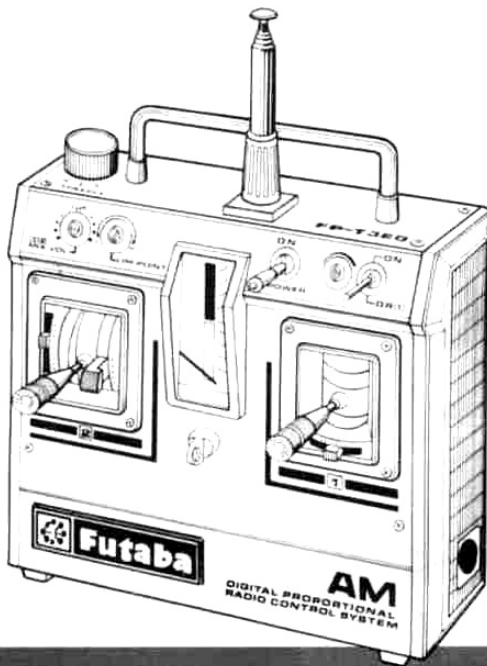


# Futaba

DIGITAL PROPORTIONAL  
RADIO CONTROL



## INSTRUCTION MANUAL

### FP-3EG AM 3 CHANNEL



**FUTABA** CORPORATION OF AMERICA  
**FUTABA** CORPORATION

***Thank you for purchasing a Futaba digital proportional radio control set.  
Please read this manual thoroughly before using your new set.***

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**IMPORTANT:**

AN FCC CLASS C LICENSE IS REQUIRED TO OPERATE THIS SYSTEM. WRITE TO THE FEDERAL COMMUNICATIONS COMMISSION AS LISTED BELOW FOR AN APPLICATION FORM #505.

FEDERAL COMMUNICATIONS COMMISSION  
P.O. BOX 1010  
Gettysburg, PA 17325

\*All prices and specifications subject change without notice.

# •FEATURES

The FP-3EG is a high quality 3 channel, expanded digital proportional radio control set.

The receiver and servo power is a four-battery; 4.8V (Ni-Cad)/6.0V (Dry-Cell). The transmitter power supply is 9.6V (Ni-Cad)/10.5V (Dry-Cell). 3FG with S24 servos only comes with Ni-cads for both TX and RX. Speed and torque of our servo are the highest in its class.

## Transmitter FP-T3EG

- Rudder dual rate (dual-rate on, dual-rate off). The desired rudder angle can be selected when dual-rate on.
- Servo reversing switch at rudder and throttle channel.
- Throttle and rudder mixing is adjustable up to the limit point.
- Three channel transmitter. Third channel has a click knob and can be conveniently used as a subchannel.
- Throttle lever has a neutral shift device, but can be instantly changed to a ratchet type.
- Semi-open gimbal sticks provide maximum feel.
- Neck band provided as standard. Comfortable operation is possible by hooking the band around your neck.
- Seven pen-cell battery power supply can also be changed to Ni-Cad battery (NT-8C).
- Beautiful exterior based on human engineering. Easy-to-use design.

## Receiver FP-R3F

- Miniature type, light, weight, rugged construction.
- Crystal is replaceable from the outside.
- 3P mini-connectors are compatible with existing sets.
- 3 channel specifications.
- Newly developed receiver use Futaba Custom I/C, BA633. This I/C is extremely stable against power supply voltage fluctuations.
- Adjacent frequency interference is minimized by the use of an RF amplifier circuit and ceramic filter.

## Servo FP-S24

- Highest output torque (4.5kg-cm/62.7oz-in. or greater) of any servo in its class.
- Output gear is supported at the top and bottom by ball bearings for excellent neutral characteristics, long life, and smooth operation.
- Large 20mm diameter coreless motor features high torque near neutral and exact tracking of even minute rudder movements.
- Indirect drive system extends the life of the potentiometer substantially.
- Watertight/dustproof.

Besides the FP-S24, FP-S27, watertight servo is available with this system.

# •CONTENTS AND RATINGS

Setname	FP-3EG
Transmitter	FP-T3EG x 1 Pen-cell Dry Battery Type or NiCd Battery Type.
Receiver	FP-R3F x 1
Servo	FP-S24 x 2 or FP-S20x2 or S21Sx2 or S26x2 or S27x2
Switch	SWH-1
NiCd battery/Batt holder	NR-4C/AA0312
Others	Frequency flag, neck band, horn, servo tray, battery charger (w/S24 only)

## Transmitter FP-T3EG

Operating system : 2 sticks, 1 knob, 3 channels  
 Transmitting frequency : 27MHz Bands  
 72MHz Bands  
 Modulation system : AM  
 Power supply : 10.5V, 7 pen-cell batteries or 9.6V NiCd (NT-80)  
 Current drain : 130mA

## Receiver FP-R3F

Receiving frequency : 27MHz Band  
 72MHz Band  
 Intermediate frequency : 455kHz  
 Receiving range : 550 yards (500m) on the ground  
 1100 yards (1000m) in the air  
 Power requirement : 4.8V Ni-Cad battery (NR-4C) or 6.0V AA pen-cell dry battery x 4  
 Current drain : 6V 10mA  
 Dimensions : 1.6x7.5x2.3 in. (40.2x19.0x58.5mm)  
 Weight : 1.6 oz (46g)

## Servo FP-S24

Control system : + pulse width control 1310 us.N  
 Operating angle : One side 45° or more (including trim)  
 Power supply : 4.8-6.0V (shared with receiver)  
 Current drain : 8mA at 6.0V (stopped)  
 Output torque : S24 62.6 oz/in. (4.5 kg/cm)  
 S27 47.3oz/in. (3.4 kg/cm)  
 Dimensions : S24 1.8x0.9x1.5in. (45.4x23x38mm)  
 S27 1.8x0.9x1.7in. (45.5x23x43.5mm)  
 Weight : S24 2.1 oz (59g)  
 S27 1.9oz (53g)

# •TRANSMITTER

## FP-T3EG

The below figure gives the name of each part of the transmitter.

Memorize the position and operation of each switch and control.

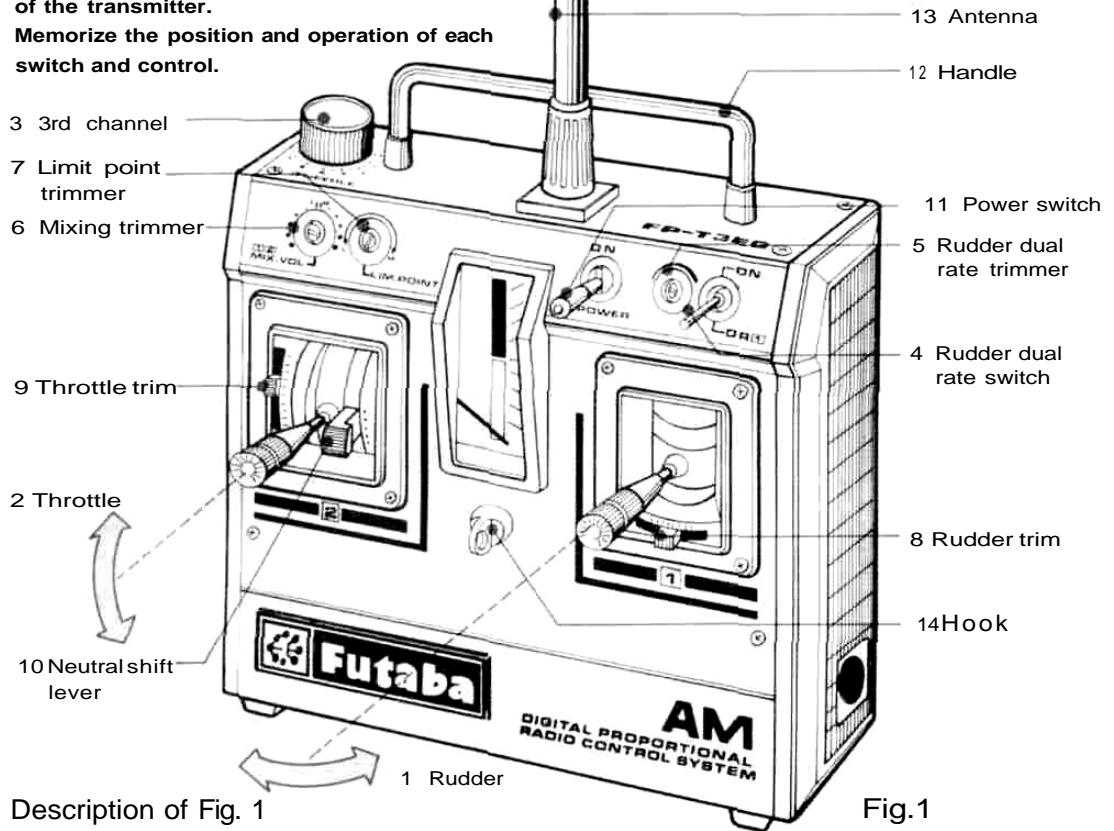
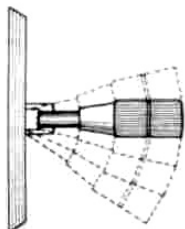


Fig.1

### Description of Fig. 1

- |                                      |  |                                  |   |
|--------------------------------------|--|----------------------------------|---|
| 1 Rudder . . . . .                   | .Rudder operation  | 7 Limit point trimmer . . . . .  | .Changes the mixing amount limit at throttle <- rudder mixing.          |
| 2 Throttle . . . . .                 | .Throttle or elevator operation  | 8 Rudder trim . . . . .          | .Rudder fine adjustment.  |
| 3 3rd channel . . . . .              | .Needle control, etc.  | 9 Throttle trim . . . . .        | .Throttle fine adjustment.  |
| 4 Rudder dual rate switch . . . . .  | .Rudder dual-rate on/off switch  | 10 Neutral shift lever . . . . . | .Changes the neutral position of the throttle control stick in 5 steps. |
| 5 Rudder dual rate trimmer . . . . . | .Adjusts the amount when the rudder dual rate switch is set to ON. (Amount is continuously adjustable from 40% to 100% at dual-rate on.) | 11 Power switch                  |   |
| 6 Mixing trimmer . . . . .           | .Throttle — rudder mixing amount trimmer   | 12 Handle                        |   |
|                                      |  | 3 Antenna                        |   |
|                                      |  | 14 Hook . . . . .                | .The accessory neck band hooks to this hook.                            |

### Neutral Lever Operation



The stick lever neutral position can be adjusted in 5 steps by moving the lever as shown in the figure.

Fig. 2

### Conversion from Self-Neutral System to ratchet System

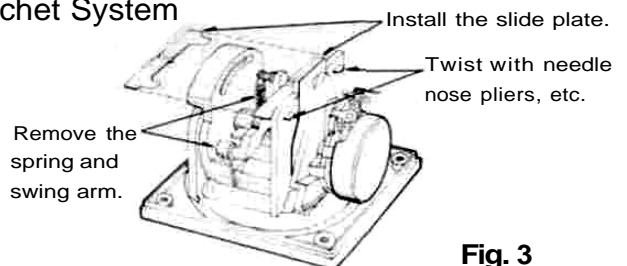
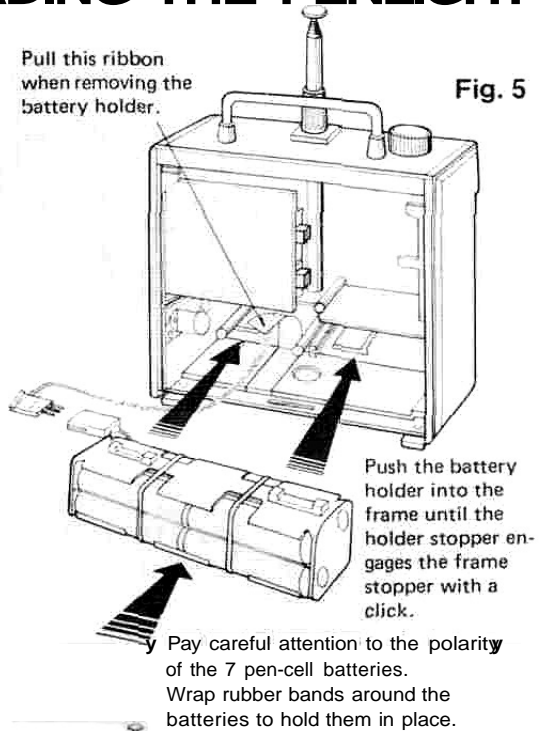
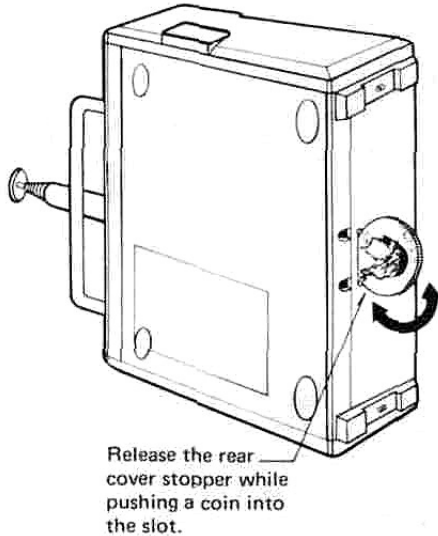


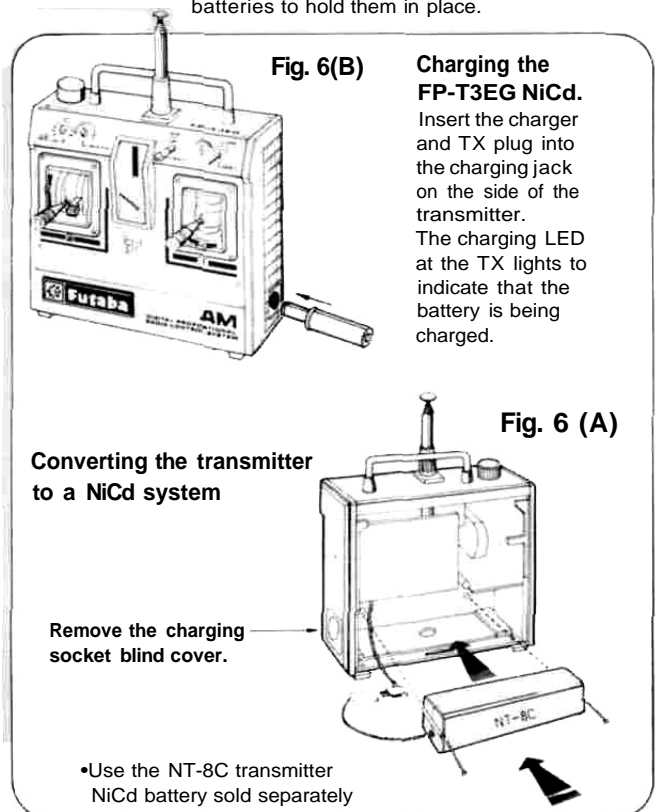
Fig. 3

# •OPENING THE TRANSMITTER REAR COVER AND LOADING THE PENLIGHT BATTERIES

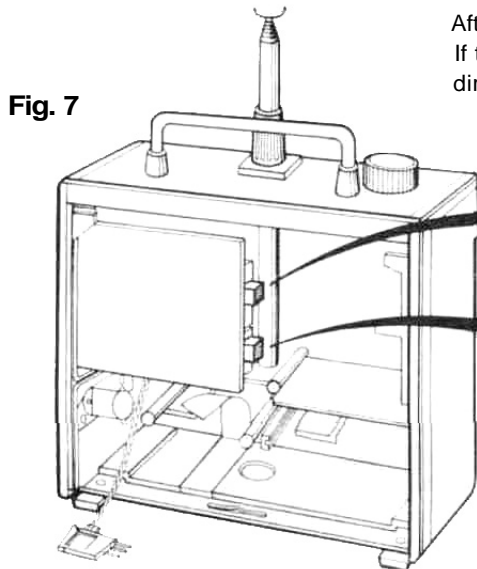


4

- Remove the rear cover of the transmitter as shown in Fig. 4 and load the 7 pen-cell batteries in the correct polarity.
- Extend the antenna fully and set the POWER switch to ON. The meter pointer should deflect to the green zone. If the meter pointer does not move, or moves very little, check for poor battery contact, incorrect battery polarity, or faulty batteries.
- When the meter pointer enters the red zone, the range of the radio waves will become short. Change the batteries when the meter pointer drops to the boundary between the red and green zones.
- Use the trim lever to fine adjust each rudder. This lever can also be used to adjust the neutral position and the flight posture after the mechanism has been mounted. However, after test flight, all adjustments should be made with the rod adjusters, etc. and the lever handle should be left in the neutral position as much as possible.
- The throttle stick neutral position can be selected in 5 steps by moving the neutral lever as shown in Fig. 2. Adjust the neutral position to match the application.
- With the NiCd system FP-T3EG, recharge the battery as shown in Fig. 6(B). The NT-8C is already installed.
- To change the elevator stick from a self-neutral type to a ratchet type, install the slide plate and remove the spring and stick arm as shown in Fig. 3.

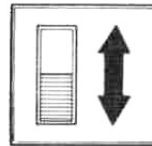


## ● REVERSING THE SERVO

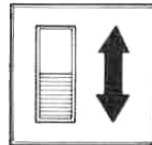


After connecting the linkage, check each rudder.  
If the direction of the rudder and the stick operating direction are opposite, switch the reversing switch.

Fig. 7



15 Rudder reverse switch



16 Throttle reverse switch

15 Rudder reverse switch (Reverses the direction of operation of the rudder servo.)

16 Throttle reverse switch (Reverses the direction of operation of the throttle servo.)

## ● RECEIVER FP-R3F and SERVO FP-S24

5

- Plug the charge (FBC-1 or FBC-2A optional) into a 110V outlet and connect the 3P connector of the charger to the receiver/servo NR-4C NiCd battery pack as shown in Fig. 8. The LED on the charger will light to indicate that the NiCd battery is charging.
- The NiCd battery pack can be used about 12 times at 10 minutes/time.
- Always recharge the battery before use.
- The charging time is about 12~15 hours

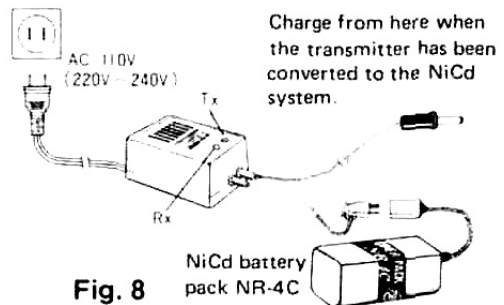


Fig. 8

- With the battery system, insert the four dry-cell batteries, being sure that the polarity is correct, then firmly tighten the coin screw.
- Connect the servo and switch as shown in Fig. 9. Then extend the transmitter and receiver antennas fully.
- Set the transmitter POWER switch to ON, then set the receiver POWER switch to ON. The servo will stop near the neutral position. Operate each stick of the transmitter and check that the corresponding servo faithfully follows the movement of the stick.
- Set the pushrod at each servo horn, then

check that the direction of servo matches the direction of transmitter stick.

- Operate each servo horn over its entire operating range and check if the pushrod is too tight or too loose. Applying unreasonable force to the servo horn will adversely affect the servo and quickly drain the batteries. Always make the operating width of each rudder somewhat larger than the full stroke (including trim) of the servo horn. Adjust the servo horns so that they operate smoothly even when the trim lever and stick lever are operated simultaneously in the same direction.

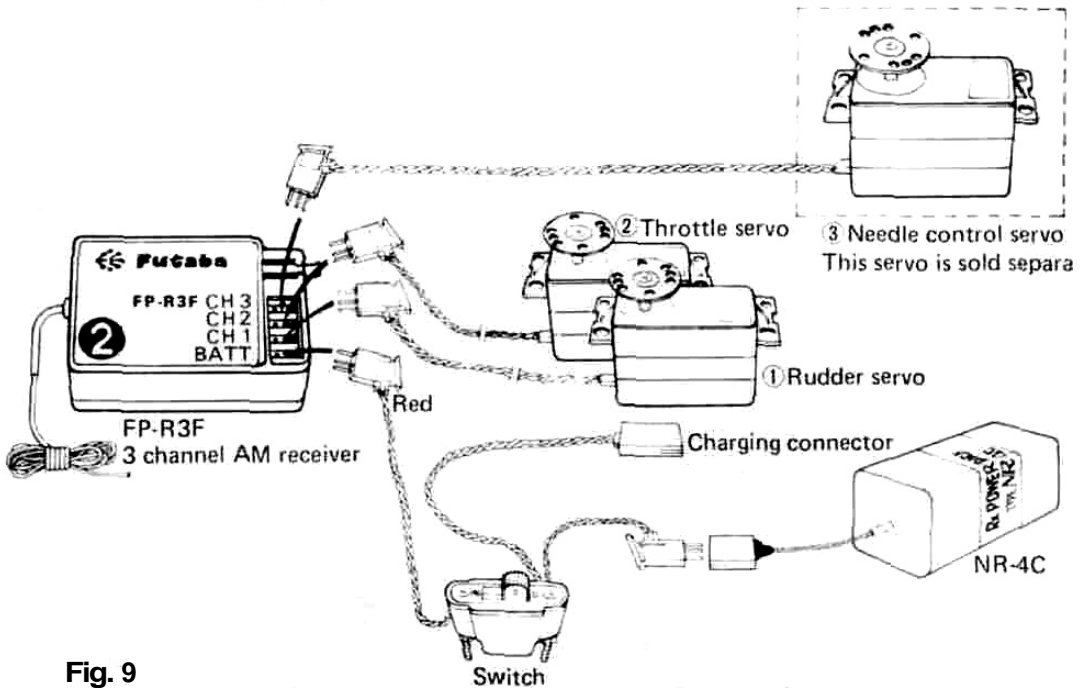


Fig. 9

6

- Be alert for noise. If engine vibration causes metal parts to touch, noise will be produced and the receiver and servos may operate incorrectly. We recommend the use of noiseless parts.
- When installing the switch, cut a rectangular hole somewhat larger than full stroke of the switch and install the switch so that it moves smoothly from ON to OFF. When the switch is mounted inside the fuselage and is turned ON-OFF with wire, install the switch mount in the same manner. Install the switch where it will not come into direct contact with the engine oil, dust, etc.
- Even though the receiver antenna is long, do not cut or bundle it.
- Install the servo firmly. Refer to Fig. 10 at the right.
- A spare servo horn is supplied. Use it as needed. Do not forget to install the tooth washer when changing the horn.
- Wrap the receiver in sponge rubber. Place the receiver in a plastic bag and wrap a rubber band around the open end of the bag to waterproof and dustproof the receiver. Do the same with the receiver battery.
- Also use the rubber bands wrapped around the receiver to hold the servo and switch leads.

- After mounting is complete, recheck each part, then make the transmitter antenna as short as possible, extend the receiver antenna fully, and operate the set from a distance of 22 to 33 yards (20 to 30m) for range check. The movement of each servo should follow the operation of each stick of the transmitter.

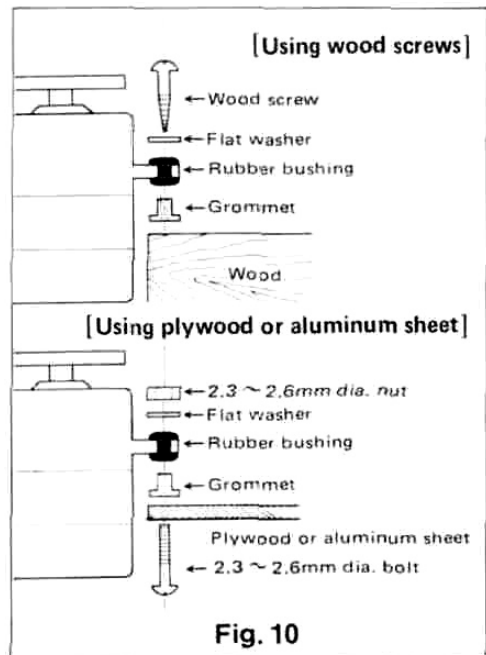


Fig. 10



## •THROTTLE -> RUDDER MIXING ADJUSTMENT

The rudder neutral position at engine SLOW and engine HIGH depends on the engine torque. When adjusted for straight ahead when a common 2-cycle glow plug engine is at HIGH, the boat will slowly swerve to the left at SLOW and if adjusted for straight ahead when the engine is at SLOW, the boat will slowly swerve to the right at HIGH. Mixing from throttle to rudder, the biggest feature of the Model FP-3EG, completely eliminates this tendency.

The following description is for a common 2-cycle glow plug engine that rotates counter-clockwise. Reverse the description for a gasoline engine, electric motor, etc. that rotates clockwise.

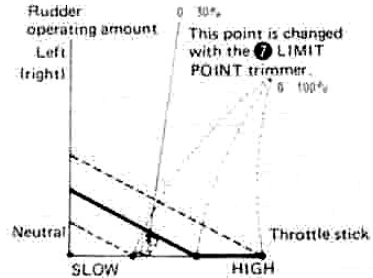
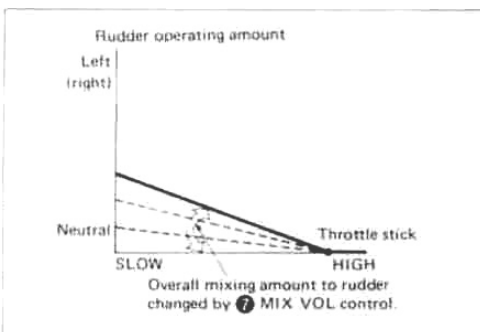
This mixing is adjusted with the mixing trimmer and limit point trimmer at the left front of the transmitter.

Mixing trimmer 6 adjusts the amount and direction of movement of the rudder servo when the throttle stick is moved up and down. The mixing amount is zero at the center position.

Limit point trimmer 7 changes the point at which the operating line of the mixing amount to the rudder servo curves when the throttle stick is moved from LOW to HIGH.

- 1 When the throttle stick is set to HIGH, a boat moving straight at engine control SLOW will swerve to the right. On the other hand, a boat moving straight ahead at throttle HIGH will swerve to the left when the throttle stick is set to SLOW. That is, the rudder servo should be turned to the right when the throttle stick is set to SLOW.
- 2 Turn the mixing trimmer with a screwdriver so that the rudder turns slightly to the right when the throttle stick is moved from HIGH to SLOW.

**Refer to the figures below while reading the description.**



You should now have a good understanding of throttle to rudder mixing.

Throttle -> rudder mixing will be called "MIX" hereafter.

3

- Run the boat without MIX (MIX trimmer at center) and check the rudder neutral, play, and engine SLOW and HIGH.
- Limit point  
Turn the trimmer about 2/3 clockwise. (In the L to H direction.)
- Under this state, turn the MIX trimmer about halfway in the R (right) direction and check the rudder movement (rudder servo) while moving the throttle stick up and down. The rudder should move a little to the right at SLOW and a little to the left at HIGH.
- Set the MIX trimmer to zero (center) at throttle stick HIGH. The rudder servo should not move because the mixing amount is zero at throttle HIGH as shown in Fig. 11.
- 4 After all preparations are complete, make adjustments while actually running.
  - A Adjust the rudder trimmer so that the boat travels straight ahead at throttle HIGH.
  - B Set the throttle stick to SLOW. If the boat swerves to the right at this time, the MIX amount is excessive. Reduce the MIX amount by turning the MIX trimmer toward the center. If the boat slowly swerves to the left, the MIX amount is insufficient. Increase the MIX amount by turning the MIX trimmer in the R direction.
  - C This completes MIX adjustment at throttle SLOW and HIGH. However, adjustment near medium SLOW is still necessary. To adjust near medium SLOW, proceed as follows:

- (a) If the boat slowly swerves to the right when the throttle stick is set to medium SLOW, the POINT is too high. Adjust it by turning the limit point trimmer counterclockwise. Then re-adjust item B above.
- (b) If the boat slowly swerves to the left, the POINT is too low. Adjust by turning the limit point trimmer clockwise. Then readjust the MIX trimmer as described in item (B).

### **RUDDER DUAL RATE (DUAL-RATE ON, DUAL-RATE OFF)**

- Rudder dual rate switch  
Dual-rate (servo stroke becomes narrow) is effected when this switch is set to ON. Dual-rate is off when the switch is set to OFF. OFF is the normal state.
- Rudder dual rate trimmer  
This trimmer adjusts the full stroke of the servo when the rudder dual rate switch is set to ON. Adjust it to match the course and technique. The rudder dual rate amount is continuously variable from 40% to 100%.
- The Futaba Mini 3-pin wire servo can be combined with any Futaba transmitter and receiver. Use it to match the application. (However, except the Futaba J Module Series.)
- After mounting and checking are complete, take your model to the store where you purchased the digital proportional set, or to an experienced radio control enthusiast, and ask them to tell you how to install your radio control set correctly and to inspect your set-up carefully.

## **Futaba Digital Proportional Frequencies**

Band (1)	26.995MHz	Brown
Band (2)	27.045MHz	Red
Band (3)	27.095MHz	Orange
Band (4)	27.145MHz	Yellow
Band (5)	27.195MHz	Green
	- 72.080MHz	Brown/White
	72.160MHz	Blue/White
	- 72.240MHz	Red/White
	72.320MHz	Violet/White
	- 72.400MHz	Orange/White
	72.960MHz	Yellow/White
	- 75.640MHz	Green/White
	-	Aircraft use only.

The frequency of Futaba digital proportional sets can be changed among bands (1)-(5) on the 27MHz band only.

However, a 27MHz band set cannot be changed to 72MHz band, and vice versa.

Therefore, always attach the correct frequency flag to the end of the transmitter antenna. Each frequency band has its own designated color, as stated above.. The frequency flag is intended for identification purposes.

Also change the frequency flag when changing the crystal.

Futaba paired crystals are precisely matched. Always use a Futaba crystal set (transmitter, receiver) when changing the frequency.

It is illegal to change crystals of transmitter on the 72-76 MHz bands in the U.S.A.

## **FACTORY REPAIR SERVICE**

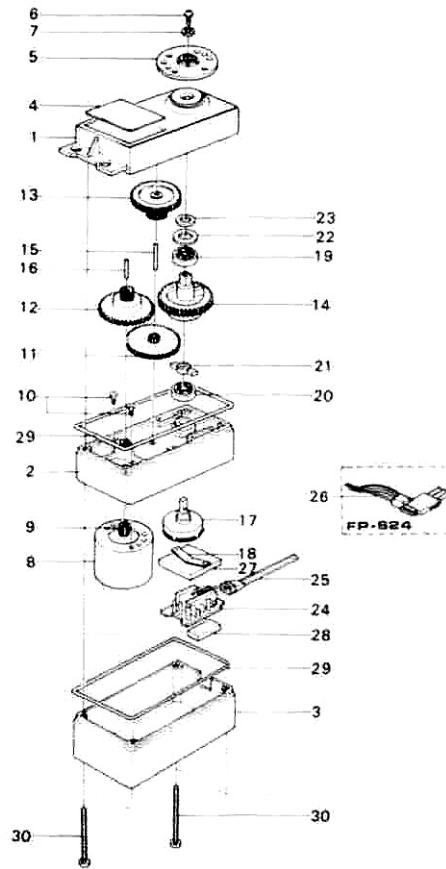
To insure prompt service, please follow the instructions given below.

1. Charge the batteries for at least 18 hours prior to shipment.
2. Return the system only. Not your complete installation. Remove the servos from their mounts and remove the foam padding from the receiver.
3. Plugs or other modifications which interfere with factory test procedures will be returned to factory standard at your expense.
4. Carefully pack all components individually, using sufficient packing material to prevent damage during shipment.
5. Include a brief but thorough explanation of all problems and service required and tape it to the back of the transmitter. Place a label describing the function of the servo on each servo.
6. Be sure to include your full address and tel. No., zip code inside the box as well as on the outside.
7. Include a packing list of all items being returned, and double check to make sure that all items are packed.
8. Upon receipt of your equipment at the Futaba factory, an estimate of the cost of repair (over \$25.00 only) will be sent to you. Your equipment will then be repaired and returned to you upon receipt of payment or C.O.D. (cash).

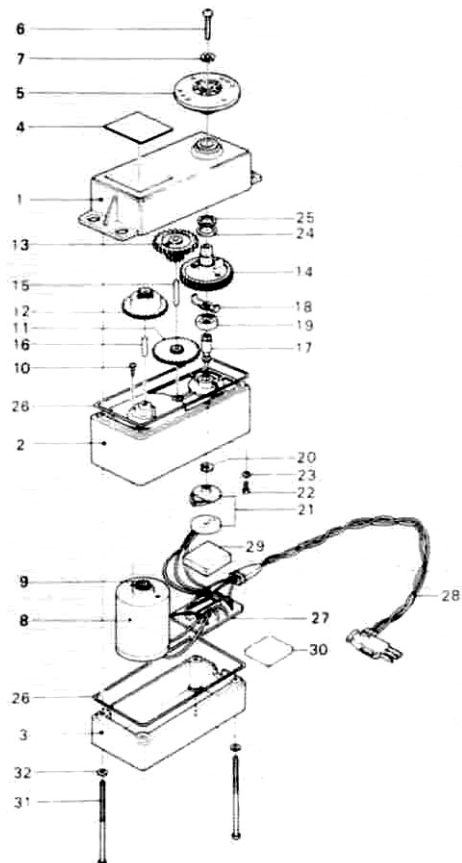
This factory repair service applies only to the continental U.S.A., Hawaii, and Alaska.

# FP-S24

No	Part Name
1	Upper case
2	Middle case
3	Bottom case
4	Main plate
5	Servo horn
6	Binding head tapping screw 2 - 8
7	Tooth washer
8	Motor
9	Motor pinion
10	Phillips flat head screw 1.6 x 3
11	1st gear
12	2nd gear
13	3rd gear
14	Final gear
15	Intermediate shaft
16	2nd shaft
17	VR
18	VR mount
19	Bearing L 1060
20	Bearing L 1170
21	VR drive plate
22	Spacer W
23	Seal ring
24	Printed wiring board
26	SX cord
27	Neoseal sponge 3 x 17 x 20
28	Neoseal sponge 3 x 15 x 7
29	O ring 32.6 black
30	Phillips pan head screw 2 x 2.5



No.	Part Name
1	Upper case
2	Middle case
3	Bottom case
4	Name plate
5	Servo horn
6	Binding head tapping screw
7	2φ toothed washer
8	Motor
9	Motor pinion
10	Phillips flat head screw
11	1st gear
12	2nd gear
13	3rd gear
14	Final gear
15	Intermediate shaft
16	2nd shaft
17	Slider drive shaft
18	Slider drive plate
19	Bearing
20	E washer 1.5 m/m
21	VR body slider set
22	Screw, truss 2x4
23	Fiber washer 2.3m/m
24	Spacer washer
25	Seal ring
26	O ring 32.6°
27	FP-S27 wiring board
28	Connector with wire
29	Neoseal sponge 5x15x15
30	Neoseal sponge 3x15x15
31	Phillips pan head screw
32	1.6φ O ring





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