Thank you for purchasing a PCM1024Z World Champion Model II.

Please read this instruction manual before using the PCM1024Z and use your set safely.

After reading this manual, store it in a safe place.

## ABOUT THIS GUIDE

This manual is supplement to the separate "PCM1024ZA/PCM1024ZH INSTRUC-TION MANUAL". Refer to the "PCM1024ZA/PCM1024ZH INSTRUCTION MANUAL" for the basic operating instructions.

This guide describes the precautions for using the set safely and the new functions of the PCM1024Z World Champion Model II.

# 9ZAP / 9ZHP

## FOR SAFE USE
## DESCRIPTION OF NEW FUNCTIONS

## APPLICATION, EXPORT, AND RECONSTRUCTION

1. Use this product in model airplanes only.

The product described in this manual is subject to regulations of the Ministry of Radio/Telecommunications and is restricted under Japanese law to such purposes.

2. Exportation precautions

(a) When this product is exported from Japan, its use is to be approved by the Radio Law of the country of destination.

(b) Use of this product with other than models may be restricted by Export and Trade Control Regulations. An application for export approval must be submitted.

3. Modification, adjustment, and replacement of parts

Futaba is not responsible for unauthorized modification, adjustment, and replacement of parts of this product.

## THE FOLLOWING STATEMENT APPLIES TO THE RECEIVER (FOR U.S.A.)

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation.

## THE RBRC™ SEAL (FOR U.S.A.)

The RBRC™ SEAL on the (easily removable) nickel-cadmium battery contained in Futaba products indicates that Futaba Corporation of America is voluntarily participating in an industry program to collect and recycle these batteries at the end of their useful lives, when taken out of service within the United States. The RBRC™ program provides a convenient alternative to placing used nickel-cadmium batteries into the trash or municipal waste which is illegal in some areas.

Futaba Corporation of America's payments to RBRC™ makes it easy for you to return the spent battery to Futaba for recycling purposes. You may also contact your local recycling center for information on where to return the spent battery. Please call 1-800-8-BATTERY for information on Ni-Cd battery recycling in your area. Futaba Corporation of America's involvement in this program is part of its commitment to protecting our environment and conserving natural resources.

NOTE: Our instruction manuals need to encourage our customers to return spent batteries to Futaba or a local recycling center in order to keep a healthy environment.

RBRC™ is a trademark of the Rechargeable Battery Recycling Corporation.

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# FOR SAFETY

To ensure safe use, observe the following precautions.

## MEANING OF SPECIAL MARKINGS

Pay special attention to the safety at the parts of this manual that are indicated by the following marks.

| Mark | Meaning |
|---|---|
| ⚠ **DANGER** | Procedures which may lead to a dangerous condition and cause death or serious injury to the user if not carried out properly. |
| ⚠ **WARNING** | Procedures which may lead to a dangerous condition or cause death or serious injury to the user if not carried out properly, or procedures where the probability of superficial injury or physical damage is high. |
| ⚠ **CAUTION** | Procedures where the possibility of serious injury to the user is small, but there is a danger of injury, or physical damage, if not carried out properly. |

**Symbol:**      ⊘ ; Prohibited       ❶ ; Mandatory

# PRECAUTIONS DURING FLIGHT

## ⚠ WARNING

### PROHIBITED ITEMS

🚫 Do not fly simultaneously on the same frequency.

Interference may cause a crash.

*Use of the same frequency will cause interference even if the modulation method (AM, FM, PCM) is different.

**Simultaneous flight on the same frequency prohibited**

🚫 Do not fly on rainy or windy days, or at night.

Water will penetrate into the transmitter and cause faulty operation, or loss of control, and cause a crash.

**Do not fly**
Rain
Wind
Night
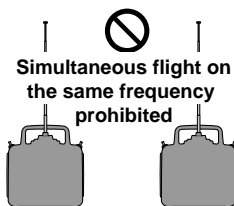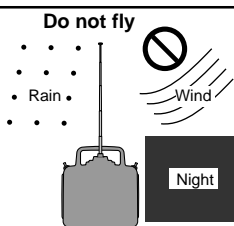
🚫 Do not fly in the following places:

-Near other R/C flying fields (within about 3km)
-Near people on the ground, or objects in the air
-Near homes, schools, hospitals, or other places where there is a lot of people
-Near high tension lines, high structures, or communication facilities

Radiowave interference and obstructions may cause a crash. A crash caused by trouble in the R/C set, or the model itself, may cause death or property damage.

🚫 Do not fly when you are tired, sick, or intoxicated.

Fatigue, illness, or intoxication will cause a loss of concentration or normal judgment and result in operation errors and a crash.

### MANDATORY ITEMS

❗ Extend the antenna to its full length.

If the antenna is too short, the effective range of the radiowaves will become shorter.

**Extend to full length**
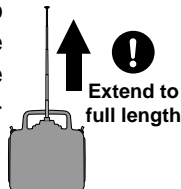
❗ Always test the digital proportional R/C set before use.

Any abnormality in the digital proportional R/C set, or model, may cause a crash.

*Before starting the engine, check that the direction of operation of each servo matches the operation of its control stick. If a servo does not move in the proper direction, or operation is abnormal, do not fly the plane.

**Test**
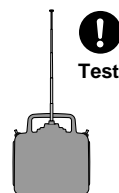
❗ Check that the transmitter antenna is not loose.

If the transmitter antenna comes off during use, control will be lost and the model will crash.

# ⚠ **CAUTION**

### PROHIBITED ITEMS

🚫 When placing the transmitter on the ground during flight preparations, be sure that the wind cannot knock it over.

If it is knocked over, the throttle stick may be pushed to full high and the engine will race and create a dangerous situation.

🚫 Do not touch the engine, motor, and FET amp during and immediately after use.

They are hot and will cause a burn.

### MANDATORY ITEMS

❗ When turning on the power switch
After setting the transmitter throttle stick to maximum slow,
1. Turn on the transmitter power switch,
2. Then turn on the receiver power switch.

When turning off the power switch
After stopping the engine,
1. Turn off the receiver power switch,
2. Then turn off the transmitter power switch.

If the power switch is turned off in the opposite order, the engine may go to full throttle unexpectedly and cause an injury.
*Maximum slow: Direction in which the engine or motor runs at the slowest speed.

❗
**Power ON**
**Power OFF**
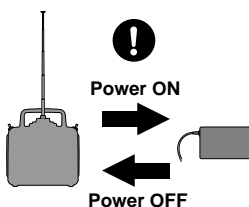
❗ When adjusting the digital proportional R/C set, always stop the engine, except when necessary.

If the engine suddenly goes to high speed, it may cause an injury.

❗ When flying, always install the frequency board to the transmitter antenna.

When the frequency was changed, also change the frequency board.

**Install frequency board** ❗
17
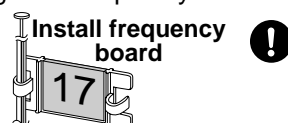
# NICD BATTERY CHARGING PRECAUTIONS

# ⚠ **WARNING**

### MANDATORY ITEMS

❗ Always charge the nicd battery before each flight.

If the battery goes dead during flight, the plane may crash.

❗ Charge the digital proportional R/C nicd battery with the special charger, or digital proportional R/C quick charger, sold separately.

Overcharging may cause burns, fire, injury, blindness, etc. due to overheating, breakage, electrolyte leakage, etc.

❗ **Use the special charger**

# ⚠ **CAUTION**

──────── **PROHIBITED ITEMS** ────────

🚫 Do not short the nicd battery connector terminals.

Shorting the terminals may cause sparking and overheating and result in burns or fire.

🚫 Do not drop or apply strong shock to nicd battery.

The battery may be shorted and cause overheating or breakage and electrolyte leakage and result in burns or damage by chemical mater.

🚫 **Shock prohibited**

---

## STORAGE AND DISPOSAL PRECAUTIONS

# ⚠ **WARNING**

──────── **PROHIBITED ITEMS** ────────

🚫 Do not leave the digital proportional R/C set, battery, model airplane, etc. within the reach of small children.

Touching and operating the digital proportional R/C set, or licking the battery, may cause injury or damage due to chemical matter.

🚫 Do not throw the nicd battery into a fire or heat the nicd battery. Also, do not disassemble or rebuild the nicd battery.

Breakage, overheating, and electrolyte leakage may cause injury, burns, or blindness.

──────── **MANDATORY ITEMS** ────────

❗ When not flying the model, store the digital proportional R/C set with the nicd battery in the discharged state. Recharge the nicd battery before the next flight.

If a partially discharged nicd battery is recharged many times, its memory effect will reduce the flight time substantially and may cause a crash, even if the battery is recharged.

### Nicd battery electrolyte

The electrolyte in the nicd battery is a strong alkali and can cause blindness if it gets in the eyes. If you get the electrolyte in your eyes, immediately wash your eyes with water and see a doctor. If you get the electrolyte on your skin or clothes, it may cause a burn. Immediately wash it off with water.

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# ⚠ CAUTION

### PROHIBITED ITEMS

🚫 Do not store the digital proportional R/C set in the following places:

-Where it is very hot (104F or more) or very cold (-14F or less).
-Where the set will be exposed to direct sunlight.
-Where the humidity is high.
-Where there is strong vibration.
-Where it is dusty.
-Where there is steam and heat.

Storing the digital proportional R/C set in the places above may cause distortion and trouble.

### MANDATORY ITEMS

❗ If the digital proportional R/C set will not be used for a long time, remove the nicd batteries from the transmitter and the model and store them in a dry place.

If the batteries are left in the transmitter and model, the battery electrolyte may leak out and degrade the performance and shorten the life of the transmitter and model.

### Nicd battery recycling

Used nicd batteries are an important resource. Stick tape over the terminals and take the used batteries to a nicd battery recycling center.

# OTHER PRECAUTIONS

# ⚠ CAUTIONS

### PROHIBITED ITEMS

🚫 Do not get fuel, waste oil, etc. on plastic parts.

The plastic may melt and fail to function.

### MANDATORY ITEMS

❗ Always use Genuine Futaba transmitter, receiver, servos, FET amp, nicd battery, and other optional parts.

Futaba is not responsible for damage, etc. caused by the use of parts other than Genuine Futaba parts.
Use the parts described in the instruction manual and catalogs.

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# CHANGES FROM EXISTING MODELS

## NEW FUNCTIONS

**FUEL MIXTURE CONTROL (FMC) FUNCTION**

This function operates an engine with the special carburetor from low speed to high speed with a suitable mixture ratio by using needle control to control the fuel and air mixture. (Refer to page 11.)

**GYRO SENSE MIXING FUNCTION**

This function adjusts the sensitivity of a rate gyro from the transmitter. (Refer to page 25.)

## CHANGES OF SWITCH TYPE

The following switches of the transmitter were changed as shown below.

**SW(A), SW(B) and SW(D)**

(2 positions)　　(3 positions)
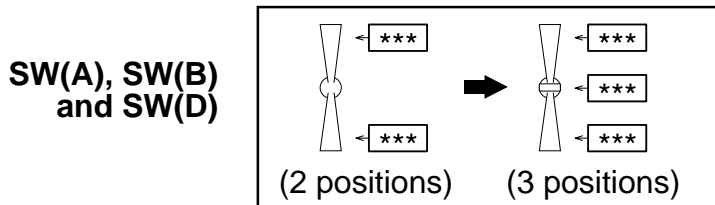
## RENAMING OF VARIABLE RESISTORS

The names of the variable resistors shown in the separate instruction manual were changed as shown below. Replace the names in the instruction manual with these names.

VR(A) ➡ LD　　　VR(B) ➡ RD

## INTERCHANGEABILITY WITH EXISTING MODELS

**Between this T9Z wc2 model and T9Z model**

The transmitter of this World Champion Model II is not interchangeable with the model setup data of the T9Z model because new functions have been added. Therefore, do not copy data between above models via a memory module, etc.

**Between this T9Z wc2 model and T9Z wc model**

The transmitter of this World Champion Model II is interchangeable with the model setup data of the World Champion Model. However, after copying the model set up data, set the ON/OFF position of the SW(A), SW(B) and SW(D) because the switch type have been changed.

# SET CONTENTS

Your PCM1024Z system includes the following components. The set contents depend on the type of set, and these are the standard.

## Airplane

### PCM1024ZA (World Champion Model II)

| | | |
|---|---|---|
| Transmitter | **T9ZAP** <br> **w/o RF module, w/ battery** | **T9ZAP** <br> **w/ RF module and battery** |
| Receiver | ———— | **R309DPS or R149DP** |
| Servos & Extension cord | ———— | ———— | **S9150 (x2), S9151 (x1) and S9250 (x1)** <br> **Extension cord (x2), Extension cord w/dual connector(x1)** |
| | **NR4F1500 receiver battery** <br> **Receiver switch** <br> **Neck strap** <br> **DSC cord and DSC/Charge harness** <br> **Others** | |

## Helicopter

### PCM1024ZH (World Champion Model II)

| | | |
|---|---|---|
| Transmitter | **T9ZHP** <br> **w/o RF module, w/ battery** | **T9ZHP** <br> **w/ RF module and battery** |
| Receiver | ———— | **R309DPS or R149DP** |
| Servos & Extension cord | ———— | ———— | **S9252 (x4)** <br> **Extension cord (x2)** |
| | **NR4F1500 receiver battery** <br> **Receiver switch** <br> **Neck strap** <br> **DSC cord and DSC/Charge harness** <br> **Others** | |

**SET CONTENTS**
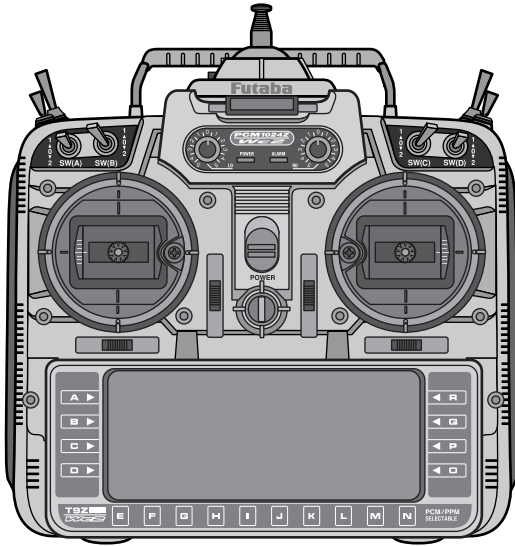
## Transmitter *T9ZAP / T9ZHP*

Operating system: 2-stick, 9 channels,
　　　PCM1024 system
Transmitting frequency: 29, 35, 36, 40, 41, 50, 60
　　　or 72 MHz band
Modulation: FM/PCM or PPM, switchable
Power supply: 9.6V NT8S1100 Ni-Cd battery
Current drain: 280 mA

## Receiver *R149DP*

Receiving frequency: 29, 35, 36, 40, 41, 50, 60
　　　or 72 MHz band
Intermediate freq.: 10.7MHz and 455kHz
Power requirement: 4.8V Ni-Cd battery
Current drain: 14 mA
Size: 32.6x55.0x20.8mm
Weight: 34.5g
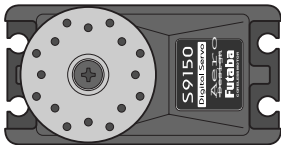
## Servo *S9150*

Power requirement: 4.8V (from receiver)
Output torque: 5.8kg-cm @4.8V
Operating speed: 0.18sec/60˚ @4.8V
Size: 47.5x27x25.3mm
Weight: 53g
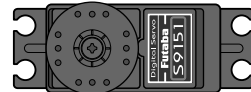
## Servo *S9151*

Power requirement: 4.8V (from receiver)
Output torque: 9.5kg-cm @4.8V
Operating speed: 0.19sec/60˚ @4.8V
Size: 40x20x36.6mm
Weight: 50g
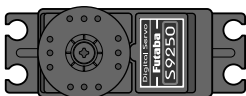
## Servo *S9250*

Power requirement: 4.8V (from receiver)
Output torque: 5.5kg-cm @4.8V
Operating speed: 0.11sec/60˚ @4.8V
Size: 40.5x20x37.5mm
Weight: 54g
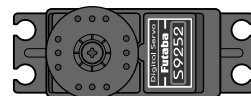
## Servo *S9252*

Power requirement: 4.8V (from receiver)
Output torque: 6.6kg-cm @4.8V
Operating speed: 0.14sec/60˚ @4.8V
Size: 40x20x36.6mm
Weight: 50g

**SET CONTENTS**

# ⚠ **WARNING**

─────── **PROHIBITED ITEMS** ───────

**72MHz band crystal**

🚫 Do not change the crystal between Low and High band.

The effective range of the radiowaves will become shorter and it may cause a crash.

─────── **MANDATORY ITEMS** ───────

**Power switch installation**

❗ Install the power switch to the fuselage so that the switch knob does not directly touch the fuselage at the ON side.

If the power switch is subjected to strong vibration from the fuselage, it may be damaged and cause a crash.

**Digital servo**

❗ Always use a 4.8V Ni-cd battery when using the Digital Servos.

6.0V applied to the servo will adversely affect the servo.

**S**ET **C**ONTENTS

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# DESCRIPTION OF NEW FUNCTIONS

## FUEL MIXTURE CONTROL (FMC) FUNCTION

Adjustment of the maximum speed of an ordinary engine outside the specified range is extremely difficult, even if adjustment is possible. Adjustment of even carburetors with a special adjustment mechanism is limited to about two points. Therefore, obtaining a stable speed matched to the model is extremely difficult and engine (carburetor) adjustment takes a long time, especially with a helicopter, when the mixture ratio differs when landing, hovering, and flying, and because there is a large change depending on the fuel used.

The Fuel Mixture Control system solves this conventional carburetor problem by independently controlling the fuel and air mixture fed to the carburetor. The engine can be operated from low speed to high speed with a suitable mixture ratio by using needle control to control the fuel and air mixture regardless of the carburetor.

There are also problems that cannot be solved with these carburetor systems alone. These problems are knocking, choking, and flooding caused by sudden operation. When accelerating, the fuel supply is temporarily delayed and the mixture becomes lean. When decelerating, the fuel supply becomes excessive and flooding occurs easily. Both cases are connected to engine stalling. Stable operation can be realized by using an acceleration function that temporarily increases the fuel amount and a deceleration function that temporarily decrease the fuel amount when accelerating and decelerating, respectively.

Actually, CH3 controls the air adjustment throttle and AU2 (CH8)controls the needle for fuel adjustment. The needle works in conjunction with the throttle.

### NEEDLE (AU2) FUNCTIONS

-Needle curve (9 points)(helicopter/airplane)
-CH8 function (helicopter only)
-Needle trim/needle high trim (helicopter/airplane)
-Needle low rate (helicopter only)
-Needle hovering (helicopter only)
-Needle hold (helicopter only)
-Needle acceleration high (airplane only)
-Needle deceleration low (airplane only)
-Needle engine cut (helicopter/airplane)

# FUEL MIXTURE SETUP ITEMS

### Needle curve (helicopter/airplane)

This curve can be set for each condition.

The basic curve is set for Model 10. This curve is not cleared even if "all set" is performed. The only thing different between Model 10 and other models is whether or not this curve is set in the initial state. Therefore, use as an ordinary model is also possible.

-A 9-point curve can be set.

-A MIX mode or UNMIX mode can be selected.

**MIX mode:The throttle curve, rudder->throttle MIX, swash->throttle MIX, and throttle hovering setup data all become the mixing master data.**

**UNMIX mode:The throttle stick position becomes the mixing master data.**

### AU2 (CH8) function application selection (helicopter only)

When fuel mixture control is made "ACTIVE", AU2 (CH8) automatically operates as needle trim (TRIM) or needle high trim (HIGH). Needle trim (TRIM) or needle high trim (HIGH) is selected from the model menu.

### Needle trim (TRIM) (helicopter only)/needle high trim (HIGH) (helicopter/airplane)

Needle trim operates with AU2 (CH8) as the needle servo overall parallel movement trimmer.

Needle high trim operates with AU2 (CH8) as the high side trimmer.

Needle high trim operation is different for helicopter and for airplane. For airplane, needle high trim acts like reverse ATL trim based on maximum slow. For a helicopter, needle high trim acts as high trim based on the center.

-Needle trim and needle high trim have a combined lever rate setting. The adjustment amount can be changed as desired.

### Needle low rate (helicopter only)

Function that adjusts the low side of the needle curve by simple screen setting instead of adjustment VR. It functions only when high trim is selected with "AU2 (CH8) function application selection" previously described.

### Needle hovering (helicopter)

Function that adjusts the needle curve near hovering, the same as pitch hovering and throttle hovering.

-A dedicated mixing VR can be selected.

-Control amount adjustment (same as throttle hovering function)

-Operation range adjustment (same as throttle hovering function)

-Operation rate adjustment (same as throttle hovering function)

### Needle hold (helicopter only)

Needle servo hold function, the same as throttle side throttle hold. Its operation is linked to throttle hold.

### Needle acceleration high (airplane only)

This function immediately increase the data to the high side from the curve set value when the throttle stick is suddenly moved from the slow side. "Rate", which determines the amount of increase, and "speed", which determines the return time to the original curve, can be set.

-The amount of increase of the servo corresponding to operation of the stick within a certain time can be set with "rate".

-The speed until the needle curve returns to the original curve can be set with "speed".

### Needle deceleration function (airplane only)

This function operates the servo after a delay when the throttle stick is suddenly moved from high to slow. "Speed", which determines the time until the curve set value is reached, can be set.

-The speed up to return to the curve set value can be set with "speed".

### Needle engine cut (helicopter/airplane)

This function stops the engine, the same as the throttle engine cut function. It sets the fuel side to the full close position. This function is linked to the throttle engine cut function.

# FUEL MIXTURE FUNCTION ACT/INH SELECTION SCREEN

## Airplane

### Model menu screen
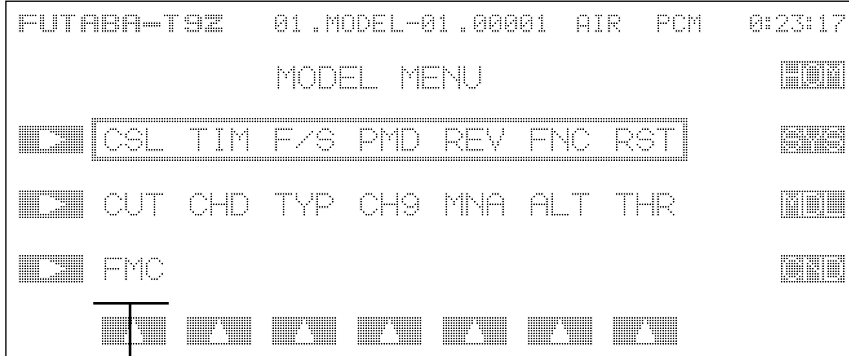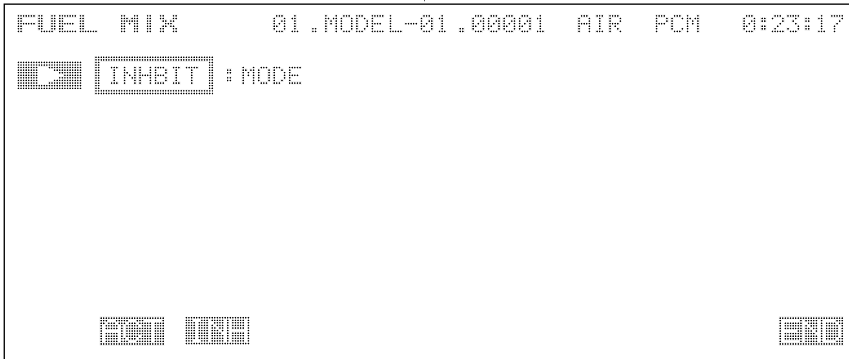
```
FUTABA-T9Z    01.MODEL-01.00001  AIR  PCM   0:23:17
                    MODEL  MENU

     CSL  TIM  F/S  PMD  REV  FNC  RST

     CUT  CHD  TYP  CH9  MNA  ALT  THR

     FMC
```

### Fuel mixture screen

```
FUEL  MIX      01.MODEL-01.00001  AIR  PCM   0:23:17

     INHBIT  :MODE
```

-The initial setting is INHBIT.

    [INHBIT]: The fuel mixture functions are disabled and AU2 (CH8) operates normally.

    [ACTIVE]: The fuel mixture functions are enabled and AU2 (CH8) controls the fuel mixture.

-AU2 (CH8) operation is forcefully changed to needle high trim operation.

## Helicopter

### Model menu screen
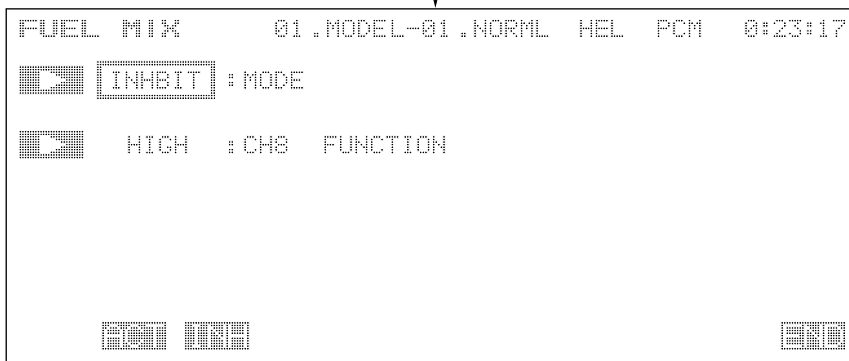
```
FUTABA-T9Z   01.MODEL-01.NORML  HEL  PCM   0:23:17

                  MODEL  MENU

   CSL  TIM  F/S  PMD  REV  FNC  RST

   CUT  CHD  TYP  CH9  MNA  ALT  THR

   SWH  RDR  INV  PIT  FMC
```

### Fuel mixture screen

```
FUEL  MIX     01.MODEL-01.NORML  HEL  PCM   0:23:17

   INHBIT :MODE

    HIGH  :CH8  FUNCTION
```

-Initial setting is INHBIT.

   [INHBIT]: The fuel mixture functions are disabled and AU2 (CH8) operates nor-
      mally.

   [ACTIVE]: The fuel mixture functions are enabled and AU2 (CH8) changes to
      fuel mixture control operation.

-AU2 (CH8) is forcefully switched to the operate set by application selection de-
scribed below.

### AU2 (CH8) application selection

-The initial setting is HIGH.

   [HIGH]: AU2 (CH8) operates as the fuel mixture curve high side adjustment
      trimmer.

   [TRIM]: AU2 (CH8) operates as a fuel mixture entire curve parallel movement
      trimmer.

# NEEDLE ENGINE CUT SETUP SCREEN

## Airplane

### Throttle cut screen
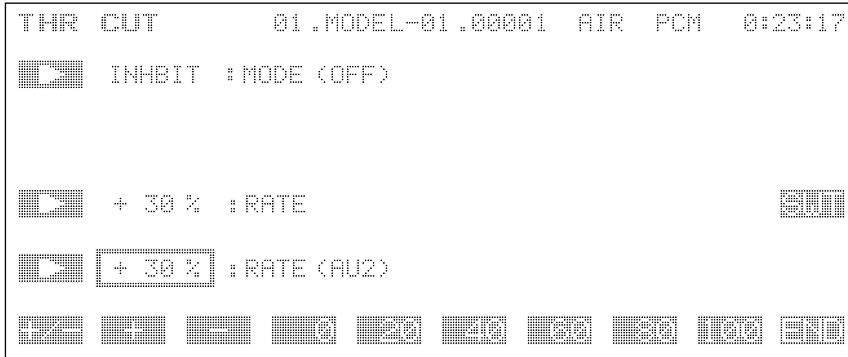
```
THR CUT       01.MODEL-01.00001  AIR  PCM  0:23:17

   ▶   INHBIT  :MODE (OFF)



   ▶   + 30 %  :RATE                              80

   ▶  │+ 30 %│ :RATE (AU2)

                0    20   40   60   80  100  END
```

-When "CUT" is selected from the model menu, this screen is displayed.
-When the fuel mixture control function is set to [ACTIVE], the AU2 (CH8) rate setup item is displayed on the throttle cut screen.

## Helicopter

### Throttle cut screen
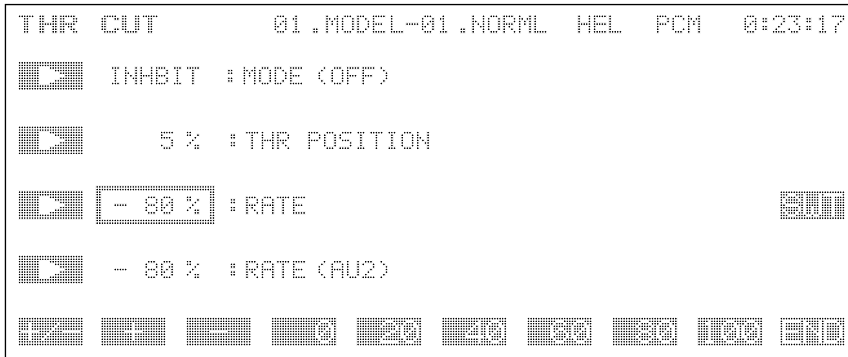
```
THR CUT       01.MODEL-01.NORML  HEL  PCM  0:23:17

   ▶   INHBIT  :MODE (OFF)

   ▶     5 %   :THR POSITION

   ▶  │- 80 %│ :RATE                              80

   ▶   - 80 %  :RATE (AU2)

                0    20   40   60   80  100  END
```

-When "CUT" is selected from the model menu, this screen is displayed.
-When the fuel mixture control function is set to [ACTIVE], the AU2 (CH8) rate setup item is displayed on the throttle cut screen.

# NEEDLE CURVE SETUP SCREEN

**Airplane**

### Condition menu screen

```
FUTABA-T9Z   01.MODEL-01.00001  AIR  PCM   0:23:17

        AIRPLANE    CONDITION MENU          00%

      ATV AFR D/R PMX STM TOF CNA           SXS

      ADF A→R VTL R→A EVN E→F F→E           DIR

      CPT ALV FPN ABK SNP TCV FMC           DAT

  TRM                                       DID
```

### Fuel mixture screen

```
FUEL MIX     01.MODEL-01.00001  AIR  PCM   0:23:17

      MIXED  :MST MIX MODE                  RT

        0 % :POINT  1          ↑
                               SLV
                                ↓

                                           PRT
                               D ▲  ← MASTR → U
  RST                                       END
```
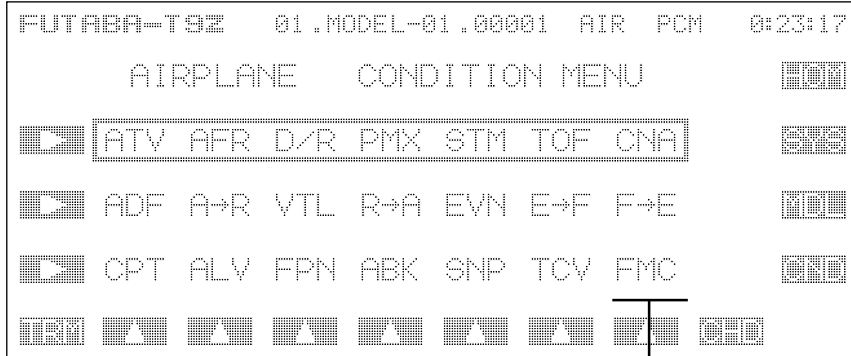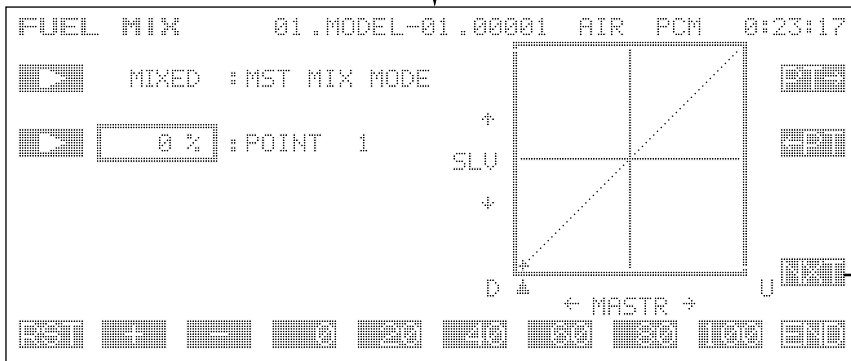
-Fuel mixture curve master data selection

   [MIXED]: The throttle curve (or AFR) data becomes the fuel mixture curve master data.

   [UNMIX]: The throttle stick becomes the fuel mixture curve master data.

-The mixing curve is made up of 9 points. Low~high is displayed by 0%~100%.

```
FUEL MIX     01.MODEL-01.00001  AIR  PCM   0:23:17




       50 % :RATE  ←─ ACC ─→   SPEED:  50 %

                    ←─ DEC ─→   SPEED:   0 %



```

**DESCRIPTION OF NEW FUNCTIONS**

**17**
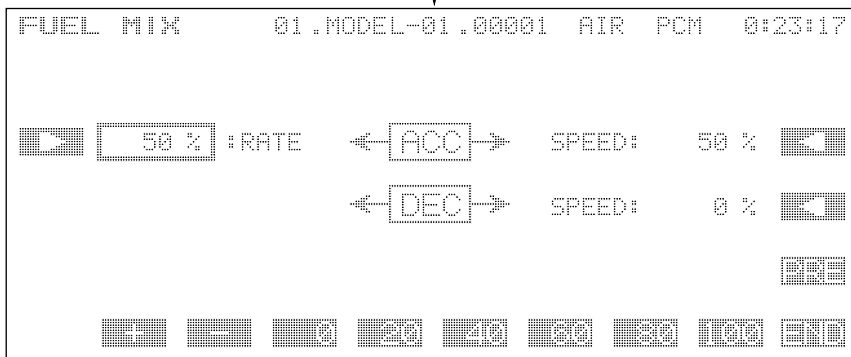
### Setting of acceleration operation amount to low~high

-Setting range: 0~100% Initial setting: 50%

### Setting of acceleration delay to low~high

-Setting range: 0~100% Initial setting: 50%

### Setting of deceleration delay from high to low

-Setting range: 0~100% Initial setting: 0%

## Helicopter

### Condition menu screen

```
FUTABA-T9Z   01.MODEL-01.NORML   HEL   PCM   0:23:17

          HELICOPTER CONDITION MENU

     ATV AFR D/R PMX STM TOF CNA

     PCV PHV PTM TCV THV HOF HLD

     SWP P→R R→T GYR ACC INV FMC
```

### Fuel mixture screen

```
FUEL MIX      01.MODEL-01.NORML   HEL   PCM   0:23:17

        MIXED :MST MIX MODE

          0 % :POINT  1        SLV

         50 % :HIGH VOL

        100 % :LOW

                             D    ← MASTR →    U
```
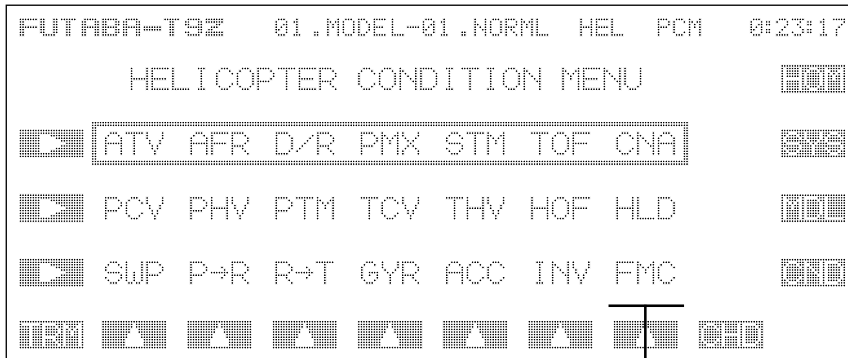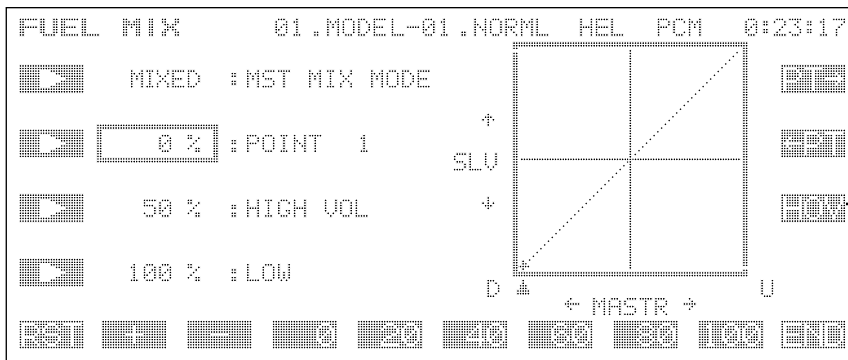
-Fuel mixture curve master data selection

[MIXED]: The sum of the throttle curve (including high/low/hovering), RUD->THR, and SWH->THR mixing data becomes the fuel mixture curve master data.

[UNMIX]: The throttle stick becomes the fuel mixture curve master data.

-The mixing data is made up of 9 points. Low~high is displayed by 0%~100%.

**Fuel mixture trim /high trim lever rate setting**

-Operated +20o at 100%.

**Fuel mixture curve low rate setting**

-This setting adjusts the low side based on the center (point 5) of the curve. However, when fuel mixture trim/high trim is selected, the screen display is cleared and the low rate function is ignored.

```
FUEL  HOVER    01.MODE -01.NORML  HEL  PCM   0:23:17


         100 % :CTRL VOL           SLV

         100 % :RANGE

          0 %  :RATE  (  0)       D         MASTR        U
```

```
VOLUME SET   01.MODEL-01.NORML  HEL  PCM   0:23:17

      + **  :RATE        FUEL HOVER
                         VOLUME CONTROL

    L Slide    L Dial     R Dial     R Slide
```
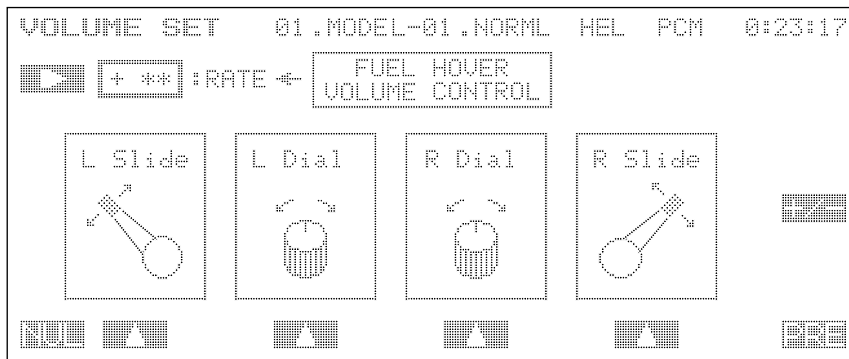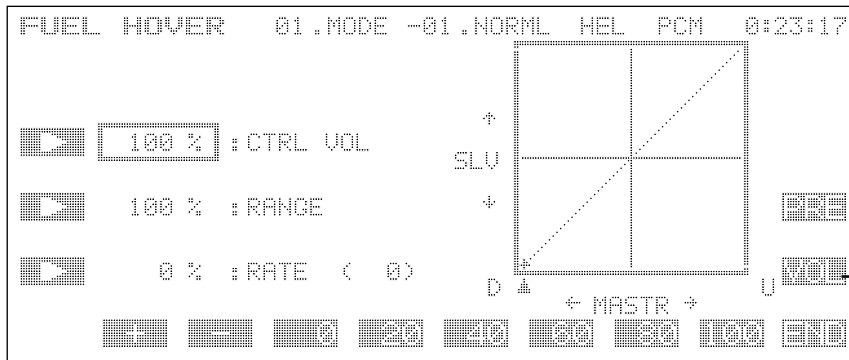
**Needle hovering settings**

- A dedicated mixing adjustment VR can be selected.

-Control amount adjustment

-Operation range adjustment

-Operation rate adjustment

## Helicopter

### Throttle hold screen

```
THR HOLD      01.MODEL-01.NORML  HEL  PCM  0:23:17
[  ▶ ]  [ AUTO ] :MODE (OFF)          TRIM: ACTIVE   [ ◀ ]

[  ▶ ]    50 % :AUTO POS       MDL POS:    15 %   [ ◀ ]

[  ▶ ]    15 % :HOLD POS ( 15)                    [    ]

[  ▶ ]     0 % :DELAY                             [    ]

        [    ] [    ] [    ]                       [    ]
```
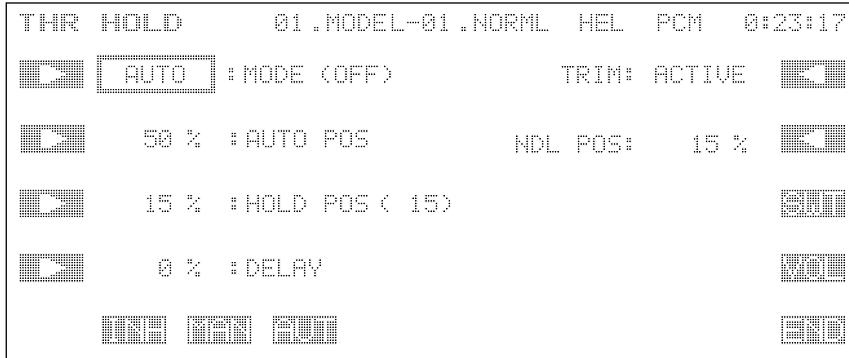
-This screen sets the needle side hold position at throttle hold. The initial setting is 15%, the same as the throttle.
-Operation is linked to throttle hold.

# FUEL MIXTURE INITIAL SET VALUES AND SETTING RANGE

## Functions set for each model

| Setting point | Initial setting | Setting range |
|---|---|---|
| Needle curve function selection | INH | ACT, INH |
| AU2 (CH8) function selection (helicopter) | HIGH | HIGH, TRIM |

## Functions set for each condition

| Setting point | | | Initial setting | Setting range |
|---|---|---|---|---|
| Needle curve settings | | | | |
| | Mode | | MIXED | UNMIX, MIXED |
| | 9-point curve | P1 | 0% (15%) | 0 - 100% |
| | | P2 | 12% (36%) | (XX%): |
| | | P3 | 25% (50%) | Numbers in parentheses |
| | | P4 | 37% (58%) | are the Model 10 initial |
| | | P5 | 50% (64%) | set value. |
| | | P6 | 63% (68%) | |
| | | P7 | 75% (73%) | |
| | | P8 | 88% (76%) | |
| | | P9 | 100% (80%) | |
| | (Helicopter) Trim rate | | 50% | 0 - 100% |
| | (Helicopter) Low rate | | 100% | 0 - 100% |
| Acceleration settings | | | | |
| | (Airplane) Acceleration rate | | 50% | 0 - 100% |
| | (Airplane) Acceleration speed | | 50% | 0 - 100% |
| | (Airplane) Deceleration speed | | 0% | 0 - 100% |
| Needle hovering setting | | | | |
| | (Helicopter) Control trim rate | | 100% | 0 - 100% |
| | (Helicopter) Range | | 100% | 0 - 100% |
| | (Helicopter) Offset rate | | 0% | -100 - +100% |
| | (Helicopter) Rate adjustment VR | | None (NULL) | LS, LD, RD, RS |
| Needle hold operation position setting | | | | |
| | (Helicopter) Needle position | | 15% | 0 - 100% |
| Needle engine cut operation position setting | | | | |
| | (Airplane) AU2 rate | | +30% | -100 - +100% |
| | (Helicopter) AU2 rate | | -80% | -100 - +100% |

# FUEL MIXTURE FUNCTION SETUP EXAMPLE

## Helicopter

This function is used by mixing the throttle (CH3) and needle (CH8) channels.

## 1 Basic curve

This fuel mixture basic curve is set for model NO.10. Use it as reference.

### Reference curve values (OS carburetor)

| Point | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 |
|---|---|---|---|---|---|---|---|---|---|
| Setting (%) | 15 | 36 | 50 | 58 | 64 | 68 | 73 | 76 | 80 |

-This curve becomes the data with a differential given to the low/high side of the throttle channel with the ATV function.
-When this curve is changed, throttle (CH3) of the ATV function in the condition menu is set.
-The ATV function settings are RATE "A" 80% and RATE" 100%. Since these values can differ slightly with the engine, fuselage, and fuel used, they are finally set individually.

## 2 Servo and carburetor linkage

(1) When connecting the linkage, read this section together with the carburetor instruction manual.

(2) Set function control (FNC) of the AU2 channel to match the application.

-Call function control (FNC) and select AU2.
-If the high side mixture (needle) is controlled while the model is flying, switch to VR setting. (However, do not duplicate the functions.)
-If high side mixture (needle) control while flying consists of curve setting only, the setting can be left in the initial setting SW "C" state. (Set the switch to the desired position.)

(3) In this stage, the fuel mixture function operates as a channel. Therefore, use the VR or switch set in item (2) above to set the operation direction and operation amount.

-Connect the AU2 (CH8) servo to the mixture control arm.
-When using a VR, when a dial VR is turned clockwise, or a slide VR is pushed down, the needle is closed. (Use the reverse function to set the operation direction.)

(4) The length of the servo horn used can be set to 16.5mm (servo horn A) and the ATV setting can be set to about 100%.

-Trim at the A and B sides of ATV AU2.

(5) When the throttle stick is in the center as shown in the figure, connect the mixture control side linkage so that the linkage rod and horn and arm are perpendicular.
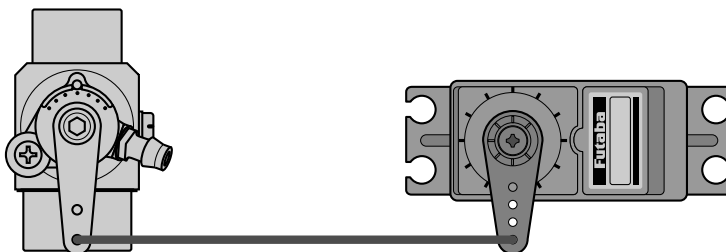
(6) Call ATV from the condition (CND) items and decide AU2 operation width.

-At this time, operate the VR set using function control (FNC), or SW "C", over its full stroke and decide the operation width while being careful that unreasonable force is not applied to the linkage.

(7) After setting the operation width, finally decide the function control (FNC) of item (2) above.

-For switch selection, select 'NULL' so that the fuel mixture function is not performed by switch operation. (Perform the fuel mixture function by switch operation by setting the fuel mixture control system to ACT.)

# 3 Operating the fuel mixture function

(1) Call the model menu (MDL) and select "FMC" fuel mixture function.

(2) Set the fuel mixture control system to "ACTIVE".

-So that the fuel mixture control system is operated with AU2 (CH8) as mixture (needle) control.
-When AU2 (CH8) FUNCTION is "HIGH", the high side needle can be controlled by moving the throttle stick from medium speed to high speed. When AU2 (CH8) FUNCTION is made "TRIM", the fuel mixture function changes to entire curve parallel movement. Normally use the fuel mixture function at the "HIGH" setting.

(3) Preset the setting VR to the center position.

(4) Set the throttle stick and throttle trimmer to the maximum slow side (+50~+100) and check if the mixture control arm moves to the stopper position and the fuel supply is completely shut off. (The trimmer position depends on the mixture curve setting.)

-At the end of confirmation, return the throttle trimmer to the neutral position.

(5) After starting the engine, use the throttle trimmer to adjust the idling speed, the same as in the past.

CAUTION: After connecting the linkage, recheck the operation direction and operation amount of each part.

# 4 Throttle cut

(1) Call the model menu (MDL) and select throttle cut "CUT".

(2) Set MODE to "ACTIVE".

(3) Set THR POSITION.

-This sets the range over which throttle cut can be turned on.

(4) Set the cut switch.

-Select "SWT" and set the switch to be used.

(5) Set the throttle cut rate.

-When the cut switch is turned on, the cut function is performed.
Adjust the rate in the ON state.
-Set the throttle and mixture rates separately. Adjust the throttle and mixture full close position with each rate item. (The operation direction is the direction in which the needle is closed in the (-) direction.)
-The (AU2) side is the mixture cut setting.

# 5 Condition setup

(1) When the condition menu (CND) is called and the fuel mixture "FMC" function is selected, the FUEL MIX item is displayed.

-This item enables setting of each condition. Set each condition matched to the number of conditions used.
  CAUTION: Conditions setting is a condition.

(2) Set MST MIX MODE (master mix mode).

-This mode operates by mixing throttle and mixture. However, what is operated is decided individually. Usually, this is used with "MIXED".

-When used with "MIXED", when the throttle curve is set, the mixture curve is simultaneously mixed and changed. (The mixture curve can also be set in the mix mode "MIXED".)

-When used with "UNMIXED", throttle and mixture control are set independently. When a tuned silencer is used, etc., the fuel can be adjusted independently and the adjustment width is widened. Since all mixture adjustments are carried out independently, learn the functions before trying to make any adjustments.

(3) Set the mixture curve with the POINT item.

-Nine points, from point 1 to point 9, can be set. The smaller displayed value is the direction in which the needle is closed and the larger displayed value is the direction in which the needle is opened.

-Set the basic curve data by referring to the values shown below. However, this setting is a little dense.

## Reference values (OS carburetor)

| Point | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 |
|-------|----|----|----|----|----|----|----|----|----|
| Set value (%) | 15 | 36 | 50 | 58 | 64 | 68 | 73 | 76 | 80 |

(4) The setting range is divided into an idling area, hovering area, and flying area.

### Idling area

Point 1 is the stick maximum slow area. Therefore, adjust the idling mixture so that a good idling speed is obtained. If the carburetor is still flooded when point 1 is 0%, raise throttle curve point 1~2 and increase the air and readjust the throttle trimmer. Set a value so that points 2 and 3 are connected to the hovering area.

### Hovering area

Points 4~6 are the hovering area. Slowly hover and adjust the mixture while observing the hovering state. After hovering adjustment, land and take off and perform climb adjustment. Next slowly climb from hovering and perform climb adjustment. Adjust for the desired response so that the carburetor is not flooded within the points 4~6 range.

### Flying range

Points 7~9 are the flying range. Point 9 is the maximum speed needle. Therefore, adjust the connection from hovering to maximum speed with points 7 and 8. Slowly set the throttle stick from hovering to full close and adjust the high side mixture. With the stick fully closed, fly at high speed and set the needle, while paying attention to the change in the sound. Finally, carry out hovering and flying adjustment and finish by fine adjusting to the best mixture. When flying, the entire high side can be controlled based on point 5 and needle changes caused by temperature changes can be adapted to by using the VR set with the model menu (MDL) fuel mixture (FMC) item.

**CAUTION:** If the mixture curve is not set for each condition, unexpected engine trouble may occur. Adjust each condition after setting the same curve as the normal condition for all the conditions whether "MIXED" or "UNMIXED" in the fuel mixture "FMC" function is used.

**CAUTION:** When the fuel mixture "FMC" function is used, the fail safe function must be set individually for the throttle channel (CH3) and mixture channel (CH8). Battery fail safe functions on the throttle channel only.

## GYRO SENSE MIXING FUNCTION

### Gyro sense mixing

This function adjusts the sensitivity of a rate gyro from the transmitter.
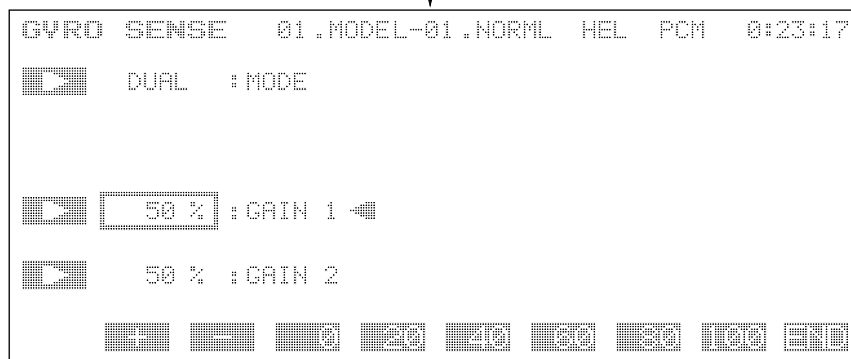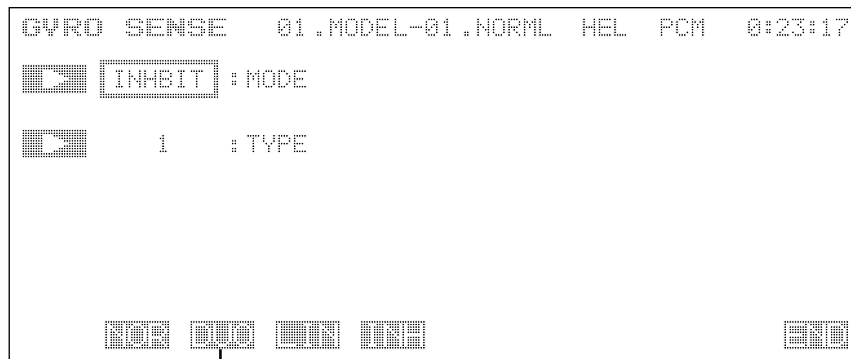With gyro sense mixing, the "dual gain control mode" is selected and two gains are input for each condition. The switch for gain switching is selected by CH5 setting. If you use only one gain with one condition, omit the switch selection operation.

## GYRO SENSE MIXING SETUP SCREEN

### Helicopter

**Gyro sense setup screen**

-Operation mode selection

There are three modes: [NORMAL], [LINEAR], and [DUAL]. The initial setting is [INHBIT].

When using the AVCS gyro, select the [DUAL] mode.

-Dual gain control mode selection display

[GAIN 1]: Gyro sensitivity when the sensitivity switch is set to NULL or OFF. The initial setting is 50%.

[GAIN 2]: Gyro gain when the sensitivity switch is set ON. The initial setting is 50%.

## GYRO SENSE MIXING INITIAL SETTING AND SETTING RANGE

### Functions set for each condition

| Setting point | Initial setting | Setting range |
|---|---|---|
| Gyro sensor sensitivity switching | | |
| (Helicopter) Function selection | INH | INH, NOR, LIN, DUO |
| (Helicopter) LIN : Position | 50% | 0 - 100% |
| (Helicopter) LIN : EXP rate | 0% | 0 - 100% |
| (Helicopter) NOR : TYPE | 1 | 1, 0 |
| (Helicopter) DUO : GAIN1 | 50% | 0 - 100% |
| (Helicopter) DUO : GAIN2 | 50% | 0 - 100% |

**DESCRIPTION OF NEW FUNCTIONS**