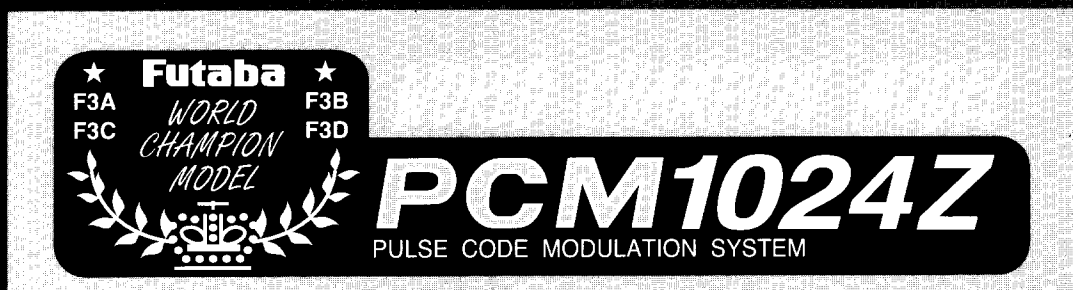


FOR SAFE USE
DESCRIPTION OF NEW FUNCTIONS

PCM1024ZA
PCM1024ZH



9ZAP

FOR F3A AIRPLANE PCM 9 CHANNELS

9ZHP

FOR F3C HELICOPTER PCM 9 CHANNELS

CAUTION

Please read this manual before using this product.
Store this manual in a safe place so that you can use it at all times.

1M23N02202

Futaba® *Digital Proportional R/C System*

TABLE OF CONTENTS

FOR SAFETY 2

MEANING OF SPECIAL MARKINGS	2
PRECAUTIONS DURING FLIGHT	3
NICD BATTERY CHARGING PRECAUTIONS	4
OTHER PRECAUTIONS	5
STORAGE AND DISPOSAL PRECAUTIONS	5

CHANGES FROM EXISTING MODELS 7

MENU SCREEN DISPLAY CHANGES	7
RENAMING OF VARIABLE RESISTORS	8
INTERCHANGEABILITY WITH EXISTING MODELS	8

DESCRIPTION OF NEW FUNCTIONS 9

FUEL MIXTURE CONTROL (FMC) FUNCTION	9
FUEL MIXTURE SETUP ITEMS	10
FUEL MIXTURE FUNCTION ACT/INH SELECTION SCREEN	12
NEEDLE ENGINE CUT SETUP SCREEN	14
NEEDLE CURVE SETUP SCREEN	15
NEEDLE HOLD FUNCTION SETUP SCREEN	18
FUEL MIXTURE INITIAL SET VALUES AND SETTING RANGE	19
FUEL MIXTURE FUNCTION SETUP EXAMPLE	20
GYRO SENSE MIXING FUNCTION FOR G501 GYRO	24
GYRO SENSE MIXING SETUP SCREEN	24
GYRO SENSE MIXING INITIAL SETTING AND SETTING RANGE	25

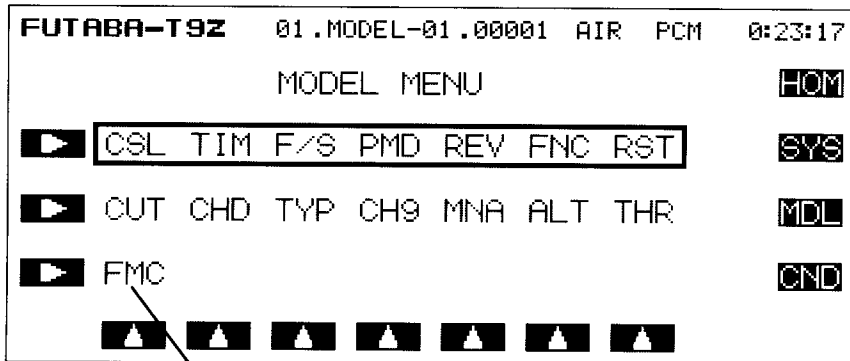
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CHANGES FROM EXISTING MODELS

MENU SCREEN DISPLAY CHANGES

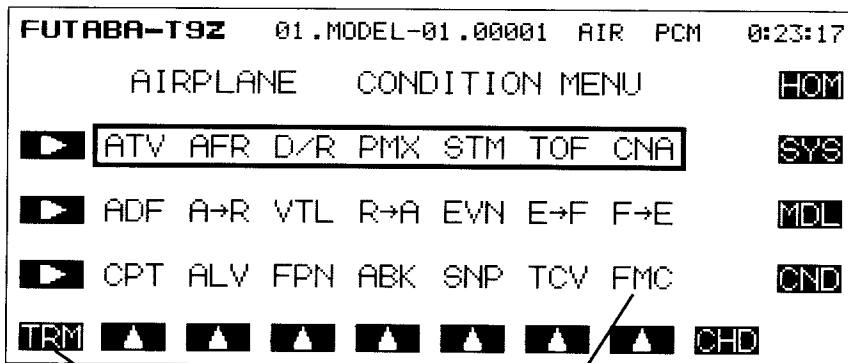
The menu screens shown in the separate instruction manual have been changed as shown below. Replace the screens shown in the instruction manual with these screens.

MODEL MENU SCREEN (HELICOPTER/AIRPLANE)



Fuel mixture control (FMC) was added to the menu.

CONDITION MENU SCREEN (ALL MODELS)



Digital trim (TRM) was moved to this position.

Fuel mixture control (FMC) was added to the menu.

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

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

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".

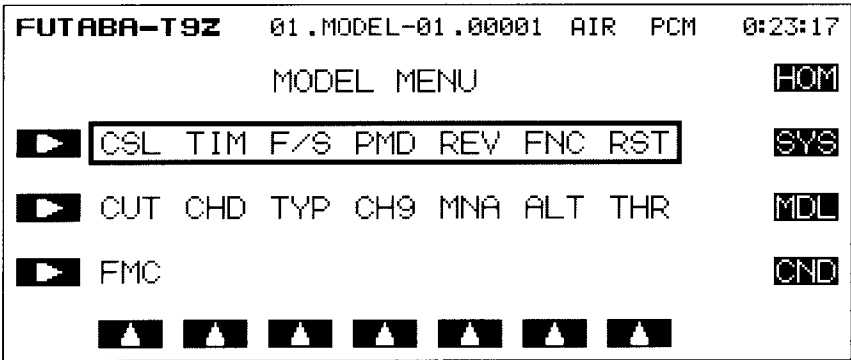
Needle engine cut (helicopter/airplane)

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.

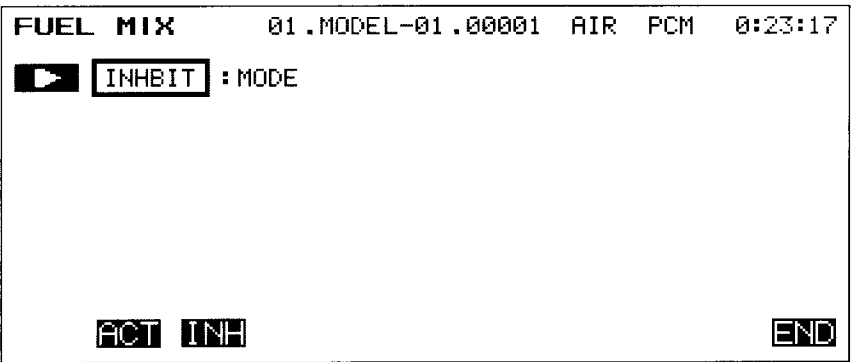
FUEL MIXTURE FUNCTION ACT/INH SELECTION SCREEN

Airplane

Model menu screen



Fuel mixture screen



- 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

ACT INH  END
```

-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) changes to fuel mixture control operation.

-AU2 (CH8) is forcefully switched to the operate set by application selection described 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	SWT							
▶ + 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	SWT							
▶ - 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.

DESCRIPTION OF NEW FUNCTIONS

Condition menu screen

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

AIRPLANE CONDITION MENU **HOM**

▶ ATV AFR D/R PMX STM TOF CNA **SYS**

▶ ADF A→R VTL R→A EVN E→F F→E **MDL**

▶ CPT ALV FPN ABK SNP TCV FMC **CND**

TRM **▲** **▲** **▲** **▲** **▲** **▲** **▲** **CHD**

Fuel mixture screen

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

▶ MIXED :MST MIX MODE

▶ 0% :POINT 1

SLU

D ▲

← MASTR →

U NXT

RST + - 0 20 40 60 80 100 END

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

▶ 50 % :RATE ◀ ACC ▶ SPEED: 50 % ◀

◀ DEC ▶ SPEED: 0 % ◀

PRE

+ - 0 20 40 60 80 100 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%.

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

TRM ▲ ▲ ▲ ▲ ▲ ▲ ▲ CHD

HOM

SYS

MDL

CND

Fuel mixture screen

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

▶ MIXED :MST MIX MODE

▶ [0 %] :POINT 1

▶ 50 % :HIGH VOL

▶ 100 % :LOW

↑

SLV

+

↓

D ▲

← MASTR →

U

PT→

←PT

HOV

RST

+

-

0

20

40

60

80

100

END

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

▶ [100 %] :CTRL VOL

▶ 100 % :RANGE

▶ 0 % :RATE (0)

↑

SLV

+

↓

D ▲

← MASTR →

U

PRE

VOL

+

-

0

20

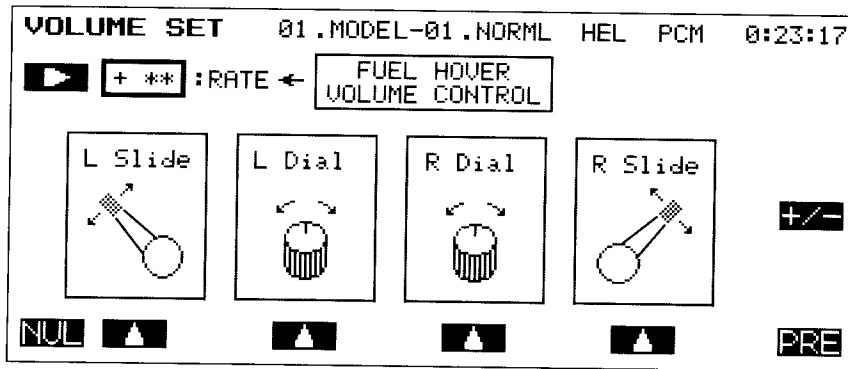
40

60

80

100

END



-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.

Needle hovering settings

- A dedicated mixing adjustment VR can be selected.
- Control amount adjustment
- Operation range adjustment
- Operation rate adjustment

NEEDLE HOLD FUNCTION SETUP SCREEN

Helicopter

Throttle hold screen

THR	HOLD	01.MODEL-01.NORML		HEL	PCM	0:23:17
▶	AUTO	: MODE (OFF)		TRIM: ACTIVE		◀
▶	50 %	: AUTO POS		NDL POS:	15 %	◀
▶	15 %	: HOLD POS (15)				SWT
▶	0 %	: DELAY				VOL
INH		MAN	AUT			END

- 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 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.)

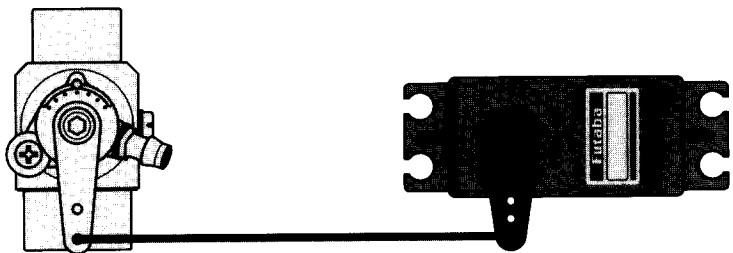
(3) In this stage, the fuel mixture function operates as a channel. Therefore, use the VR or switch set in item (2) above to set the operation direction and operation amount.

- 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 FOR G501 GYRO

Gyro sense mixing

This function adjusts the sensitivity of piezo-vibration gyro G501 from the transmitter.

It is easy to use. Just fix the gyro side sensitivity adjustment VR at 0 and 100% and perform transmitter side gyro sense mixing adjustment.

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

```
GYRO SENSE  01.MODEL-01.NORML HEL PCM  0:23:17
▶ INHBIT : MODE
▶      1 : TYPE

NOR DUO LIN INH                                END
```

```
GYRO SENSE  01.MODEL-01.NORML HEL PCM  0:23:17
▶ DUAL : MODE

▶ 50 % : GAIN 1 ◀
▶ 50 % : GAIN 2

+ - 0 20 40 60 80 100 END
```

-Operation mode selection

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

-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%