

Futaba

DIGITAL PROPORTIONAL
RADIO CONTROL

FM

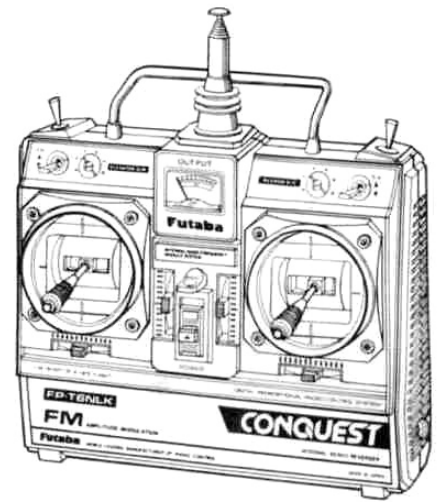
INSTRUCTION MANUAL

FP-6NLK FM6 CHANNEL
FP-5NLK FM5 CHANNEL



FUTABA CORPORATION OF AMERICA
FUTABA CORPORATION

D60399



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

FEATURES OF FP-6NLK/5NLK

The FP-6NLK and FP-5NLK are 6 channel (6NLK) and 5 channel (5NLK) FM proportional radio control set with a ergonomic case created as a result of the exhaustive pursuit of easier operation, newly designed sticks for smooth and positive operation, servo reversing switch for each channel, and other innovations based on the opinions and needs of many RC modelers.

Please read this manual before using your new set.

TRANSMITTER FP-T6NLK/T5NLK

- Reliability substantially improved by using industrial robots to assemble the PC board.
- Servo reversing switch for each channel. Servos are reversed by using this switch.
- Newly designed open gimbal sticks operate smoothly and positively.
Spring tension mechanism allows adjustment of the operating feel of the stick lever.
- Non-slip adjustable lever head allows adjustment of the stick length as desired.
- RF PC board module style system in transmitter. (Internal only)
- Functional case, created as a result of the exhaustive pursuit of easier operation, has evolved a thick case which fits into the palm of the hand.
- Aileron, Elevator dual rate function. (Dual rate ON, OFF)
- Easy to read square transmitter battery voltage/output level meter.
- Excellent radiation efficiency, strong 8-stage telescoping antenna.
- Neck strap bracket provided as standard. Operation is easier if the transmitter is hung from your neck by using the optional neck strap.

RECEIVER FP-R107N

- Compact, high performance FM 7-channel receiver with PC board space reduced to a minimum.
- Special IF amp for radio communications improves the effective receiving range stability.
- Narrow band ceramic filter improves rejection of adjacent channel interference.
- Futaba original squelch circuit reduces erroneous operation by weak signals (when passing a dead point, etc.) and erroneous operation by natural noise when no signals are being received.

- Large capacitor copes with voltage changes when a battery is used.
- Vibration-resistant pin connectors.
- Fiberglass epoxy PC board with thru-the-hole plating is vibration and shock resistant.

SERVO FP-S138

SMALL, RUGGED, HIGH NEUTRAL LOW PROFILE SERVO

- Height is 0.2 in (5.2mm) lower than existing servos of its type.
- New indirect drive potentiometer improves vibration and shock resistance and neutral accuracy.
- Futaba low-power custom 1C provides extremely high torque, narrow dead band, and superior tracking.
- Fiberglass reinforced PBT (polybutylene terephthalate) injection molded servo case is mechanically strong and invulnerable to glow fuel.
- Strong polyacetal resin ultra-precision servo gear features smooth operation, positive neutral, and very little backlash.
- Fiberglass reinforced epoxy resin PC board with thru-the-hole plating improves servo amp vibration and shock resistance.
- Three pin connector eliminates faulty contact and improves reliability against vibration and shock. Housing has a reverse insertion prevention mechanism.
- Special grommet simplifies mounting of the servo and has an excellent cushioning effect.
- Six special adjustable splined horns.
- Since the output torque is 34.75oz-in (2.5kg.cm) and operating speed is 0.23sec/6CT, it can be used with almost all models.

SET CONTENTS AND RATINGS

(Specifications are subject to change without prior notice.)

	FP-6NLK	FP-5NLK
Transmitter	FP-T6NLK x 1	FP-T5NLK x 1
Receiver	FP-R107N x 1	FP-R107N x 1
Servo	FP-S138x4	FP-S138x4
Battery holder	NR-4J x 1	
Switch	SSW-J x 1	
Others	Charger, Frequency flag, Spare horn, Mounting screw.	

TRANSMITTER FP-T6NLK/T5N

Operating system	: 2 stick, servo reverse
	Aileron, Elevator dual switch,
	Landing gear switch (5ch)
	[Switch (6ch) 6NLK only]
Transmitting frequency	: 53, 72MHz bands
Modulation system	: FM
Power requirement	: 9.6V NiCd battery (NT-8LP)
Current drain	: 190mA

RECEIVER FP-R107N

Receiving frequency	: 53, 72MHz bands
Intermediate frequency	: 455kHz
Power requirement	: 4.8V NiCd battery (Common use with servo)
Current drain	: 13.5mA (4.8V reception)
Dimensions	: 1.38 x 2.42 x 0.8 in (35.2x61.7x20.3mm)
Weight	: 1.55oz (43g)
Receiving range	: 550 yards (500m) on the ground, 1,100 yards (1,000m) in the air. (at the best conditions)

SERVO FP-S138

Control system	+pulse width control
Operating angle	One side 45° or more (including trim)
Power requirement	4.8V~6V
Current drain (IDLE)	6.0V, 8mA
Output torque	34.75oz-in (2.5kg-cm)
Operating speed	0.23 sec/60°
Dimensions	1.59 x 0.79 x 1.38 in (40.5 x 20 x 35.3mm)
Weight	1.44oz (41g)

TRANSMITTER FP-T6NLK/T5N CONTROLS

Fig. 1 shows the name of each part of the transmitter. Memorize the position and operation of each switch and control.

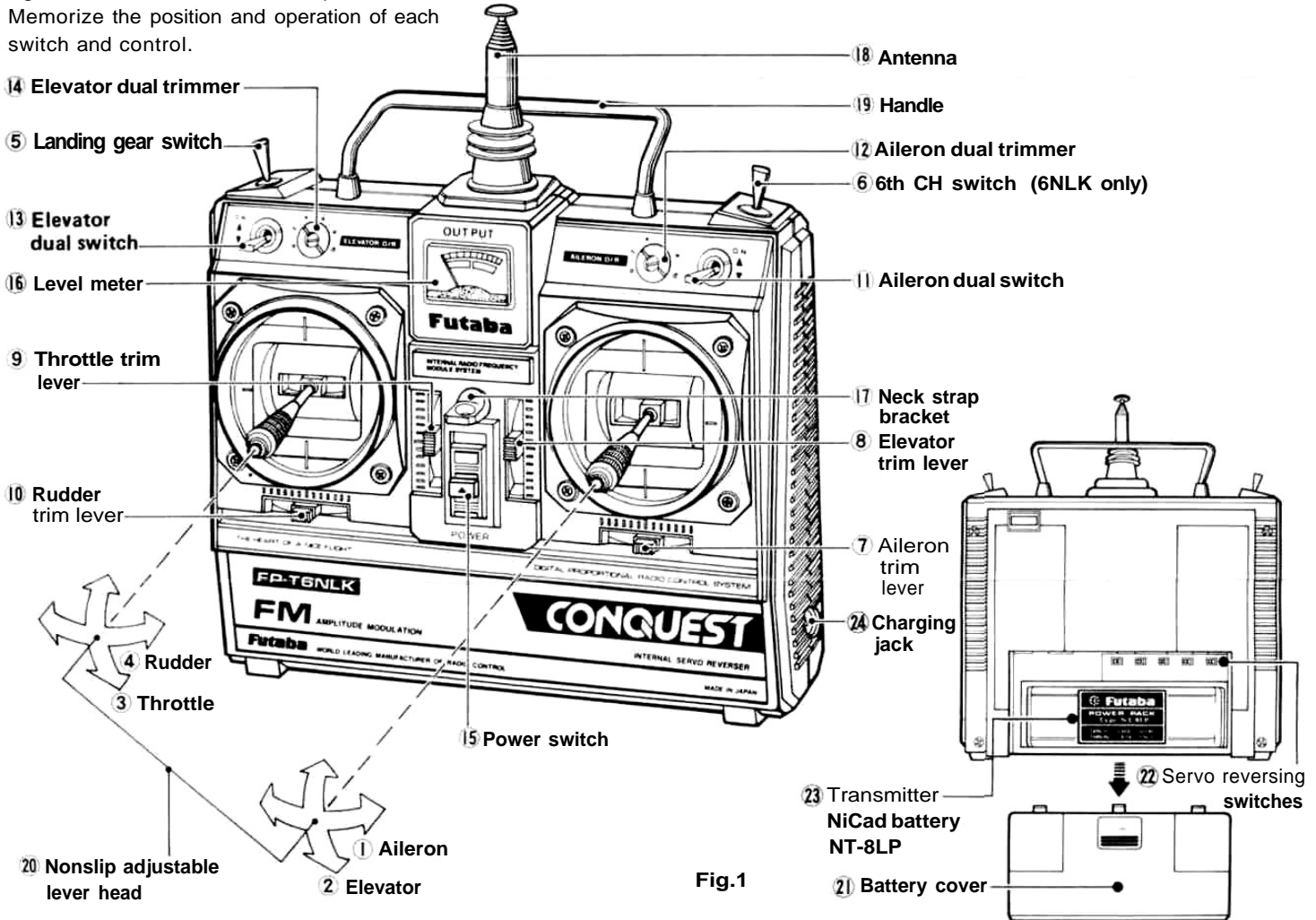


Fig. 1

In the following descriptions, all the servo reversing switches are assumed to be in the normal position. When they are in the reverse position, operation is the opposite of that described.

- ① Aileron Aileron operation
- ② Elevator Elevator operation
- ③ Throttle Throttle operation
- ④ Rudder Rudder operation
- ⑤ Landing gear switch Raising and lowering the landing gear.
- ⑥ 6th CH switch (6NLK only) Use for controlling model airplane flaps, etc. The servo is operated at the **A** and **C** positions. The **B** position is off.
- ⑦ Aileron trim lever Aileron trimmer
- ⑧ Elevator trim lever Elevator trimmer
- ⑨ Throttle trim lever Throttle trimmer
- ⑩ Rudder trim lever Rudder trimmer

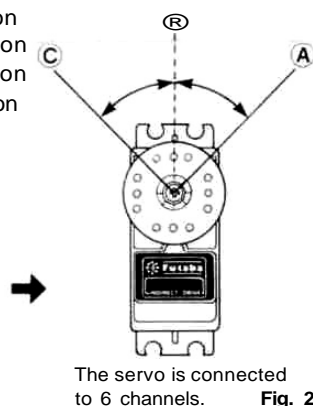


Fig. 2

- ⑪ Aileron dual rate switch Aileron dual rate ON-OFF switch. When set to the upper position, dual rate is turned on, and when set to the lower position, dual rate is turned off.
- ⑫ Aileron dual rate trimmer This trimmer sets the aileron travel when the aileron dual rate switch is set to ON. When the dual rate switch is set to ON, the servo throw can be set to an arbitrary angle smaller than when the dual rate switch is OFF (normal) as shown in the figure. Use the throw matched to the aircraft and the maneuvers to be performed.

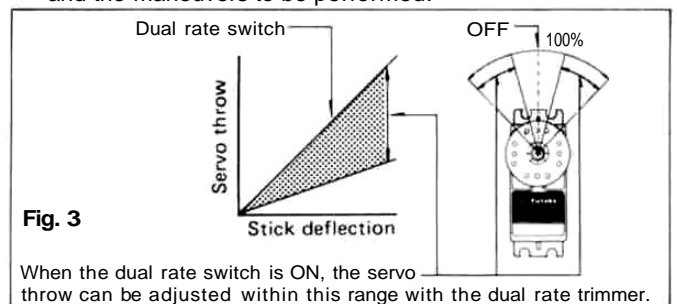
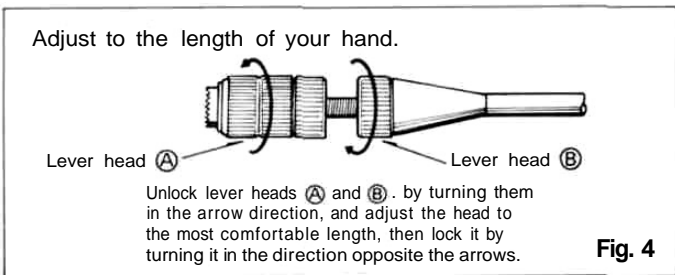


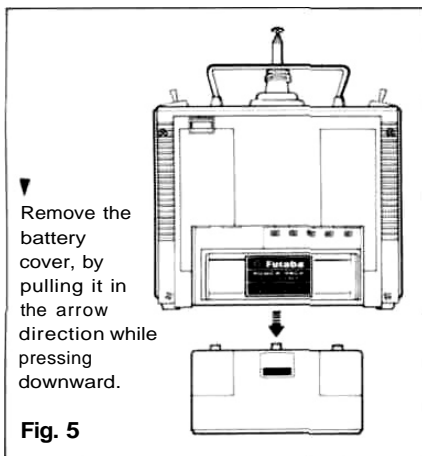
Fig. 3

When the dual rate switch is ON, the servo throw can be adjusted within this range with the dual rate trimmer.

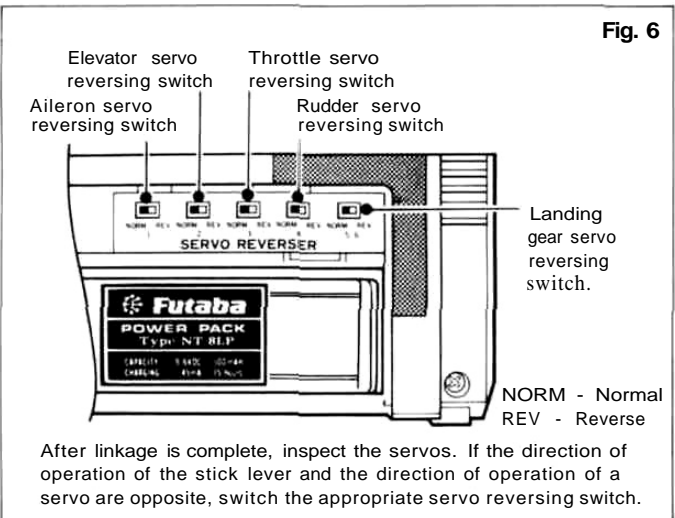
- 13 Elevator dual rate switch
This switch turns the elevator dual rate function on and off. The lower position is dual rate OFF and the upper position is dual rate ON.
- 14 Elevator dual rate trimmer
This trimmer sets the elevator deflection angle when the elevator dual rate switch is in the ON position. It has the same functions as aileron dual rate.
- 15 Power switch
The upper position is ON.
- 16 Level meter
This level meter indicates the transmitter battery voltage.
- 17 Neck strap bracket
Bracket for the neck strap (optional).
- 18 Antenna
Strong telescoping antenna. Extend it to its full length when using the transmitter.
- 19 Handle
Use this bar to carry the transmitter.
- 20 Nonslip adjustable lever head
The length of the lever head can be adjusted to fit the operator.



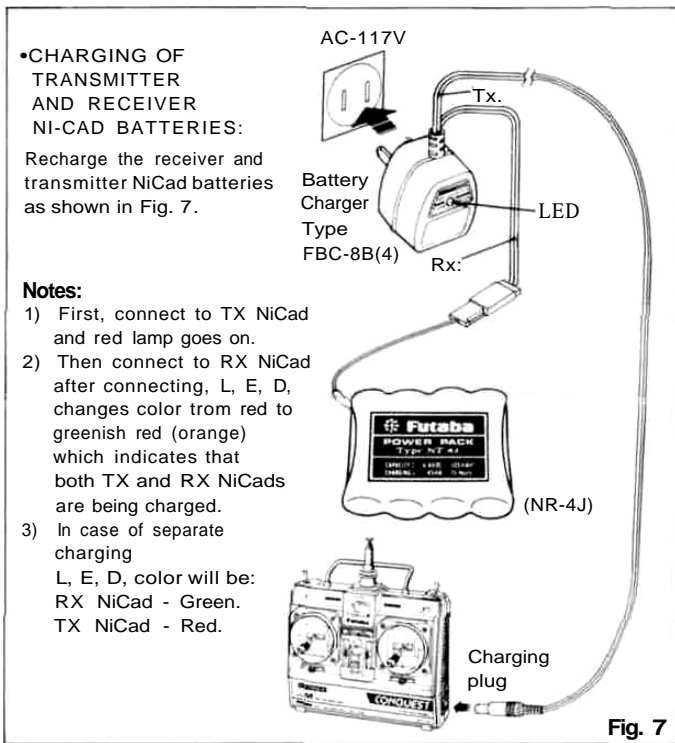
- 21 Battery cover
Remove this cover when switching the servo reversing switches.



- 22 Servo reversing switches
Using the servo reversing switches
 - The left side of each switch is the normal position.
 - The servo reversing switches reverse the direction of operation of the servos.



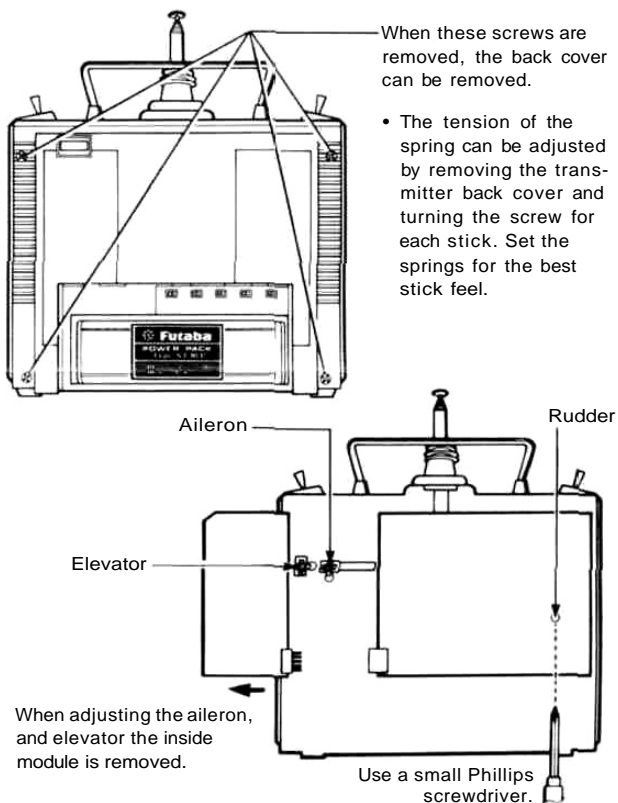
- 23 Transmitter NiCad battery NT-8LP
- 24 Charging jack
Battery charge jack for built-in NiCad battery.



- Notes:**
- 1) First, connect to TX NiCad and red lamp goes on.
 - 2) Then connect to RX NiCad after connecting, L, E, D, changes color from red to greenish red (orange) which indicates that both TX and RX NiCads are being charged.
 - 3) In case of separate charging
L, E, D, color will be:
RX NiCad - Green.
TX NiCad - Red.

- Connect the charging plug of the FBC-8B charge to the transmitter charging jack, connect the 3P connector of the FBC-8B to the receiver NiCad battery (NR-4J), and plug the FBC-8B to a 117VAC outlet as shown in this figure.
- The Receiver battery can be used about 10 times at 10 minutes per flight between rechargings.
- Charge the batteries for about 15 hours. When the set is not in use for some time, repeat discharge and charge two to three times before use. (If the batteries are not used for a long time, their capacity will go down).
- FBC-8B charges transmitter and receiver NiCad batteries independently or simultaneously.

The tension of the stick lever spring can be adjusted.



RECEIVER FP-R107N & SERVO FP-S138

Receiver, servos, switches, and battery connections

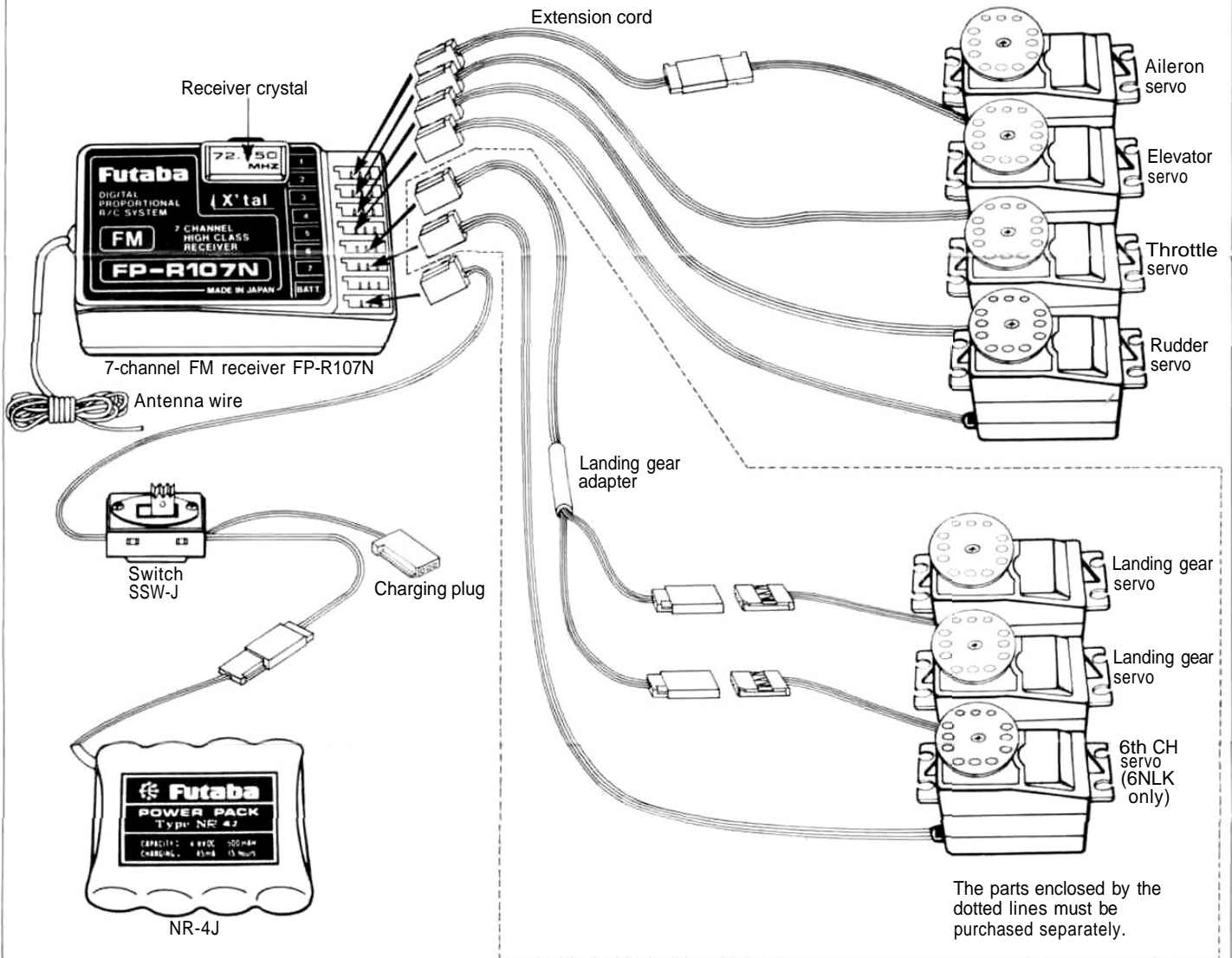


Fig. 9

PRECAUTIONS

- Connect the receiver, servos, switches, and battery firmly 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 servos stop near the neutral position. Operate the transmitter sticks and check that each servo follows the movement of the stick.
- Connect the pushrod to each servo horn, then check if the direction of travel of each servo matches the direction of operation of its transmitter stick. To reverse the direction of servo travel, switch the servo reversing switch.
- Operate each servo over its full stroke, and check if the pushrod binds or is too loose. Applying unreasonable force to the servo horn will adversely affect the servo and quickly drain the battery. Always make the travel of each control mechanism somewhat larger than the full travel (including trim) of the servo horn. Adjust the servo horns so that they move smoothly even when the trim lever and stick are operated simultaneously in the same direction.
- Be alert for noise.
This set is noise-resistant, but is not completely immune to noise. We recommend the use of noiseless parts.

- When installing the switch harness, cut a rectangular hole somewhat larger than the full stroke of the switch and install the switch so that it moves smoothly from ON to OFF. This also applies to the switch mount when the switch is installed inside the fuselage and is turned on and off from the outside with a piece of wire, etc. Install the switch where it will not be exposed to engine oil, dust, etc.

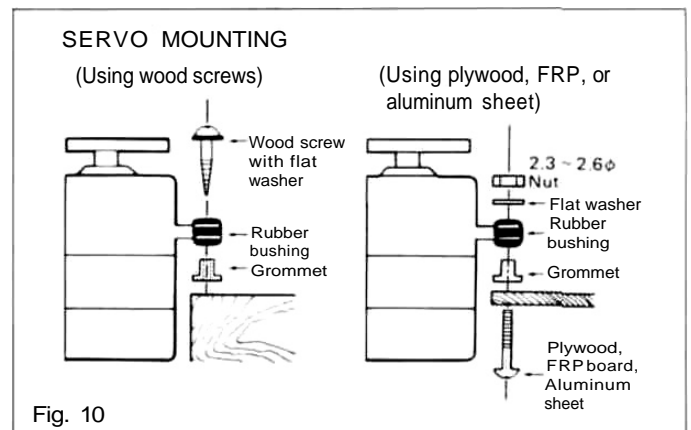


Fig. 10

- Even though the receiver antenna is long, do not cut or bundle it.
- Install the servos securely. Tighten the mounting screws until the rubber grommet is crushed slightly. If the screws are too tight, the cushioning effect will be adversely affected.
- Wrap the receiver in sponge rubber. Waterproof and dust-proof the receiver by placing it in a plastic bag and wrapping a rubber band around the open end of the bag. Do the same with the receiver/servobattery.
- Use the rubber bands wrapped around the receiver to hold the servo and switch leads.
- After mounting is complete, recheck each part, then check the range by making the transmitter antenna as short as possible, extending the receiver antenna fully, and operating the set from a distance of 20m to 30m. The movement of each servo should follow the movement of each stick of the transmitter.
- After mounting and checking are complete, take your model to the shop where you purchased the set, or to an experienced radio control modeler, and ask them to teach you how to handle your radio control set in the proper manner and to inspect your set-up carefully.
- To enjoy radio control models fully, be sure to observe all safety standards.

AILERON AND ELEVATOR DUAL (dual rate ON, OFF) ADJUSTMENT

When the dual switch is set to ON, the servo throw is made smaller by the amount shown by the hatched lines in Fig. 10. The servo throw can be set from 40% to 100% of the total travel by adjusting the trimmer next to the switch with a flat bladed screwdriver. When the dual rate switch is set to OFF, the throw is normal. When desiring a larger throw, such as for spins, etc., set the dual rate switch to OFF and adjust the throw mechanically by horn and rod adjustment. Set the dual rate switch to on for level flight and adjust the trimmer for the required amount of throw.

When the dual rate switch is set to OFF, dual rate is set and the throw becomes large.

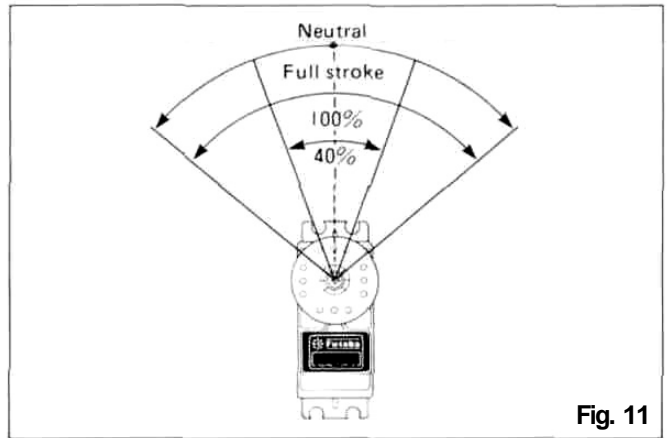


Fig. 11

SPLINED HORNS

This horn permits shifting of the servo neutral position at the servo horn. Setting and shifting the neutral position

a) Angle divisions

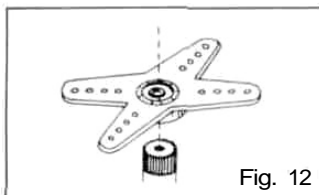


Fig. 12

1) The splined horn has 25 segments. The amount of change per segment is; $360:25=14.4^\circ$

2) The minimum adjustable angle is determined by the number of arms or number of the holes. For four arms, the minimum adjustable angle is:

$$360^\circ \div \frac{(25 \times 4)}{\text{Number of divisions}} = 3.6^\circ$$

b) Effect

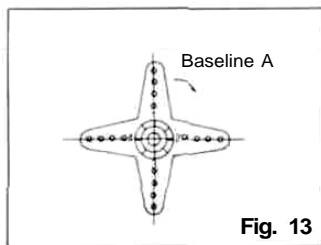


Fig. 13

To shift the holes center line to the right (clockwise) relative to baseline A, shift arm 2 to the position of arm 1 and set it to the position closest to baseline A.

(Example] For a four arm horn, the angular shift per segment is 14.4° . The shift to the right is $90^\circ - (14.4 \times 6) = 3.6^\circ$

To shift by the same angle in the opposite direction, use the opposite arm number.

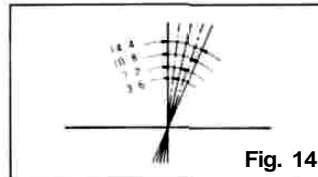


Fig. 14

For a six arm horn, turn the arm counterclockwise and set arm 2 to the position of arm 1. The adjustable angle is $60^\circ - (14.4 \times 4) = 2.4^\circ$.

Arm 3 shift 4.8° to the right, arm 6 shifts 2.4° to the left, and arm 4 shifts 7.2° to the right and left.

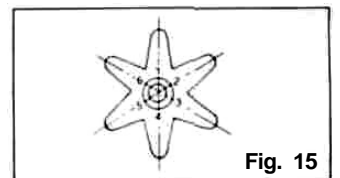
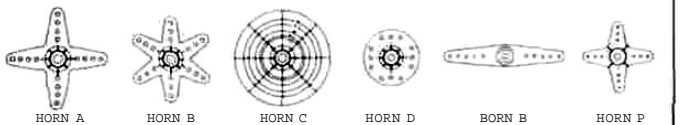


Fig. 15

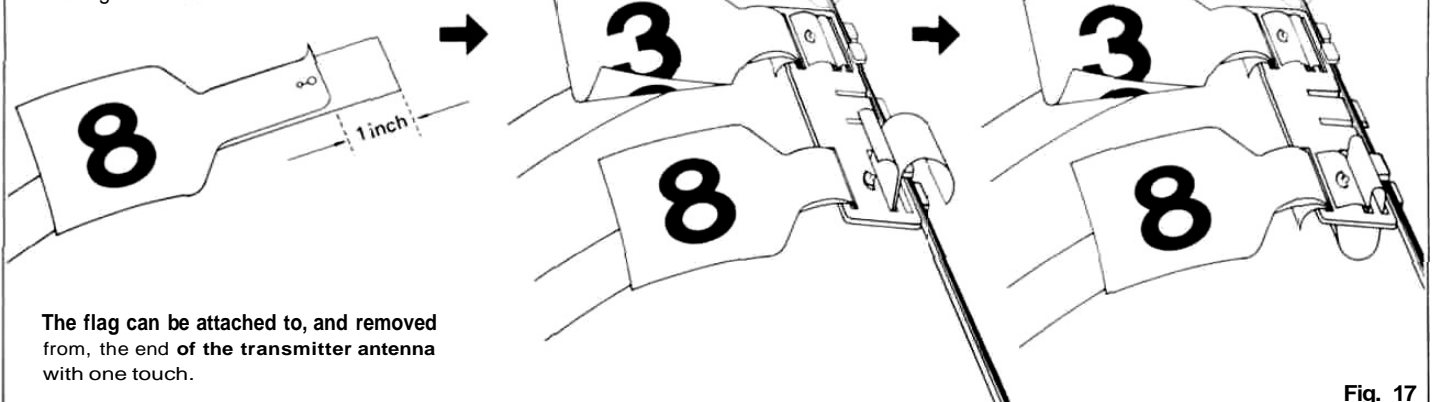
The following splined horns are optional.

Fig. 16



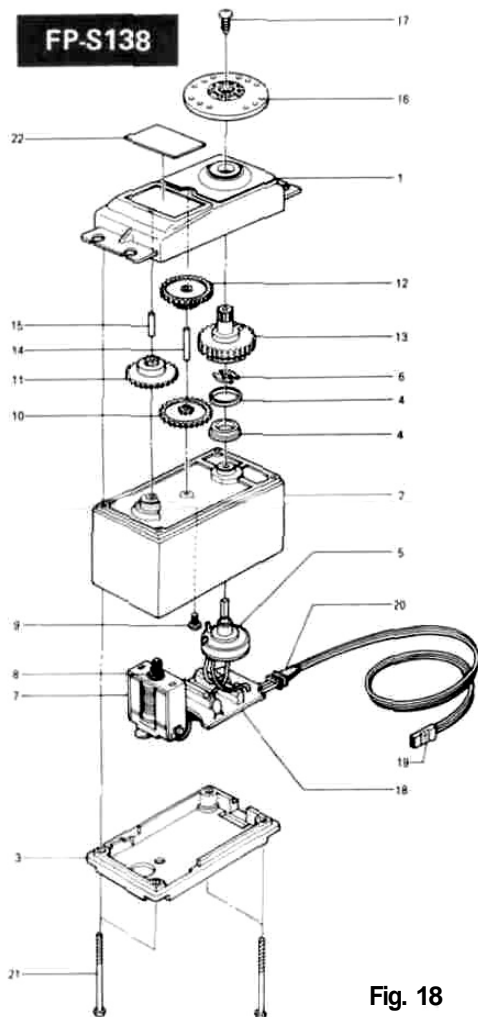
USING THE ANTENNA FREQUENCY FLAG

Insert the frequency flag into the flag holder as shown here.



The flag can be attached to, and removed from, the end of the transmitter antenna with one touch.

Fig. 17



No.	Part Name	Part No.
1	Upper case	S05650
2	Middle case	S06010
3	Bottom case	S06020
4	Metal bearing	S04134
5	Potentiometer	i39995
6	VR drive plate	S02753
7	Motor	S91218
8	Motor pinion	S02461
9	VR set screw	J55016
10	1st gear	S02751
11	2nd gear	S02491
12	3rd gear	S02492
13	Final gear	S02752
14	Intermediate shaft	S02495
15	2-stage shaft	S02494
16	Servo horn 0	S01239
17	Horn set screw 2.6x8	J55178
18	Printed wiring board S138	AS 1305
19	S138. . . .3PB-WRB300	AT2465
20	Lead wire packing	S90045
21	Case set screw	J50360
22	Nameplate S138	S60141

Fig. 18

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.

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