

Thank you for purchasing a Futaba SKYSPORT 4YF.

Before using your SKYSPORT 4YF, read this manual carefully and use your R/C set safely.

After reading this manual, store it in a safe place.

*See the glossary page 19 for a definition of the special terms used in this manual.*

## **Application, Export, and Modification**

1. This product may be used for model airplane use, if on the correct frequency. 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. In the US, use of 72MHz (aircraft only), 75MHz (ground models only) and 27MHz (both) frequency bands are strictly regulated by the FCC. This equipment must not be utilized to operate equipment other than radio controlled models. Similarly, other frequencies (except 50MHz, for HAM operators) must not be used to operate 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.

## **The Following Statement Applies to the Receiver (for U.S.A.)**

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.

## **Battery Recycling (for U.S.A.)**



The RBRC™ SEAL on the (easily removable) nickel-cadmium battery contained in Futaba products indicates that Futaba Corporation of America is voluntarily participating in an industry 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 1-800-8-BATTERY for information on Ni-Cd 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.

**NOTE:** Our instruction manuals encourage our customers to return spent batteries to a local recycling center in order to keep a healthy environment.

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

**Warning: This product contains a chemical known to cause cancer and birth defects (or other reproductive harm).**

- No part of this manual may be reproduced in any form without prior permission.
- The contents of this manual are subject to change without prior notice.
- This manual has been carefully written. Please write to Futaba if you feel that any corrections or clarifications should be made.
- Futaba is not responsible for the use of this product.



**SKYSPORT**

**4YF**




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To ensure safe use, observe the following precautions.

## Meaning of Special Markings


Pay special attention to the safety at the parts of this manual that are indicated by the following marks.

Mark	Meaning
 <b>DANGER</b>	Procedures which may lead to a dangerous condition and cause death or serious injury to the user if not carried out properly.
 <b>WARNING</b>	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.
 <b>CAUTION</b>	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.

Symbol:  ; Prohibited  ; Mandatory

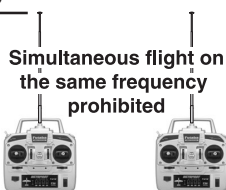
## Precautions During Flight


### **WARNING**

 Do not fly simultaneously on the same frequency.

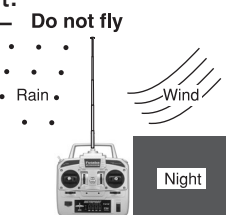
Interference may cause a crash.

\*Use of the same frequency will cause interference even if the modulation method (AM, FM, PCM) is different.



 Do not fly on rainy or windy days, or at night.


Water will penetrate into the transmitter and cause faulty operation, or loss of control, and cause a crash.



 Do not fly in the following places:

- Near other R/C flying fields (within about 3km)
- Near people on the ground, or objects in the air
- Near homes, schools, hospitals, or other places where there is a lot of people
- Near high tension lines, high structures, or communication facilities

Radiowave interference and obstructions may cause a crash. A crash caused by trouble in the R/C set, or the model itself, may cause death or property damage.

 Do not fly when you are tired, sick, or intoxicated.

Fatigue, illness, or intoxication will cause a loss of concentration or normal judgment and result in operation errors and a crash.

**!** Extend the antenna to its full length.

If the antenna is collapsed, the effective range of the radiowaves will become shorter.



**!** Always test the digital proportional R/C set before use.

Any abnormality in the digital proportional R/C set, or model, may cause a crash.

\*Before starting the engine, check that the direction of operation of each servo matches the operation of its control stick. If a servo does not move in the proper direction, or operation is abnormal, do not fly the plane.



**!** Check that the transmitter antenna is not loose.

If the transmitter antenna comes off during use, control will be lost and the model will crash.

## **!** CAUTION

**!** Do not touch the engine, motor, and speed control during and immediately after use.

They are hot and will cause a burn.

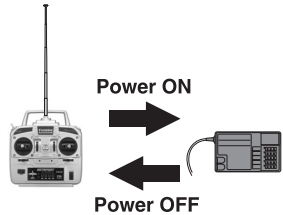
**!** When placing the transmitter on the ground during flight preparations, be sure that the wind cannot knock it over.

If it is knocked over, the throttle stick may be pushed to full high and the engine will race and create a dangerous situation.

**!** When turning on the power switch  
After setting the transmitter throttle lever to maximum slow,  
1. Turn on the transmitter power switch,  
2. Then turn on the receiver power switch.

**!** When turning off the power switch  
After stopping the engine,  
1. Turn off the receiver power switch,  
2. Then turn off the transmitter power switch.

If the power switch is turned off in the opposite order, the engine may go to full throttle unexpectedly and cause an injury.



\*Maximum slow: Direction in which the engine or motor runs at the slowest speed.

**!** When adjusting the digital proportional R/C set, always stop the engine, except when necessary.

If the engine suddenly goes to high speed, it may cause an injury.

(In case of a set w/ frequency board)

**!** When flying, always install the frequency board to the transmitter antenna.

When the frequency was changed, also change the frequency board.

# Ni-cd Battery Charging Precautions

(If using a Ni-cd battery)

## ⚠️ WARNING

- ❗ Always charge the nicd battery before each flight.

If the battery goes dead during flight, the plane may crash.

- ❗ Charge the digital proportional R/C nicd battery with the special charger, or digital proportional R/C quick charger, sold separately.

Overcharging may cause burns, fire, injury, blindness, etc. due to overheating, breakage, electrolyte leakage, etc.



## ⚠️ CAUTION

- ⊘ Do not use commercial nicd penlight batteries.

During quick charging, the battery holder contacts may overheat and damage the equipment, or prevent charging.



- ⊘ Do not short the nicd battery connector terminals.

Shorting the terminals may cause sparking and overheating and result in burns or fire.

- ⊘ Do not drop or apply strong shock to nicd battery.

The battery may be shorted and cause overheating or breakage and electrolyte leakage and result in burns or damage by chemical mater.



# Storage and Disposal Precautions

## ⚠️ WARNING

- ⊘ Do not leave the digital proportional R/C set, battery, model airplane, etc. within the reach of small children.

Touching and operating the digital proportional R/C set, or licking the battery, may cause injury or damage due to chemical matter.

- ⊘ Do not throw the nicd battery into a fire or heat the nicd battery. Also, do not disassemble or rebuild the nicd battery.

Breakage, overheating, and electrolyte leakage may cause injury, burns, or blindness.

**!** When not flying the model, store the digital proportional R/C set with the nicd battery in the discharged state. Recharge the nicd battery before the next flight.

If a partially discharged nicd battery is recharged many times, its memory effect will reduce the flight time substantially and may cause a crash, even if the battery is recharged.

## Nicd battery electrolyte

The electrolyte in the nicd battery is a strong alkali and can cause blindness if it gets in the eyes. If you get the electrolyte in your eyes, immediately wash your eyes with water and see a doctor. If you get the electrolyte on your skin or clothes, it may cause a burn. Immediately wash it off with water.

## **!** CAUTION

**⊘** Do not store the digital proportional R/C set in the following places:

- Where it is very hot (40C/104F or more) or very cold (-10C/-14F or less).
- Where the set will be exposed to direct sunlight.
- Where the humidity is high.
- Where there is strong vibration.
- Where it is dusty.
- Where there is steam and heat.

Storing the digital proportional R/C set in the places above may cause distortion and trouble.

**!** If the digital proportional R/C set will not be used for a long time, remove the batteries from the transmitter and the model and store them in a dry place.

If the batteries are left in the transmitter and model, the battery electrolyte may leak out and degrade the performance and shorten the life of the transmitter and model.

## Nicd battery recycling

Used nicd batteries are an important resource. Stick tape over the terminals and take the used batteries to a nicd battery recycling center.

## Other Precautions

### **!** CAUTIONS

**⊘** Do not get fuel, waste oil, etc. on plastic parts.

The plastic may melt and fail to function.

**!** Always use Genuine Futaba transmitter, receiver, servos, FET amp, nicd battery, and other optional parts.

Futaba is not responsible for damage, etc. caused by the use of parts other than Genuine Futaba parts. Use the parts described in the instruction manual and catalogs.

**Use genuine parts**





# BEFORE USE

## Set Contents

After opening the carton, first check if the following items are provided. The set contents depend on the type of set.

BEFORE USE

Transmitter	T4YF				
Receiver	R127DF	R148DF	R136F <small>(not for USA)</small>		
Servo	S3004 (x4)	S3101 (x2)	S3003 (x3)		
Receiver Niid Battery or Battery holder	NR-4QB	NR-4K		Battery holder	NR-4J
Others	Charger				
	Receiver Swich				
	Servo horn				
	frequency board				
	Servo tray				
	Neck strap				
	Extension cord				

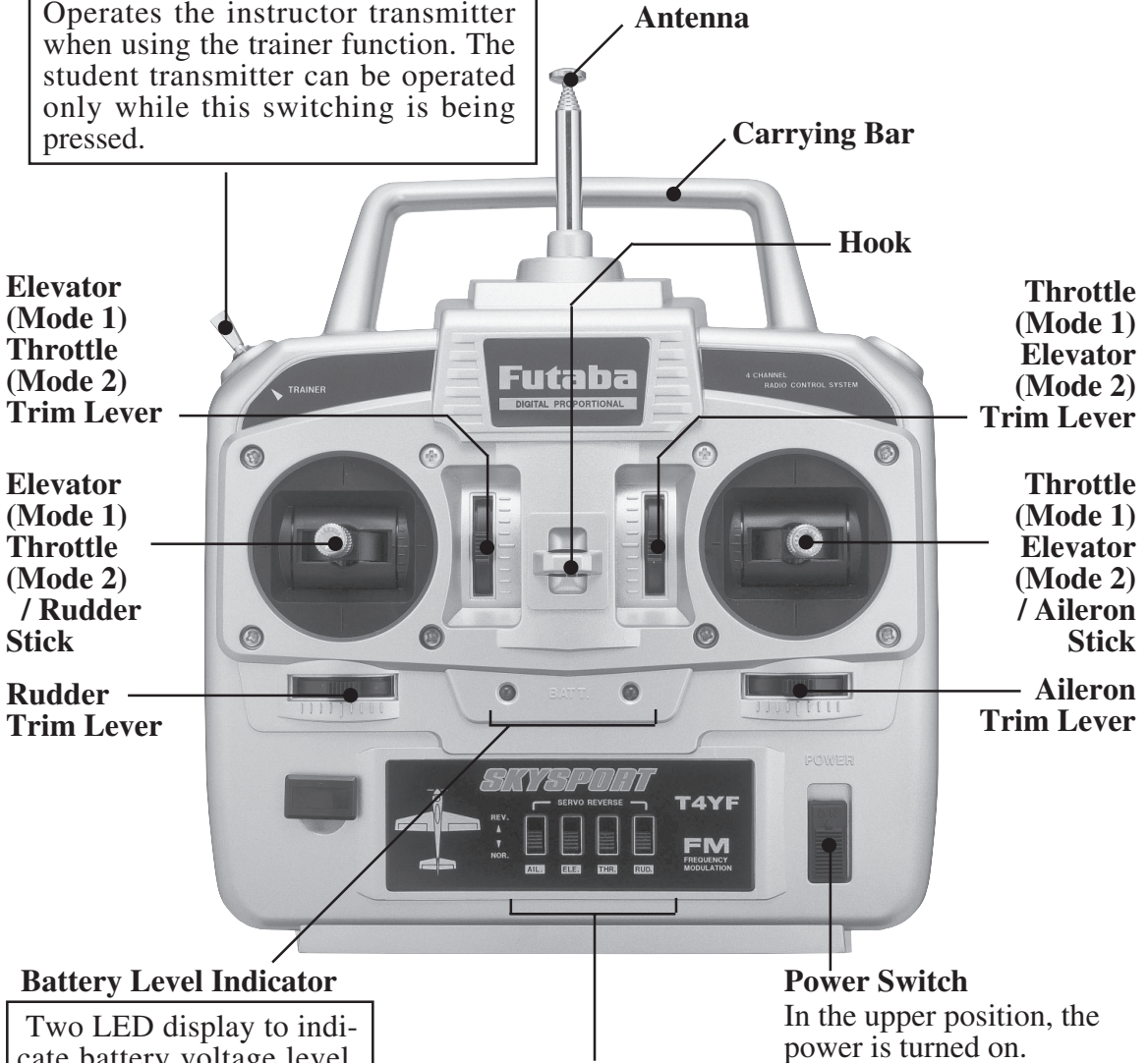
If the set contents are incomplete, or if you have any questions, please contact the dealer.

# Name and Handling of Each Part

## TRANSMITTER T4YF (Front Panel)

### Trainer Switch

Operates the instructor transmitter when using the trainer function. The student transmitter can be operated only while this switching is being pressed.



Elevator  
(Mode 1)  
Throttle  
(Mode 2)  
Trim Lever

Elevator  
(Mode 1)  
Throttle  
(Mode 2)  
/ Rudder  
Stick

Rudder  
Trim Lever

### Battery Level Indicator

Two LED display to indicate battery voltage level. If the red LED flashes, replace batteries.

Antenna

Carrying Bar

Hook

Throttle  
(Mode 1)  
Elevator  
(Mode 2)  
Trim Lever

Throttle  
(Mode 1)  
Elevator  
(Mode 2)  
/ Aileron  
Stick

Aileron  
Trim Lever

### Power Switch

In the upper position, the power is turned on.

### Servo Reversing Switch

Switches that reverse the direction of operation of the servos. The lower position is the normal side and the upper position is the reverse side.

#### Channel display

AIL. : Aileron (CH1)  
ELE. : Elevator (CH2)  
THR. : Throttle (CH3)  
RUD. : Rudder (CH4)

#### Operating direction display

REV. : Reverse side  
NOR. : Normal side

BEFORE USE

## TRANSMITTER T4YF (Rear Panel)

BEFORE USE




### Trainer jack

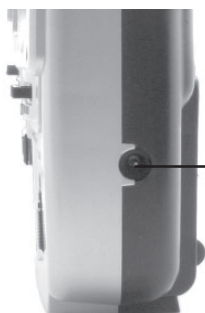
Connects the trainer cord when using the trainer function.  
(The trainer cord is sold separately. )  
(See page 15 for the trainer function operation instructions.)



### Battery cover

Use when replacing the battery .  
Slide the cover downward while pressing the part marked "  ".

## TRANSMITTER T4YF (Side Panel)



### Charging jack

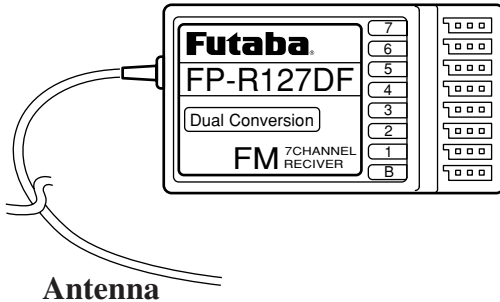
(See page 16 for a description of the charging method.)

# RECEIVER

## R127DF

### Crystal

The crystal is replaced from the side of the receiver.



### Output / battery connector

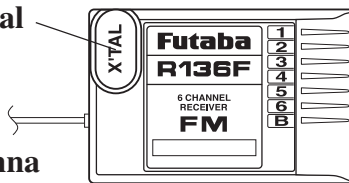
- "1": Aileron servo (CH1)
- "2": Elevator servo (CH2)
- "3": Throttle servo (CH3)
- "4": Rudder servo (CH4)
- "5": (Not used) (CH5)
- "6": (Not used) (CH6)
- "7": (Not used) (CH7)
- "8": (Not used) (CH8)
- "B": Battery connector

Antenna

## R136F (not for USA)

### Crystal

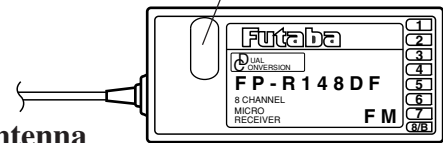
Antenna



## R148DF

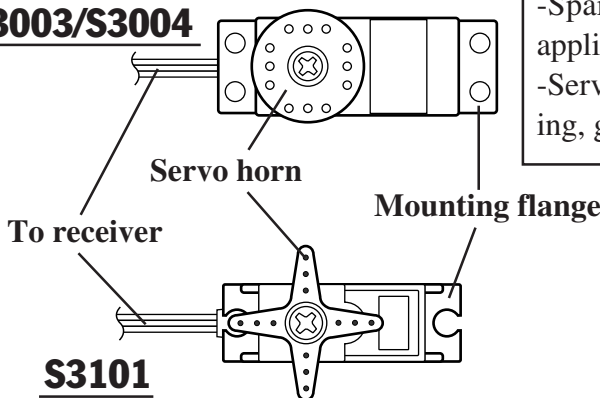
### Crystal

Antenna



# SERVO

## S3003/S3004



## S3101

### <Accessories>

The following items are supplies with the set:

- Spare servo horn: Use to match the application.
- Servo mounting parts: Rubber bushing, grommet, wood screw

## ⚠ CAUTION

! Use the horn set screw supplied with the servo.

If a long screw is used, the interior of the servo may be damaged.

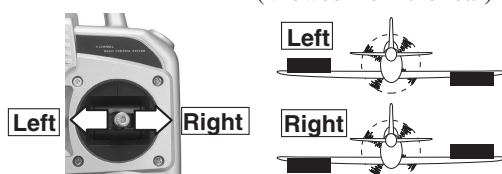
# Transmitter Operation and Movement of Each Servo

Before making any adjustments, learn the operation of the transmitter and the movement of each servo. (In the following descriptions, the transmitter is assumed to be in the standby state.)

## AILERON OPERATION

When the aileron stick is moved to the right, the right aileron is raised and the left aileron is lowered, relative to the direction of flight, and the plane turns to the right. When the aileron stick is moved to the left, the ailerons move in the opposite direction. To level the plane, the aileron stick must be moved in the opposite direction. When the aileron stick is tilted and held, the plane will roll.

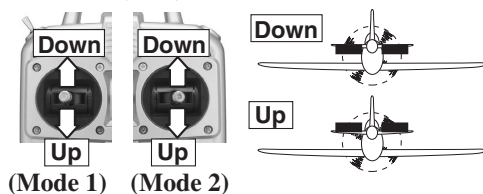
### Aileron(ch1)



## ELEVATOR OPERATION

When the elevator stick is pulled back, the tail elevator is raised and the tail of the plane is forced down, the air flow applied to the wings is changed, the lifting force is increased, and the plane climbs (UP operation). When the elevator stick is pushed forward, the elevator is lowered, the tail of the plane is forced up, the air flow applied to the wings is changed, the lifting force is decreased, and the plane dives (DOWN operation).

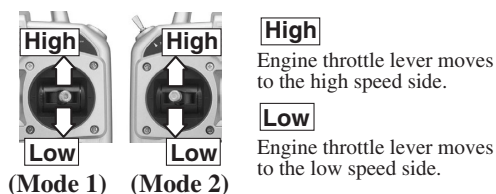
### Elevator(ch2)



## THROTTLE OPERATION

When the throttle stick is pulled back, the engine throttle lever arm moves to the SLOW (low speed) side. When the throttle stick is pushed forward, the throttle lever arm moves to the HIGH (high speed) side.

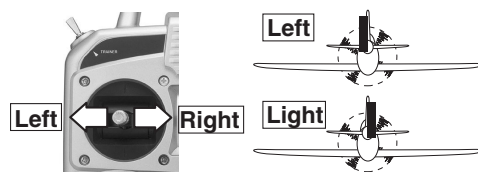
### Throttle(ch3)



## RUDDER OPERATION

When the rudder stick is moved to the right, the rudder moves to the right and the nose points to the right, relative to the direction of flight. When the rudder stick is moved to the left, the rudder moves to the left and the nose points to the left and the direction of travel of the plane changes.

### Rudder(ch4)



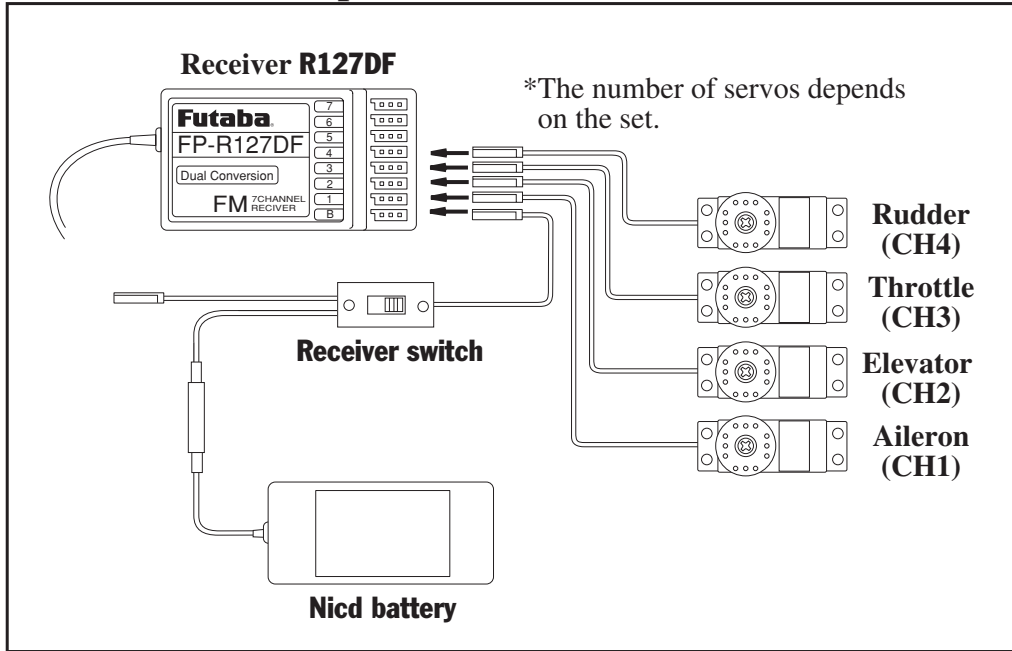


This section describes the installation method and adjustment method after installation when installing the receiver, servos, etc. to the plane.

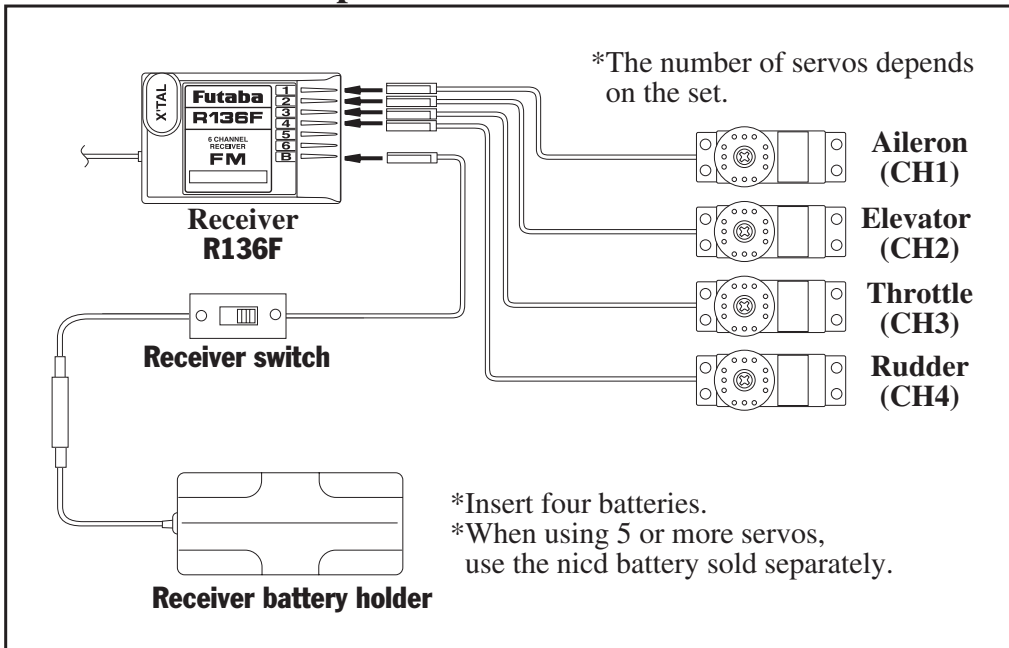
## Connections

Connection example is shown below.

### Connection Example



### Connection Example



# ⚠ WARNING

## Connector Connection

- ❗ Insert the receiver, servo, and battery connectors fully and firmly.

If vibration, etc. causes a connector to work loose during flight, the plane may crash.

## Receiver Vibrationproofing / Waterproofing

- ❗ Vibrationproof the receiver by wrapping it in sponge rubber or some such material. If the receiver may get wet, waterproof it by placing it in a plastic bag.

If the receiver is subjected to strong vibration and shock, or gets wet, it may operate erroneously and cause a crash.

## Receiver Antenna

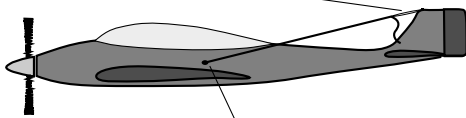
- ⊘ Do not cut or bundle the receiver antenna. Also, do not bundle the antenna together with the servo lead wires.

Cutting or bundling the receiver antenna will lower the receiver sensitivity and shorten the flight range and cause a crash.

### <Antenna installation>

For aircraft, attach the antenna to the top of the tail.

Attach the antenna with a rubber band, etc.



Use a rubber grommet, etc. at the part at which the antenna comes out of the fuselage so that it will not break. Also tie a knot in the antenna wire inside the fuselage so that the antenna cannot be pulled out.

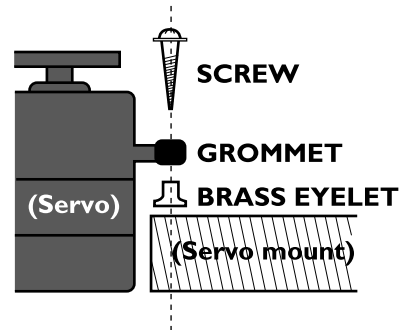
## Servo Throw

- ❗ Operate each servo horn over its full stroke and adjust so that the pushrod does not bind or is not too loose.

Unreasonable force applied to the servo horn will adversely affect the servo and drain the battery quickly.

## Servo Installation

- ❗ Install the servos to the servo mount, etc. through a rubber grommet. Also install the servos so that the servo case does not directly touch the servo mount or other parts of the fuselage.



## Power Switch Installation

When installing a receiver power switch to the fuselage, cut a rectangular hole somewhat larger than the full stroke of the switch knob and install the switch so it moves smoothly from ON to OFF.

Also install the switch where it will not come into direct contact with engine oil, dust, etc. Generally, install the switch to the fuselage at the side opposite the muffler exhaust.

# Adjustments

The operating direction, neutral position, and steering angle of each servo are adjusted.

## ⚠ CAUTION

! The basic linkage and adjustments of the fuselage conform to the fuselage design drawings and kit instruction manual. Be sure that the center of gravity is at the prescribed position.

## Adjustment Procedure

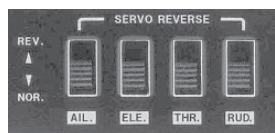
Before making any adjustments, set all the SERVO REVERSE switches on the front of the transmitter to the lower (NOR) position. (Switch the switches with a small screwdriver, etc.)

Turn on the transmitter and receiver power switches and make the following adjustments:

### 1 Check the direction of operation of each servo.

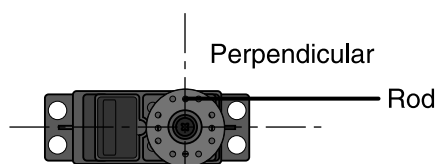
If a servo operates in the wrong direction, switch its SERVO REVERSE switch. (The direction of operation can be changed without changing the linkage.)

\*Note that the direction of the aileron servo is easily mistaken. (Page 10)



### 2 Check the aileron, elevator, and rudder neutral adjustment and left-right (up-down) throw.

Check that when trimmed to the center, the servo horn is perpendicular to the servo and check the neutral position of the fuselage control surfaces (aileron, elevator, rudder,



etc.). If the neutral position has changed, reset it by adjusting the length of the rod with the linkage rod adjuster.

When the throw is unsuitable (different from steering angle specified by the kit instruction manual), adjust it by changing the servo horn and each control surface horn rod.

### 3 Check the engine throttle (speed adjustment) linkage.

Change the servo horn installation position and hole position so that the throttle is opened fully when the throttle stick is set to HIGH (forward) and is closed fully when the throttle stick and throttle trim are set for maximum slow (backward position and lower position, respectively).

### 4 After all the linkages have been connected, recheck the operating direction, throw, etc.

\*Before flight, adjust the aircraft in accordance with the kit and engine instruction manuals.

### 5 Fly the plane and trim each servo.

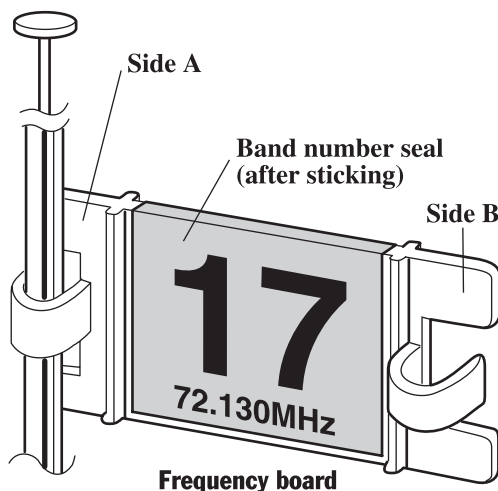
## Using the Frequency Board

**1** Stick the band number seal to the frequency board.

**2** Install the frequency board to the antenna.

Pass the frequency board over the small part of the antenna and slide it to the large part.

\*Use side A or side B, depending on the thickness of the antenna. Cut off the unused side along the slot with cutters, etc.



## Servo Horn

Spare servo horns are supplied with the digital proportional R/C set. Use them according to the application.

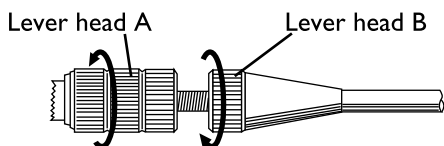
### ⚠ CAUTION

**!** Use the horn set screw supplied with the servo.

If a long screw is used, the interior of the servo may be damaged.

## Non-slip Adjustable Lever Head

The length of the stick lever head can be adjusted.



**1** Unlock lever heads A and B by turning them in the arrow directions.

**2** Set the stick to the most comfortable length and lock the lever heads by turning them in the opposite direction of the arrows.

# Trainer Function

The trainer function is a very effective way for training students. To use it, the special trainer cord (sold separately) is necessary.

*The special trainer cord can be connected to SKYSPORT4, FF5, SKYSPORT6, 6X series, 7U series, 8U series, 9C series, and PCM1024Z series transmitters.*

## Operating Instructions

**Instructor side:**

**Turn on the power switch and extend the antenna to its full length.  
When the trainer switch is not pressed, the instructor has control.  
When the trainer switch is pressed, control is transferred to the student.**

**Student side:**

**Never turn on the power switch.**

\*Connect the student and instructor transmitters with the trainer cord.

## WARNING

 Never turn on the student transmitter power switch.

Turning on the power switch will cause interference and a crash.

 Set the student and instructor transmitters to the same settings.

For example, if the direction of operation is reversed, control will be lost and the plane will crash.

 The opposite side can only use an FM (PPM) type transmitter.

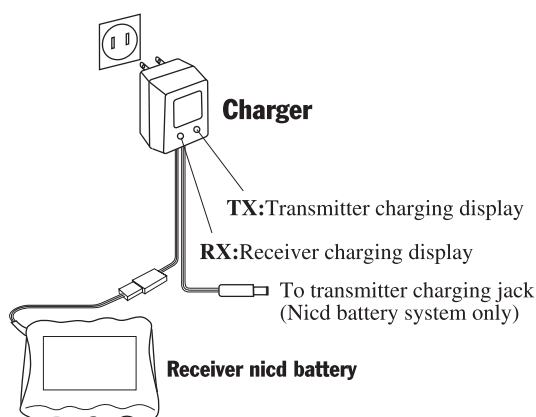
If the modulation method is different, control is impossible.

## Charging The Nicd Battery

The transmitter and receiver nicd batteries can be charged simultaneously or independently.

### Charging The Nicd Battery

- 1** Connect the charger transmitter connector to the transmitter charging jack and the charger receiver connector to the receiver servo nicd battery.
- 2** Connect the charger to an AC outlet.
- 3** Check that the charging LED light.
- 4** At the end of charging, disconnect the charger from the AC outlet.



### ⚠️ WARNING

- ⊘ Never plug the special charger into an AC outlet other than specified.

If the charger is plugged into an AC outlet other than specified, overheating, sparking, etc, may cause burns, fire, etc.

- ❗ Use the special charger, or digital proportional R/C quick charger, sold separately to charge the digital proportional R/C nicd battery.

Overcharging will cause burns, fire, injury, or blindness due to overheating, breakage, electrolyte leakage, etc.

### ⚠️ CAUTION

- ❗ When not using the nicd battery charger, disconnect it from the AC outlet.



# REFERENCE

## Ratings

\*Specifications and ratings are subject to change without prior notice.

### TRANSMITTER T4YF

(2 sticks, 4 channels, FM transmitter)  
Transmitting frequency: 29, 35, 36, 40, 41, 50, 60, 72, 75 MHz  
Modulation method: FM (Frequency Modulation)  
Power requirement: 12V (penlight battery x8) or 9.6V nicd battery  
Current drain: 180mA

### RECEIVER R136F (not for USA)

(6 channels, FM receiver)  
Receiving frequency: 29, 35, 36, 40, 41, 60, 72 MHz  
Intermediate frequency: 455kHz  
Power requirement: 6V (penlight battery x4) or 4.8V nicd battery (common with servo)  
Current drain: 9.5mA  
Size: 33.4x50.3x18.1mm  
Weight: 27.8g

### RECEIVER R127DF

(7 channels, FM receiver)  
Receiving frequency: 50, 60, 72, 75 MHz  
Intermediate frequency: 1st IF 10.7MHz, 2nd IF 455kHz  
Power requirement: 4.8 or 6V (common with servo)  
Current drain: 10.0mA  
Size: 64.3x35.8x21.0mm  
Weight: 40.5g

### SERVO S3003/S3004

(Standard servo)  
Power requirement: 4.8V or 6V (common with receiver)  
Current drain: 8mA (idle)  
Output torque: 3.2kg-cm (4.8V)  
Operating speed: 0.23sec/60 degree (4.8V)  
Size: 40.4x19.8x36mm  
Weight: 37.2g

### RECEIVER R148DF

(8 channels, FM receiver)  
Receiving frequency: 35, 36, 40, 41, 50, 72 MHz  
Intermediate frequency: 1st IF 10.7MHz, 2nd IF 455kHz  
Power requirement: 4.8 or 6V (common with servo)  
Current drain: 13mA  
Size: 55.5x25.5x22.5mm  
Weight: 30.4g

### SERVO S3101

(Micro servo)  
Power requirement: 4.8V or 6V (common with receiver)  
Current drain: 8mA (idle)  
Output torque: 2.5kg-cm (4.8V)  
Operating speed: 0.18sec/60 degree (4.8V)  
Size: 28x13x29.7mm  
Weight: 17g

## Frequencies (for U.S.A.)

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

### 72 MHz Band: (Aircraft only)

72.010	11	72.210	21	72.410	31	72.610	41	72.810	51
72.030	12	72.230	22	72.430	32	72.630	42	72.830	52
72.050	13	72.250	23	72.450	33	72.650	43	72.850	53
72.070	14	72.270	24	72.470	34	72.670	44	72.870	54
72.090	15	72.290	25	72.490	35	72.690	45	72.890	55
72.110	16	72.310	26	72.510	36	72.710	46	72.910	56
72.130	17	72.330	27	72.530	37	72.730	47	72.930	57
72.150	18	72.350	28	72.550	38	72.750	48	72.950	58
72.170	19	72.370	29	72.570	39	72.770	49	72.970	59
72.190	20	72.390	30	72.590	40	72.790	50	72.990	60

### 75 MHz Band: (car/boat only)

75.410	61	75.610	71	75.810	81
75.430	62	75.630	72	75.830	82
75.450	63	75.650	73	75.850	83
75.470	64	75.670	74	75.870	84
75.490	65	75.690	75	75.890	85
75.510	66	75.710	76	75.910	86
75.530	67	75.730	77	75.930	87
75.550	68	75.750	78	75.950	88
75.570	69	75.770	79	75.970	89
75.590	70	75.790	80	75.990	90

### 50 MHz Band: (Aircraft/car/boat -Fcc Amateur license required)

50.800	00	50.900	05
50.820	01	50.920	06
50.840	02	50.940	07
50.860	03	50.960	08
50.880	04	50.980	09

## Troubleshooting

If your digital proportional R/C set does not operate, its range is short, it intermittently stops operating, or it operates erroneously, take the action shown in the table below. If this does not correct the trouble, please contact a Futaba dealer.

Check point	Check item	Action
Transmitter/receiver battery	Dead battery. Incorrect loading. Faulty contact connection. Dirty contacts.	Replace the battery. Charge the nicd battery. Reload the batteries in the correct polarity. If the contact spring is deformed, correct it. Wipe with a dry cloth.
Transmitter antenna	Loose. Not extended to full length.	Screw in. Extend fully.
Crystal	Disconnected. Wrong band. Different from specification.	Push in. Match transmitter/receiver band. Replace with specified crystal.
Connector connection	Incorrect wiring. Disconnection.	Reinsert. Push in.
Receiver antenna	Close to other wiring. Not cut? Not bundled?	Separate from other wiring. Request repair. Install in accordance with instruction manual.
Servo linkage	Binding or looseness	Adjust at the fuselage side.
Motor (electric motor plane)	Noise countermeasures.	Install a noise absorbing capacitor.

# Glossary

The following defines the symbols and terms used in this instruction manual.

## **Aileron (AIL.)**

Control surface at the left and right sides of the main wing of an aircraft. It usually controls turning of the aircraft.

## **Channel**

Represents the number of control systems. It can also represent the number of servos that are operated.

## **Down**

Means down elevator. It is the direction in which the trailing edge of the elevator is pointing down.

## **Elevator (ELE.)**

Control surface that moves up and down on the horizontal stabilizer of an aircraft. It usually controls up and down.

## **Linkage**

Mechanism that connects the servos and the fuselage control surfaces.

## **Modulation method**

Two modulation methods are used with radio control: AM (Amplitude Modulation) and FM (Frequency Modulation). Radio sets for aircraft mainly use FM. Another method that encodes and transmits the modulated signals is called "PCM".

## **Neutral**

Means the neutral position. It is the state in which a transmitter stick returns to the center when not operated.

## **Normal (NOR.)**

For the servo reversing function, it is the normal side. The opposite side is the reverse side.

## **Proportional**

Because today's radio control sets control servos in proportion to stick operation, radio control equipment is called proportional.

## **Rudder (RUD.)**

Tail control surface that controls the direction of the aircraft.

## **Reverse (REV.)**

With the servo reversing function, this is used to mean the reverse side. The opposite side is the normal side.

## **Rod**

A bar that connects the servos and the fuselage control surfaces.

## **Servo horn**

A part that is installed to the shaft of a servo and changes the rotating motion of the servo to linear motion and transmits the linear motion to a rod. Servo horns come in various shapes.

## **Servo mount**

Fuselage base for installing a servo to the fuselage.

## **Stick**

Rod for operating the transmitter.

## **Throttle (THR.)**

Part that controls the air mixture at the engine intake. When opened (throttle high side), a large air mixture is sucked in and the engine speed increases. When closed (throttle low side), the engine speed decreases.

## **Trim**

A device that fine adjusts the neutral point of each servo for safe flying. It is a mechanism that corrects bad tendencies of the aircraft.

## **Up**

Means up elevator. Direction in which the trailing edge of the elevator is pointing up.

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