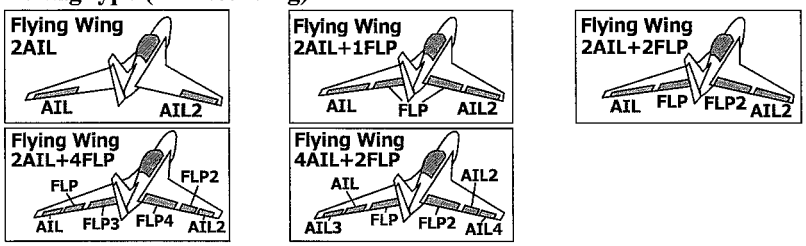
Activate the swash type setting. The swash setting parameters are reset.

Model type selection (Airplane, Glider)

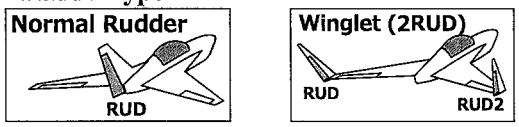
•Wing type (Normal)



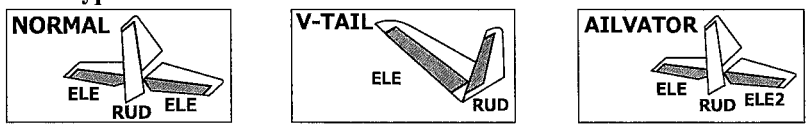
•Wing type (Tailless wing)



•Rudder type

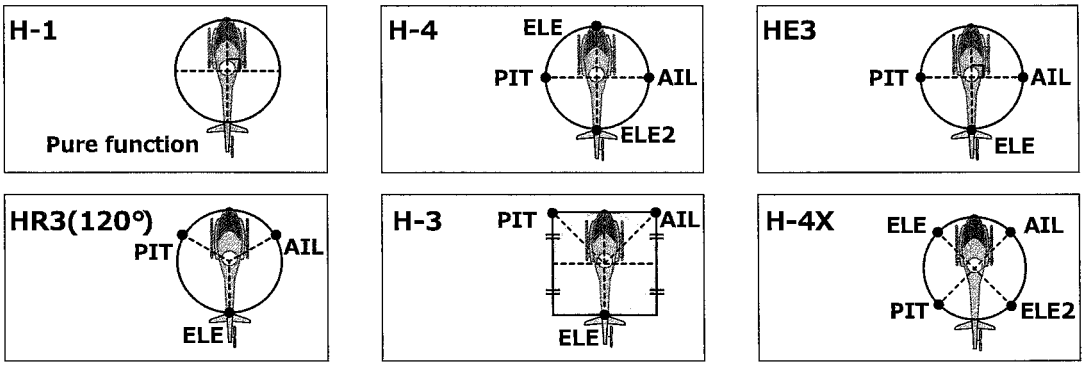


•Tail type



Model type selection (Helicopter)

•Swash type



System Type selection

The T14SG is for 2.4GHz only. The system can be changed from among 5 choices: FASSTest 14CH, FASSTest 12CH, FASST MULTI, FASST 7CH, S-FHSS. It is FASSTest14CH and FASSTest12CH which can be chosen by R7008SB set. The method of selection is to the next page.

*If you change the System Type, other model data is not reset.

*If a system type is changed in Helicopter mode, the transmitter will offer two selections:

[Yes] : Selection sets the channel order suitable for System Type. (We recommend here.)

[No] : The present channel order is maintained.

*After any change, remember to test the model and should fully check servo direction and a motion.

*Analog servos cannot be used with the R7008SB in the FASSTest 12CH mode.

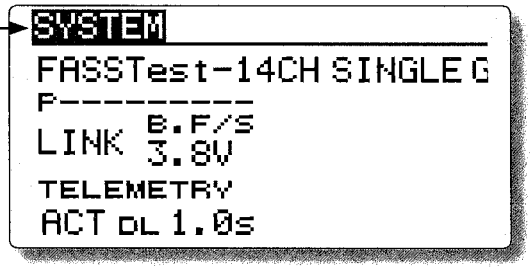
Dual receiver function (only FASSTest 14CH mode)

Dual receivers can be linked with the T14SG. Two receivers are recognized individually by ID numbers. For example, in R7008SB, CH output setting function is used, by setting the first as as "1-8CH", and setting the second as "9-14CH", two sets of receivers can be used as a set in the model, allowing you 14 channels. If a Dual receiver function is used, the following function can set up individually.

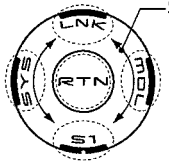
- Battery fail-safe voltage setup
- Telemetry function ON/OFF
- Sensor setup

• Select [SYSTEM] in the Linkage menu and access the setup screen shown below by touching the RTN button.

• Select the function name and return to the Linkage menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



<SensorTouch™>



Scrolling
• Moving cursor
• Selecting mode

Area mode selection (Frequency range)

The T14SG transmitter has been designed to function in many countries. If you will be utilizing this transmitter in a country other than France, please make sure that [AREA] is set to "G". If, however, this transmitter will be utilized in France, it must be set to "F" in order to comply with French regulations.FASST mode selection

Receiver linking

The receiver will only be controlled (without being affected by other transmitters) by the transmitter it is linked to. When using a receiver other than one purchased as a set, linking is necessary.

Moreover, a re-link is required when a new model is added by model selection, and the time of system type change.

Linking method P.37

Cases when linking is necessary:
- When using a receiver other than the initial setting.
- When the communication system was changed. (FASSTest14CH ↔ FASSTest12CH etc.)
- When a new model was created by model selection.

Battery fail-safe voltage setup (only FASSTest mode)

The voltage which battery fail-safe activates, can be set when you link. (3.5-8.4V) The receiver memorizes the setting as it was at link.

Suggested setting voltages are as follows.

- 4 cells NiCd or NiMH (Normal: 4.8v) = 3.8 v
- 2 cells LiFe (Normal: 6.6 v) = 6.0 ~ 6.2 v
- 2 cells LiPo (Normal: 7.4 v) = 7.2 ~ 7.4 v

It is a rough reference value.

Since it changes with servos carried in the condition and the model of a battery, please set to your own model in a battery consumption current.

Telemetry function (FASSTest mode only)

To use the telemetry function, set "Telemetry" to "ACT".

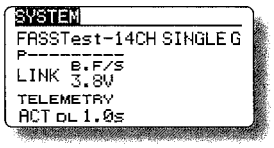
DL Interval (FASSTest mode only)

When a telemetry function is enabled, the receiving interval (down-link interval) of sensor data can be changed.

If a DL interval is increased, the response of the sensor data display becomes slower, but stick response will improve.

System Type selection procedure

1. Move the cursor to the [FASSTest-14CH] item and touch the RTN button to switch to the data input mode.



2. Select the system type by scrolling the touch sensor.

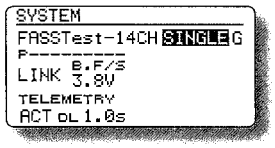
   [FASSTest-14CH][FASSTest-12CH][FASST-MULT][FASST-7CH][S-FHSS]

   *An example of selections for each system is on the following page.

3. Touch the RTN button to end adjustment and return to the cursor mode.

Dual receiver function (only FASSTest 14CH mode) procedure

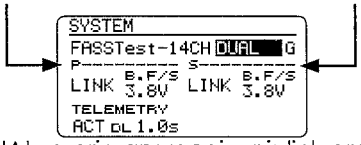
1. Move the cursor to the [SINGLE] item and touch the RTN button to switch to the data input mode.



2. Select the [SINGLE] or [DUAL] by scrolling the touch sensor.

ID of a Primary receiver displays.

ID of a Secondary receiver displays.

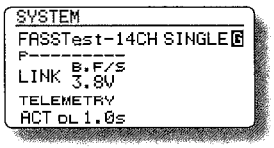


In DUAL, a primary receiver is link previously. Next, a secondary receiver is link.

3. Touch the RTN button to end adjustment and return to the cursor mode.

Area mode selection (Frequency range) procedure

1. Move the cursor to the [G] item and touch the RTN button to switch to the data input mode.



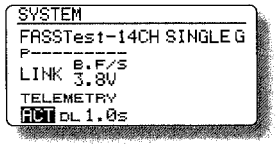
2. Select the [G]or[F] by scrolling the touch sensor.

   *"F" is chosen only when using the transmitter is used in France. Leave this in "G" otherwise.

3. Touch the RTN button to end adjustment and return to the cursor mode.

Telemetry ACT/INH procedure

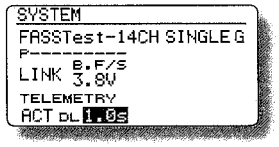
1. Move the cursor to the TELEMETRY [ACT] item and touch the RTN button to switch to the data input mode.



2. Select the [ACT]or[INH] by scrolling the touch sensor.
3. Touch the RTN button to end adjustment and return to the cursor mode.

DL Interval set procedure

1. Move the cursor to the TELEMETRY DL[1.0s] item and touch the RTN button to switch to the data input mode.



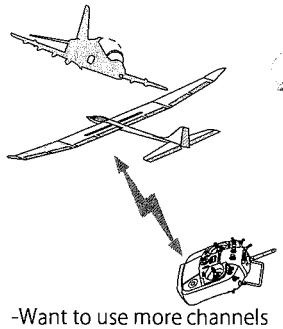
2. Select the DL time by scrolling the touch sensor. If a DL interval is increased, the response of the sensor data display becomes slower, but stick response will improve.

   Initial value: 1.0s

   Adjustment range : 0.1s~2.0s

3. Touch the RTN button to end adjustment and return to the cursor mode.

The example for choosing System Type



-Want to use more channels
-Want to use a large number of telemetry functions

FASSTest 14CH

R7008SB
R7003SB

-Response speed has priority over number of channels
-Telemetry requires only the current receiver battery

FASSTest 12CH

R7008SB
R7003SB

-Want to use a previously used receiver as is

FASST MULTI

R608FS
R6008HS
R6108SB
R6208SB
R6014HS
R6014FS
R6203SB
R6203SBE
R6202SBW
R6303SB
R6303SBE

-Want to use a miniature receiver for indoor planes

FASST 7CH

R617FS
R6004FF
R616FFM
R6106HF
R6106HFC
R6203SB
R6203SBE
R6202SBW
R6303SB
R6303SBE

-Want to use an S-FHSS system miniature receiver

S-FHSS

R2006GS
R2106GF
R2008SB

(Usable receivers)
(The time of December, 2012)

System Type

■ **FASSTest 14CH** --- FASSTest system receiver mode. Applicable with the telemetry sensor unit. Up to 18 channels (linear 12+ON/OFF2) can be used.

■ **FASSTest 12CH** --- FASSTest system receiver mode. Applicable with receiver voltage display. Up to 12 channels (linear10+ON/OFF2) can be used. Telemetry Sensor cannot be used, but the response speed is a faster than that of the 14CH mode.

- Analog servos cannot be used with the R7008SB in the FASSTest 12CH mode.

■ **FASST MULTI** ---FASST-MULTI system receiver mode. Up to 14 channels (linear 12+ON/OFF2) can be used.

■ **FASST 7CH** --- FASST-7CH system receiver mode. Up to 7 channels can be used.

■ **S-FHSS** --- S-FHSS system receiver mode. Up to 8 channels can be used.

When you select model and wing (swash) types, you will find that the optimized combinations of servo output channels and functions have been already preset. If you would like, you can freely change combinations of servo output channels, functions (aileron, elevator, etc), and control (sticks, switches, and trim levers).

*You can also assign the same function to multiple servo output channels such as assigning elevator function to CH2 and CH3.

Channel Replacement

When the channel is replaced in the Function menu, replaced channel uses the setting data (ATV, SUB-TRIM, REVERSE, F/S, and B-F/S, etc.).

Servo Output Channels

For FASSTest 14CH mode, you can set 12 linear channels and two digital channels. For FASSTest 12CH mode, you can set 10 linear channels and two digital channels. For FASST MULT mode, you can set 12 linear channels and two digital channels.

For FASST 7CH mode, you can set only 7 linear channels. For S-FHSS mode, you can set only 8 linear channels.

*DG1/2 (digital channels)
These channels can function as switched channels. You can freely change combinations between servo output channels and input controls (sticks, switches, and trim levers).

Motor Function

If you have either a Glider or Airplane Model Type selected, and choose to activate the Motor function, a reverse setting screen is displayed.

*If YES is selected, the output is reversed. If NO is selected, the output is normal.

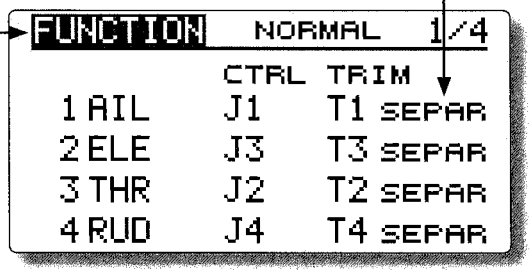
⚠ Warning

- As a safety precaution to prevent the motor from starting unexpectedly, please switch off the motor accordingly. We also suggest removing the propeller from the motor as an additional precaution.

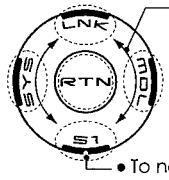
• Select [FUNCTION] in the Linkage menu and access the setup screen shown below by touching the RTN button.

• Trim operation mode
"COMB": Combination mode
"SEPAR": Separate mode
It sets up by **T1-T4 SET** of LINKAGE MENU.

• Select the function name and return to the Linkage menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



<SensorTouch™>



Scrolling
• Moving cursor
• Selecting mode
• Adjusting value
• To next page

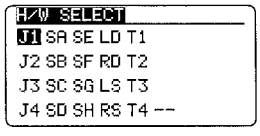
(The display sereen is an example. The screen depends on the model type.)

Function change

1. Move the cursor to the function item of the channel you want to change and touch the RTN button.
   *The function selection screen is displayed.
2. Move the cursor to the function name you want to set and touch the RTN button.
   *The function name blinks.
3. Touch the RTN button to execute the change. (When you want to cancel this operation, touch the S1 button.)
   *Multiple channels can be assigned to one function.

Operation control change

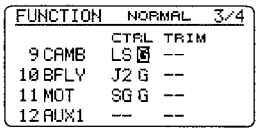
1. Move the cursor to the "CTRL" item of the channel you want to change and touch the RTN button.
   *The control selection screen is displayed.



2. Move the cursor to the control you want to change, and touch the RTN button.
   *The same control can be assigned to multiple channels.

Camber/Motor/Butterfly control setting (glider)

*Camber/Motor/Butterfly function control can be changed for each condition.



Camber, Motor or Butterfly control group/ single setting is performed at the function setup screen.

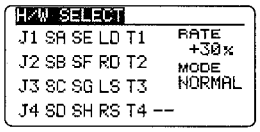
"G": Group (common to all conditions)

"S": Single (set for each condition)

Trim setting

Move the cursor to the "TRIM" item of the channel you want to change and touch the RTN button.

*The trim setup screen is displayed.



The following items can be set at the trim setup screen:

Trim selection

Move the cursor to the trim, lever, etc. you want to set and touch the RTN button.

*The setting can be changed.

Trim rate setting

Move the cursor to the [RATE] item and touch the RTN button to switch to the data input mode.

Set the trim rate by scrolling the touch sensor.

Initial value: +30%

Adjustment range : -150~+150%

(When the RTN button is touched for one second, the trim rate is reset to the initial value.)

Touch the RTN button to end adjustment and return to the cursor mode.

Trim mode selection

Move the cursor to the [MODE] item and touch the RTN button to switch to the data input mode.

Select the trim mode by scrolling the touch sensor. A confirmation message appears. Touch the RTN button to change the mode. (To terminate input and return to the original state, touch the S1 button.)

[NORM]: Normal mode. Normal trim (parallel shift trim) operation.

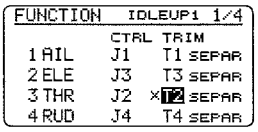
[ATL]: ATL operation mode. Maximum change near idle or low-stick position, normally used with throttle trim. It is also possible to reverse the travel.

*[NORMAL]/[REVERSE] selection is possible in "ATL" mode.

Throttle trim (helicopter only)

*The throttle trim in conditions other than "Normal" condition can be inhibited.

When other than normal condition is selected, move the cursor to throttle trim on the function setup screen and touch the RTN button for 1 second.



*When "X" is displayed, THR trim is inhibited in conditions other than normal condition.

Channel replacement

Move the cursor to the channel # you want to replace and touch the RTN button to switch to the data input mode.

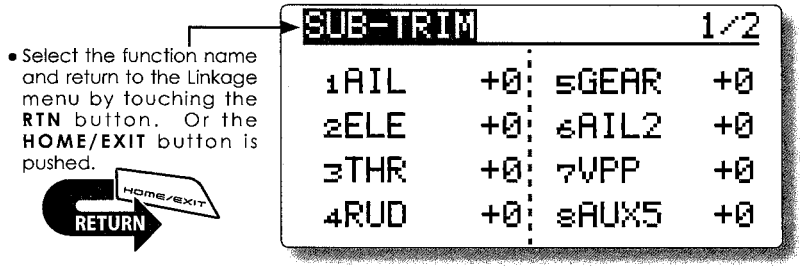
Select the destination channel # by scrolling the touch sensor. A confirmation message appears. Touch the RTN button to replace the channel. (To terminate input and return to the original state, touch the S1 button.)

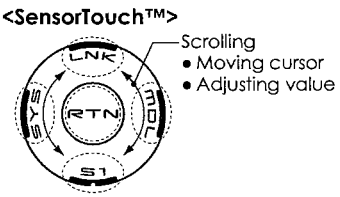
SUB-TRIM

Setting of neutral position of each servo.

The Sub-Trim function is used to set the servo neutral position, and may be used to make fine adjustments to the control surface after linkages and pushrods are hooked up. When you begin to set up a model, be sure that the digital trims are set to their center position.

- Select [SUB-TRIM] in the Linkage menu and access the setup screen shown below by touching the RTN button.





(The display screen is an example. The screen depends on the model type.)

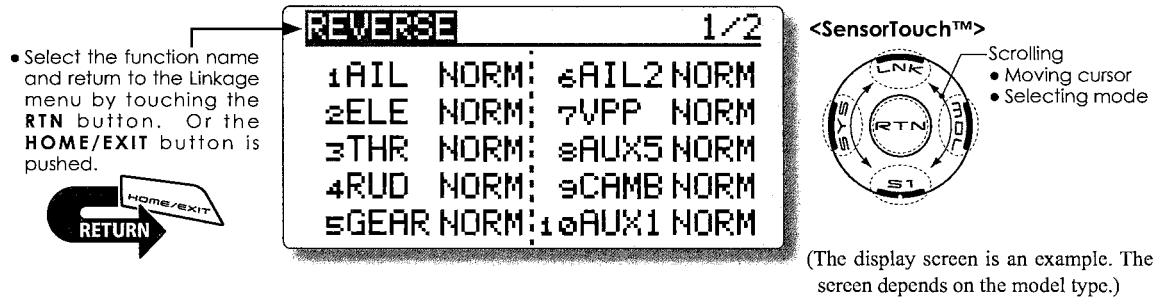
Sub-trim adjustment

1. Move the cursor to the channel you want to adjust and touch the RTN button to switch to the data input mode.
2. Adjust the rate by scrolling the touch sensor.
   Initial value: 0
   Adjustment range: -240~+240 (steps)
   (When the RTN button is touched for one second, sub-trim is reset to the initial value.)
   *Before sub-trim adjustment, it is very important to adjust the linkages at the control surface so that you do not use sub-trim, except for very minute adjustments.
3. Touch the RTN button to end adjustment and return to the cursor mode.
4. Repeat this procedure for each channel.

Servo Reverse changes the direction of an individual servo's response to a control input.

For CCPM helicopters, be sure to read the section on Swash AFR before reversing any servos. With CCPM helicopters, always complete your servo reversing prior to any other programming. If you use pre-built Airplane/Sailplane functions that control multiple servos, it may be confusing to tell whether the servo needs to be reversed or a setting in the function needs to be reversed. See 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.

- Select [REVERSE] in the Linkage menu and access the setup screen shown below by touching the RTN button.



(The display screen is an example. The screen depends on the model type.)

Servo reversing procedure

*Upon setup completion of a new model, check whether or not each servo is connected to the correct channel.

*Next, determine whether you need to reverse any channels by moving each stick and/or other control inputs.

1. Move the cursor to the channel you want to reverse and touch the RTN button to switch to the data input mode.
2. Select the direction by scrolling the touch sensor. A confirmation message appears.

   [NORM]: Normal
   [REV]: Reverse

3. Touch the RTN button to change the direction. (To terminate input and return to the original state, touch the S1 button.)

*Repeat the operation above for each channel that must be reversed.

FAIL SAFE

Sets the servos operating position when transmitter signals can no longer be received or when the receiver battery voltage drops.

The Failsafe function may be used to set up positions that the servos move to in the case of radio interference.

You may set either of two positions for each channel: Hold, where the servo maintains its last commanded position, or Failsafe, where each servo moves to a predetermined position. You may choose either mode for each channel. **(FASST 7CH mode: CH3 only)**

The T14SG system also provides you with an advanced battery monitoring function that warns you when the receiver battery has only a little power remaining. In this case, each servo is moved to the defined failsafe position. **(FASST 7CH mode: CH3 only)** The battery failsafe may be released by operating a predefined control on the transmitter (default is throttle), do not continue to fly, land as soon as possible. Remember, if the predefined control suddenly moves to a position you did not command, land at once and check your receiver battery.

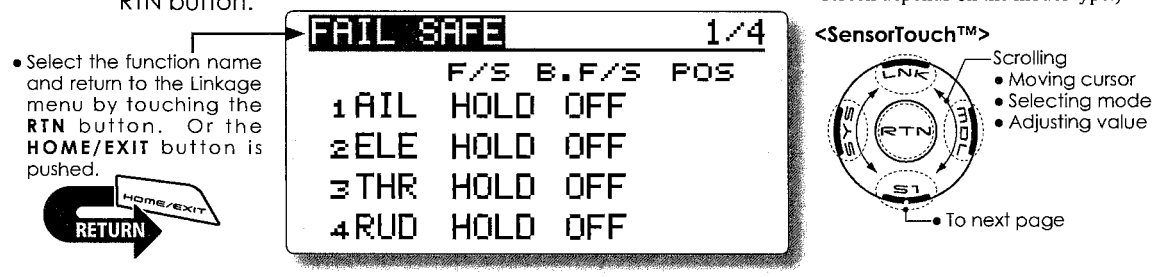
Defines servo position when signals are lost and when receiver battery voltage becomes low.

⚠ Warning

- For safety, always set the fail safe functions.
  - Remember to set the throttle channel fail safe function so that the servo moves to the maximum slow side for airplanes and to the slow side from the hovering position for helicopters. Crashing of the model at full high when normal radio waves cannot be received due to interference, etc., is very dangerous.
  - If the battery fail safe is reset by the throttle stick, it may be mistaken for an engine malfunction and will be reset at throttle slow and the model will continue to fly. If you have any doubts, immediately land.

- Select [FAIL SAFE] in the Linkage menu and access the setup screen shown below by touching the RTN button.

(The display screen is an example. The screen depends on the model type.)



Fail safe setting procedure

1. Move the cursor to the "F/S" item of the channel you want to set and touch the RTN button to switch to the data input mode.
2. Select the F/S mode by scrolling the touch sensor. A confirmation message appears.
   *The display blinks.
3. Touch the RTN button. (Touch the S1 button to stop setting.)
   *The channel switches to the F/S mode.
4. Move the cursor to the "POS" item.
   Hold the corresponding stick, knob, slider, etc. in the position you want the servo to move to when the fail safe function is activated and Touch the RTN button for one second.
   *The set position is displayed in percentage.
   *If you want to return that channel to the hold mode, move the cursor to the "F/S" item and touch the RTN button to switch to the data input mode. Select the F/S mode by scrolling the touch sensor. A confirmation message appears and then change the mode by touching the RTN button.

Battery fail safe setting procedure

Battery fail safe can be set for each channel by the same method as the fail safe setting procedure. Select and set the "B.F/S" item.

[ON]: Battery fail safe function ON

[OFF]: Battery fail safe function OFF

Battery fail safe release switch setting

This function temporarily releases the battery fail safe function, so the fuselage can recover after the battery fail safe function was activated by a drop in the receiver battery voltage. This setting selects the switch which releases the battery fail safe function.

1. Move the cursor to the [RELEASE B.F/S] item in the setup screen (last page).
2. Touch the RTN button.
   *The switch selection screen is called.
   *For a detailed description of the switch selection and ON/OFF direction setting method, see [Switch Setting Method] at the back of this manual.

END POINT

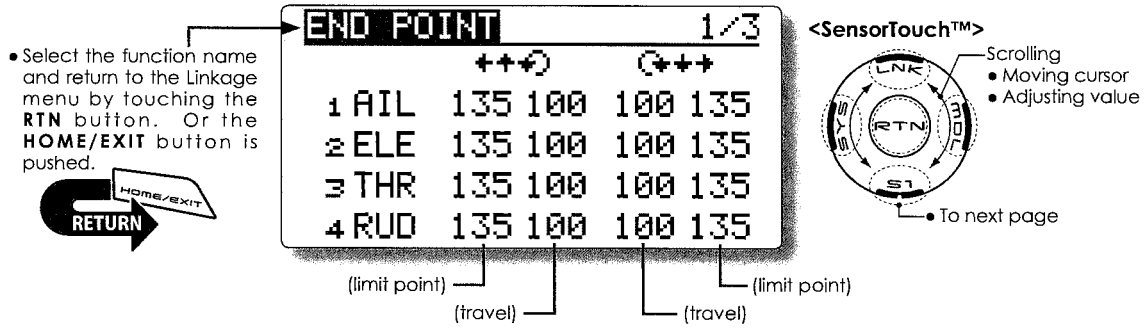
Sets the travel and limit point of each servo.

The End Point function adjusts the left and right servo throws, generates differential throws, and will correct improper linkage settings.

The travel rate can be varied from 0% to 140% in each direction on channels 1 to 12(FASSTest 12CH mode). Also, the limit point where servo throw stops may be varied from 0% to 155%.

- Select [END POINT] in the Linkage menu and access the setup screen shown below by touching the RTN button.

(The display screen is an example. The screen depends on the model type.)



Servo travel adjustment

1. Move the cursor to the travel icon of the channel you want to adjust and touch the RTN button to switch to the data input mode.
2. Ajust the rate by scrolling the touch sensor.

   Initial value: 100%

   Adjustment range: 0%~140%

   *When the RTN button is touched for one second, the rate is reset to the initial value.

   Touch the RTN button to end adjustment and return to the cursor mode.
3. Repeat this procedure for each rate.

Limit point adjustment

1. Move the cursor to the limit point icon of the channel you want to adjust and touch the RTN button to switch to the data input mode.
2. Ajust the limit point by scrolling the touch sensor.

   Initial value: 135%

   Adjustment range: 0%~155%

   *When the RTN button is touched for one second, the limit point is reset to the initial value.

   Touch the RTN button to end adjustment and return to the cursor mode.
3. Repeat this procedure for each limit point.

SERVO SPEED

Sets the speed of each servo.

The speed of the servo from 1CH to 12CH of operation can be set up.

It can adjust to 0-27.

Speed becomes slow as a numerical value's 0 increases in the state of the fastest of the servo.

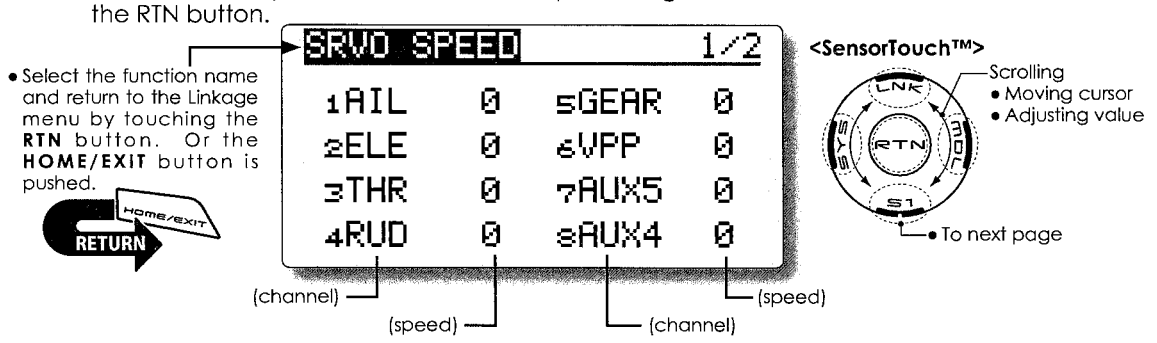
* Speed cannot be made quicker than the maximal rate of the servo to be used.

* It will overlap, if speed control of a S.BUS servo setup is used at the time of S.BUS servo use, and speed changes. Please use one either.

* The speed of THR is not set up simultaneously with THR DELAY (model menu : only airplane).

- Select [SERVO SPEED] in the Linkage menu and access the setup screen shown below by touching the RTN button.

(The display screen is an example. The screen depends on the model type.)



Servo speed setting

1. Touch the Speed button of the channel you want to set.
2. Use the adjustment buttons to adjust the servo speed.

•Initial value: 0

•Adjustment range: 0~27 (steps)

*When the RTN button is touched for one second, the rate is reset to the initial value.

3. Repeat this procedure for each channel.

THR CUT

Stops the engine safely and easily.(airplane and helicopter only)

Throttle cut provides an easy way to stop the engine. Generally speaking, modelers will do so by flipping a switch with the throttle stick at idle. The action is not functional at high throttle to avoid accidental dead stick landings. The switch's location and direction must be chosen, as it defaults to NULL.

Individually adjust the Throttle Cut activation setting for each condition. (helicopter)

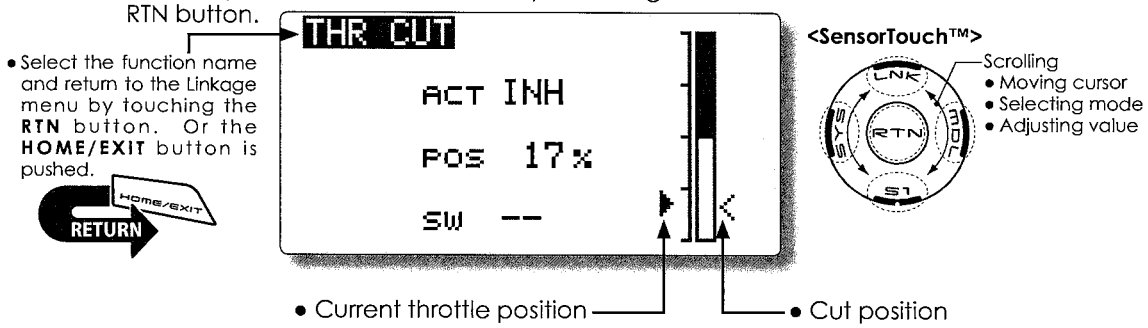
*Since conditions are not offered when an Airplane is selected, the Throttle Cut options will vary from the options noted below.

*The Throttle Cut POS and SW settings are utilized for all conditions.

*If the Throttle Cut switch is activated, or on, this status will continue even if the condition is changed to an inhibited setting.

*If the condition is inhibited (INH) the Throttle Cut is off if the SW is in the off position and the throttle stick is low.

- Select [THR CUT] in the Linkage menu and access the setup screen shown below by touching the RTN button.



Throttle cut setting procedure

1. Activate the function:

   Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode.

   Select the ACT mode by scrolling the touch sensor.

   *The display blinks.

   Touch the RTN button to activate the function and return to the cursor mode.

2. Switch selection:

   Move the cursor to the [SW] item and access the switch setup screen by touching the RTN button and select the switch and ON direction.

   *For a detailed description of the setting method, see [Switch Setting Method] at the back of this manual.

3. Throttle cut position setting:

   Move the cursor to the [POS] item and touch the RTN button to switch to the data input mode.

   Adjust the servo operation position at throttle cut operation by scrolling the touch sensor.

   Initial value: 17%

   Adjustment range: 0%~50%

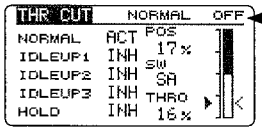
   *When the RTN button is touched for one second, the servo operation position is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

*With the selected cut switch ON and the throttle stick at idle; adjust the rate until the engine consistently cuts off.

However, be sure that the throttle linkage is not pulled too tight or unreasonable force is not applied to the servo.

- Individually adjust the Throttle Cut activation setting for each condition. (helicopter)



Designating a Throttle Cut setting position. (helicopter)

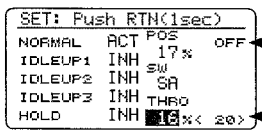
*A throttle cut function acts in the low side of the throttle position.

*"THRO" setting is common with all condition.

⚠ Warning

❗ Normal setting is slightly above idle.

1. To add the Throttle Cut position, use the cursor to select the THRO percentage desired, then press and hold the RTN button for one second.

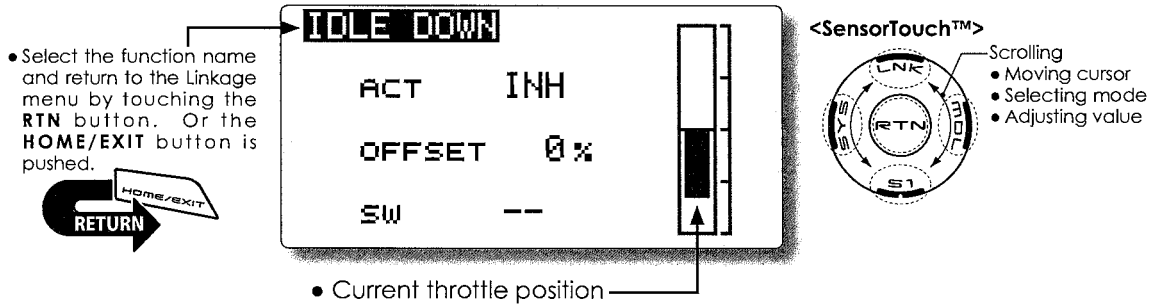


IDLE DOWN

Lowers the engine idling speed.(airplane only)

The Idle Down function lowers the engine to its idle position. Like Throttle Cut, this is usually accomplished by flipping a switch with the throttle stick at idle. The action is not functional at high throttle to avoid accidental dead sticks. The switch's location and direction must be chosen, as it defaults to NULL.

- Select [IDLE DOWN] in the Linkage menu and access the setup screen shown below by touching the RTN button.



Idle down setting procedure

1. Activate the function:

   Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode.

   Select the ACT mode by scrolling the touch sensor.

   *The display blinks.

   Touch the RTN button to activate the function and return to the cursor mode.

2. Switch selection:

   Move the cursor to the [SW] item and access the switch setup screen by touching the RTN button. Select the switch and ON direction.

   *For a detailed description of the setting method, see [Switch Setting Method] at the back of this manual.

3. Offset rate setting:

   Move the cursor to the [OFFSET] item and touch the RTN button to switch to the data input mode.

   Adjust the servo offset rate at idle down operation by scrolling the touch sensor.

   Initial value: 0%

   Adjustment range: -100%~0%~+100%

*When a minus rate is input, an offset is applied at the high side.

*Maximum offset amount is near maximum slow.

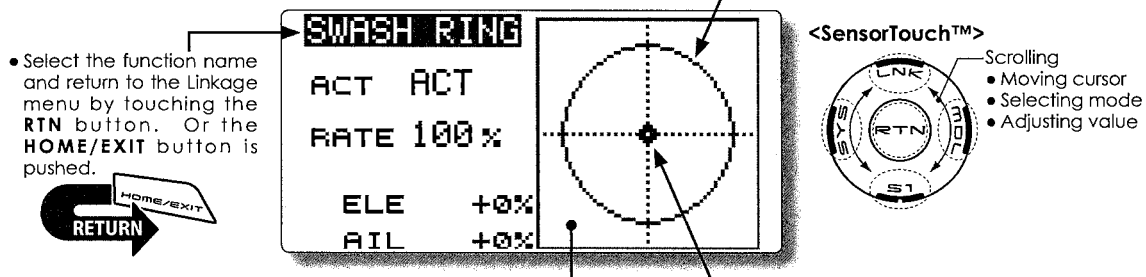
*When the RTN button is touched for one second, the offset rate is reset to the initial value.

Touch the RTN button to end the adjustment and return to the cursor mode.

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

- Select [SWASH RING] in the Linkage menu and access the setup screen shown below by touching the RTN button.

- When the swash ring function is activated, a circle is displayed in the operating range display area and the rate input box is displayed. Stick operation is limited to the area of this circle.



- Select the function name and return to the Linkage menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.

<SensorTouch™>

Scrolling
- Moving cursor
- Selecting mode
- Adjusting value

- The operating range display area:
  The vertical direction shows the elevator travel. The horizontal direction shows the aileron travel.

- The marker shows the stick position.

Swash ring setting procedure

1. Activate the function:

   Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode.

   Select the ACT mode by scrolling the touch sensor.

   *The display blinks.

   Touch the RTN button to activate the function and return to the cursor mode.

2. Rate setting:

   Move the cursor to the [RATE] item touch the RTN button to switch to the data input mode.

   Set the rate by scrolling the touch sensor.

   Initial value: 100%.

   Adjustment range: 50 to 200%.

   *Adjust the rate to maximum swash tilt.

   *When the RTN button is touched for one second, the rate is reset to the initial value.

   Touch the RTN button to end adjustment and return to the cursor mode.

Neutral Point

At your linkages, if the servo horn deviates from a perpendicular position at neutral, the linkage compensation functions in this menu may not compensate effectively. To correct this use the Neutral Point function. This will move the neutral point of the servos to the actual perpendicular position. However, this adjustment changes only the axis point of the compensation functions in this menu, and does not affect the neutral position of other functions.

Swash AFR

Swash AFR function reduces, increases, or reverses the rate (travel) of the aileron, elevator and collective pitch functions, by adjusting or reversing the motion of all servos involved in that function, only when using that function.

Mixing Rate

This mixing is used to compensate the swash-plate as necessary during specific control inputs. The following compensation mixing is possible; PIT to AIL, PIT to ELE, AIL to PIT, ELE to AIL, and ELE to PIT (HR3 mode.) It adjusts the swash-plate to for proper operation of each control using the corresponding compensation mixing.

Linkage Compensation

This compensation mixing is used to correct the swash-plate for pitch control at low pitch and high pitch.

Speed Compensation

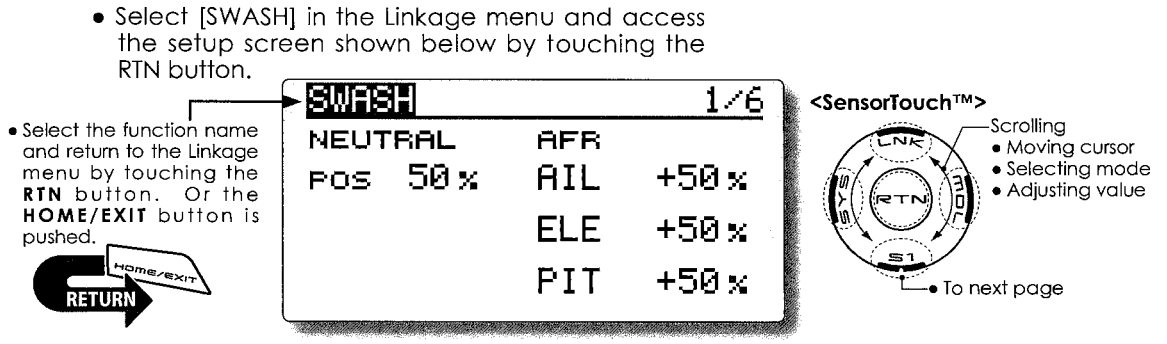
This function is used to cancel the reaction that is generated by the difference in the movements of each servo when the swash-plate moves.

Subtrim

Subtrim for aileron, elevator and pitch can be set during swash setting.

Pitch adjustment function

High, neutral and low pitch fixed outputs can be used while adjusting the pitch.



Neutral point setting procedure

The neutral point becomes the correction standard point.

*Adjusting the servo horn so that the neutral point is near the 50% position makes the mixing amount small.

1. Neutral point setting

   Move the cursor to the [POS] item and hold the pitch operation so that the servo horn is at a right angle to the linkage rod and Touch the RTN button for one second. This value indicates the servo's neutral position.

   After reading the neutral point, use the other correction functions to make further adjustments.

Swash AFR setting procedure

The swash AFR function makes adjustments so that the servos travel the specified amount by [AIL], [ELE], and [PIT] operation.

1. Move the cursor to the function you want to adjust and touch the RTN button to switch to the data input mode.
2. Adjust the AFR rate by scrolling the touch sensor.

   Initial value: +50%

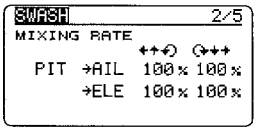
   Adjustment range: -100%~+100%

   *When the RTN button is touched for one second, the AFR rate is reset to the initial value.

   Touch the RTN button to end adjustment and return to the cursor mode.

Mixing rate setting procedure

The HR3 swash-plate type will be used as an example to describe mixing rate setting. The mixing used in other swash modes may be different, however, the setting procedure is the same.



*Set the throttle stick to the preset neutral point. Adjust the length of the linkage rod so that the swash plate is horizontal at this position.

*The sub-trim function can be used to make small adjustments.

*Adjust so that the pitch curve is a straight line and the helicopter achieves maximum pitch.

*Move the cursor to the item you want to adjust and touch the RTN button to switch to the data input mode. Touch the RTN button to end adjustment and return to the cursor mode.

1. Adjusting the aileron operation [AIL to PIT]

   Adjust the AIL to PIT rate so there is no binding in the elevator or pitch movement when the aileron stick is moved to the left and right.

   *Adjust by scrolling the touch sensor.

   *The left and right sides can be adjusted individually.

2. Adjusting the elevator operation [ELE to AIL]/ [ELE to PIT]

   Adjust the ELE to AIL and ELE to PIT rates so there is no binding in the aileron or pitch movement when the elevator stick is moved up and down.

   *Adjust by scrolling the touch sensor.

   *The up and down sides can be adjusted individually.

3. Adjusting the pitch operation [PIT to AIL] [PIT to ELE]

   Adjust the PIT to AIL and PIT to ELE rates so that the swash plate moves to the level/ horizontal position when the throttle stick was moved to maximum low and full high.

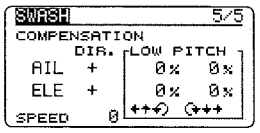
   *Adjust by scrolling the touch sensor.

   *The slow and high sides can be adjusted individually.

Linkage compensation setting procedure

*Prior to utilizing the linkage compensation settings, it is important to adjust the mixing rate settings.

*Linkage compensation overrides interference from the aileron operation with the elevator or elevator operation with the aileron at collective pitch control for low pitch and high pitch.



*When making the following setting, Move the cursor to the item you want to set and touch the RTN button to switch to the data input mode. Touch the RTN button to end adjustment and return to the cursor mode.

1. Compensating aileron input [AIL]

   Set the throttle to the lowest position. Move the aileron stick to the left and right and adjust the aileron compensation amount so that interference in the elevator or pitch direction is minimal.

   *Adjust by scrolling the touch sensor.

   *The left and right sides can be adjusted individually.

   *If the interference increases when the compensation amount was increased, make adjustments with the direction [DIR.] using the plus "+" or minus "-".

2. Compensating elevator input [ELE]

   Adjust the elevator compensation amount so that the aileron or pitch direction interference when the elevator stick was moved up and down is minimal.

3. Repeat steps 1 and 2 above, perform aileron and elevator compensation similarly at full throttle.

Speed compensation setting procedure

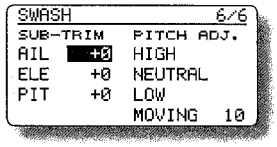
1. Move the cursor to the "SPEED" item and touch the RTN button to switch to the data input mode.
2. Set the throttle stick to the neutral point position. Quickly move the elevator stick and adjust the speed compensation amount [SPEED] for minimum interference in the pitch direction.

   *Adjust by scrolling the touch sensor.

   Touch the RTN button to end adjustment and return to the cursor mode.

Subtrim setting procedure

Subtrim can be set on the last page of the swash setting screen.



*The sub-trim value set here is reflected at sub-trim of the linkage menu.

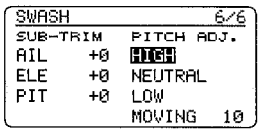
Pitch adjustment procedure

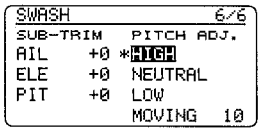
The pitch adjustment function can be used on the last page of the swash setting screen.

1. Call the last page of the swash setting screen.
2. When the cursor is moved to a pitch adjustment button and the RTN button is touched, the corresponding pitch is output.

* In the pitch adjustment mode an * is displayed at the left side of the current output setting button.

*If the cursor is moved to another button and the RTN button is touched during pitch adjustment, the pitch adjustment mode is deactivated.





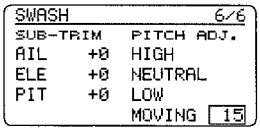
Function details are as follows:

Button	Function
High	High pitch fixed output mode
Neutral	Neutral pitch fixed output mode
Low	Low pitch fixed output mode
Moving	Cyclic pitch output mode

*The cyclic pitch speed can be set with the button at the right side of the "Moving" button.

Setting range: 1 to 100

*When the set value is large, motion becomes fast and when the set value is small, motion becomes slow.

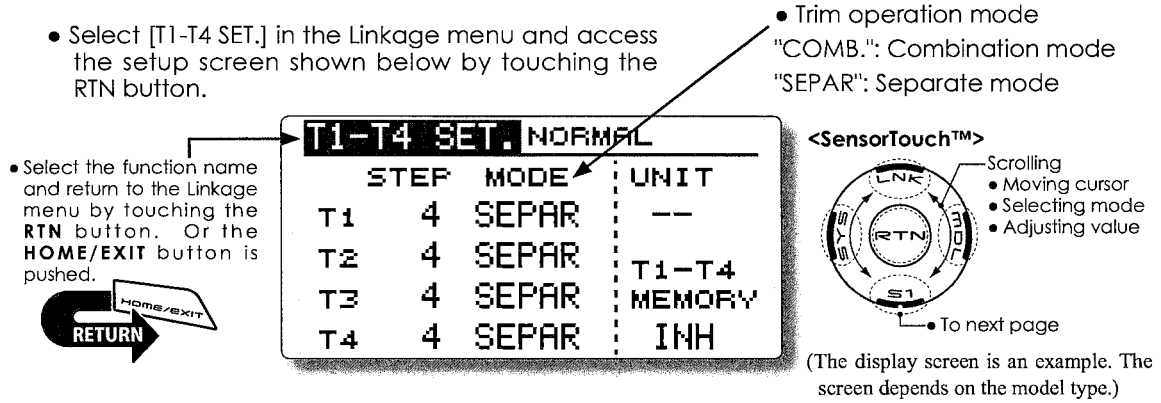


This function adjusts the digital trim's step amount and operation mode (T1~T4.)

When the flight conditions are set, the trim operation can be coupled with the conditions when combination mode is selected.

The T14SG unit of trim is displayed on the home screen.

Only the trim displayed on the home screen can be moved to the center position without changing the actual trim's memory position.



(The display screen is an example. The screen depends on the model type.)

Control step amount setting

1. Move the cursor to the [STEP] item and touch the RTN button to switch to the data input mode.
2. Set the control step amount by scrolling the touch sensor.

   Initial value: 4

   Adjustment range: 0~200

   *When the RTN button is touched for one second, the control step amount is reset to the initial value.

   *When the value is increased, the change per step becomes larger.
3. Touch the RTN button to end adjustment and return to the cursor mode.

Separate/combination mode selection (Heli and Glider only)

1. Move the cursor to the [MODE] item and touch the RTN button to switch to the data input mode.
2. Select the mode by scrolling the touch sensor. A confirmation message appears.

   *The display blinks.

   [COMB.]: Combination mode. The trim's data is reflected in all flight conditions.

   [SEPAR]: Separate mode. Trim adjustments are made individually for each flight condition.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

Display unit selection

1. Move the cursor to the [UNIT] item and touch the RTN button to switch to the data input mode.
2. Select the mode by scrolling the touch sensor. A confirmation message appears.

   *The display blinks.

   [--]: A step number is displayed on the home screen. There is no unit display.

   [%]: "%" is displayed as a unit.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

Trim Memory Operation procedure

1. Move the cursor to the [T1-T4 MEMORY] item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor. A confirmation message appears.

   [INH]: Inhibited *The display blinks.

   [ACT]: Activated
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. At the home screen, move the cursor to the trim you want to change and touch the RTN for one second. The trim display is moved to the center position.

   *When the function is inhibited, the trim position returns to the actual trim position.

The T14SG includes an audible alarm that sounds when the transmitter's battery voltage drops below a pre-determined setting; adjustable for cell types and voltages.

Mixing warning at power ON can be reset to OFF.

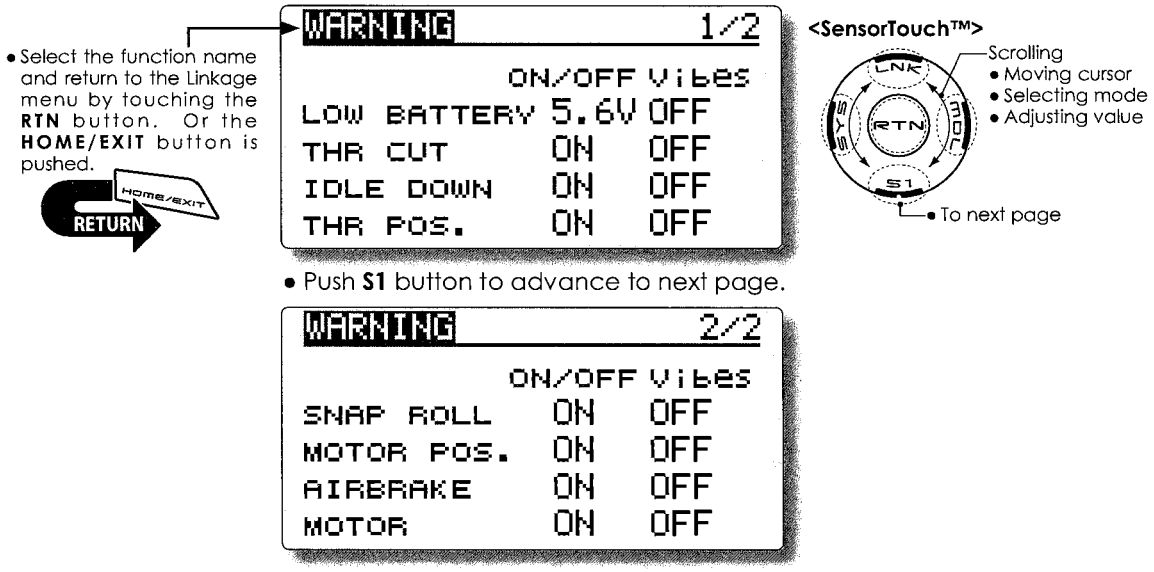
Warning display:

Airplane: Throttle cut/Idle down/Throttle position/Snap-roll/Motor position/Airbrake/ Motor

Helicopter: Condition/Throttle cut/Throttle position/Throttle Hold

Glider: Condition/Motor position/Trim-mix/Motor

- Select [WARNING] in the Linkage menu and access the setup screen shown below by touching the RTN button.



Accessing and Activating the Low Battery Alarm

1. The Low Battery (LOW BATTERY) alarm voltage is accessed through the T14SG's System Menu. Within the System Menu, use the SensorTouch™ to highlight the SOUND option and then press the Return (RTN) button to confirm the selection.
2. Use the SensorTouch to scroll to the Low Battery (LOW BATTERY) alarm, and then press the Return (RTN) button to access the voltage settings. Using the SensorTouch, adjust the voltage as desired and/or determined by the transmitter battery pack being utilized. The voltage options range from 5.0V to 6.0V. Suggested voltage settings are as follows:
   - **5-Cell NiCd or NiMH: 5.6V**
   - **2-Cell LiFe: 6.0V**

*About low battery voltage, all the models included in one transmitter are changed in common. It cannot set to different voltage for every model. Moreover, data reset is not carried out.

Warning normally resetting method

1. Move the cursor to the item you want to reset to OFF and touch the RTN button to switch to the data input mode.
2. Select the OFF mode by scrolling the touch sensor.
   *The display blinks.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

This screen displays your choice of data from the receiver.

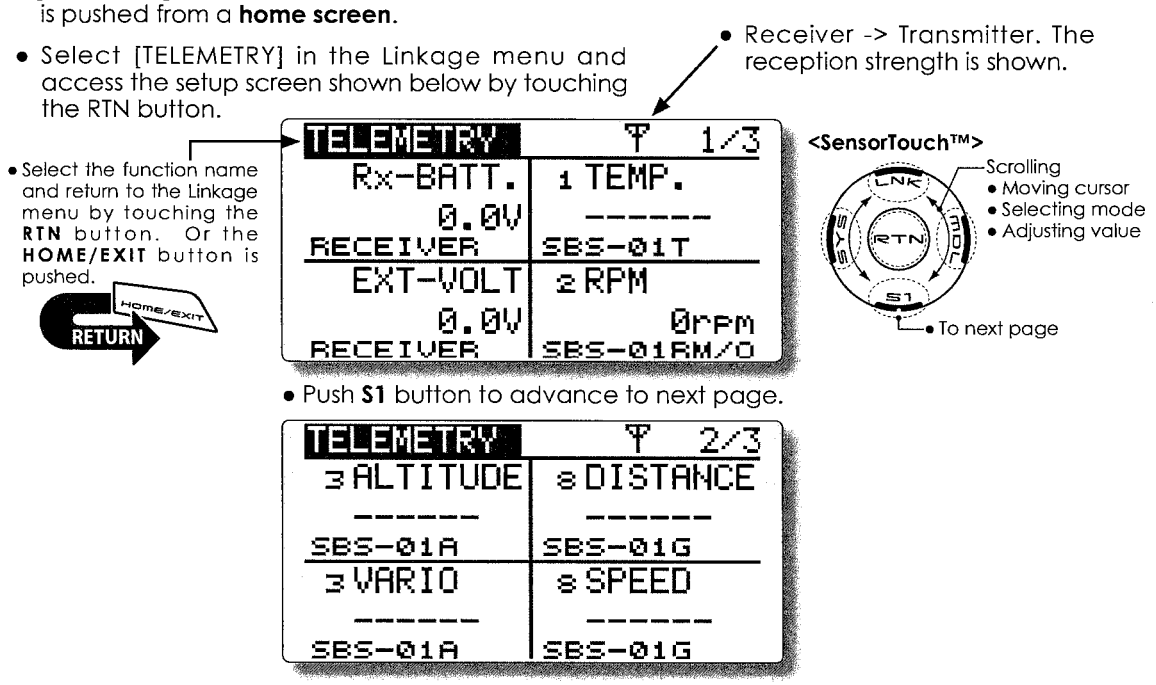
Also warnings can be activated regarding other data from your aircraft. For example, if the receiver voltage drops, the user can be warned by an alarm (and vibration).

*It cannot be used in FASST mode and S-FHSS mode.

*Only receiver voltage and EXT voltage can be used in FASSTest12CH mode.

*The FASSTest14CH mode can use all the telemetry functions.

- **[TELEMETRY]** can be called if the **HOME/EXIT** button is pushed from a **home screen**.
- Select [TELEMETRY] in the Linkage menu and access the setup screen shown below by touching the RTN button.



How to see telemetry date

1. Telemetry screen can be called if the HOME/EXIT button is pushed from the home screen. Or select [TELEMETRY] in the Linkage menu and access the setup screen by touching the RTN button.
2. If each item is chosen and the RTN button is pushed, an alarm setup can be performed with the minimum/maximum after a transmitter is turned on.

*Receiver voltage can be checked immediately. An optional sensor will need to be attached to S.BUS2 of a receiver if you would like to see other information.

*No special setup is necessary if each sensor displayed is left as in the default setup. Separate sensor ID is also unnecessary. However, if two or more of one kind of sensor is used, setup is required in the "SENSOR" menu.

⚠ Warning

⃠ Do not watch the transmitter screen during flight.

*You may loose sight of the aircraft during flight and this is extremely dangerous. Have an assistant on hand to check the screen for you. A pilot should NEVER take his eyes off his aircraft.

TELEMETRY : Rx-BATT.

Displaying data from the receiver battery voltage

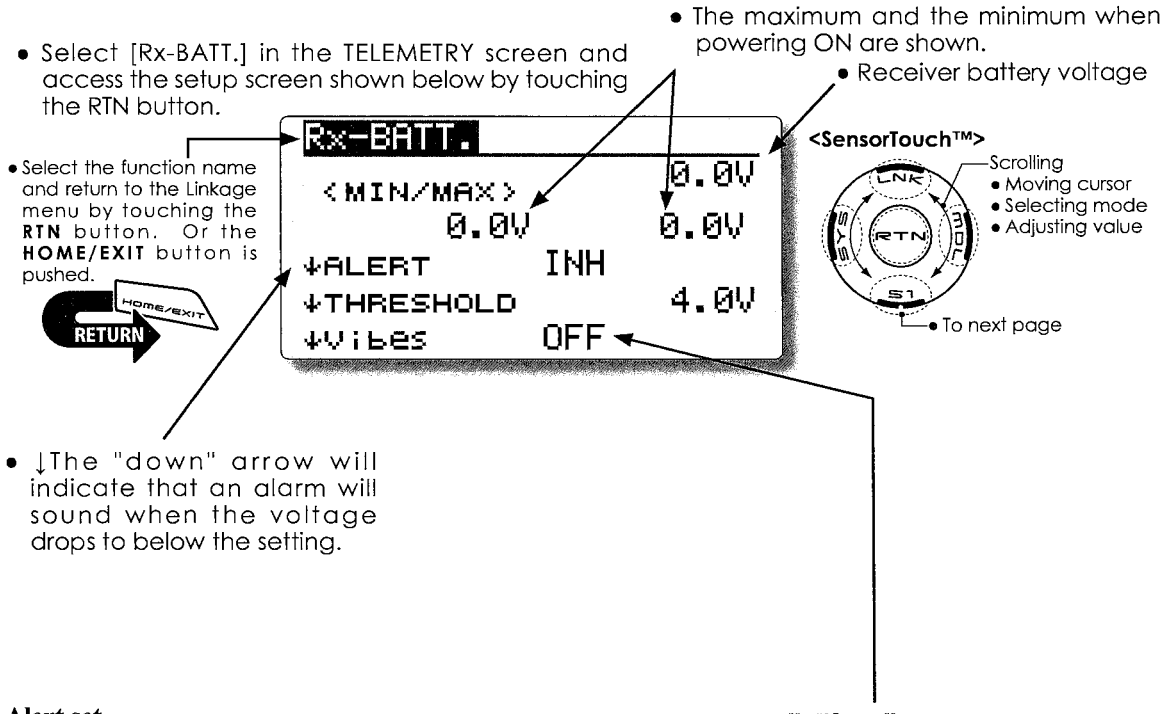
In this screen, the battery voltage of a receiver is displayed.

If it becomes higher or lower than the setting an alarm and/or vibration will alert you.

*It cannot be used in FASST mode and S-FHSS mode.

*Only receiver voltage and EXT voltage can be used in FASSTest12CH mode.

*The FASSTest14CH mode can use all the telemetry functions.



Alert set

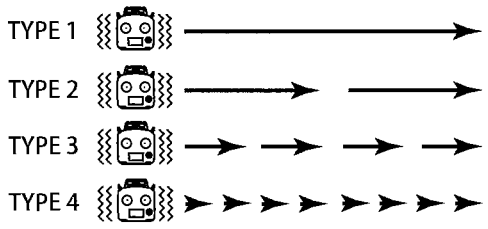
1. Move the cursor to the ↓ALERT [INH] item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↓THRESHOLD [4.0V] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: 4.0V
   Adjustment range: 0.0V~8.4V

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

"Vibes" type

If the following types are selected, the transmitter will vibrate during the warning.



TELEMETRY : EXT-VOLT

Displaying data from the EXT battery voltage port

*CA-RVIN-700 or SBS-01V must be installed in the aircraft.

The EXT-VOLT screen will display the data from the EXT-battery output from the R7008SB receiver. In order to use this function, it is necessary to connect External voltage connector of the R7008SB receiver to a CA-RVIN-700 (FUTM5551) or SBS-01V to the battery you desire to measure the voltage of.

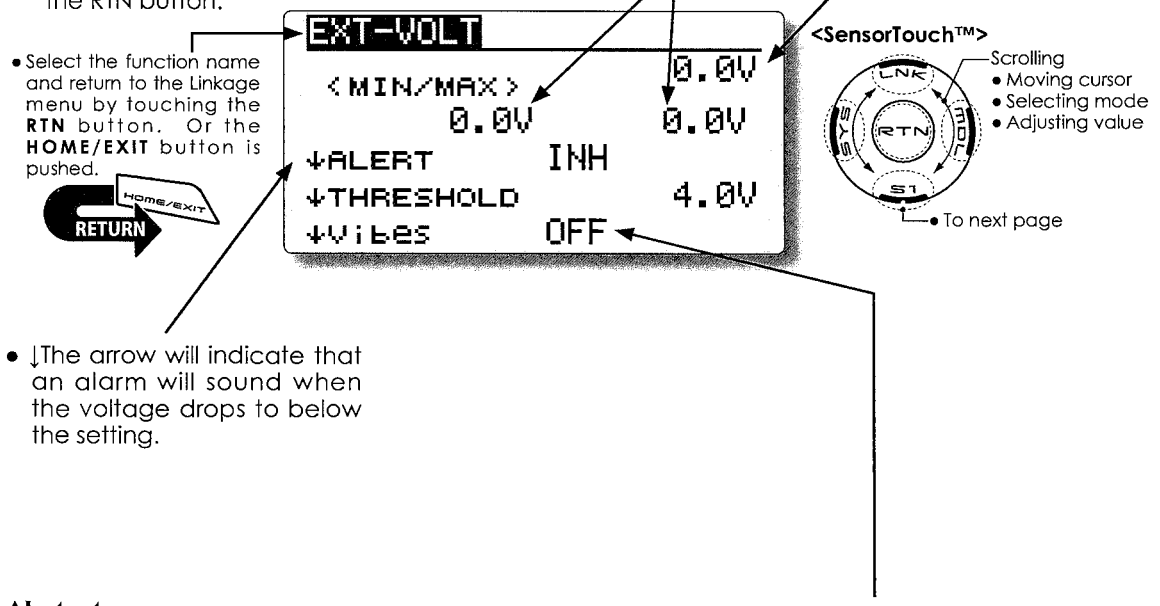
You will be alerted by an alarm or vibration if the voltage set by you is exceeded.

*It cannot be used in FASST mode and S-FHSS mode.

*Only receiver voltage and EXT voltage will be received in the FASSTest12CH mode.

*The FASSTest14CH mode will display all telemetry data.

- Select [EXT-VOLT] in the TELEMETRY screen and access the setup screen shown below by touching the RTN button.
- The maximum and the minimum when powering ON are shown.
- EXT battery voltage



Alert set

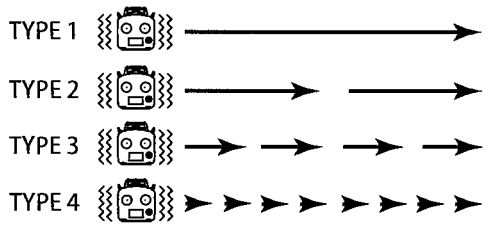
1. Move the cursor to the ↓ALERT [INH] item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↓THRESHOLD [4.0V] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: 4.0V
   Adjustment range: 0.0V~100.0V

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

"Vibes" type

If the following types are selected, the transmitter will vibrate during the warning.



TELEMETRY : TEMP.

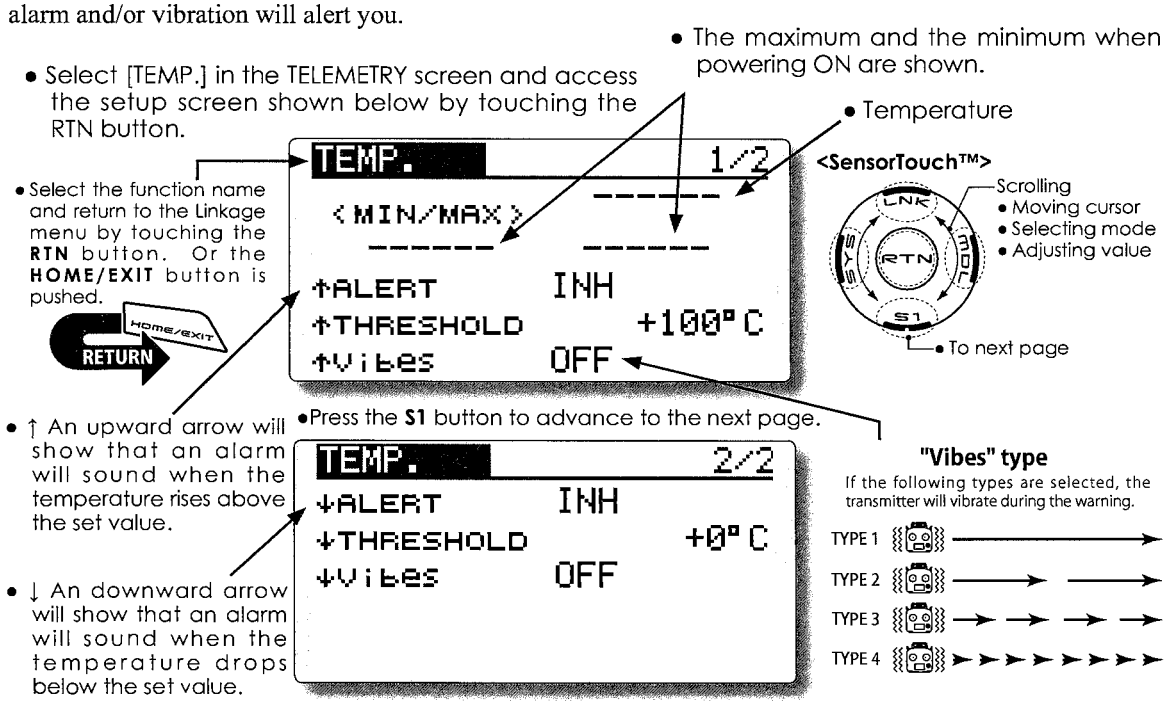
Displaying data from the temperature
*A temperature sensor must be installed in the aircraft.

TEMP. is a screen which displays/sets up the temperature information from an optional temperature sensor.

The temperature of the model (engine, motor, battery etc.) which is flying can be displayed.

If it becomes higher or lower than the setting an alarm and/or vibration will alert you.

*It cannot be used in FASST mode and S-FHSS mode.
*Only receiver voltage and EXT voltage can be used in FASSTest12CH mode.
*The FASSTest14CH mode can use all the telemetry functions.



Alert set : Hot warning

1. Move the cursor to the ↑ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↑THRESHOLD [+100℃] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: +100℃
   Adjustment range: 1℃ ~200℃
   (↑THRESHOLD > ↓THRESHOLD)

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

Alert set : Low-temperature warning

1. 2/2 page is accessed by pushing S1. Move the cursor to the ↓ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↓THRESHOLD [+0 ℃] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: +0℃
   Adjustment range: 0℃ ~199℃
   (↑THRESHOLD > ↓THRESHOLD)

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

TELEMETRY : RPM

Displaying data from the RPM

*A RPM sensor must be installed in the aircraft.

RPM is a screen which displays / sets up the RPM information from an optional RPM sensor.

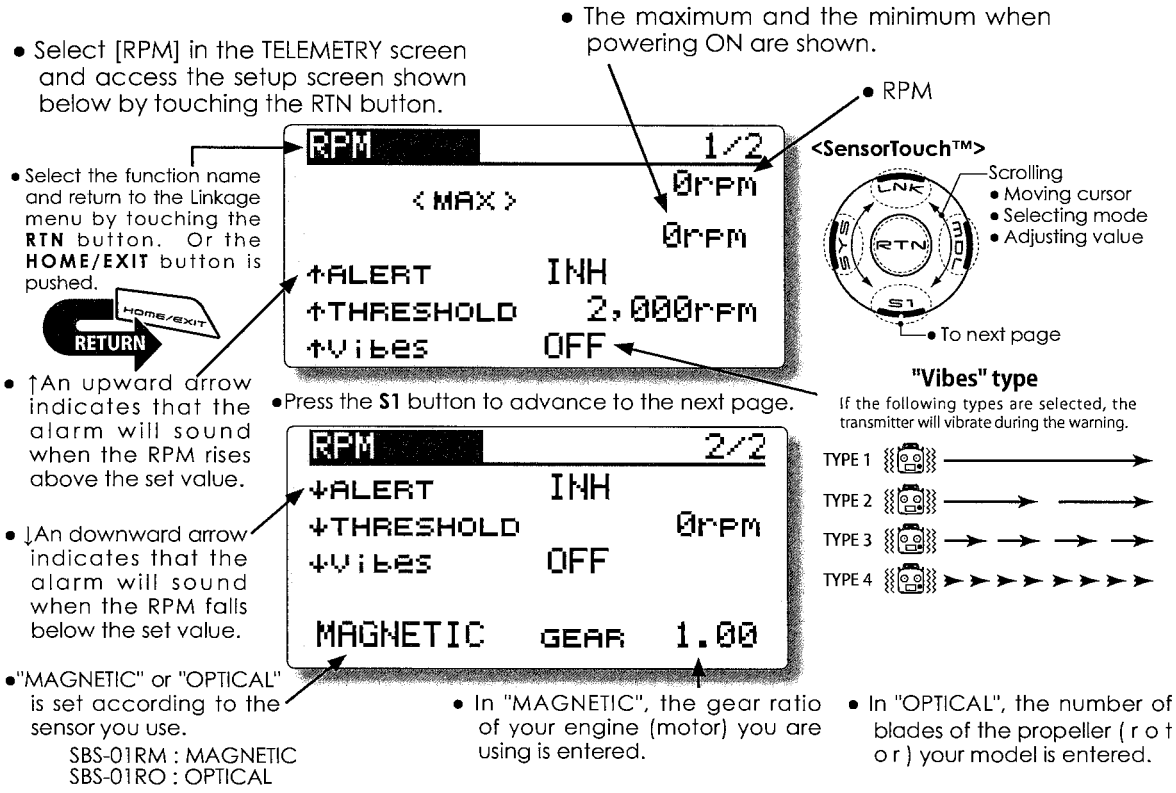
The RPM of the model (engine, motor, etc.) which is flying can be shown.

If it becomes higher or lower than the setting an alarm and/or vibration will alert you.

*It cannot be used in FASST mode and S-FHSS mode.

*Only receiver voltage and EXT voltage can be used in FASSTest12CH mode.

*The FASSTest14CH mode can use all the telemetry functions.



Alert set : Over rotations

1. Move the cursor to the ↑ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↑THRESHOLD [2000rpm]item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: 2000rpm
   Adjustment range: 1rpm~150,000rpm
   (↑THRESHOLD > ↓THRESHOLD)

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

Alert set : Under rotations

1. Scroll to the second page by pushing S1. Move the cursor to the ↓ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↓THRESHOLD [0rpm] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: 0rpm
   Adjustment range: 0rpm~149,999rpm
   (↑THRESHOLD > ↓THRESHOLD)

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

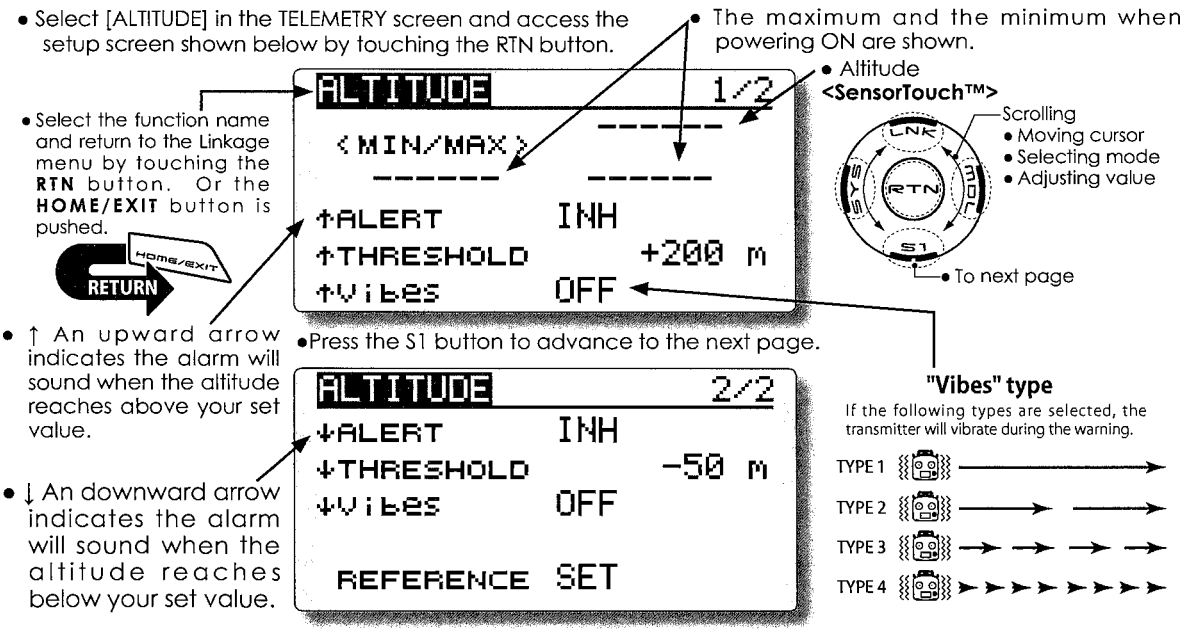
TELEMETRY : ALTITUDE

Displaying data from the altitude

*An altitude sensor or GPS sensor must be installed in the aircraft.

ALTITUDE is a screen which displays / sets up the altitude information from an optional altitude sensor or GPS sensor. The altitude of the model which is flying can be known. If it becomes higher (low) than preset altitude, you can be told by alarm. To show warning by vibration can also be chosen. Data when a power supply is turned on shall be 0 m, and it displays the altitude which changed from there. Even if the altitude of an airfield is high, that shall be 0 m and the altitude difference from an airfield is displayed. This sensor calculates the altitude from atmospheric pressure. Atmospheric pressure will get lower as you go up in altitude, using this the sensor will estimate the altitude. Please understand that an exact advanced display cannot be performed if atmospheric pressure changes in a weather situation.

*It cannot be used in FASST mode and S-FHSS mode.
*Only receiver voltage and EXT voltage can be used in FASSTest12CH mode.
*The FASSTest14CH mode can use all the telemetry functions.



First, the set of a reference is required.

1. The model and transmitter to which the altitude sensor was connected are turned on.
2. Move the cursor to the [SET] of "REFERENCE" item and touch the RTN button to switch to the data input mode.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

*Atmospheric pressure is changed according to the weather also at the same airfield. You should preset before a flight.

Alert set : High side

1. Move the cursor to the ↑ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↑THRESHOLD [+200m] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: +200m
   Adjustment range: -499m~+5,000m
   (↑THRESHOLD > ↓THRESHOLD)

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

Alert set : Low side

1. Scroll to the second page by pushing S1. Move the cursor to the ↓ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↓THRESHOLD [-50m] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: -50m
   Adjustment range: -500m~+4,999m
   (↑THRESHOLD > ↓THRESHOLD)

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

TELEMETRY : VARIO

Displaying data from the variometer

*An altitude sensor or GPS sensor must be installed in the aircraft.

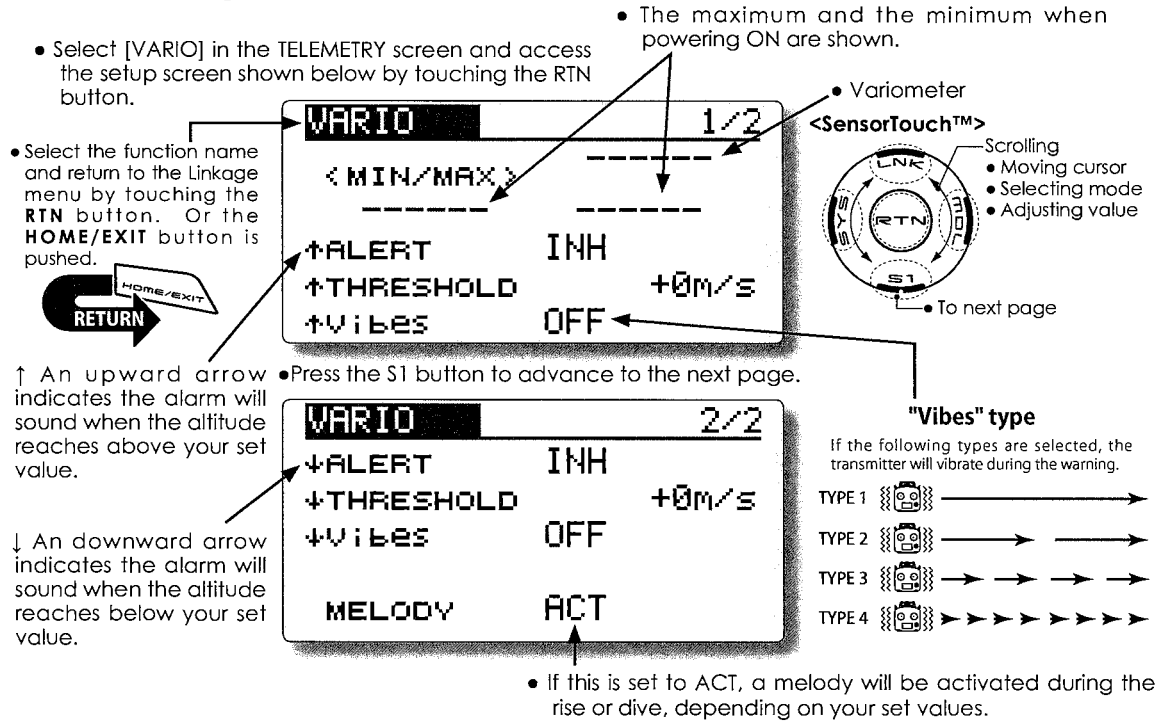
VARIO is a screen which displays / sets up the variometer information from an optional altitude sensor or GPS sensor.

The variometer of the model which is flying can be known.

If it becomes higher or lower than the setting an alarm and/or vibration will alert you.

To ensure that the pilot is aware as to the model's status, the T14SG incorporates a different melody for ascent and descent. Additionally, depending upon the rate of climb or descent, the tones vary to indicate whether or not the airplane is climbing or descending at a rapid rate.

*It cannot be used in FASST mode and S-FHSS mode.
*Only receiver voltage and EXT voltage can be used in FASSTest12CH mode.
*The FASSTest14CH mode can use all the telemetry functions.



Alert set : Rise side

1. Move the cursor to the ↑ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↑THRESHOLD [+0m/s] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: +0m/s
   Adjustment range: -49m/s~+50m/s
   (↑THRESHOLD > ↓THRESHOLD)

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

Alert set : Dive side

1. Scroll to the second page by pushing S1. Move the cursor to the ↓ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↓THRESHOLD [+0m/s] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: +0m/s
   Adjustment range: -50m/s~+49m
   (↑THRESHOLD > ↓THRESHOLD)

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

TELEMETRY : BATTERY

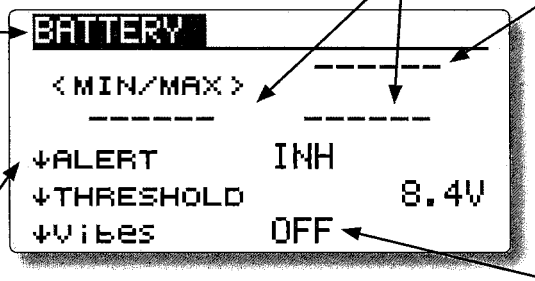
In this screen, the battery voltage is displayed. In order to use this function, it is necessary to connect External voltage connector of R7008SB ⇔ SBS-01V ⇔ Battery

SBS-01V measures two batteries. The drive battery connected to two lines is displayed on EXT-VOLT. The battery for receivers connected to 3P lines is displayed here.

Displaying data from the battery voltage
*SBS-01V must be installed in the aircraft.

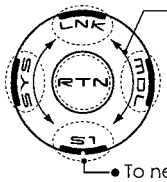
*It cannot be used in FASST mode and S-FHSS mode.
*Only receiver voltage and EXT voltage can be used in FASSTest12CH mode.
*The FASSTest14CH mode can use all the telemetry functions.

- Select [BATTERY] in the TELEMETRY screen and access the setup screen shown below by touching the RTN button.
- The maximum and the minimum when powering ON are shown.
- battery voltage



- Select the function name and return to the Linkage menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.

<SensorTouch™>



- Scrolling
- Moving cursor
- Selecting mode
- Adjusting value
- To next page

- ↓The arrow will indicate that an alarm will sound when the voltage drops to below the setting.

Alert set

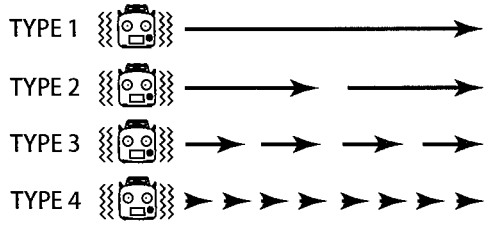
1. Move the cursor to the ↓ALERT [INH] item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↓THRESHOLD [4.0V] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.
   Initial value: 4.0V
   Adjustment range: 0.0V~8.4V

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

"Vibes" type

If the following types are selected, the transmitter will vibrate during the warning.



TELEMETRY : DISTANCE

Distance is a screen that displays and sets the altitude data from an SBS-01G (GPS Sensor) sold separately. The distance to the airborne aircraft can be read by the transmitter. When the aircraft flies outside (inside) the set distance the operator is alerted by an alarm and vibration.

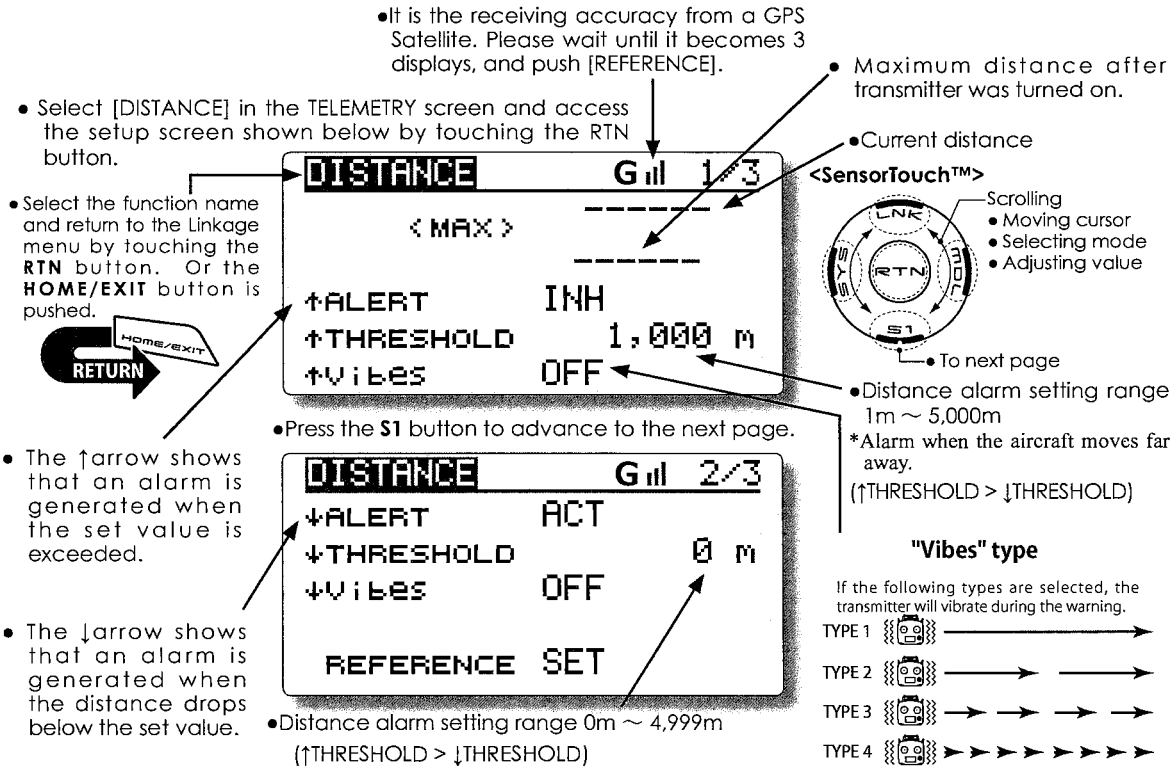
Displaying data from the distance
*A GPS sensor must be installed in the aircraft.

*The GPS sensor sold separately is necessary. Mount and connect the sensor in accordance with the sensor instruction manual.

*It cannot be used in FASST mode and S-FHSS mode.

*Only receiver voltage and EXT voltage can be used in FASSTest12CH mode.

*The FASSTest14CH mode can use all the telemetry functions.



First, the set of a reference is required.

1. The model and transmitter to which the GPS sensor was connected are turned on.
2. It waits until the GPS receiving accuracy displayed on a screen becomes three.
3. Move the cursor to the [SET] of "REFERENCE" item and touch the RTN button to switch to the data input mode.
4. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

*Now, the position of the present model was set to 0 m.

Alert setting when aircraft goes too far

1. Move the cursor to the ↑ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↓THRESHOLD [1,000m] item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

Alert setting when the aircraft approaches

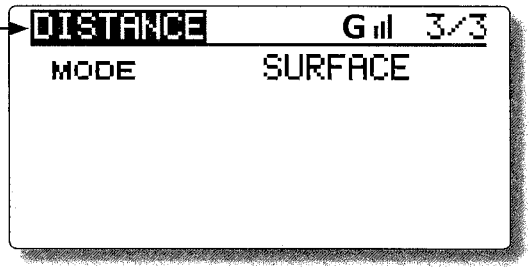
1. Access the second page by pushing S1. Move the cursor to the ↓ALERT item and touch the RTN button to switch to the data input mode.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. Move the cursor to the ↓THRESHOLD [0m]item and touch the RTN button to switch to the data input mode.
5. Ajust the rate by scrolling the touch sensor.

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)Slant and surface distance

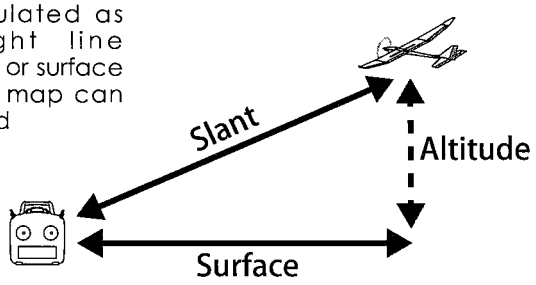
• Select [DISTANCE] in the TELEMETRY screen by touching the **RTN** button. And **S1** button is touched twice.

• Select the function name and return to the Linkage menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



<SensorTouch™>

• Altitude calculated as either straight line distance (slant) or surface distance on a map can also be selected (3/3)



Two displays methods, straight line distance and surface distance, can be selected as shown above.

1. Select page 3 by touching the S1 button twice from the "DISTANCE" screen.
2. Select <SLANT> <SURFACE> next to "MODE", scroll to the desired method and touch the RTN button.

TELEMETRY : SPEED

Displaying data from the speed
*A GPS sensor must be installed in the aircraft.

The speed screen displays and sets the speed data from an SBS-01G (GPS sensor) sold separately.

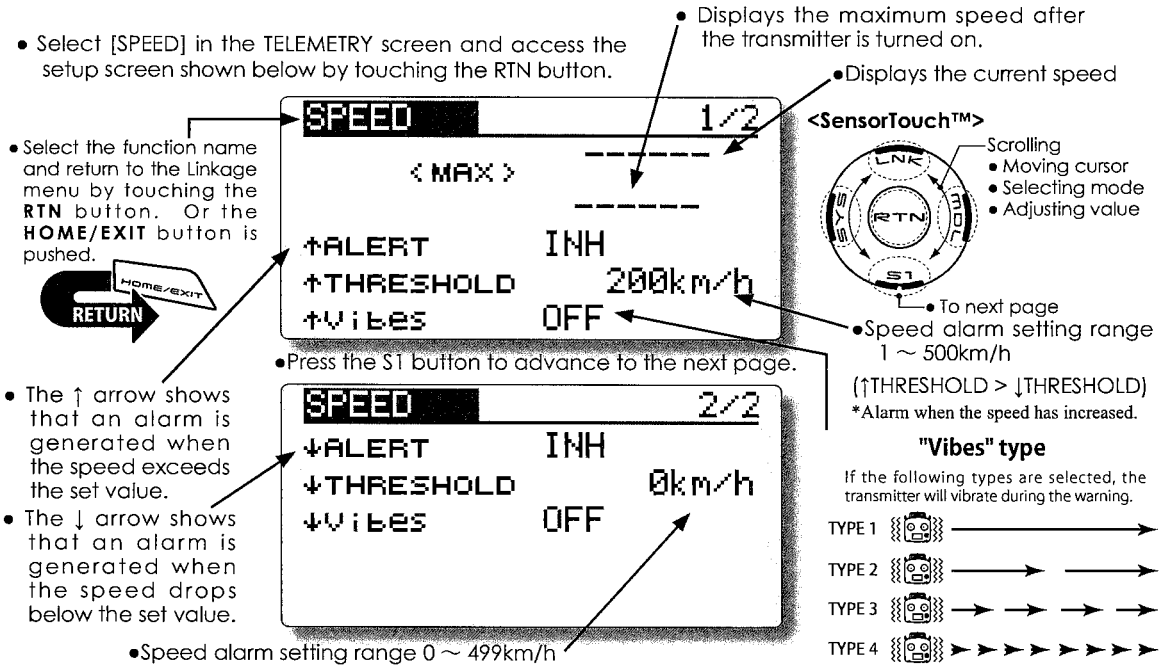
The speed of the aircraft during flight can be displayed.

After flight, the maximum speed during flight can be viewed. Because this speed is based on position data from a GPS satellite, the ground speed is displayed instead of air speed. Consequently, with a head wind, the displayed speed decreases and with a tail wind, the displayed speed increases.

*It cannot be used in FASST mode and S-FHSS mode.

*Only receiver voltage and EXT voltage can be used in FASSTest12CH mode.

*The FASSTest14CH mode can use all the telemetry functions.



Alert setting when speed increases

1. Set "↑ALERT" on the <SPEED> screen to ACT. Move the cursor to INH and touch the RTN button.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. The speed at which an alarm is generated can be set by selecting the speed display next to "↑ THRESHOLD" and touching the RTN button. This generates an alarm when the speed increases.
5. Ajust the rate by scrolling the touch sensor.

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

Alert setting when speed decreases

1. Select page 2 by pressing S1 from the <SPEED> screen and set " ↓ ALERT" to ACT.
2. Select the ACT mode by scrolling the touch sensor.
3. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)
4. The speed at which an alarm is generated can be set by selecting the numerical display next to " ↓ THRESHOLD" and touching the RTN button. This sounds an alarm when the speed decreases.
5. Ajust the rate by scrolling the touch sensor.

*When the RTN button is touched for one second, the rate is reset to the initial value.

6. Touch the RTN button. (To terminate the input and return to the original state, touch the S1 button.)

***Speed alarm precaution**

Since the GPS speed sensor displays the ground speed, it cannot be used as a stall alarm. For example, an aircraft that stalls at 50km/h will stall if the tailwind is 5km/h or greater even through 55km/h is displayed by ground speed. In addition, with an aircraft that will disintegrate in midflight at 400km/h at an over-speed alarm, when the headwind reaches 30km/h the airplane will disintegrate in midair due to over speeding even at a ground speed of 370km/h.

SENSOR

Various telemetry sensors setting

This screen registers the telemetry sensors used with the transmitter. When only one of a certain type of sensor is used, this setting is unnecessary and the sensor can be used by simply connecting it to the S.BUS2 port of the transmitter.

When using 2 or more of the same kind of sensor, they must be registered here.

[What is a slot?]

Servos are classified by CH, but **sensors** are classified in units called **"slot"**. There are **slots** from **No. 1** to **No. 31**.

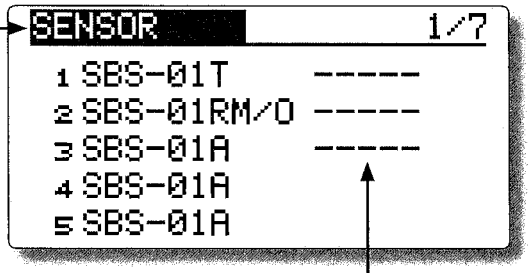
Altitude sensors, GPS sensors and other data sensor units may use **multiple slots**.

Using a sensor which uses two or more slots, the required number of slots is automatically assigned by setting up a **start slot**.

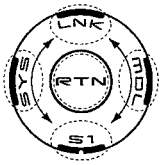
When 2 or more of the same kind of sensor are used, the sensors themselves must allocate unused slots and memorize that slot.

- Select [SENSOR] in the Linkage menu and access the setup screen shown below by touching the RTN button.

- Select the function name and return to the Linkage menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.

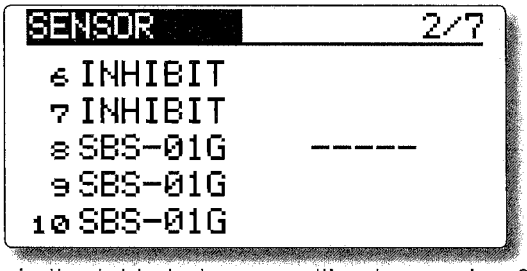


<SensorTouch™>



- Sensor ID: When multiple sensors of the same type are not used, ID is unnecessary.

*3 slots of altitude sensor are used.
*8 slots of GPS sensor are used.



- As shown in the table below, an altimeter requires 3 contiguous slots and a GPS sensor requires 8 contiguous slots. In addition, since the GPS (SBS-01G) start slots are 8, 16, and 24, slots 6 and 7 are inhibited.

< Assignable slot >

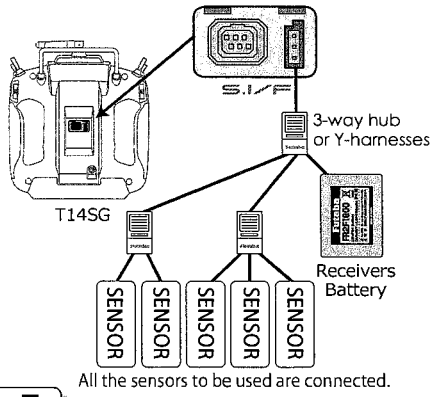
*Altimeter, GPS, and other sensors that display a large amount of data require multiple slots.
*Depending on the type of sensor, the slot numbers that can be allocated may be limited.

Sensor	The required number of slots	The number which can be used as a start slot	Selling area
TEMP (SBS-01T)	1 slot	1 ~ 31	Global
RPM (SBS01RM,SBS-01RO)	1 slot	1 ~ 31	
Voltage (SBS-01V)	2 slots	1,2,3,4,5,6,8,9,10,11,12,13,14,16,17,18,19,20,21,22,24,25,26,27,28,29,30	
Altitude (SBS-01A)	3 slots	1,2,3,4,5,8,9,10,11,12,13,16,17,18,19,20,21,24,25,26,27,28,29	
GPS (SBS-01G)	8 slots	8,16,24	
TEMP125-F1713	1 slot	1 ~ 31	Europe
VARIO-F1712	2 slots	1,2,3,4,5,6,8,9,10,11,12,13,14,16,17,18,19,20,21,22,24,25,26,27,28,29,30	
VARIO-F1672	2 slots	1,2,3,4,5,6,8,9,10,11,12,13,14,16,17,18,19,20,21,22,24,25,26,27,28,29,30	
GPS-F1675	8 slots	8,16,24	

SENSOR : RELOAD

This page is set when using multiple telemetry sensors of the same type.

When using multiple sensors of the same type the sensors must be registered in the transmitter. Connect all the sensors to be used to the T14SG as shown in the figure at the right and register them by the following procedure. The ID of each sensor is registered in the transmitter.

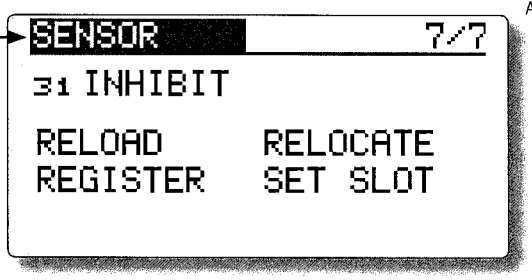


All the sensors to be used are connected.

- Call page 7 by touching the S1 button 6 times from the [SENSOR] menu.

<SensorTouch™>

- Select the function name and return to the Linkage menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



Reading all the sensors to be used

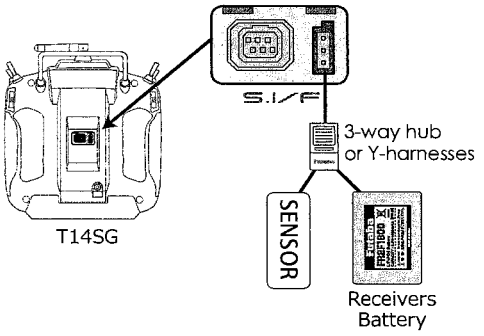
1. Connect all the sensors and receiver batteries to be used to the T14SG through a hub as shown in the figure above.
2. Move the cursor to "RELORD" on page 7 of the [SENSOR] screen.
3. Touch the RTN button.

   All the sensors are registered and can be used.

SENSOR : REGISTER

This page is set when using multiple telemetry sensors of the same type.

This function registers an additional sensor. Connect the sensor as shown in the figure at the right and register it by the following procedure. The sensor ID is registered in the transmitter.



Additional sensor registration

1. Connect the sensor and receiver battery to be used to the T14SG through a hub as shown in the figure at the right.
2. Move the cursor to "REGISTER" on page 7 of the <Sensor> screen.
3. Touch the RTN button.

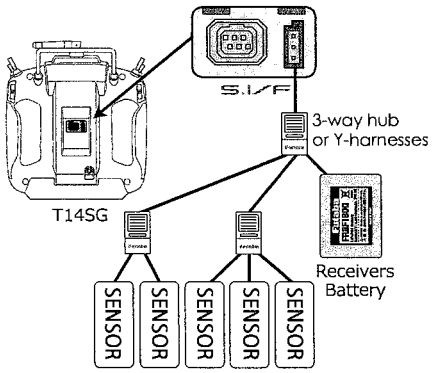
   The sensor is registered and can be used.

*When the number of slots needed in registration is insufficient, an error is displayed and registration cannot be performed. Disable unused slots or perform the following relocate.

SENSOR : RELOCATE

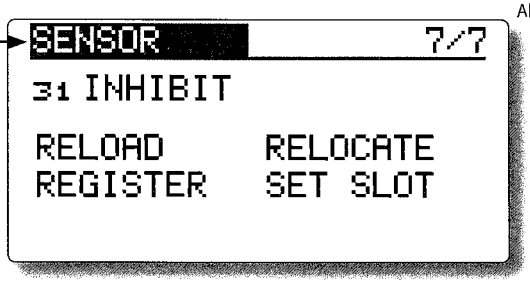
This page is set when using multiple telemetry sensors of the same type.

This function secures contiguous unused slots by rearranging the registration state when sensor registration and deregistration are performed repeatedly and the unused slots are fragmented.



All the sensors to be used are connected.

- Call page 7 by touching the S1 button 6 times from the [SENSOR] menu.



<SensorTouch™>

- Select the function name and return to the Linkage menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.

Relocate of sensors to be used

1. Connect all the sensors and receiver batteries to be used to the T14SG through a hub as shown in the figure above.
2. Move the cursor to "RELOCATE" on page 7 of the [SENSOR] screen.
3. Touch the RTN button.

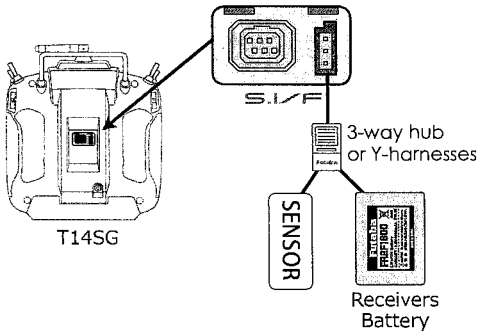
SENSOR : SET SLOT

This page is set when using multiple telemetry sensors of the same type.

This procedure changes the slot No. of one registered sensor.

Sensor slot change

1. Connect the sensor and receiver battery to be changed to the T14SG through a hub as shown in the figure above.
2. Move the cursor to "SET SLOT" on page 7 of the <Sensor> screen.
3. Touch the RTN button. A sensor details screen appears.
4. Move the cursor to "LOAD" and touch the RTN button.
5. The current start slot is displayed. Move the cursor to the number of the start slot and change it to the desired value. (Cannot be set to a slot that cannot be allocated like the table of all pages.)
6. Move the cursor to "WRITE" and touch the RTN button.



DATA RESET

Model memory setting data reset.

This function is designed to allow you to reset trim settings or all of the settings saved in the active model memory. You may individually choose to reset the following data;

T1~T4:

Reset the digital trim setting.

*The trim step amount and trim rate are not reset.

All model setting:

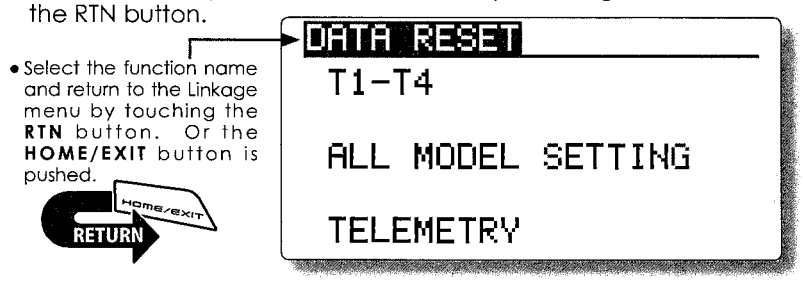
Resets all Linkage and Model Menu functions except for Frequency, Model Select, Low battery voltage, and Model Type.

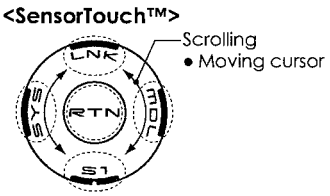
*If the Model Type selected is Glider, the motor function channel is automatically reversed in the Reverse menu; all other channels remain normal.

TELEMETRY:

Reset the telemetry setting.

- Select [DATA RESET] in the Linkage menu and access the setup screen shown below by touching the RTN button.





Data resetting method

1. Move the cursor to the item you want to reset and touch the RTN button.
   *A confirmation message appears.
2. Execute reset by touching the RTN button for one second. (Touch the S1 button to cease resetting.)

[T1-T4]: Resets only the T1-T4

[ALL MODEL SETTING]: Resets all the functions in the Linkage menu and Model menu except the frequency, model select, and model type functions.

[TELEMETRY]: Resets only the teremetry functions.

MODEL MENU (COMMON FUNCTIONS)

This section describes the D/R, program mixing, and other functions common to all model types.

Before setting the model data, use the Model Type function of the Linkage menu to select the model type matched to the aircraft. If a different model type is selected afterwards, the D/R, program mixing, and other parameters are reset.

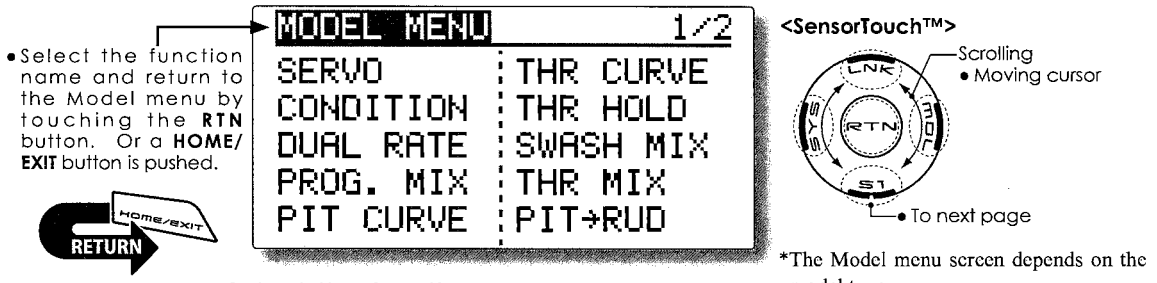
If either a helicopter or glider have been selected as the model type, then the specific functions in the Model menu can be set for each flight condition. If you want to switch the settings for each condition by switch, stick position, etc., use the Condition Select function to add flight conditions. (Up to five conditions can be used)

Note: The T14SG is designed so that the airplane and glider (including EP glider) model types are compatible with aircraft of similar type wings.

This section outlines the relationship between the functions common to airplanes and gliders, except some dedicated functions, and model type.

The setting menus will depend on the number of servos and other differences according to the wing type used. The setup screens in the instruction manual are typical examples.

- Access the model menu shown below by touching the MDL button twice at the home screen, etc.



*The Model menu screen depends on the model type.

- Select the function you want to set and access the setup screen by touching the RTN button.

Model Menu functions (Common) list

•SERVO

Servo test and servo position display (For a description of its functions, see the Linkage Menu section.)

•CONDITION (applicable to helicopter and glider selections)

Flight conditions addition, deletion, copy, condition renaming, and condition delay can be set.

•DUAL RATE

The D/R curve of a T14SG transmitter may be activated from a switch, stick, position, etc. For information on how to do so, please refer to the Switch Setting Method located at the back of this manual.

•PROG. MIX

The T14SG transmitter allows up to five completely customizable program mixes.

CONDITION

Flight condition's switch assignment, copy, priority change and condition delay can be set. [except airplane type]

This function, in the Model menu, can be used to switch the settings of up to 5 flight conditions. Please note this is not applicable to airplane type selections.

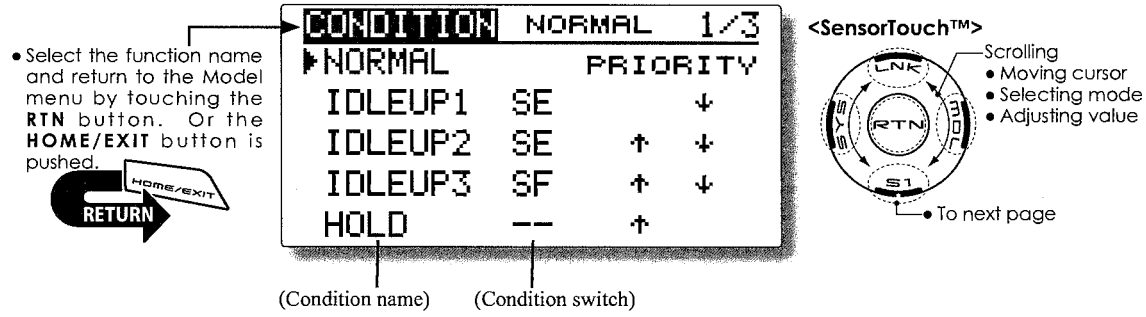
Note: To prevent accidental activation of any unused flight conditions during flight, set the switch setting of those unused conditions to null [--].

- A Condition Delay function can be set. Unnecessary fuselage motion which may be generated when there are sudden changes in the servo positions and when there are variations in the operating time between channels during condition switching. The delay can be set for each channel to ensure maximum performance from your aircraft.

  When setting the delay function for a specific flight condition, the related function changes after a delay corresponding to the set amount.
- If multiple conditions were set, their operational priority may be customized as desired.

- Select [CONDITION] at the Model menu and access the setup screen shown below by touching the RTN button.

(Currently selected condition name)

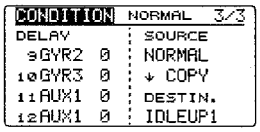


Condition switch selection/deletion

1. Move the cursor to the switch item of the condition you want to select/delete and access the switch setup screen by touching the RTN button and select the switch and ON direction.

   *For a detailed description of the setting method, see [Switch Setting Method] at the back of this manual.

Condition copy



(Setup screen page 3)

1. Move the cursor to the [SOURCE] item and touch the RTN button to switch to the data input mode.

   Select the copy source condition by scrolling the touch sensor. Then, touch the RTN button.
2. Move the cursor to the [DESTIN.] item and touch the RTN button.

   Select the copy destination condition by scrolling the touch sensor. Then, touch the RTN button.

   *The current condition can not be selected for the copy destination condition.
3. Move the cursor to the [COPY] item and touch the RTN button. A confirmation message appears.

   *The display blinks.
4. Touch the RTN button for one second and the copying is completed. (Touch the S1 button to stop copying.)

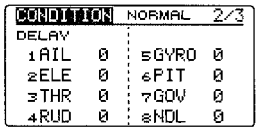
Priority change

1. Move the cursor to the priority up-arrow or down-arrow you want to change and touch the RTN button.

   The priority of the corresponding condition is changed. (The last condition becomes the highest priority.)

   *The Normal condition cannot be changed or moved, its priority is always the lowest.

Condition delay setting



(Setup screen page 2)

1. Select the condition which you want to set.
2. Move the cursor to the "DELAY" icon of the channel you want to set and touch the RTN button to switch to the data input mode.

   Adjust the delay amount by scrolling the touch sensor.

   Initial value: 0

   Adjustment range: 0~27 (maximum delay)
3. Touch the RTN button to end adjustment and return to the cursor mode.

DUAL RATE

The angle and curve of each stick function can be set. [All model types]

Dual rate function is used to adjust the amount of throw and the operational curve of the stick functions (aileron, elevator and rudder) for each flight condition or up to 5 rates for each function. For airplane type, it is also possible to adjust the operational curve of the throttle function.

This is normally used after the End Point programming has been completed to define the maximum throw. When mixing is applied from one channel to another channel, both channels can be adjusted at the same time by adjusting the operation rate through the dual rate function.

Neutral position of the dual rate curve can be set.

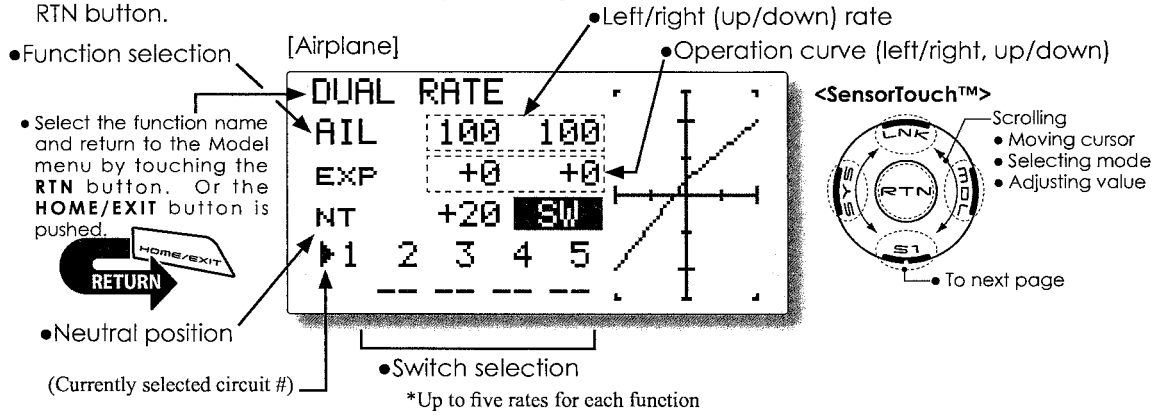
Dual rate curve of FLAP, FLAP3, BUTTERFLY, and CAMBER function can be set. (Airplane/ Glider)

*FLAP3 and BUTTERFLY are glider only functions.

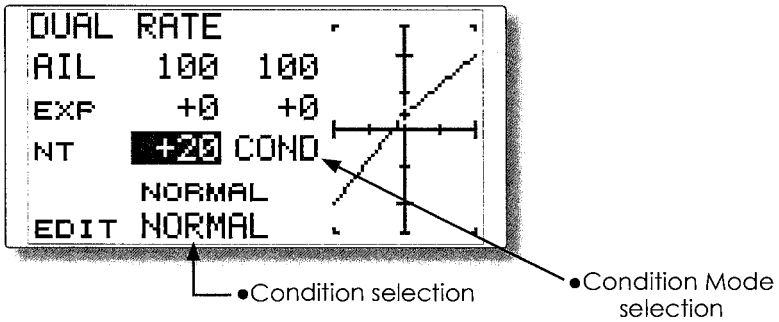
*EXP rate setting is not allowed in the FLAP, FLAP3,BUTTERFLY, and CAMBER functions.

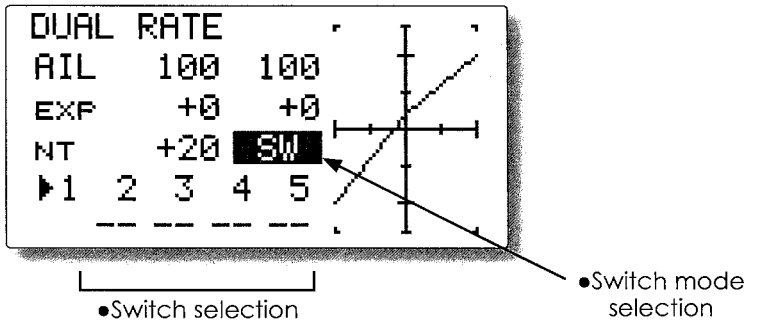
*Individual switch setting is not allowed in the FLAP,FLAP3, and BUTTERFLY, CAMBER functions. (Condition switching only)

- Select [DUAL RATE] at the Model menu and access the setup screen shown below by touching the RTN button.



[Helicopter/glider]





Dual rate setting procedure

1. Function selection

   Move the cursor to the function selection item and touch the RTN button to switch to the data input mode.

   Select the function you want to adjust by scrolling the touch sensor.

   Touch the RTN button to the cursor mode.

2. Switch selection

   Move the cursor to the circuit # item and access the switch setup screen by touching the RTN button. Select the switch activation method and the activation position (if applicable).

   *For a detailed description of the setting method, see [Switch Setting Method] at the back of this manual.

3. Left/right (up/down) rate adjustment

   *Perform the settings below after changing to the circuit # or condition you want to adjust.

   Move the cursor to the rate item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the rate by scrolling the touch sensor.

   Initial value: 100%

   Adjustment range: 0%~140%

   *When the RTN button is touched for one second, the servo operation position is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

   Repeat this procedure for additional rate and other functions as desired.

4. Operation curve (EXP curve) adjustment

   *Perform the settings below after changing to the circuit # or condition you want to adjust.

   Move the cursor to the EXP item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the rate by scrolling the touch sensor.

   Initial value: 0%

   Adjustment range: -100%~+100%

   *When the RTN button is touched for one second, the servo operation position is reset to the initial value.)

   *Using the EXP curve is effective to smoothe or soften the control inputs around center to avoid over-controlling the model. This is often used for the ailerons, elevator and rudder and may be used with the throttle in the case of an airplane selection to smoothe the engine controls as well.

   Touch the RTN button to end adjustment and return to the cursor mode.

   Repeat this procedure for all other rates and functions as desired.

5. Neutral position adjustment

   *Perform the settings below after changing to the circuit # or condition you want to adjust.

   Move the cursor to the [NT] item and touch the RTN button to switch to the data input mode.

   Adjust the rate by scrolling the touch sensor.

   Initial value: 0%

   Adjustment range: -100%~+100%

   *When the RTN button is touched for one second, the neutral position is reset to the initial value.)

   Touch the RTN button to the cursor mode.

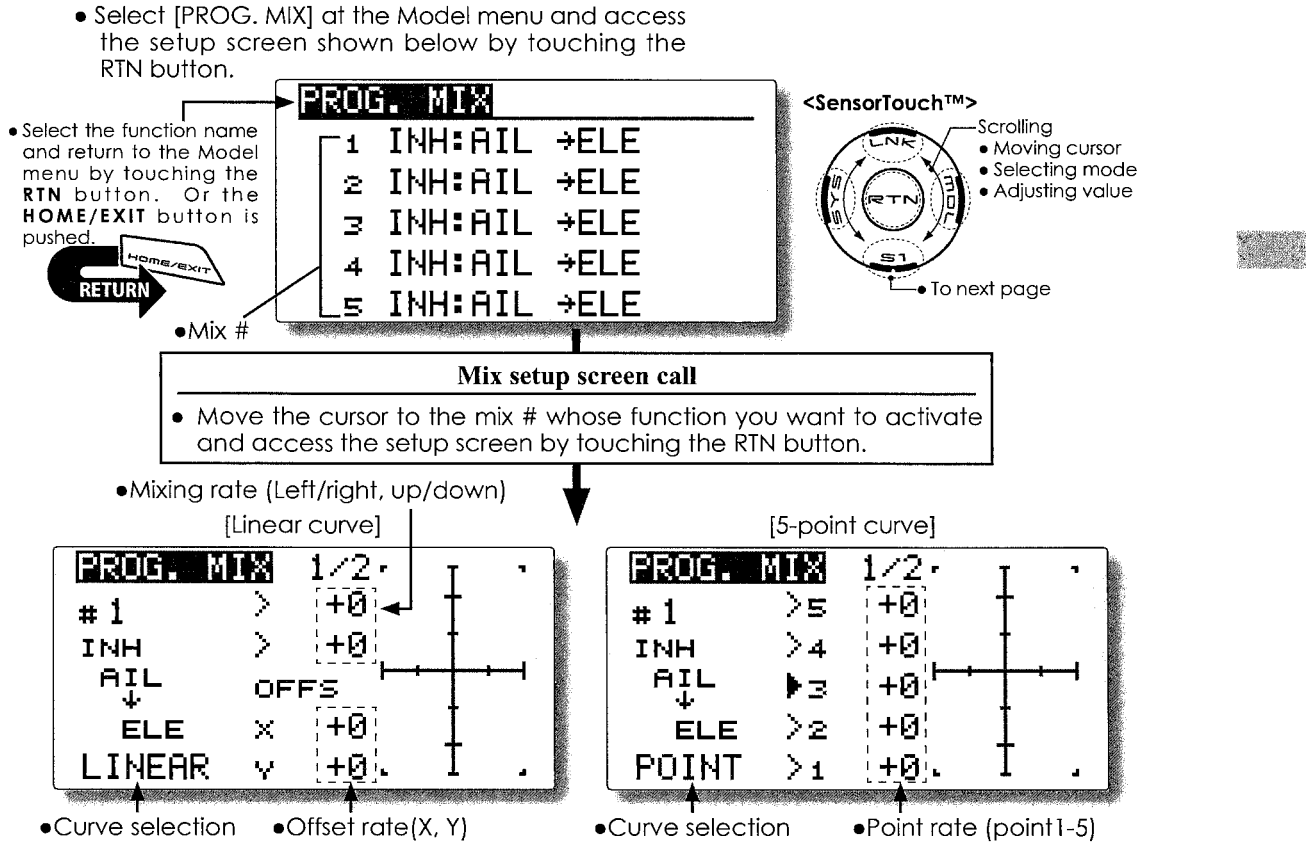
PROG. MIX

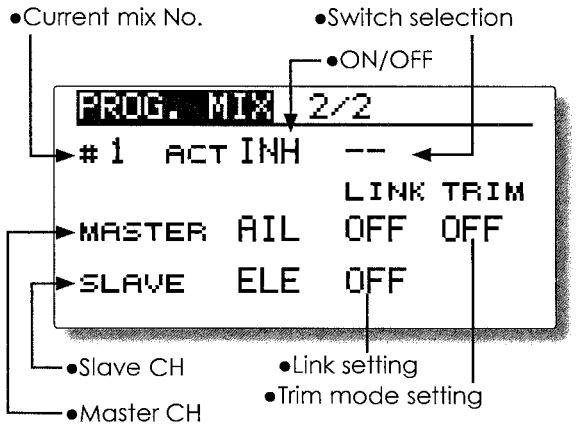
Program mixing which can be freely customized. Up to five mixings can be used for each model. [All model types]

Programmable mixing may be used to correct undesired tendencies of the aircraft, and it may also be used for unusual control configurations. Mixing means that the motion of a command channel, called the "master," is added to the motion of the mixed channel, called "slave."

You may choose to have the Master's trim added to the Slave channel response ("Trim" setting). The mixing curve (Linear/5-point) can be changed. You may select Mixing ON/OFF switch, control or you may choose to have mixing remaining on all the time.

The Programmable mixing includes a powerful link function, which allows Programmable mixing to be linked with the special mixing functions, or with other programmable mixing functions. The link function can be set up for Master and Slave channel individually.





Prog. mix setting procedure

•Activate the function.

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode.

Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode.

*The function is activated. (ON or OFF display)

*ON/OFF switch and mix rate are not set even though the function is activated.

•ON/OFF switch setting

Move the cursor to the switch item and access the switch setup screen by touching the RTN button and select the switch and ON direction.

*For a detailed description of the setting method, see [Switch Setting Method] at the back of this manual.

*Always on when [--].

•Master channel setting

1. Move the cursor to the [MASTER] item and touch the RTN button to switch to the data input mode.
   Select the function by scrolling the touch sensor.
   *The display blinks.
   Touch the RTN button to change the function and return to the cursor mode.
2. When you want to link this mixing with other mixes, move the cursor to the [LINK] item and touch the RTN button to switch to the data input mode.
   Select the link mode, either [+] or [-], by scrolling the touch sensor.
   *The display blinks.
   Touch the RTN button to set the link mode and return to the cursor mode.

*Check to ensure that the link mode is functioning properly by operating the mix accordingly.

*Master channel control can be set to activate based on the amount of stick input, or VR input, neither of which include ATV, D/R, and mixing selection. In this case, the switch setup screen is displayed by touching the RTN button with "H/W" selected in the function selection. Select master channel control. (To terminate the "H/W" selection, select the [--] display and touch the RTN button.

•Slave channel setting

1. Move the cursor to the [SLAVE] item and touch the RTN button to switch to the data input mode.
   Select the function by scrolling the touch sensor.
   *The display blinks.
   Touch the RTN button to change the function and return to the cursor mode.
2. When you want to link this mixing with other mixes, move the cursor to the [LINK] item and touch the RTN button to switch to the data input mode.
   Select the link mode to [+] or [-] by scrolling the touch sensor.
   *The display blinks.
   Touch the RTN button to set the link mode and return to the cursor mode.

*Check the direction by actual operation.

•Trim mode ON/OFF setting

1. When changing the trim mode, move the cursor to the [TRIM] item and touch the RTN button to switch to the data input mode.
   Select ON/OFF by scrolling the touch sensor.
   *The display blinks.
   Touch the RTN button to change the trim mode ON/OFF and return to the cursor mode.

*To incorporate the mixing from the master trim select [ON]. If trim is not desired, select [OFF].

*Effective when a function is set in the master channel.

•Linear curve setting

[Rate setting]

1. Move the cursor to the mixing rate setting item and touch the RTN button to switch to the data input mode.
   Adjust the rate by scrolling the touch sensor.
   Initial value: 0%
   Adjustment range: -100%~+100%

*When the RTN button is touched for one second, the servo operation position is reset to the initial value.

   Touch the RTN button to end adjustment and return to the cursor mode.
2. Repeat this procedure for all other rates as desired.

[Offsetting the curve horizontally in the vertical or horizontal direction]

1. Move the cursor to the [OFFS] setting item and touch the RTN button to switch to the data input mode.
   Adjust the offset rate by scrolling the touch sensor.
   Initial value: 0%
   Adjustment range: -100%~+100%

*When the RTN button is touched for one second, the servo operation position is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.
2. Repeat this procedure for the other direction.

•5-point curve setting

[Rate setting]

1. Move the cursor to the point rate setting item you want to adjust and touch the RTN button to switch to the data input mode.
   Adjust the rate by scrolling the touch sensor.
   Initial value: 0%
   Adjustment range: -100%~+100%

*When the RTN button is touched for one second, the servo operation position is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.
2. Repeat this procedure for each point as desired.

FUEL MIX

Dedicated mixing used to adjust the fuel mixture of applicable engines. [Airplane/helicopter]

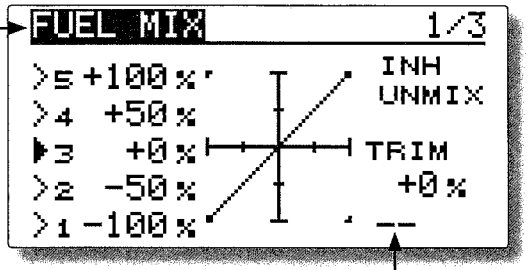
This function is utilized to refine inflight needle adjustments of engines that offer mixture control carburetors.

Note: Initial settings does not assign fuel mix to any channel. Prior to utilizing the Fuel Mix settings, select an unused channel on your receiver and assign it accordingly for the mixture control. Additionally, please make sure that your [Control] and [Trim] are set to null [--].

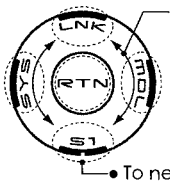
- Select [FUEL MIX] at the Model menu and access the setup screen shown below by touching the RTN button.

[Airplane type]

- Select the function name and return to the Model menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.

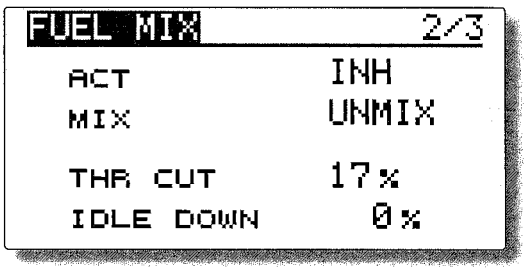


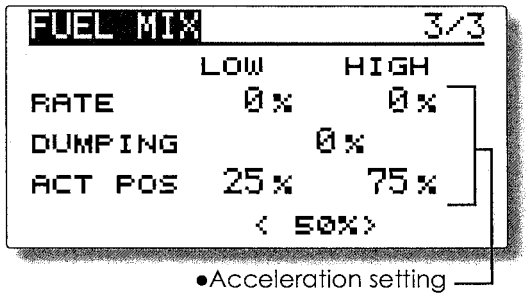
<SensorTouch™>



- Scrolling
- Moving cursor
- Selecting mode
- Adjusting value
- To next page

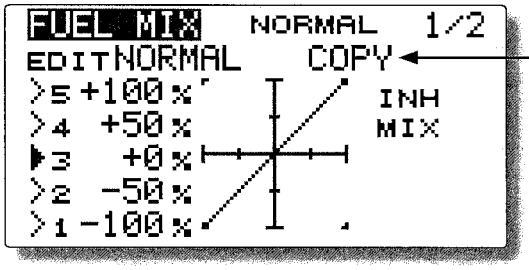
- Needle high trim selection





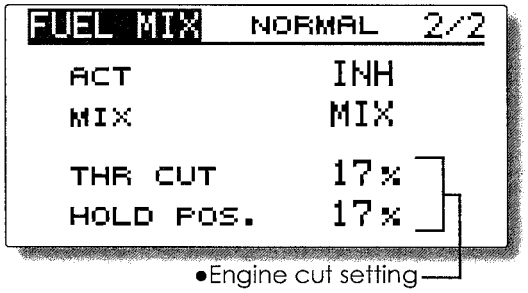
- Acceleration setting

[Helicopter type]



- Mixing curve copy function

Move the COPY item and touch the RTN button to switch to the data input mode. Select the copy destination condition by scrolling the touch sensor and touch the RTN button. Select the [YES] and touch the RTN button.



- Engine cut setting

Setting method

*Before using this function, assign the [FUEL MIX] function to an unused channel in the Linkage menu [FUNCTION] .

•Activate the function.

1. Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode.

   Select the ACT mode by scrolling the touch sensor.

   *The display blinks.

   Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

2. Move the cursor to the [MIX] item and touch the RTN button to switch to the data input mode.

   Select the mixing mode you want to change by scrolling the touch sensor.

   *The display blinks.

   Touch the RTN button to change the mode and return to the cursor mode.

   *When [MIX] is selected at the [MIX] icon, the throttle curve data that is set becomes the mix master. When [UNMIX] is selected, the throttle stick position becomes the master.

•5-point curve setting

1. Move the cursor to the point rate setting item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the rate by scrolling the touch sensor.

   Initial value: 0%

   Adjustment range: -100%~+100%

   *When the RTN button is touched for one second, the servo operation position is reset to the initial value.)

   Touch the RTN button to end adjustment and return to the cursor mode.

2. Repeat this procedure for each point.

•Needle high trim setting

1. Move the cursor to the needle high trim selection item and access the switch setup screen by touching the RTN button. Select the needle high trim lever.

   *For a detailed description of the setting method, see [Switch Setting Method] at the back of this manual.

2. Move the cursor to the TRIM rate item and touch the RTN button to switch to the data input mode.

   Adjust the trim rate by scrolling the touch sensor.

   Initial value: 0%

   Adjustment range: -30%~+30%

   *When the RTN button is touched for one second, the rate is reset to the initial value.)

   Touch the RTN button to end adjustment and return to the cursor mode.

   *Needle high trim works as high trim based on the center. (Works like ATL trim.)

•Acceleration setting (Airplane)

*This function is used to adjust the needle/engine rise characteristics during acceleration. This enables an acceleration function which temporarily increases the needle operation from the throttle stick.

This function is used when there are symptoms of the mixture being too lean or too rich, which would be generated by sudden throttle stick inputs.

[Acceleration rate setting (RATE)]

*Acceleration can be adjusted for both high and low settings.

[Damping rate setting (DUMPING)]

*The return time after operation (Dumping) can be set.

Move the cursor to the rate item you want to change and touch the RTN button to switch to the data input mode.

Adjust the rate by scrolling the touch sensor.

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end adjustment and return to the cursor mode.

[Operation point setting (ACT POS)]

*The operation point at which the acceleration setting will occur. If this point is exceeded, acceleration is performed.

Move the cursor to the [ACT POS] item and hold the throttle stick to the position you want to change and touch the RTN button for one second.

Note: When using the acceleration function, since the needle stroke is large, adjust your settings so there is no binding of your linkage.

•Engine cut setting

*Operation linked with the throttle hold function, throttle cut function, and idle down function is possible. The throttle cut position can be adjusted accordingly. Set it to the full closed position.

Move the cursor to the throttle cut or idle down item and touch the RTN button to switch to the data input mode.

Adjust the servo position by scrolling the touch sensor.

Initial value: THR CUT: 17%, IDLE DOWN: 0%

Adjustment range: THR CUT: 0~50%, IDLE DOWN: 0~100%

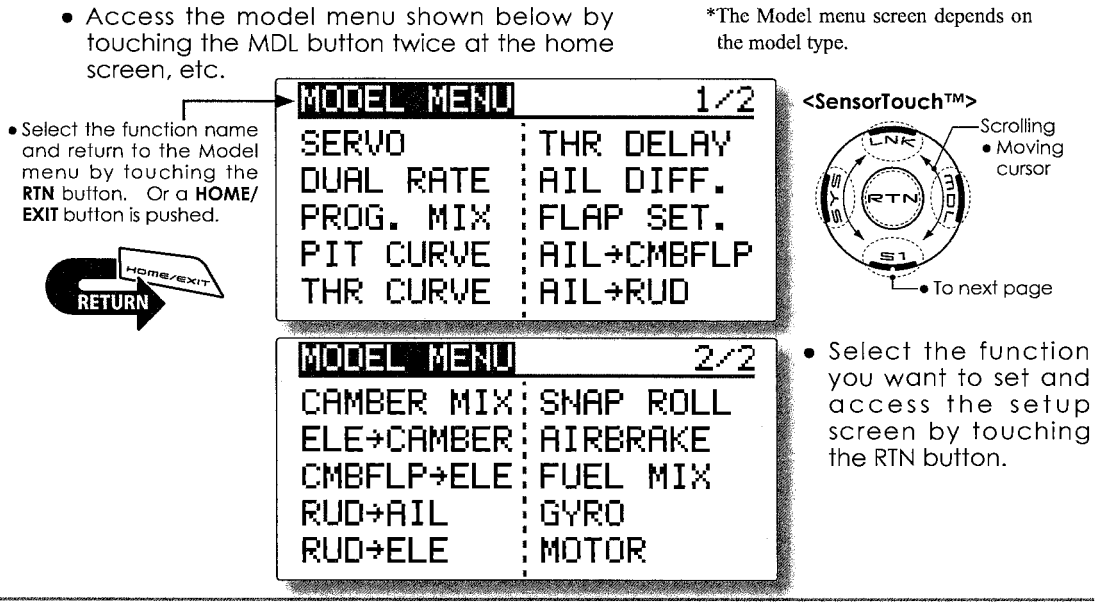
*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

The dedicated mixes, etc. that are applicable when an airplane or glider model type is selected are displayed in this Model menu functions section. Prior to adjusting any of these mixes, etc. use the Model Type function in the Linkage menu to select the model type, wing type, and tail type matched to the aircraft. Other settings reset the data used in mixing function, etc.

For glider, many dedicated mixes can be set for each flight condition, as required. To switch the settings for each condition by switch or stick position, use the Condition Select function to add flight conditions. (Up to five conditions can be used)

Note: The T14SG is designed so that the airplane and glider model types can utilize aircraft of the same wing type.
The functions common to airplanes and gliders, with the exception of some dedicated functions, are written without regard to the model type.
While there may be differences, depending on the number of servos, etc. the wing type used, etc. the setup screens in the instruction manual are typical examples.



Model Menu functions list

PITCH CURVE

Compatible with VPP (Variable Pitch Propeller) function. [Airplane, general]

THR CURVE

THR curve function adjusts the throttle operation curve for optimum engine speed to throttle stick movement. [Airplane/glider, general]

THR DELAY

THR-DELAY function is used to slow the response of the throttle stick to simulate the slow response of a turbine engine, etc. [Airplane, general]

AIL DIFFERENTIAL

The left and right aileron differential can be adjusted independently. For glider, the differential rate in butterfly mixing can be adjusted.
[Airplane/glider, 2 ailerons or more]

FLAP SETTING

The up/down travel of each flap can be adjusted independently for each servo according to the wing type. [Airplane/glider, 2 flaps or more]

AIL to CAMB.FLP

This mix operates the camber flaps in the aileron mode. It improves the roll axis characteristics. [Airplane/glider, 2 ailerons + 2 flaps or more]

AIL to BRKFLP

This mix operates the brake flaps in the aileron mode. It improves the roll axis characteristics. [Glider, 4 flaps]

AIL to RUD

This mix is used when you want to coordinate the rudder with aileron operation for banking at shallow angles. [Airplane/glider, general]

RUD to AIL

This function is used when you want to mix the ailerons with rudder input. Rudder is applied during rolling maneuvers such as knife edge flight. [Airplane/glider, general]

CAMBER MIX

This mix adjusts the camber and corrects the elevators. [Airplane/glider, 2 ailerons or more]

ELE to CAMBER

This mix is used when you want to the mix camber flaps with elevator to increase the lift of the model. [Airplane/glider, 2 ailerons or more]

CAMB.FLP to ELE

This mix is used to correct for changes in attitude when the camber flaps are utilized. [Airplane/glider, 2 ailerons + 1 flap or more]

BUTTERFLY (Crow)

This function is used to quickly slow the aircraft and/or reduce the altitude. [Glider, 2 ailerons or more (Flying: 2 ailerons + 1 flap or more)]

TRIM MIX

The ailerons, elevators, and flaps trim offset rate can be accessed by selecting a switch or condition selection as desired. [Glider, 2 ailerons or more]

AIRBRAKE

This function is used when airbrakes are necessary when landing or when diving, etc. during flight. (Airplane, 2 ailerons or more)

GYRO

This is a dedicated mix when a GYA Series gyro is used. [Airplane/glider, general]

V-TAIL

This function incorporates the elevators and rudder input for use with V-tail models. [Airplane/glider, V-tail specifications]

AILEVATOR (DUAL ELEVATOR)

This function adjusts the elevators and ailerons of models with elevator specifications. [Airplane/glider, ailevator specifications]

WINGLET

This function adjusts the left and right rudders of winglet models. [Airplane/glider, winglet specifications]

MOTOR

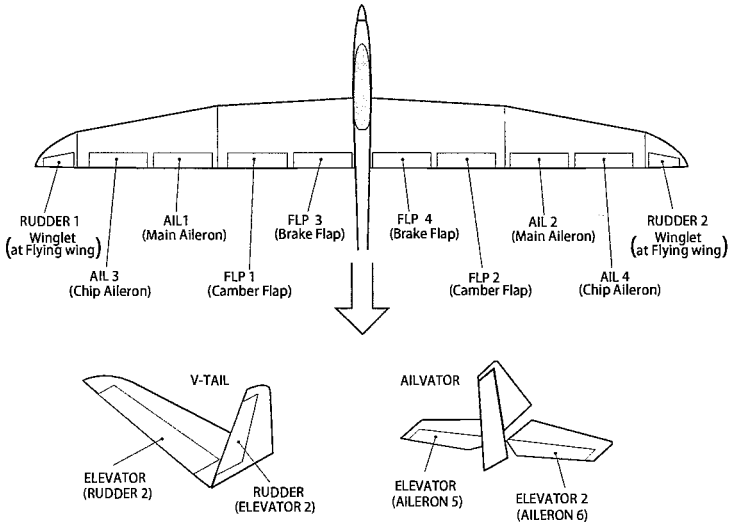
This function adjusts the operation speed when the motor of an F5B or other such EP glider is started by a switch. [Airplane/glider, general]

RUD to ELE

This function is used to correct rolling maneuvers such as, knife edge flight. [Airplane, general]

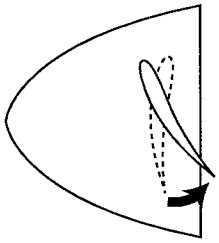
SNAP ROLL

This function selects the snap roll switch and adjusts the amount of servo input. Servo speed can also be adjusted. [Airplane general]



PIT CURVE

[Corresponding model type]: Airplane, general



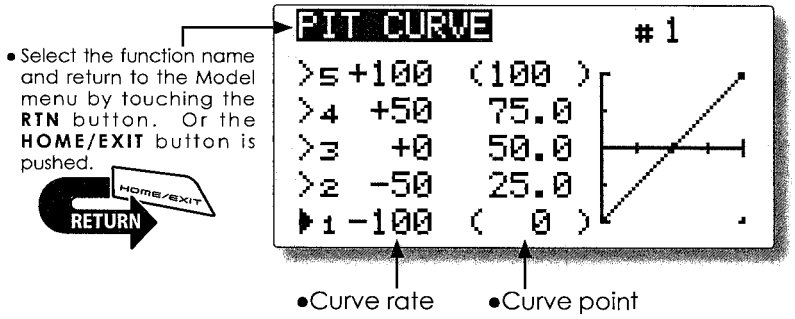
This function adjusts the pitch curve for VPP (Variable Pitch Propeller) airplane.

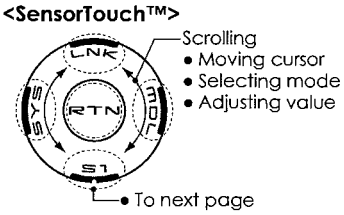
*Up to 3 conditions can be set.

*The priority increases in condition 1→2→3 order.

- Select [PIT CURVE] at the Model menu and access the setup screen shown below by touching the RTN button.

NOTE: When VPP is not assigned to any channel, the pitch curve is not displayed in the model menu. In this case, assign VPP to any channel on the function screen.





Setting method

•VPP condition selection

1. Move the cursor to the # button at the top right side of the screen and touch the RTN button to switch to the data input mode.

   Select the VPP condition by scrolling the touch sensor.

   *The display blinks.

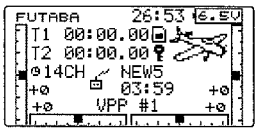
   Touch the RTN button to call the setting screen and return to the cursor mode.

2. Move the cursor to the switch item and touch the RTN button to access the selection screen. Select the switch and set its ON direction.

   *For a description of the switch selection method, see the description at the back of this manual.

   Set the VPP condition 2 and 3 switch.

   *The VPP conditions can also be checked in the HOME screen.



•5-point curve setting

[Curve rate setting]

1. Move the cursor to the curve rate setting item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the rate by scrolling the touch sensor.

   Initial value: 0%

   Adjustment range: 0%~100%

   *When the RTN button is touched for one second, the rate is reset to the initial value.

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point.

[Moving curve point]

1. Move the cursor to the curve point setting item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the curve point by scrolling the touch sensor.

   Initial value: P1: (0%), P2: 25%, P3: 50%, P4: 75%, P5: (100%)

   Adjustment range: Up to 2.5% in front of the adjoining point

   *When the RTN button is touched for one second, the curve position is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point.

[Deleting/returning curve point]

Move the cursor to the curve point setting item you want to delete/return and touch the RTN button for one second.

THR CURVE

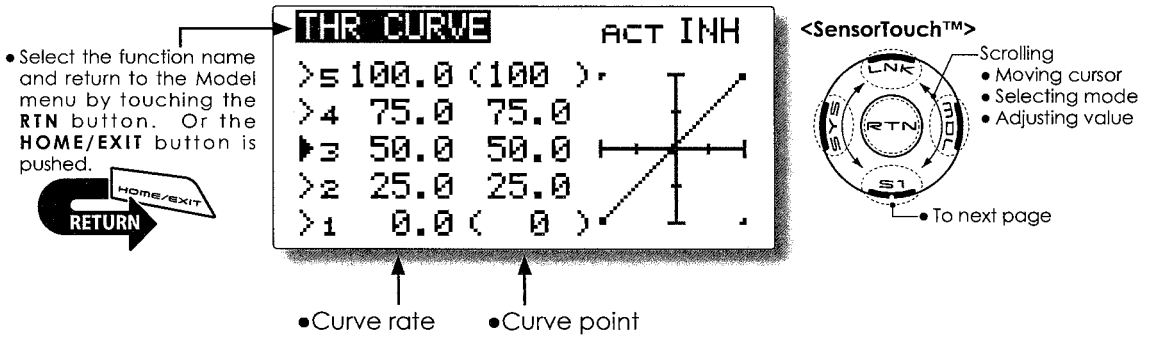
[Corresponding model type]: Airplane/glider, general

This function adjusts the throttle curve for optimum engine speed from throttle stick input.

*When throttle curve is set to ON when there is no throttle function; this curve acts as the motor function.

• Select [THR CURVE] at the Model menu and access the setup screen shown below by touching the RTN button.

NOTE: If this throttle curve function is activated, you can not use the THR-EXP function within the DUAL RATE function simultaneously.



Setting method

•Activate the function.

1. Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode.

   Select the ON mode by scrolling the touch sensor.

   *The display blinks.

   Touch the RTN button to activate the function and return to the cursor mode.

•5-point curve setting

[Curve rate setting]

1. Move the cursor to the curve rate setting item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the rate by scrolling the touch sensor.

   Initial value: 0%

   Adjustment range: 0%~100%

   *When the RTN button is touched for one second, the rate is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point.

[Moving curve point]

1. Move the cursor to the curve point setting item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the curve point by scrolling the touch sensor.

   Initial value: P1: (0%), P2: 25%, P3: 50%, P4: 75%, P5: (100%)

   Adjustment range: Up to 2.5% in front of the adjoining point

   *When the RTN button is touched for one second, the curve position is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point.

[Deleting/returning curve point]

Move the cursor to the curve point setting item you want to delete/return and touch the RTN button for one second.

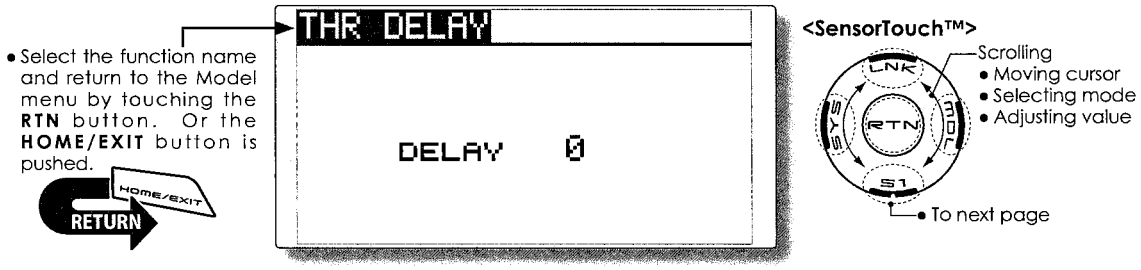
THR DELAY

[Corresponding model type]: Airplane, general

THR-DELAY function is used to slow the response of the throttle stick to simulate the slow response of a turbine engine, etc.

*This function is the same as THR of servo speed. If it sets up in great numbers, it overlaps and a THR servo becomes late further. Please do not let me overlap. Use either.

• Select [THR DELAY] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

•Operation speed (delay) setting

1. Move the cursor to the [DELAY] item and touch the RTN button to switch to the data input mode.

   Adjust the delay rate by scrolling the touch sensor.

   Initial value: 0

   Adjustment range: 0~27 (maximum delay)

   *When the RTN button is touched for one second, the rate is reset to the initial value.)

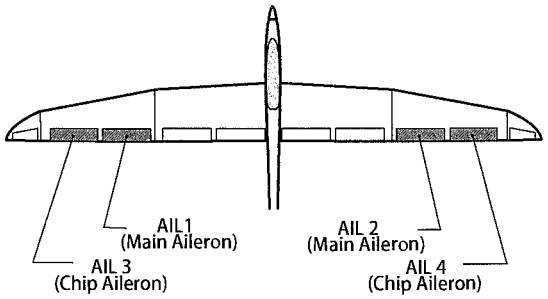
   Touch the RTN button to activate the function and return to the cursor mode.

AIL DIFF.

[Corresponding model type]: Airplane/glider, 2 ailerons or more

The left and right aileron differential can be adjusted independently.

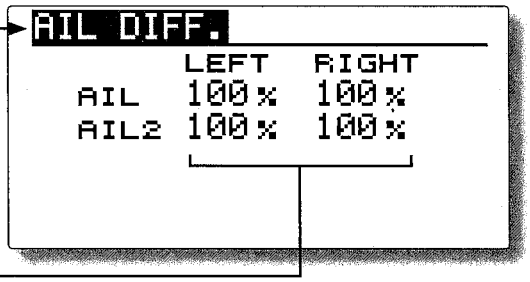
For glider, the differential rate in butterfly mixing can be adjusted.



*The display screen is an example. The actual screen depends on the Model Type.

- Select [AIL DIFF.] at the Model menu and access the setup screen shown below by touching the RTN button.

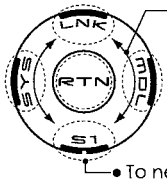
[Airplane (2A+2F)]



- Select the function name and return to the Model menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.

- Aileron left/right adjustment

<SensorTouch™>

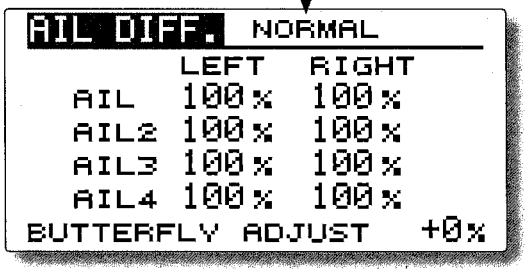


Scrolling
- Moving cursor
- Selecting mode
- Adjusting value

- To next page

[Glider (4A+2F)]

(Currently selected condition name)



Setting method

•Aileron left/right adjustment

Move the cursor to the aileron (AIL) 1~4 left (or right) setting item and touch the RTN button to switch to the data input mode.

Adjust the aileron angles by scrolling the touch sensor when the stick is moved to the left (or right) end.

Initial value: 100%

Adjustment range: 0~120%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

•Aileron differential adjustment in butterfly mixing

Move the cursor to the [BUTTERFLY ADJUST] item and touch the RTN button to switch to the data input mode.

Adjust the differential rate by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -120~+120%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

FLAP SET.

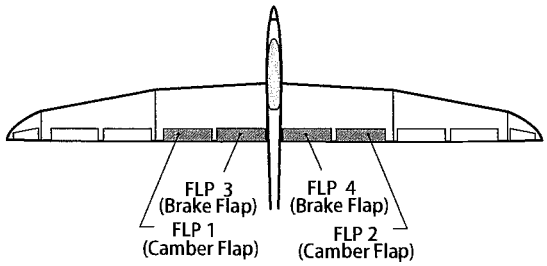
[Corresponding model type]: Airplane/glider, 2 flaps or more

The up/down travel of each flap (camber flaps: FLP1/2, brake flaps: FLP3/4) can be adjusted independently for each servo according to the wing type.

- The operation reference point of each flap can be offset

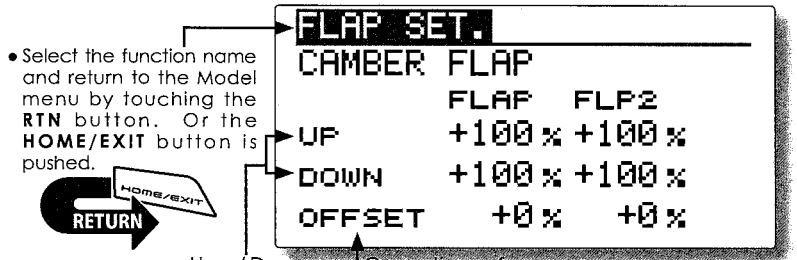
The camber flaps of a 4-flap model can be mixed with the brake flaps. (BRKFLP to CMBFLP)

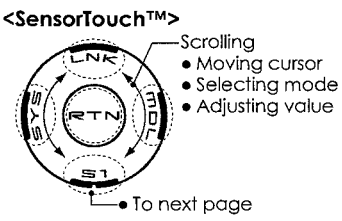
- An ON/OFF switch can be set.



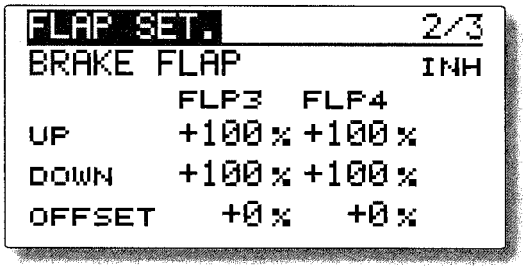
*The display screen is an example. The actual screen depends on the model type.

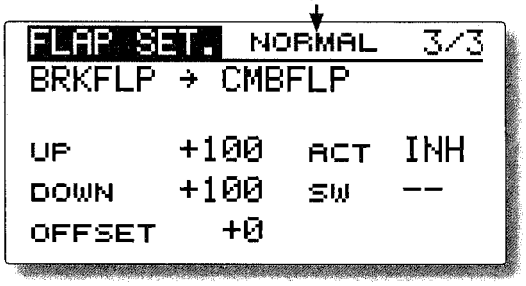
- Select [FLAP SET.] at the Model menu and access the setup screen shown below by touching the RTN button.





(Glider: Currently selected condition name)





Setting method

•Flap up/down adjustment

Move the cursor to the flap (FLP) 1~4 Up or Down item according to the wing type and touch the RTN button to switch to the data input mode. Adjust the travel independently by scrolling the touch sensor.

Initial value: +100%

Adjustment range: -120~+120%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

•Reference point adjustment

Move the cursor to the [OFFSET] item and touch the RTN button to switch to the data input mode. Adjust the operation reference point of each flap by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -100~+100%

*When the RTN button is touched for one second, the reference point is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

•Activate the Brake FLP to Camber FLP mixing

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

To select a switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

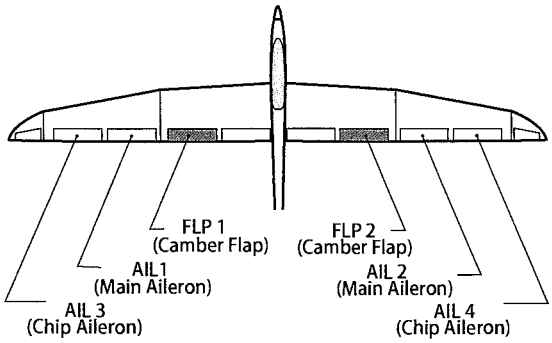
*For a description of the switch selection method, see the description at the back of this manual.

AIL to CMBFLP

[Corresponding model type]: Airplane/glider, 2 ailerons + 2 flaps or more

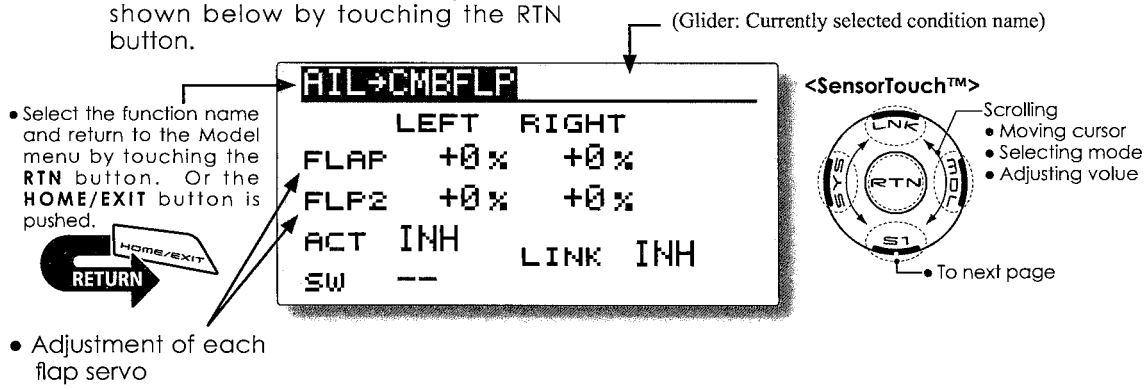
This mix operates the camber flaps (FLP1/2) in the aileron mode. When the aileron stick is manipulated, the ailerons and camber flaps perform aileron operation simultaneously to significantly improve the roll axis.

- The aileron left/right mixing rate of each flap servo can be independently adjusted.
- An ON/OFF switch can be set.
- Linking is possible: Link this mix to other mixes.



*The display screen is an example. The actual screen depends on the model type.

- Select [AIL to CMBFLP] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When selecting a switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Mixing rate adjustment

Move the cursor to the flap (FLP) 1~2 left or right item according to the wing type and touch the RTN button to switch to the data input mode. Adjust the mixing rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -120~+120%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

•Link mode setting

When linking a mix, move the cursor to the [LINK] item and touch the RTN button to switch to the data input mode. Select the ON mode by scrolling the touch sensor.

*The display blinks.

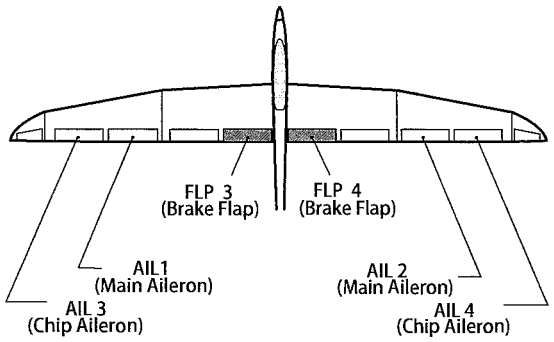
Touch the RTN button to set the link mode and return to the cursor mode.

AIL to BRAKEFLP

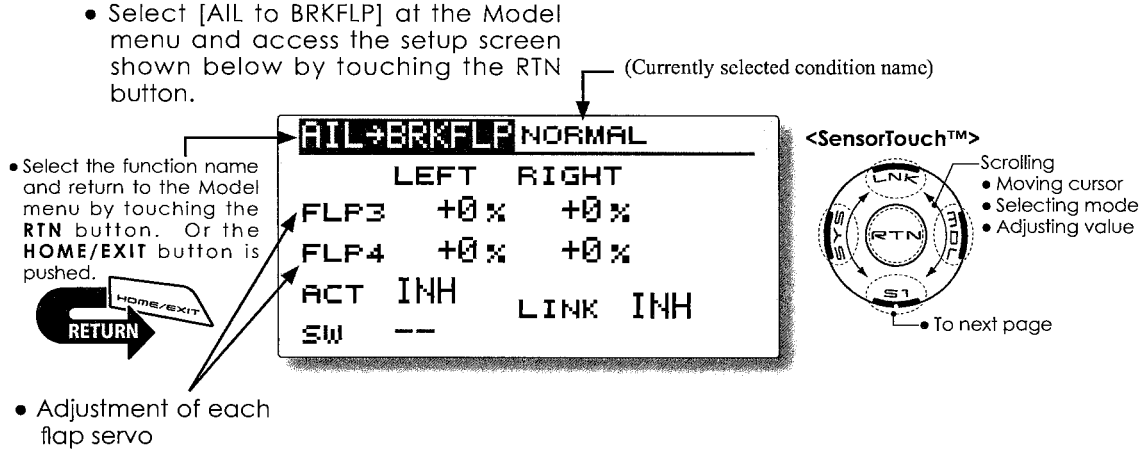
[Corresponding model type]: Glider, 4 flaps

This mix operates the brake flaps (FLP3/4) in the aileron mode. When the aileron stick is manipulated, the aileron and brake flaps perform the aileron operation simultaneously and the roll axis is improved.

- The aileron left and right mixing rates can be adjusted separately for each flap servo.
- Mixing during flight can be turned ON/OFF by setting a switch. (Always ON at [--] setting)
- Linking can be set: Link this mix to other mixes.



*The display screen is an example. The actual screen depends on the model type.



Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When setting a switch, move the cursor to the [SW] item and touch the RTN button to access the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Mixing rate adjustment

Move the cursor to the flap (FLP) 3~4 left or right item and touch the RTN button to switch to the data input mode. Adjust the mixing rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -120~+120%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

•Link mode setting

To activate the mixing, move the cursor to the [LINK] item and touch the RTN button to switch to the data input mode. Select the ON mode by scrolling the touch sensor.

*The display blinks.

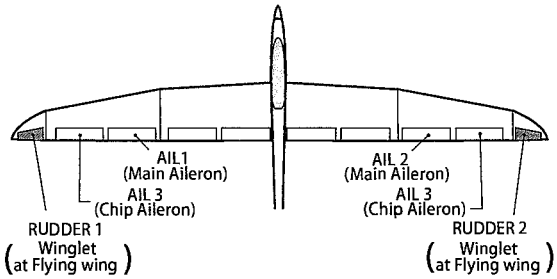
Touch the RTN button to set the link mode and return to the cursor mode.

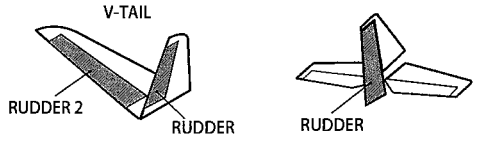
AIL to RUD

[Corresponding model type]: Airplane/glider, general

Use this mix when you want to mix the rudders with aileron operation. This allows the aircraft to bank at a steep angle.

- Mixing during flight can be turned ON/OFF by a switch. (Always ON at [--] setting)
- The mixing rate can be adjusted.

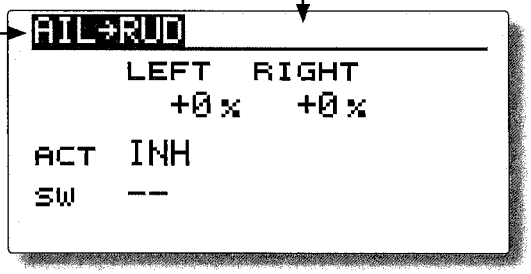




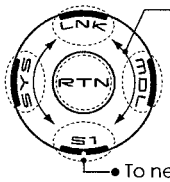
- Select [AIL to RUD] at the Model menu and access the setup screen shown below by touching the RTN button.

(Glider: Currently selected condition name)

- Select the function name and return to the Model menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



<SensorTouch™>



Scrolling
- Moving cursor
- Selecting mode
- Adjusting value

To next page

*The display screen is an example. The actual screen depends on the model type.

Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When selecting a switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Mixing rate adjustment

Move the cursor to the left or right item and touch the RTN button to switch to the data input mode. Adjust the mixing rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -100~+100%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

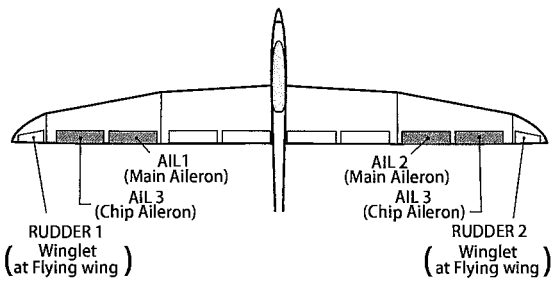
Touch the RTN button to end the adjustment and return to the cursor mode.

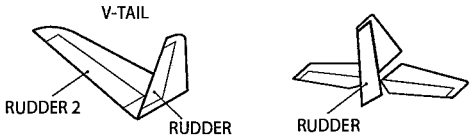
RUD to AIL

[Corresponding model type]: Airplane/glider, general

This function is used when you want to mix the ailerons with rudder input. It is used when rudder is applied during roll maneuvers such as, knife edge flight. It can be used to turn or bank scale models, large models, etc. like a full-size aircraft.

- Mixing during flight can be turned ON/OFF by setting a switch. (Always ON at [--] setting)
- Linking can be set: Link this mix to other mixes.
- The mixing rate can also be adjusted.
- A 5-point curve can be set at airplane model type.

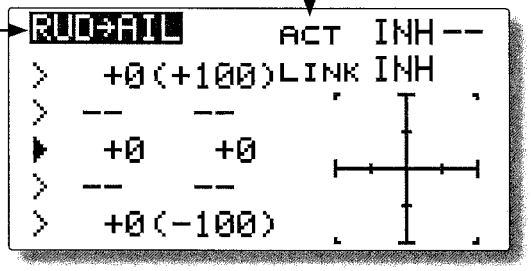




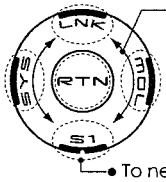
- Select [RUD to AIL] at the Model menu and access the setup screen shown below by touching the RTN button.

(Glider: Currently selected condition name)

- Select the function name and return to the Model menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



<SensorTouch™>



- Scrolling
  - Moving cursor
  - Selecting mode
  - Adjusting value

- To next page

*The display screen is an example. The actual screen depends on the model type.

Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When setting a switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Mixing rate adjustment (glider)

Move the cursor to the left or right item and touch the RTN button to switch to the data input mode. Adjust the mixing rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -100~+100%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

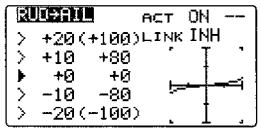
•Link mode setting

To activate the link mixing, move the cursor to the [LINK] item and touch the RTN button to switch to the data input mode. Select the ON mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to set the link mode and return to the cursor mode.

•5-point curve setting (airplane)



[Curve rate setting]

1. Move the cursor to the curve rate setting item (left side) you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the rate by scrolling the touch sensor.

   Adjustment range: -100%~+100%

   *When the RTN button is touched for one second, the rate is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point.

[Moving curve point]

1. Move the cursor to the curve point setting item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the curve point by scrolling the touch sensor.

   Adjustment range: Up to 2.5% in front of the adjoining point

   *When the RTN button is touched for one second, the curve position is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point.

[Deleting/returning curve point]

Move the cursor to the curve point setting item you want to delete/return and touch the RTN button for one second.

CAMBER MIX

[Corresponding model type]: Airplane/glider, 2 ailerons or more

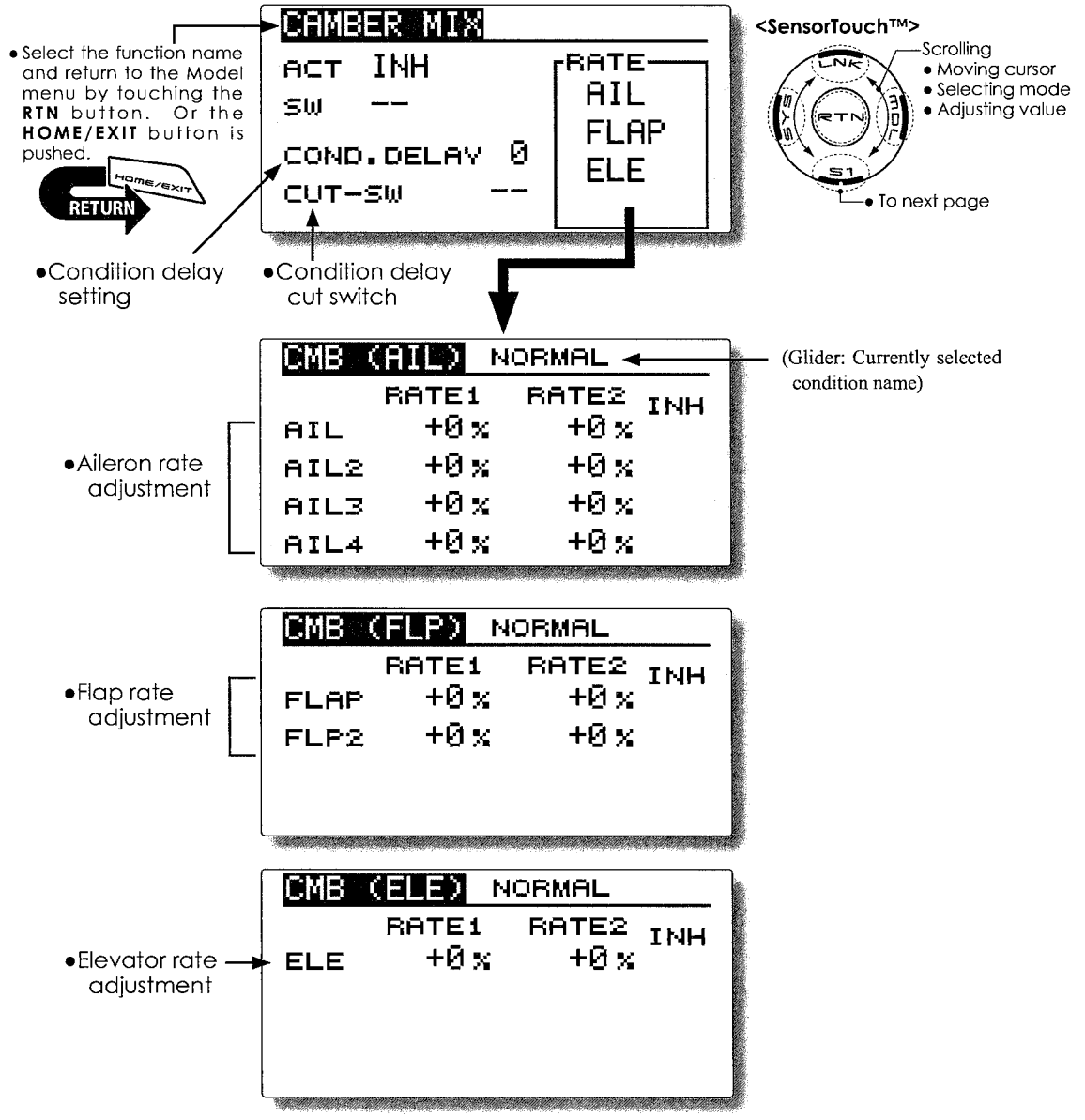
This function adjusts the rate of camber operation for the wing camber (ailerons, camber flaps, brake flaps) in the negative and positive directions. The aileron, flap, and elevator rates can also be adjusted independently and attitude changes caused by camber operation can be corrected.

*Initial setting assigns camber operation to side lever LS.

- The up/down rates of the aileron, flap, and elevator servos can be adjusted. When the mixing direction is reversed by the linkage, adjustments can be made by changing the mixing rate polarity (+ or -).
- Mixing during flight can be turned ON/OFF by setting a switch. (Always ON at [--] setting)
- A condition delay can be set. A cut switch which can turn OFF the delay function can be set.

- Select [CAMBER MIX] at the Model menu and access the setup screen shown below by touching the RTN button.

*The display screen is an example. The actual screen depends on the model type.



Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When setting a switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Condition delay setting

Move the cursor to the [COND.DELAY] item and touch the RTN button to switch to the data input mode. Adjust the condition delay by scrolling the touch sensor.

Initial value: 0

Adjustment range: 0~27

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

When setting a cut switch, move the cursor to the [CUT-SW] item and touch the RTN button to access the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Rate adjustment

The rates are adjusted by accessing the aileron, flap, and elevator rate screens.

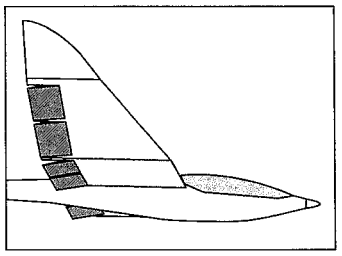
Move the cursor to the rate1 or rate2 item and touch the RTN button to switch to the data input mode. Adjust the rate independently by scrolling the touch sensor.

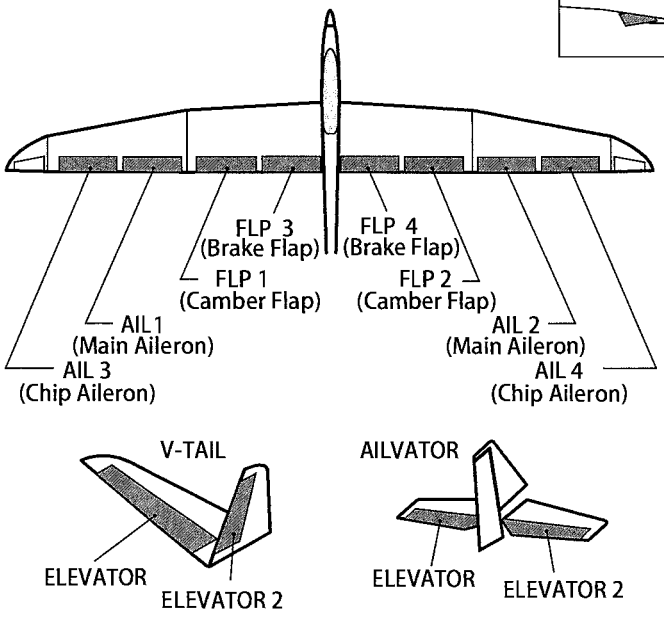
Initial value: 0%

Adjustment range: -100~+100%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.





ELE to CAMBER

[Corresponding model type]: Airplane/glider, 2 ailerons or more

This function is used when you want to mix the camber flaps with elevator operation. When used, the flaps are lowered by up elevator, and lift is increased.

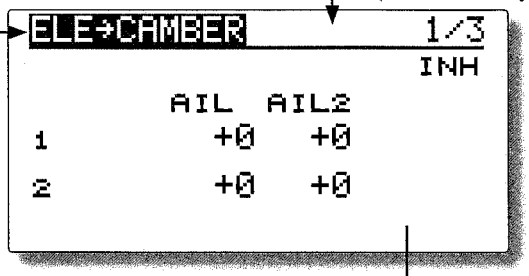
- In-flight mixing can be turned ON/OFF by assigning this to a switch. (Always ON at [--] setting)
- The mixing rate can be adjusted.
- The point that has little effect near the neutral position of the elevator stick can be adjusted. (Glider only)

Note: The elevator on the tailless wing will also be effected when this mix is activated.

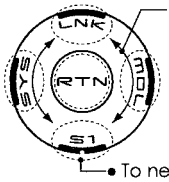
- Select [ELE to CAMBER] at the Model menu and access the setup screen shown below by touching the RTN button.

(Glider: Currently selected condition name)

- Select the function name and return to the Model menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



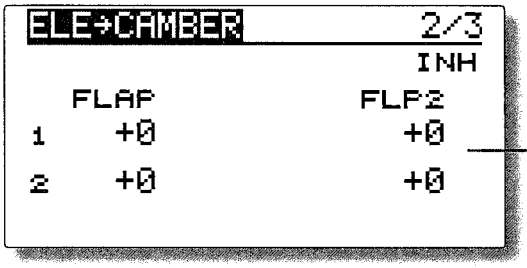
<SensorTouch™>

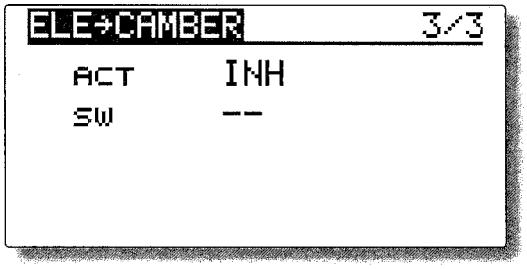


Scrolling
- Moving cursor
- Selecting mode
- Adjusting value

- To next page

*The display screen is an example. The actual screen depends on the model type.





Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When setting a switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Range setting (Glider only)

Move the cursor to the [RANGE] item and hold the elevator stick to the desired position (upper or lower side) and then touch the RTN button for one second to set the range.

*The mixing does not work near neutral of the elevator stick.

Initial value: 0%

Adjustment range: 0~100%

•Mixing rate adjustment

Move the cursor to the up or down mixing rate item for each servo and touch the RTN button to switch to the data input mode. Adjust the rate independently by scrolling the touch sensor.

Initial value: 0%

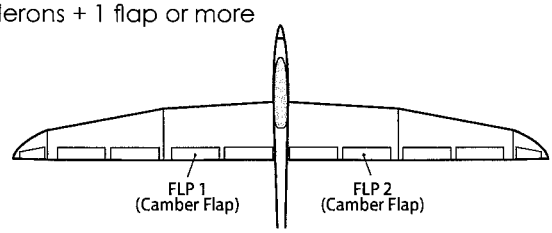
Adjustment range: -100~+100%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

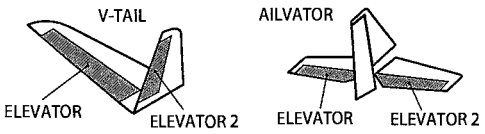
CMBFLP to ELE

[Corresponding model type]: Airplane/glider, 2 ailerons + 1 flap or more

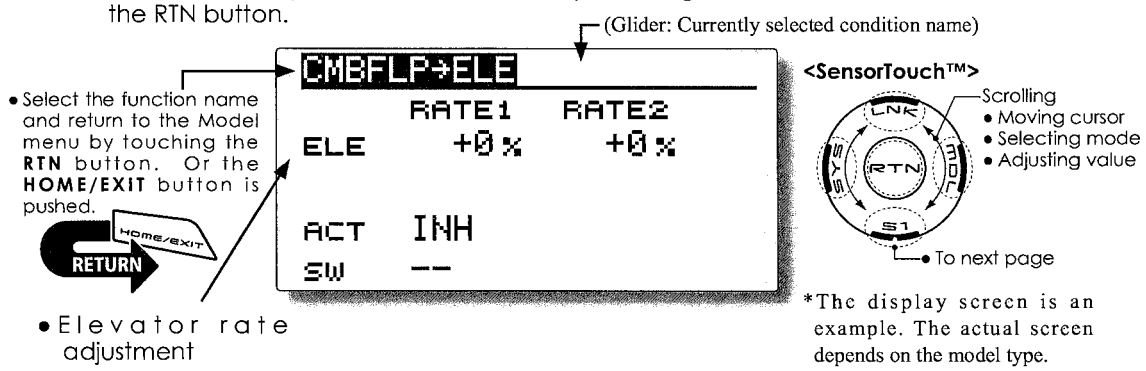


When the camber/speed flaps are utilized, the aircraft might experience, a change in pitch. This mix compensates for such changes by incorporating elevator input.

- The elevator servos up/down rates can be adjusted separately. If the mixing direction is reversed, change the mixing rate polarity (+ or –).
- Mixing during flight can be turned ON/OFF by setting a switch. (Always ON at [--] setting)



- Select [CMBFLP to ELE] at the Model menu and access the setup screen shown below by touching the RTN button.



*The display screen is an example. The actual screen depends on the model type.

Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When setting a switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Mixing rate adjustment

Move the cursor to the RATE1 or RATE2 item and touch the RTN button to switch to the data input mode. Adjust the mixing rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -120~+120%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

BUTTERFLY

[Corresponding model type]: Glider, Normal: 2 ailerons or more
Flying: 2 ailerons + 1 flap or more

This function is utilized to quickly slow the aircraft and reduce altitude by simultaneously raising the left and right ailerons and lowering the flaps (camber flap, brake flap).

Butterfly (Crow) produces an extremely efficient landing configuration by accomplishing the following:

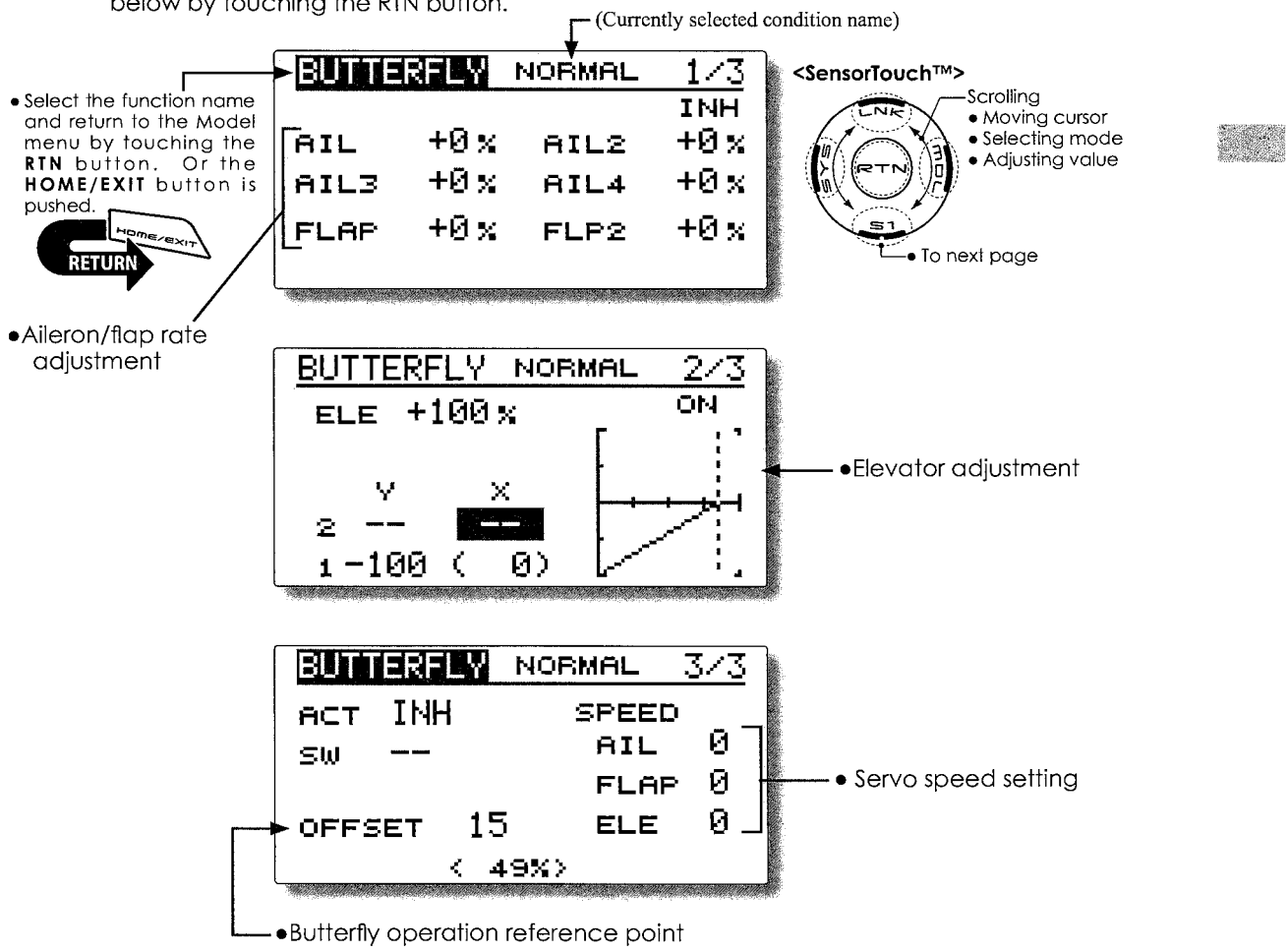
1. Slow the aircraft's velocity.
2. Provide washout at the wing tips to reduce the tendency to tip stall.
3. Create more lift toward the center of the wing allowing it to fly at a slower speed

- Mixing during flight can be turned ON/OFF by setting a switch. (Always ON at [--] setting)
- The point at which the butterfly operation reference point can be offset.
- The operational speed of the ailerons and flaps can be adjusted.
- The differential rate can be adjusted.

*For a description of the setting method, see the aileron differential function.

- Select [BUTTERFLY] at the Model menu and access the setup screen shown below by touching the RTN button.

*The display screen is an example. The actual screen depends on the model type.



Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When setting a switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Rate adjustment

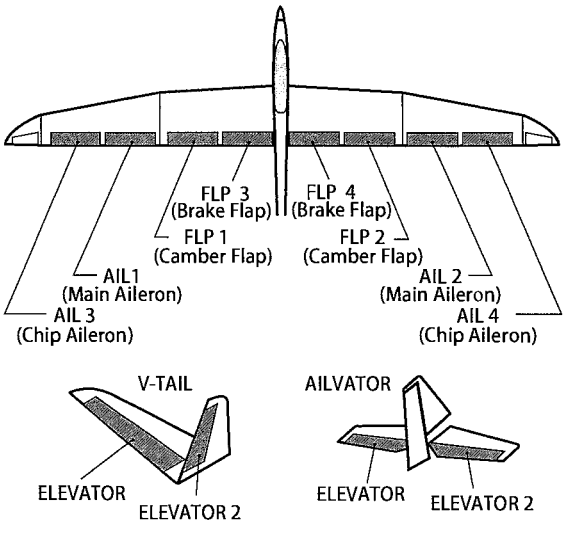
Move the cursor to the aileron, flap or elevator rate item and touch the RTN button to switch to the data input mode. Adjust the rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -200~+200% (Elevator: -120~+120%)

*When the RTN button is touched for one second, the rate is reset to the initial value.)

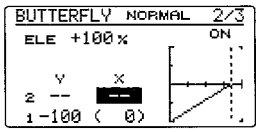
Touch the RTN button to end the adjustment and return to the cursor mode.

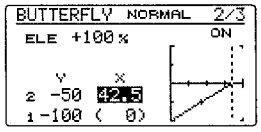


• Elevator compensation curve adjustment

	Output (Y)	Position (X)
Offset point	Fixed (0)	Fixed (offset position)
2- Intermediate point	Settable	Settable
1- End point	Settable	Fixed

* The range where mixing does not work close to the neutral position of the elevator stick can be adjusted. (Glider only)





*When offset is set, the curve is initialized.

•Reference point adjustment

Move the cursor to the [OFFSET] item and hold the airbrake stick to the desired position and then touch the RTN button for one second to set the butterfly operational reference point.

Initial value: 0% (upper side)

Adjustment range: 0~100%

•Servo speed setting

Move the cursor to the aileron, flap or elevator speed item and touch the RTN button to switch to the data input mode.

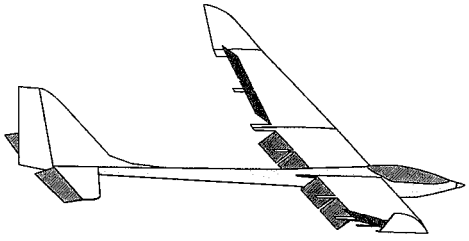
Adjust the rate by scrolling the touch sensor.

Initial value: 0

Adjustment range: 0~27 (maximum delay)

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to activate the function and return to the cursor mode.



This function adjusts the trim offset rates of the ailerons, elevators, and flaps (camber flaps, brake flaps) according to the flight status.

As an example this function can be set up for launching, with speed flaps and ailerons drooped, and a slight amount of up elevator, and can be used for high speed flying, with both ailerons and speed flaps reflexed slightly, and a bit of down elevator.

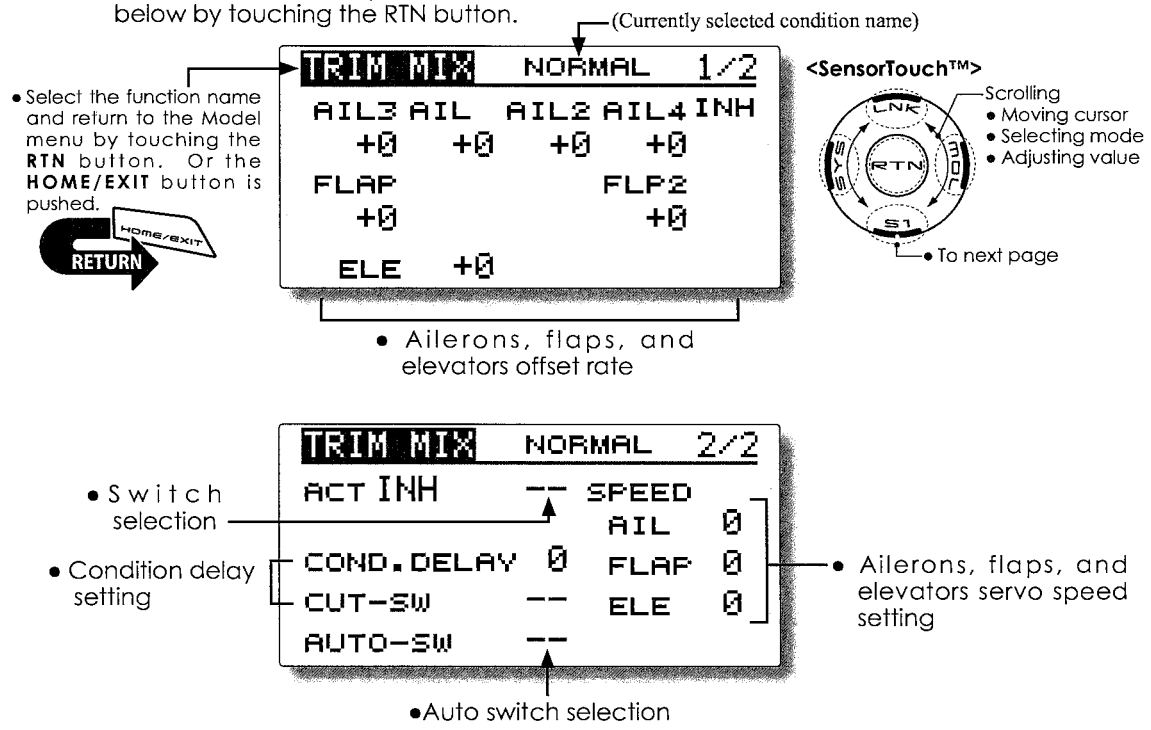
To prevent sudden trim changes when switching flight conditions, a delay can be set to provide a smooth transition between the two conditions. It is also possible to program a cut switch which will turn off the delay.

Furthermore, you can set the auto switch, which will link the trim mix to a stick, switch, or dial.

Additionally, the speed of the aileron, elevator, and flap servos can be adjusted.

*The display screen is an example. The actual screen depends on the model type.

• Select [TRIM MIX] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When setting a switch, move the cursor to the switch item and touch the RTN button to access the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Trim offset rate adjustment

Move the cursor to the aileron, flap or elevator rate item and touch the RTN button to switch to the data input mode. Adjust the rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -250~+250%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

•Condition delay setting

Move the cursor to the [COND.DELAY] item and touch the RTN button to switch to the data input mode. Adjust the condition delay by scrolling the touch sensor.

Initial value: 0

Adjustment range: 0~27

*When the RTN button is touched for one second, the servo operation position is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

When setting a cut switch, move the cursor to the [CUT-SW] item and touch the RTN button to access the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Servo speed setting

Move the cursor to the aileron, flap or elevator speed item and touch the RTN button to switch to the data input mode.

Adjust the rate by scrolling the touch sensor.

Initial value: 0

Adjustment range: 0~27 (maximum delay)

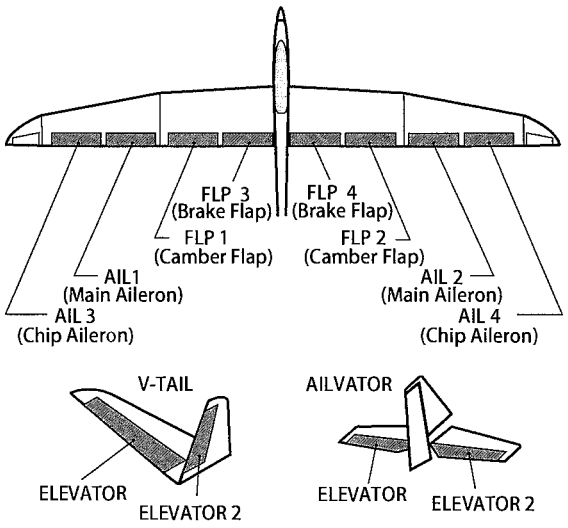
*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to activate the function and return to the cursor mode.

•Auto switch selection

When selecting an auto switch, move the cursor to the [AUTO-SW] item and touch the RTN button to access the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.



This function is used to increase the aircraft's drag and is useful for landing or diving, etc.

The preset elevators and flaps (camber flap, brake flap) offset amount can be activated by a switch.

The offset amount of the aileron, elevator, and flap servos can be adjusted as needed. Also the speed of the aileron, elevator, and flap servos can be adjusted. If the Auto Mode is activated, this will link the Airbrake to a stick, switch, or dial. A separate stick switch or dial can also be set as the ON/OFF switch.

Setting example for F3A and other flaperon specifications

(When 2 ailerons model type selected)

Offset rate:

AIL: [-35~-45%], AIL2: [-35~-45%], ELE: [+5~7%]

Note: The input numerics are examples. Adjust the travel to match the aircraft.

Mode setting:

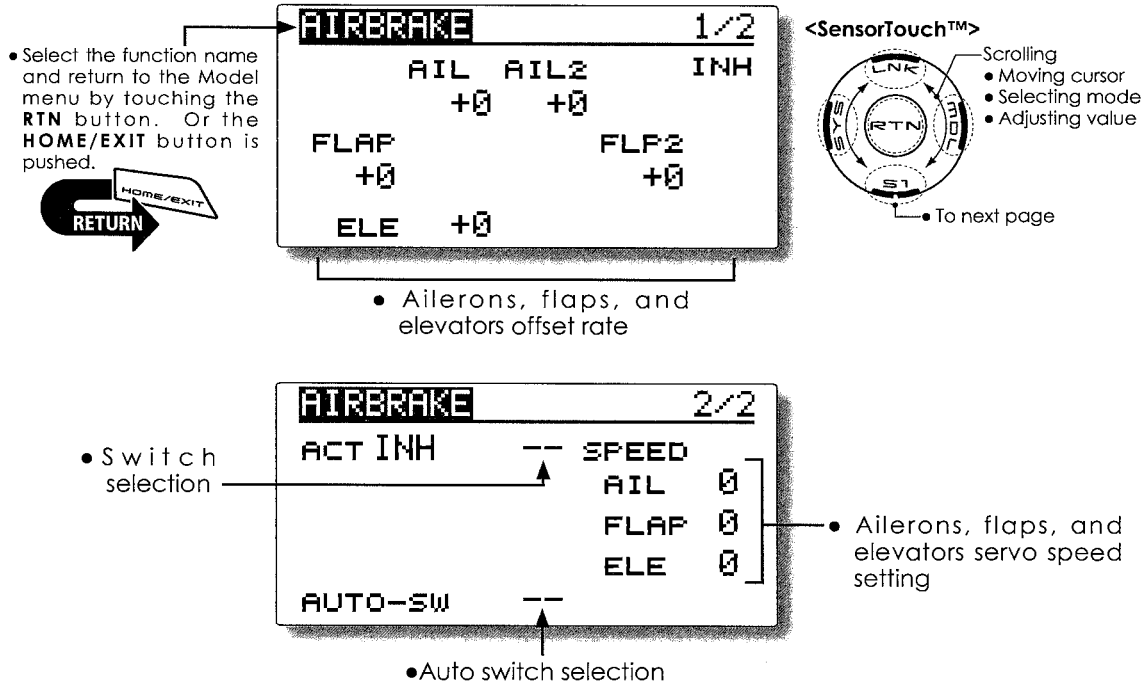
ACT: [ON]

Switch: [SW-C]

AUTO-SW: [–]

• Select [AIRBRAKE] at the Model menu and access the setup screen shown below by touching the RTN button.

*The display screen is an example. The actual screen depends on the model type.



Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When setting a switch, move the cursor to the switch item and touch the RTN button to access the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Offset rate adjustment

Move the cursor to the aileron, flap or elevator rate item and touch the RTN button to switch to the data input mode. Adjust the rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -250~+250%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

•Servo speed setting

Move the cursor to the aileron, flap or elevator speed item and touch the RTN button to switch to the data input mode.

Adjust the rate by scrolling the touch sensor.

Initial value: 0

Adjustment range: 0~27 (maximum delay)

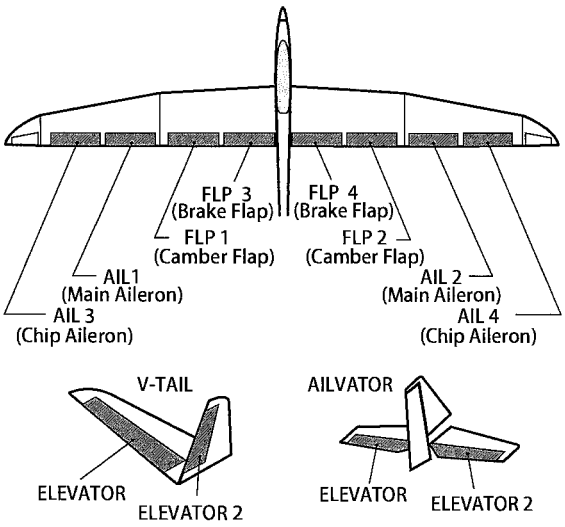
*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to return to the cursor mode.

•Auto switch selection

When setting a auto switch, move the cursor to the [AUTO-SW] item and touch the RTN button to access the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.



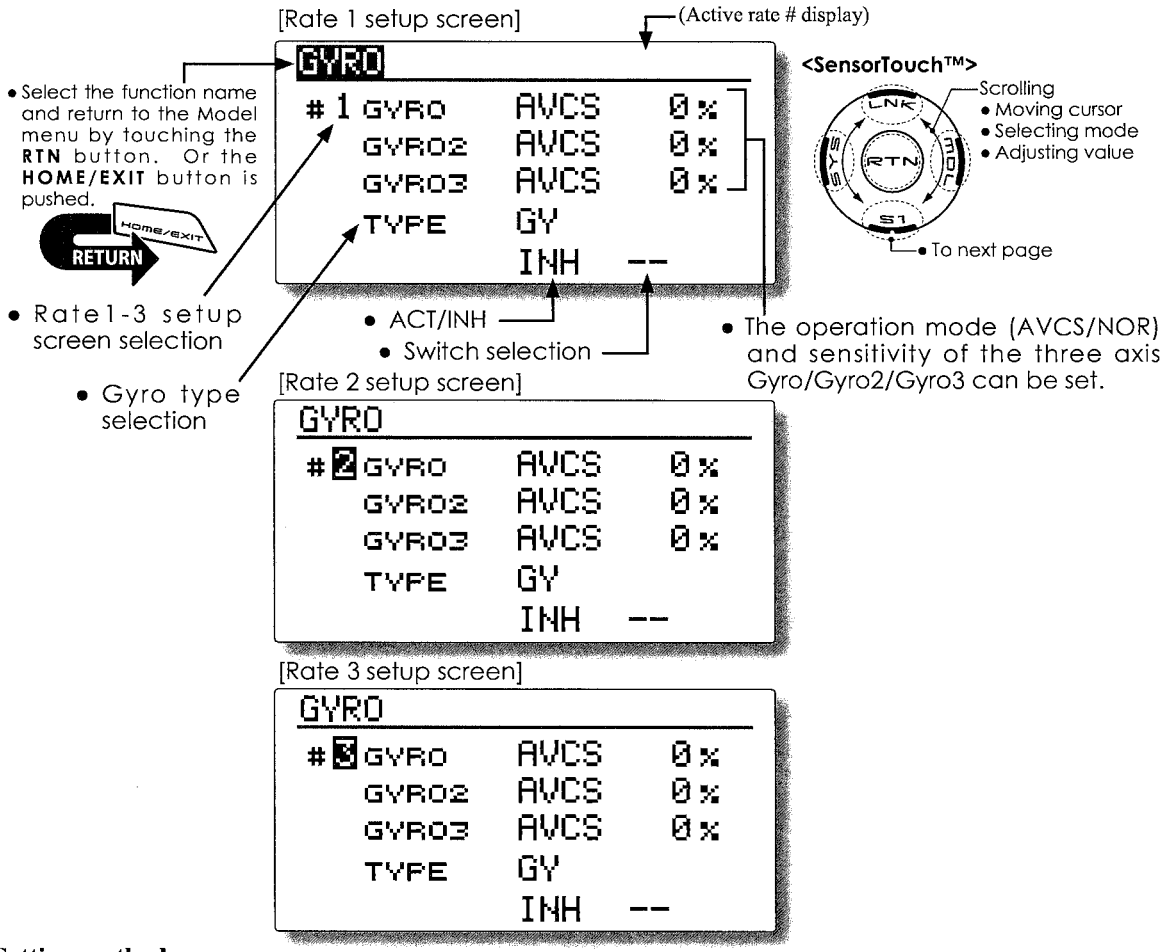
This function is used when a GYA Series gyro is used to stabilize the aircraft's attitude. The sensitivity and operation mode (Normal mode/ AVCS mode) can be changed via a switch.

- Three rates (Rate 1/Rate 2/Rate 3) can be switched.
- Up to 3 axes (Gyro/Gyro 2/Gyro 3) can be simultaneously controlled.

Note: This setting does not assign a sensitivity channel. To do so, use the Linkage menu prior to assigning the sensitivity channel (Gyro/Gyro2/Gyro3), be sure to select an unused channel.

Set the [Control] and [Trim] settings other than Function to [--].

- Select [GYRO] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

*Prior to using the Function menu in the Linkage menu to assign the sensitivity channel (Gyro/Gyro2/Gyro3) select an unused channel.

Set [Control] and [Trim] other than function to [--].

•Rate1-3 setup screen selection

Move the cursor to the setup screen selection item and touch the RTN button to switch to the data input mode. Select the setup screen # by scrolling the touch sensor.

Touch the RTN button to change the setup screen and return to the cursor mode.

•Activate the function

Move the cursor to the [INH] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode.

When setting a rate selection switch, move the cursor to the switch item and touch the RTN button to access the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•Gyro type selection

Move the cursor to the gyro type selection item and touch the RTN button to switch to the data input mode. Select the gyro type by scrolling the touch sensor.

[GY]: When a Futaba GYA gyro is used

[NORM]: When using something other than Futaba GYA gyro is used.

Touch the RTN button to change the gyro type and return to the cursor mode.

*When a Futaba GYA gyro is used and [GY] type is selected, the sensitivity set value is directly read in both the AVCS and NORM modes.

•Operation mode selection (GYA gyro)

Move the cursor to the operation mode selection item and touch the RTN button to switch to the data input mode. Select the operation mode by scrolling the touch sensor.

[AVCS]: AVCS mode

[NORM]: Normal mode

Touch the RTN button to change the operation mode and return to the cursor mode.

•Sensitivity setting

Move the cursor to the sensitivity icon and touch the RTN button to switch to the data input mode.

Adjust the sensitivity by scrolling the touch sensor.

Initial value: 0%

Adjustment range: 0~100%

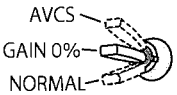
*When the RTN button is touched for one second, the sensitivity is reset to the initial value.)

Touch the RTN button to return to the cursor mode.

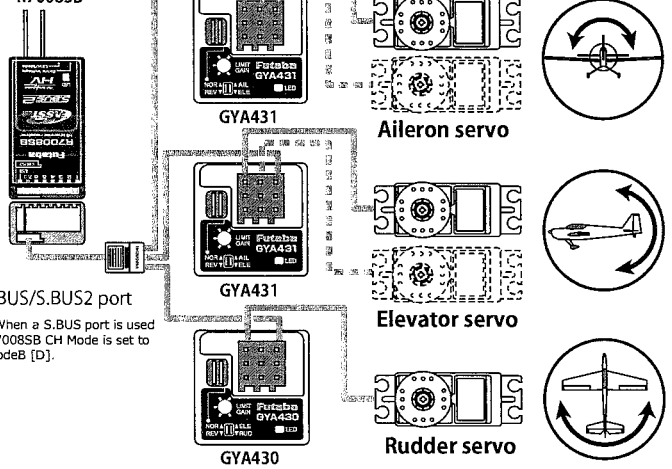
(Example) Setting three axis using a GYA430 and GYA431 (2)

- Wing type: Aileron 2 servos mounted fuselage selected
- Set Gyro 1 (GYA431AIL): CH5, Gyro 2 (GYA431ELE): CH7, Gyro 3 (GYA430RUD): CH8 at the Function menu of the Linkage menu.
- Rate 1 [OFF][GY][SE][NORM][60%][NORM][60%][NORM][60%]
  Rate 2 [INH]
  Rate 3 [OFF][GY][SE][AVCS][60%][AVCS][60%][AVCS][60%]

*Set so that Rate 1 is turned on at the back position of switch E and Rate 3 is turned ON at the front position. Since switch E is turned OFF at the center, Rate 2 remains [INH].

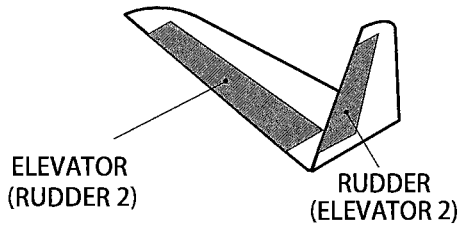


When AVCS is used we recommend that the sensitivity CH be set to the 3-position.

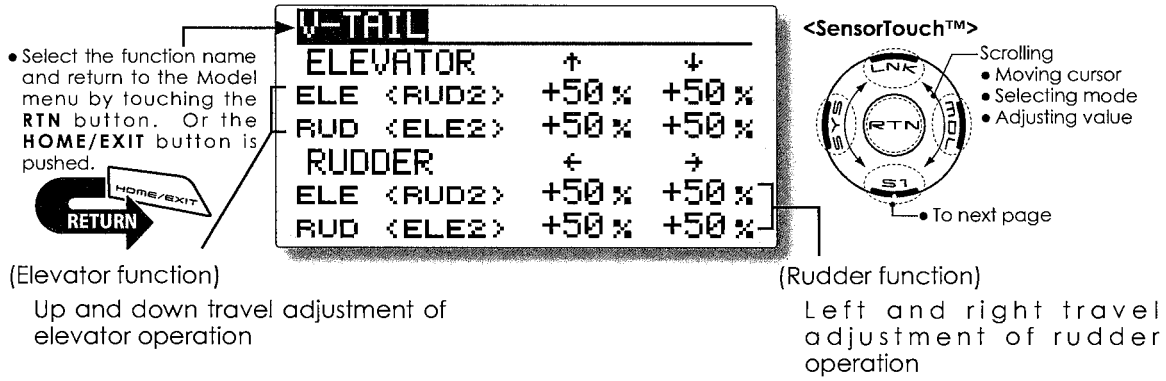


This function enables adjustments for left and right rudder angle changes during elevator and rudder operation of a V-tail airplane.

V-tail is when two servos are used together to control rudder movement as elevators. In addition to each elevator side moving up and down together, each side moves in opposite directions when moving as rudders. On a V-tail, this is also known as a Ruddervator, as they serve the same purpose.



- Select [V-TAIL] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

- **Travel adjustment**

Move the cursor to the item you want to adjust and touch the RTN button to switch to the data input mode.

Adjust the rate by scrolling the touch sensor.

Initial value: +50%

Adjustment range: -120~+120%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to return to the cursor mode.

*If the mixing direction is reversed, adjustments can be made by changing the mixing rate polarity (+ or -).

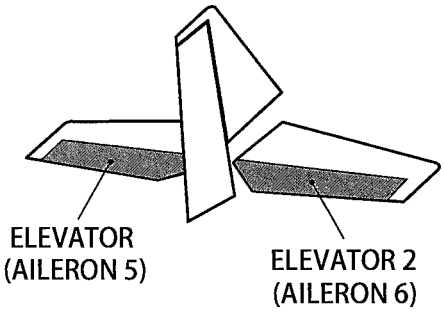
*If a large value of travel is specified, when the sticks are moved at the same time, the controls may bind or run out of travel. Decrease the travel until no binding occurs.

AILEVATOR

[Corresponding model type]: Airplane/glider, Ailevator
(Effective only when 2 servos used at the elevators)

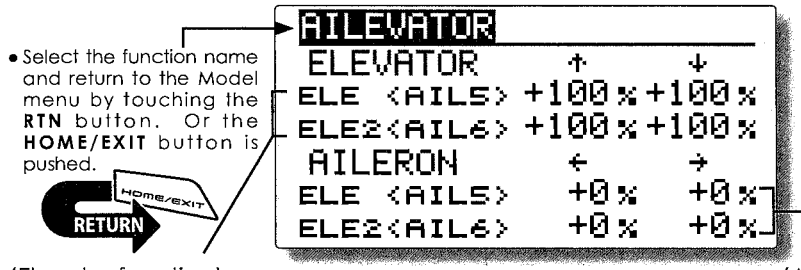
This function improves the performance of the roll axis by operating the elevators as ailerons.

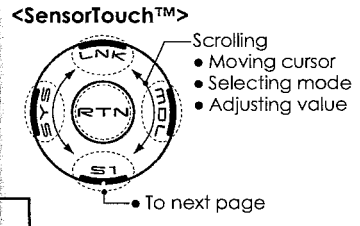
Ailevator is where each elevator in a standard (conventional) or v-tail moves independently, like ailerons on a wing. In addition to each elevator side moving up and down together, each side moves in opposite directions when moving as an Ailevator. On a V-tail, this is also known as a Ruddervator, as they can serve the same purpose. Typically, both Ailevator and ailerons are coupled together to maximize roll performance, especially on larger wingspan planes.



Note: Select Ailevator as the Model Type at the Model Type screen. This changes the output channel. Check the Function menu.

- Select [AILEVATOR] at the Model menu and access the setup screen shown below by touching the RTN button.





(Elevator function)

- The up and down rate of both elevators when the elevator stick is moved can be individually adjusted.

(Aileron function)

- When the elevators are used as ailerons, aileron travel of the left and right elevators can be adjusted.

Setting method

- **Travel adjustment**

Move the cursor to the item you want to adjust and touch the RTN button to switch to the data input mode.

Adjust the rate by scrolling the touch sensor.

Initial value: ELE: +100%, AIL: 0%

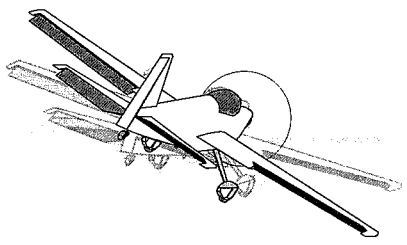
Adjustment range: -120~+120%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to return to the cursor mode.

*If the mixing direction is reversed, adjustments can be made by changing the mixing rate polarity (+ or -).

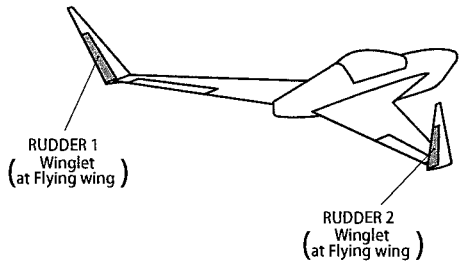
*If a large value of travel is specified, when the sticks are moved at the same time, the controls may bind or run out of travel. Decrease the travel until no binding occurs.



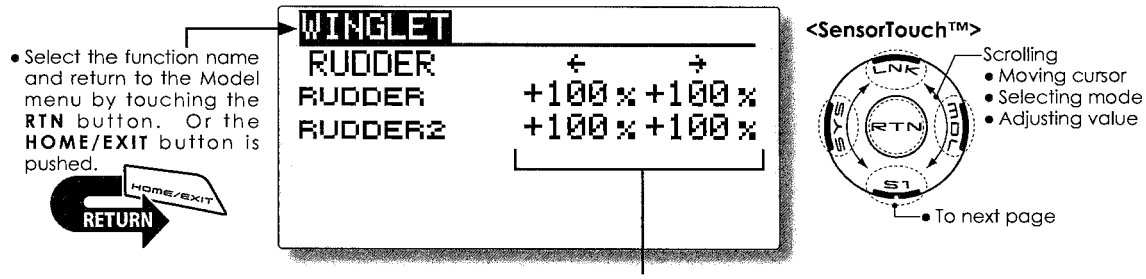
This function adjusts the left and right rudder angles of airplanes with winglets.

Winglets are used to improve the efficiency of aircraft by lowering the lift-induced drag caused by wingtip vortices. The winglet is a vertical or angled extension located at the tip of each wing.

Winglets work by increasing the effective aspect ratio wing without adding greatly to the structural stress and hence necessary weight of its structure - an extension of wing span would also permit lowering of induced drag, though it would cause parasitic drag and would require boosting the strength of the wing and hence its weight. There would come a point at which no overall useful gains would be made. A winglet helps to solve this by effectively increasing the aspect ratio without adding to the span of the wing.



- Select [WINGLET] at the Model menu and access the setup screen shown below by touching the RTN button.



(Rudder 1/2)

- The travel during rudder stick operation can be individually adjusted.

Setting method

- **Travel adjustment**

Move the cursor to the item you want to adjust and touch the RTN button to switch to the data input mode.

Adjust the rate by scrolling the touch sensor.

Initial value: +100%

Adjustment range: -120~+120%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to return to the cursor mode.

*If the mixing direction is reversed, change the mixing rate polarity (+ or -).

MOTOR

[Corresponding model type]: Airplane/glider, general

This function lets you set the speed when the motor of an F5B or other EP glider is started via a switch. The operation speed can be set for two ranges, slow speed flight and high speed flight (Speed 1/Speed 2). This function can also be operated as a safety function by programming it to a switch.

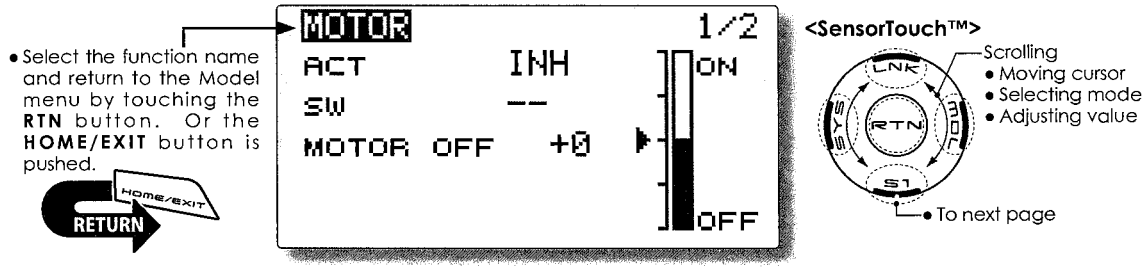
- The In side and Out side operating speeds can be adjusted independently in 2 ranges (Speed 1/ Speed 2).
- The boundary between the 2 ranges can be set. (From Speed 1 to Speed 2)
- The operational speed can only be activated at the initial operation. However, operation can be repeated by setting the switch to OFF before the operation is finished. When you want to reset one time operation, set the ACT/INH item to [INH] and then reset it to [ON].
- The motor channel is controlled by SW-G. (Glider: Initial setting) When changing the switch or stick which controls the motor, first change Function of the Linkage menu.
- If the Model Type selected is Airplane, the MOTOR function is changed from INH to ON and it is not assigned to another channel, the changes from the throttle channel to the motor channel are enabled.

Note: Initial setting does not assign a motor channel according to the model type. Prior to assigning the motor channel, find an unused channel. Then, use the Function menu of the Linkage menu.

Set [Control] to the switch you want to use and [Trim] to [--].

Note: When using this function, always check the initial operation with the propeller removed.

- Select [MOTOR] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

• Activate the function

When using this function, move the cursor to the [ACT/INH] item and touch the RTN button to switch to the data input mode. Select the [ACT] by scrolling the touch sensor and touch the RTN button.

When selecting the ON/OFF switch, move the cursor to the switch item and touch the RTN button to access the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

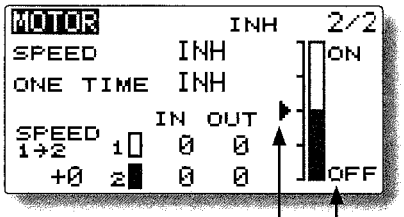
*For a description of the switch selection method, see the description at the back of this manual.

• Motor off position setting

Move the cursor to the [MOTOR OFF] item and touch the RTN button for one second when the motor function switch (SG, etc.) is in the motor OFF position you want to set. The direction of the motor switch is memorized. The screen graph display OFF direction also changes.

Note:

- **First decide the motor OFF direction, and then set the speed. When you want to reset the motor OFF direction, also reset the speed.**
- **We recommend that Motor OFF be set in combination with F/S.**
- **Set the basic operation direction with the Reverse function to match the ESC used.**
- **Always set the Motor OFF position.**



• ON/OFF direction

• Motor function switch current position

Setting method

• Activate the motor speed function

When using motor speed function, move the cursor to the [INH] item and touch the RTN button to switch to the data input mode. Select the [ACT] by scrolling the touch sensor and touch the RTN button.

• Sifting the boundary between the 2 ranges

Move the cursor to the [SPEED 1>2] item and touch the RTN button to switch to the data input mode.

Adjust the boundary position by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -100~+100%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to return to the cursor mode.

• Operation speed adjustment

Move the cursor to the [IN] (on to off) or [OUT] (off to on) item and touch the RTN button to switch to the data input mode.

Adjust the operation speed you want to set by scrolling the touch sensor.

Initial value: 0

Adjustment range: 0~27

*When the RTN button is touched for one second, the rate is reset to the initial value.)

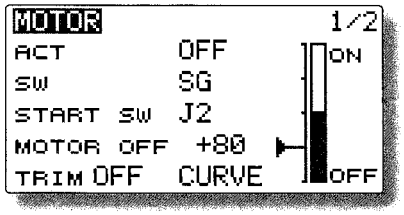
Touch the RTN button to return to the cursor mode.

• Set/Reset the one time operation

Move the cursor to the [ONE TIME] item and touch the RTN button to switch to the data input mode.

Select the [ACT] by scrolling the touch sensor and touch the RTN button to set the one time operation.

*When you want to reset one time operation, set the ACT/INH item to [INH] and then reset it to [ON].



•Start switch function

When active, the "START SW" allows the motor's state to change from OFF to ON. The motor is ON when the main SW and "START SW" are turned ON simultaneously. The motor changes to OFF only when the main SW is turned off. If "START SW" is turned OFF but the main SW is still ON, the motor remains ON.

[START SW function example]

When the throttle (motor) stick is assigned as the "START SW", and the low throttle position of the throttle curve is adjusted, the motor starts operating with the initial stick movement. The motor will not cease functionality even if the stick position is returned to it's lowest setting.

•Trim effect / invalid setting in motor OFF

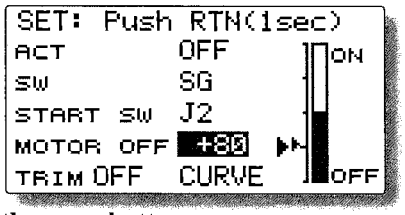
If one of the trim levers is assigned to the Motor function, it is possible to turn the motor off with the trim lever. To maintain compatibility after updating the T14SG/S, the trim setting is adjusted to the on position. However, it is suggested to return it to the off position accordingly in the programming of the transmitter.

*Data Reset will return the trim setting to the off position.

•Screen at the time of the motor OFF setting

When the MOTOR OFF setting is highlighted, you will note the presence of the small cursor that indicates the MOTOR OFF position. To adjust this MOTOR OFF position, use the throttle stick to move the cursor accordingly. When satisfied with this position, press and hold the RTN button on the transmitter.

*The larger cursor is used to indicate the output of the motor channel. This cursor reflects any throttle curves and motor mixing which may be active.



•Throttle curve button

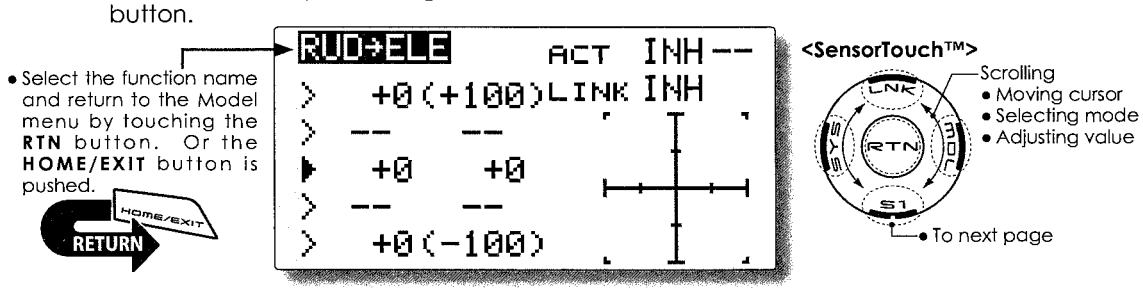
When "CURVE" button is chosen, a throttle curve screen opens.

*When a throttle function is assigned to either channel, the "CURVE" button is not displayed because a throttle curve does not function as a motor curve.

This function is used when you want to mix elevator operation with rudder operation. It is used to correct undesirable tendencies when rudder is applied in rolling maneuvers such as, knife edge flight.

- Mixing during flight can be turned ON/OFF by setting a switch. (Always ON at [--] setting)
- Link mixing can be set: Links this mix to other mixes.

- Select [RUD to ELE] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

•Activate the function

Move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode. Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the function and return to the cursor mode. (ON is displayed.)

When selecting a switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Select the switch and set its ON direction. (Always ON at "--" setting)

*For a description of the switch selection method, see the description at the back of this manual.

•5-point curve setting (airplane)

[Curve rate setting]

1. Move the cursor to the curve rate setting item (left side) you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the rate by scrolling the touch sensor.

   Adjustment range: -100%~+100%

   *When the RTN button is touched for one second, the rate is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point.

[Moving curve point]

1. Move the cursor to the curve point setting item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the curve point by scrolling the touch sensor.

   Adjustment range: Up to 2.5% in front of the adjoining point

   *When the RTN button is touched for one second, the curve position is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point.

[Deleting/returning curve point]

Move the cursor to the curve point setting item you want to delete/return and touch the RTN button for one second.

•Link mode setting

When selecting the link mixing, move the cursor to the [LINK] item and touch the RTN button to switch to the data input mode. Select the ON mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to set the link mode and return to the cursor mode.

SNAP ROLL

[Corresponding model type]: Airplane, general

This function selects the switch and rate adjustment of ailerons, elevators, and rudder when a snap roll is performed.

- Four snap roll directions can be set. (Right/up, right/down, left/up, left/down)
- Operation mode: When [Master] mode is selected, the Snap Roll function is turned ON/OFF by the master switch. It is possible to set the direction switch was switched to the direction in which you want to snap roll. When [Single] mode is selected, the snap roll in each direction can be executed by means of independent switches and positions.
- A safety switch can be set to prevent the inadvertent activation of the snap roll. For example, the landing gear is lowered, even if the switch is turned on accidentally the snap roll would not be executed. The snap roll switch is activated only when the safety switch is OFF.

(Example) Setting example for F3A

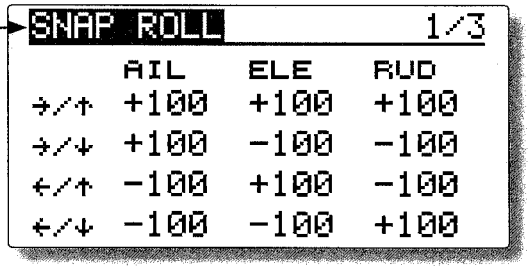
- Mode: [Master]
- Safety SW: [SG] (Safety measure)
- Master SW: [SH] (Main switch for executing snap roll)
- Direction switches:

*The snap roll up side left and right and down side left and right direction switches are selected here.

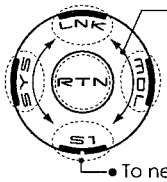
Right/Up: OFF [SD]
Right/Down: OFF [SD]
Left/Up: OFF [SA]
Left/Down: OFF [SA]

- Select [SNAP ROLL] at the Model menu and access the setup screen shown below by touching the RTN button.

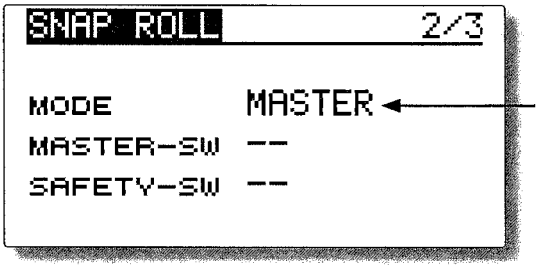
- Select the function name and return to the Model menu by touching the **RTN** button. Or the **HOME/EXIT** button is pushed.



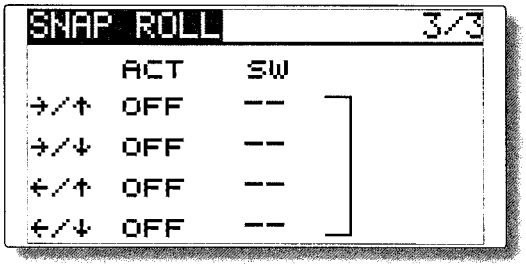
<SensorTouch™>



- Scrolling
- Moving cursor
- Selecting mode
- Adjusting value
- To next page



- Master/single mode selection



- Direction switches

Setting method

•Master/single mode selection

Move the cursor to the [MODE] item and touch the RTN button to switch to the data input mode. Select the master or single mode by scrolling the touch sensor.

*The display blinks.

[MASTER]: Master mode

[SINGLE]: Single mode

Touch the RTN button to select the mode and return to the cursor mode.

When setting a master switch, move the cursor to the [MASTER-SW] item and touch the RTN button to access the selection screen. Select the switch and set its ON direction.

*For a description of the switch selection method, see the description at the back of this manual.

When setting a safety switch, move the cursor to the [SAFETY-SW] item and touch the RTN button to access the selection screen. Select the switch and set its ON direction.

•Direction switch selection

Move the cursor to the direction switch item and touch the RTN button to access the selection screen. Select the switch and set its ON direction.

*For a description of the switch selection method, see the description at the back of this manual.

•Rate adjustment

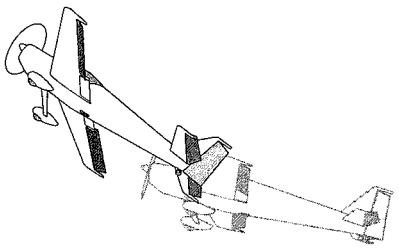
Move the cursor to the aileron, elevator or rudder item for each direction and touch the RTN button to switch to the data input mode. Adjust the rate independently by scrolling the touch sensor.

Initial value: (Dependent upon the snap roll direction)

Adjustment range: -150~+150%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.



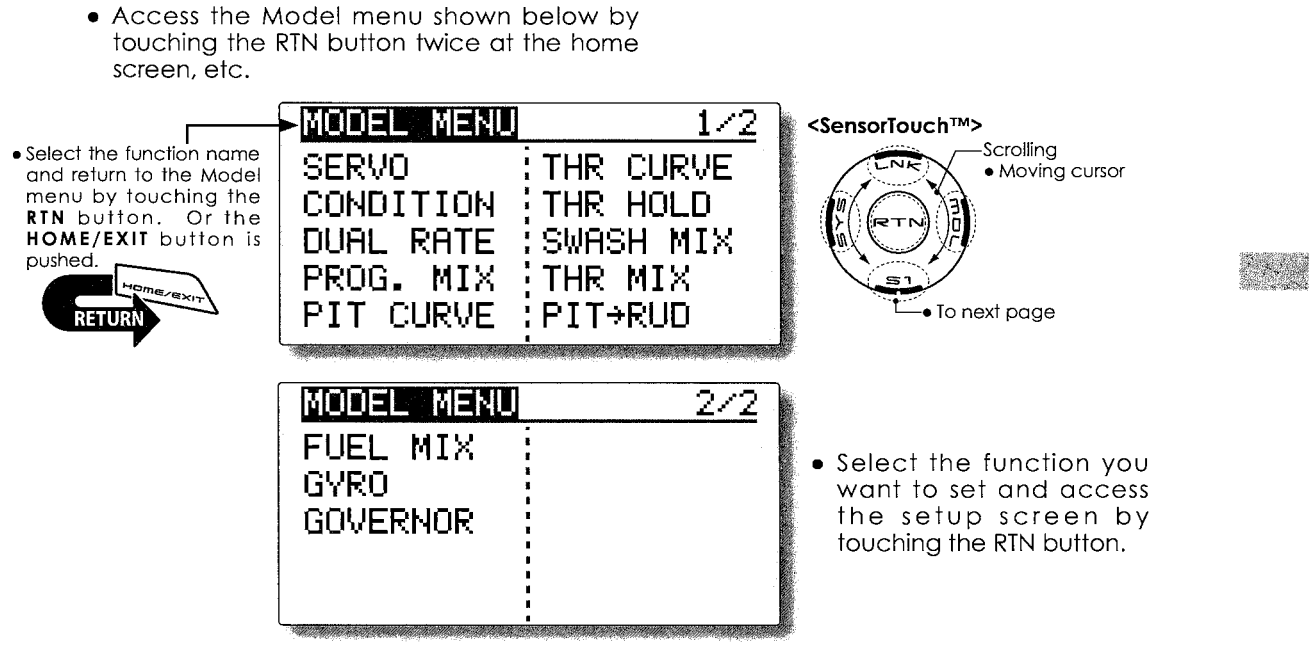
MODEL MENU (HELICOPTER)

This section contains information on the commands that apply to helicopters only. For instructions on Airplanes and Sailplanes, refer to the sections pertaining to those aircraft.

Use the Model Type function in the Linkage Menu to select the swash type matched to the respective aircraft.

Also, activate/deactivate flight conditions according to your model. To do so, access at the Condition Select screen prior to adjusting the model's parameters. (Up to five conditions can be used)

The Dual Rate function and other functions common to all model types have already been described elsewhere in this manual. Please refer to these respective sections for information on how to do so.



Model Menu functions (helicopter) list

PIT CURVE: Adjusts pitch settings in different flight conditions

THR CURVE: Throttle curve and hovering trim adjustment in different flight conditions

THR HOLD: Moves the throttle to idle during autorotation

SWASH MIX: Compensates control response in different flight conditions

THROTTLE MIX: Compensates for power loss when cyclic applied

PIT to NEEDLE: Adjusts pitch response in different flight conditions

PIT to RUD: Compensates torque changes from pitch angle inputs

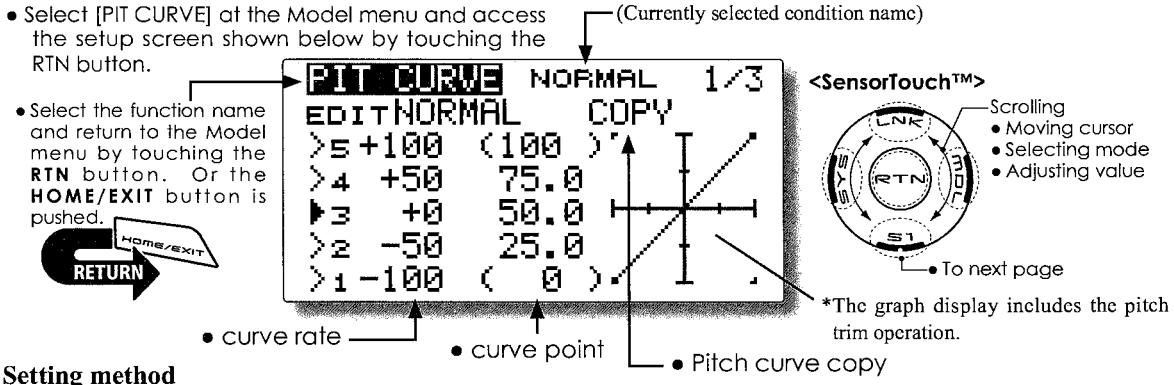
GYRO: Used to switch gyro sensitivity

GOVERNOR: Used to switch RPM of the helicopter's head

Pitch Curve

This function adjusts the pitch operation curve for each flight condition to optmize the model's performance in relationship to the throttle stick position.

*A simple curve can be created by reducing the number of input points to two or three, and then entering the specified value at the corresponding points.



Setting method

•5-point curve setting

[Curve rate setting]

1. Move the cursor to the curve rate setting item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the rate by scrolling the touch sensor.

   Initial value: P1: -100%, P2: -50%, P3: 0%, P4: +50%, P5: +100%

   Adjustment range: -100%~+100%

   *When the RTN button is touched for one second, the rate is reset to the initial value.

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point as desired.

[Moving curve point]

1. Move the cursor to the curve point setting item you want to adjust and touch the RTN button to switch to the data input mode.

   Adjust the curve point by scrolling the touch sensor.

   Initial value: P1: (0%), P2: 25%, P3: 50%, P4: 75%, P5: (100%)

   Adjustment range: Up to 2.5% in front of the adjoining point

   *When the RTN button is touched for one second, the curve position is reset to the initial value.)

   Touch the RTN button to end the adjustment and return to the cursor mode.

2. Repeat this procedure for each point as desired.

[Deleting/returning curve point]

1. Move the cursor to the curve point setting item you want to delete/return and touch the RTN button for one second.

•Pitch curve copy function

Move the cursor to COPY and touch the RTN button to switch to the data input mode. Select the copy destination condition by scrolling the touch sensor and touch the RTN button. Select the [YES] and touch the RTN button.

Normal curve adjustment

*For normal curve, create a basic pitch curve centered about hovering. Use this function together with the THR Curve (Normal) function and adjust the curve so that up/down control is best at a constant engine speed.

Idle up curve adjustment

*For the high side pitch curve, set the maximum pitch so that it does not overload the engine. For the low side pitch curve, create curves matched to loop, roll, 3D, and other purposes and use the idle up curves according to the performance.

Throttle hold curve adjustment

*The throttle hold curve is used when executing auto rotations.

Operation precautions

⚠Warning

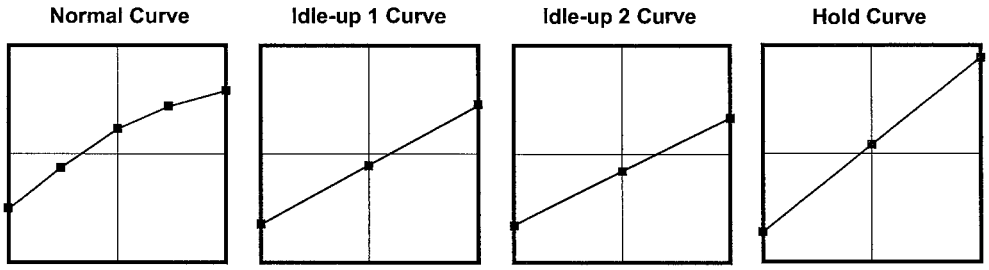
❗When actually starting the engine and flying, always set the idle up condition switch to OFF and start the engine at idle.

Curve setting examples

The screens shown below are curves created by entering the pitch rate at low, center, and high side (3 points or 5 points) at each condition.

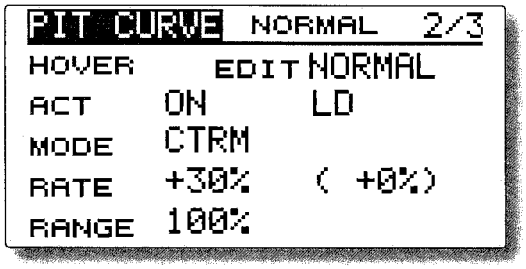
When actually creating a curve, input the rate specified by the model (or the reference value).

•Pitch Curve (Example)



Pitch Trim (Hovering pitch, high pitch, low pitch)

[Hovering pitch trim setting]



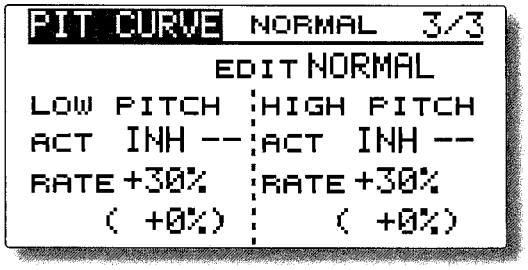
Hovering pitch trim

The Hovering Pitch trim function trims the pitch near the hovering point. Normally, it is used with the hovering condition. The hovering pitch can be fine tuned for changes in rotor speed accompanying changes in temperature, humidity, and other flight conditions. Adjust the hovering pitch so that rotor speed is constant. This function can be used together with the Hovering Throttle Trim function for more precise operation.

Setting method

- Set the function to ACT [ON]. (initial setting)
- Select the adjustment knob.
  Selection example: LD (initial setting)
- The trim operation mode (Mode: CTRM/NORM) can be selected.
  CTRM mode: Maximum amount of change near center by center trim operation (recommended)
  NORM mode: Normal trim (parallel movement trim) operation. The advantage of using this mode is that the hovering pitch can be adjusted without changing the curve.
- The trim rate can be adjusted and the operation direction can be changed.
- Trim adjustment range (Range) setting
  When this value is made small, trim can only be used near the center.

[Low/High pitch trim setting]



High Pitch/Low Pitch Trim

High Pitch/Low Pitch Trim is the pitch servo high side and low side trim function.

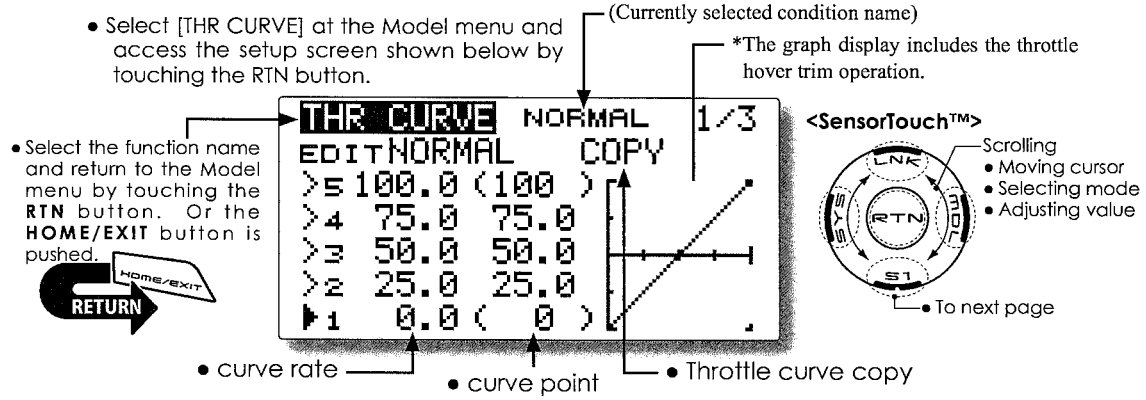
Setting method

- Set the function to ACT (ON).
- Select the adjustment knobs.
  Selection example: LS (high side), RS (low side)
- The trim rate can be adjusted and the operation direction can be changed.
- Trim acts as high side or low side trim with the center as the standard.

Throttle Curve

Throttle curve function adjusts the throttle operation curve for each condition to optimize the engine speed to throttle stick movement.

The Throttle Hover function trims the throttle near the hovering point. Normally, use it with hovering conditions. Changes in rotor speed accompanying changes in the temperature, humidity, and other flight conditions can be trimmed. Adjust the throttle so that rotor rotation is most stable. More precise trimming is also possible by using this function along with the Hover Pitch function.



Setting method

•5-point curve setting

[Curve rate setting]

1. Move the cursor to the curve rate setting item you want to adjust and touch the RTN button to switch to the data input mode.
   Adjust the rate by scrolling the touch sensor.
   Initial value: P1: 0%, P2: 25%, P3: 50%, P4: 75%, P5: 100%
   Adjustment range: 0%~100%
   *When the RTN button is touched for one second, the rate is reset to the initial value.)
   Touch the RTN button to end the adjustment and return to the cursor mode.
2. Repeat this procedure for each point as desired.

[Moving curve point]

1. Move the cursor to the curve point setting item you want to adjust and touch the RTN button to switch to the data input mode.
   Adjust the curve point by scrolling the touch sensor.
   Initial value: P1: (0%), P2: 25%, P3: 50%, P4: 75%, P5: (100%)
   Adjustment range: Up to 2.5% in front of the adjoining point
   *When the RTN button is touched for one second, the curve position is reset to the initial value.)
   Touch the RTN button to end the adjustment and return to the cursor mode.
2. Repeat this procedure for each point as desired.

[Deleting/returning curve point]

1. Move the cursor to the curve point setting item you want to delete/return and touch the RTN button for one second.

•Throttle curve copy function

Move the COPY item and touch the RTN button to switch to the data input mode. Select the copy destination condition by scrolling the touch sensor and touch the RTN button. Select the [YES] and touch the RTN button.

Normal curve adjustment

*Normal curve creates a basic curve centered around hovering. Use it along with the normal pitch curve and adjust so that up/down control results in a constant engine speed.

Idle up curve adjustment

*Set a idle up curve that maintains a constant speed at all times, even during operation which reduces the pitch performed in flight. Create a curve matched to loop, roll, 3D, or other purposes and the idle up curve according to the performance.

Operation precautions

⚠Warning

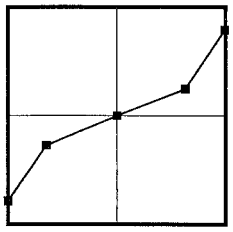
❗When actually starting the engine and flying, always set the idle up condition switch to OFF and start the engine at the idle.

Curve setting examples

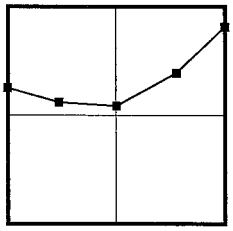
The curves shown below are created by inputting the data of the 5 points 0% (low side), 25%, 50% (center), 75%, 100% (high) side for each condition. When actually creating a curve, enter the parameters specified per the model (or the reference value).

•Throttle Curve (Example)

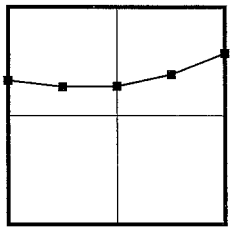
Normal Curve



Idle-up 1 Curve

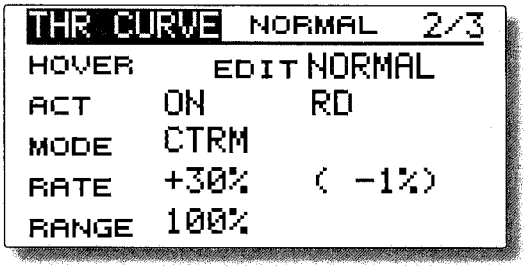


Idle-up 2 Curve



Throttle Hover trim

[Throttle hover trim setting]



Setting method

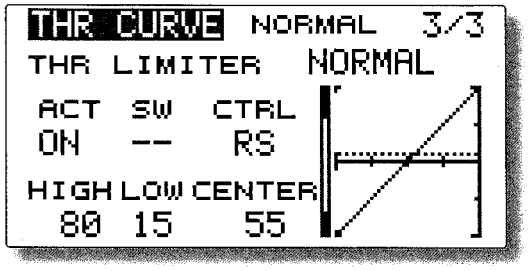
- Set the function to ACT ([ON]). (initial setting)
- Select the adjustment knob.
  Selection example: RD (initial setting)
- The trim operation mode (Mode: CTRM/ NORM) can be selected.
  CTRM mode: Maximum rate of change near center by center trim operation (recommended)
  NORM mode: Normal trim (horizontal movement trim) operation.
- The trim rate can be adjusted and the operation direction can be set.
- Trim adjustment range (Range) setting
  With smaller values, the trim is only active near the center.

Throttle limiter function

This function limits the high range of the throttle movement by any slider or trimmer.

*Control which adjusts the limit point during flight can be set.

[Throttle limiter setting]



Setting method

*Set at the 3rd page of the throttle curve screen.

•Activate the function.

1. Select ACT and touch the RTN button.
2. Switch the display to ACT by scrolling the touch sensor.

*The display blinks.

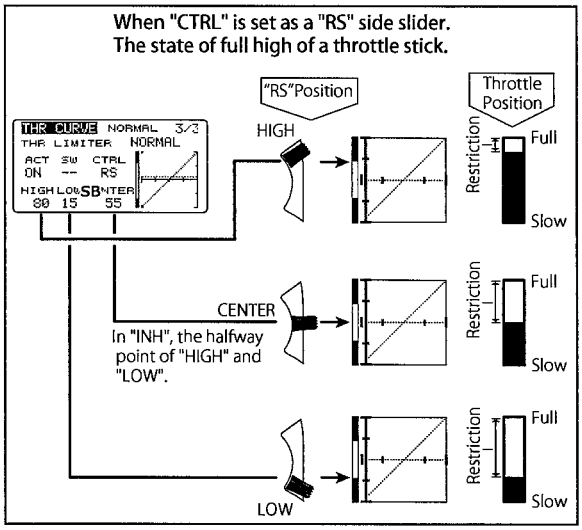
INH: Inhibit

ACT: Activate

3. Enter the selection by touching the RTN button.

•ON/OFF switch setting

1. Select SW and touch the RTN button.
2. The H/W SET screen is displayed. Select the hardware and touch the RTN button.



•High side operating range setting

1. Select HIGH and touch the RTN button.
2. Adjust the high side operating range by scrolling the touch sensor.

*A gauge is displayed at the left side of the graph.

3. Touch the RTN button to switch to the cursor mode.

•Low side operating range setting

1. Select LOW and touch the RTN button.
2. Adjust the low side operating range by scrolling the touch sensor.

*A gauge is displayed at the left side of the graph.

3. Touch the RTN button to switch to the cursor mode.

•Limiter operating range adjustment control setting

1. Select CTRL and touch the RTN button.
2. The H/W SET screen is displayed. Select the hardware and touch the RTN button.

*The throttle limiter operating position is indicated by a dotted line on the graph.

*When limiter operating range adjustment control is NULL, the throttle limiter function is not performed.

•Changing the control center position

1. Select CENTER and touch the RTN button for 1 second. CENTER changes from INH to "rate display".
2. When the CENTER rate is changed, the neutral position of the hardware set at CTRL can be adjusted.

*When CENTER is INH, the neutral position becomes the LOW intermediate value.

*When CENTER is changed from INH to "rate display", the CENTER rate is set to the LOW intermediate value.

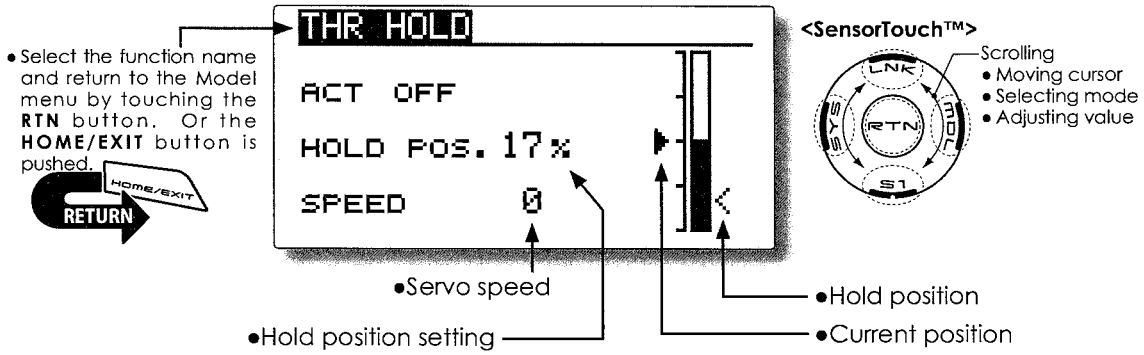
*The CENTER rate can be set between HIGH and LOW.

THR HOLD

This function sets the throttle cut position for auto rotation. The throttle servo operating speed can be adjusted. (Speed)

Note: Initially, this setting does not assign the throttle hold switch. Prior to adjusting the parameters for the throttle hold, we suggest designating a throttle hold switch. To do so, access the Condition menu within the Model menu options.

- Select [THR HOLD] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

•Hold condition switch selection

Use the Condition select menu of the Model menu to assign the hold condition switch.

Selection example: SG

•Hold position adjustment

Move the cursor to the hold position item and touch the RTN button to switch to the data input mode.

Adjust the rate by scrolling the touch sensor.

Initial value: 17%

Adjustment range: 0%~50%

*Hold position sets the throttle cut position. Adjust it so that the carburetor is completely closed.

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

•Servo speed setting

Move the cursor to the servo speed item and touch the RTN button to switch to the data input mode.

Adjust the rate by scrolling the touch sensor.

Initial value: 0

Adjustment range: 0~27 (maximum delay)

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to return to the cursor mode.

Operation precautions

⚠Warning

❗When actually starting the engine and flying, always set the idle up condition switch to OFF and start the engine at idle.

SWASH MIX

Example of use

- As an example, use swash mixing to correct undesirable roll tendencies.
- For a condition which uses AIL to ELE, set this function to ON.

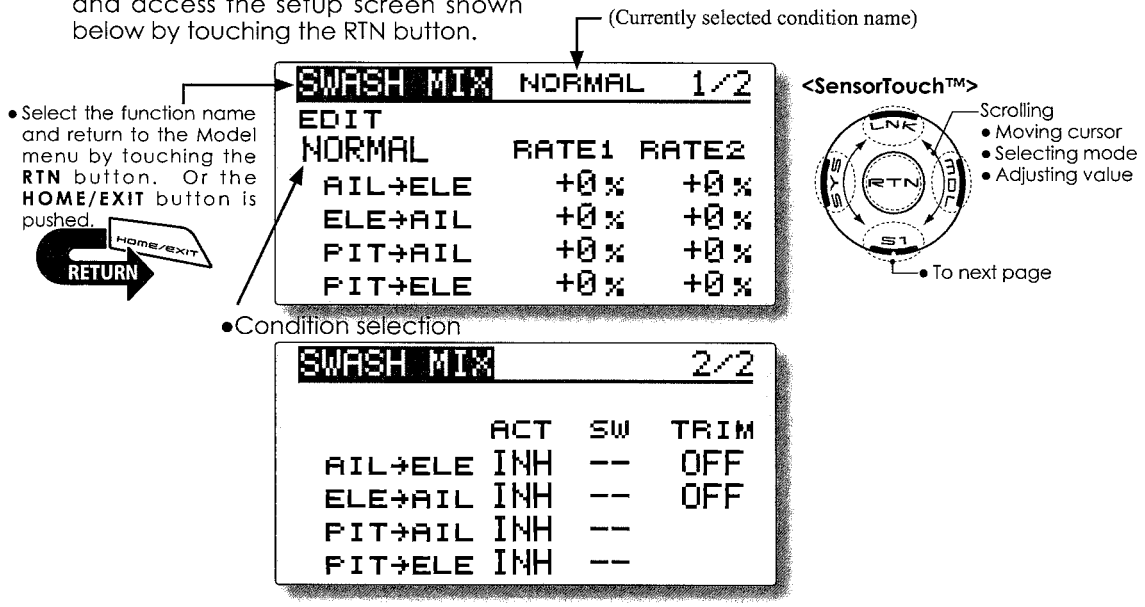
  If the front of the helicopter raises during a right roll, when the Rate 2 side is input and the right aileron is operated, the elevator moves to the down side. Tune by adjusting the Rate.

  For left roll, adjust to the Rate 1 side.

The swash mix function is used to correct the swash plate in the aileron (roll) direction and elevator (cyclic pitch) corresponding to each operation of each condition.

This function allows the independent rate adjustments for the ailerons, elevator and pitch.

- Select [SWASH MIX] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

•Activate the mixing

When using this function, move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode.

Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the mixing and return to the cursor mode. (ON is displayed.)

[Switch selection]

When [[--]] is set, the swash mixing function is always active and operated by merely selecting the condition.

When setting an [ON]/[OFF] switch, move the cursor to the [SW] item and touch the RTN button to access the selection screen. Set the switch and its ON position.

*For a description of the switch selection method, see the description at the back of this manual.

•Mixing rate adjustment

Move the cursor to the mixing rate item you want to correct and touch the RTN button to switch to the data input mode. Adjust the rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -100~+100%

*When the RTN button is touched for one second, the rate is reset to the initial value.

Touch the RTN button to end the adjustment and return to the cursor mode.

•Trim mode ON/OFF setting

When changing the trim mode, move the cursor to the [TRIM] item and touch the RTN button to switch to the data input mode.

Select ON/OFF by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to change the trim mode ON/OFF and return to the cursor mode.

*When mixing includes master side trim, select [ON] and when mixing does not include master trim, select [OFF].

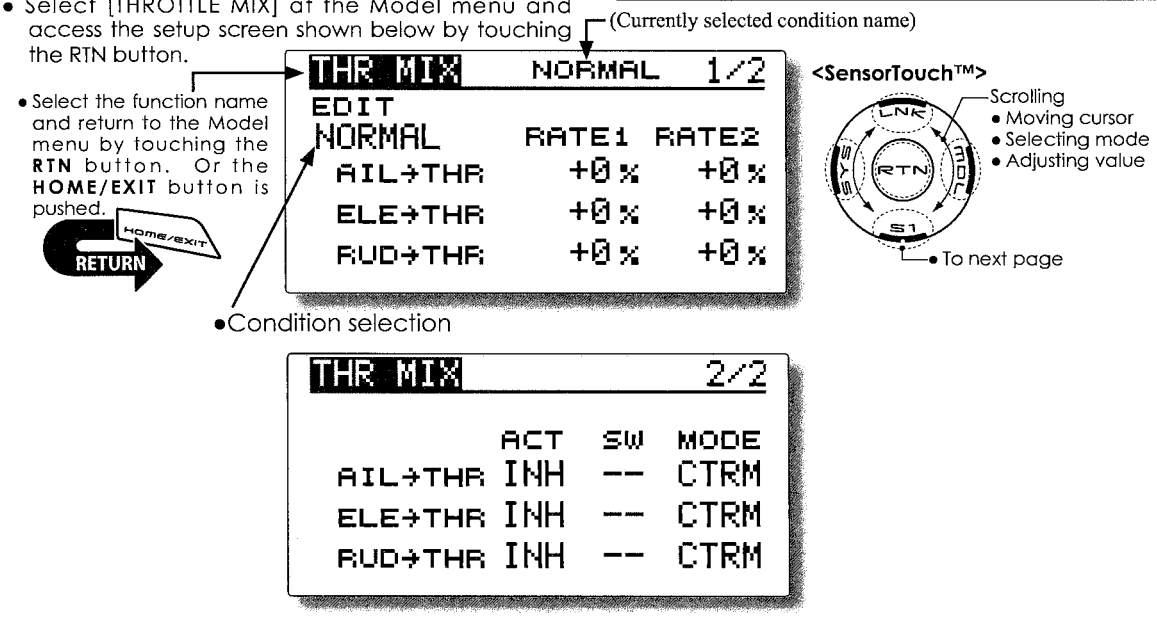
THROTTLE MIX

This function corrects slowing of engine speed caused by swash plate operation during aileron or elevator operation. The method of applying clockwise or counterclockwise torque when pirouetting can also be corrected.

Setting example

- AIL to THR mixing counteracts the lag in engine RPM's when an aileron input is given to the helicopter. Engine over-speeding can be adjusted independently for the right aileron and left aileron inputs utilizing Rates 1 and 2.

- Select [THROTTLE MIX] at the Model menu and access the setup screen shown below by touching the RTN button.



Setting method

•Activate the mixing

When using this function, move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode.

Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the mixing and return to the cursor mode. (ON is displayed.)

[Switch selection]

When [[--]] is set, the swash mixing function is always active and operated by merely selecting the condition.

When setting an [ON]/[OFF] switch, move the cursor to the [SW] item and touch the RTN button to call the selection screen. Set the switch and its ON position.

*For a description of the switch selection method, see the description at the back of this manual.

•Mixing rate adjustment

Move the cursor to the mixing rate item you want to correct and touch the RTN button to switch to the data input mode. Adjust the rate independently by scrolling the touch sensor.

Initial value: 0%

Adjustment range: -100~+100%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

•Operation mode setting

Move the cursor to the [MODE] item and touch the RTN button to switch to the data input mode.

Select the operation mode by scrolling the touch sensor.

*The display blinks.

CTRM mode: Corrects near the center only.

LIN. mode: Corrects the complete range.

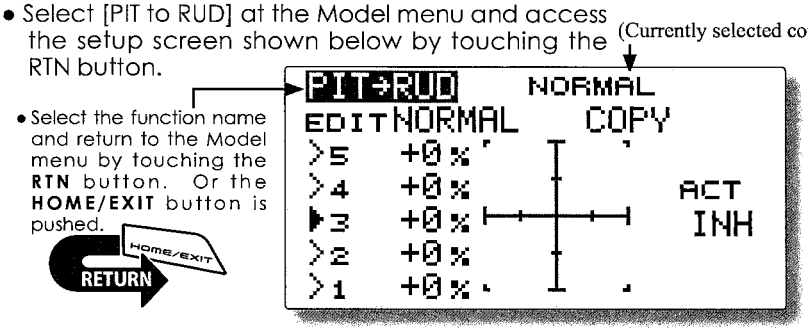
Touch the RTN button to change the operation mode and return to the cursor mode.

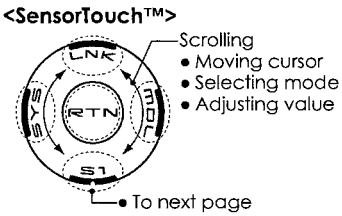
PIT to RUD mixing (Revolution mixing)

Use this mix when you want to suppress the reaction torque generated by main rotor pitch and speed changes during pitch operation. Adjust so that the nose does not move in the rudder direction.

Note: When a GY Series or other heading hold gyro is used, since correction is performed by the gyro, this mix is not utilized. If this function is used when the gyro operation mode is the AVCS mode, the neutral position will change.

- Select [PIT to RUD] at the Model menu and access the setup screen shown below by touching the RTN button.





Setting method

•Activate the mixing

When using this function, move the cursor to the [ACT] item and touch the RTN button to switch to the data input mode.

Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the mixing and return to the cursor mode. (ON is displayed.)

•5-point curve setting

Move the cursor to the curve rate setting item you want to adjust and touch the RTN button to switch to the data input mode.

Adjust the rate by scrolling the touch sensor.

Initial value: P1~P5: 0%

Adjustment range: -100%~+100%

*When the RTN button is touched for one second, the rate is reset to the initial value.)

Touch the RTN button to end the adjustment and return to the cursor mode.

Repeat this procedure for each point.

•Pitch curve copy function

Move the cursor to COPY item and touch the RTN button to switch to the data input mode. Select the copy destination condition by scrolling the touch sensor and touch the RTN button. Select the [YES] and touch the RTN button.

<Normal condition mixing curve>

The mixing curve rate should be started using smaller values.

For a rotor with a clockwise operation direction, when pitch was input at the plus side, set these parameters so that mixing is in the clockwise direction. First, trim at hovering and then adjust the neutral position.

1. Adjustment between slow and hovering

   Repeatedly hover from take off and land at a constant rate matched to your own rhythm. Then adjust the pitch so that the nose of the helicopter remains steady when the throttle is raised and lowered.

2. Throttle high side (climbing and diving from hovering)

   Repeat climbing and diving from hovering at a constant rate matched to your own rhythm and adjust the pitch so that the nose does not deflect when the throttle is raised and lowered.

<Idle up condition mixing curve>

Set the mixing rate so that the rudder direction at high-speed flight is straight ahead. Adjust for each condition used.

GYRO mixing

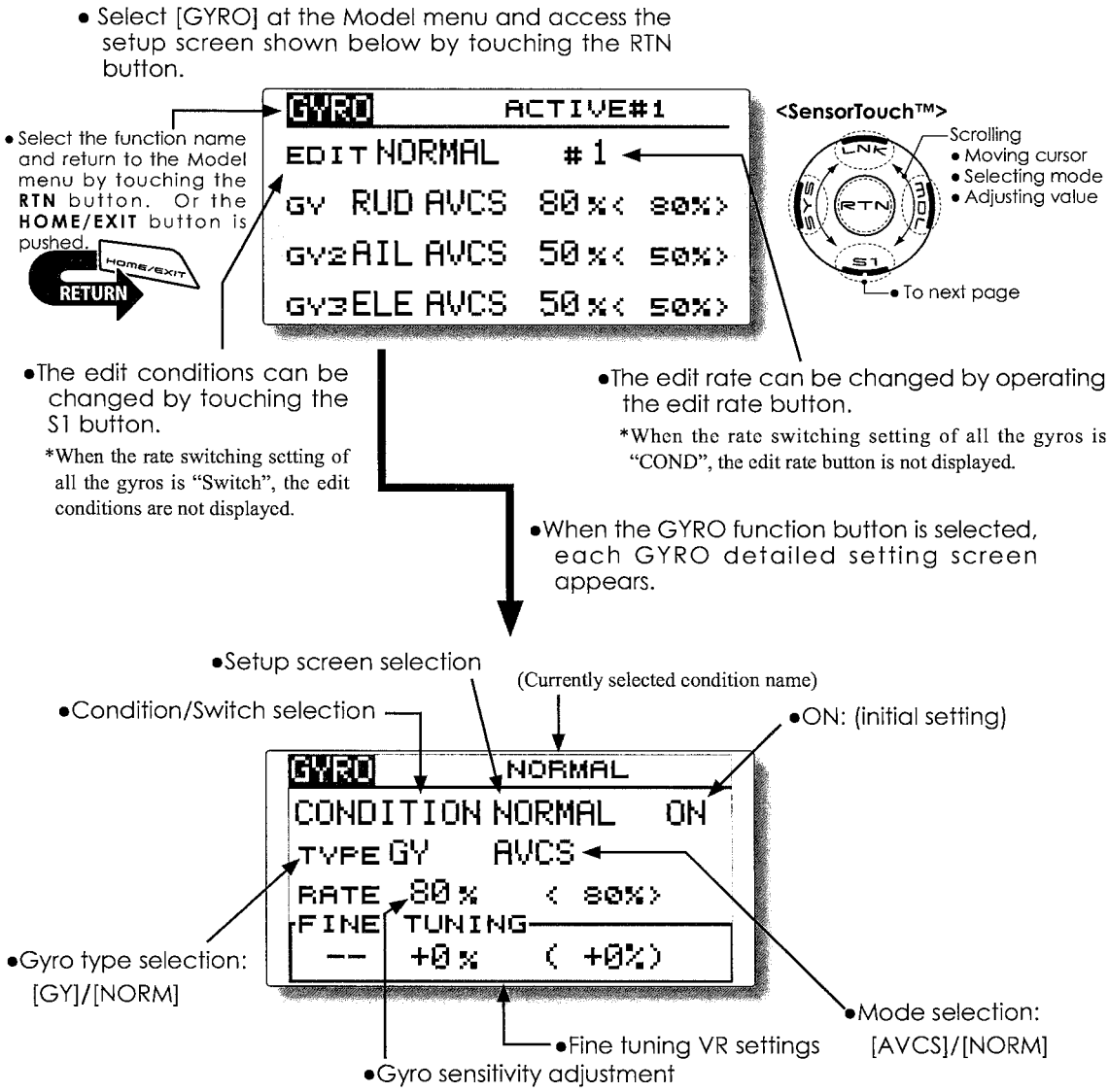
This function used to adjust gyro sensitivity. The sensitivity and operation mode (Normal mode/ AVCS mode) can be set for each condition.

The gyro sensitivity can be switched with each condition or the switch. (5 sensitivities)

*Compatible with 3 axis gyro(CGY750).

Note: When using the [Gyro2]/[Gyro3] function, assign [Gyro2]/[Gyro3] to any channel on the function screen.

Always set to [--] both (Control) and (Trim) for the [Gyro] function at the Function menu in the Linkage menu.



Setting method

•Gyro type selection

Move the cursor to the gyro type selection item and touch the RTN button to switch to the data input mode. Select the gyro type by scrolling the touch sensor.

[GY]: When a Futaba GY gyro is used

[NORM]: When other than Futaba GY gyro is used

Touch the RTN button to change the gyro type and return to the cursor mode.

*When a Futaba GY gyro is used and [GY] type is selected, the sensitivity set value is directly read in both the AVCS and NORM modes.

•Operation mode selection (GY gyro)

Move the cursor to the operation mode selection item and touch the RTN button to switch to the data input mode. Select the operation mode by scrolling the touch sensor.

[AVCS]: AVCS mode

[NORM]: Normal mode

Touch the RTN button to change the operation mode and return to the cursor mode.

•Sensitivity setting

Move the cursor to the rate item and touch the RTN button to switch to the data input mode.
Adjust the sensitivity by scrolling the touch sensor.

Initial value: 80%

Adjustment range: 0~100%

*When the RTN button is touched for one second, the sensitivity is reset to the initial value.)

Touch the RTN button to return to the cursor mode.

•Fine tuning VR settings

Move the cursor to the [--] item and touch the RTN button to access the selection screen. Select the control.

*For a description of the switch selection method, see the description at the back of this manual.

Move the cursor to the rate item and touch the RTN button to switch to the data input mode.
Adjust the trim rate by scrolling the touch sensor.
Initial value: 0%
Adjustment range: -20~+20%

*When the RTN button is touched for one second, the sensitivity is reset to the initial value.)

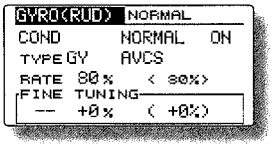
Touch the RTN button to return to the cursor mode.

<EXAMPLE>Rudder gyro gain is changed with a switch (SF) irrespective of condition.

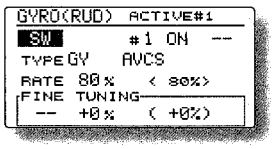
Generally, gain is interlocked with condition and changes a rate.

How to change two rates in the same condition here.

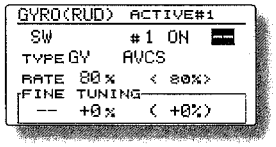
1. Select [GYRO] at the Model menu and access the setup screen shown below by touching the RTN button.



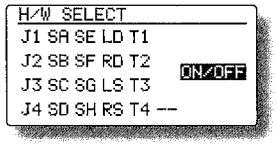
2. Move the cursor to the [COND] item and touch the RTN button to access the selection screen. Select the [SW]. Touch the RTN button to return to the cursor mode.



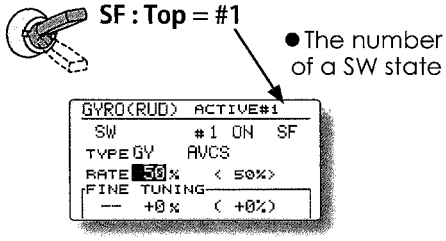
3. # number shows the present switch state. In the state of # 1 a cursor is moved to [--] and RTN is pushed.



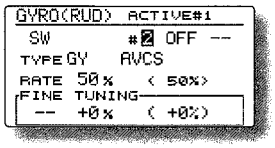
4. [SF] is chosen by [H/W SELECT] and then a top is turned ON.



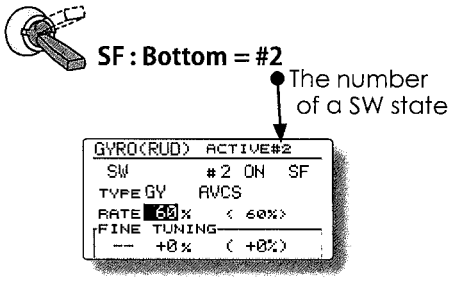
5. [TYPE GY] and [RATE] of a state of "#1=SF top"are set up.



6. It is a setup of "#2". Move the cursor to the [#1] item and touch the RTN button to access the selection screen. Select the [#2]. Touch the RTN button to return to the cursor mode.



7. Move the cursor to the [--] item and touch the RTN button.
8. [SF] is chosen by [H/W SELECT] and then a bottom is turned ON. the RTN button.
9. [TYPE GY] and [RATE] of a state of "#2=SF bottom"are set up.



*If 3 position switch is chosen, the change of 3 rates can be performed.

*Combined use of two or more switches cannot be performed.

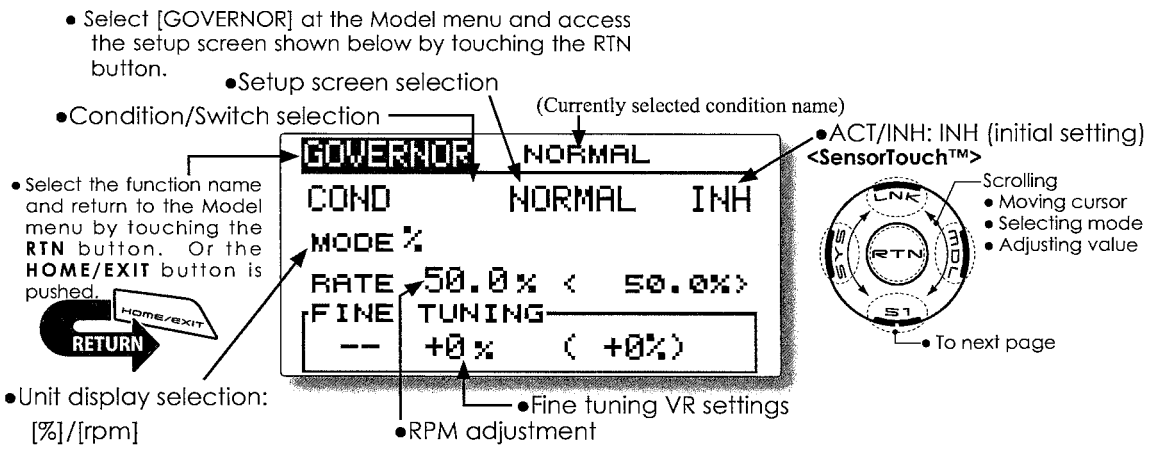
GOVERNOR mixing

When using a Futaba GV-1/GY701/CGY750 governor, this function is used to switch the RPM of the helicopter's rotor head. The rotor head speed can be switched with each condition or the switch.

*The governor is used by connecting the governor speed setting channel to CH7 (initial setting).

*When using an independent governor [ON]/[OFF] switch, connect the AUX([ON]/[OFF]) connector of the governor to CH8 and set the switch to CH8 (Governor2) at the Function menu of the Linkage Menu.

Note: Always set (Control) and (Trim) to [--] for [Governor] of the Function menu of the Linkage menu.



Setting method

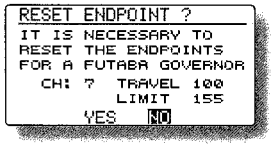
•Activate the mixing

When using this function, move the cursor to the [INH] item and touch the RTN button to switch to the data input mode.
Select the ACT mode by scrolling the touch sensor.

*The display blinks.

Touch the RTN button to activate the mixing and return to the cursor mode. (ON is displayed.)

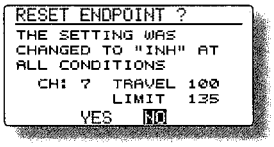
When the Governor is changed from the default inhibited (INH) state to the active (ACT) state, the endpoint menu will be displayed and it is possible to utilize the endpoints for this given condition.



*When the function is set ON/OFF at the governor setup screen, the governor rpm setting channel end point servo travel and limit point are now initialized.

*When changed from INH to ACT (ON), the servo travel is initialized to 100 and the limit point is initialized to 155.

*When operation is changed to INH at all conditions, the servo travel is initialized to 100 and the limit point is initialized to 135.



Use the SensorTouch to scroll to either YES (incorporate the default endpoints) or NO (endpoints are not utilized. Press the Return (RTN) button to confirm the selection made.

•RPM adjustment

Move the cursor to the rate item and touch the RTN button to switch to the data input mode.
Adjust the rpm by scrolling the touch sensor.
Initial value: 50% (1500rpm)
Adjustment range: OFF, 0~110% (OFF, 700~3500rpm)

*When the RTN button is touched for one second, the sensitivity is reset to the initial value.)

Touch the RTN button to return to the cursor mode.

•Unit diplay selection

Move the cursor to the UNIT item and touch the RTN button to switch to the data input mode. Select the unit by scrolling the touch sensor.
Touch the RTN button to change the operation mode and return to the cursor mode.

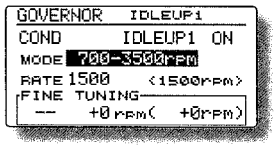
•Diplay mode selection

*When [rpm] mode is selected above setting, the display mode can be selected.

*There is no change in the transmitter output even when the "MODE" is changed. Calibration should be performed via the governor.

*In order to use the Governor function of the T14SG, it is necessary to change the settings on the governor for the low side 700 rpm mode.

When the MODE of the Governor screen's model menu is changed, the change is also indicated on-screen.



The chart below indicates the mode percentage and the corresponding RPM.

MODE	0%	50%	100%	110%
1000-2000rpm	1000rpm	1500rpm	2000rpm	2100rpm
1000-2500rpm	1000rpm	1500rpm	2500rpm	2700rpm
1000-3500rpm	1000rpm	1500rpm	3500rpm	3900rpm
700-2000rpm	700rpm	1500rpm	2000rpm	2100rpm
700-2500rpm	700rpm	1500rpm	2500rpm	2700rpm
700-3500rpm	700rpm	1500rpm	3500rpm	3900rpm

•Fine tuning VR settings

Move the cursor to the [--] item and touch the RTN button to access the selection screen. Select the control.

*For a description of the switch selection method, see the description at the back of this manual.

Move the cursor to the rate item and touch the RTN button to switch to the data input mode.

Adjust the trim rate by scrolling the touch sensor.

Initial value: 0% (0rpm)

Adjustment range: -20~+20% (-200~+200rpm)

*When the RTN button is touched for one second, the sensitivity is reset to the initial value.)

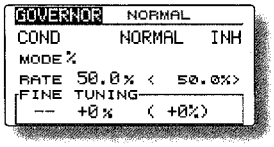
Touch the RTN button to return to the cursor mode.

<EXAMPLE>RPM rate is changed with a switch (SF) irrespective of condition.

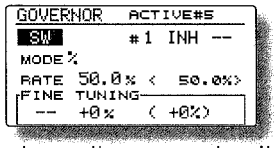
Generally, RPM rate is interlocked with condition and changes a rate.

How to change two rates in the same condition here.

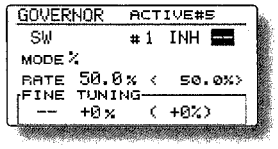
1. Select [GOVERNOR] at the Model menu and access the setup screen shown below by touching the RTN button.



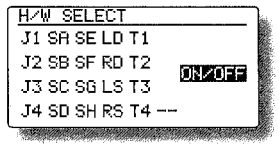
2. Move the cursor to the [COND] item and touch the RTN button to access the selection screen. Select the [SW]. Touch the RTN button to return to the cursor mode. And [INH] is set to [ACT].



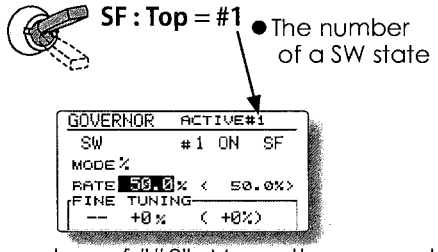
3. # number shows the present switch state. In the state of # 1 a cursor is moved to [--] and RTN is pushed.



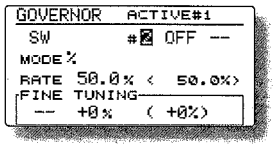
4. [SF] is chosen by [H/W SELECT] and then a top is turned ON.



5. [MODE] and [RATE] of a state of "#1=SF top"are set up.



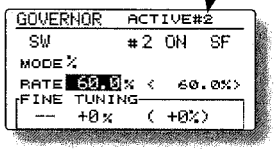
6. It is a setup of "#2". Move the cursor to the [#1] item and touch the RTN button to access the selection screen. Select the [#2]. Touch the RTN button to return to the cursormode. And [INH] is set to [ACT].



7. Move the cursor to the [--] item and touch the RTN button.
8. [SF] is chosen by [H/W SELECT] and then a bottom is turned ON. the RTN button.
9. [MODE] and [RATE] of a state of "#2=SF bottom"are set up.

SF : Bottom = #2

● The number of a SW state



*If 3 position switch is chosen, 3 rate changes can be performed.

*Combined use of two or more switches cannot be performed.

The Timer function may be set for any desired time, i.e. engine run time, specified times for competitions, etc. Two independent timers are provided for your use. The timers are stored independently with each model, meaning that when you switch between model setups, the timer associated with the new model is brought up automatically.

The timers may be set to start and stop from the motion of any switch or stick. You may set the ON and OFF directions freely. Each timer has a capacity of up to 59 minutes 59 seconds.

Each timer may be set for count-down (DOWN mode) or count up (UP mode) operation with a target time or for count up to 99 hours 59 minutes (HOUR mode).

If a target time is set and the timer reaches the set time, a buzzer sound for each count is generated.

Countdown timers sound one short beep during the last twenty seconds and two short beeps during the last ten seconds before reaching the target, then a long tone at the target time, and continue counting with displaying a minus (-) sign. Count-up timers also beep the last twenty and ten seconds, beep the target time, and keep counting upwards until shut down.

A mode which sounds an alarm each minute of the time remaining up to the timer alarm time can be selected.

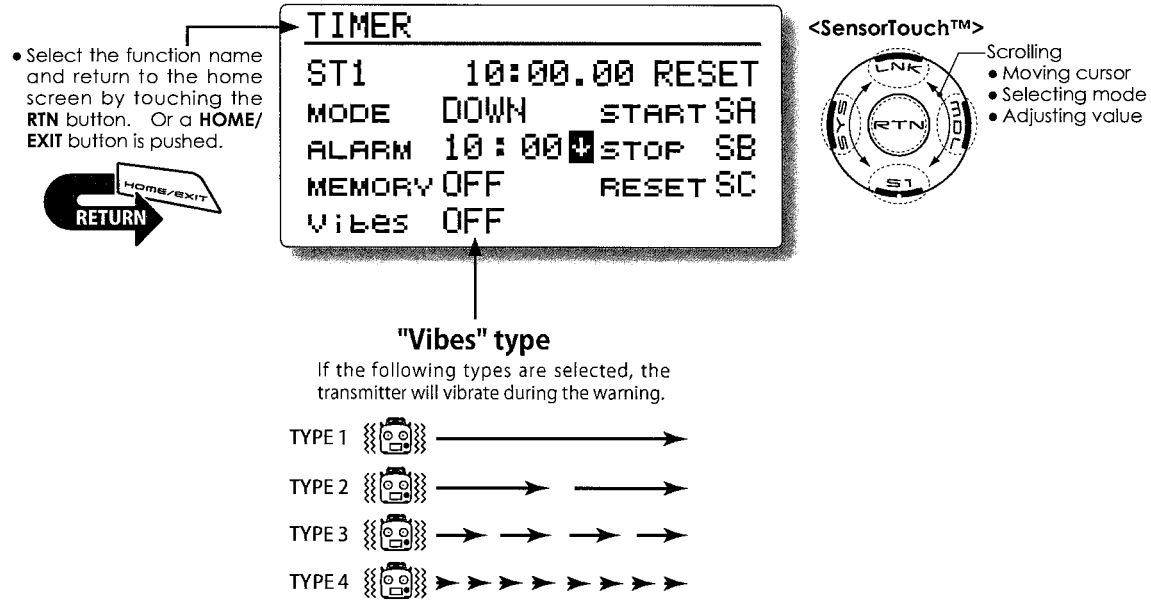
The HOUR mode is convenient when used in engine maintenance period and other long-term measurements.

*When the HOUR mode is set, "xx (hour): xx (minute)" is displayed on the count time display. Seconds are not displayed.

*When the HOUR mode is set, ":" blinks each second during timer operation.

*When the HOUR mode is set, the alarm function is inhibited.

- Select ST1 or ST2 at the home screen and call the setup screen shown below by touching the RTN button.



Timer setting

•Up timer/down timer setting

Move the cursor to the [MODE] item and touch the RTN button to switch to the data input mode.

Select the mode by scrolling the touch sensor and touch the RTN button.

[UP]: Up timer

[DOWN]: Down timer

[HOUR]: Hour mode timer

•Timer time setting

Move the cursor to the [ALARM] item and touch the RTN button to switch to the data input mode.

Set the time by scrolling the touch sensor.

[00]:[00]:[min]:[sec]

Touch the RTN button to end the adjustment and return to the cursor mode.

•Switch setting

Move the cursor to the item of the switch you want to set, access the switch setup screen by touching the RTN button. Select the switch and ON direction.

[For a detailed description of the setting method, see [Switch Setting Method] located on the next page.]

[START]: Start switch

[STOP]: Stop switch

[RESET]: Reset switch

•Memory setting

Move the cursor to the [MEMORY] item and touch the RTN button to switch to the data input mode.

Select the mode by scrolling the touch sensor and touch the RTN button.

[OFF]: Memory function OFF

[ON]: Mode where the timer is not reset when turned power off and switched the model.

•A mode which sounds an alarm each minute can be selected.

Change the setting using the "↑" button (or "↓" button).

"↑": Alarm sounds each minute of the time elapsed from timer start. (Conventional mode)

"↓": Alarm sounds each minute of the time remaining up to the alarm time.

Timer operation

- Timer ST1 and ST2 are started/stopped by pre-selected start/stop switch.
- To reset a timer, operate the pre-selected reset switch, or move the cursor to the [RESET] display on the timer screen and touch the RTN button.

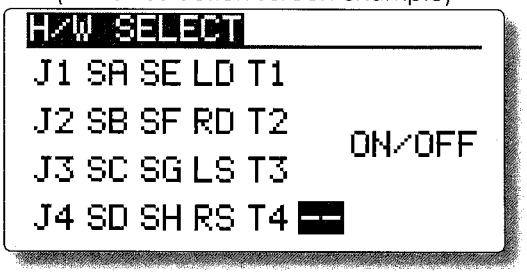
Switch Setting Method

The various functions used in the T14SG can be activated by a switch. For the purposes of this manual, a stick position, VR position, etc. shall be commonly referred to as a switch in all cases. That is, whenever the manual indicates that something is operated via a switch, it is possible for the user to activate this setting via a stick, stick position, etc.

Switch selection

When a switch is selected at a mixing function, etc., the selection screen shown below is called.

(Switch selection screen example)



Switch selection

1. Use the touch sensor to move the cursor (highlights) to the switch you want to select and touch the RTN button.

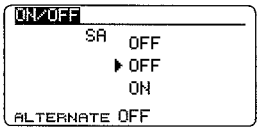
*The switch blinks.

2. To return to the preceeding screen, move the cursor to the [H/W SELECT] at the top of the screen and touch the RTN button.

Or, move the cursor to the [ON/OFF] and call the ON/OFF position setting screen by touching the RTN button.

When switch is selected

When switch was selected, ON/OFF position setting is also performed.



*The ON/OFF setting state of each position is displayed.

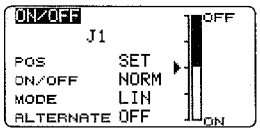
1. When you want to change the ON/OFF setting, use the touch sensor to move the cursor and touch the RTN button to switch to the data input mode. Switch the ON/Off display by scrolling the touch sensor.

*ON/OFF display blinks.

2. When the RTN button is touched, the ON/OFF setting is changed. (Touch the S1 button to stop the change.)
3. To return to the preceeding screen, move the cursor to the [ON/OFF] at the top of the screen and touch the RTN button.

When stick, trim lever, or knob selected

When a stick, trim lever, or knob is used as a switch, two operation modes can be selected:



1. When you want to change the mode, move the cursor to [MODE] item and touch the RTN button to switch to the data input mode. Switch the display to the mode you want to change by scrolling the touch sensor and then make the change by touching the RTN button.

•Mode: [LIN]/[SYM]

*Set the ON/Off point by the method described on the next page.

Alternate mode setting

•ALTERNATE mode: [OFF]/[ON]

1. Move the cursor to the [ALTERNATE] item and touch the RTN button to switch to the data input mode.
2. Change to the mode you want to set by scrolling the touch sensor.

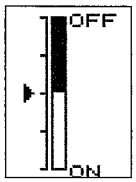
*The mode display blinks.

3. Touch the RTN button. (Touch the S1 button to stop the change.)
4. To return to the preceeding screen, move the cursor to the [ON/OFF] at the top of the screen and touch the RTN button.

Operation modes

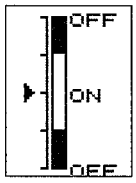
The operation modes available when stick, trim lever, or knob was selected are described below.

Linear mode [LIN]



This mode sets ON/OFF to the left or right (up or down) with the set point as the reference.

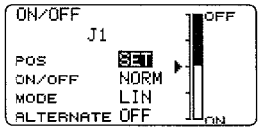
Symmetrical mode [SYM]



Left and right (up and down) operations are symmetrical near the neutral position. For instance, when you want to switch D/R with the aileron stick, when the stick is moved to the left or right, DR can be turned on at the same position.

Shifting the ON/Off point

The ON/OFF point can be shifted. ON/OFF at a free position can be changed.



- Black range: OFF range
- White range: ON range

[Setting method]

1. First, use the touch sensor to move the cursor to the [POS] item.
2. Move the stick, trim lever, or knob to the point you want to change and touch the RTN button. The point is shifted.
3. To return to the preceeding screen, move the cursor to the [ON/OFF] at the top of the screen and touch the RTN button.

Logic switch (Condition Select function only)

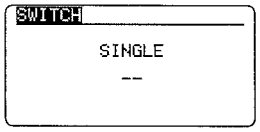
The logic switch function lets you turn operation on and off by combining two switches.

Logic mode

AND: When both switches are ON, the condition is ON.

OR: When either switch is ON, the condition is ON.

EX-OR: When the two switches are in different states, the condition is ON.



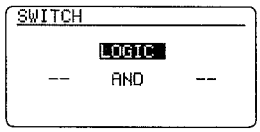
Switch mode selection

1. Move the cursor to the [SINGLE] item and touch the RTN button to switch to the data input mode.
2. Select the [LOGIC] by scrolling the touch sensor.

*[LOGIC] display blinks.

3. Touch the RTN button to change to the logic switch mode.

(Logic switch setting screen)



Logic mode selection

1. Move the cursor to the logic mode item and touch the RTN button to switch to the data input mode.
2. Select the logic mode by scrolling the touch sensor. [AND, OR or EX-OR]

*The mode display blinks.

3. Touch the RTN button to change to the logic mode.

Swich selection

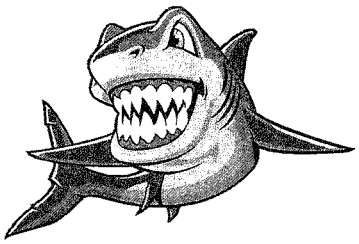
1. Select the right and left switch respectively. (Refer to the description at the previous page.)

To return to the preceeding screen, move the cursor to the [SWITCH] at the top of the screen and touch the RTN button.

FUTABA CORPORATION Phone: +81 475 32 6982, Facsimile: +81 475 32 6983
1080 Yabutsuka, Chosei-mura, Chosei-gun, Chiba-ken, 299-4395, Japan

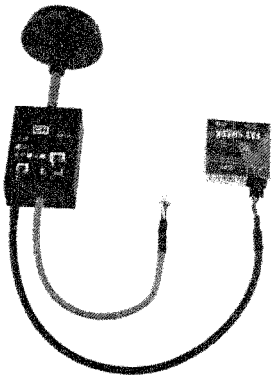
Available from www.dpcav.com
Part Number #TX-5G8-FCC1

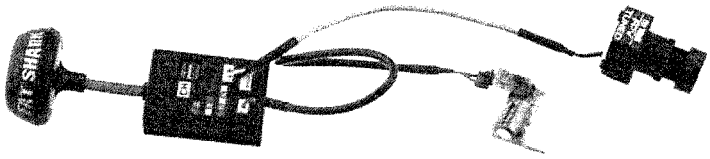
FAT SHARK
RC VISION SYSTEMS



Model 2461 (FCC certified) Cased 5G8 Transmitter Spec Doc REV A
FCC ID#: 2ABYQFSV2461 (Part 15, license free operation)

Operation
Connect a Fat Shark camera to the camera cable to complete the downlink system. Use your goggles or vRx to scan for a clear channel (display should be uniform snow). Set the transmitter channel to same frequency (ships default on channel 1) and connect the balance lead of your 2S, 3S or 4S (7.4V - 16V) RC battery to the filtered balance lead and you are ready to fly. The handy balance lead filters RC servo and motor noise from your RC pack for a crisp, clear image.

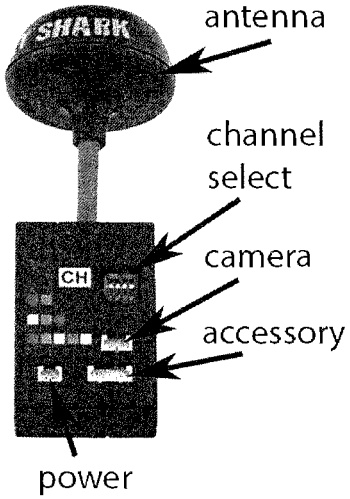




Specifications

Electrical:

RF Module:	NexwaveRF
Power supply	7 - 17V (2S-4S supply)
Power consumption:	<100mA @12V (+camera supply)
Power out (to camera)	5V, 250mA max
Operating Frequency:	5G8 (see below frequency chart)



Channel select chart:

	1	2	3	4
Ch1 5740 MHz	On	On	On	N/A
Ch2 5760 MHz	Off	On	On	N/A
Ch3 5780 MHz	On	Off	On	N/A
Ch4 5800 Mhz	Off	Off	On	N/A
Ch5 5820 MHz	On	On	Off	N/A
Ch6 5840 Mhz	Off	On	Off	N/A
Ch75860 MHz	On	Off	Off	N/A

Connector sticker color designation
Red=V+, Grey= GND, Yellow=VID, Green/white=AUD L/R

Antennae
Antenna type: circular polarized

Mechanical
Dimensions: 40 X 26 X 14 mm
Weight: 20g

Packaging
Dimensions: 120 x 40 x 18 mm
Weight: 40g

FCC COMPLIANCE INFORMATION: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Made in China by FatShark RC Vision Systems

TX-5G8-FCC1 5.8GHz 7-Channel Cased A/V Transmitter, FCC Compliant (FatShark)

The FatShark 5.8GHz cased A/V transmitter is FCC Part 15 approved for license free operation. It does NOT require an amateur radio license to use it in the USA! It is designed for short range wireless video applications such as multirotor or KAP camera operators.

Your purchase includes a 2S-4S compatible power filter with cable, Fatshark camera compatible cable, and built-in Spironet circular polarized omni antenna.

This transmitter is compatible with 5.8GHz A/V receivers or goggles offered by ImmersionRC and FatShark. It is also compatible with our 7-Channel Black Pearl Diversity monitor and 7-Channel Flysight receiver. It is NOT compatible with 32-channel 5.8GHz video systems except those offered by ImmersionRC. The provided power filter is compatible with a 2S-4S LiPO battery that has a JST-XH type charge port connector. The provided camera cable is compatible with Fatshark's 5 Volt CCD and CMOS cameras.

Features and Specifications:

Frequency: 5.8GHz RF band.

Channels: Seven (5740, 5760, 5780, 5800, 5820, 5840, 5860 MHz).

RF Field Strength: Approximately 90dBuV/m @ 3m (<1mW RF Power).

Operating Distance: 100 meters in ideal line-of-sight environments.

Video Input: Composite NTSC / PAL, 75 ohms.

Audio Sub-carrier: 6.0 / 6.5 MHz.

Audio Input: 1V Line Level, >10K ohms.

Antenna: Circular Polarized Omni, not detachable.

Antenna Connector: None.

Operating Voltage: 6 - 17 VDC.

5VDC Accessory Power Output (250mA Maximum).

Typical current: 8V@80mA / 12V@60mA (transmitter only).

External Power Filter: 2S, 3S, and 4S LiPO battery compatible.

Weight: 1 ounce (27 grams) with antenna, cables, and filter.

Case Size: 1.5 x 1.0 x 0.6 inches (38 x 25 x 15 mm).

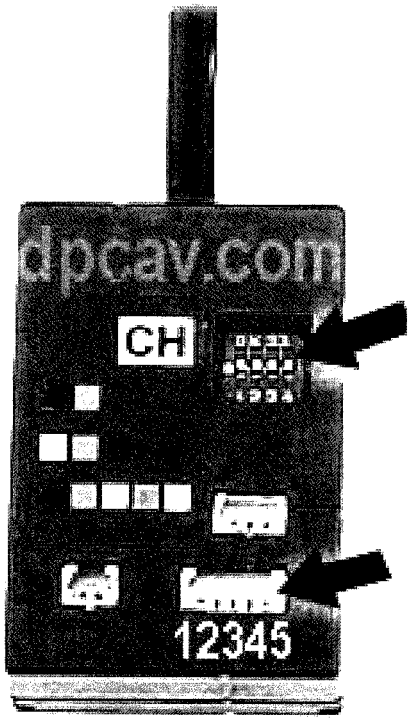
Overall Length: 3.3 inches (includes antenna).

FCC ID: 2ABYQFSV2461.

Made in China by FatShark RC Vision Systems.

Audio inputs are available on the front panel's 5-Pin connector. This connector also has 5V power and video connections. It's ideal for custom A/V applications. This optional connector feature requires a 5-pin plug cable (sold separately).

5-Pin connector wiring Information (see photo below):



Channel select chart:

	1	2	3	4
Ch1 5740 MHz	On	On	On	N/A
Ch2 5760 MHz	Off	On	On	N/A
Ch3 5780 MHz	On	Off	On	N/A
Ch4 5800 Mhz	Off	Off	On	N/A
Ch5 5820 MHz	On	On	Off	N/A
Ch6 5840 Mhz	Off	On	Off	N/A
Ch75860 MHz	On	Off	Off	N/A

1: VDC
2: GND
3: VID
4: AUDR
5: AUDL

VDC: 5VDC Output (camera power)

GND: Common ground

VID: Video Input

AUDR: Audio Input, Right Channel

AUDL: Audio Input, Left Channel

Important:

► This transmitter is 100% compatible with 5.8GHz A/V receivers offered by ImmersionRC and FatShark. It is also compatible with our 7-channel Black Pearl Diversity Monitor and 7-channel Flysight receiver. It is NOT recommended for use with competitor branded 5.8GHz video systems.

► Maximum allowed voltage is 17VDC. Exceeding the voltage or reversing the polarity will cause damage and void the warranty.

A usable range of approximately 200 meters is achieved by pairing the transmitter (equipped with integrated circular polarized antenna) with a similarly equipped Fat Shark headset or ImmersionRC receiver (which have superior RF sensitivity). A right hand circular polarized antenna, such as the Spironet Omni or Spironet Patch, is required on the receive side. Operating distance is affected by the environment, receiver's antenna, and other factors. Obstructions and interference sources will reduce range.

Notice: This is a FCC Part 15 compliant RF device. A ham radio license is NOT required to use it in the USA. However, its low RF power limits this transmitter to short range line-of-sight applications.

Frequency Summary List:

CH1= 5.740 GHz

CH2= 5.760 GHz

CH3= 5.780 GHz

CH4= 5.800 GHz

CH5= 5.820 GHz

CH6= 5.840 GHz

CH7= 5.860 GHz

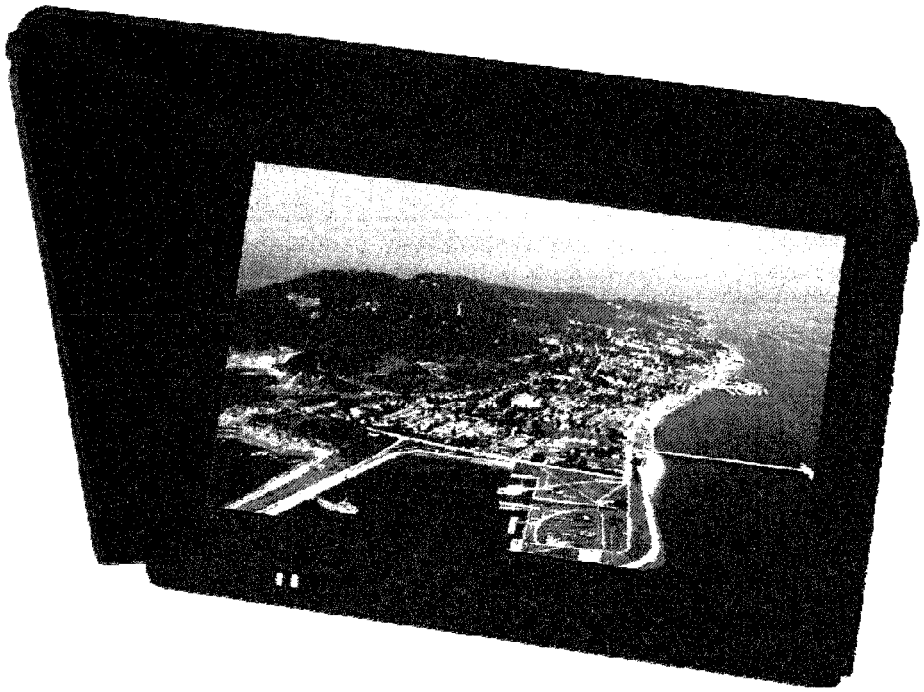
FCC COMPLIANCE INFORMATION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

BLACK PEARL RC801

7 ″ H D S c r e e n F P V D i v e r s i t y R X

Instruction Manual



Before operating the unit,please read this manual thoroughly,and retain it for future reference.

Catalogue

Safety Notice

Warning

- In order to reduce the damage of fire, electric shock or product hazard, do not expose the unit to rain or moisture.
- Please use only the recommended accessories.
- Do not disassemble this product,it should be repaired by the professional people.

Battery

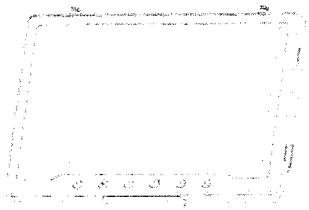
- DO NOT dismantle the battery.
- DO NOT make the battery short or its terminals in touch with metal objects,there is explosion danger.
- DO NOT use any damaged or leaking battery.
- DO NOT throw the battery into fire
- DO NOT put the battery in the place over 65℃.
- DO NOT expose the battery to strike,fall,etc..
- Be sure to leep the battery out of children’ s reach.
- Please replace the battery immediately if its working life becomes short significantly.
- Replace the battery with the same one or the equivalent recommended by the manufacturer.
- This device uses Li battery,which is recyclable resources, to deal with the waste battery, please send it to the resource recycling.

Caution

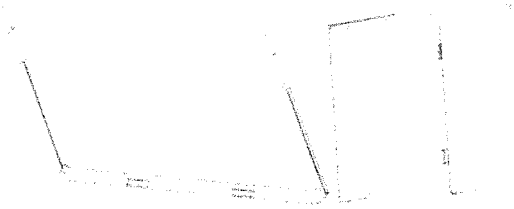
- The magnetic field with certain frequency may affect the image and sound of this device.
- DO NOT install or store this device in book cabinet,closet or other closed spaces to avoid such risks as electronic shock,fire and so on due to overheat.
- DO NOT place this device near open fire.
- This device is not dustproof,waterproof,please note when using.

Packing List

☐ Main Body



☐ Sun Shadow

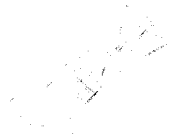


☐ Battery

☐ Antenna

☐ AV Cable

☐ DC Input Cable

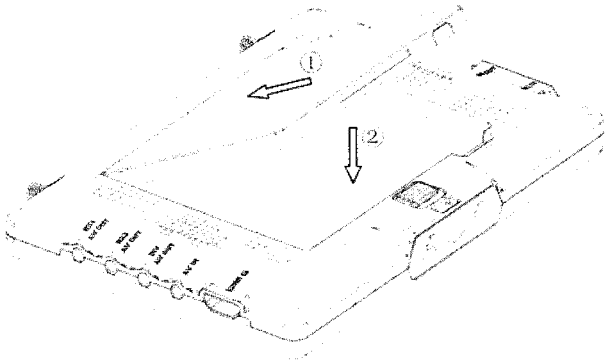


☐ DC Output Cab

Battery

Battery Installation

- Push the battery socket with gold contacts toward the gold contacts of the battery compartment of the device,and press the battery down;when battery reaches the bottom of the battery compartment,the battery lock will fix the battery automatically.
- If you don’ t install the battery, you can use 7～28V power supply.



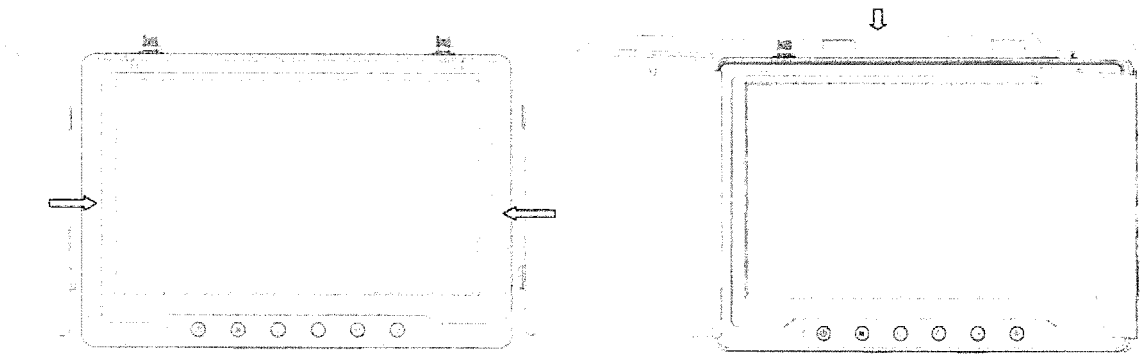
Recharge the Battery

- Please use power supply with 15V/2A at least
- Please recharge the battery fully at the first time
- During recharging,the red indicated light is on;after recharging,the green indicated light is on.

Sun-shadow

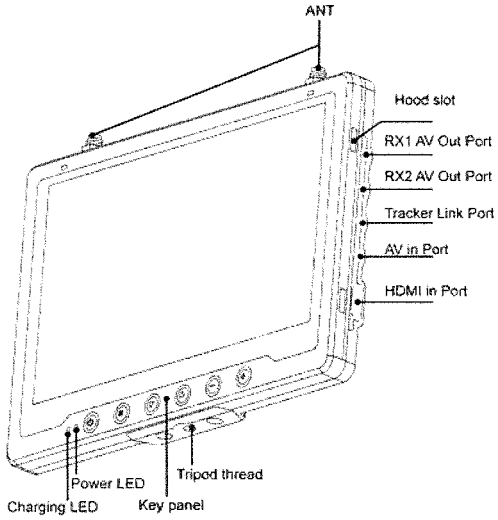
Install the Sun-shadow

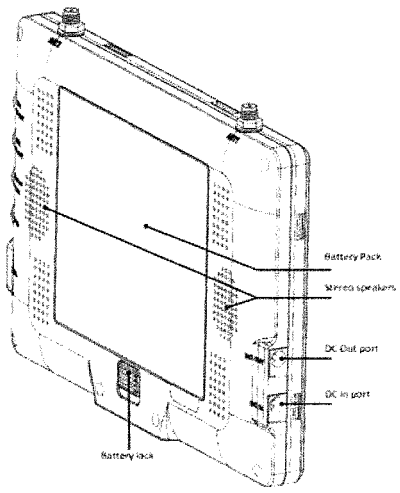
- 3 pieces of baffles make up the sun-shadow,first install 2pieces of baffles on the both sides of main body ,then install
- The top baffle toward the card slot of the main body according to the icon as below,and make sure they are fixed well,.
- When you disassemble the sun-shadow,please take off the top baffle,then the right and left one.

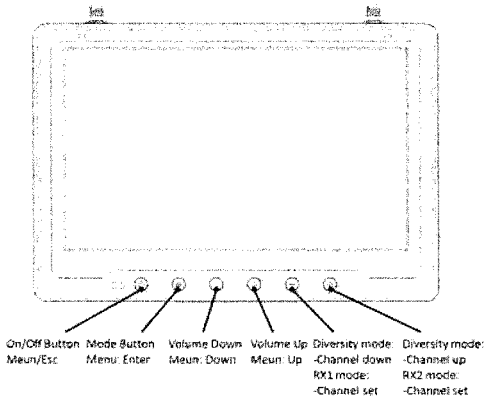


Icons

Function Icons

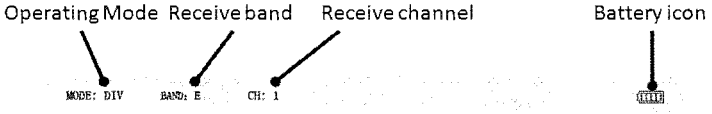


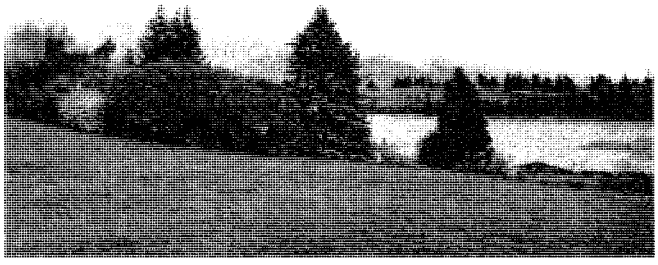




Screen Icons

- **There are different icons in different working modes.**
- **When battery icons shows as ▭,it means the batter need be recharged or changed.**





Operation Instruction

Power on/off

- Press the power button until the device is on,the red indicated light will be on.

Working Mode

- Press mode button can set up: DIV、RX1、RX2、AV IN、HDMI IN model.
- Video TV system set-up(except HDMI mode): Press menu button to enter 'function' ,then 'Video sys' to choose PAL or NTSC.
- Under DIV、RX1、RX2 modes,you need press menu button first to enter RF to set up the frequency band to make sure,the device Work with the transmitter in the same band.

Diversity Mode

- The due antenna diversity receiver is made up of ANT1、ANT2 and receiving circuit,according to their RSSI output,the device can keep receive the strongest signal all the time. and maximize image display stability.
- Antenna LED will show the current stronger one.
- < - > and < + > button controls the channel change.
- DIV AV OUT outputs diversity receiving signal for video recorder and external display purposes.

DIV AV OUT ONLY works under the diversity mode.

RX1 and RX2 Mode

- Under this mode, the channel of RX1 and RX2 can be set up separately; can set up the current shown video signal of RX1 or RX2 by mode button.
- < - > button controls RX1 channel,< + > button controls RX2 channel.
- RX1 AV OUT and RX2 AV OUT output the corresponding channel of themselves,the device can receiver the video signals from 2different transmitters at the same time.

If there is only one transmitter working, there is no different to use RX1 and RX2.
If there are two transmitters working,Please pay attention to adjust the bang and the channel,let each other dose not affect the image effect.

AV IN Mode

- For inputting external video and audio signal.
- In AV IN mode, wireless receiving circuit automatically shut down to save battery life.

HDMI Mode

- HDMI can input HD video to show much clearer image,and automatically adapt to the resolution (the maximum input 1920X1080/60Hz).
- In HDMI mode,wireless receiving circuit automatically shut down to save battery life.

Press the mode button in the HDMI mode, may slow response, this is a normal phenomenon, because HDMI mode requires multiple attempts to connect with an external device, after success connecting,the device can quickly display.

Function Instruction

ZOOM Function

- **Vertical Scaling**

Use this function, can make vertical scaling, only show 16:9 moving image region of 4:3 picture on the screen.

Support shortcut keys:Long press <✣>button to ZOOM IN, long press <⟺> button to ZOOM OUT(back to original scale)

Attention: NOT Support HDMI video vertical scaling.

For example: original scale **ZOOM IN**


- **Horizontal Scaling**

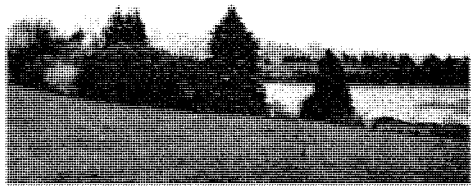
Use this function, can make horizontal scaling, change input 4:3 image into 16:9 image displayed on the screen.

The default in 16:9 mode (ZOOM IN full screen display), to change settings, please enter the menu->Function-> Display

Ratio to choose 4：3 or 16：9 displaying.

For example:Original scale **16:9(ZOOM IN)**


Through these functions can realize image full screen easily display, in order to obtain the best display effect,enable the above functions at the same time can also obtain the following display effect:



DNR

When external signal is input,due to various reasons,for example: signal source is interference transmission line caused by EMI,which may cause more image noise and more serious picture ripples;set up DNR function can improve these phenomenas.When you set DNR to "High" ,you Will reduce the noise to the maximum extent to improve the display effect.

-When there is some serious noise interference, the DNR features may not function.

Display Direction

In the menu,Flip Horizontal、Flip Vertical can control video display direction, Flip Horizontal is for image mirror display,Flip Vertical is for image upside down display.

-This feature helps CAMERA inverted installation,the reversed image display on the screen; open the two functions at the same time can make sure the image displayed in normal correct direction for ever.

-Attention: this function starts, the screen icon will also change the display direction

Menu

(Works in black for explaining the menu function)

Press ⏻ button into menu setup;these menu consists of 4 directories:Color、Audio、Function、Wireless;Press M button to enter settings,press ▽ or △ button to browse options and adjust value.

Color

- Picture Mode
  - Bright
  - Standard — Default setup, we advise to use this setup,which applies to most image display
  - Soft
  - User-Brightness、Contrast、Saturation、Sharpness
- Color Temp
  - Warm
  - Normal
  - Cool
- DNR
  - off — turn off DNR
  - Low — light noise
  - Mid — middle noise
  - High — strengthening noise, may reduce the quality of the image

Sound

- Sound Mode
  - Standard
  - Class
  - Dance
  - Live
  - Pop
  - Rock
  - User-Bass、Treble
- Balance — 0~20 adjust the volume balance of speakers;the default is 10,two speakers with the same volume.

Function

- Language — English、French、German、Spanish、Portuguese、Japanese、Russian、Italian
- OSD setting — OSD Timeout 0~60S，can set up the menu shown time on the screen
  Transparency 0~4 level，control menu into a translucent display effect
- Display Ratio
  - 4：3
  - 16：9
  - Auto — default automatically that video will display full screen according to input resolution
- Reset — all specifications are back to factory settings
- Auto Power Off — Off、15Mins、30 Mins、45 Mins、60 Mins
- Flip Horizontal — On、Off — mirror image display control
- Flip Vertical — On、Off — image 180 degree rotating display control

- Icon　　On、5 Sec、10 Sec、15Sec、20 Sec、25 Sec、30 Sec、35 Sec、40 Sec、45 Sec、50 Sec、55 Sec、60 Sec

set the status icon on the screen shown all the time or hidden automatically according to set time

- Video Sys　　PAL 、NTSC

Wireless

- -Diversity band　　A、B、E、F
- -RX1 band　　A、B、E、F
- -RX2 band　　A、B、E、F

Specification

Display Screen	Diagonal	7 inch							
	Resolution	1024X600							
	Contrast	700:1							
	Luminance	300cd/㎡							
Wireless Receiving	Working frequency	ISM 5.8GHz							
		Band	CH 1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
		A	5865M	5845M	5825M	5805M	5785M	5765M	5745M	5725M
		B	5733M	5752M	5771M	5790M	5809M	5828M	5847M	5866M
		E	5705M	5685M	5665M	5645M	5885M	5905M	5925M	5945M
		F	5740M	5760M	5780M	5800M	5820M	5840M	5860M	5880M
	Sensitivity	-90dBm±1dBm							
	Channel	32Channel (4 Band X 8 Channel)							
	Antenna Port	2 X SMA,50ohm							
	Diversity receiving	Antenna diversity							
	TV System	NTSC/PAL							
	Video output level	1.0Vp-p Typ,75ohm							
	Audio output level	1.0Vp-p Typ,10Kohm							
AV Port	RX1 AV OUT	Video、Audio output							
	RX2 AV OUT	Video、Audio output							
	DIV AV OUT	Diversity receiving, Video、Audio output							
	AV IN	Video、Stereo Audio input							
	HDMI IN(A Type)	Support HDMI 1.3 Digital Input, Support HDMI Audio in							
	Built-in Microphone	8Ω/1W X 2							
Power Supply	DC IN	7～28V/ 2A							
	DC OUT	Output Voltage：DC IN or battery voltage Output Current：1A							
	Battery	11.1V/1000mAh(3 series LiPo cells)							
	Consumption	12V input:7.8W							
Dimensions	Main Body	183X126X19.5mm(not include sun shadow)							
	Battery	105X87.5X6.7 mm(not include prominent part)							

Weight	Main body	350 g
	Battery	95 g
Tripod connector		General 1/4 "thread
Working Temperature		-10□～+65□