



**Instrument Specialties Company, Inc. – World Compliance Center**

## EXHIBIT A

### **User's Manual**

FUTABA CORPORATION OF AMERICA

Model: T6YF

FCC ID: AZPT6YF-72

# Futaba®

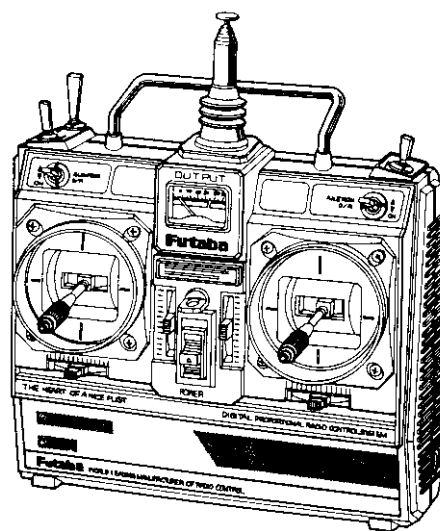
DIGITAL PROPORTIONAL RADIO CONTROL

## 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~~/<sup>64F</sup>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~~) <sup>64F</sup>
- Servo reversing switch.
- F/S (fail safe), B•F/S (battery fail safe)..... (~~FP-6NPK~~) <sup>64F</sup>
- 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/R/F 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.)

|                     | <del>FP-6NPK</del>  | <sup>64F</sup> FP- <del>6NFK</del>  |
|---------------------|---|-------------------------------------|
| Transmitter         | <del>FP-T6NPK</del>   | <sup>64F</sup> FP-T <del>6NFK</del> |
| Receiver            | <del>FP-R127DP</del>  | FP-R127DF                           |
| Servo               | FP-S148(x4)   |                                     |
| Battery and Charger | <ul style="list-style-type: none"> <li>● Transmitter battery NT-8IB</li> <li>● Receiver battery NR-4J</li> <li>● Charger FBC-8B(4)</li> </ul>   |                                     |
| Crystal             | <ul style="list-style-type: none"> <li>● FM crystal set (Transmitter and Receiver) However the crystal type for dual conversion receiver is the following type.</li> </ul> <p>72MHz Band TYPE 72-10<br/>50MHz Band TYPE 50-10 (stated on the tab)</p> |                                     |
| Others              | <ul style="list-style-type: none"> <li>● Switch</li> <li>● Extension cord</li> <li>● Spare horn</li> <li>● Others</li> </ul>  |                                     |

### Transmitter (FP-~~T6NPK~~/<sup>64F</sup>FP-T~~6NFK~~)

- 2 sticks 6 channels transmitter
- Transmitting frequency : 72MHz, 50MHz band
- Modulation : ~~FM (6NPK)~~ <sup>64F</sup>FM (T~~6NFK~~)
- Power requirement : 9.6V Nicd battery pack
- Current drain : 190mA

### Receiver (FP-~~R127DP~~/<sup>64F</sup>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)~~ <sup>64F</sup>10.0mA at 4.8V (R127DF)
- Dimensions and weight : ~~64.3x35.8x21.0mm, 41.5g (R127DP)~~ <sup>64F</sup>64.3x35.8x21.0mm, 40.5g (R127DF)
- Receiving range : 500m on the ground, 1000m in the air. (range differs with the surroundings)

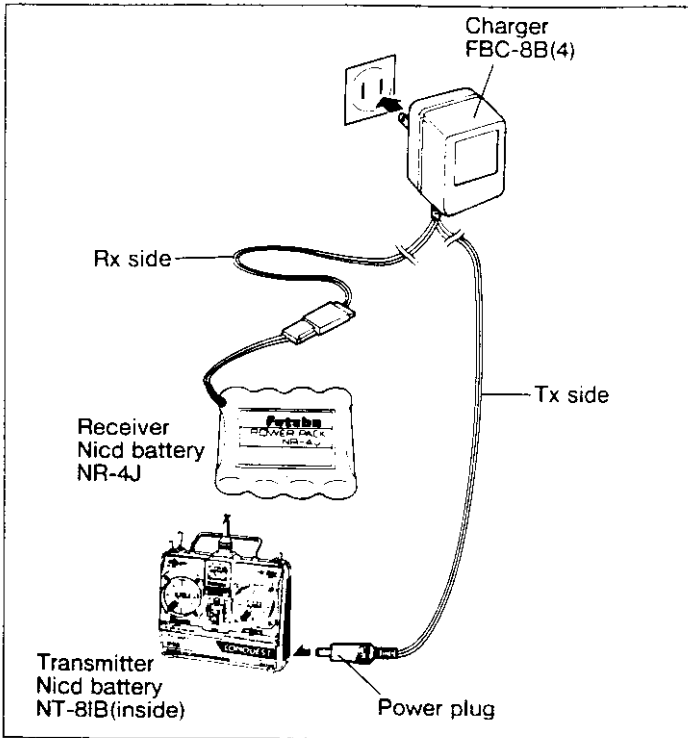
### Servo (FP-S148)

- 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 unreparable.

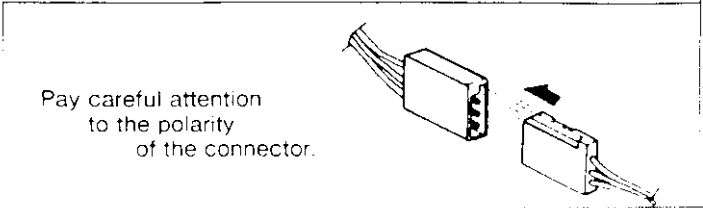
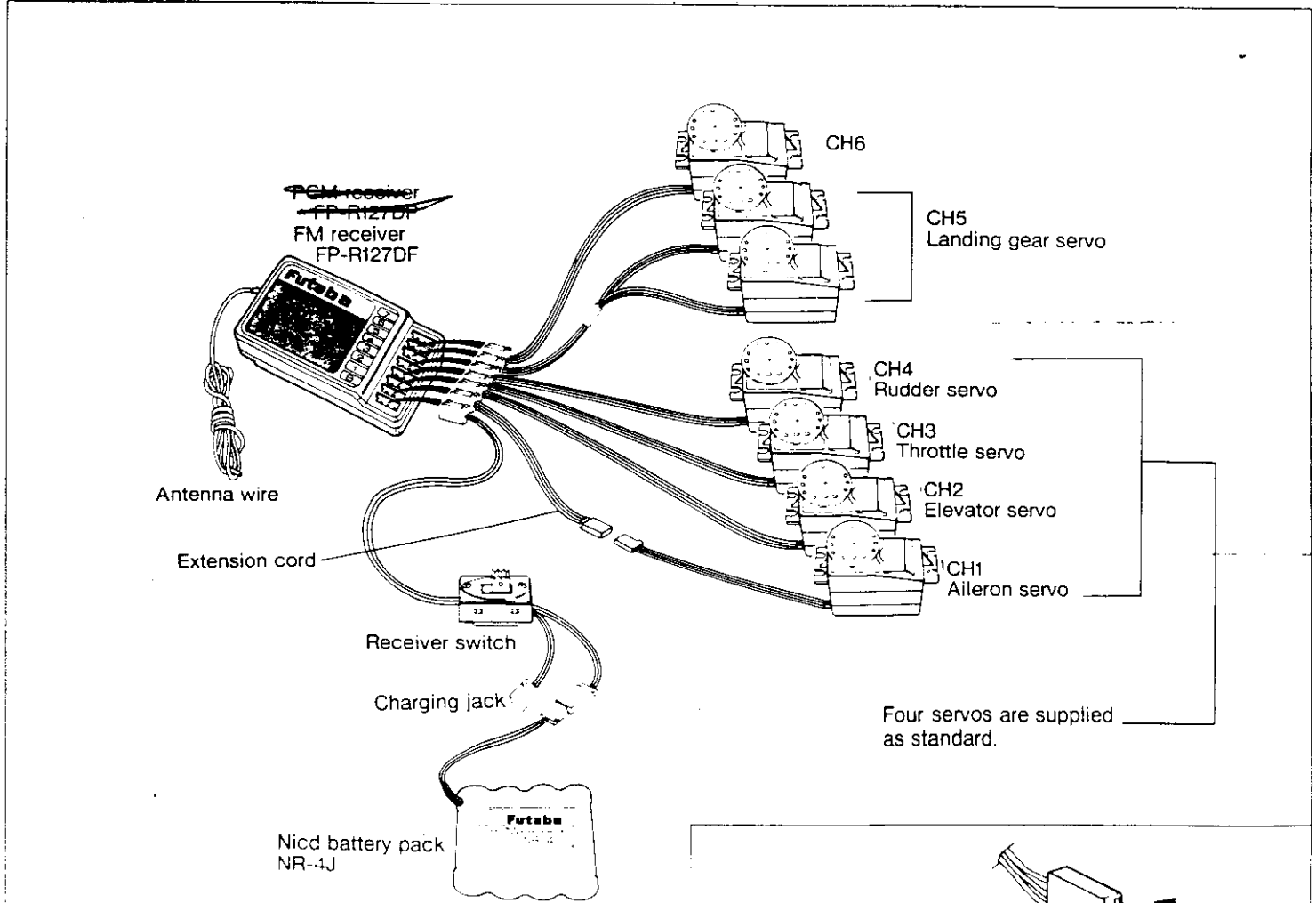
■The charging time is 15 hours.

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.



Pay careful attention to the polarity of the connector.

## 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.

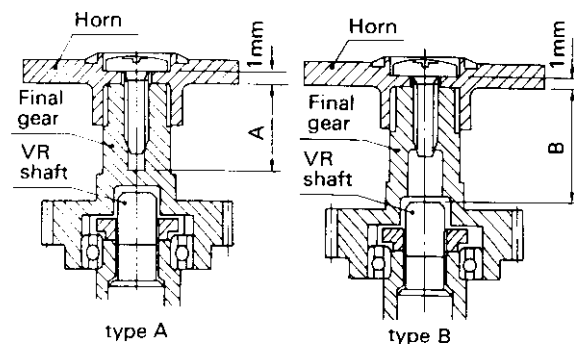
- Although the antenna appears to be too long, do not cut it or fold it back.
- Install the servos securely. Tighten the mounting screws until the rubber damper is crushed slightly. If the screws are too tight, the cushioning effect will be adversely affected.
- The crystal can be changed from the outside 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 airborne 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            |



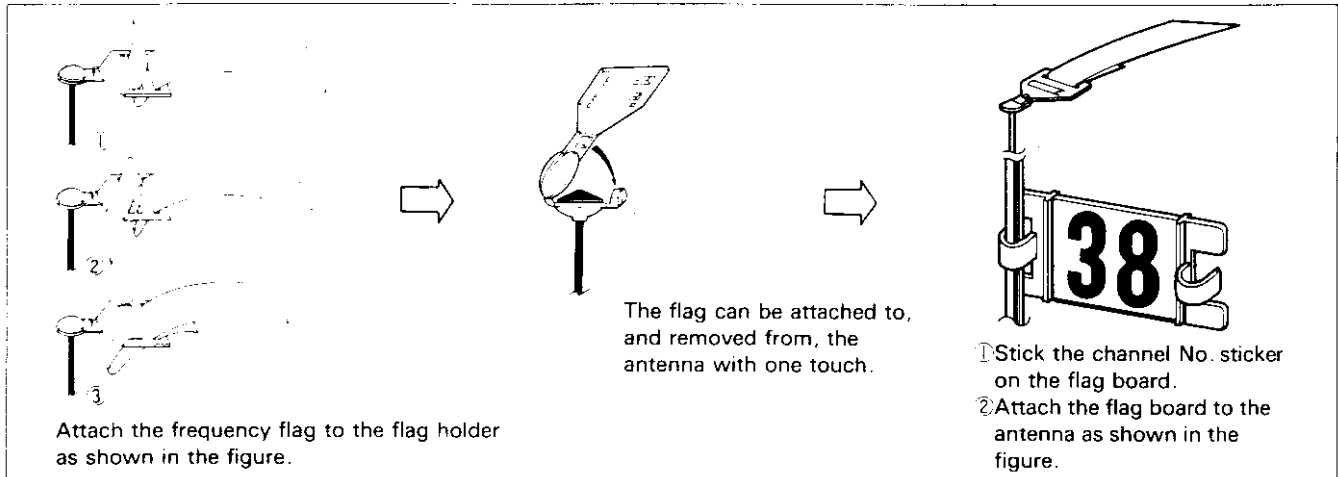
### Notes

- 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.

■ Antenna 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   |

72MHz-Aircraft only

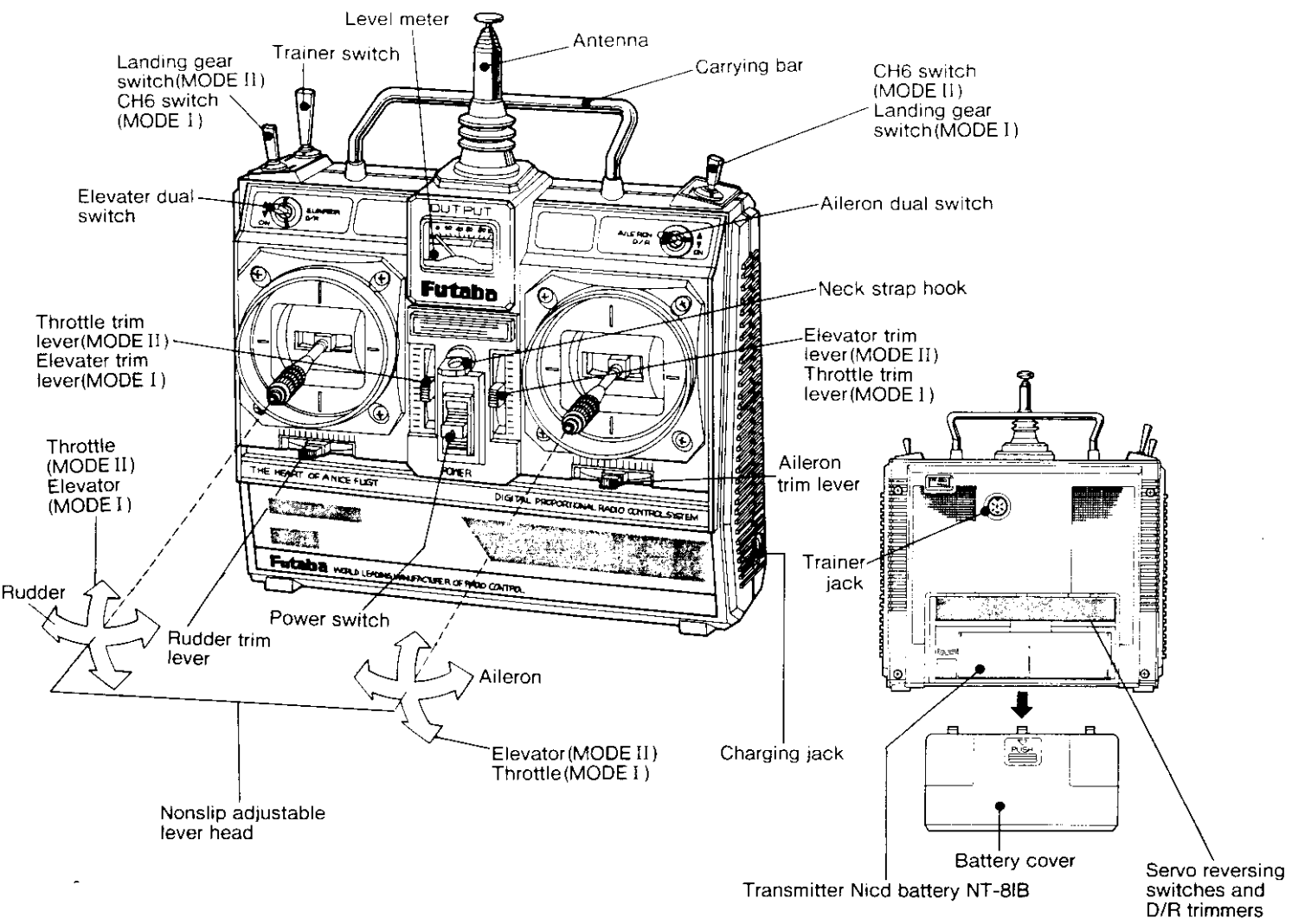
|          |    |          |    |          |    |
|----------|----|----------|----|----------|----|
| * 72.010 | 11 | * 72.410 | 31 | * 72.810 | 51 |
| 72.030   | 12 | 72.430   | 32 | 72.830   | 52 |
| * 72.050 | 13 | * 72.450 | 33 | * 72.850 | 53 |
| 72.070   | 14 | 72.470   | 34 | 72.870   | 54 |
| * 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 |          |    |

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

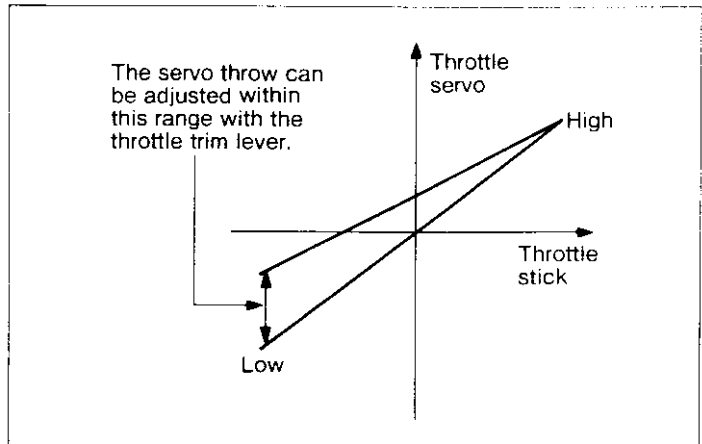
| Frequency | Channel No. |
|-----------|-------------|
| 50.800    | RC00        |
| * 50.820  | RC01        |
| 50.840    | RC02        |
| * 50.860  | RC03        |
| 50.880    | RC04        |
| * 50.900  | RC05        |
| 50.920    | RC06        |
| * 50.940  | RC07        |
| 50.960    | RC08  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

75MHz-Car/boat only

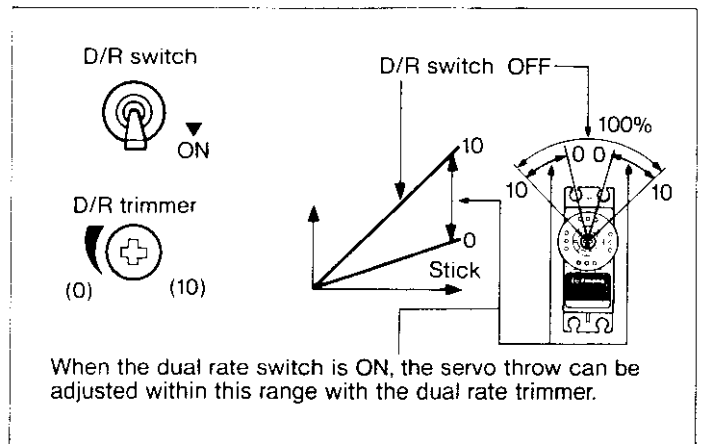
|        |              |          |    |          |    |          |    |
|--------|--------------|----------|----|----------|----|----------|----|
| 53.100 | Black-Brown  | * 75.410 | 61 | * 75.610 | 71 | * 75.810 | 81 |
| 53.200 | Black-Red    | 75.430   | 62 | 75.630   | 72 | 75.830   | 82 |
| 53.300 | 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 |



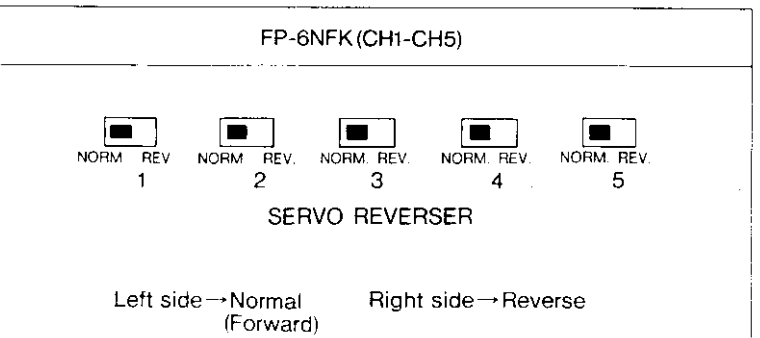
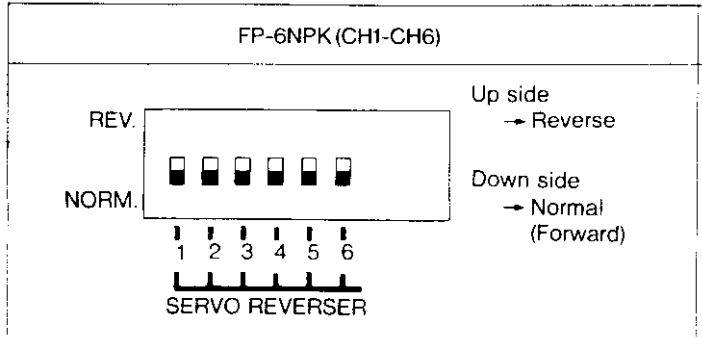
■ ATL (Adjustable throttle limiter) (only FP-6NPK)



■ D/R (Dual rate) (CH1, CH2)



■ Servo reversing switches



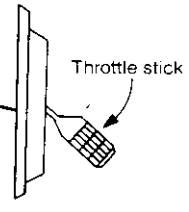
~~F/S (fail safe) function~~

~~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~~

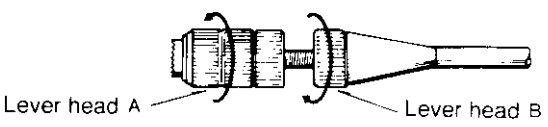
~~The B-F/S function is activated when the airborne battery voltage drops to a critical level. The throttle will travel to the low side and all other channels will remain operative. Throttle control may be regained by moving the throttle stick to the maximum low position, then forward to any desired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

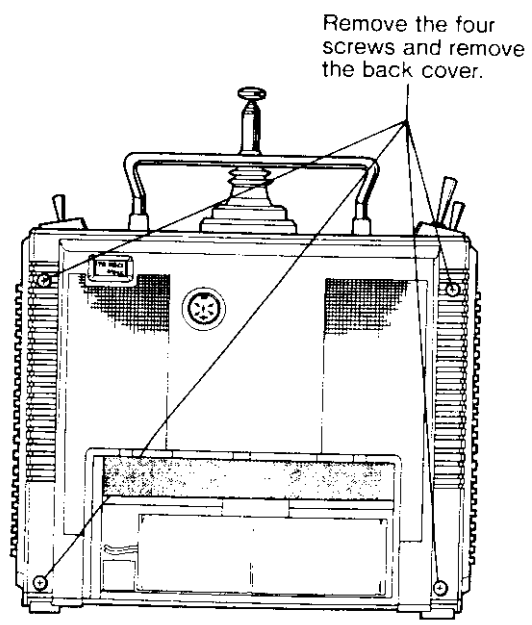
The length of the lever head can be changed.



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.

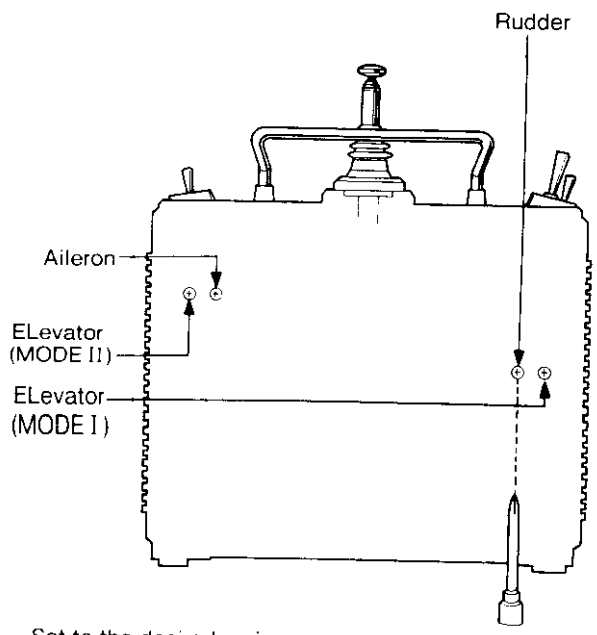
■ Stick lever tension adjustment

1. Remove the transmitter back cover.



Remove the four screws and remove the back cover.

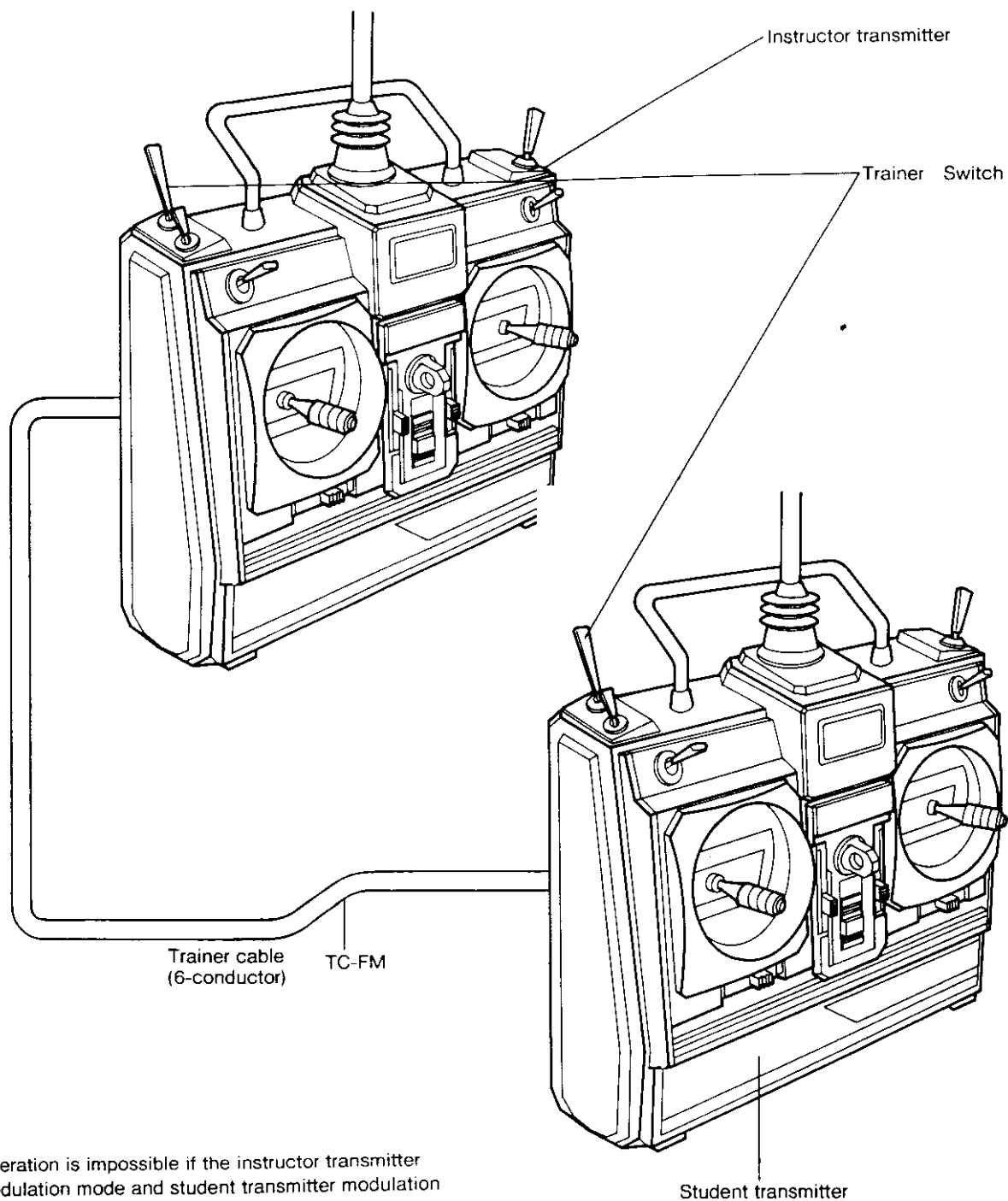
2. Adjust the spring strength.



Set to the desired spring strength by turning the screw of each stick.

Use a small Phillips screwdriver.

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

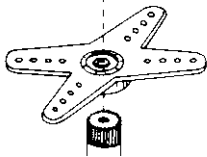
Operation is possible at the student transmitter while the trainer switch at the instructor side is held in the ON state.



## SPLINED HORNS

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

a) Angle divisions

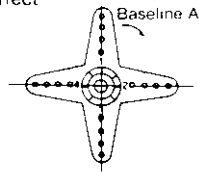


- 1) The splined horn has 25 segments. The amount of change per segment is;  $360 \div 25 = 14.4^\circ$
- 2) The minimum adjustable angle is determined by the number of arms or number of the holes center line. For four arms, the minimum adjustable angle is;

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

Number of divisions

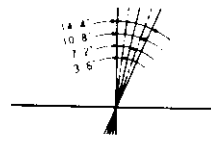
b) Effect



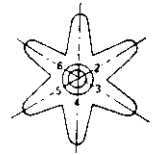
To shift the holes center line to the right (clockwise) relative to baseline A, shift arm 2 to the position of arm 1 and set it to the position closest to baseline A.

[Example] For a four arm horn, the angular shift per segment is  $14.4^\circ$ . 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.

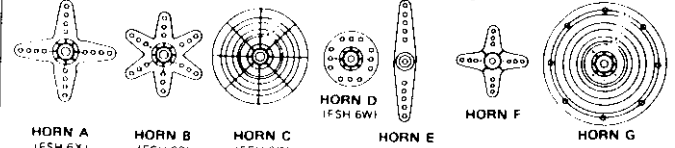


Arm 3 shift  $4.8^\circ$  to the right, arm 6 shifts  $2.4^\circ$  to the left, and arm 4 shifts  $7.2^\circ$  to the right and left.



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

The following splined horns are optional.



HORN A  
(FSH 6X)

HORN B  
(FSH 6S)

HORN C  
(FSH 6H)

HORN D  
(FSH 6W)

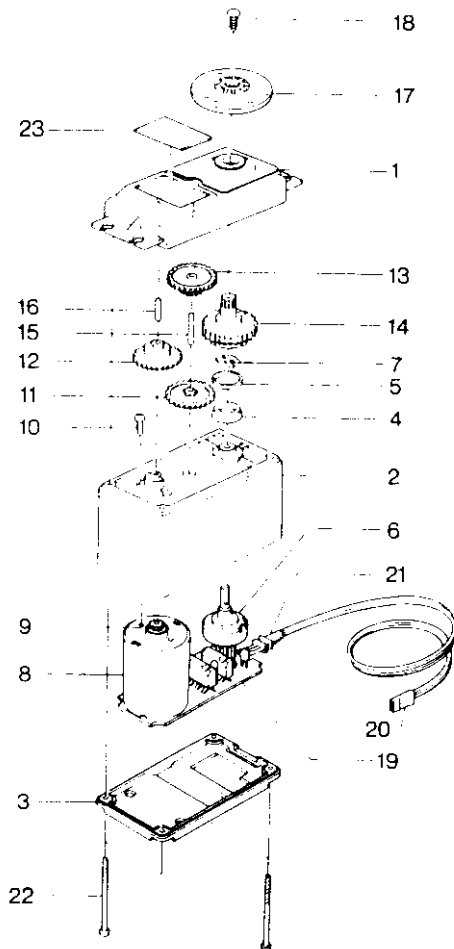
HORN E

HORN F

HORN G

## 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 Ø                       | 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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