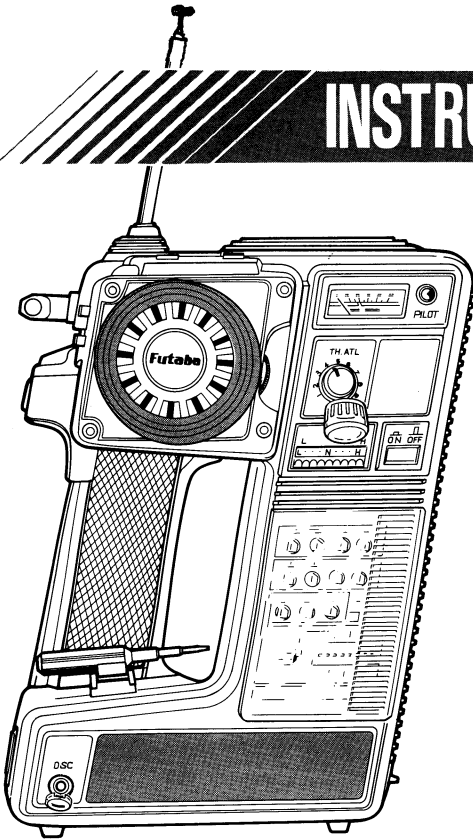


Futaba

DIGITAL PROPORTIONAL
RADIO CONTROL

D60917

INSTRUCTION MANUAL



PCM1024

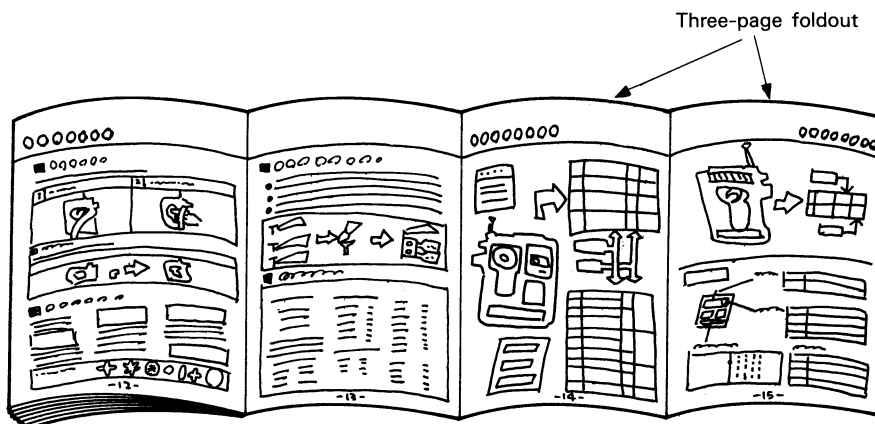
- PCM1024 system is a high-resolution, fast-response 3-channel digital proportional R/C set for experts.
- This digital proportional R/C set is for land (motor car, engine car) and water (motor boat, engine boat) use.

FP-3PB

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Thank you for purchasing a Futaba digital proportional R/C set.
Please read this manual carefully before using your set.
The last page of this manual is a three-page foldout showing the name of each part of the transmitter.
Unfold this page when reading this manual.



ABBREVIATIONS

ATL : ADJUSTABLE THROTTLE LIMITER

EXP : EXPONENTIAL

ATV : ADJUSTABLE TRAVEL VOLUME

D/R : DUAL RATE

AUX : AUXILIARY

F/S : FAIL SAFE

B·F/S : BATTERY FAIL SAFE

PCM : PULSE CODE MODULATION

PPM : PULSE POSITION MODULATION

MIX : MIXING

DSC : DIRECT SERVO CONTROLLER

T. S : TWIN SERVO

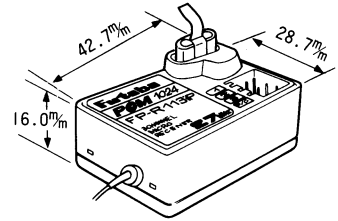
4WS : 4 WHEEL STEERING

FEATURES

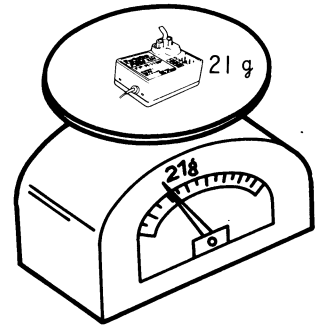
- Set data is not destroyed even when the battery is changed.

● RF module.

- High-resolution and fast response obtained by PCM1024 system.
- Full fail safe functions.



- Miniature, lightweight PCM receiver.



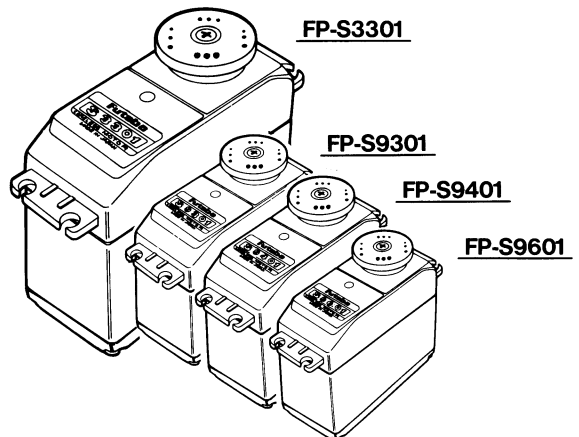
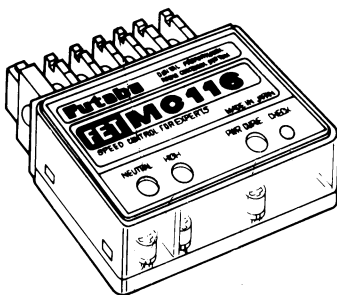
- One-touch trim
Positive operation
by beep sound

- Full mixing functions.

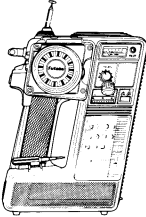
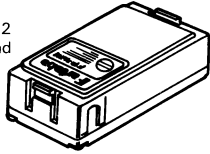
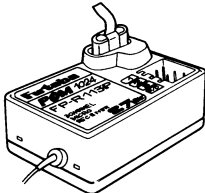
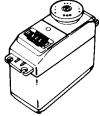
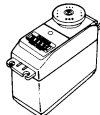
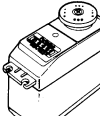
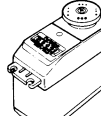
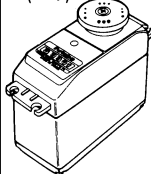

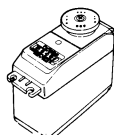

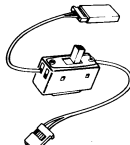
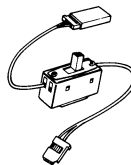
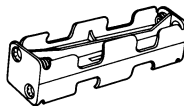


● DSC

- New high-starting-torque servo

- EFT amp for experts (motor car set only).

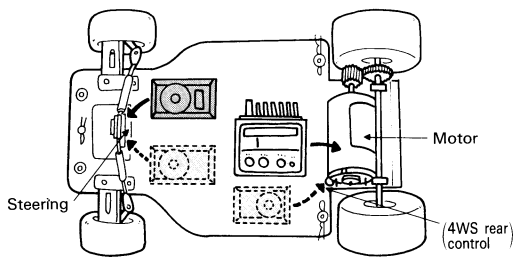
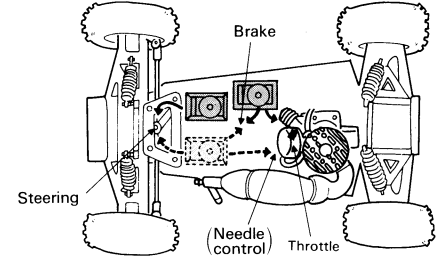
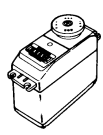
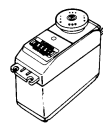

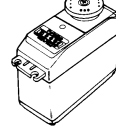
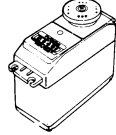
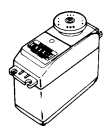
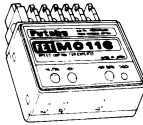
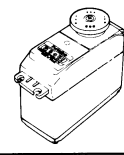
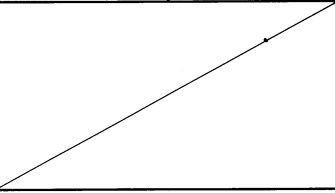

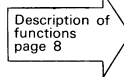
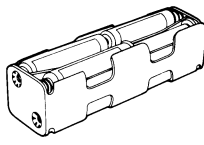
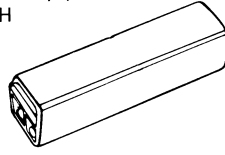
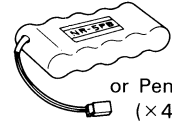

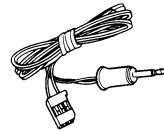
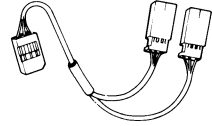
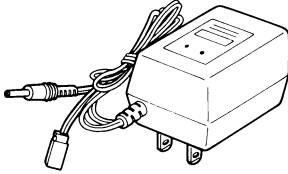


CONTENTS AND RATINGS

Contents	FP-3PB for motor racing	FP-3PB for motor buggy	FP-3PB for engine racing and buggy	FP-3PB for engine buggy	Ratings																																					
Transmitter and RF module	<ul style="list-style-type: none"> ●FP-T3PB (×1) 		<ul style="list-style-type: none"> ●FP-TL-FM (×1) 27, 29, 40, 72 or 75MHz Band 		Pistol grip 3-channel transmitter Transmitting frequency : 27, 29, 40, 72 or 75 MHz band Modulation : FM-PCM/PPM switching Power requirement : Penlight battery × 7 (10.5V) or 9.6V Nicd battery pack Current drain : 200mA																																					
	Receiver	<ul style="list-style-type: none"> ●FP-R113iP (×1) 				Miniature 3-channel PCM receiver Receiving frequency : 27, 29, 40, 72 or 75 MHz band Intermediate frequency : 455kHz Power requirement : 4.8V or 6V Current drain : 16mA Dimensions : 42.7 × 28.7 × 16.0mm (1.68 × 1.13 × 0.63in) Weight : 21g (0.74oz) Receiving range : 300m on the ground (differs with the surrounding conditions) Antenna length : 50cm (19.5 inches)																																				
Servo	Steering	<ul style="list-style-type: none"> ●FP-S9601 or FP-S132H (×1) 	<ul style="list-style-type: none"> ●FP-S9601 (×1) 	<ul style="list-style-type: none"> ●FP-S9401 (×1) 	<ul style="list-style-type: none"> ●FP-S9301 (×1) 	<ul style="list-style-type: none"> ●FP-S3301 (×1) 	Control system : + pulse width control 1520μs neutral Operating angle : One side 45° or more (including trim) Power requirement : 4.8V or 6V, shared with receiver Current drain : 12mA at 6V (idle) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Output torque</th> <th>Operating speed</th> <th>Dimensions</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>FP-S9601</td> <td>2.4 (33.3)</td> <td>0.15S/60°</td> <td>31×16×30.2 (1.22×0.63×1.19)</td> <td>31g (1.09)</td> </tr> <tr> <td>FP-S9401</td> <td>3.2 (44.4)</td> <td>0.16S/60°</td> <td>40.5×20×35.5 (1.59×0.79×1.40)</td> <td>50g (1.76)</td> </tr> <tr> <td>FP-S9301</td> <td>5.0 (69.4)</td> <td>0.22S/60°</td> <td>40.5×20×35.5 (1.59×0.79×1.40)</td> <td>50g (1.76)</td> </tr> <tr> <td>FP-S3301</td> <td>8.0 (111)</td> <td>0.19S/60°</td> <td>59.2×28.8×49.8 (2.33×1.13×1.96)</td> <td>94g (3.32)</td> </tr> <tr> <td>FP-S132H</td> <td>1.8 (25.0)</td> <td>0.13S/60°</td> <td>37×18×30.5 (1.46×0.71×1.20)</td> <td>32g (1.13)</td> </tr> <tr> <td></td> <td>kg·cm (oz·in)</td> <td></td> <td>mm (in)</td> <td>g (oz)</td> </tr> </tbody> </table>		Output torque	Operating speed	Dimensions	Weight	FP-S9601	2.4 (33.3)	0.15S/60°	31×16×30.2 (1.22×0.63×1.19)	31g (1.09)	FP-S9401	3.2 (44.4)	0.16S/60°	40.5×20×35.5 (1.59×0.79×1.40)	50g (1.76)	FP-S9301	5.0 (69.4)	0.22S/60°	40.5×20×35.5 (1.59×0.79×1.40)	50g (1.76)	FP-S3301	8.0 (111)	0.19S/60°	59.2×28.8×49.8 (2.33×1.13×1.96)	94g (3.32)	FP-S132H	1.8 (25.0)	0.13S/60°	37×18×30.5 (1.46×0.71×1.20)	32g (1.13)		kg·cm (oz·in)		mm (in)	g (oz)
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	kg·cm (oz·in)		mm (in)	g (oz)																																						
Throttle	<ul style="list-style-type: none"> ●FP-S9601 or FP-S132H (×1) 		<ul style="list-style-type: none"> ●FP-S9401 (×1) or FP-S9301 																																							
FET amp	<ul style="list-style-type: none"> ●FP-MC116 (×1) 		Operating system : Forward only, w/electronic brake Power requirement : 6 cell—1200 or 7 cell—1200 Nicd battery pack Regulator output : 6V/2A (max) Continuous current (8 mins rating) : 35A FET ratings : Continuous max current 210A Instantaneous max current 1260A Loss resistance : 0.0035Ω (FET rating) Dimensions : 38.5 × 40.3 × 15.5 mm (1.52 × 1.59 × 0.61 in) (excluding cords) Weight : 42g (1.48 oz)																																							
Accessories	<ul style="list-style-type: none"> ●Receiver switch SSW-GS (×1) 		<ul style="list-style-type: none"> ●Receiver switch SSW-GS (×1) 		Amp accessories (packed in a bag)																																					
	<ul style="list-style-type: none"> ●Transmitter battery holder 8P-BH (w/dummy) or Nicd battery pack NT-8LP (w/charger) 		<ul style="list-style-type: none"> ●T3PB hook band ●T3PB grip adapter  																																							
		<ul style="list-style-type: none"> ●Servo horn bag ●Ribbon bag or Flag bag ●Mini screwdriver for adjustment ●Receiver battery holder R2-BSS-B (particular set only) 																																								

*Specifications are subject to change without prior notice.

RECOMMENDED USAGE EXAMPLES

Set name	Motor racing	Motor buggy	Engine racing	Engine buggy	
Model					
Steering servo	<ul style="list-style-type: none"> ●FP-S9601 or FP-S132H 	<ul style="list-style-type: none"> ●FP-S9601 	<ul style="list-style-type: none"> ●FP-S9401 	<ul style="list-style-type: none"> ●FP-S9301 or FP-S9401 	<ul style="list-style-type: none"> ●FP-S3301 or FP-S9301 × 2 
Throttle servo or motor controller	<ul style="list-style-type: none"> ●FP-S9601 or FP-S132H 	<ul style="list-style-type: none"> ●FP-MC116 	<ul style="list-style-type: none"> ●FP-S9401 or FP-S9301 		
AUX (CH3) servo (option)			<ul style="list-style-type: none"> ●Twin servo function FP-S9601 (small type priority) or FP-S9401 as steering and AUX servo ※Use the same kind of servo as twin servo. ●4WS function FP-S9401 	<ul style="list-style-type: none"> ●When brake servo added FP-S9301 ●When needle control servo added FP-S9401 	<ul style="list-style-type: none"> ●Twin servo function FP-S9301 or FP-S9401 as steering and AUX servo ※Use the same kind of servo as the twin servo. (A Y harness cord does not have to be used with steering.)
Transmitter battery	<ul style="list-style-type: none"> ●Penlight battery (×7) 		or	<ul style="list-style-type: none"> ●NT-8LP Nicd battery pack 9.6V—500mAH 	
Receiver battery	<ul style="list-style-type: none"> ●Penlight battery (×4), NR-5PB or NR-4NB 	(Shared with drive power supply)		<ul style="list-style-type: none"> ●NR-5PB (Option) 6V/450mAH ●NR-4NB (Option) 4.8V/700mAH 	<ul style="list-style-type: none"> ●Penlight battery (×4) 
DSC cord	DSC cord (Option) 	However, except FET amp set, Y harness cord is also necessary.		<ul style="list-style-type: none"> ●Y harness cord (Option) 	
Charger			<ul style="list-style-type: none"> ●Charger However a charger differs with the input rating voltage.		

BEFORE USE

■ Loading the transmitter battery (penlight battery x 7)

1 Insert the batteries into the holder.

2 Load the holder into the transmitter.

When using a Nicd battery pack……

- Use the NT-8LP.
- Use the Futaba charger as the charger.
- Charging time : 15 hours.

* However, when the battery pack has not been used for some time, it may be necessary to charge and discharge two or three times, before you gain a full charge even if charged for the specified time (15 hours) or longer.

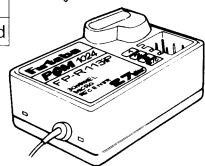
■ Changing the RF MODULE band

1 Remove the module.

2 Change the crystal.

3 Install the module.

	27MHz Band	29MHz Band	40MHz Band	72MHz Band	75MHz Band
RF module	FP-TL-FM-27	FP-TL-FM-29	FP-TL-FM-40	FP-TL-FM-72	FP-TL-FM-75
Receiver	FP-R113iP-27	FP-R113iP-29	FP-R113iP-40	FP-R113iP-72	FP-R113iP-75
Crystal set	FM 27MHz Band	FM 29MHz Band	FM 40MHz Band	FM 72MHz Band	FM 75MHz Band



- Change the receiver crystal at the same time. Use a transmitter and receiver crystal pair.
- When changing the frequency band, use the combination shown in the table at the upper table.

■ Receiver and servos connections

Set using an FET amp

Steering servo

Receiver

4WS or twin servo use
* Use the same kind of servo as the steering servo as the twin servo.

FET amp

To motor

Switch

Drive Nicd battery pack

Other sets

Steering servo

Receiver

Throttle servo

B/C

(Option)

(Option) 4WS or twin servo use
* Use the same kind of servo as the steering servo as the twin servo.

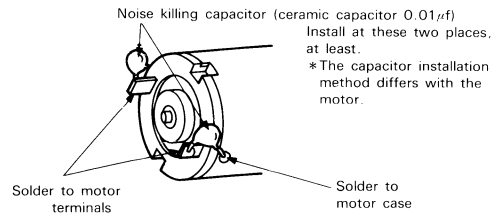
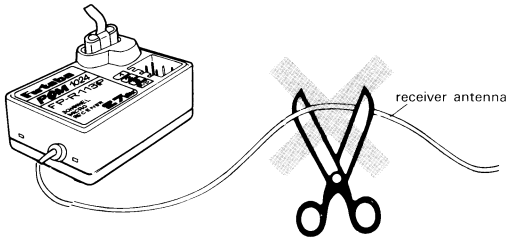
(Option) Nicd battery pack (4.8V or 6V) or penlight battery (x4)

Receiver connector arrangement

1	□ □ □ □	→ Steering servo
2	□ □ □ □	→ Throttle servo
3	□ □ □ □	→ AUX servo
B/C	□ □ □ □	→ Battery/DSC cord

Receiver and servo precautions

- Operate each servo to its full stroke and check if the pushrod binds or is loose. Unreasonable force applied to the servo horns is bad for the servos and will also cause the battery to run down quickly. Be especially careful when using 8.4V.
- Make the stroke of each control mechanism somewhat larger than the full stroke (including the trim component) of the servo horn. Adjust the servo horns so they move smoothly even when the trim levers and wheel or trigger are operated simultaneously in the same direction.
- Be alert for noise.
Always solder noise killing capacitors to the running motor. Otherwise, the receiving range may be shortened or there may be numerous dead points. If 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.
- Just because the receiver antenna may seem long, do not cut it off or fold it back on itself. The receiving range will be shortened.



- When using a commercial motor checker, always disconnect the motor from the speed control and radio. If it is not disconnected, the amp may be destroyed.
- If the FET fins (metal part) of the FET amp touch the chassis made of aluminum, carbon, or other conductive material, the FET may be destroyed. When installing the FET amp, be sure that it does not touch such materials.
- A spare horn is provided. Use it as required.
- Use double-side adhesive tape so that the receiver is not exposed to direct vibration. Also, install the receiver so that it does not directly touch the frame or other parts and does not move.
- When the receiver is installed on a boat or is used where it may be splashed with mud and water, place it in a plastic bag and wrap a rubber band around the open end of the bag. After use remove the receiver from the bag to prevent condensation.
- After mounting is complete, recheck each part, then check the transmitting range by making the transmitter a antenna as short as possible and 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 the transmitter sticks. At this time, place the vehicle on a stand, etc. so that it does not move.
- The crystal can change from the outside of the receiver case. Always use a Futaba transmitter and receiver crystal pair as the replacement crystals.

IMPORTANT : Receiver Antenna Routing

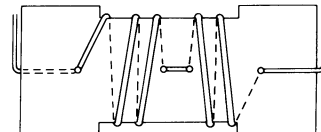
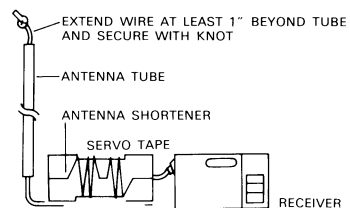
To obtain the best possible range (car to transmitter distance) and reduce the possibility of interference, please observe these antenna routing instructions.

Failure to follow these guidelines can result in loss of control or limited range.

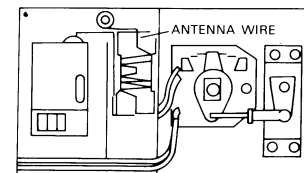
- 1) NEVER cut your receiver's antenna wire.
Your system has been precisely tuned to the full length of the stock antenna.
- 2) Excess antenna wire should NOT be tightly coiled. To safely store the excess wire make an antenna shortener from a small piece of stiff cardboard. This will provide maximum reception and prevent tangling and breakage of the wire.
- 3) When routing the antenna wire to the antenna tube keep the wire away from battery and speed control wiring. The high power of the NiCd battery creates electrical "noise" which can cause interference.

SNOW IS WATER

Remember that operating your FX10 on snow or in wet areas is not recommended. Melted snow becomes water which will damage or short out your system's electronics.



ANTENNA SHORTENER TEMPLATE



KEEP ANTENNA WIRE AWAY FROM POWER WIRES

BASIC SETTINGS

[Note] The (symbol) function names in the figures correspond to the name of each part (foldout).

Motor power using FP-MC116 FET AMP

Transmitter normal settings

④ Throttle one-touch trim
→ neutral
(LED display : Green)

① Steering one-touch trim → neutral (LED display : Green)

② Wheel angle adjuster → Fully down

⑤ ALT knob → Fully clockwise

⑦ Throttle neutral adjuster may be set to :
 $\frac{1}{2}^{\circ}$ or 0°
 Select the easiest to use.

Trimmers in arrow direction. Selector switch in lower position.

(the other side)
⑥ Steering D/R → Fully right

One-touch trim neutral setting method



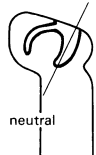

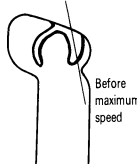


When the two direction buttons are pressed simultaneously for about 1 second, trim returns to neutral. The center (green) one-touch trim LED lights.

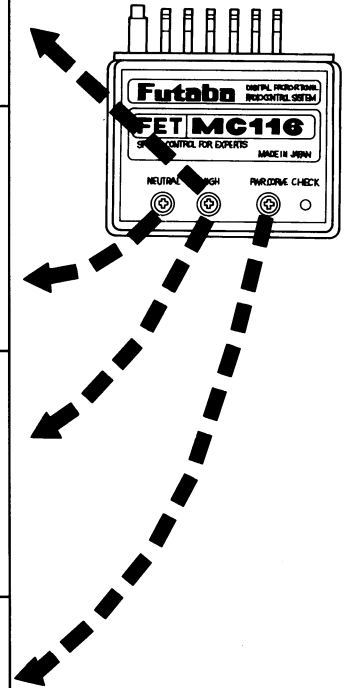
Steering adjustment

<p>1 Set the steering wheel and linkage direction.</p> <p>Ⓜ Reversing switch (CH1)</p> <div style="display: flex; align-items: center;"> <div style="text-align: center; margin-right: 10px;"> </div> <div> <p>Reverse ↑</p> <p>To reverse the direction of operation, flip the switch to the opposite side.</p> </div> </div> <div style="text-align: center; margin-top: 20px;"> </div> <div style="text-align: center; margin-top: 20px;"> </div>	<p>2 Set the linkage neutral position.</p> <p>ⓐ Steering SUB TRIM</p> <div style="text-align: center; margin-bottom: 20px;"> <p>Left Right</p> </div> <p>[1] After adjusting the neutral position of the linkage itself with SUB TRIM in the center (0) position, [2] trim with SUB TRIM.</p> <div style="text-align: center; margin-top: 20px;"> </div> <div style="text-align: center; margin-top: 20px;"> <p>Neutral</p> </div>
---	--

■ FET amp adjustment

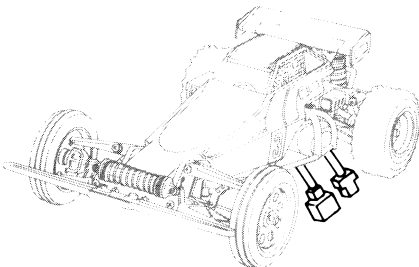
Do not make these adjustments with the motor connected.

1	<p>HIGH</p>  <p>Turn fully clockwise.</p>	—
	<p>Neutral adjustment</p> <p>NEUTRAL</p>  <p>Set the throttle trigger to the neutral point and set the neutral point of the speed control by adjusting the neutral trimmer until the monitor lamp goes off. Then turn the neutral trimmer a small amount from the point at which the monitor lamp goes off to ensure a positive neutral point.</p> 	<p>CHECK</p> <p>○</p> <p>Off</p>
2	<p>High point adjustment</p> <p>HIGH</p>  <p>Set the throttle trigger to a little before maximum speed, then set the high point trimmer so that the monitor lamp changes from green to red.</p> 	<p>CHECK</p>  <p>ON (red)</p>
3	<p>Power curve adjustment</p> <p>PWR. CURVE</p>  <p>Mild Quick</p> <p>Adjust the power curve while running.</p> <p>* More exact adjustment is possible by performing power curve adjustment together with transmitter throttle exponential adjustment.</p>	—



CAUTION

- When using an FET amp, always turn off the battery fail safe function.



- When not running, always disconnect the drive Nicd battery pack.

■ With the adjustments made up to this point, now run the vehicle slowly and trim as described on the next page.

FUNCTIONS AND SETTING METHOD

[Note] The (symbol) functions in the figures correspond to the name of each part (foldout).


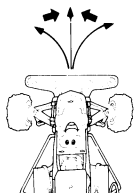

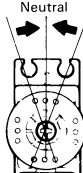
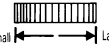
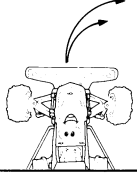

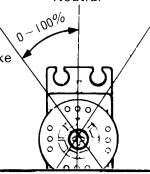
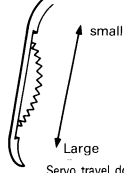
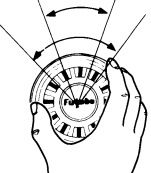
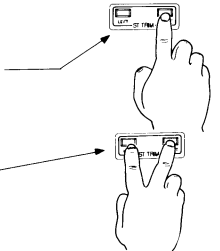
Functions convenient at linkage adjustment

* Make adjustments with the adjustment screwdriver supplied.

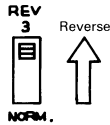
Steering CH1		Throttle CH2	
Steering neutral adjustment	(a) Steering sub trim 	Throttle neutral adjustment	(e) Throttle sub trim
Steering characteristic curve adjustment	(b) Steering EXP 	Throttle characteristic curve adjustment	(5) Throttle EXP
Making the left and right turning radiuses the same	(c) (d) Steering ATV (right), (left) 	Throttle brake side and high side steering angle adjustment	(g) (h) Throttle ATV (low), (high)
Reversing the servo direction of operation	(m) Reversing switch (CH1) 	Reversing the servo direction of operation	(m) Reversing switch (CH2)
Steering wheel spring adjustment	(3) Wheel tension adjuster 	Changing the neutral position	(7) Throttle neutral adjuster
		Making the servo operation low, high; 1:1 when neutral adjuster is 1/3	(m) Preset switch
Mixing function			
When using brake servo and needle control servo (CH2→CH3) (n) (m) (l) (k) brake mixing 		When steering control made twin servo (CH1→CH3) (n) (m) (k) twin servo mixing 	

Functions convenient when running

(functions corresponding to the conditions of the course and machine which change periodically during a race)

Steering CH1		Throttle CH2	
<p>Neutral adjustment when running</p>  <p>Neutral trimming (left and right 20 steps)</p> <p>Press the button of the direction to be adjusted.</p> 	<p>Neutral adjustment when running</p>  <p>Neutral trimming (high and low 20 steps)</p> <p>Press the button of the direction to be adjusted.</p> 		
<p>Setting minimum turning radius matched to the course</p>  <p>20~100% Steering angle adjustment (left and right simultaneously)</p> 	<p>Brake amount adjustment to match the state of the course</p>  <p>Brake side steering angle adjustment</p> 		
<p>Changing the steering wheel operating angle</p>  <p>Angle adjustment (60°-76°)</p> <p>Servo travel does not change.</p> 	<p>* One-touch trim</p> <ul style="list-style-type: none"> ● Continuous shift function When the button is pressed continuously, trim moves continuously in that direction. ● Neutral reset function When the two direction buttons are pressed simultaneously for about one second, trim returns to neutral. 		

Throttle one-touch trim is not influence of ATV, ATL setting.

AUX CH3	
<p>Reversing the servo direction of operation</p>  <p>Reverse</p> <p>Servo reverse</p>	<p>Reversing switch (CH3)</p>

*For the mixing function, trim the AUX (CH3) servo with the (j) AUX trimmer.

When 4WS function used (CH1→CH3)

(n) (m) (i) (k) **4WS mixing**

[1] Small steering operating angle

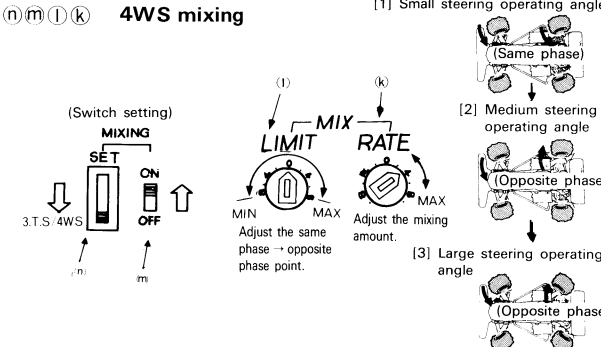
(Same phase)

[2] Medium steering operating angle

(Opposite phase)

[3] Large steering operating angle

(Opposite phase)



(Switch setting)

MIXING SET ON OFF

3.T.S 4WS

MIN MAX Adjust the same phase → opposite phase point.

MIX RATE MAX Adjust the mixing amount.

When boat mixing used (CH2→CH1)

(n) (m) (i) (k) **Boat mixing**

(1) MAX speed

(2) Medium speed

(3) Slow speed

Mixing amount 0

Mixing maximum

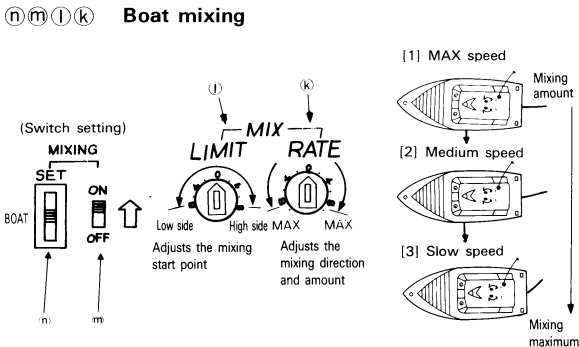
(Switch setting)

MIXING SET ON OFF

2. BOAT

Low side High side MAX MAX Adjusts the mixing start point

MIX RATE MAX Adjusts the mixing direction and amount

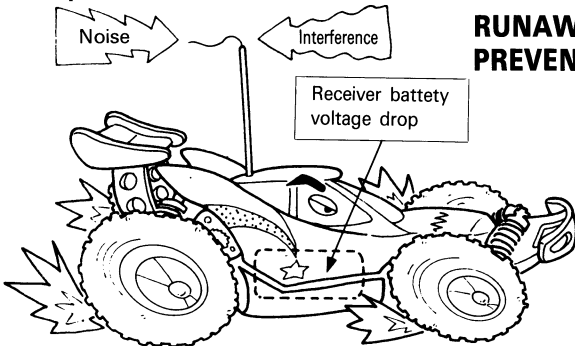


FAIL SAFE FUNCTIONS

[Note] The (symbol) in the figures correspond to part names (foldout).

Fail Safe Function That Protects the R/C Car Against Unforeseen Accidents

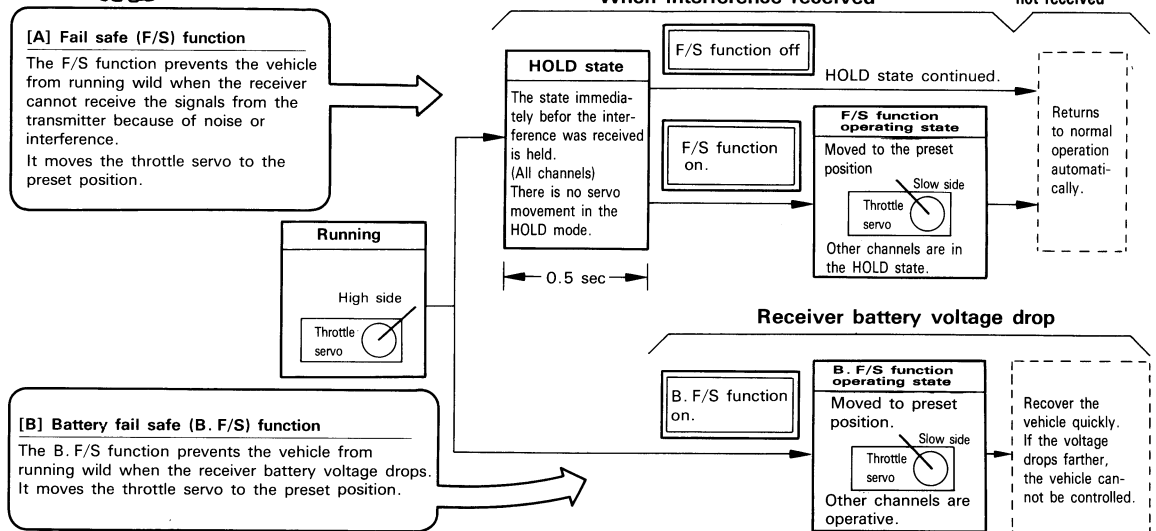
● It is recommended that the F/S function be set when interference may be received during practice runs, etc.



RUNAWAY PREVENTION!

CAUTION

- When using an FET amp, turn off the F/S function.
- Also turn off the F/S function when using an penlight battery as the receiver battery.



■ F/S function setting

■ F/S function release

■ B.F/S function setting

■ B.F/S function release

1 Select the function.

Ⓜ F/S-HOLD switch

Set to the FS position

2 Set the throttle position.

Ⓜ Fail safe set button

Set the throttle trigger to the desired position. (Slow side)

Press the FAIL SAFE SET button

The set contents are memorized even if the battery is changed.

Release the F/S function.

Ⓜ F/S-HOLD switch

Set to the HOLD position.

1 Select the function.

Ⓜ B. F/S ON/OFF switch

Set to ON position.

2 Set the throttle position.

(Same as F/S function setting.)

The set contents are memorized even if the battery is changed.

Release the B. F/S function.

Ⓜ B. F/S ON/OFF switch

Set to the OFF position.

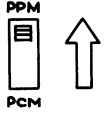
Either F/S or B. F/S can be set, but the throttle position set last by F/S or B. F/S is memorized.

PCM/PPM switching

■When optional Futaba FM receiver used

Transmitter setting

① **PCM/PPM switch**



When switching this switch, turn off the transmitter power switch. If the power switch is not turned off, PCM→PPM and PPM→PCM switching cannot be performed.

●When switched to the PPM position, an optional Futaba FM receiver can be used instead of the conventional FM system.

However, the F/S and B.F/S functions cannot be used.

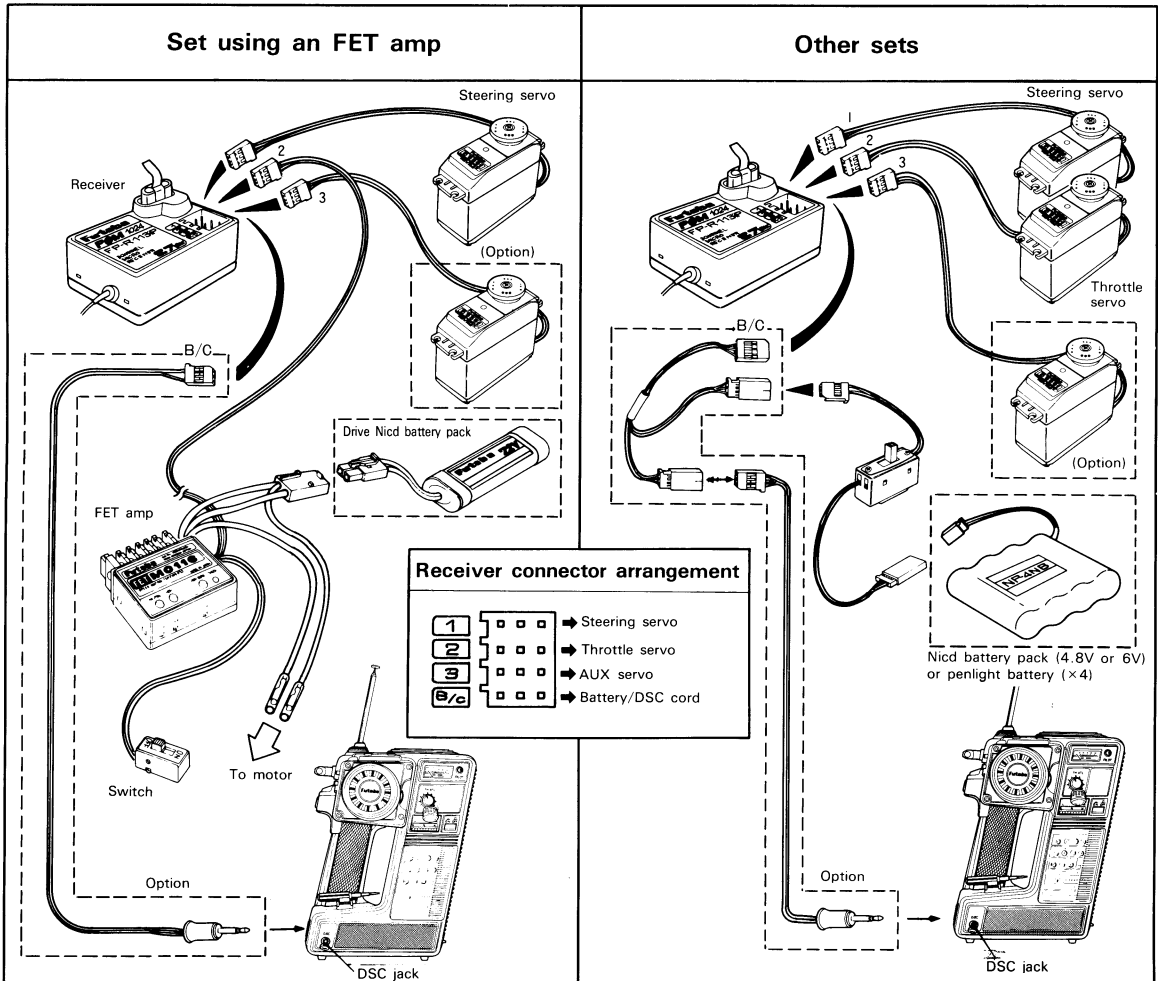
Recommended receiver FP-R103F (small 3-channel FM receiver)

DSC (Direct Servo Control) function

■Use this function when wanting to adjust your vehicle without turning on transmitter during meets and races or when the same band is used.

CAUTION

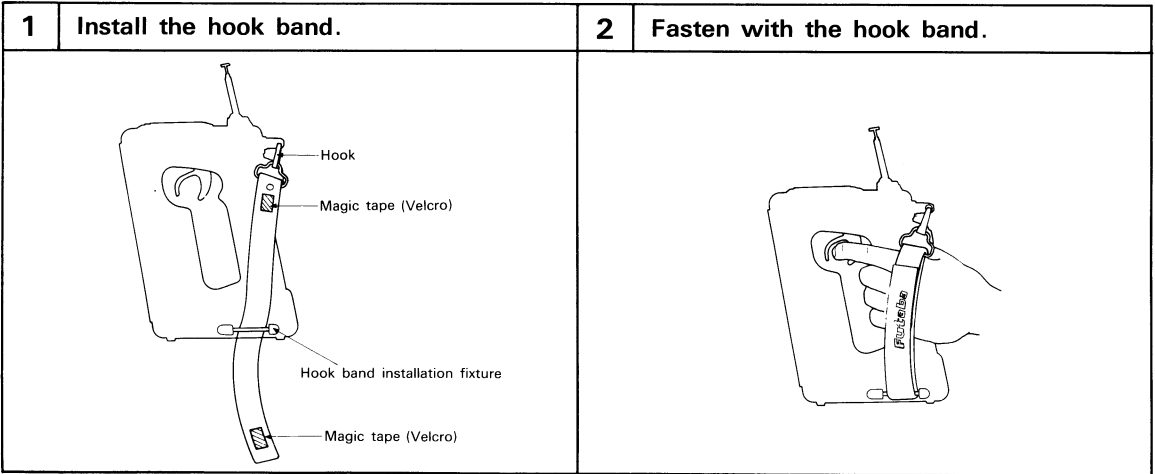
●When using this function, always turn off the transmitter power switch.



USING THE ACCESSORIES

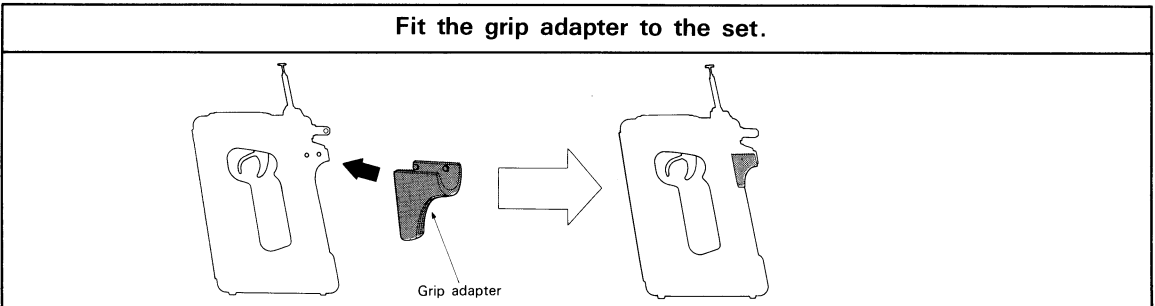
■ Hook band

When the hook band is used, grip is stable and operation is easier.



■ Grip adapter

Use the grip adapter, as preferred.

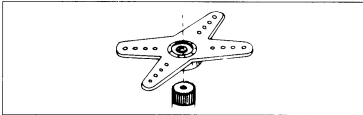


■ SPLINED HORN

This horn permitting of the servo neutral position at the servo horn side.

Setting and shifting the neutral position.

a) Angle division



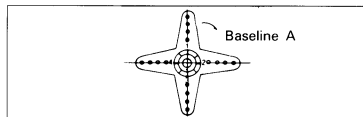
1) The number of segments per spline is 25. The amount of change per segment is $360 \div 25 = 14.4^\circ$.

2) The minimum adjustable angle is determined by the number of arms or number of axes of the holes.

For four arms,

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

b) Effect



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

[Example] For a four arm horn, the angular shift per segment is 14.4° .

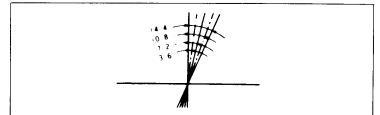
The shift to the right is

$$90^\circ - (14.4^\circ \times 6) = 3.6^\circ$$

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

For a six arm horn, to shift the holes

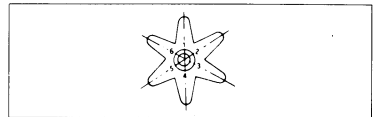
center line to the right (clockwise) relative to baseline A. turn the arm



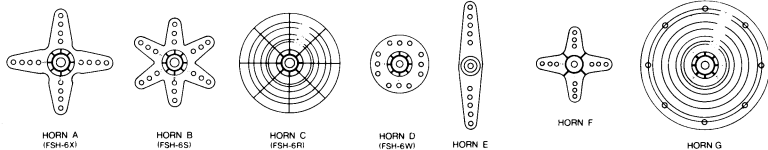
counterclockwise and set arm 2 to the position of arm 1. The adjustable angle is

$$60^\circ - (14.4^\circ \times 4) = 2.4^\circ$$

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



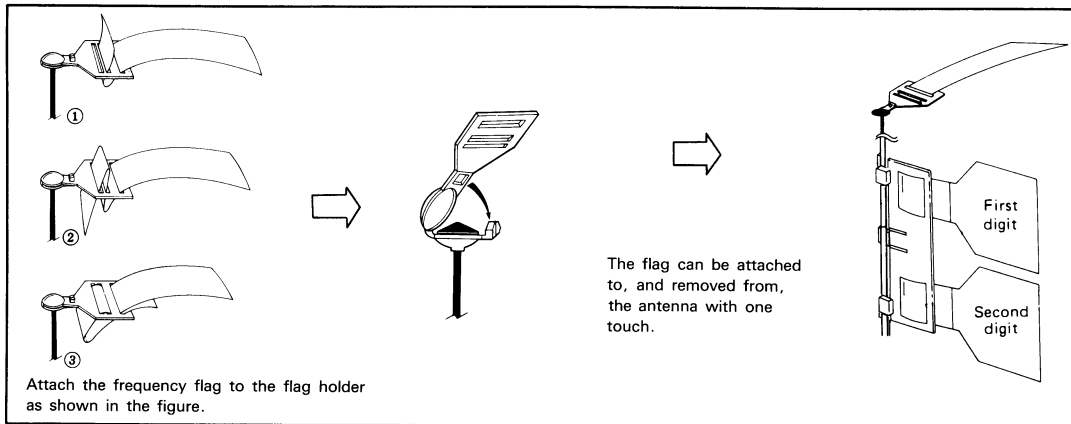
● SPLINED SERVO HORNS



■ 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 (27 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 75 MHz bands in the U.S.A.

■ Antenna Frequency Flag



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

26-27 MHz—Aircraft/car/boat

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

72 MHz—Aircraft only

72.030	12	* 72.470	34
* 72.070	14	72.550	38
* 72.110	16	72.590	40
* 72.150	18	72.630	42
* 72.190	20	72.670	44
* 72.230	22	72.710	46
* 72.270	24	72.750	48
* 72.310	26	72.790	50
* 72.350	28	72.830	52
* 72.390	30	72.870	54
* 72.430	32	72.910	56

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

Frequency	Channel No.	Color
50.800	RC00	Black—Brown
50.840	RC02	Black—Red
50.880	RC04	Black—Orange
50.920	RC06	Black—Yellow
50.960	RC08	Black—Green
53.100		Black—Blue
53.200		Black—Violet
53.300		Black—Gray
53.400		
53.500		
53.600		
53.700		
53.800		

75 MHz—Car/Boat only

75.430	62	75.750	78
75.470	64	75.790	80
75.510	66	75.830	82
75.550	68	75.870	84
75.590	70	* 75.910	86
* 75.630	72	* 75.950	88
75.670	74	* 75.990	90
75.710	76		

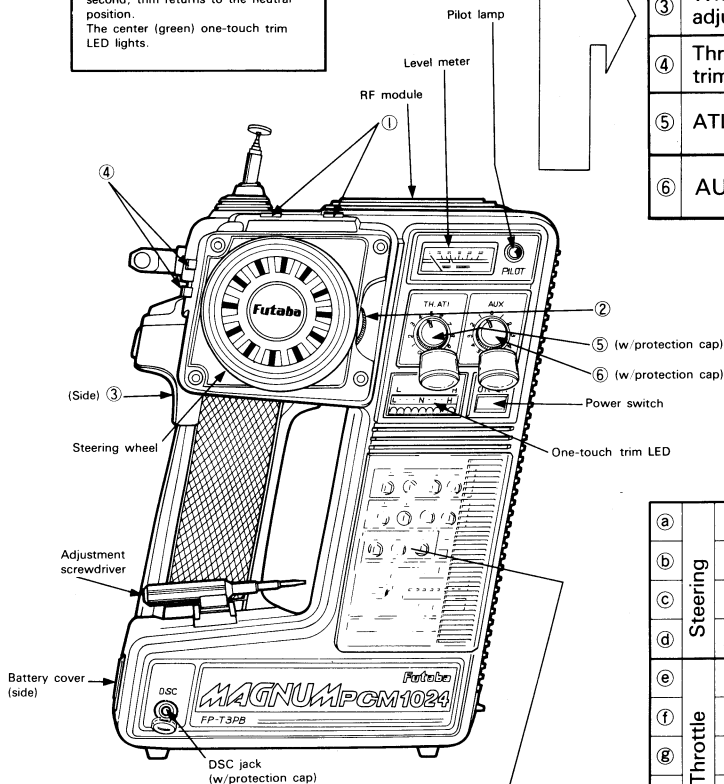
* Effective JAN 1. 1988

NOMENCLATURE

One-touch trim neutral position setting



When the two direction buttons are pressed simultaneously for about one second, trim returns to the neutral position. The center (green) one-touch trim LED lights.

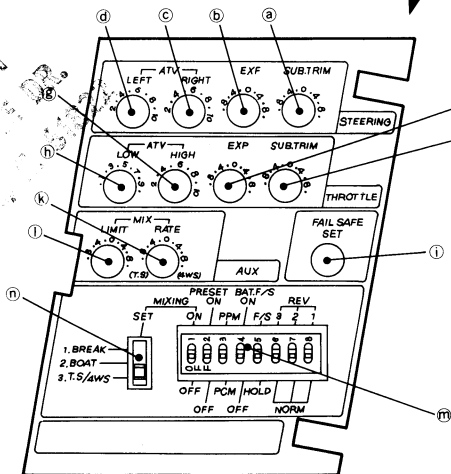


①	Steering one-touch trim	Neutral	9 Page
②	Wheel angle adjuster	Fully down	8 Page
③	Wheel tension adjuster	—	8 Page
④	Throttle one-touch trim	Neutral	9 Page
⑤	ATL knob	Fully clockwise	9 Page
⑥	AUX knob	Center	9 Page

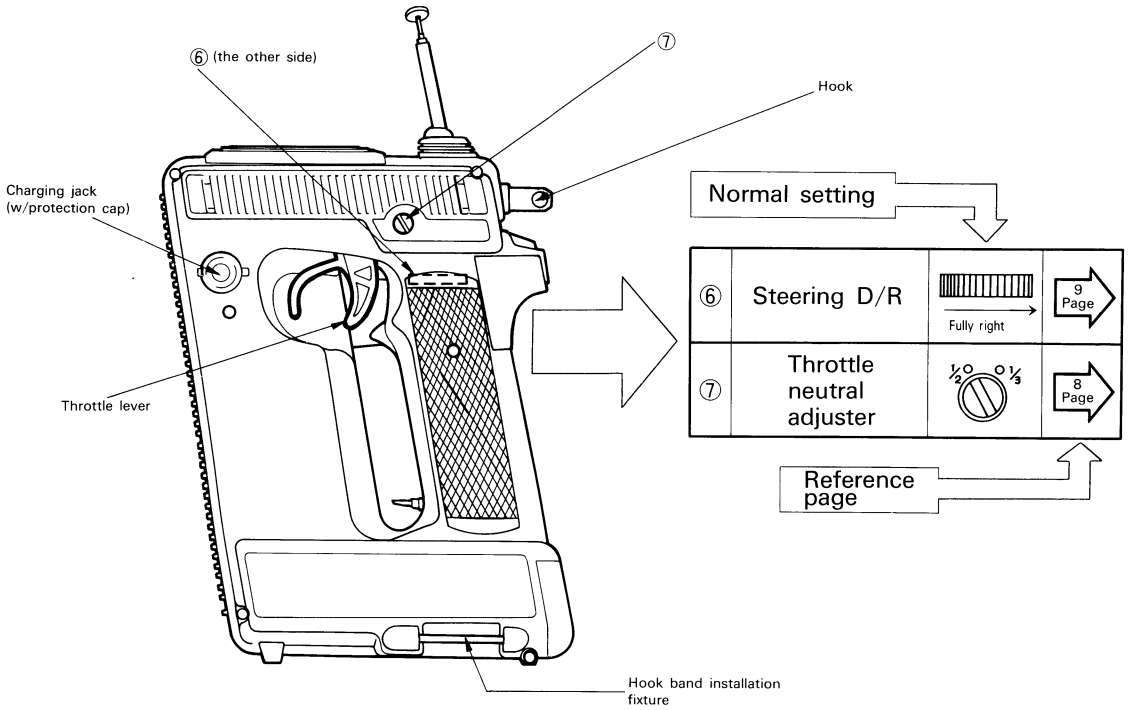
Normal settings

Reference page

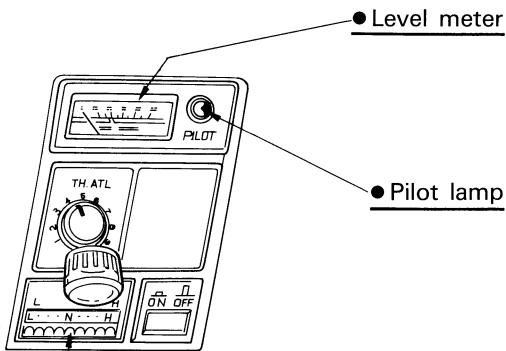
a	Steering	Sub trim	Center	
b		EXP	Center	
c		ATV (right side)		
d		ATV (left side)		
e	Throttle	Sub trim	Center	
f		EXP	Center	
g		ATV (high side)		8 Page
h		ATV (low side)		
i		Fail safe set button	—	
k	AUX	MIX rate trimmer	Center	8 9 Page
l		MIX limit trimmer	Center	
m	Setting switches	Reversing switch	1CH NORM	8 Page
			2CH NORM	8 Page
			3CH NORM	8 Page
		F/S-HOLD switch	HOLD	10 Page
		B. F/S ON/OFF switch	OFF	11 Page
		PPM/PCM switch	PCM	11 Page
		Preset switch	OFF	11 Page
		MIX ON/OFF switch	OFF	8 9 Page
n		MIX set switch	—	



(panel)



Display Functions



Voltage display	When the pointer enters the red zone, change the battery.
RF output display	When the level meter pointer does not deflect, check the RF module connection.

Pilot lamp	Lights when the power switch is on.
Battery alarm	When the lamp blinks, change the battery.
DSC display	Lights at DSC operation. (When using DSC, turn off the power switch.)
Fail safe data automatic transmission display	Blinks off momentarily every 60 seconds when F/S data transmitted.

● One-touch trim LED

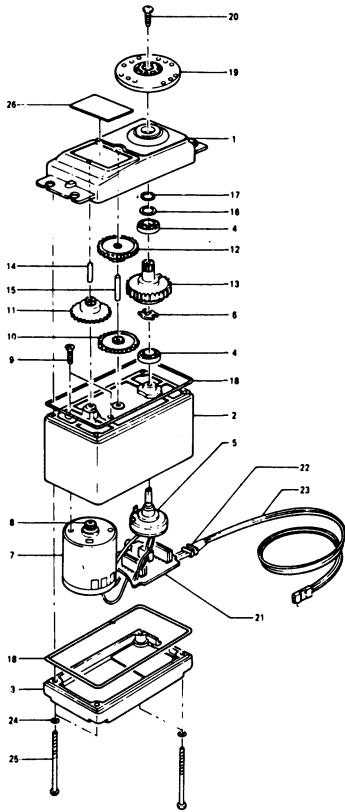
Display example	0000 ■ 0000 Neutral (green)	
The relationship between the number of times the steering one-touch trim right side button is pressed and the LED display position is shown at the right.	0000 ■ 0000 1 ~ 2 times	
	0000 ■ 0000 3 ~ 4 "	
	0000 ■ 0000 5 ~ 6 "	
	0000 ■ 0000 7 ~ 8 "	
	0000 ■ 0000 9 ~ 10 "	
	0000 ■ 0000 11 ~ 12 "	
	0000 ■ 0000 13 ~ 14 "	
	0000 ■ 0000 15 ~ 20 "	
	■ → On □ → Off	

● Buzzer

Trimmer center display	When a trimmer on the panel is set, the buzzer sounds when "0" point is passed. "Peee....."
Display when switch is turned on and off	When a switch which enables a function is operated, a buzzer sounds. "Peee....."
Battery alarm	When the battery alarm is generated, a buzzer sounds. "Pee, Pee, Pee,....."
Buzzer off	When the power switch is turned on while the fail safe set button is being pressed, the buzzer stops sounding.

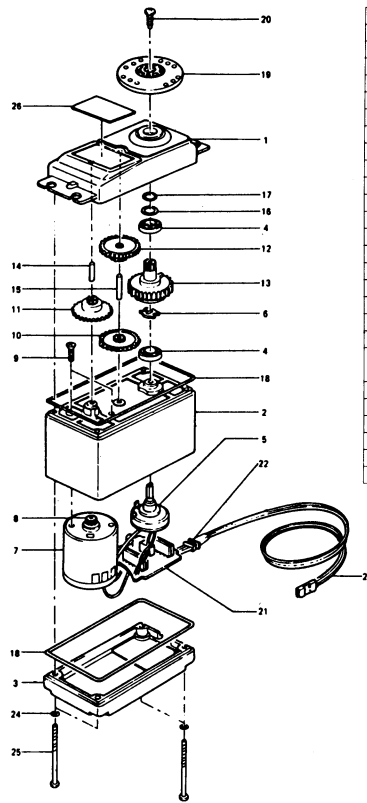
SERVO EXPLODED VIEWS

FP-S9401 EXPLODED VIEW



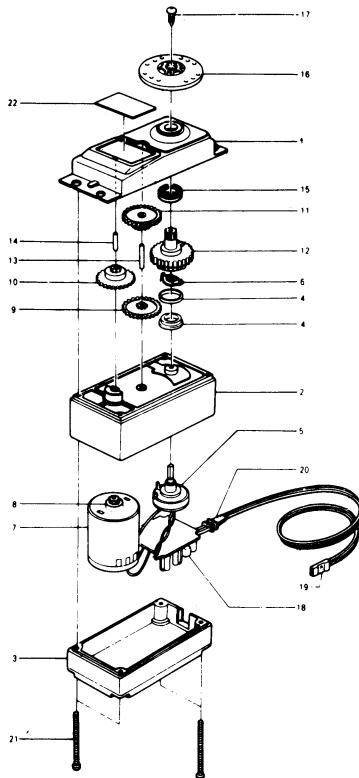
No.	Part name	Part No.
1	Upper case	S05770
2	Middle case	S05780
3	Bottom case	S05790
4	Ball bearing L1060	S04130
5	Potentiometer	I39995
6	VR drive plate	S02753
7	Coreless motor	S91268
8	Pinion gear	S02605
9	Phillips flat head screw 1.6x2.5	J51008
10	1st gear	S02780
11	2nd gear	S02471
12	3rd gear	S02807
13	Final gear	S02809
14	2nd shaft	S01351
15	Intermediate shaft	S04287
16	Spacer washer	S02486
17	Seal ring	S09415
18	O-ring	S90417
19	Splined horn D	S01239
20	Binding head tapping screw 2.6x10 blask	J55204
21	S9401 AMP. S150	AS1340
22	Grommet	S90045
23	3PBG-WRB-300	AT2238
24	O-ring for 1.6φ screw	S90410
25	Phillips pan head screw 2x27.5	J50085
26	S9401 nameplate	S60192

FP-S9301 EXPLODED VIEW



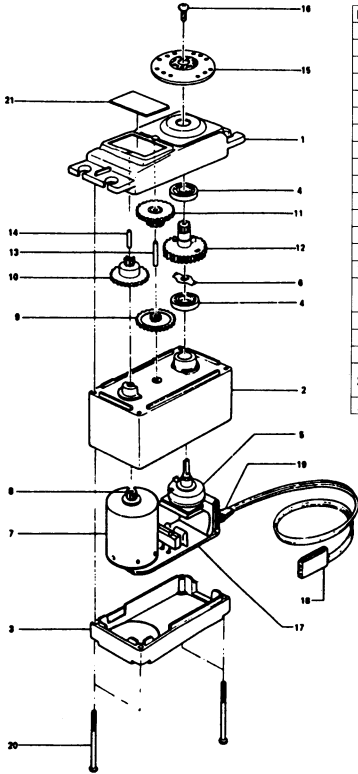
No.	Part name	Part No.
1	Upper case	S05770
2	Middle case	S05780
3	Bottom case	S05790
4	Ball bearing L1060	S04130
5	Potentiometer	I39995
6	VR drive plate	S02753
7	Coreless motor	S91267
8	Pinion gear	S05530
9	Phillips flat head screw 1.6x2.5	J51008
10	1st gear	S02751
11	2nd gear	S02471
12	3rd gear	S0807
13	Final gear	S02809
14	2nd shaft	S01351
15	Intermediate shaft	S04287
16	Spacer washer	S02486
17	Seal ring	S09415
18	O-ring	S90417
19	Splined horn D	S01239
20	Binding head tapping screw 2.6x10 blask	J55204
21	S9301 AMP. S150	AS1339
22	Grommet	S90045
23	3PBG-WRB-300	AT2238
24	O-ring for 1.6φ screw	S90410
25	Phillips pan head screw 2x27.5	J50085
26	S9301 nameplate	S60191

FP-S132H EXPLODED VIEW



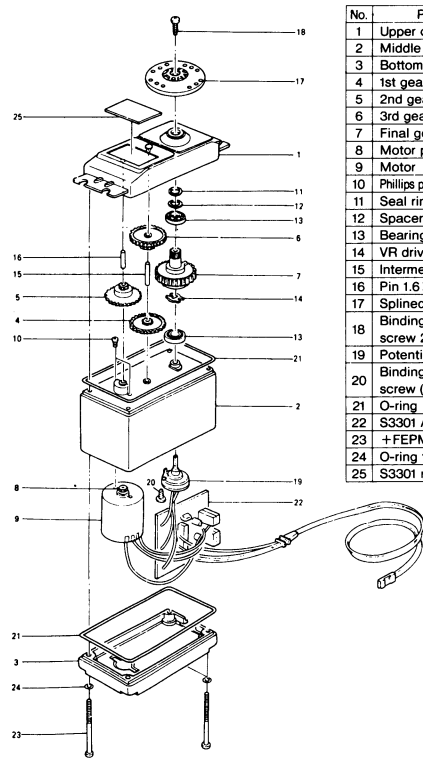
No.	Part name	Part No.
1	Upper case	S05820
2	Middle case	S05830
3	Bottom case	S05840
4	Metal bearing, outer	S04136
	Metal bearing, inner	S04137
5	TR-133VR	I39995
6	VR drive plate	S05626
7	Motor	S91249
8	Motor pinion	S02788
9	1st gear	S02787
10	2nd gear	S03250
11	3rd gear	S03252
12	Final gear	S03254
13	Intermediate gear	S02480
14	Two-stage shaft	S02481
15	Ball bearing	S04130
16	Splined horn D	S01239
17	Horn set screw	J55178
18	S132H printed wiring board	AS1271
19	S132H 3PB WRB-300	AT2165
20	Grommet	S90045
21	Pan head truss screw 2x25	J50083
22	S132H nameplate	S60128

FP-S9601 EXPLODED VIEW



No.	Part name	Part No.
1	Upper case	S05970
2	Middle case	S05980
3	Bottom case	S05990
4	Bearing L1060	S04130
5	Potentiometer	i39665
6	VR drive plate	S05625
7	Motor	S91266
8	Motor pinion	S05532
9	1st gear	S02761
10	2nd gear	S02762
11	3rd gear	S02761
12	Final gear	S02763
13	Intermediate shaft	S02764
14	2nd shaft	S04285
15	Splined horn D	S02767
16	Binding head tapping screw 2.6×8	J55178
17	S9601 AMP.	AS1317
18	3PD-WRB-170B	AL0705
19	Grommet	S90045
20	No. 0 type 3 pan head screw M1.7×24	J40070
21	S9601 nameplate	S60193

FP-S3301 EXPLODED VIEW



No.	Part name	Part No.
1	Upper case	S05940
2	Middle case	S05950
3	Bottom case	S05960
4	1st gear	S02790
5	2nd gear	S02791
6	3rd gear	S02792
7	Final gear	S02793
8	Motor pinion	S02794
9	Motor	S91214
10	Phillips pan head screw 2×3	J50002
11	Seal ring	S90415
12	Spacer washer	S02486
13	Bearing	S04130
14	VR drive plate	S02753
15	Intermediate shaft	S02795
16	Pin 1.6×12 black	S01351
17	Splined horn D	S01239
18	Binding head tapping screw 2.6×12 black	J55147
19	Potentiometer	i39995
20	Binding head tapping screw (2) 2×5	J55016
21	O-ring	S90385
22	S3301 AMP, S144	AS1338
23	+FEPMS, 2.3×40 Ni	J55202
24	O-ring for 1.6 screw	S90410
25	S3301 nameplate	S60190

SERVO HORN MOUNTING SCREW PRECAUTIONS

Horn mounting screws table

Horn mounting screw dimensions	Applicable servo	Type	Dimensions (m/m)
2.6×6	S133, S143 series	B	5.7
	S129 series	A	7.9
2.6×8	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	B	10.5
2.6×10	S231S series, S9201, S9301, S9401	A	9.0
	S136G	A	9.0
2.6×12	S134 series, S3301	A	11.3

Note

- Use 2.7 m/m tapping screw.
- If screws longer than necessary are used, the final gear may be destroyed or the potentiometer may be destroyed or may fall out.

