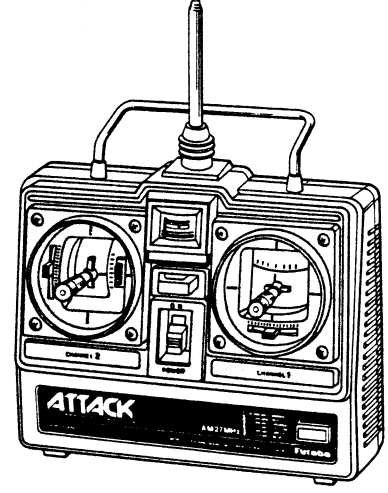
Futaba®

DIGITAL PROPORTIONAL
RADIO CONTROL

ATTACK



INSTRUCTION MANUAL

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

FUTABA CORPORATION OF AMERICA
FUTABA CORPORATION

D60292

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

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Printed in Japan/850150

FEATURES OF ATTACK

TRANSMITTER FP-T2NL

- Operating direction of new swivel stick lever can be selected within a range of 20°
- Superior ease of use achieved by using a racing specification short aluminum stick lever.
- New neutral lever allows setting of the lefthand side throttle stick neutral position in two steps. Perfectly matched to the throttle position of motor and gasoline engine driven cars. The stick can be changed to a ratchet type by installing the throttle ratchet plate sold separately.
- Level meter tells the state of the battery at a glance.
- Crystal can be changed from the outside. On 27MHz only.
- Can be modified for NiCd battery use. (Using the NT-8J sold separately.)
- Hook. Neck strap sold separately can be used.

RECEIVER FP-R2GS

- Miniature type, light weight, rugged construction.
- Crystal can be changed from outside the receiver, the same as the transmitter. Except 72/75 MHz.
- 3P mini connectors are compatible with existing standard systems.

SERVO FP-S28 (High neutral, small, rugged servo)

- New indirect drive potentiometer substantially improves vibration and shock resistance and neutral accuracy.
- Unique Futaba power-saving custom IC provides high starting torque, narrow dead band, and excellent trackability.
- Fiberglass PBT (polybutylene terephthalate) servo case is mechanically strong and invulnerable to glow fuel.
- Strong polyacetyl resin precision servo gear features smooth operation, accurate neutral, and minimal backlash.
- Fiberglass epoxy PC board with thru-the-hole plating improves the servo amp vibration and shock resistance.
- 3P mini connectors are compatible with existing servos.
- Special pad grommets simplify mounting of the servo, and are extremely vibration-resistant.
- Six different special adjustable horns are available.
- High 48.7 oz-in (3.5 kg-cm) (max) output torque is perfect for almost all models.

SET CONTENTS AND RATINGS

(Specifications are subject to change without prior notice.)

	ATTACK
Transmitter	FP-T2NL
Receiver	FP-R2GS
Servo	FP-S28 x 2
Others	Switch, battery holder, etc.

TRANSMITTER FP-T2NL

Operating system	: 2 stick
Transmitting frequency	: 27MHz band
Modulation system	: AM (amplitude modulation)
Power requirement	: 12.0V, AA penlight battery x 8
Current drain	: 170mA

RECEIVER FP-R2GS

Receiving frequency	: 27MHz band
Intermediate frequency	: 455kHz
Selectivity	: 3kHz/-3dB
Power requirement	: 4.8V or 6.0V, AA penlight battery x 4, shared with servo
Receiving range	: With FP-T2NL 500m on the ground, 1000m in the air.
Current drain	: 10mA at 6V
Dimensions	: 39 x 53.5 x 19mm (1.54 x 2.11 x 0.75in)
Weight	: 38g (1.34 oz)
Connector type	: Mini 3 pin

SERVO FP-S28 (High neutral, small, rugged servo)

Control system	: + pulse width control (1320μsec neutral)
Operating angle	: One-side 45° or greater (including trim)
Power requirement	: 4.8V or 6.0V, AA penlight battery x 4, shared with receiver.
Current drain	: 6.0V, 8mA (at idle)
Output torque	: 48.7 oz.in (3.5 kg-cm)
Operating speed	: 0.24 sec/60°
Dimensions	: 1.59 x 0.91 x 1.7 in (40.5 x 20 x 40.5mm)
Connector type	: Mini 3 pin

HANDLING THE FP-R2GS RECEIVER AND FP-S28 SERVO

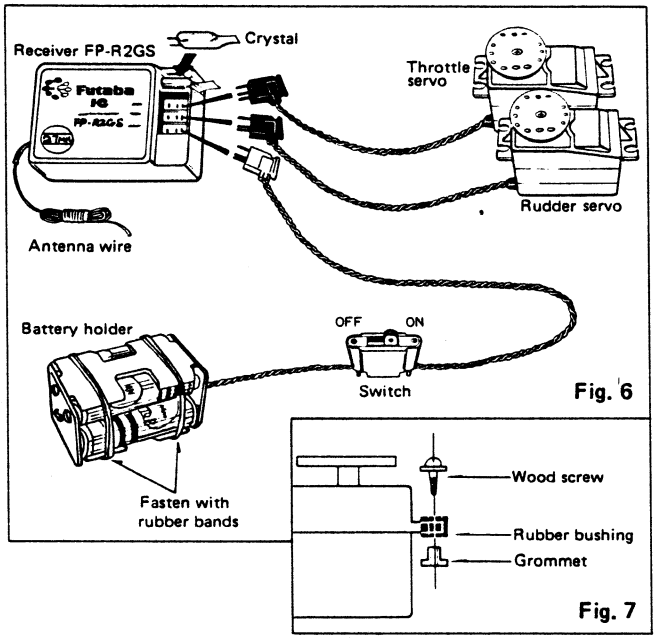


Fig. 6

Fig. 7

- Load the four penlight batteries into the battery holder in the correct polarity, and wrap the rubber bands around the holder as shown in Fig. 6.
- Connect the servo and switch securely as shown in the figure. Then extend the transmitter and receiver antennas to their full length.
- Set the transmitter power switch to ON, then set the receiver switch to ON.
  The servos stop near the neutral position. Operate the transmitter sticks and check if the servos follow the movement of the sticks.
- Set the pushrod at each servo horn, and check that the direction of operation of each function matches to that of the transmitter controls.
- Operate each servo horn over its operating range, being sure that the pushrods do not bind or bend.
  Applying unreasonable force to the servo horn will adversely affect the servo and quickly drain the batteries. Be sure that the operating travel of the function is larger than the full stroke (including the trim component) of the servo. Mount the servos so that the servo horns move smoothly and do not interfere with each other even when the trim lever and stick lever are operated in the same direction at the same time.
- Pay careful attention to noise.
  Intermittent contact of metal parts due to engine vibration, etc. will generate noise and cause the receiver servos to operate erroneously. We recommend the use of noiseless parts.
- When installing the switch harness, drill and cut a rectangular hole somewhat larger than the full stroke of the switch knob and mount the switch so that it can be turned on and off smoothly and positively. This also applies when the switch is mounted inside the fuselage and is turned on and off from the outside with a piece of wire, etc. Mount the switch where it will not come into contact with engine oil, dust, etc.
- Never cut the receiver antenna even though it may seem to be too long.
- When using the receiver and servos in a boat or car, waterproof and dustproof the radio compartment. After use, open the compartment to prevent condensation.
- After mounting and checking each part, range check the system by extending the transmitter to its shortest length and the receiver antenna to its full length and try operating the model from a distance of net-100 feet (20m to 30m). The rudders (servos) should faithfully follow the operations performed at the transmitter.
- The crystal can be changed from the outside of the receiver case. Always use Futaba pair crystals.
- Install the servos securely. Use servo trays for easy and convenient installation of the servos. When installing the servo directly to wood, use an eyelet and flat washers as shown in Fig. 7.
- A spare horn A and horn E are supplied with the set. Use them as needed.
- Pack the receiver in sponge rubber and wrap the rubber with rubber bands. Mount the receiver so that it will not be affected by engine vibrations and will not directly touch the fuselage and cannot move. If the receiver may be used where it may be covered with mud or water, waterproof and dustproof it by placing it in a plastic bag and wrap a rubber band around the mouth of the bag to seal it. After use, immediately remove the receiver to prevent condensation.
- Also pack the receiver and servo batteries in sponge rubber and wrap the sponge with rubber bands. When used in an airplane, shifting of the batteries will change the center of gravity of the plane. After positioning the batteries, fasten them securely. Waterproof the connectors in the same manner as the receiver.
- Fasten the servo and switch leads with the same rubber bands used to wrap the receiver.
- Futaba three-wire servos can be used with any Futaba transmitter and receiver combination. (Except the J. PCM, G-FM and Magnum Series.)
- After mounting and checking all the parts, take your set to a hobby shop or an experienced radio control enthusiast and ask them to inspect your setup and to explain the handling and precautions for radio control models.
- To enjoy your radio control model to the fullest, always follow the instructions of an experienced radio control enthusiast and obey all safety rules.

USING THE ANTENNA FREQUENCY FLAG

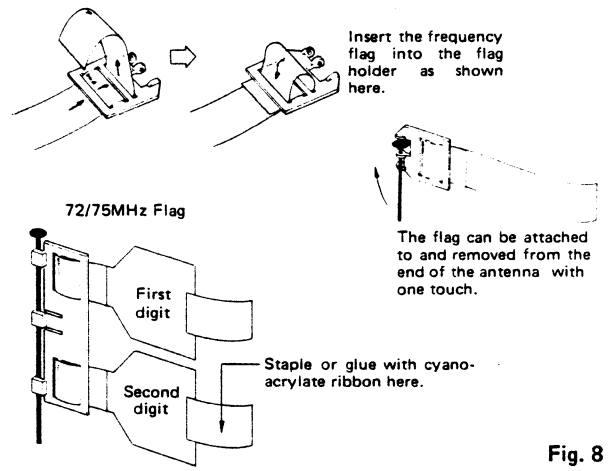
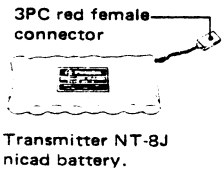


Fig. 8

CONVERSION TO NICAD SYSTEM

To use a nicad battery with this set, modify the set with the optional FBPK-10 (Attack nicad battery conversion set). A Phillips screwdriver, needle nosed pliers, and tweezers are needed to make this conversion.

(1) Remove the battery cover and disconnect the nine contacts with needle nosed pliers as shown in Fig.15 (At this time, cut the red and black leads.) Then install the transmitter NT-8J nicad battery and install the battery cover.



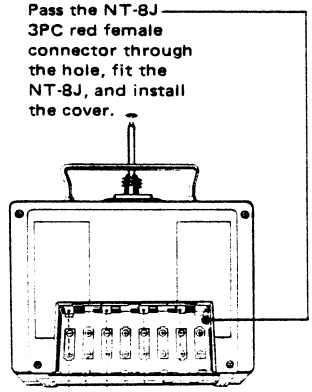
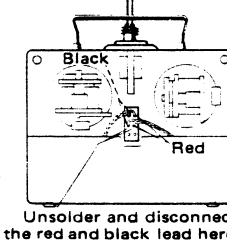


Fig. 15

(2) Unsolder and disconnect the lead between the power switch and battery holder as shown in Fig.16.

(3) Connect and solder the power jack in the FBPK-10 to the 3PC red male connector, while being sure that the red and black leads are connected in the correct position. Remove the plate at the position where the charger power jack is to be installed using needle nosed pliers.

Fig. 16



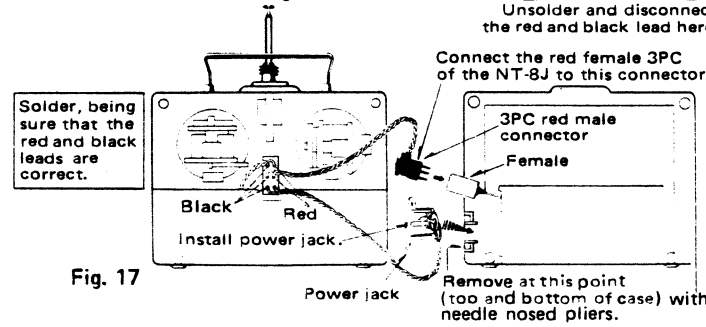
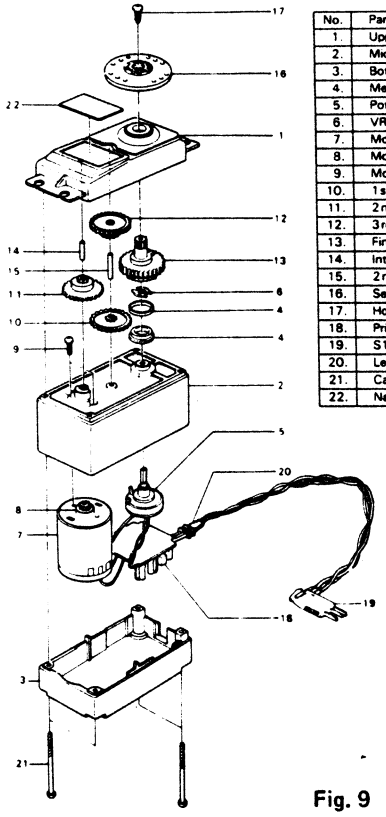


Fig. 17

FP-S28



No.	Part Name	Part No.
1.	Upper case	FCS-28
2.	Middle case	
3.	Bottom case	
4.	Metal bearing	S04134
5.	Potentiometer	i39995
6.	VR drive plate	S02753
7.	Motor	S91212
8.	Motor pinion	S02461
9.	Motor mounting screw 2×3	J50002
10.	1st gear	FGS-28
11.	2nd gear	
12.	3rd gear	
13.	Final gear	
14.	Intermediate shaft	S02495
15.	2nd shaft	S02494
16.	Servo horn D	FSH-6W
17.	Horn mounting screw 2.6×8	FSH-4I
18.	Printed wiring board	AS1202
19.	S128...3PB WRB300	FPC-8M
20.	Lead wire packing	S90045
21.	Case mounting screw	J50400
22.	Nameplate	S80700

Fig. 9

● SPLINED HORNS

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

a) Angle divisions

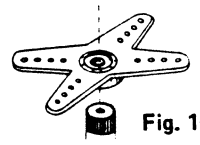


Fig. 10

1) The splined horn has 25 segments. The amount of change per segment is; 360÷25=14.4°

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:

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

b) Effect

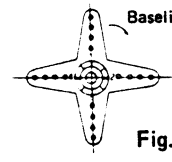


Fig. 11

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° − (14.4 x 6) = 3.6°

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

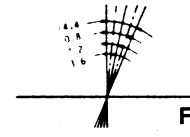


Fig. 12

For a six arm horn, turn the arm counterclockwise and set arm 2 to the position of arm 1. The adjustable angle is 60° − (14.4 x 4) = 2.4°.

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.

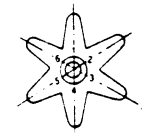
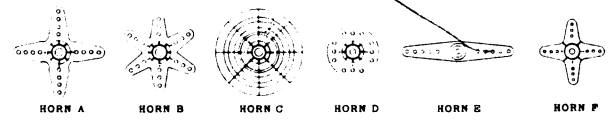


Fig. 13

The following splined horns are optional. Fig. 14



REPAIR SERVICE

- When requesting repair of trouble that has occurred suddenly of from long use, describe the trouble symptoms in as much detail as possible.
  This will facilitate detection of the trouble point and shorten the repair period greatly.
- Defects caused by faulty materials or workmanship will be corrected free of charge.
- This limited warranty is null and void if the set has been tampered with or disassembled.
  Refer to warranty statement for details.

GUARANTEE

Your NEW FUTABA Digital Proportional R/C system is guaranteed against defects in workmanship and material for 180 days from the date of purchase when the attached registration card is returned to us within ten days of purchase.

This Guarantee is null and void if the R/C system has been improperly handled, damaged in a crash, or tampered with and does not cover the replacement of plastic housings or electronic components damaged due to the use of improper voltages.

When service is required, please take your equipment to your local authorized service station or ship it directly to us. All postage, shipping, and insurance charges must be paid by the user.

---

(4) Connect the 3PC red male connector soldered to the power switch to the 3PC red female connector of the NT-8J, check the positions of the left and right sticks, level meter, power switch, PC wiring board, and the power jack just installed, then install the transmitter case with the screws.

(5) Charging and use

(a) Connect the power plug of the FBC-8B (1) battery charger to the transmitter charging connector. Connect the 3PC red male connector to the receiver and servo NR-4C nicad battery. Plug the battery charger into a 120 VAC outlet as shown in Fig. 18.

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

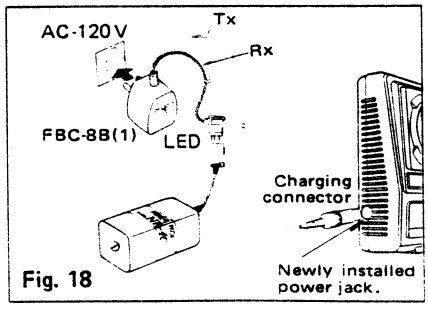


Fig. 18

(b) Normally recharge the battery about 15 hours. If the battery has not been used for some time or is new, discharge and recharge it 2 or 3 times before use.

(c) Connect the receiver servos as shown in Fig. 19.

(d) If the battery is left discharged for a long time, its capacity will decrease and the life of the battery will be shortened. After use, recharge the battery before storing it.

(e) Always recharge the battery before use.

(f) A fully charged battery can be used for about tow hours at 10 minutes/flight.

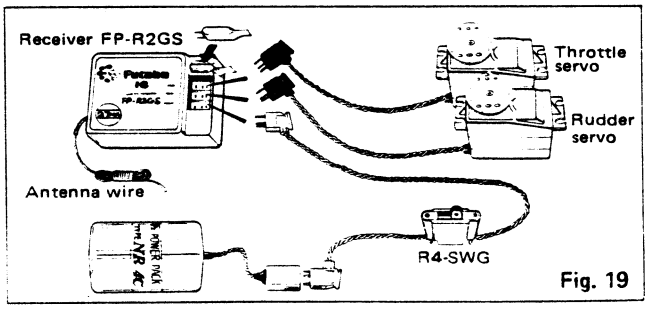


Fig. 19

HANDLING THE TRANSMITTER FP-T2NL

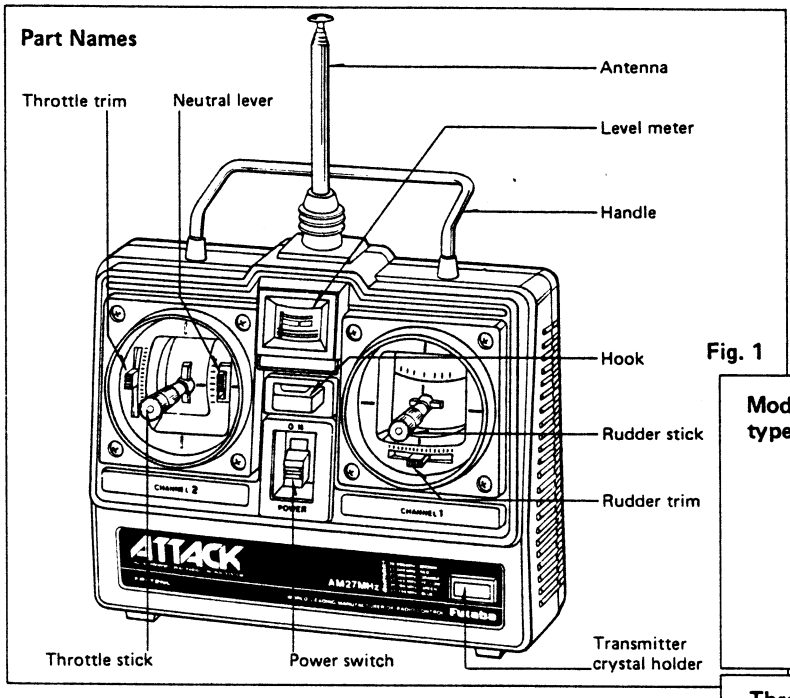


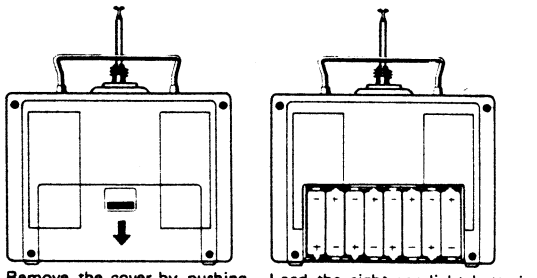
Fig. 1

- The name of each part of the transmitter is shown in Fig. 1. Memorize the name and function of each part before using your set.
- Remove the battery cover at the rear of the set and load the eight penlight batteries in the correct polarity as shown in Fig. 2.
- Extend the antenna to its full length and set the power switch to ON. The pointer of the level meter should deflect to the silver zone. If the pointer does not deflect, or deflects very little, check the batteries and their connections and polarity.
- If the level meter pointer deflects to the red zone, the receiving range will be short. Therefore, replace the batteries whenever the pointer drops to the boundary between the red and silver zones.
- The trim lever fine adjusts the rudder. Use it for neutral adjustment and to correct the flying posture after mounting of the mechanism. After test flight, keep the trim lever in the neutral position as much as possible, and adjust the pushrod linkage for correction.
- The neutral position of the lefthand elevator stick (engine control stick) can be selected in two steps by shifting the neutral lever as shown in Fig. 4. Adjust it to match the application.
- The throttle stick is a self-neutral type. To change it to a ratchet type, install the slide plate (sold separately) as shown in Fig. 3. Then remove the spring and swing arm.
- When changing the frequency, remove the crystal holder and change the crystal. Except 72/75 MHz.

Use an AM replacement crystal. The transmitter crystal is marked (T) and the receiver crystal is marked (R).

- To adjust the operating direction of the stick lever, loosen the four screws and turn the stick and set it at the best position as shown in Fig. 5. After setting the stick, retighten the four screws.
- The hook is for hooking a neck strap (sold separately) to the transmitter. Hanging the transmitter from your neck with the neck strap is very convenient.
- To use this set with an Nicd battery, purchase an FBPK-8 [Consisting of NT-8J (Tx Nicd), NR-4M (Rx Nicd) and charger, FBC-2A or FBC-8B (1)] and modify the set.

Loading the penlight batteries



Remove the cover by pushing here and sliding down.

Load the eight pen-light batteries while paying careful attention to their polarity.

Fig. 2

Modification from throttle stick from self-neutral type to ratchet type

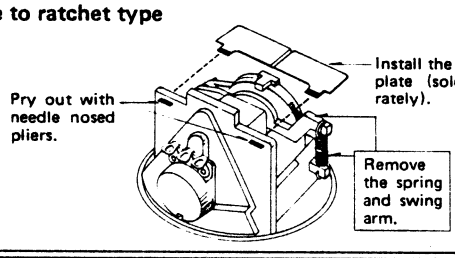
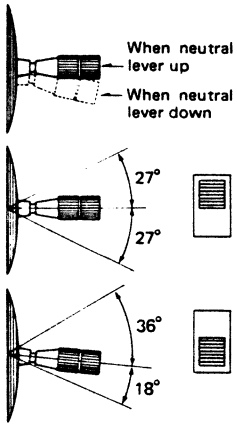


Fig. 3

Throttle stick neutral lever operation

Fig. 4



If the neutral lever is moved, the neutral position of the stick lever can be adjusted in two steps as shown in the figure.

When the neutral lever is up, the throttle stick can be adjusted to a total of 54°, 27° up and 27° down, from the neutral position. This position is best for electric cars and other models with which the center of the speed controller is the neutral position.

When the neutral lever is down, the throttle stick can be adjusted to a total of 54°, 36° up and 18° down (2-to-1), from the neutral position. This position is best for engine-drive cars or other models with which the speed controller neutral position is offset.

Swivel stick setting method

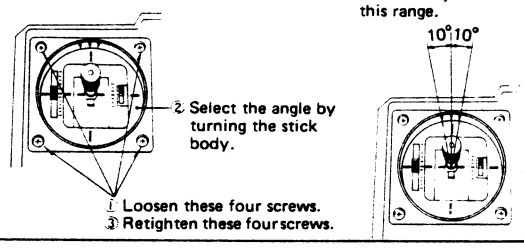


Fig. 5

Futaba Digital Proportional Frequencies (FOR U.S.A.)

- The frequency of **Futaba** digital proportional sets can be changed among bands (1) ~ (6) 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 frequency is changed.
- **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 72-75MHz bands in the U.S.A.

Frequency	Channel No.	Flag Color
26-27MHz - Aircraft/Car/Boat		
26.995	–	Brown
27.045	–	Red
27.095	–	Orange
27.145	–	Yellow
27.195	–	Green
27.255	–	Blue
72/75MHz - Aircraft only *Shared		
72.030	12	Brown-Red (Top Flag/Ribbon-Bottom Flag/Ribbon)
72.080	–	White/Brown
72.160*	–	White/Blue
72.240	–	White/Red
72.320*	–	White/Purple
72.400	–	White/Orange
72.550	38	Orange-Grey
72.590	40	Yellow-Black
72.630	42	Yellow-Red
72.670	44	Yellow-Yellow
72.710	46	Yellow-Blue
72.750	48	Yellow-Grey
72.790	50	Green-Black
72.830	52	Green-Red
72.870	54	Green-Yellow
72.910	56	Green-Blue
72.960*	–	White/Yellow
75.840	–	White/Green
75MHz - Car & Boat only		
75.430	62	Blue-Red (Top Flag/Ribbon-Bottom Flag/Ribbon)
75.470	64	Blue-Yellow
75.510	66	Blue-Blue
75.550	68	Blue-Grey
75.590	70	Purple-Black
75.670	74	Purple-Yellow
75.710	76	Purple-Blue
75.750	78	Purple-Grey
75.790	80	Grey-Black
75.830	82	Grey-Red
75.870	84	Grey-Yellow
53MHz - Aircraft/Car/Boat - FCC Amateur License Required		
53.100	–	Black/Brown
53.200	–	Black/Red
53.300	–	Black/Orange
53.400	–	Black/Yellow
53.500	–	Black/Green
53.600	–	Black/Blue (Not generally in use)
53.700	–	Black/Purple (Not generally in use)
53.800	–	Black/Grey (Not generally in use)