

Because this transmitter utilizes a 5-point adjusting system for the throttle curve and pitch curve settings, it will be possible to freely carry out adjustment of the five points to create throttle curves and pitch curves that realize optimum flight conditions.

The digital display using figures indicates the positions moved by each of the servo horns for each point (L, 1, 2, 3, H). Further, each point (L, 1, 2, 3, H) is also the position of each control surface of the throttle stick. Please refer to Graph 1.

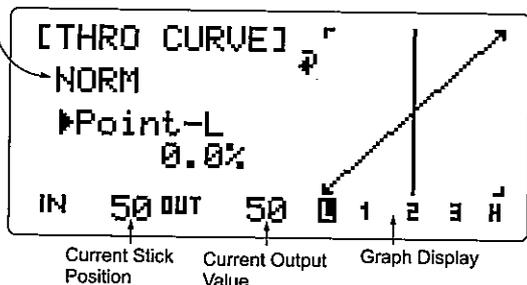
For example, point 2 is the center of the throttle stick. The amount by which the servo will move in relation to this point is shown in the digital display below. If the display is 50% the movement will be a straight line, while if it is set to 30% the movement will be exponential. Further, even if point 2 is set to 50%, if the position of H is 80%, conversely the movement will become anti-logarithmic.

In addition, similarly if the L point is 20%, the lower part will become logarithmic. Further, the L point can also be moved to the L point minus side by the throttle trim. In this way, it will be possible to create a variety of curves depending on the settings of each of the point numerical values.

If L is set to 0% and H to 100%, according to the displayed numerical values of intermediate points 1 and 3, it will be possible to intuitively read the curve. This is a large merit. Note that the fact it will be possible to adjust each of the Flight Mode switch positions NORM, ST-1, and ST-2 is also a large merit.

Note: By setting the high side and low side both to the same values so that the throttle control surface adjustment amount becomes a straight line movement when seen from the center, and then carrying out fine adjustment using the linkages and sub trim in order to achieve the full stroke, the setting will become easier to understand.

Flight Mode Switch Position



●Point Numerical Values Input

Rotate the dial to display each point for which you wish to carry out numerical value setting, and then press the dial. (The figure at right shows the situation where point 1 has been selected.)

Rotating the dial in this condition allows the numerical values to be increased or decreased. Further, the preset values can be set by pressing the CLR key. The preset values for each point are as described below.

- When presetting is carried out:
- Point-L: The output value becomes zero.
- Point-1: The point becomes "INH".
- Point-2: The output value becomes 50%.
- Point-3: The point becomes "INH".
- Point-H: The output value becomes 50%.

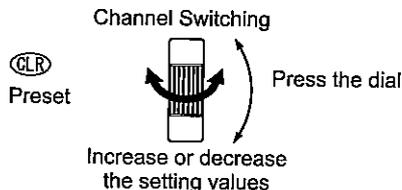
●Exponential Curve (EXP) Function

The curves are independent for each system, and it is possible to select sequential lines or curves. When "EXP" is set to "ON", the curve will become an exponential curve in which the changes in the output values in the vicinity of each point will be smoothed.

By rotating the dial to move between the points, the display will become EXP and the operation can be selected. By pressing the dial it will be possible to select ON/OFF. While in this condition, it will be possible to use the CLR key to preset the setting to "OFF".

Here, there are three screens for each Flight Mode, but because the setting methods are the same they are explained all together.

The display in the figure at left shows the NORM (normal) position.

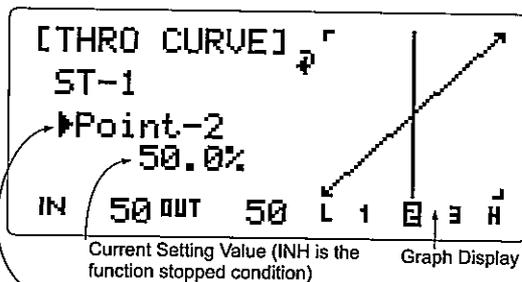


●Flight Mode Switch Position Display

The Flight Mode switch is the switch located on the transmitter right shoulder, and the switch rear side is the NORM position, the center is the ST-1 position, and the front side is the ST-2 position.

According to the switch position, the name will be displayed flashing. In the situation where the "NORM" characters are displayed flashing in the figure above, the switch is set to the "NORM" side.

- Flight Mode Switch Positions
- NORM: Normal (Used for hovering)
- ST-1: Stunt 1 (Used for overflying)
- ST-2: Stunt 2 (Used for overflying)



- Point Displays
- Point-L: Full Slow Position
- Point-1: Stick 1/4 Position
- Point-2: Stick Center Position
- Point-3: Stick 3/4 Position
- Point-H: Full High Position
- \*The point position is fixed.

### ■ About the Intermediate Points 1 and 3

In the initial values, the intermediate points 1 and 3 in all the flight modes are set to inhibit (INH), so that the operation is as shown in Graph 1. Note that intermediate points 1 and 3 can be freely set to the inhibit (INH) or active (output value displayed) condition.

To set the intermediate point 1 to active in this condition, rotate the dial to select point 1, then press the dial to set the numerical value display condition (active). To set the point to INH, press the CLR key.

When intermediate points 1 and 3 have been changed from "INH" to the active condition, the values in the situation where these points are linked with the points above and below in a straight line condition will be automatically displayed as the output values.

Further, if all of the intermediate points are set to active, the initial values will become as shown in Graph 2. In this condition the points will be linked by straight lines. Although it will be possible to freely set these to curves, the following points should be taken into consideration when implementing these settings.

Make sure you understand the hovering throttle trim assignment and throttle trim assignment while carrying out the adjustment. Take care to note that the graph display values include the hovering throttle trim and the throttle trim operations.

Further, carry out the curve settings to match the purpose of each flight, including consideration of whether or not intermediate points 1 and 3 are to be set and of the helicopter setting conditions.

### ■ Throttle Trim

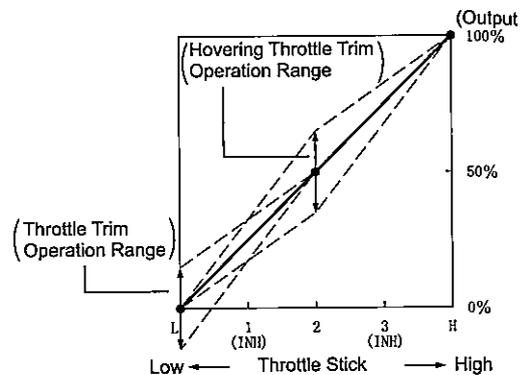
The throttle trim operates separately in each mode, and the point L output can be increased or decreased as shown in the graph.

In addition, this trim operation exerts an influence on the operations up to the next point as shown in Graph 1 and Graph 2.

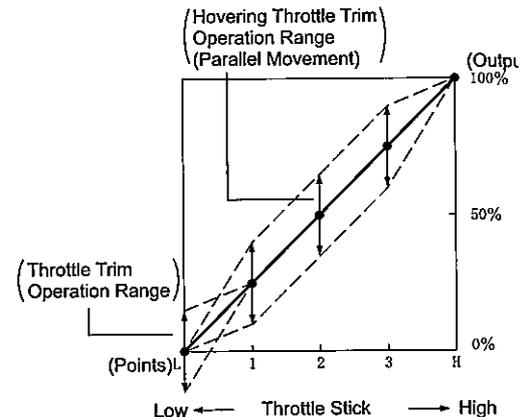
### ■ Hovering Throttle Trim

The hovering throttle trim operation is in the active condition, in which it is possible to increase or decrease the intermediate point outputs.

As shown in Graph 2, in the situation where intermediate points 1 and 3 are active, the movements between intermediate points 1 to 3 will be parallel, and an identical raising and lowering response will be maintained by this trim operation without changing the curve gradient.



Graph 1: NORM (Normal) Switch Positions of Initial V  
(The intermediate points are in the INH condition)



Graph 2: NORM Condition Switch Positions when All  
Intermediate Points are set to Active  
(The initial conditions of intermediate points 1 and 3 are  
the INH condition)

### ■ Idle Up

Stunt 1, 2, 3, and 4 of the normal Flight Mode should be used for Idle Up.

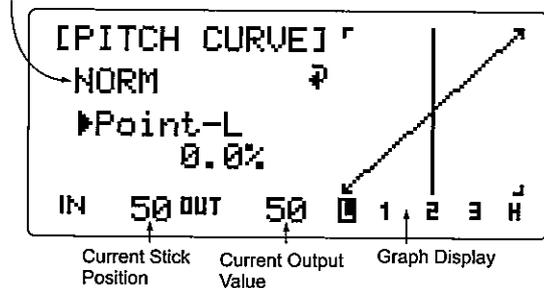
● An aerobatic specification setting example graph shown in the Pitch Curve section. This should be referred to during setting.

Because the operation method is based on the method used for the throttle curve described in the previous section, this operation should be carried out after gaining an understanding of the throttle curve setting method.

Differences between the methods will relate to the external trims and systems.

That is, in the pitch curve system there are four independent systems consisting of NORM, ST-1, ST-2, and HOLD (during Throttle Hold) which can be set, and the points in these systems comprise the five points L, 1, 2, 3, and H as in the throttle curve, and all these systems are independent. Note that in the situation when setting the pitch curve for Throttle Hold, it will be necessary for the Throttle Hold function to be active. If this is set to inhibit, use will not be possible.

Flight Mode Switch Position



### ●Point Numerical Values Input

Rotate the dial to display each point for which you wish to carry out numerical value setting, and then press the dial. (The figure at right shows the situation where point 1 has been selected.)

Rotating the dial in this condition allows the numerical values to be increased or decreased. Further, the preset values can be set by pressing the (CLR) key. The preset values for each point are as described below.

When presetting is carried out:

- Point-L: The output value becomes zero.
- Point-1: The point becomes "INH".
- Point-2: The output value becomes 50%.
- Point-3: The point becomes "INH".
- Point-H: The output value becomes 50%.

### ●Exponential Curve (EXP) Function

The curves are independent for each system, and it is possible to select sequential lines or curves. When "EXP" is set to "ON", the curve will become an exponential curve in which the changes in the output values in the vicinity of each point will be smoothed.

By rotating the dial to move between the points, the display will become EXP and the operation can be selected. By pressing the dial it will be possible to select ON/OFF.

While in this condition, it will be possible to use the (CLR) key to preset the setting to "OFF".

### ■Hovering Pitch Trim

This trim should be considered to be the same as the hovering throttle trim. (Please refer to Graph 1 and Graph 2 of the throttle curve item.)

To set HOLD so that it can be used, first carry out the settings using [21] Throttle Hold. By doing this, the HOLD item will be added, and it will become possible to set the curve during auto rotation.

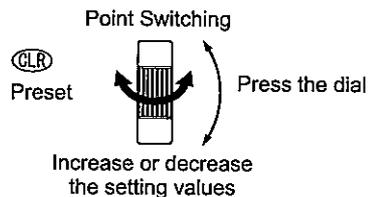
Note that in this situation, the Hold switch will be given prioritized operation for whichever of the Flight Mode switches is set.

Giving adequate consideration to the settings given by the helicopter manufacturer, carry out the curve settings for each position to match the purpose.

Similarly to the throttle curve, the necessary pitch full stroke is divided into 100 portions and direct viewing is possible.

In this function, because the setting methods of the total four screens consisting of the three screens of each Flight Mode and the Hold setting screen during Throttle Hold setting will be the same, they are described all together.

The display shown in the figure at left shows the NORM (Normal) position display.



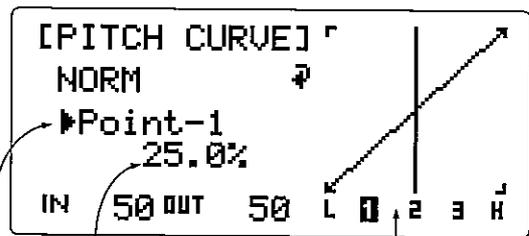
### ●Flight Mode Switch Position Display

The Flight Mode switch is the three-position switch located on the transmitter right shoulder, and the switch rear side is the NORM position, the center is the ST-1 position, and the front side is the ST-2 position. According to the switch position, the name will flash.

In the situation where the "NORM" characters are flashing in the figure above, the switch is set to the "NORM" side.

Switch Positions

- NORM: Normal
- ST-1: Stunt 1
- ST-2: Stunt 2
- HOLD: Throttle Hold
- (Only during Throttle Hold setting)



Current Setting Value (INH is the function stopped condition)

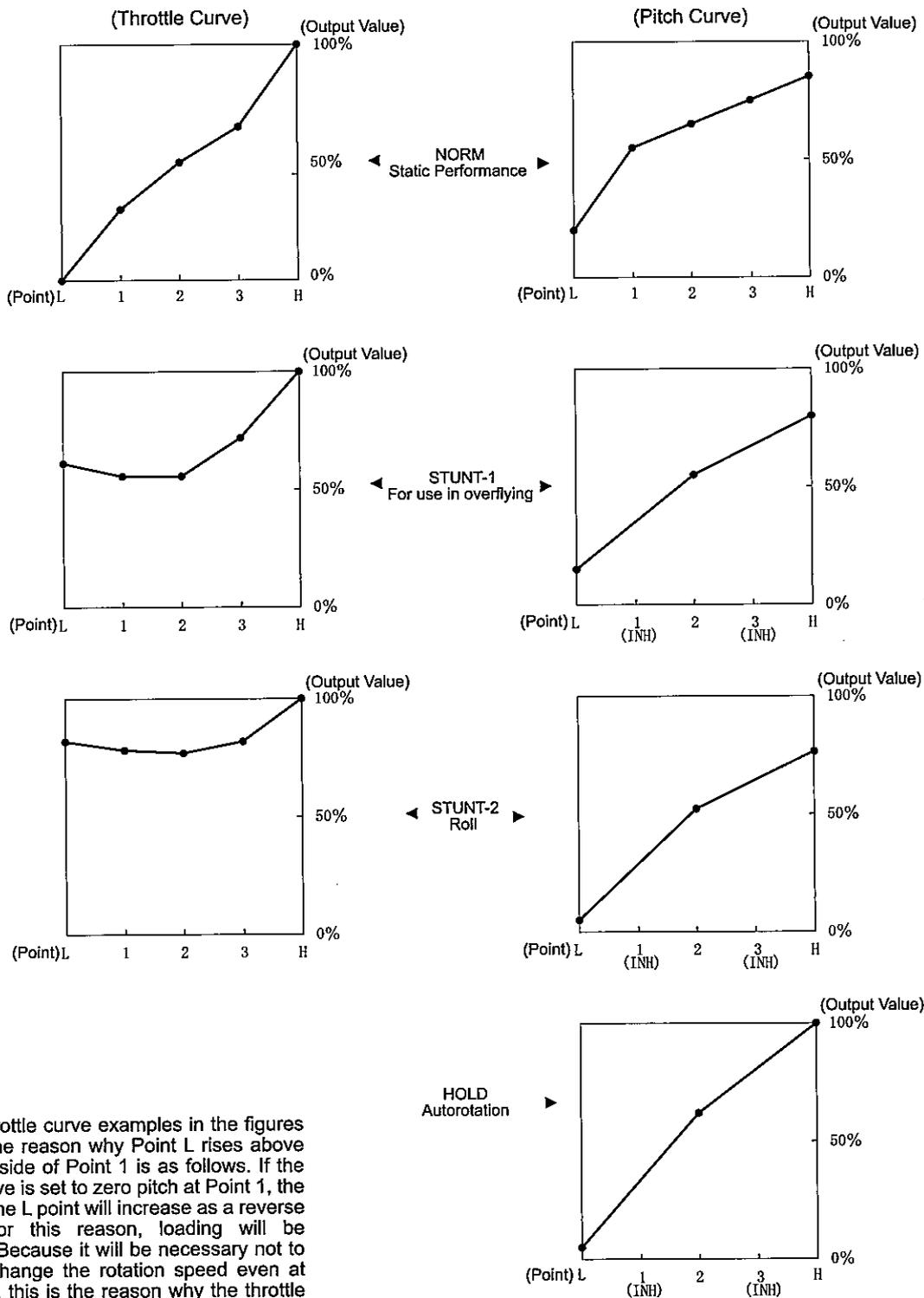
Point Displays

- Point-L: Full Slow Position
- Point-1: Stick 1/4 Position
- Point-2: Stick Center Position
- Point-3: Stick 3/4 Position
- Point-H: Full High Position
- \*The point position is fixed.

## Setting Example

Examples of the Throttle Curve and Pitch Curve settings in the aerobatic specifications are shown in the graphs. However, these are just a few examples, and the settings will be different depending on the specifications of the helicopter that is being used. In addition, Idle Up should be set considering the neighborhood of point 2 as the zero pitch.

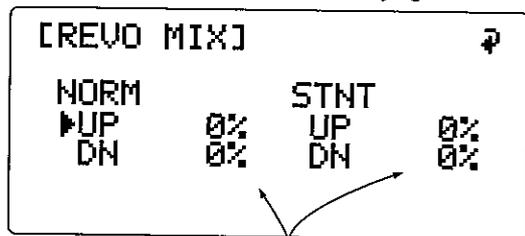
Because the full stroke between throttle idling and the full open condition, and the pitch full stroke during Autorotation will be taken as between 0 and 100%, it will be easy to understand the kind of curves that will be formed by throttle and pitch according to the displayed numeric values. Further, this will also make it easy to consider other curves.



In the throttle curve examples in the figures above, the reason why Point L rises above the high side of Point 1 is as follows. If the pitch curve is set to zero pitch at Point 1, the pitch at the L point will increase as a reverse pitch. For this reason, loading will be applied. Because it will be necessary not to greatly change the rotation speed even at this time, this is the reason why the throttle will have to be increased.

## 24 REVOLUTION MIXING

The revolution mixing in this transmitter is based on the hovering points (output values from the stick center position on the pitch curve), and it is possible to set separate mixing amounts in each of the up and down directions. In addition, because these transmitter settings use the Flight Mode switch positions 1 and 2 (center and forward sides) for stunt flying, each of the up and down mixing amounts can be set as different systems in normal and stunt flying.



Corresponding mixing amount (L125% to 0 to R125%)

During left rotation ↑

↑ During right rotation

Mixing System Display

NORM (Normal)

UP: Up side during normal flying

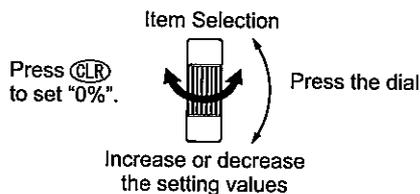
DN: Down side during normal flying

STNT (Stunt)

UP: Up side during stunt flying

DN: Down side during stunt flying

Note that after the settings have been made, even if the pitch curves are changed the settings will change in response, and readjustment will not be necessary. Further, when Throttle Hold is applied, the revolution mixing will become OFF.



### NOTE:

In the situation where a tail lock (heading lock) gyro is being used, set it to not be used (Make all settings 0%).

This mixing is pitch→rudder mixing, and is used to compensate for the half torque caused by the changes in pitch of the main rotor.

The "R" and "L" which appears in front of the percentage display indicates the rotor rotating direction. When seen from above, R is a clockwise rotation while L is an anticlockwise rotation.

In normal flying, values of around 5% should be preset in both the up and down directions, and fine adjustment should be carried out in actual flight. During overflying in stunt flying, it can be expected that the mixing amounts should be around half those in normal flying. In addition, in situations where more advanced revolution mixing is required, program mixing should be utilized.

### ●Setting Method

Rotate the dial to match the triangular arrow with the item that is to be set and then press the dial. In this condition, rotating the dial will increase or decrease the numerical values. Further, pressing the CLR key will return the value to 0%.

The Flight Mode switch is the switch located on the transmitter right shoulder, and the switch rear side is the NORM position, while the center and the front side are the STNT (stunt) positions. According to the switch position, the corresponding mixing position will flash. In the situation shown in the figure above where "UP" of "NORM" is flashing, the switch is set to the "NORM" side, and the pitch is set to "UP".

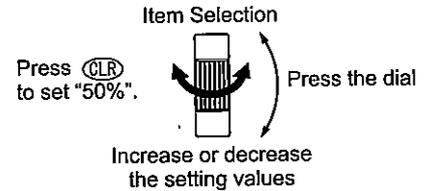
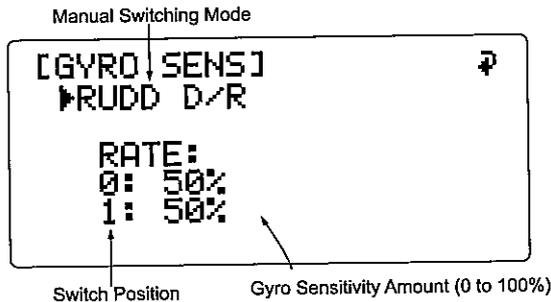
## 25 GYRO SENSING

For the gyro sensitivity switching, manual switching can be carried out using the RUDD D/R switch of the GEAR channel or AUX2 channel, or automatic switching can be carried out in each Flight Mode.

Note that when this function is set to active, the output of the channel that has been set will be exclusively used with the gyro, and the channel output will become the setting value here.

To set this item, it will be necessary for either "GEAR" "AUX2" to be set to "GYRO SYS" in [41]. Device Select. the situation where neither has been selected, this item will not be displayed. In the initial setting, this is allocated to the GEAR channel.

The following screen shows the situation during manual switching (when switching is carried out using the RUDD D/R switch).



### ● Setting Method

Rotate the dial to match the triangular arrow with the item that is to be set, and then press the dial. In this condition, rotating the dial will increase or decrease the numerical values.

Further, pressing the CLR key returns the values to 50%. The RUDD D/R switch has a value of 0 for the rear side and a value of 1 for the front side, and the current switch position is indicated by a flashing display.

### ■ During Auto Sensitivity Switching

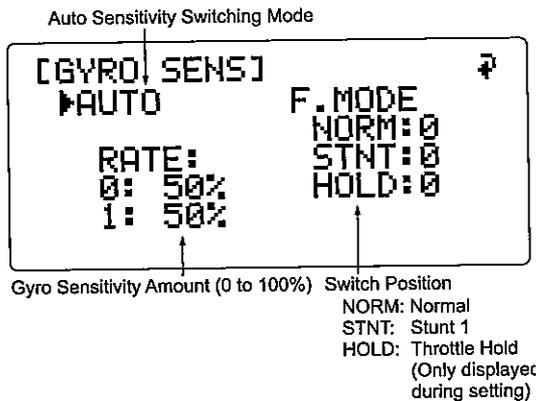
During the auto sensitivity switching (in AUTO), it will be possible to select a sensitivity of either 0 or 1 for the display in each flight condition. Further, the sensitivity during the Throttle Hold condition can also be selected in this display after [21] Throttle Hold has been set to active.

### ● Setting Method

Rotate the dial to match the triangular arrow with the item that is to be set, and then press the dial. In this condition, rotating the dial will increase and decrease the numerical values.

Further, pressing the CLR key will return the values to 50%. Move the triangular arrow to beside "F.MODE", and determine which of the values are to be utilized in each position.

The Flight Mode switch is the switch located on the transmitter right shoulder, and the switch rear side is NORM position, while the center and the front side are STNT (stunt) positions. According to the switch position, corresponding gyro sensitivity amount will flash.



### ■ When using the G490T Gyroscope

Connect the white connector to "GEAR" or "AUX2" of the receiver.

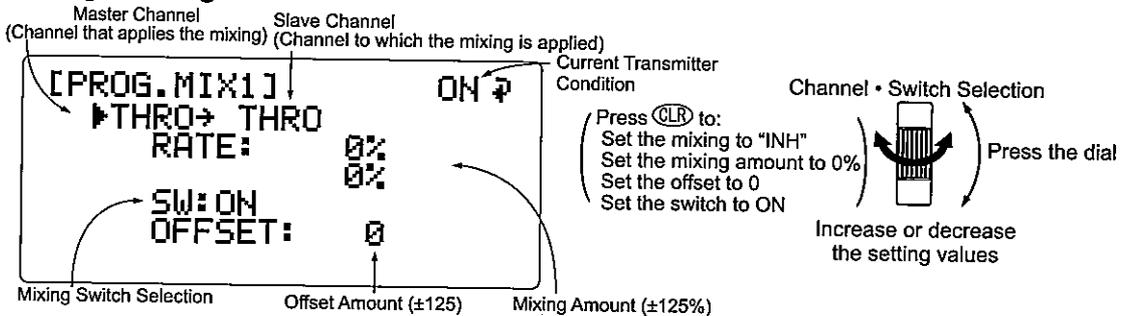
The sensitivity setting can be adjusted over the range of 0 to 100% for each.

For more details, please read the gyroscope operation manual.

This transmitter incorporates three program mixing systems. Although there are three screens, they are explained together here since the operations of the MIX1-3 screens are basically common to each. The following screen shows the situation in the Mixing 1 screen.

Because this is set to the "INH" display in the initial condition, it will be in the usage stopped condition.

## ■ Mixing Settings



### Switch Display

- ON: Mixing is always ON
- F-NR: Right Shoulder Switch (Flight Mode Switch) Back Side ON (MIX1 and 3 only)
- F-S12: Right Shoulder Switch (Flight Mode Switch) Center and Front Side ON
- F-S2: Right Shoulder Switch (Flight Mode Switch) Front Side ON (MIX1 and 3 only)
- GEAR: Right Side Center Switch (GEAR Switch) Lower Side ON (MIX2 only)
- HOLD: Left Shoulder Switch (HOLD Switch) Front Side ON (MIX2 only)

\* When the Flight Mode has been selected, MIX1 and 3 will become OFF in the situation where the Throttle Hold has operated.

## ● Channel Setting

Rotate the dial to match the triangular arrow with the master channel (or with the slave channel) and then press the dial. Next, rotate the dial to change to an optional channel. In addition, pressing the (CLR) key in this condition allows the mixing to be returned to "INH" (usage stopped).

### Channels that are being set:

- THRO ..... 1: Throttle
- AILE ..... 2: Aileron
- ELEV ..... 3: Elevator
- RUDD ..... 4: Rudder
- GEAR ..... 5: Gear (Retractable landing gear)
- PIT. .... 6: PITCH
- AUX2 ..... 7: Auxiliary (AUX2)

## ● Mixing Amount Adjustment

Rotate the dial to position the triangular arrow in front of the numerical values, and move the master channel stick to the side that you wish to adjust.

Next, rotate the dial to increase or decrease the mixing values on each side. Further, pressing the (CLR) key will return the value to 0%. If you wish to reverse the mixing direction, increase the mixing amount in the minus direction. When mixing is not to be used, set both sides to 0%.

## ● Offset Setting (Shifting the Mixing Reference Point)

It is possible to set an optional position on the master channel as the mixing reference point. For example, this can be used in situations where there is no neutral position such as on the throttle stick, where the mixing can be set to be applied taking a certain position as the reference.

This determines an offset amount based on the center (neutral position) of each stick. To confirm the offset position, set to the mixing amount setting condition then move the stick and confirm the reference point position where the value changes between up and down. Note that pressing the (CLR) key will return the value to 0.

By rotating the dial it will be possible to start using the mixing.

On the screen, the channel setting, offset setting, mixing amount setting, and the mixing switch selection can be set using a single screen. Note that because there are some small differences in the functions depending on the mixing system, the functions should be used after clearly understanding the function details.

## ● Operation Switch Selection Method

All of the program mixing can also be switched ON/OFF using the optional lever switches. The display of the lever switches that can be selected, and the positions when they are ON, are as shown in the figure above.

In addition, pressing the (CLR) will return the switch to "ON".

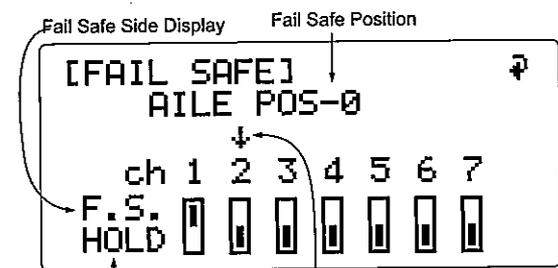
## ■ Precautions during the Helicopter Type

- In the situation where the ailerons, elevators, and rudders are selected in the master channel and D/R or EXP are being set, the mixing will also include the D/R or EXP operation.
- In the situation where "THRO" has been selected in the master channel using MIX1 and 2, the throttle trim amounts and throttle curve amounts including the Throttle Hold will affect the slave channel. During Throttle Hold, MIX3 will be the throttle stick operation amount only.
- In the situation where "PIT" (pitch) has been selected in the master channel, MIX1 will consist only of the throttle (pitch) stick operation amount, while MIX2 and 3 will include the pitch curve amounts and trim amounts.

## 27 FAIL SAFE

The transmitter incorporates a Hold function that maintains the conditions immediately before a loss of contact occurred, and a Fail Safe function in which servos which have been optionally set beforehand operate if the loss of contact continues for longer than a fixed time.

To avoid extremely dangerous situations such as when the airplane crashes under full throttle, it is recommended that you use the Fail Safe as much as possible.



Hold Side Setting Display

Channels that are being set:

- THRO ..... 1:Throttle
- AILE..... 2:Aileron
- ELEV..... 3:Elevator
- RUDD ..... 4:Rudder
- GEAR ..... 5:Gear (Retractable landing gear)
- PIT. .... 6:PITCH
- AUX2 ..... 7:Auxiliary (AUX2)

### ●Setting Method

Rotate the dial to match the downward-pointing arrow with the channel that you wish to set. Press the dial in this condition to change to the inversed condition and switch to the F.S. (Fail Safe) side. It is possible to set Fail Safe or Hold (HOLD) to each of the channels 1 to 7. The Fail Safe settings should be carried out for each model. In the situation where the Fail Safe has been set, the position where it has been set will be shown.

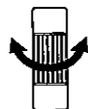
\* Be certain to carry out the Fail Safe position memory setting using the method described at right.

Since data transfer to the receivers is carried out automatically there will be no need to set the receivers each time a fail made. Of course, as soon as the cause of the loss of contact is eliminated, the connections will be restored immediately and control will become possible again.

Note that during loss of contact, the servos will maintain Hold condition for the time period (0.5 sec) until the Fail operation begins.

### Channel Switching

Press **CLR** to implement the position memory (Batch setting)



Press the dial Setting Condition Inv (F.S. ↔ HOLD)

### ■Fail Safe Position Memory Setting

Press the **CLR** key while matching the cursor with all positions of the channels that are to have the Fail Safe (for example, when the aileron is to be set to neutral stick center position). Here, the **CLR** key operates memory key.

The transmitter memorizes the channel position on the side (Fail Safe = Graph display), and this setting is automatically sent to the receiver.

Note that the Fail Safe position memory setting certainly be carried out. In addition, be sure to carry out confirmation of whether the F.S. operation realize servo positions as they had been set.

\*Be certain to carry out the memory setting of the Fail positions as described in the following method.

\* The position memory will be recorded simultaneously for all channels of the screen switches that are the F.S. side.



## CAUTION

In the transmitter initial settings, All channels are set to the Hold side. In the transmitter initial settings, the throttle channel is set to the Hold side.

Accordingly, if a loss of contact during operation and the Fail Safe is enabled, the throttle channel will be hold as default. It makes the Aircraft/Helicopter into an extremely dangerous situation.

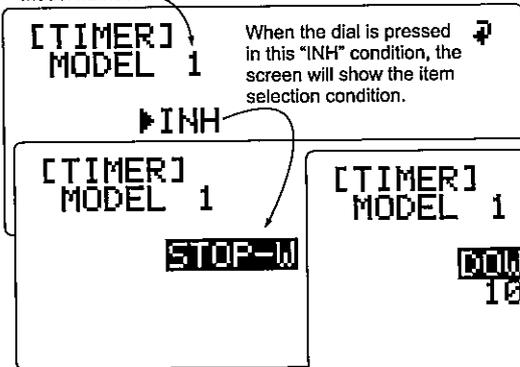
When carrying out the transmitter settings, be certain to implement the Fail Safe settings lastly (match the stick position to be set and press the memory key), and be sure to carry out confirmation of the operation (Switch off the transmitter power one time, and confirm whether servo movements reach their correct position.)

## 28 TIMER

This timer setting function is independent for each model. The time setting of the down timer can be set in 10-second units up to 59 minutes 50 seconds, and pressing the **CLR**

key will preset the value to 10 minutes (10:00). From when this timer function is set, the timer display is shown in the normal display.

Model number



When the dial is pressed in this "INH" condition, the screen will show the item selection condition.

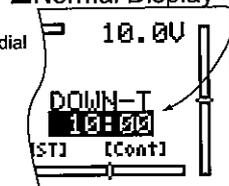
In the following display, press the dial to return to the item selection condition. By matching the arrow with the time display and then pressing the dial, it will become possible to set the time as shown at right.

DOWN-T 10:00

Press the dial

DOWN-T 10:00

### ■Normal Display



The time that has been set is shown here

During the count, the sound from seconds by alarm time passing the display will be up to the "+" will be:

the time display.

The count time will continue up to 59:59 setting the stop watch, up counting will be out from zero to 59:59 (59 minutes 59 seconds). The starting and stopping of each count out using the **CLR** key. By rotating the stopping and time presetting can be carried out.

By rotating the dial in the item selection condition, it will be possible to select the stop watch and down timer.

## 29 THROTTLE CUT

This function allows the engine to be cut during idling without operating the throttle trim. This operation should be allocated to one of the lever switches located on the furthest inside at the left and right

of the transmitter front face, and the trim position when the throttle is cut should be set. In the case where this function is not used, it should be set to "INH".

[THRO CUT] ↻

**INH**

When the dial is pressed in this "INH" condition, the screen will show the item selection condition.

[THRO CUT] ↻

**OFF** ↻

**SET**

**-12.0%**

**SW: R-LEVER**

Throttle Cut Position  
±25.0%

In the situation where the functions are in the operating condition, this will be displayed as ON.

In the situation where the function is set, the carburetor should also be set to fully closed during the period between pressing the switch and the ON display (while the function is starting up). At this time, take care that excessive force is not applied to the servos.

Rotate the dial to set the switch items to the inversed display.

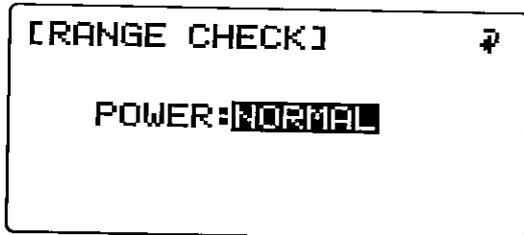
Pressing the dial in this condition will allow selection of the left and right lever switches that operate this function.

Left side **L-LEVER** ← **R-LEVER** Right side switch

Item•Switch Selection

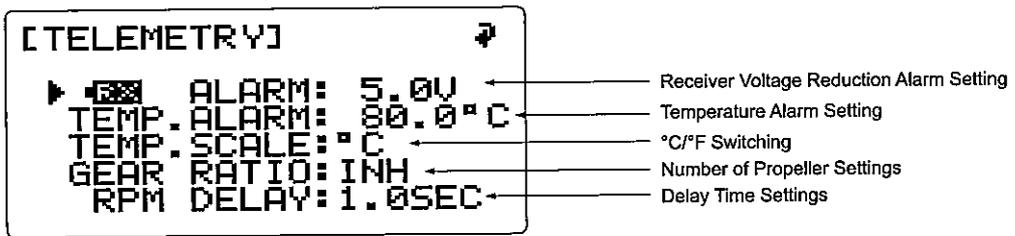
## 30 RANGE CHECK

This function is used in pre-flight range testing. By moving the cursor to the NORMAL position and pressing the dial, "LOW" will be displayed and the transmitter will be in the low power mode where the transmission output is 1/100. In this condition, the distance reached by the radio waves will be approximately 40m or more. The transmission power will be returned to normal either by moving the cursor to the LOW position and pressing the dial, or by exiting from this setting.



## 31 TELEMETRY

In this function, the telemetry system settings are carried out.



### ●RX ALARM

This gives notification of reductions in the receiver voltage. By matching the cursor to RXALARM and setting a numerical value by rotating the dial, an alarm will sound when the receiver voltage drops below the value that has been set.

### ●TEMP. ALARM

In the situation where a temperature sensor has been connected, this gives notification by an alarm when the set temperature value is exceeded.

The setting temperature range is between 60 and 160°C. If "INH" is set, the alarm will not sound.

### ●TEMP. SCALE

This switches the temperature setting units. By matching the cursor and pressing the dial, it will be possible to switch alternately between °C and °F.

### ●GEAR RATIO

When the gear ratio is set, it will be possible to display revolution speed considering the gear ratio.

This should be set in the situation where the sensor is mounted on the engine side and you wish to display helicopter rotor rotation speed.

In the situation where this is not required, it should be "INH".

### ●RPM DELAY (Helicopter Only)

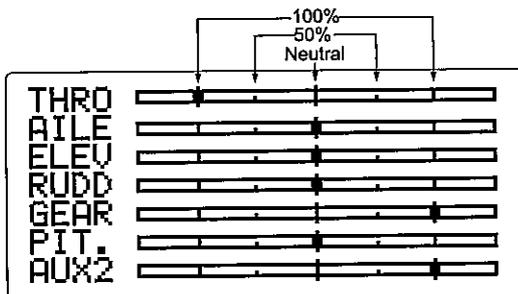
In this transmitter, although a maximum rotation speed is memorized for each Flight Mode, a delay time can be set in order that the rotation speed can be cancelled in a situation where the rotor rotation does not change immediately after changing the Flight Mode.

A delay of 0.5 to 2.0 seconds can be set, and when a delay is not required this should be set to "INH".

## 32 MONITOR

This function is for monitoring the servo movements of each channel on the transmitter display screen.

The servo movement display is a bar display with a vertical line in the center marking the neutral position. Centered around this to left and right are graduations marking the control surface angle 50% and 100% positions in order, and at each of the left and right ends there are the maximum control surface angle 150% positions.



The movements in this function include all of the servos and mixing. Each of the display positions should be considered as a rough guide.

#### Channel Name

THRO ..... Throttle  
AILE ..... Aileron  
ELEV ..... Elevator  
RUDD ..... Rudder  
GEAR ..... Gear (Retractable landing gear)  
PIT. .... PITCH  
AUX2 ..... Auxiliary (AUX2)