



Instrument Specialties Company, Inc. — World Compliance Center

EXHIBIT A

User's Manual

FUTABA CORPORATION OF AMERICA

Model: T6YF

FCC ID: AZPT6YF-72

Futaba®

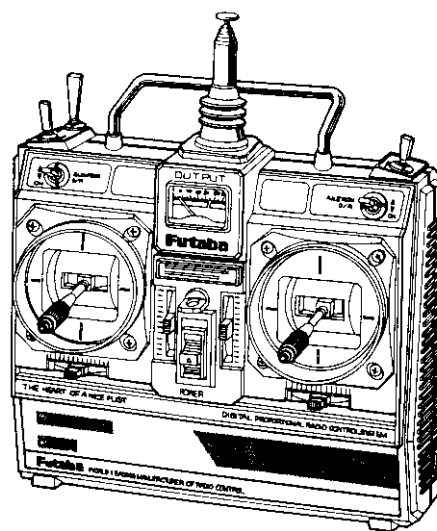
DIGITAL PROPORTIONAL RADIO CONTROL

INSTRUCTION MANUAL



FUTABA CORPORATION OF AMERICA
FUTABA CORPORATION

D60925



FOR AIRCRAFT, ~~PCM~~/FM 6 CHANNELS SYSTEM.

Thank you for purchasing a Futaba digital proportional radio control set.

Please read this manual carefully before using your set.

1 FEATURES OF FP-~~6NPK~~/FP-~~6NFK~~

- High resolution and fast response PCM System. (FP-~~6NPK~~)
- Aileron and Elevator D/R (dual rate).
- ATL (adjustable throttle limiter) for throttle. (FP-~~6NPK~~)
- Servo reversing switch.
- F/S (fail safe), B•F/S (battery fail safe)..... (FP-~~6NPK~~)
- Trainer system. (Trainer cable optional)
- Stick spring tension can be adjusted.
- Nonslip adjustable stick lever head.
- Neck strap hook.
- Easy to read square level meter. (transmitter battery voltage/RF indicator)
- Rugged low-profile servo. (FP-S148)
- Nicd battery operation as standard.

2 SET CONTENTS AND RATINGS

(Specifications are subject to change without prior notice.)

	~~FP-6NPK~~	FP- ~~6NFK~~
Transmitter	FP-T ~~6NPK~~	FP-T ~~6NFK~~
Receiver	FP-R127DP	FP-R127DF
Servo	FP-S148 (x4)	
Battery and Charger	● Transmitter battery NT-8IB ● Receiver battery NR-4J ● Charger FBC-8B(4)	
Crystal	● FM crystal set (Transmitter and Receiver) However the crystal type for dual conversion receiver is the following type. 72MHz Band TYPE 72-10 50MHz Band TYPE 50-10 (stated on the tab)	
Others	● Switch ● Extension cord ● Spare horn ● Others	

Transmitter (FP-T~~6NPK~~/FP-T~~6NFK~~)

- 2 sticks 6 channels transmitter
- Transmitting frequency : 72MHz, 50MHz band
- Modulation : ~~FM (PCM/FM NPK)~~
FM (T~~6NFK~~)
- Power requirement : 9.6V Nicd battery pack
- Current drain : 190mA

Receiver (FP-R127DP/FP-R127DF)

- Receiving frequency : 72MHz, 50MHz band
- Intermediate frequency : 1st IF 10.7MHz, 2nd IF 455kHz
- Power requirement : 4.8V Nicd battery pack (shared with servo)
- Current drain : 17.5mA at 4.8V (R127DP)
10.0mA at 4.8V (R127DF)
- Dimensions and weight : 64.3x35.8x21.0mm, 41.5g (R127DP)
64.3x35.8x21.0mm, 40.5g (R127DF)
- Receiving range : 500m on the ground, 1000m in the air.
(range differs with the surroundings)

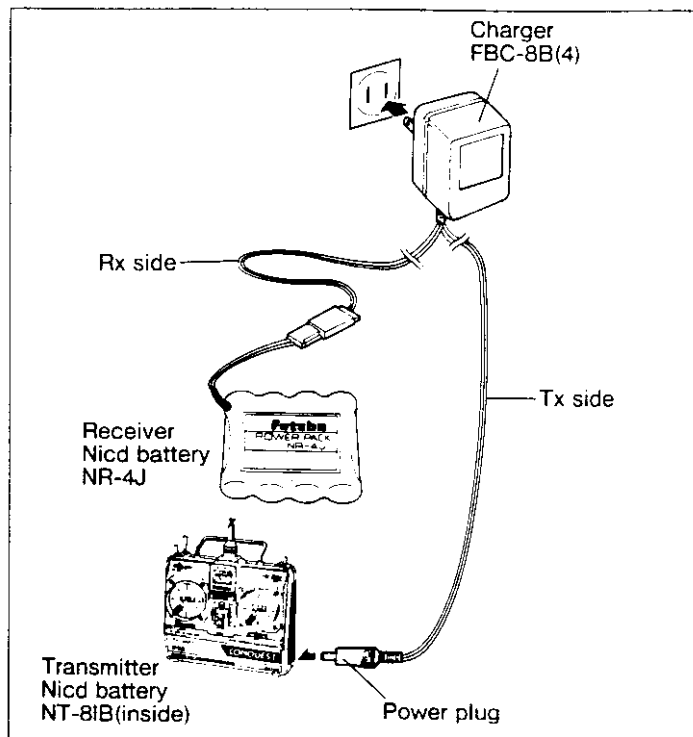
Servo (FP-S148)

- Control system : + pulse width control
- Operating angle : Rotary system, one side 45° or greater (including trim)
- Power requirement : 4.8V or 6.0V (shared with receiver)
- Current drain : 8mA at 6V (at idle)
- Output torque : 3kg/cm
- Operating speed : 0.22sec/60°
- Dimensions and weight : 40.4x19.8x36mm 44.4g

Nicd battery (NT-8IB/NR-4J)

- Voltage : 9.6V (NT-8IB), 4.8V (NR-4J)
- Capacity : 500mAh
- Dimensions and weight : 51x58x15mm, 95g (NR-4J)

■Charging the transmitter and receiver Nicd battery.



■Use the special Futaba charger.

If charging in more than the specified current, the transmitter may be unrepairable.

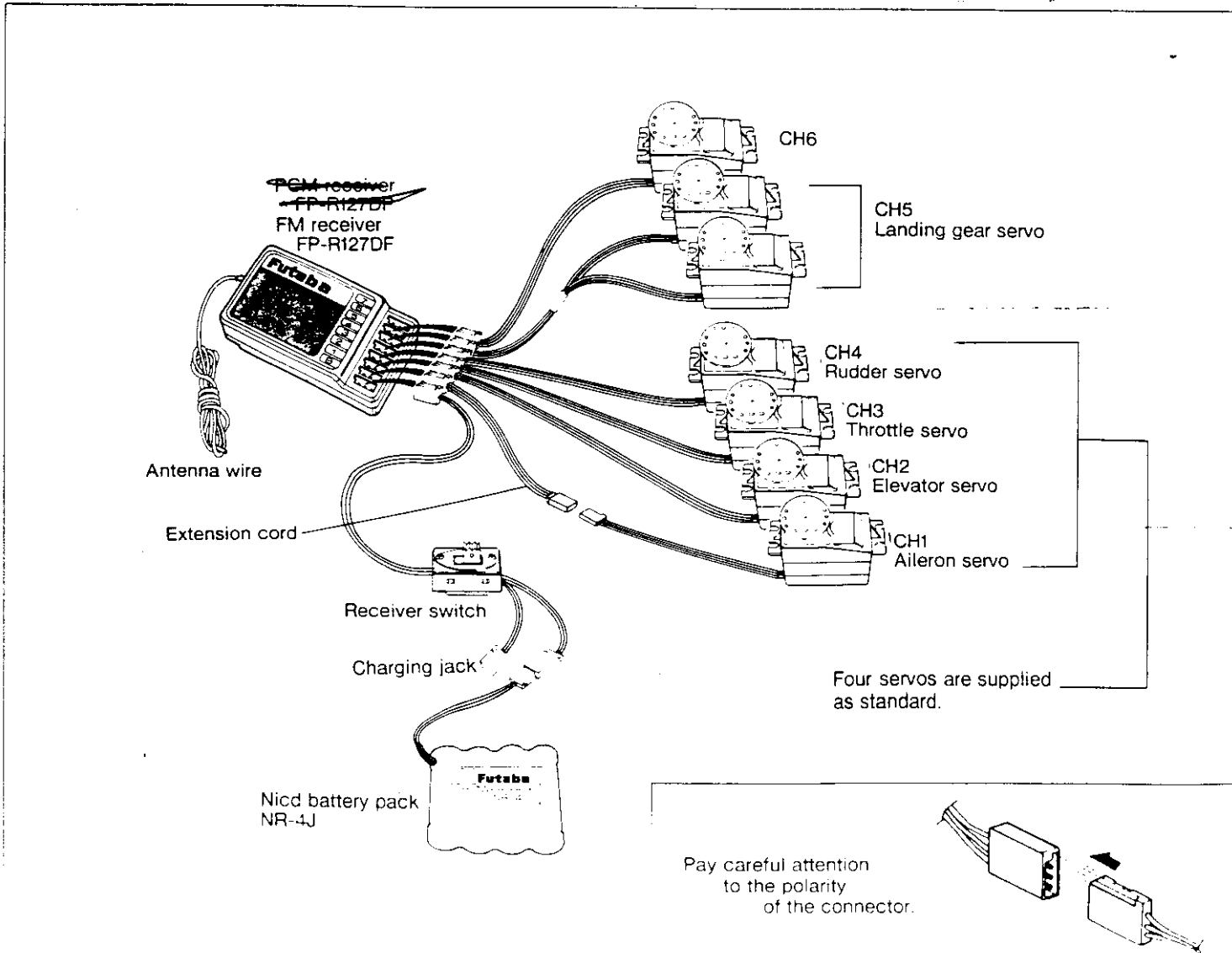
■The charging time is 15 hours.

However when the battery was not used for some time, charge and discharge it 2-3 times. Otherwise, the battery will not be charged even after the specified charging time.

A fully-charged transmitter battery can be used for about 10 flights of 10 minutes each. The airborne NR-4J Nicd battery pack can be used for about 8 flights when 4 servos are used.

Changes or modifications not expressly approved by the party responsible for FCC regulations compliance could void the user's authority to operate the equipment

■Receiver and servos connections.



PRECAUTIONS

- Connect the receiver, servos, switches and battery as shown in the figure. Extend the transmitter and receiver antennas to their full length.
- Turn on the transmitter power switch, then turn on the receiver power switch.
The servos will go to their neutral position. Move the transmitter sticks one at a time to check that each servo follows its control stick movement.
- Connect the pushrods to the servos and check that the direction of travel of each servo matches the direction of movement of its control stick. If a servo does not move in the proper direction, switch its direction with the servo reversing function.
- Operate each servo horn over its full stroke and check 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 pack very quickly. Make the travel of each control mechanism somewhat larger than the full stroke (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 not completely immune to noise. The use of noiseless parts is recommended.
- When installing the switch harness, cut a rectangular hole slightly larger than the full stroke of the switch and install the switch so that it moves smoothly from ON to OFF. Also do this when the switch is installed inside the fuselage and is turned on and

off from the outside with a piece of wire.

Install the switch where it will not be exposed to engine oil or dust and dirt.

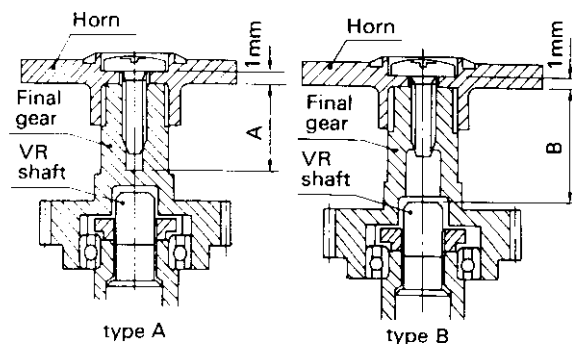
- Although the antenna appears to be too long, do not cut it or fold it back.
- Install the servos securely. Tighten the mounting screws until the rubber damper is crushed slightly. If the screws are too tight, the cushioning effect will be adversely affected.
- The crystal can be changed from the outside of the receiver case. Always use the Futaba transmitter/receiver matched crystal set to change the frequency.
- The FP-R127DP and FP-R127DF are a dual conversion receiver. These receivers require a special crystal so please order the correct crystal set.
- Spare servo horns are supplied. Use them as needed.
- Use extension cords matched to the model.
- Wrap the receiver in sponge rubber. Place it inside a waterproof plastic bag and secure the end of the bag with a rubber band. Do the same with the air-borne battery pack.
- Use the rubber bands wrapped around the receiver to hold the servo and switch leads.
- After installation and checking are complete, perform a range check by collapsing the transmitter antenna and extending the receiver antenna to its full length and operating the transmitter from a distance of 20 to 30 meters from the receiver. The servos should operate normally at this distance.

* Differs with the weather and surroundings.

SERVO HORN MOUNTING SCREW PRECAUTIONS

Servo horn screws

Horn mounting screw size	Applicable servo	Type	Dimensions (mm)
2.6 x 6	S133, S143 series	B	5.7
2.6 x 8	S129 series	A	7.9
	S130 series, S9101, S5101	A	7.9
	S128 series	B	11.9
	S132 series	B	7.3
	S135 series, S9601	B	8.7
	S138 series	B	9.9
	S148 series, S3001	A	8.3
2.6 x 10	S131S series, S9201, S9301, S9401	A	9.0
2.6 x 12	S134 series, S3301	A	11.3



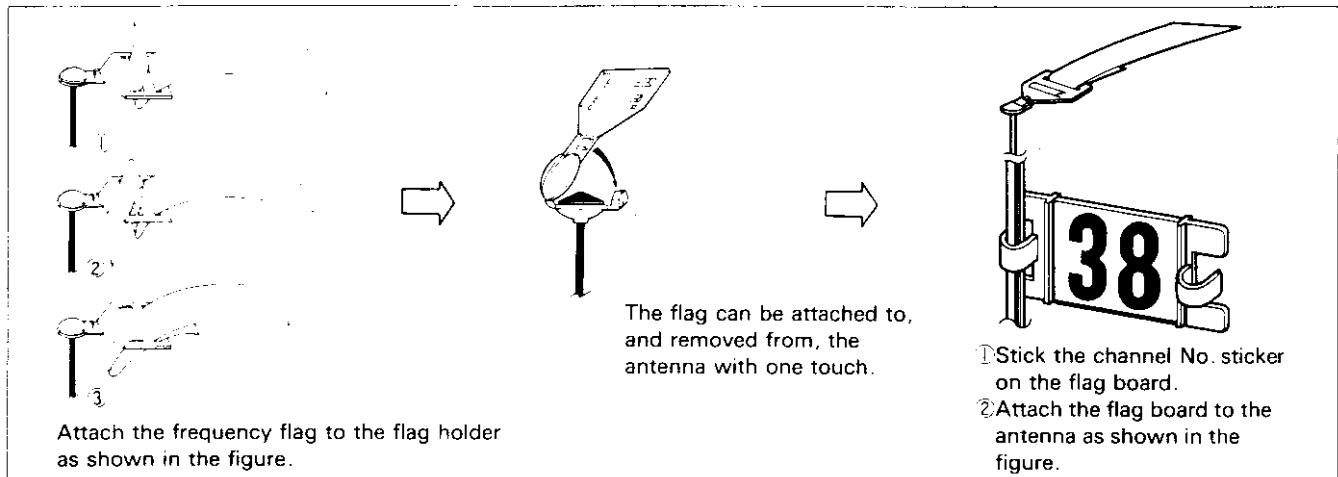
Notes

- The screws are 2.6 mm tapping screws.
- If screws longer than necessary are used, the final gear may be broken or the potentiometer may be damaged or may fall out.

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

- The frequency of Futaba digital proportional sets can be changed within their own band. There are 2 different bands for you to choose from (50 MHz, 72 MHz and 75 MHz). Please see chart listed below for specific frequency and its intended use. Please note there are specific frequencies allocated for aircraft only and surface only use.
- The frequency can be changed within the same BAND by using a precisely matched pair of Futaba crystals. However, Futaba recommends that you return your system to our factory service department for frequency changing, as tuning may be necessary for proper operation. Changing frequency from one band to another is NOT possible.
- Always change frequency flag when frequency is changed. The frequency flag is to be attached to the top of antenna and the channel designation to the base. (See Drawing)
- It is illegal to change crystals on 72MHz and 75 MHz bands in the U.S.A.

■ Antena Frequency Flag



■ Frequency, Channel No. , Flag Color (FOR U.S.A.)

26-27MHz-Aircraft/car/boat

Frequency	Color
26.995	Brown
27.045	Red
27.095	Orange
27.145	Yellow
27.195	Green
27.255	Blue

50/53MHz-Aircraft/car/boat-Fcc Amature Licence required (2 and 3 channels not produced on these frequencies.)

Frequency	Channel No.
50.800	RC00
* 50.820	RC01
50.840	RC02
* 50.860	RC03
50.880	RC04
* 50.900	RC05
50.920	RC06
* 50.940	RC07
50.960	RC08
* 50.980	RC09

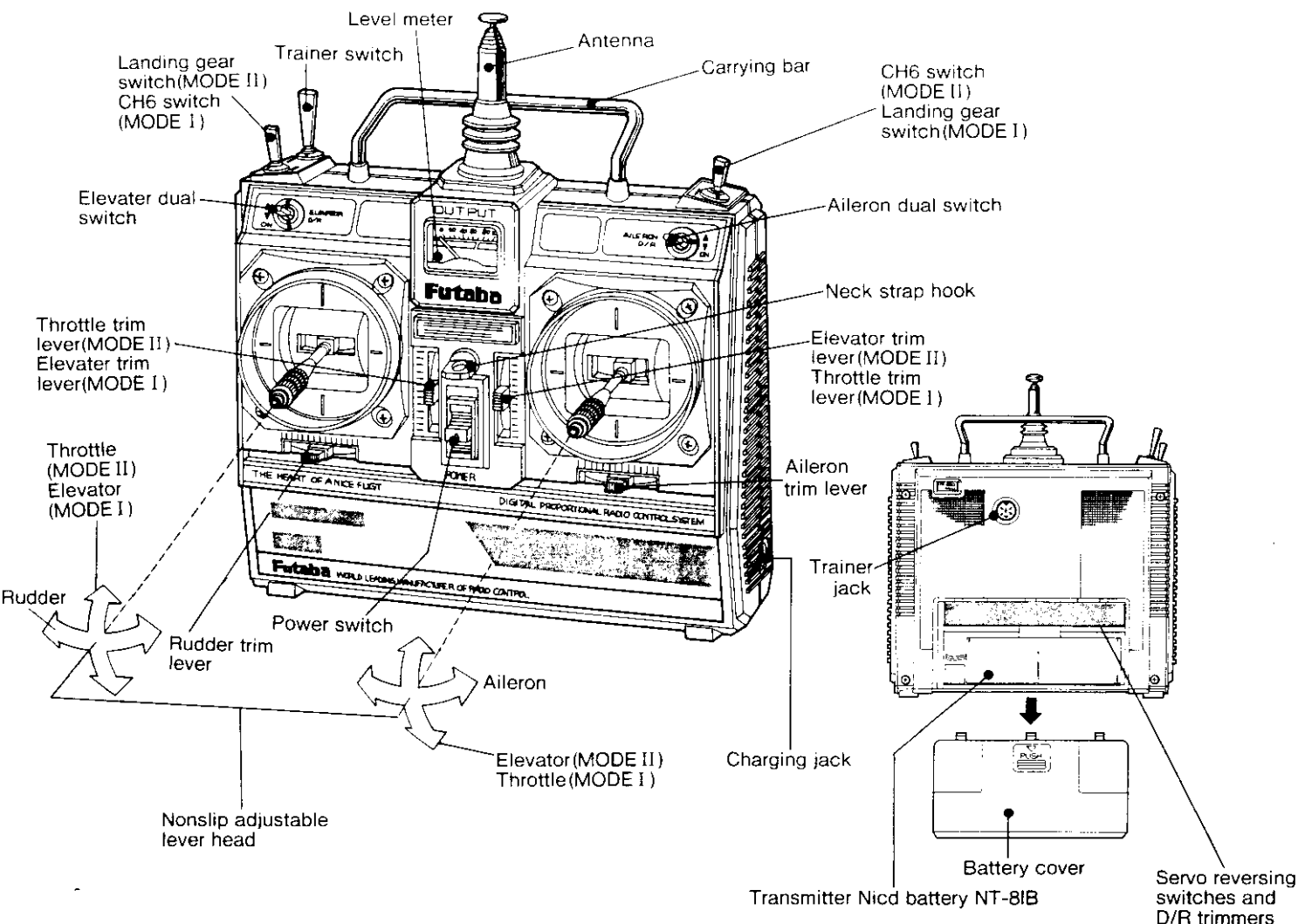
72MHz-Aircraft only

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

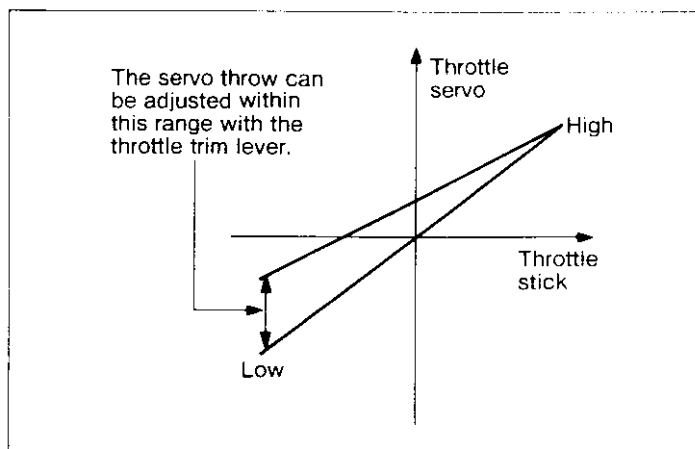
75MHz-Car/boat only

Frequency	Color	Frequency	Channel No.	Frequency	Channel No.	Frequency	Channel No.
53.100	Black-Brown	* 75.410	61	* 75.610	71	* 75.810	81
53.200	Black-Red	75.430	62	75.630	72	75.830	82
53.300	Black-Orange	* 75.450	63	* 75.650	73	* 75.850	83
53.400	Black-Yellow	75.470	64	75.670	74	75.870	84
53.500	Black-Green	* 75.490	65	* 75.690	75	* 75.890	85
53.600	Black-Blue	75.510	66	75.710	76	75.910	86
53.700	Black-Violet	* 75.530	67	* 75.730	77	* 75.930	87
53.800	Black-Gray	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

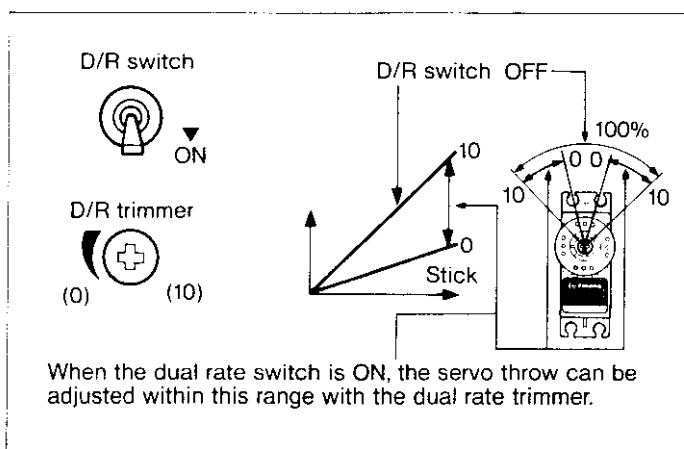
* Effective JAN 1, 1991



■ ATL (Adjustable throttle limiter (only FP-6NPK))



■ D/R (Dual rate) (CH1, CH2)



■ Servo reversing switches

FP-6NPK (CH1-CH6)	FP-6NFK (CH1-CH5)
REV. NORM. Up side → Reverse Down side → Normal (Forward) 1 2 3 4 5 6 SERVO REVERSER	NORM. REV. 1 NORM. REV. 2 NORM. REV. 3 NORM. REV. 4 NORM. REV. 5 SERVO REVERSER Left side → Normal (Forward) Right side → Reverse

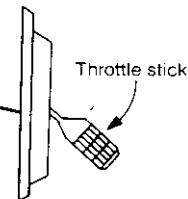
~~F/S (fail safe) function~~

~~The F/S function holds all servos in their current position except for throttle which will move to a low side when the receiver is under heavy interference or loss of transmitter signal.~~

~~B-F/S (battery fail safe) function~~

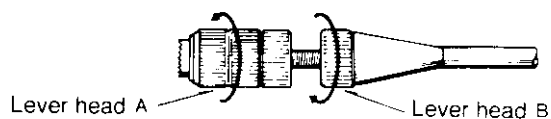
~~The B-F/S function is activated when the airborne battery voltage drops to a critical level. The throttle will travel to the low side and all other channels will remain operative. Throttle control may be regained by moving the throttle stick to the maximum low position, then forward to any desired setting. An immediate landing should be made.~~

~~B-F/S mode resetting method.
When the throttle stick is set to the maximum low position, the B-F/S mode is reset.~~



■ Non-slip adjustable lever head adjustment

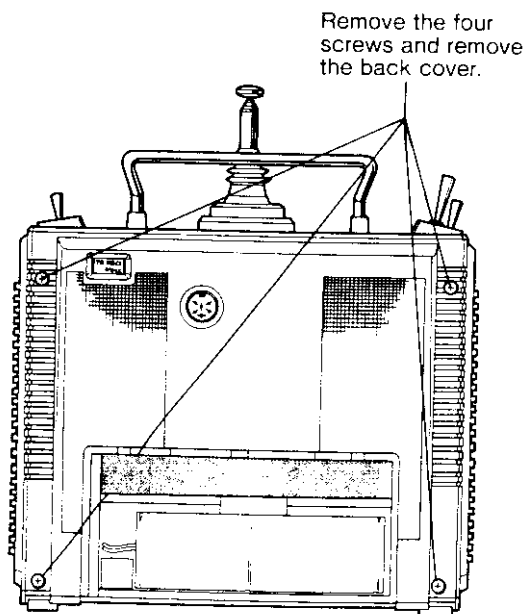
The length of the lever head can be changed.



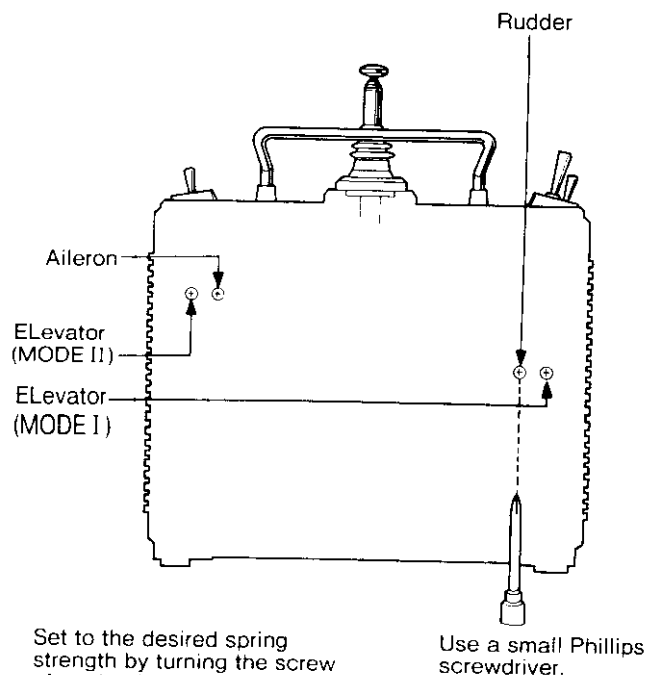
Unlock lever heads A and B by turning them in opposite directions as shown by the arrows and adjust the stick to the most comfortable length.

■ Stick lever tension adjustment

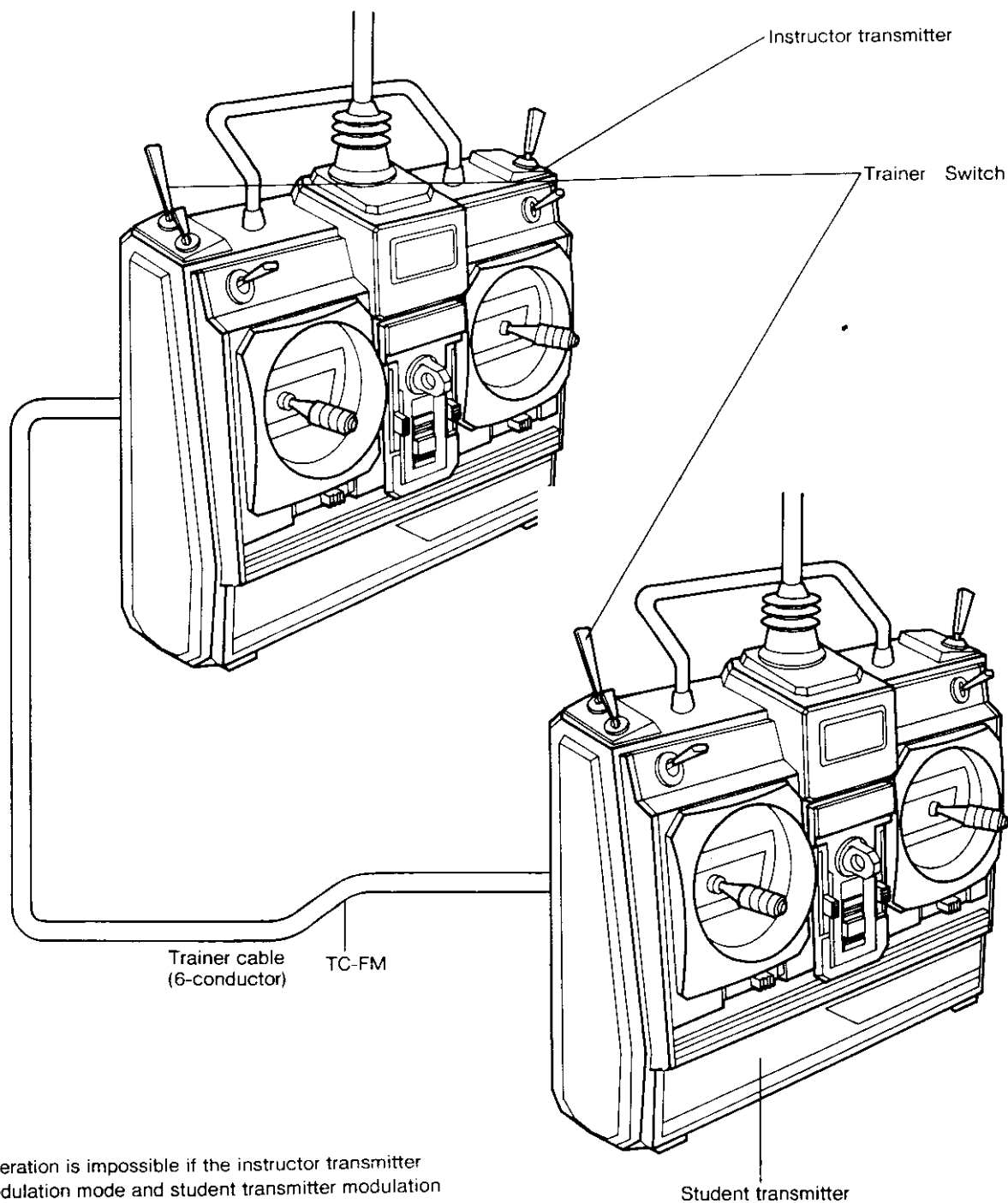
1. Remove the transmitter back cover.



2. Adjust the spring strength.



1. Connection to transmitter.



- Operation is impossible if the instructor transmitter modulation mode and student transmitter modulation mode is different.
- Always turn off the student transmitter power switch. Do not operate the trainer switch either.
- Use the functions of the other two transmitters with the same setting.
- Extend the instructor transmitter antenna.

2. Operating at the instructor side

Operation is possible by turning on the instructor transmitter power switch.
At this time turn off the trainer switch.

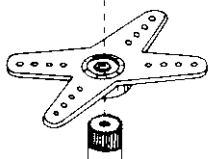
3. Operating at the student side

Operation is possible at the student transmitter while the trainer switch at the instructor side is held in the ON state.

SPLINED HORNS

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

a) Angle divisions



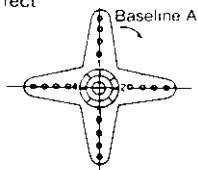
1) The splined horn has 25 segments. The amount of change per segment is; $360 \div 25 = 14.4^\circ$

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

$$360^\circ \div (25 \times 4) = 3.6^\circ$$

Number of divisions

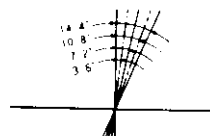
b) Effect



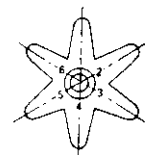
To shift the holes center line to the right (clockwise) relative to baseline A, shift arm 2 to the position of arm 1 and set it to the position closest to baseline A.

[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.

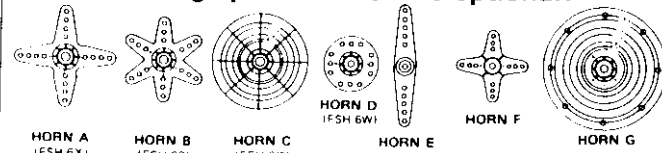


For a six arm horn, turn the arm counterclockwise and set arm 2 to the position of arm 1. The adjustable angle is $60^\circ - (14.4 \times 4) = 2.4^\circ$.



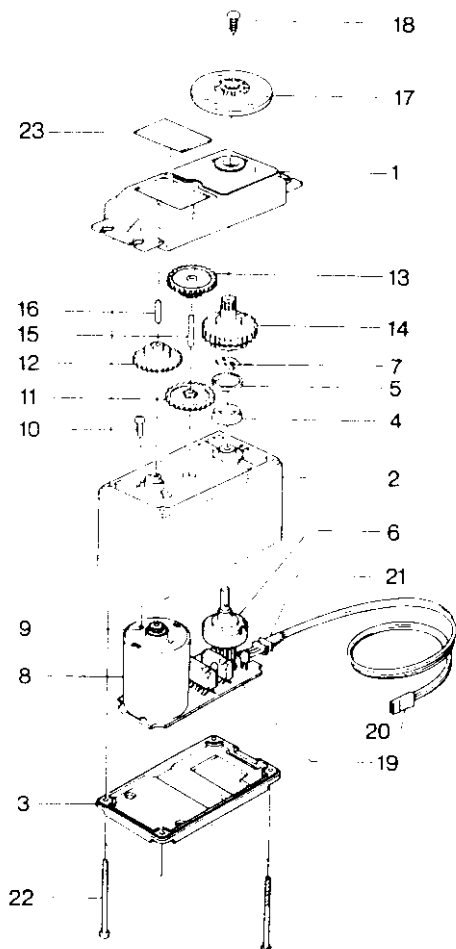
Arm 3 shift 4.8° to the right, arm 6 shifts 2.4° to the left, and arm 4 shifts 7.2° to the right and left.

The following splined horns are optional.



5 SERVO EXPLODED VIEW

FP-S148



No.	Part Name	Part No.
1	Upper case	FCS-48
2	Middle case	FCS-48
3	Bottom case	FCS-48
4	Metal bearing	S04137
5	Metal bearing	S04136
6	Potentiometer	I39668
7	Potentiometer drive plate	S02753
8	Motor	S91239
9	Motor pinion	S02461
10	Screw	J50002
11	1st gear	FGS-48
12	2nd gear	FGS-48
13	3rd gear	FGS-48
14	Final gear	FGS-48
15	Intermediate shaft	S02495
16	2nd shaft	S02494
17	Servo horn D	FSH-6W
18	Binding head tapping screw 2.6 x 8	FSH-41
19	Printed wiring board	AS1157
20	3PB-WRB300G	AT2453
21	w/gum bush	S90045
22	Pan head truss screw	S50360
23	Nameplate	S60099



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