

## EXAMPLES OF PROGRAMMABLE MIXING

*Programmable Mixing combinations are extremely versatile and can be as complex as desired, limited only by the modeler's needs and imagination. A few examples of how mixing functions can be used are shown below:*

### *Eliminating Unwanted Control Interactions*

Adverse control interactions (caused by trim, model inaccuracies, etc.) can be compensated for automatically, with the use of the Programmable Mixing function.

As an example, let's presume that when top rudder is applied during "knife-edge" flight, an unwanted movement toward the top of the aircraft occurs. We can use a Programmable Mixing circuit to automatically apply a small amount of DOWN Elevator control with the application of top (Right or Left!) Elevator.

#### Setting Method

- 1) Select the PROGRAMABLE MIX screen and press the SET key to display the CHANNEL SETTING screen.
- 2) Select RUD as the Master "mas" channel on MX1 circuit using the **+** or **-** program key.
- 3) Move the cursor to the "slv" position and select ELV as the Slave channel. RUD-- ELV will appear on the right side of the screen.
- 4) Return to the PROGRAMABLE MIX screen by pressing the **END** key.
- 5) Move the cursor to the "inh" position and press the **ACT** key.
- 6) Move the cursor to the R/U and L/D positions. The direction of Elevator movement is set with the **+** and **-** program keys, and the rate (amount) of movement set with **+** and **-** program keys. Set the rate and direction to give a small amount of DOWN Elevator with the application of either direction of Rudder.
- 7) Move the cursor to the "sw" position and select the desired Mixing ON/OFF Switch option.

#### • *Flapperons (Flapperon Mixing for Fixed-Wing Aircraft)*

*CH1 and CH7 are used as the operating channels.*

#### Setting Method

- 1) Select the CHANNEL SETTING screen as outlined earlier.
- 2) On MX1 set AIL as the Master channel and AU1 (CH7) as the Slave channel.
- 3) On MX2 set AU1 (CH7) as the Master channel and AIL as the Slave channel.
- 4) Select the PROGRAMABLE MIX screen by pressing the **END** key.

- 5) Move the cursor to the "inh" position and press **ACT** for MX1.
- 6) Move the cursor to the R/U and L/D positions respectively, and set each to "—100%".
- 7) Move the cursor to the MX2 line with the **↓** cursor key, and to the "inh" position with the **←** or **→** cursor key. Press the **ACT** key to activate the MX2 circuit.
- 8) Move the cursor to the R/U and L/D positions respectively, and set each to +100%.
- 9) Direction of mixing may need to be altered, depending on servo installation, linkage, etc.
- 10) Flap deflection is more conveniently set in this case using the AFR program for CH7 (See AFR, page 17).
- 11) The CH7 Knob is used to control the Flap function. Depending upon the rate set, this can be used as a "Flap Trim" function.
- 12) Aileron throw is most conveniently set using the AFR program (See AFR, page 17).
- 13) CH8 (AU2) can be used as a pre-set "Down Flap" switch.

On the CHANNEL SETTING screen, move the cursor to the MX2 "mas" position and press the **XON** key.

Move the cursor to the MX3 "mas" position and set the Master channel to "AU2". Move the cursor to the "slv" position and set the MX3 Slave channel to AU1 and press the **YON** key.

Return to the PROGRAMMABLE MIX screen by pressing the **END** key and set the MX3 circuit to **ACT**.

The direction and amount of "flap" deflection when the CH8 Switch is thrown is set using the R/U and L/D positions on the P.MIX screen.

- 14) To automatically add compensating Elevator Trim when the "Flap" Switch is thrown, activate the MX4 circuit and set the Master channel to AU2 and Slave channel to ELV. Then set the direction and amount of elevator trim (One direction will be = 0%).

The right side of the CHANNEL SETTING screen should appear as shown.

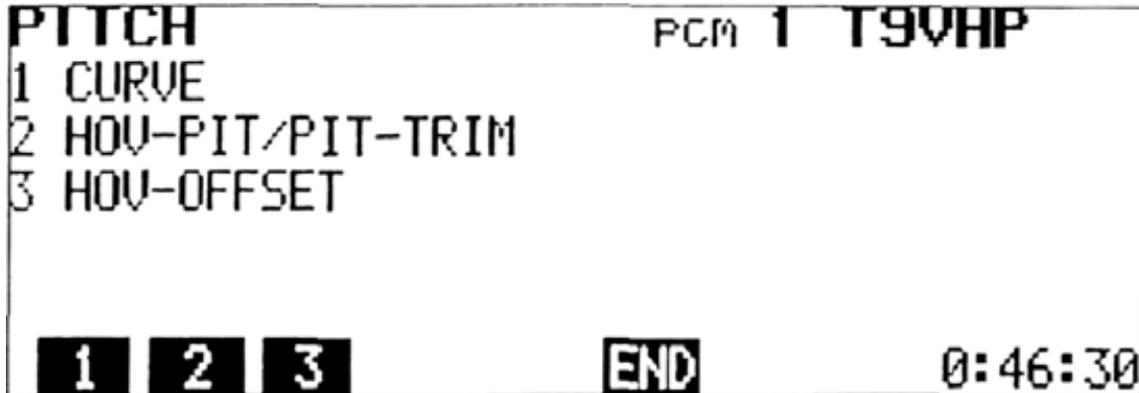
```
AIL->AU1
AU1->AIL
AU2->AU1
AU2->ELV
```

- 15) Aileron differential can be adjusted using the ATV program screen (See ATV page 16).

## ADJUSTMENTS AND FLIGHT TECHNIQUES

### 2:PITCH

Throttle (CH3) and collective pitch (CH6) are both operated from the Throttle/Collective stick (T/C). The servo response curves for both (collective) pitch and throttle functions can be independently adjusted to give optimum Throttle/Collective relationships at all T/C stick positions.



#### (1) CURVE

- There are five separate pitch curves:

**NORMAL** — For hovering and normal forward flight.

**IDLE UP 1** - Used when the Idle Up 1 Throttle function is ON.

**IDLE UP 2**- Used when the Idle Up 2 Throttle function is ON.

**T. HOLD** - Used when the Throttle Hold function is ON (autorotations).

**INVERT** — For inverted hovering and flying when the INVERT Switch is activated and ON.

- The NOR, ID1, ID2, and HLD curves are divided into 11 equal parts and adjustment is possible at each of 12 points along the curve.

- The maximum High and Low Pitch limits (rates) can be adjusted from 0 to 100% of

normal servo travel.

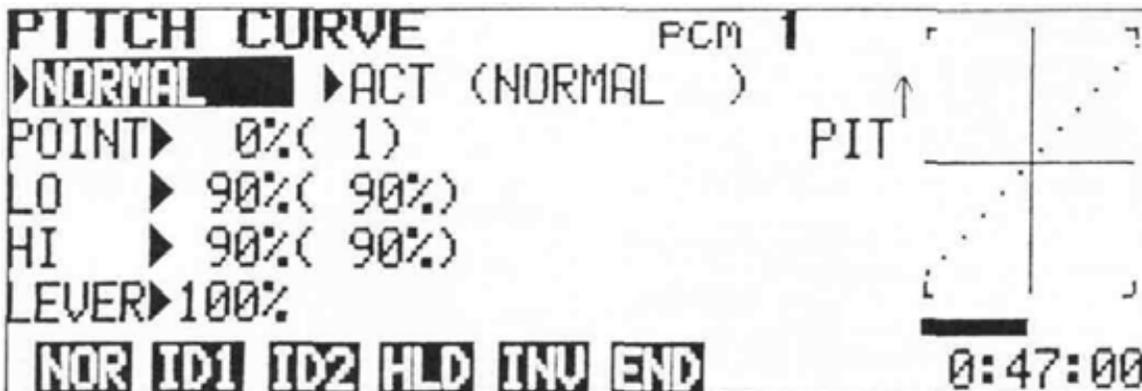
- The High Pitch setting for NOR, ID1, ID2, and INV curves can be trimmed  $\pm 25\%$  with the High Pitch Trim Lever on the right side of the transmitter.

- Trim throw (authority) can be varied from 0 to 100% of normal.

- The NORMAL PITCH low, IDLE UP 1 PITCH low, IDLE UP 2 PITCH low, and T. HOLD PITCH high and low limits can be adjusted  $\pm 25\%$  with the sub-trimmers on the trimmer panel.

- In the INVERT Mode, the NORMAL and INVERT low pitch limit crossover amount can be adjusted from -5% to +45% of the total.

- The CURVE COPY Function allows certain curve adjustments to be transferred from one curve to another.



### Setting Method

- Make the basic linkage settings according to the helicopter manufacturer's instructions, except allow for slightly more total collective **pitch** travel than specified.
- Select the MIX screen and then press the **[ 2 ]** (PITCH) program key. Select the CURVE program by pressing the **[ 1 ]** (CURVE) program key.
- Move the cursor to the top left corner of the screen and select the curve that you wish to set by pressing the **NOR**, **ID1**, **ID2**, **HLD**, or **INV** program key.

NOTE: The ID1, ID2, and HLD pitch curves cannot be set until the corresponding Throttle functions are activated (See pages 40 through 42).

- The setting method is the same for the NOR, ID1, ID2, and HLD curves and is described below.

- 1) Select the NORMAL curve setting screen as described above.
- 2) Move the cursor to the INH position with the **[ ← ]** cursor key and activate the NORMAL pitch curve by pressing the **[ ACT ]** program key.
- 3) Switch the airborne system ON and set the T/C stick on the transmitter to the center (hover) position.
- 4) Adjust the model linkage to give the desired pitch at hover (use a pitch gage to measure).
- 5) Move the cursor to the LO (Low Pitch) position with the **[ ↓ ]** or **[ ↑ ]** cursor key. Move the T/C stick to the full low position, and set

the desired low pitch limit by pressing the **[ + ]**, **[ - ]**, or **[ 100 ]** program key (usually about 0 or -1 ).

- 6) Move the cursor to the HI (High Pitch) setting position with the **[ + ]** or **[ - ]** cursor key. Move the T/C stick to the full High position, and set the High Pitch Trim Lever on the right side of the transmitter to the center position. Measure the actual pitch on the model with a gauge, and set the desired High Pitch limit with the **[ + ]**, **[ - ]** or **[ 100 ]** program key.
- The High Pitch setting can be trimmed conveniently during flight by using the High Pitch Trim Lever. A maximum adjustment of  $\pm 25\%$  is possible. Sensitivity of the trim lever can be adjusted by moving the cursor to the LEVER position and using the **[ + ]**, **[ - ]**, or **[ 100 ]** program key. The High Pitch Trim Lever also adjusts the High Pitch in the ID1 and ID2 modes. NOR, ID1, and ID2 limits can be set separately.
  - The low pitch limit in the NORMAL mode can be adjusted  $\pm 25\%$  with the NOR OI.LO. sub-trimmer on the trimmer panel.
  - Sub-trimmers are also available for IDL UP2 PI. LO., HOLD PI. HI., HOLD PI. LO., and IDL UP1 PI. LO. When a trimmer is turned slowly, a buzzer will sound at the center or neutral (sub-trim = 0) position. The pitch rate actually set (including the sub-trim amount) is displayed in ( ) on the screen.



### Pitch Curve Point Setting Method

- Once the basic settings are made, the curve can be further refined utilizing the Point Cursor in conjunction with the curve display graph on the right side of the screen.
- The pitch curve displayed on the graph is divid-

ed into 11 equal parts. There are 12 individual dots or "points" that represent the curve on the graphic display. Each of these points can be individually adjusted UP or DOWN using the "Point Cursor".

## ADJUSTMENTS AND FLIGHT TECHNIQUES

- A bar graph along the lower edge of the display indicates the corresponding T/C stick position.
- 1) Move the standard cursor to the POINT position using the **↓** or **↑** cursor key.
  - 2) Select the graph point to be adjusted with the **←** or **→** cursor key. The points are numbered 1 through 12 from left to right on the graph.
  - 3) The Point Cursor is designated by a "+" symbol on the graph. The point number selected will be displayed in ( ) next to the standard cursor and the Point Cursor (+) will be located at that point on the graph.
  - 4) The selected point can be raised or lowered by pressing the **+** or **-** program key. The curve can be returned to normal (linear) from by pressing the **0** key.
  - 5) The rate set at each point will be displayed inside the standard cursor.

### Curve Copy Function

- Refinements in the Pitch Curve shape that were made using the "Point Cursor" method can be transferred from one curve to another. High and Low Pitch limits set at the HI and LO position lines will not transfer. Therefore, the curve being set will become similar in shape to the curve being copied although it will not be identical unless the HI and LO limits are the same on both curves.

### Setting Method

- 1) Move the cursor to the POINT line of the PITCH CURVE screen with the **↓** or **↑** cursor key.
- 2) Press the **CPY** program key. The word "COPY FROM" will be displayed on the POINT line.
- 3) Select the curve to be copied by pressing the **NOR**, **ID1**, **ID2**, or **HLD** program key.
- 4) Copying of the POINT settings is now completed, and the graph on the right will display a curve more similar (or identical) to the curve that was copied.
- 5) Return to the original % display by pressing the **END** key.

### When Pitch Curves Are Not Used

- 1) To deactivate the pitch curve function, move the cursor to the ACT/INH position of the PITCH CURVE screen using the cursor keys, and press the **INH** program key.
- 2) When the pitch curves are deactivated, the Hovering Pitch lever on the left side of the transmitter becomes the CH6 control lever.

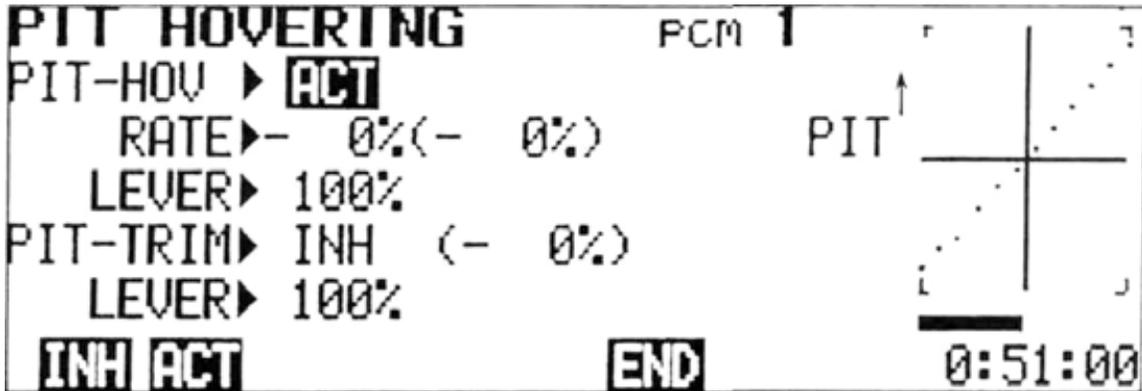
### Inverted Pitch Setting

- 1) Move the cursor to the upper left corner of the PITCH CURVE screen and select the INVERT function by pressing the **INV** program key.
- 2) Move the cursor to the INH/ACT position at the top of the screen and press the **ACT** program key.
- 3) The CH5 switch is the INVERT ON/OFF Switch.
- 4) The INVERT curve does not have a Point Cursor Setting function. The NORMAL pitch curve is used as the pitch curve.
- 5) The maximum LOW and HIGH pitch limits can be set the same as the other curves. There is no sub-trimmer for the INVERT Low pitch adjustment. The High Pitch limit can be trimmed with the High Pitch Trim Lever (lever throw can be adjusted in the same manner as with the other curves). The "LO" and "HI" settings made on the INVERT screen will affect the pitch limits only at INVERT ON position of the CH5 switch.
- 6) The low pitch limits (crossover) can be adjusted for both the NORMAL and INVERT curves simultaneously, by moving the cursor to the INV-TRIM line and adjusting the limits using the **+**, **-**, or **0** program keys.
- 7) Return to the EDIT screen by pressing the **END** program key.

NOTE: Pitch mixing cannot be used in the BASIC mixing mode. (See PARAMETERS ON page 46).

## (2) PIT HOVERING/PIT-TRIM

- HOVERING PITCH trims the pitch setting near the center (hover) point on the T/C stick. Adjustment is possible without changing the High or Low pitch limits.
- PITCH TRIM makes parallel shifting of the pitch curve possible without changing the shape of the curve.

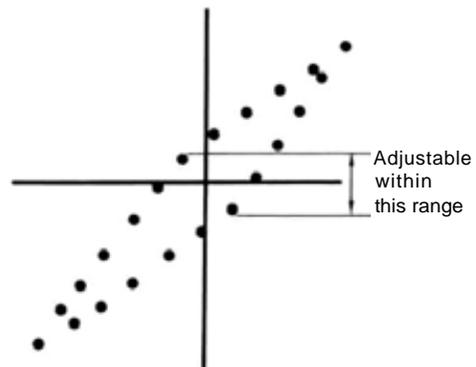


### Setting Method (PIT HOVERING)

- 1) Select the EDIT screen and move the cursor to Line 2 with the cursor key, then press the **MIX** program key.
- 2) Select the PITCH screen by pressing the **2** program key, then press the **2** key again to select the PIT HOVERING screen.
- 3) To change the Hovering Pitch value, move the cursor to the RATE line with the **↓** or **↑** cursor key and set the rate with the **+**, **-**, or **0** program key. The high and low pitch limits will remain the same.
- 4) The Hovering Pitch can be trimmed using the Hovering Pitch Trim Lever on the left side of the transmitter. The hovering pitch rate, including the trim lever amount is displayed in ( ) on the RATE line. A buzzer sounds when the trim lever is moved to the center position.
- 5) Trim lever authority can be adjusted by moving the cursor to the LEVER line and using the **+**, **-**, or **100** program keys.
- 6) To activate the Hovering Pitch function, move the cursor to the ACT/INH position and press the **ACT** program key. To deactivate, press the **INH** key.

### Setting Method (PIT-TRIM)

- 1) Move the cursor to the PIT-TRIM line with the **↓** or **↑** cursor key and press the **ACT** program key. The PITCH TRIM position is displayed in ( ).
- 2) The CH7 Knob becomes the Pitch Trim Control and normal CH7 use is deactivated. A **buzzer** sounds at the neutral (PIT-TRIM = 0) position.
- 3) The CH7 Knob trim authority can be adjusted by moving the cursor to the LEVER line and using the **+**, **-**, or **100** program keys.
- 4) To deactivate Pitch Trim, move the cursor to the PIT-TRIM line and press the **INH** program key.
- 5) To return to the PITCH screen, press the **END** program key.



## ADJUSTMENTS AND FLIGHT TECHNIQUES

### (3) HOVERING OFFSET

- The *HOVERING OFFSET* function programs the *EXACT T/C stick hovering position* into the computer. This position is incorporated into the pitch curves, and is also the changeover point between *UP and DOWN Revolution (rudder or tailrotor) Mixing inputs*.



#### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 2 with the **↓** cursor key, then press the **MIX** program key.
- 2) Select the PITCH mixing screen by pressing the **2** program key. Display the HOVERING OFFSET screen by pressing the **3** program key.
- 3) At POS1 0%, HOV is displayed in ( ) on the POS1 line and a buzzer sounds when the T/C stick is at the center position. This is the standard position for the Hovering Offset point.
- 4) Actually hover the helicopter and have a helper note the T/C stick position.
- 5) Land and stop the engine. Then set the T/C stick to the hover position noted in Step #4.
- 6) Program the stick position by pressing the **+** or **-** program key until the word "HOV" again appears in ( ). **Go slowly**, in small increments.
- 7) Return to the PITCH mixing screen by pressing the **END** program key.

Basically, adjust the model so that hovering is performed near the center position on the T/C stick.

Pitch Mixing cannot be used in the BASIC mixing mode,

## 3:RUDDER RUDDER

Rudder (tail rotor) mixing functions automatically provide trim changes and corrective inputs to the tail rotor to compensate for changes in main rotor torque (due to changes in the T/C stick position).

### Revolution Mixing

Automatic trimming of the tail rotor neutral position is provided in response to Throttle/Collective changes. As the T/C stick is raised above the center (hover) position, tail rotor pitch is increased and is reduced when the stick is moved below the hover point. The amount of trim change is adjustable in each direction from the T/C stick hover point (UP and DOWN Mixing). The exact T/C stick hovering point is programmed into the computer using the HOVERING OFFSET screen (See page 32).

```
RUDDER                                PCM 1 T9VHP
ROTOR-DIR▶CW (RIGHT)
REVO-MIX ▶ACT UP  ▶ 50%( 50%)
                   DN  ▶ 50%( 50%)
ACCE-MIX ▶INH RATE▶ 100%                DELY▶ 0%
RUD-OFS▶INH POSI▶+ 0%(+ 0%)DELY▶ 0%
CW  CCW                                END                                0:52:00
```

### Acceleration Mixing

Acceleration Mixing is used primarily on "fixed pitch" helicopters. This function provides a momentary increase or decrease in tail rotor pitch when the throttle is raised or lowered. This compensates for momentary changes in main rotor torque until the rotor speed stabilizes at the new throttle setting. The rate at which the momentary tail rotor input decays (DELAY) is adjustable.

### Rudder Offset

This function disconnects Revolution Mixing (Pitch -> Rudder Mixing), and returns the rudder servo to a preset neutral position. Rudder Offset is used in forward flight when airflow over the fuselage reduces the need for anti-torque force from the tail rotor. Flight trim is improved, and the power-robbing effect of the tail rotor is reduced.

### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 2 with the **↓** the **MIX** program key.
- 2) Select the RUDDER mixing screen by pressing the **3** program key.

### ROTOR-DIR (Revolution Mixing Rotor Direction Setting)

- 1) Move the cursor to the ROTOR-DIR line with the **↓** or **↑** cursor key.
- 2) Set the mixing direction by pressing the **CW** program key when the main rotor rotates clockwise and pressing the **CCW** program key when the main rotor rotates counterclockwise. The direction of rotation is indicated by RIGHT or LEFT displayed in ( ).

## ADJUSTMENTS AND FLIGHT TECHNIQUES

### REVO-MIX (Revolution Mixing Setting)

- 1) Move the cursor to the REVO-MIX line with the **↓** or **↑** cursor key.
- 2) To set the UP and DN mixing rates, move the cursor to the rate setting position with the **→** and **←** cursor keys. Then move the cursor to the UP or DN position with the **↓** or **↑** cursor key and set the rates with the **+** and **-** program keys or the **100** key. (Set the UP side to about 50% and the DN side to about 70% initially.)
- 3) Trimming can be performed with the **+** and **-** program keys or the REVO.MIX UP and REVO.MIX DN trimmer knobs at the top right side of the transmitter. The amount actually set, including the trim amount set with the knobs is displayed in ( ). When the mixing knob is turned slowly to the center (trim = 0) position, a tone will sound.
- 4) To deactivate Revolution Mixing, move the cursor to the **ACT** position with the cursor keys and press the **INH** program key. To reactivate revolution mixing, press the **ACT** program key.

**NOTE:** The effectiveness of Revolution Mixing is modified by the action of a rate gyro on the tail rotor. REVO-MIX can be adjusted more accurately by switching the gyro OFF, or to a lower sensitivity setting.

### ACCE-MIX (Acceleration Mixing Setting)

- 1) To activate acceleration mixing, move the cursor to the ACCE-MIX position with the **↓**, **↑**, **→**, and **←** press the **ACT** key.
- 2) To set the amount of the momentary tail rotor input, move the cursor to the ACCE-MIX RATE position using the cursor keys and set the rate with the **+**, **-**, or **100** program key
- 3) Set the decay rate (time) of the tail rotor input by moving the cursor to the DELY position and setting the time with the **+**, **-**, or **100** program key.

### RUD-OFST (Rudder Offset)

- 1) To activate Rudder Offset, move the cursor to the RUD-OFST INH position with the **↑**, **↓**, **→**, and **←** cursor keys and press the **ACT** program key.
  - 2) Set the offset position (usually near neutral) by moving the cursor to the RUD-OFST POSI position with the cursor keys and set the rudder servo position with the **+**, **-**, or **0** program key.
  - 3) The offset position can be trimmed with the RUD.OFFSET sub trimmer on the trimmer panel. The total amount set, including the sub trimmer rate, is displayed in ( ). As the trimmer is turned slowly, a tone will sound at the center (sub trim = 0) position.
  - 4) Tail swing when the rudder servo moves to the RUD-OFST position can be reduced using the DELY (Delay) function. Move the cursor to the RUD-OFST DELY position and set the Delay Time with the **+**, **-**, or **100** program keys.
  - 5) RUD-OFST can be switched ON when the IDLE UP1 or IDLE UP2 is turned ON (IDLE UP must be activated; see page 40 ). The GEAR (CH5) switch or AUX2 (CH8) Switch can also be used by activating the COMBI Switch (See page 46).
  - 6) Initially set the RUD-OFST POSI to 0 and DELY to -20%, then adjust as necessary for your individual model.
  - 7) To deactivate RUD-OFST, move the cursor to the RUD-OFST **ACT** position and press the **INH** program key.
- To return to the MIXING screen, press the **END** program key.

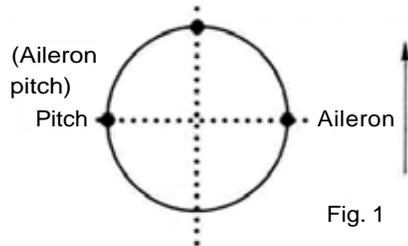
**NOTE:** Rudder Mixing cannot be used in the BASIC mixing mode.

# 4: SWASH MODE SWASH MODE

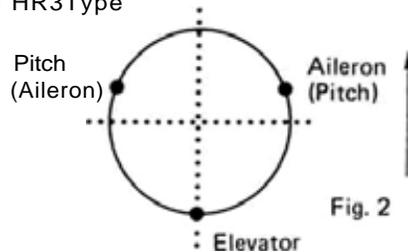
## Functions of Swash Mode

1) Five types of swash plate mixing are possible.

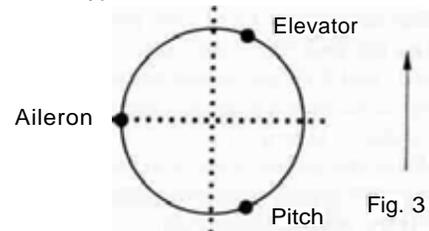
- a) H-1 (normal plate) type
- b) H-2 Type



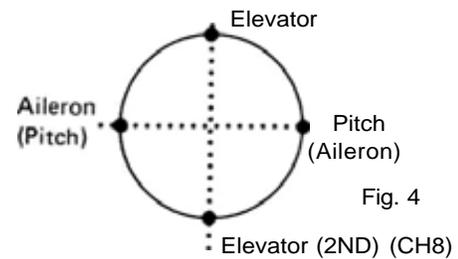
- c) HR3Type



- d) HN3 Type



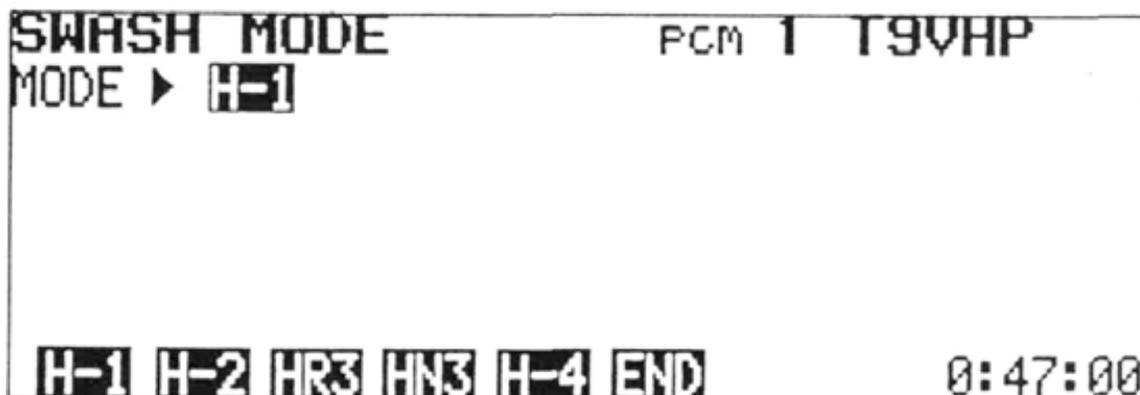
- e) H-4 Type



- 2) The rate of the aileron, elevator, and pitch functions can be adjusted (except for H-1). Only Aileron and pitch can be set for H-2.

## Setting Method

- 1) Select the EDIT screen and move the cursor to Line 2 with the **↓** cursor key, then press the **MIX** program key.
- 2) Select the SWASH MODE screen by pressing the **4** program key.
- 3) Select the Swash Mode by pressing the **H-1**, **H-2**, **HR3**, **HN3**, or **H-4** program key.



## ADJUSTMENTS AND FLIGHT TECHNIQUES

### (a) H 1 Type

Use this mixing mode with normal linkage.

### (b) H-2 Type, Fig. 1

1) Select the H-2 Mode by pressing the **H-2** program key.

2) The swash plate has a pawl position every **90°**. Use the two 180° positions.

3) AIL and PIT are mixed to provide both aileron and collective pitch functions.

<Aileron Operation>

When the aileron stick is moved, both the **AIL** and **PIT** servos move in opposite directions to **tilt** the plate left and right.

<Pitch Operation>

When a collective pitch input is given (T/C stick), both servos move in the same direction to lift the plate up and down vertically.

Use a normal mechanical linkage for the elevator.

4) Set the servos for aileron and pitch operation by using the reversing function of each servo.

5) Move the cursor to the RATE line with the **↓** or **↑** key and set the direction of operation with the **+** or **-** program keys.

6) Adjust the throw of each servo (AIL and PIT) using the ATV function (See page ) so that the travel is the same.

7) Move the cursor to the AIL or PIT position with the **←** or **→** cursor key and set the rate with the **+** and **-** program keys.

8) Since each servo is performing two functions, use caution not to set the aileron and pitch rates so that excess throw is required of the servo mechanics.

### (c) HR3 Type, Fig. 2

1) Select the HR3 Mode by pressing the **HR3** program key.

2) Use a swash plate with a pawl position every 120°.

3) Use three servos linked directly to the swash plate, to perform the AIL, ELV, and PIT operations.

<Aileron Operation>

When the aileron and pitch servos are operated, the swash plate is tilted left and right. The elevator servo remains stationary.

<Elevator Operation>

All three servos move to **tilt** the swash plate fore and aft.

<Pitch Operation>

All servos operate simultaneously to move the plate up and down.

4) Set the servos for AIL, PIT, and ELV operation by using the reversing function for each servo.

5) Move the cursor to the rate line with the **↓** or **↑** cursor key and set the direction of operation of the servos with the **+** and **-** program keys.

6) Use the ATV function to set the throw of each servo so that all are equal.

7) Move the cursor to the AIL, ELV, or PIT position with the **←** or **→** cursor key and set the rates with the **+** or **-** program key.

8) Because each servo performs two or three operations, be sure that the rates set are not excessive for the servo mechanics.

### (d) HN3 Type, Fig.

1) Select the HN3 Mode by pressing the HN3 program key of the SWASH MODE screen.

2) Use a swash plate with a pawl position every 120°.

3) Use three servos, linked directly to the swash plate to perform the AIL, ELV, and PIT operations.

<Aileron Operation>

All three servos operate to **tilt** the swash plate left and right.

<Elevator Operation>

The elevator and pitch servos operate to **tilt** the plate fore and aft. The aileron servo remains stationary.

<Pitch Operation>

All three servos operate in unison to move the swash plate up and down.

4) Set the servos for AIL, ELV, AND PIT by using the servo reversing function.

5) Move the cursor to the Rate line with the **↓** or **↑** cursor key and set the direction of operation of the servos with the **+** and **-** program keys.

6) Use the ATV function to set the throw of each servo so that all are equal.

7) Move the cursor to the AIL, ELV, AND PIT positions with the **←** or **→** cursor key and set the rates with the **+** and **-** program keys.

8) Because each servo performs two or three operations, be sure that the rates set are not excessive for the servo mechanics.

(e) H-4Type

- 1) Select the H-4 Mode by pressing the **H-4** program key of the SWASH MODE screen.
- 2) Use a swash plate with a pawl position every 90°.
- 3) Use four servos linked directly to the swash-plate (AIL, PIT, ELV, and ELEV-(AU2)) to perform Aileron, Elevator, and Pitch operations.  
<Aileron Operation>  
The aileron and pitch servos tilt the swash plate left and right.  
<Elevator Operation>  
The elevator and 2nd elevator (AUX2) servo operate to tilt the plate fore and aft.  
<Pitch Operation>  
All four servos move in unison to lift the swash plate up and down.
- 4) Set the servos for aileron, pitch, and elevator operation by using the servo reversing function.

- 5) Move the cursor to the RATE line with the **↓** or **↑** cursor key and set the direction of operation of operation to the servos with the **+** and **-** program keys.
- 6) Use the ATV function to set the throw of each servo so that all are equal.
- 7) Move the cursor to the AIL, ELV, or PIT position with the **←** or **→** cursor key and set the rates with the **+** and **-** program keys.
- 8) Because each servo performs two operations, be sure that the rates are not excessive for the servo mechanics.

Use a coaxial swash plate with the H-2, HR3, and H-4 Mixing Modes.

## **5:THROTTLE** THROTTLE MIX

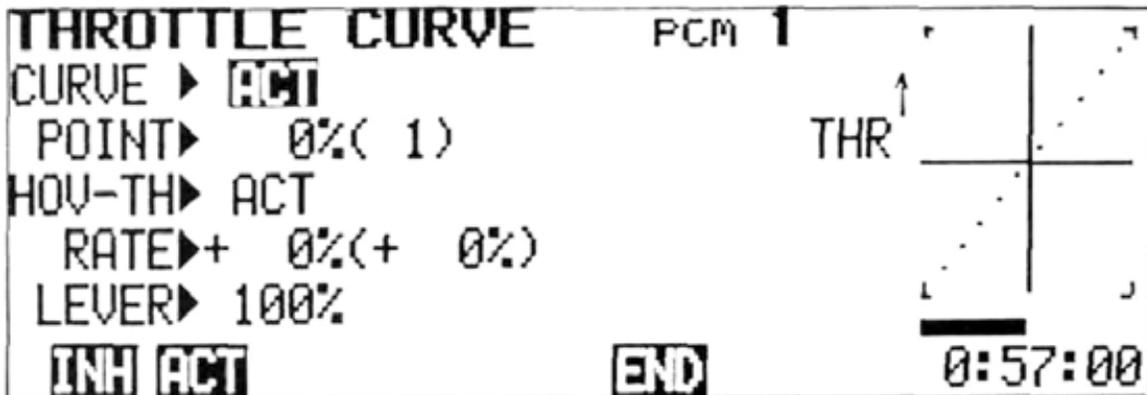
<b>THROTTLE</b>	<b>PCM 1 T9VHP</b>
1 TH-CURVE/HOV-TH	
2 IDLE-UP1	
3 IDLE-UP2	
4 TH-HOLD	
5 RUD to THR	
<b>1 2 3 4 5 END</b>	<b>0:56:00</b>

## ADJUSTMENTS AND FLIGHT TECHNIQUES

### TH-CURVE/HOV-TH THROTTLE CURVE Throttle Curve/Hovering Throttle

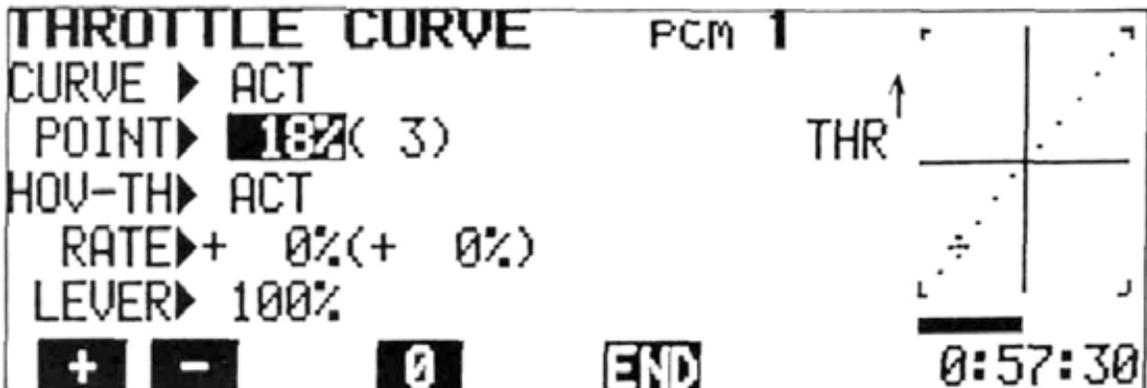
The throttle (CH3) servo response curve is represented by a graphic display on the right side of the THROTTLE CURVE screen. The response curve is divided into 11 equal segments by 12 dots or "Points" on the graphic display. Each of the 12 Points can be adjusted up or down on the display to refine the shape of the curve.

The HOV-TH (Hovering Throttle) function trims the throttle servo position when the T/C stick is near the center (hover) position. High and Low throttle servo limits are not affected. Initial adjustment of the hover position can be made using the computer display. Later, field adjustments can be made with the Hovering Throttle Knob on the transmitter. Throw (trim authority) of the knob is adjustable.



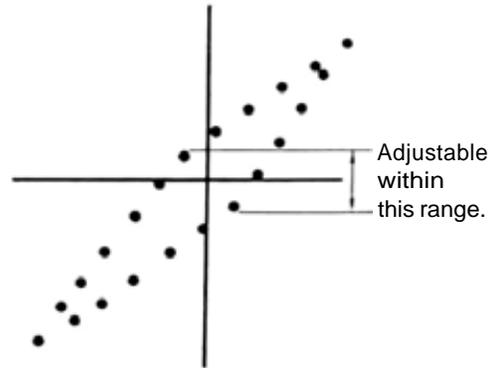
#### Setting Method

- 1) Install the throttle servo and linkage according to the helicopter manufacturer's instructions.
- 2) Move the Throttle Trim (ATL) lever to the full low position. Set the Hovering Throttle Knob to the "0" position. Set the extreme HIGH and LOW servo limits using the AFR setting screen (See page 17).
- 3) Select the EDIT screen and move the cursor to Line 2 with the **↓** cursor key, and press the **MIX** program key.
- 4) Select the THROTTLE mixing screen by pressing the **5** program key, then select the throttle setting mode by pressing the **1** TH-CURVE/HOV-TH program key.
- 5) To activate the throttle curve, move the cursor to the CURVE position and press the **ACT** program key.



(1) CURVE

- 1) Move the cursor to the POINT position with the **↓** or **↑** cursor key.
- 2) Select the curve point on the display that you wish to adjust by using the **←** or **→** cursor key. The "Point Cursor" is denoted by a "+" symbol and will be on the point that is selected for adjustment.
- 3) The point number is displayed in ( ). Points are numbered 1 through 12 from left to right on the display.
- 4) Each point can be adjusted up or down with the **+** or **-** program key. The rate setting for that point is displayed inside the standard cursor. Extreme precision and versatility in setting the throttle is made possible.
- 5) To return to a standard linear response curve, press the **0** key.



The amount actually set, including the trim is displayed in ( ).

(2) Hovering Throttle

- 1) Move the cursor to the HOV-TH position and press the **ACT** program key.
- 2) Set the T/C stick at center and move the cursor to the RATE line with the **↓** cursor key.
- 3) Set the desired throttle servo position at hover by using the **+**, **-**, or **0** program key. The rate set by the computer is displayed inside the standard cursor. The total rate set, including the amount added or subtracted with the HOV-TH trim knob is displayed in ( ).
- 4) To change the throw when the Hovering Throttle Knob is turned, move the cursor to the LEVER position with the **↓** cursor key and set the throw with the **+** and **-** program keys or the **100** program key.
- 5) To deactivate the hovering throttle, move the cursor to the HOV-TH ACT position with the **↓** or **↑** cursor key and press the **INH** program key.

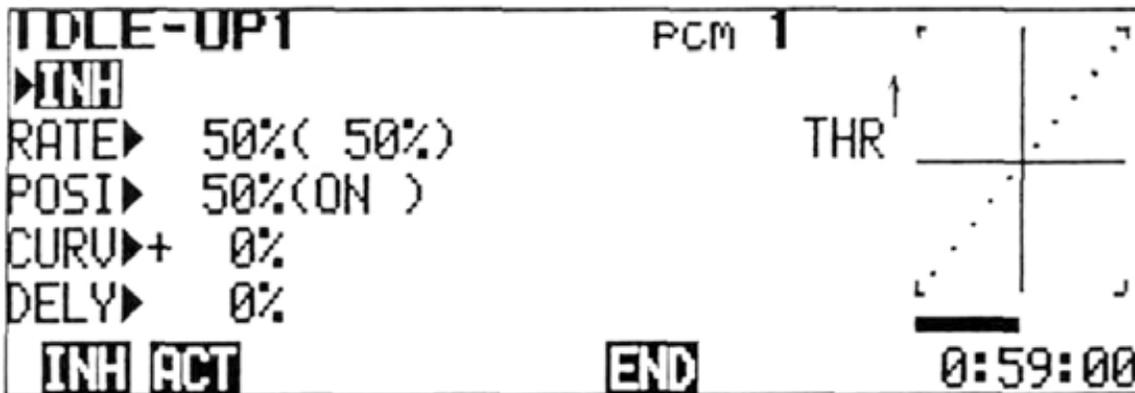
Return to the THROTTLE mixing screen by pressing the **END** program key.

*NOTE: Throttle mixing cannot be used in the basic mixing mode.*

## ADJUSTMENTS AND FLIGHT TECHNIQUES

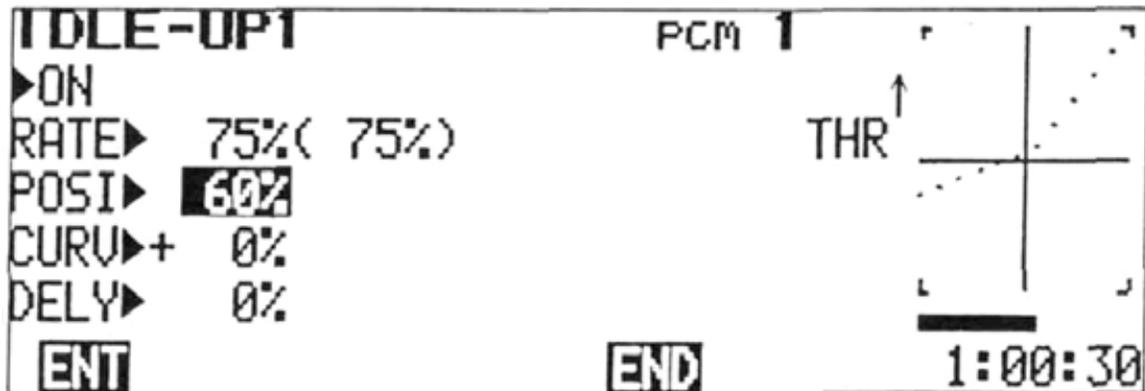
### **IDLE-UP1** **IDLE-UP2** IDLE UP 1.2 Idle-up 1 and 2

- Idle-Up or "High Idle" functions allow the collective pitch to be reduced while engine speed is reduced to a lesser extent. This allows a more constant engine and main rotor speed during hovering and certain aerobatics. Collective pitch response is improved.
- Two separate Idle-Up circuits are provided. Idle-Up 1 is usually used for normal hovering and forward flight, while Idle-Up 2 is usually reserved for aerobatics where a high rotor speed is needed at low (negative) pitch settings (while inverted during rolls, etc.).
- Each Idle-Up circuit has a "Point" and "Rate" adjustment. The "Point" is the T/C stick position above which the Idle-Up has no effect. The "Rate" adjustment sets the throttle servo response curve as the stick is moved below the Idle-Up "Point".
- The CURVE adjustment on the IDLE-UP screens can be used to refine the shape of the response curve below the idle-Up "Point".
- The DELAY function slows the servo movement from the normal to idle-Up position when the idle-Up Switch is turned ON. This makes the transition in engine speed less abrupt.

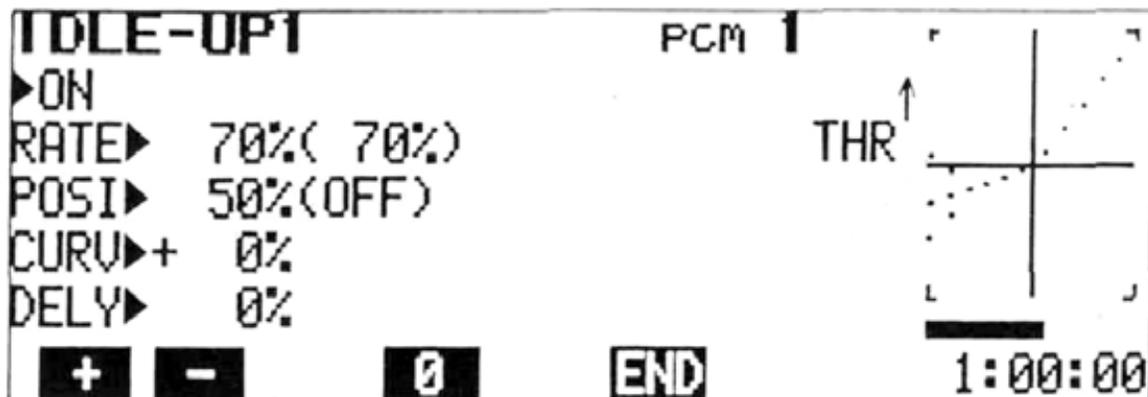


#### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 2 with the **↓** cursor key, and press the **MIX** program key.
- 2) Select the THROTTLE mixing screen by pressing the **5** program key, then press the **2** program key (**3** program key for Idle Up 2).
- 3) To activate the Idle-Up function, move the cursor to the **INH** position and press the **ACT** program key. If the IDLE-UP 1 Switch is on, "ON" is displayed. If the IDLE-UP 1 Switch is off, "OFF" is displayed.
- 4) Move the cursor to the POSI position with the **↓** or **↑** cursor key.
- 5) Set the Idle-Up "Point" by moving the T/C stick to the desired position and pressing the **ENT** key. (About 50% for IDL1 and 70% for IDL2 initially.) As the T/C stick is moved above the Idle-Up Point, "OFF" is displayed in ( ). As the stick is moved below the point, "ON" appears in ( ) to indicate that the Idle-Up function is operating (if the appropriate Idle-Up switch is ON). The Point cannot be set above the 75% position or below the 25% position.



- 6) Move the cursor to the RATE line with the  $\downarrow$  or  $\uparrow$  cursor key. Set the Idle Up Rate Knobs on the top left of the transmitter to "0".
- 7) Set the rate for the desired throttle opening at full LOW position of the T/C stick, using the  $\oplus$ ,  $\ominus$ , or  $\text{100}$  program key. (When the Idle-Up switch is ON.) Initially set the rate for about 40% carburetor opening on IDL1 and about 60 to 70% on IDL2 (actual opening, not the computer display figure).
- 8) The rates can be trimmed with the Idle Up Knobs. The total rate set including the trim amount is displayed in ( ). A buzzer sounds when the knob is turned to the center position (Trim = 0).
- 9) To refine the shape of the Idle Up curve below the Idle Up Point, move the cursor to the CURV position and set the response curve shape with the  $\oplus$  or  $\ominus$  program key. Press the  $\text{0}$  key to return to a standard linear curve.
- 10) The Idle-Up Delay is set by moving the cursor to the DELY position and setting the Delay amount with the  $\oplus$ ,  $\ominus$ , or  $\text{100}$  key (Only Idle-Up 1 has a Delay feature).



- The curve at Idle-Up can be confirmed by turning on the IDLE-UP 1 and IDLE-UP 2 Switch.
- Idle-Up rate setting example.
 

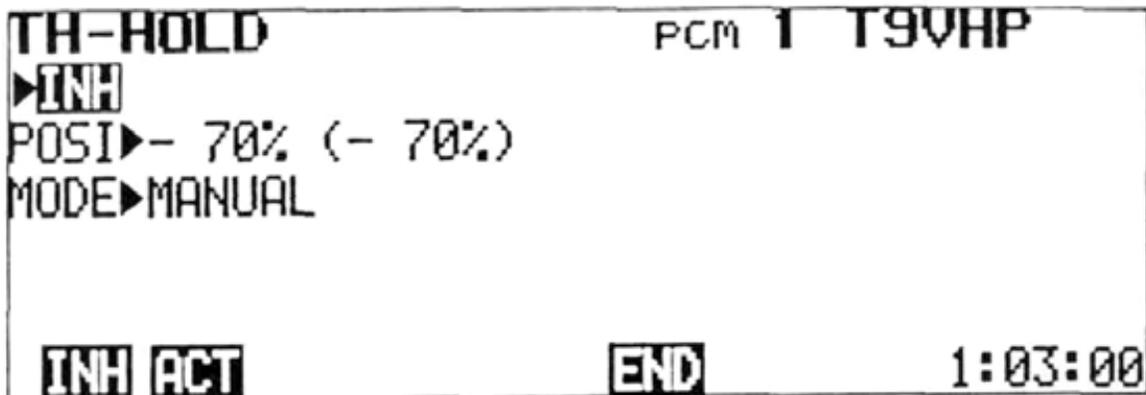
Idle-up 1 rate	50%
Idle-up 2 rate	70%
Position	50%

**NOTE:** Throttle mixing cannot be used in the BASIC mixing mode.

## ADJUSTMENTS AND FLIGHT TECHNIQUES

### **TH-HOLD** TH-HOLD Throttle Hold

- *Throttle Hold is used for practicing autorotations. When the TH-HOLD Switch is pulled, the throttle (CH3) servo moves to a pre-set position (at or near idle) and remains there as long as the HOLD Switch is left ON. Throttle -> Pitch mixing is disconnected, and the collective pitch servo operates over the full range with the T/C stick.*
- *Manual or Auto mode can be selected. In MANUAL mode, TH-HOLD is engaged as described above. In the AUTO mode, the TH-HOLD Switch is set to ON in preparation for performing autorotation. The HOLD function then automatically engages when the T/C stick is moved below a certain (adjustable) position.*
- *The Pitch Curve is fully-adjustable for optimum performance in autorotations (See page 28).*



#### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 2 with the **↓** cursor key, then press the **MIX** program key.
- 2) Select the THROTTLE mixing screen by pressing the **5** program key, then select the TH-HOLD screen by pressing the **4** program key.
- 3) To activate Throttle Hold (Manual), move the cursor to the **INH** position and press the **ACT** program key. If the THROTTLE HOLD Switch is on at this time, "ON" is displayed. If the THROTTLE HOLD Switch is OFF, "OFF" is displayed.
- 4) To set the servo position when the Throttle Hold Switch is turned ON, move the cursor to the POSI position with the **↓** or **↑** cursor key.
- 5) Set the servo to the idling position with the **+** or **-** program key. 0% = Center (neutral) position. "+" = higher throttle. "-" = slower throttle. Hint: With the TH-HOLD Switch OFF, set the T/C stick and trim (ATL) lever to the safe idle position. Stop the engine, and adjust the TH-HOLD position so that the servo does not move when the HOLD Switch is turned ON and OFF. For competition, etc., the TH-HOLD position can be set to the engine shut off point if desired.
- 6) The TH-HOLD servo position can be trimmed with the TH-HOLD sub trimmer on the trimmer panel. A tone sounds at the trimmer neutral position. The actual position set, including the sub trim amount is displayed in ( ). Hint: With the HOLD position set at idle with the program keys, the HOLD position can be quickly changed to full cut-off using the sub trimmer.

#### TH-HOLD AUTO MODE

- 1) Move the cursor to the MODE position with the **↓** or **↑** cursor key.
- 2) Activate the Auto Mode by pressing the **AUT** key.
- 3) ON or OFF is displayed in the ( ) at the right side of the POSI % display.
- 4) To set the throttle hold ON and OFF position, move the T/C stick to the desired position and press the ENT program key. That position is memorized.

- 5) When the T/C stick is moved above the AUTO ON/OFF position, OFF is displayed in ( ) and TH-HOLD is not engaged. As the stick is lowered past the memorized stick point, ON is displayed and TH-HOLD is engaged (if the HOLD Switch is ON).
- 6) When the stick is above the ON/OFF point and the HOLD Switch is set to ON, the word "PRE" will be displayed at the top left of the screen. As the stick is lowered past the ON/OFF point, the "PRE" changes to "ON",

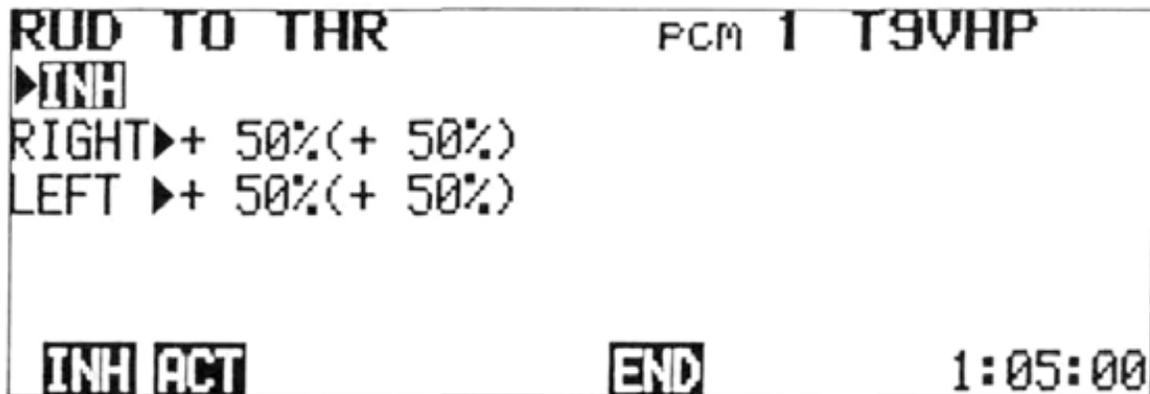
indicating that TH-HOLD is engaged. ON is also displayed in ( ) on the POSI line, indicating that the T/C stick is below the ON/OFF point. When the TH-HOLD Switch is turned OFF, the word "OFF" is displayed at the top left and TH-HOLD remains OFF regardless of stick position.

- 7) To deactivate Throttle Hold, move the cursor to the **ACT** position and press the **INH** program key.

*NOTE: Throttle mixing cannot be used in the BASIC mixing mode.  
To return to the THROTTLE mixing screen, press the **END** program key.*

## **RUD to THR** RUD TO THR Rudder to Throttle

*Rudder (CH4) -> Throttle (CH3) mixing automatically increases or decreases throttle when the rudder stick is moved left or right. Therefore, power is increased when tail rotor pitch is increased and vice versa. This reduces the tendency of the helicopter to rise or descend vertically when a tail rotor (rudder) command is given.*



### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 2 with the **↓** cursor key, then press the **MIX** program key.
- 2) Select the THROTTLE screen by pressing the **5** program key, then press the **5** (RUD to THR) program key.
- 3) To activate Rudder -> Throttle mixing, move the cursor to the **INH** position with the **↑** or **↓** cursor key, and press the **ACT** program key.
- 4) To set the amount (rate) and direction of throttle servo movement (in response to rudder input), move the cursor to the RIGHT or LEFT (rudder) line with the **↓** or **↑** cursor key.
- 5) Set the direction of throttle servo movement with the **+** and **-** program keys and the amount of movement (rate) with the **+**, **-**, or **0** keys.
- 6) The left and right rates can be trimmed simultaneously with the RUD. ▶THR. sub trimmer on the trimmer panel. The rates actually set, including trim, are displayed in ( ). A limiter prevents operation exceeding the throttle stick limits.
- 7) Set the rates initially to 0%, then increase gradually.

## ADJUSTMENTS AND FLIGHT TECHNIQUES

### TRM TRIM

#### Trim Authority

When Trim adjustments are too sensitive (Ex: One notch on the trim lever in either direction is too much) the Trim Rate (Authority) can be reduced, allowing finer adjustments.

#### ATL

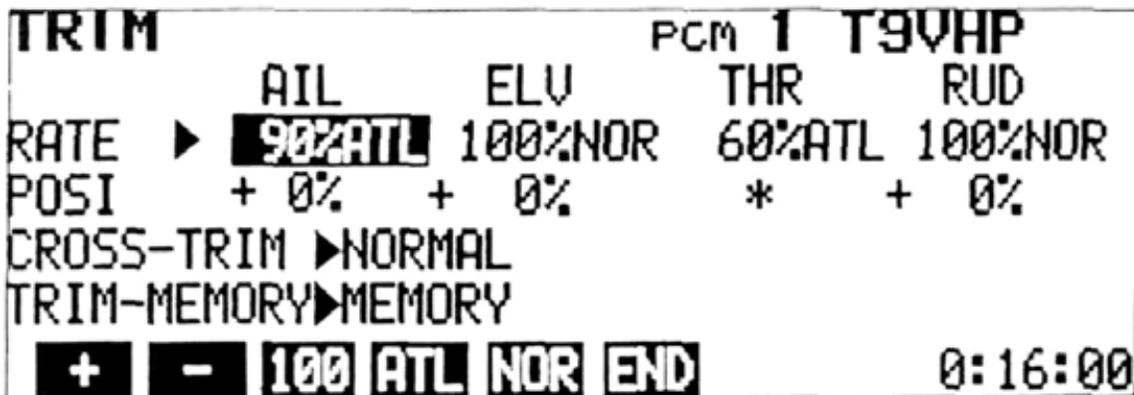
This type of trim is most useful on the Throttle channel. When the ATL function is used, the trim lever will affect only the extreme LOW throttle servo position. The servo position at HIGH throttle is unaffected by the trim. Therefore, the idle speed can be easily adjusted, while the full throttle opening remains the same.

#### Cross Trims

Whether or not the Throttle (CH3) and Elevator (CH2) trim levers are "crossed" can be selected.

#### Trim Memory

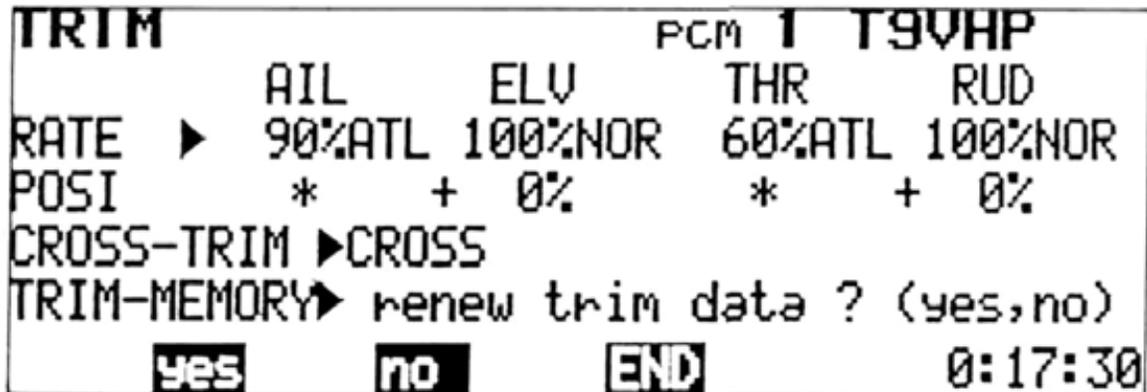
Trim settings can be memorized by the computer, allowing the trim levers and knobs to be returned to neutral position. The trim settings can be left stored on the same program while flying other models, and may also be copied to other programs in the transmitter memory.



#### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 2 with the **↓** or **↑** cursor key, and display the TRIM screen by pressing the **TRM** program key.
- 2) Move the cursor to the RATE line and use the **→** and **←** cursor keys to select the channel to be set. Select normal trim or ATL with the **NOR** or **ATL** program key and set the Trim Rate (Authority) with the **+**, **-**, or **100** program key. Trim throw can be adjusted from 30% to 100% of normal. Pressing the **100** key will return the rate to 100%.
- 3) The trim position will be displayed on the POSI line (except in the ATL mode).
- 4) If "crossed" trim levers are desired (Elev. trim lever controls throttle trim and the normal throttle trim lever controls elev. trim), move the cursor to the CROSS-TRIM line and press the **CRS** program key.

## TrimMemory



- 1) After the model is "trimmed out" and flying well, land and select the TRIM screen.
- 2) Move the cursor to the TRIM-MEMORY line and press the **MEM** program key. A message will be displayed asking if the trim data is to be renewed. Press the **YES** program key. All trim positions are then "memorized" by the computer.
- 3) All trim levers featuring Trim Memory can then be returned to their neutral positions. When the AIL, ELEV, RUD, and THR Trim Levers are moved to their neutral positions, a softer "click" will be felt. When a knob or sub trimmer is moved slowly to the neutral position, a tone will sound indicating the electrical neutral. Positions displayed on the POSI line

of the TRIM screen should then be equal to those displayed before pressing the **yes** key.

### <Trim Memory Trimmers>

- a) Control Stick Trim (Except ATL trim)
- b) Eight sub trimmers on the trimmer panel
- c) REV MIX UP and DN Knobs
- d) IDLE-UP 1 and 2 Knobs
- e) Hovering Pitch and High Pitch Trim Levers
- f) Hovering Throttle Knob
- g) Pitch Trim (when activated)

## ADJUSTMENTS AND FLIGHT TECHNIQUES

### **PAR** PARAMETER

- 1) *Servo Test*: Each servo is operated in linear fashion from neutral, to its maximum and minimum positions. The operation is repeated sequentially for Channels 1 through 8.
- 2) *Mixing Mode*: In the BASIC mode, all of the special mixing circuits except Programmable Mixing are deactivated. BASIC or HELI operating mode can be selected.
- 3) *PCM/PPM*: PCM or PPM encoding can be selected with this function. PPM encoding allows the transmitter to be used with standard FM receivers.
- 4) *D/R SW DIR*: The ON/OFF directions of the D/R Switches can be selected. In Mode 1, the upper position is the D/R ON (Low Rate) position, and in Mode 2, the lower position is the ON position.
- 5) *COMBI SW*: The function of the CH5 switch can be selected from among Rudder D/R, Rudder Offset, and Idle-Up 1.



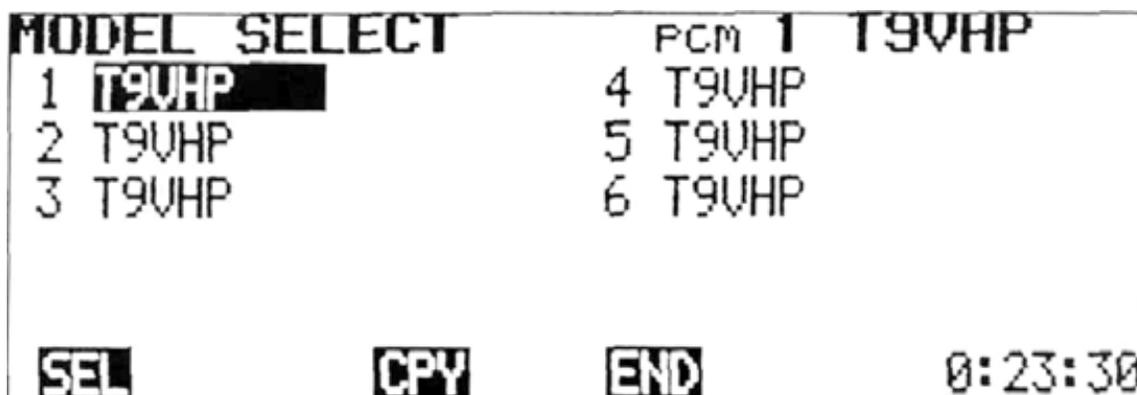
#### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 2 with the **↓** or **↑** cursor key, then display the PARAMETER screen by pressing the **PAR** program key.
- 2) *Servo Test*: Move the cursor to the SERVO-TEST position with the **↑** or **↓** cursor key. Turn the function ON and OFF with the **ON** and **OFF** program keys.
- 3) *MIX-MODE*: Move the cursor to the MIX-MODE position with the **↑** or **↓** cursor key. Select either the BASIC or HELI mixing mode by pressing the **BASC** or **HEL** program key.
- 4) *PCM/PPM*: Move the cursor to the PCM/PPM position and select the desired encoding method by pressing the **PCM** or **PPM** program key.  
*NOTE: The encoding will NOT change until the transmitter power switch is turned OFF and back ON again.*
- 5) *Dual Rate Switch Direction*: Move the cursor to the D/R SW DIR position and select Mode 1 or Mode 2 with the **1** or **2** program key.
- 6) *Combi Switch*:
  1. Move the cursor to the COMBI SW position using the **↓** or **↑** cursor key and activate or deactivate the function with the **ACT** and **INH** program keys.
  2. Designate the CH5 Switch or the AUX. CH8 switch as the COMBI switch with the **GEA** or **AU2** program key.
  3. Move the cursor to the MIX position with the **↑** or **↓** cursor key. To use IDLE-UP1, press the **IDL** soft key and to use rudder offset, press the **ROF** soft key. When nothing is used, press the **INH** soft key.
  4. Move the cursor to the D/R position with the **↑** or **↓** cursor key and select if rudder D/R is deactivated or activated when the COMBI switch is turned on with the **INH** and **ACT** soft keys.
  - 7) Return to the EDIT screen by pressing the soft key.

## **MDL** MODEL SELECT

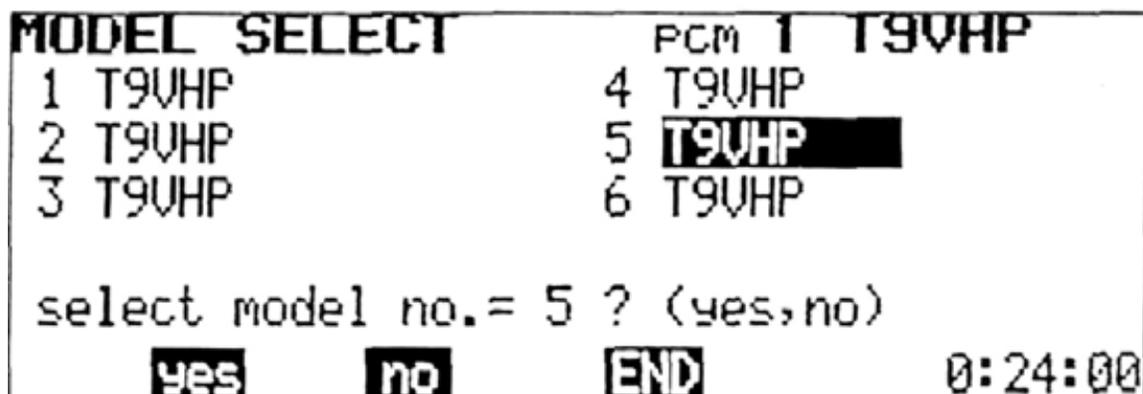
### Model Select Functions

- 1) Settings and data for up to 6 different models can be stored independently in the transmitter memory.
- 2) Any one of the 6 programs (models) can be selected for use when desired.
- 3) Each model can be given a name of up to 8 characters using the NAME function (See page 49).
- 4) After the Trim Memory function has been performed, the trim positions for each model can be read by selecting the desired model and setting each trimmer to the center position. Then the best setting for up to six models can be re-read.



### Setting Method

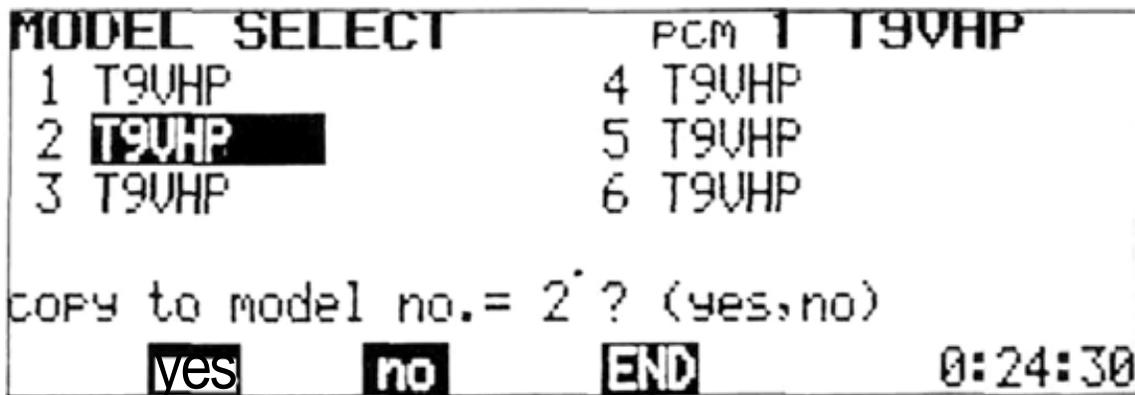
- 1) Select the EDIT screen and move the cursor to Line 2 with the **↓** or **↑** cursor key, and display the MODEL SELECT screen by pressing the **MDL** program key. The position of the cursor will then indicate the model currently selected.
- 2) Select the desired model number with the **↓**, **↑**, **←**, and **→** cursor keys and press the **SEL** program key. A message asking if the selection is to be executed will be displayed. To execute the selection, press the **yes** program key. When the **yes** program key is pressed, the model number and name at the top right corner of the screen change to show the new selection. In the example shown, the message asks if model No. 5 is to be selected. To select Model No. 5, the **yes** soft key is pressed. To remain with Model No. 1, the **no** program key is pressed.



## ADJUSTMENTS AND FLIGHT TECHNIQUES

### Model Copy Function

- The Copy function allows the programmed data and trim positions for one model to be duplicated in their entirety on another program (model) number. As an example, let's suppose that Aircraft No. 1 is properly-trimmed and flies well, but you wish to experiment with a different mixing or trim setting. The Model No. 1 data can be copied onto the Model No. 2 program. You can then make the experimental trim modification on the Model No. 2 program only. The original settings will be retained as is, on the No. 1 program. The MODEL SELECT function can then be used to easily switch back and forth between the old and new setting for comparison (although not in-flight).
- As another alternative, settings for a given model could be copied on two or more programs with modifications for different weather conditions, maneuver schedules, etc.



#### Setting Method

- 1) Perform the Model Select function to select the Model No. that you wish to copy.
- 2) Move the cursor to the program No. that you wish to copy the data onto, and press the **CPY** program key.
- 3) A message will appear asking if the data is to be copied, (in the example shown, the Model No. 1 data is to be copied to the Model No. 2 program slot.)
- 4) Press the **yes** key to execute the copy function or the **no** key to cancel.

*NOTE: Perform the TRIM MEMORY function before copying. The trim levers can then be set to the neutral position.*

### 3 ▶ **NAM SRV RES** **END**

Move the cursor to Line 3 of the EDIT screen with the  cursor key.

<b>NAM</b>	NAME		
<b>NAME</b>		PCM 1	T9VHP
A	BCDEFGHIJKLM	-01234	
N	OPQRSTUVWXYZ.	/56789	
< SELECT & INPUT CHARACTER >			
<b>MODEL</b>		<b>CODE</b>	<b>USER</b>
T9VHP		0000	FUTABA
<b>ENT</b>			<b>SET</b> <b>END</b> 0:25:00

A model name of up to 8 characters and a user name of up to 10 characters can be input. The user name has a security feature. Once a four-digit ID number is input, the user name cannot be changed unless the same ID code is input first (The ID code does not appear on the screen after the initial input).

The model name and user name are initially set to T9VHP and FUTABA, respectively.

The model name and user name are displayed at the top right and left corners of the screen. The user name is displayed on the standard screen only.

**NOTE:** CODE number 0000 is an open code and the user name can be changed. For example, if 1234 is set as your personal ID code number, it is memorized, together with your name, and the user name cannot be changed if the code number 1234 is not input first.  
**DO NOT FORGET YOUR CODE NUMBER!!!**

#### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 3 with the  cursor key, then display the NAME screen by pressing the **NAM** program key.
- 2) Use the , , , and  cursor keys to move the cursor to each letter or character to be input.

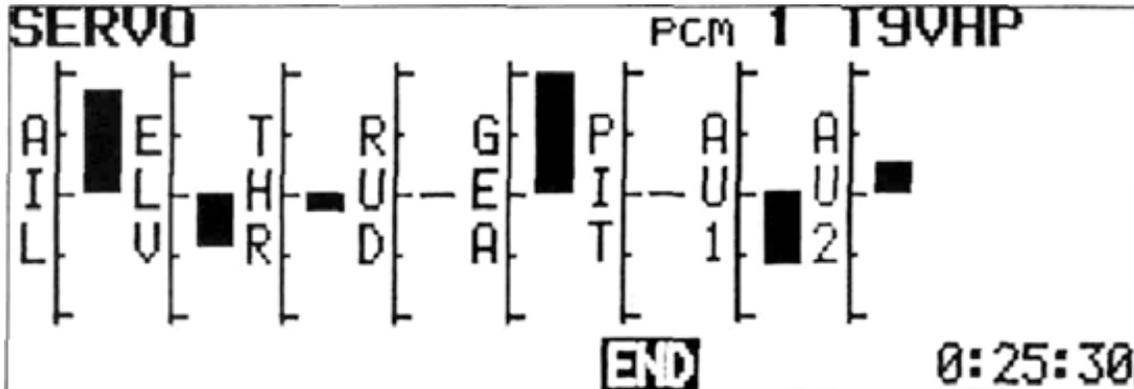
- 3) To input the model name, select each character as in Step 2 and press the **ENT** program key. The character will then appear above the underline and the underline will automatically move to the next space.
- 4) Up to 8 characters can be input by repeating steps 2) and 3). At the completion of the model name, press the **SET** program key.
- 5) To input your personal ID Code, move the lower cursor and the underline to the CODE position with the  or  program key and repeat Steps 2) and 3) to input the characters. Up to four characters can be input. When all code characters are input, press the **SET** key.
- 6) Next, move the cursor to the USER input position with the  or  program key, and a user name of up to 10 characters can be input (Steps 2 and 3). At the completion of the user name input, press the **SET** key.
- 7) When the NAME screen is again selected after the ID code has been set the code will NOT be displayed. The code and user name cannot be changed unless the original code is re-entered (Repeat Step 5 including pressing the **SET** key). The ID code and user name can then be changed. Therefore, do not forget your ID code.

*If you should forget your personal ID code, it can only be reset by a Futaba service center.*

## ADJUSTMENTS AND FLIGHT TECHNIQUES

### **SRV** SERVO (Transmitter Test Mode)

Transmitter control movements are shown on a bar graph representing servo movement for channels 1 through 8. The center of the graph is the neutral position. The bottom half indicates counterclockwise servo rotation and the top half represents clockwise rotation.



#### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 3 with the **↓** cursor key, then display the SERVO screen by pressing the **SRV** program key.
- 2) Bar graphs proportional to the servo throw

can be observed by operating the control sticks, levers, and switches of each channel of the transmitter (1 to 8). This can be used to test the performance of the transmitter, and check the effect of new settings and data inputs.

### **RES** RESET

The RESET function can be used to return programmed data to the original factory settings. Certain functions can be reset individually (Items 1 through 7 below), or all data can be reset in a single operation (Item 8).

Functions to be Reset:

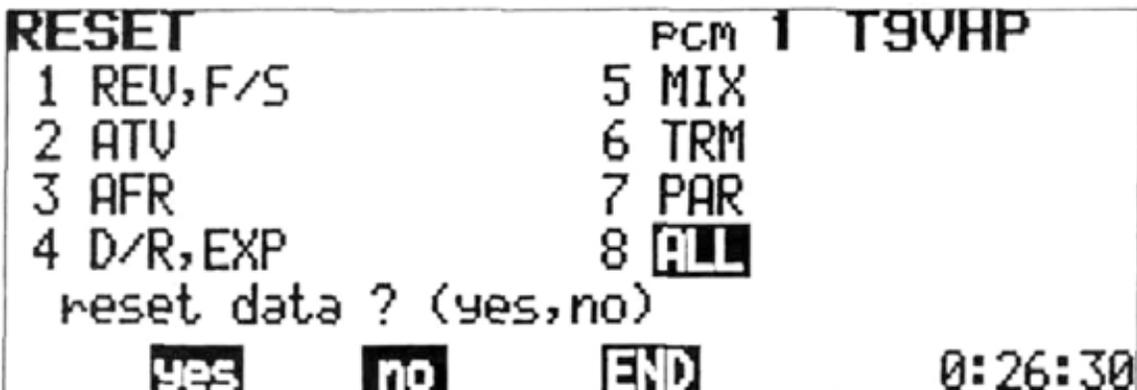
- |             |             |        |        |
|-------------|-------------|--------|--------|
| 1. REV, F/S | 3. AFR      | 5. MIX | 7. PAR |
| 2. ATV      | 4. D/R, EXP | 6. TRM | 8. ALL |
- ALL resets Items 1 through 7 simultaneously.

the **RES** program key.

#### Setting Method

- 1) Select the EDIT screen and move the cursor to Line 3 with the **↓** cursor key, then press

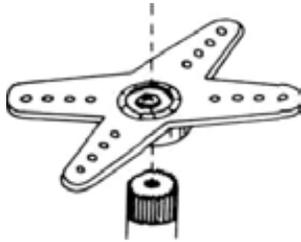
- 2) Move the cursor to the Item No. to be reset with the **↓**, **↑**, **←**, or **→** cursor keys.
- 3) Press the **RES** program key. A message will appear asking if the data is to be reset.
- 4) To complete the RESET operation, press the **yes** program key. To cancel the operation, press the **no** key.



# •SPLINED HORN

The splined horns allow adjustment of the servo neutral position at the servo horn.

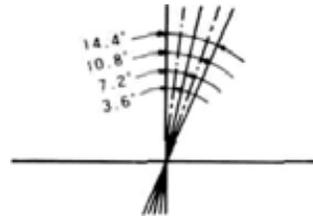
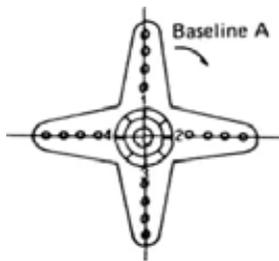
Neutral position adjustment  
a) Angle divisions



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

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

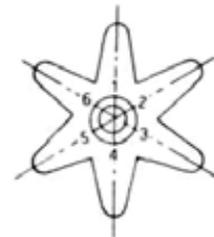
b) Effect



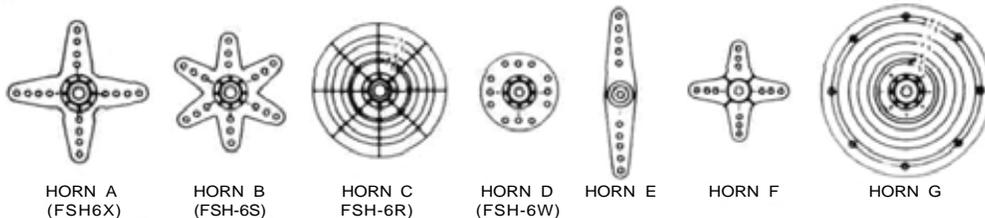
To shift the holes center line to the right (clockwise) relative to baseline A, shift arm 2 to the position of arm 1 and set it to the position closest to baseline A.  
(Example) For a four arm horn, the angular shift per segment is  $14.4^\circ$ . The shift to the right is:  
 $90^\circ - (14.4 \times 6) = 3.6^\circ$

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

For a six arm horn, turn the arm counterclockwise and set arm 2 to the position of arm 1.  
The adjustable angle is  $60 - (14.4 \times 4) = 2.4^\circ$ .  
Arm 3 shifts  $4.8^\circ$  to the right, arm 6 shifts  $2.4^\circ$  to the left, and arm 4 shifts  $7.2^\circ$  to the right and left.



The following splined horns are optional.



HORN A (FSH6X)

HORN B (FSH-6S)

HORN C (FSH-6R)

HORN D (FSH-6W)

HORN E

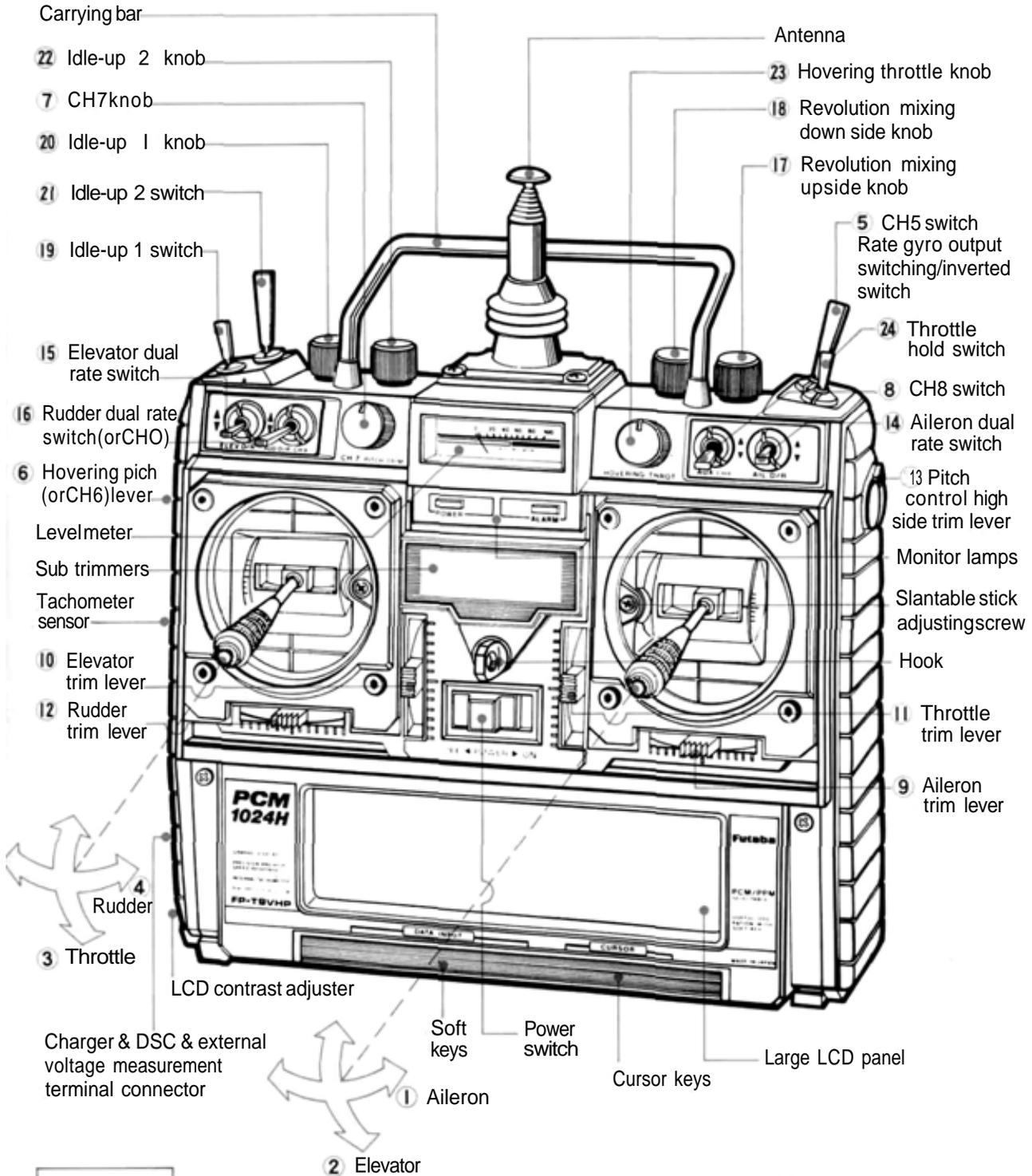
HORN F

HORN G

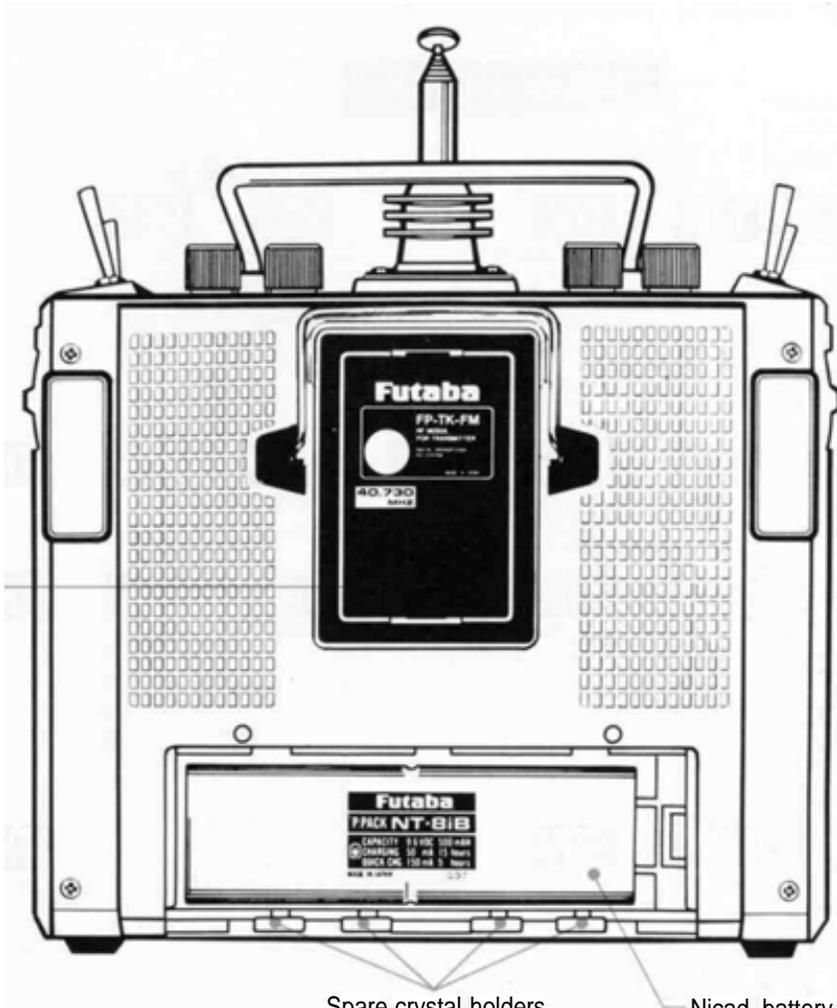




# •T9VHP TRANSMITTER CONTROLS



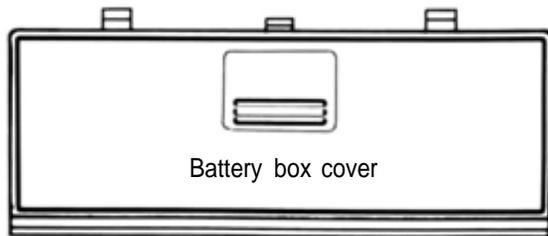
MODE II



RF module

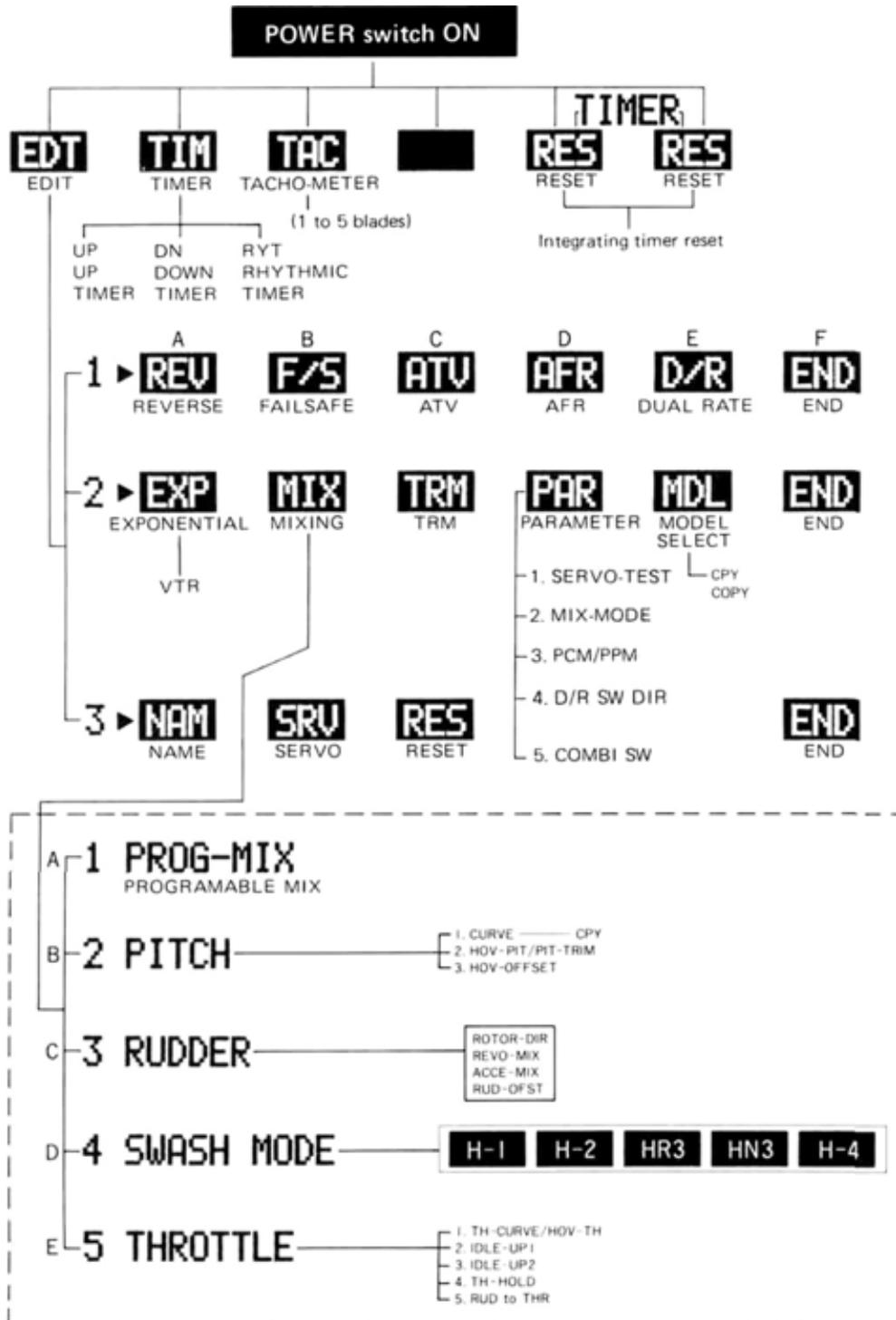
Spare crystal holders

Nicad battery



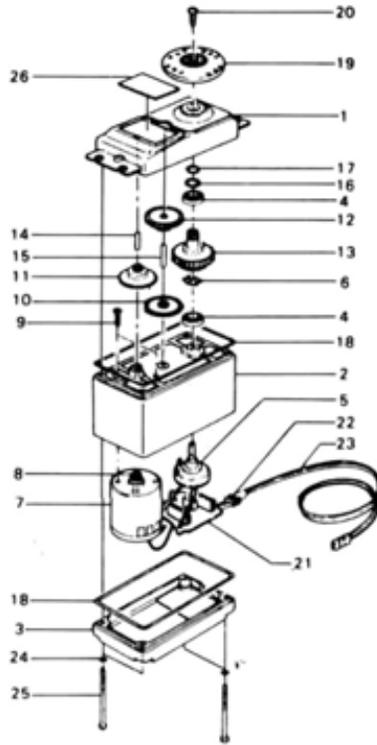
Battery box cover

# •T9VHP SOFT MAP 2



This portable soft map shows which soft keys change to which function keys when a soft key (DATA INPUT key) was pressed. Use it when setting data in the field.

## •FP-S9201 EXPLODED VIEW



No.	Part Name	Part No.
1	Upper case	S05770
2	Middle case	S05780
3	Bottom case	S05790
4	Ball bearing L1060	S04130
5	VR	I39995
6	VR drive plate	S02753
7	Coreless motor	S91215
8	Pinion gear	S05530
9	Flat head Phillips screw 1.6x2.5	J51008
10	1st gear	S02751
11	2nd gear	S02471
12	3rd gear	S02807
13	Final gear	S02809
14	2nd shaft	S01351
15	Intermediate shaft	S04287
16	Spacer washer	S02486
17	Seal ring	S09415
18	O-ring 32.6 fiber black	S90420
19	Splined horn D	S01239
20	Binding head tapping screw 1.6x10 black	J55204
21	S9201 amp	AS1128
22	Grommet	S90045
23	SPBG, WRB-300B	AT2238
24	O-ring for 1.6mm dia screw	S90410
25	Pan head Phillips screw 2x27.5	J50085
26	S9201 nameplate	S60089

### FACTORY REPAIR SERVICE

To insure prompt service, please follow the instructions given below.

1. Charge the batteries for at least 18 hours prior to shipment.
2. Return the system only. Not your complete installation. Remove the servos from their mounts and remove the foam padding from the receiver.
3. Plugs or other modifications which interfere with factory test procedures will be returned to factory standard at your expense.
4. Carefully pack all components individually, using sufficient packing material to prevent damage during shipment.
5. Include a brief but thorough explanation of all problems and service required and tape it to the back of the transmitter. Place a label describing the function of the servo on each servo.
6. Be sure to include your full address and tel. No., zip code inside the box as well as on the outside.
7. Include a packing list of all items being returned, and double check to make sure that all items are packed.
8. Upon receipt of your equipment at the Futaba factory, an estimate of the cost of repair (over \$25.00 only) will be sent to you. Your equipment will then be repaired and returned to you upon receipt of payment or C.O.D. (cash).

This factory repair service applies only to the continental U.S.A., Hawaii, and Alaska.



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