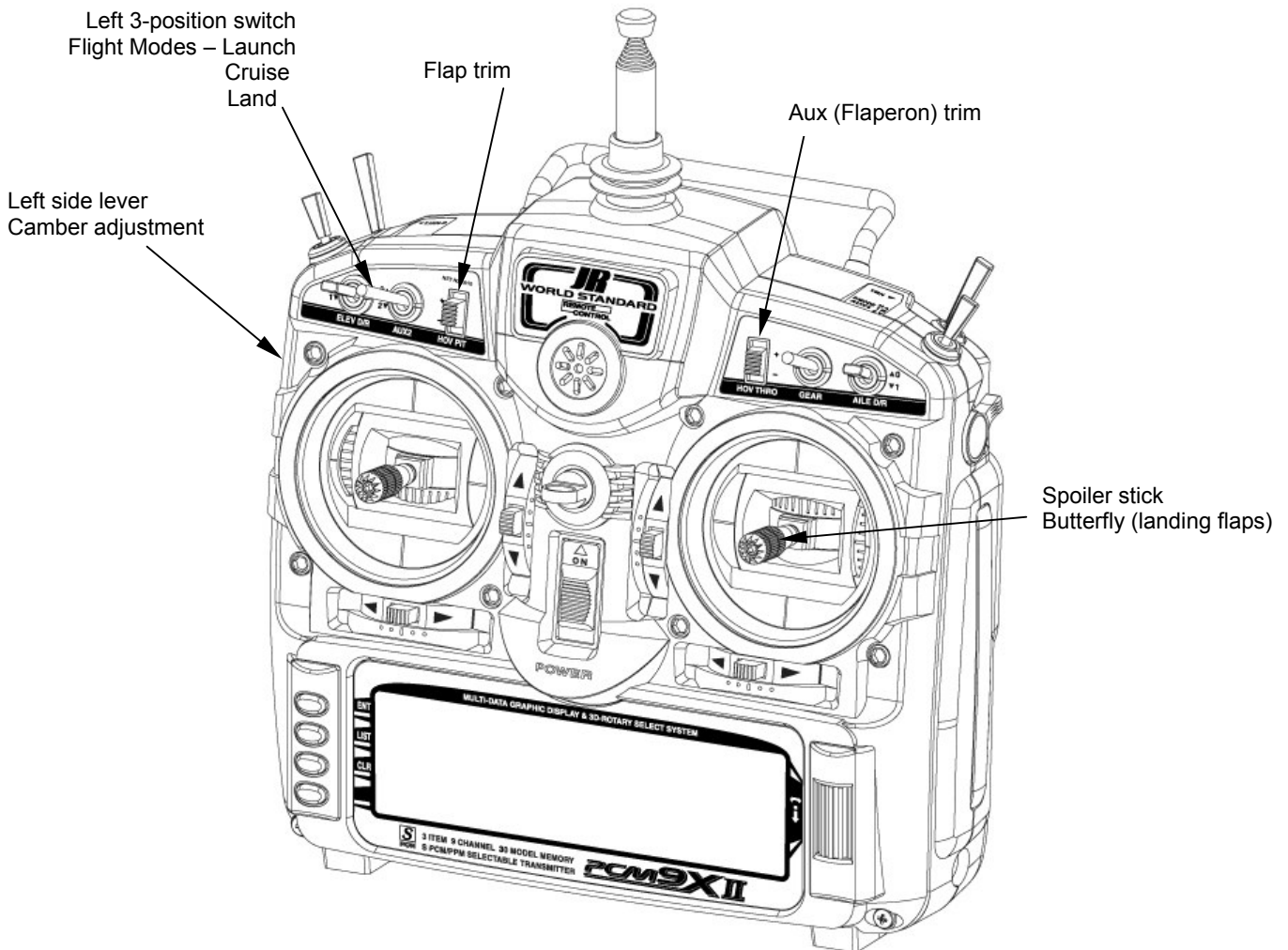# Programming a 6-Channel Sailplane

This section has been adapted for the PCM9X II from the Programming a 6-Channel Sailplane section by Engineering Manager John Adams in the XP9303 manual.

The PCM9X II offers tremendous flexibility allowing nearly infinite setup options. Five flight modes are available that allow virtually every parameter to be independently adjusted in each flight mode. Camber adjustment, landing flaps, motor control, flight modes with all their options, programmable mixes, dual rates and even the two timers can be programmed to several different levers and/ or switches, allowing personal customization preferences.

Following is a step-by-step programming guide that will familiarize you with a typical setup procedure. We recommend following this setup guide during your first attempts at programming, as it will familiarize you with the available functions and how flight modes operate. Later you can customize this setup, adding more flight modes, changing function locations, etc. to meet your specific needs and preferences.



Left 3-position switch
Flight Modes – Launch
Cruise
Land

Flap trim

Aux (Flaperon) trim

Left side lever
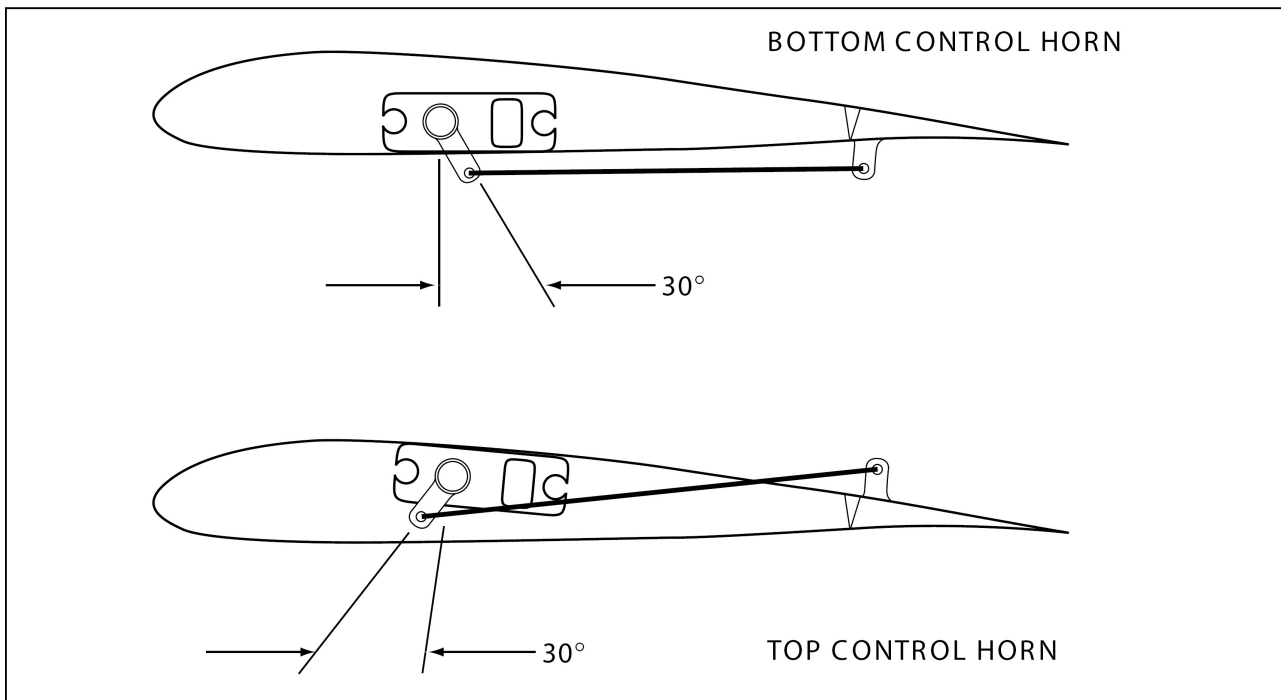Camber adjustment

Spoiler stick
Butterfly (landing flaps)

The following setup utilizes three flight modes (Launch, Cruise and Land), which are selected using the left 3-position switch on the face of the transmitter. Trailing edge camber adjustment will be assigned to the left side lever in the launch and cruise mode. Butterfly (landing flaps) will be assigned to the spoiler stick (throttle stick) to be active in all flight modes. This is the setup I personally use and believe this program offers a great base for sailplane pilots to develop their own setups from.

**Note on installing flap servos:** Typical flap geometry requires that the servo arms be significantly offset to provide adequate down flap throw. This issue exists because flaps typically have a large travel down (80 to 90 degrees) but very little up travel (less than 15 degrees). To achieve proper flap travel, it is necessary that the right flap sub trim is set at 225 down and the left flap sub trim is set at 225 up as a starting point. Then when installing the flap servo arms, be sure the spoiler stick is in the up position and camber lever is in the middle position. Install the flap servo horns such that they are angled approximately 30 degrees toward the trailing edge (if the flaps have the control horn on the bottom of the flap) or 30 degrees toward the leading edge (if the flap control horn is on top of the flap) then adjust the flap linkage such that the flaps are level. See Sub Trim below for more details.

BOTTOM CONTROL HORN

30°

30°

TOP CONTROL HORN

# Contents

# Step #1 Servo Assignment

## Channel Assignment

**Important**: In glider mode, the channel assignment (servo lead positions in the receiver) of the PCM9X II is different than previous JR radios. This new channel assignment has two important advantages:

• It allows a 6-channel receiver to be used to control the 6 functions commonly found on full function Sailplanes.

• It locates commonly mixed channels, like right and left ailerons, right and left flaps, rudder and elevator for (V-tail), next to each other in the data stream minimizing synchronizing delay issues.

Install the servos in the correct location in the receiver per the chart and illustration below.

| Servo | Channel # | Receiver Position |
|---|---|---|
| Left Aileron | 1 | Throttle |
| Right Aileron | 2 | Aileron |
| Elevator | 3 | Elevator |
| Rudder | 4 | Rudder |
| Right Flap | 5 | Gear |
| Left Flap | 6 | Flap/ Aux. 1 |



**Note**: The flap and aileron servos should be positioned such that their output shafts are oriented facing outward towards the wing tips.
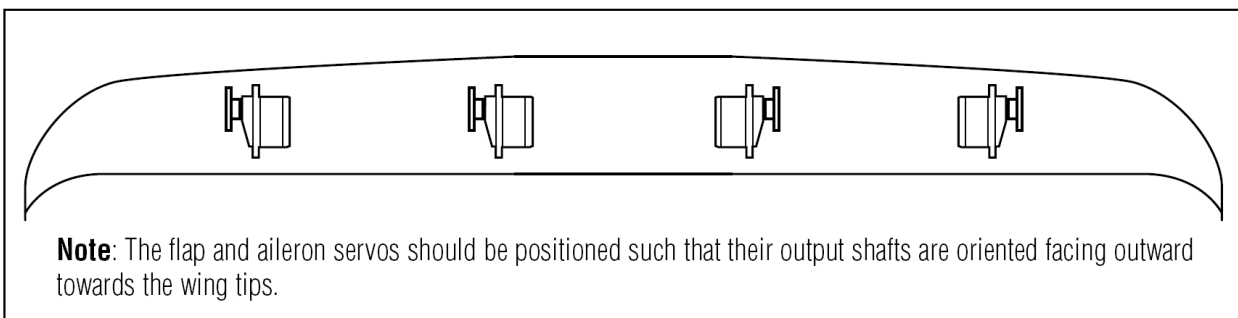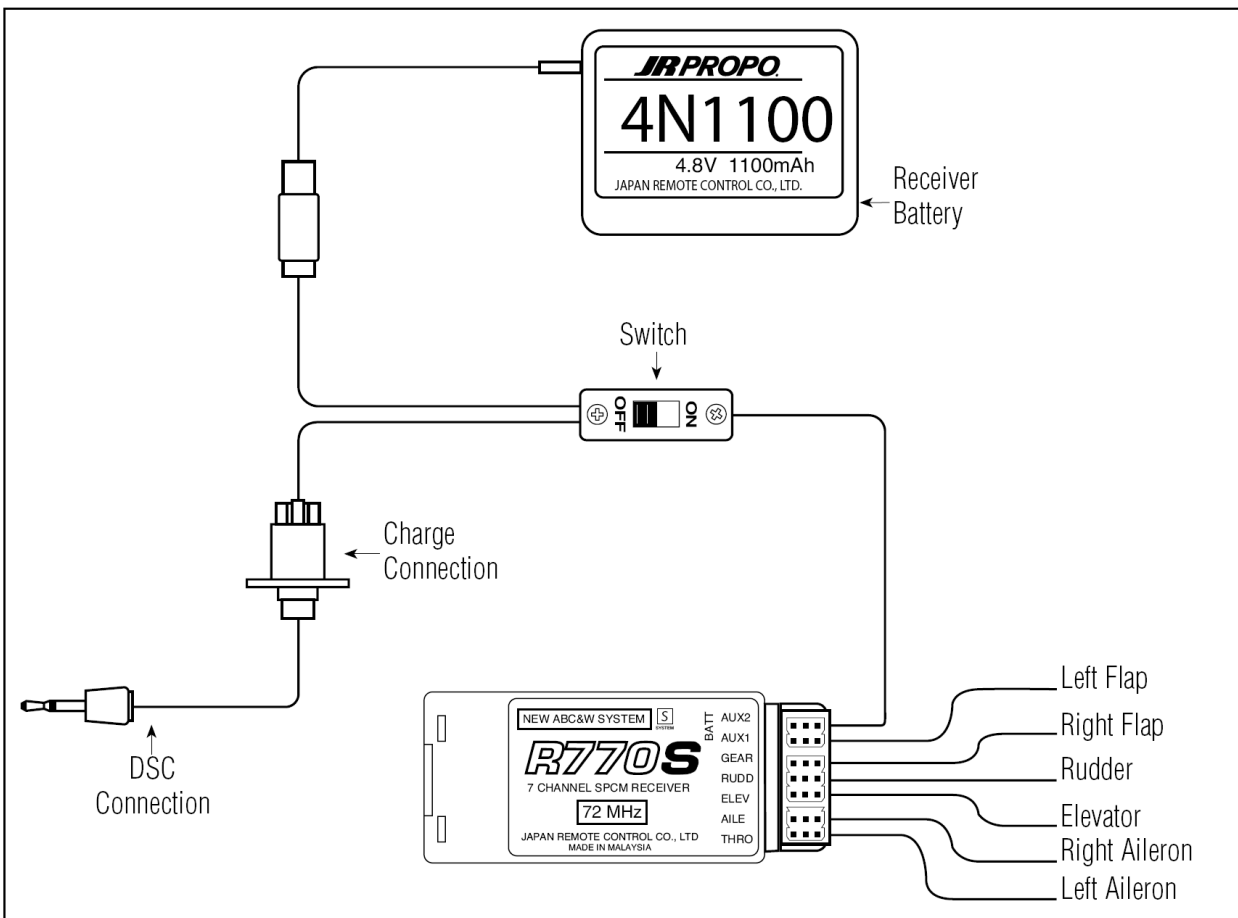
## Step #2 System Mode

Enter the **System Mode** by depressing and holding the ENT button while turning on the transmitter.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM
[SYSTEM M.]
INFO-DISP  TRANSFER
Model SEL  TRIM STEP
MDL Name   Devic.SEL
Type SEL   Wing TYPE
MDL Reset  STICK MOD
MODULAT.   STICK Dir

S  3 ITEM  9 CHANNEL  30 MODEL MEMORY   PCM9XII
PCM  S PCM/PPM SELECTABLE TRANSMITTER
```
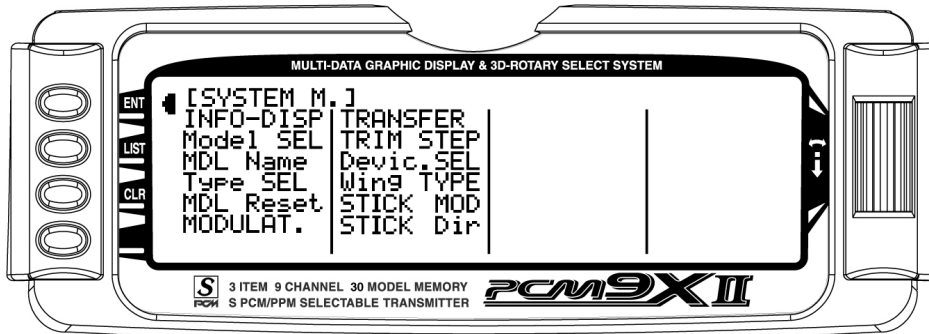
## Step #3 Selecting a Model Memory

Depress the Selector to enter the model select menu. Rotate the Selector to highlight **Model SEL** and depress the Selector to access the 30 available model memories. Rotating the Selector will allow memory model selection. Choose the memory (1–30) that you intend to store the current model in, then depress the Selector to store that memory position. Press the LIST button to return to the SYSTEM M. list.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM
[Model SEL]
Select          29 HELI SPCM
/Copy           30 HELI SPCM
           MODEL 1 GLID SPCM
                 2 HELI SPCM
                 3 HELI SPCM

S  3 ITEM  9 CHANNEL  30 MODEL MEMORY   PCM9XII
PCM  S PCM/PPM SELECTABLE TRANSMITTER
```
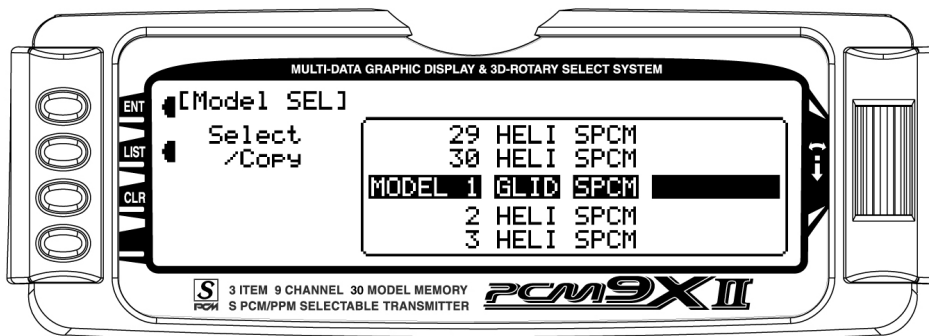
## Step #4 Selecting Model Type

In **SYSTEM M**. list, rotate the Selector until **Type SEL** is highlighted. Depress the Selector to access the Model Type Selection menu. Rotate the Selector to highlight **GLID** then depress the Selector to store the glider programming. Press the LIST button to return to the System Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM
[Type SEL]    MODEL 1 GLID

   GLID       ACRO       HELI

S  3 ITEM  9 CHANNEL  30 MODEL MEMORY   PCM9XII
PCM  S PCM/PPM SELECTABLE TRANSMITTER
```
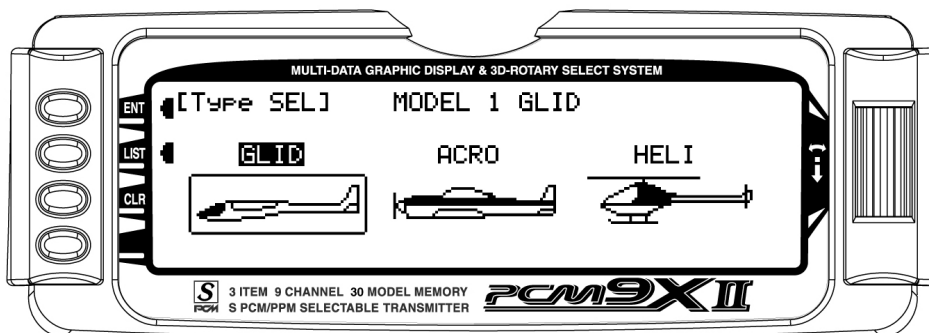
# Step #5 Naming a Model

In the **SYSTEM M.** list, rotate the Selector until **MDL Name** is highlighted. Depress the Selector to access the model name menu. Rotate the Selector to position the cursor under the desired position and press the Selector to access the alphanumeric list. Rotate the Selector to highlight the desired character. Depressing the Selector will now place the selected character in position. Rotating the Selector will advance the cursor, allowing the selection of another character. Pressing the **LIST** button will store the name and return to the System Mode screen.

# Step #6 Selecting the Modulation

In the **SYSTEM M**. list, rotate the Selector until **MODULAT**. is highlighted. Depress the Selector to access the Modulation menu. Rotate the Selector to highlight Modulation and press the Selector to access the two types of modulation (**ZPCM**, **SPCM** and **PPM**). Rotate the Selector to highlight the desired modulation type dependent on the type of receiver being used. Depressing the Selector will store the desire modulation type in the model memory. Press the LIST button to return to the System Mode screen.
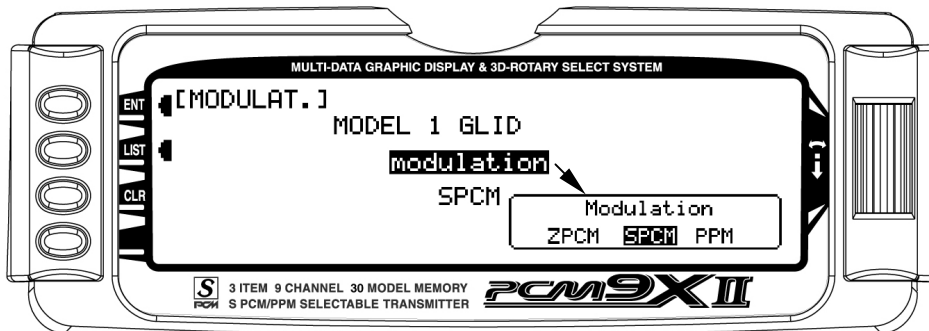
# Step #7 Turning Off the Spoiler Stick Trim

In the **SYSTEM M**. list, rotate the Selector until **TRIM STEP** is highlighted. Depress the Selector to access the TRIM STEP menu. Rotate the Selector to highlight **SPOI** and press the Selector to access the spoiler trim value. Rotate the Selector until a 0% is shown. This will turn off the spoiler trim, preventing any unwanted interaction with the spoiler trim and the spoiler stick. Depressing 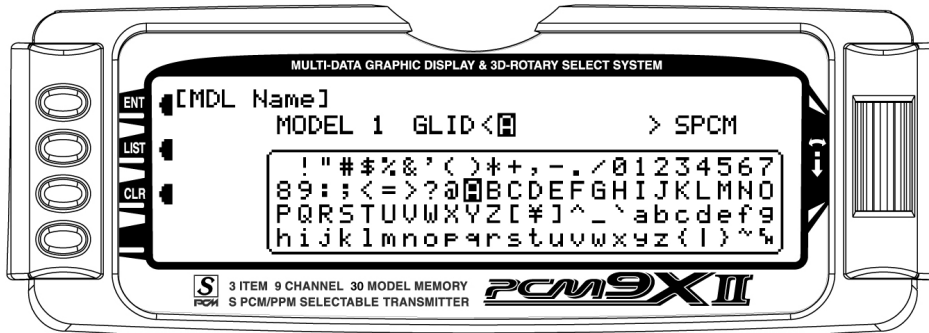the Selector will store the desired 0% value in the model memory. Press the LIST button to return to the System Mode screen.
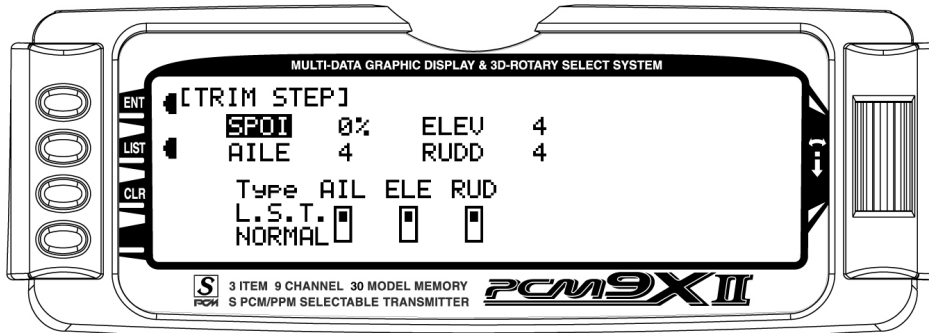


# Step #8 Establishing Flight Modes

In the **SYSTEM M**. list, rotate the Selector until **Devic. SEL** is highlighted. Depress the Selector to access the Device Select menu. Initially we are going to activate three of the available five flight modes (Launch, Cruise and Land). Rotate the Selector to highlight **LAUN** and press the Selector to access the available switches that the flight mode can be assigned to. For our purpose, assign the **LAUN** flight mode to **AUX4 SW** (left 3-position switch). Later you can change the flight mode to the position that best suit your needs. Rotate the Selector until **AUX4 SW** is highlighted and press the Selector to store the desired left 3-position switch. Press the LIST button to return to the System Mode screen.
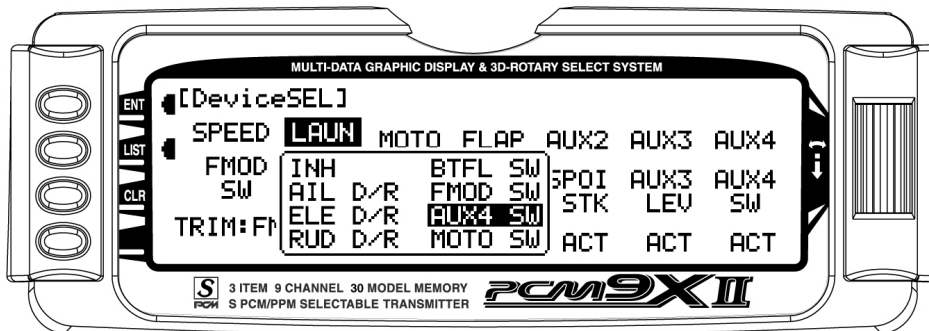
## Step #9 Wing and Tail Type Select

In the **SYSTEM M**. list, rotate the Selector until **Wing TYPE** is highlighted. Depress the Selector to access the Wing Type menu. If your sailplane has a V-tail rotate the Selector to highlight V-tail and press the Selector to select **ACT**. Rotate the Selector to access the **DUAL FLAP** function and press the Selector to access dual flap if your sailplane has individual servos for each flap. Press the LIST button to return to the System Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM

[Wing TYPE]

    V-tail          DUAL FLAP

     INH              ACT

   S   3 ITEM  9 CHANNEL  30 MODEL MEMORY   PCM9XII
  PCM  S PCM/PPM SELECTABLE TRANSMITTER
```

## Step #10 Entering FUNC.LIST

To enter the **Function list**, turn on the transmitter and then press the LIST button on the transmitter. The following screen will appear.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM

[FUNC.LIST]
D/R & EXP  FM Delay  PROG.Mix1  Trainer
REV.SW     Flaprn MX PROG.Mix2  TIMER
Sub Trim   AIL→RUD M PROG.Mix3  MONITOR
TRVL ADJ.  Butterfly PROG.Mix4
ELE→FLP M  FLAP RATE PROG.Mix5
AIL→FLP M  MOTO.HOLD PROG.Mix6
DIFFEREN.            Fail Safe

   S   3 ITEM  9 CHANNEL  30 MODEL MEMORY   PCM9XII
  PCM  S PCM/PPM SELECTABLE TRANSMITTER
```

## Step #11 Servo Reversing

In **FUNC.LIST** list, rotate the Selector until **REV. SW** is highlighted. Press the Selector to access the reverse sw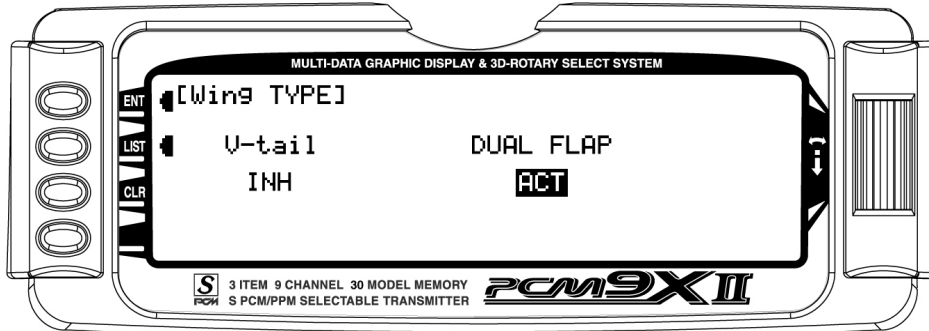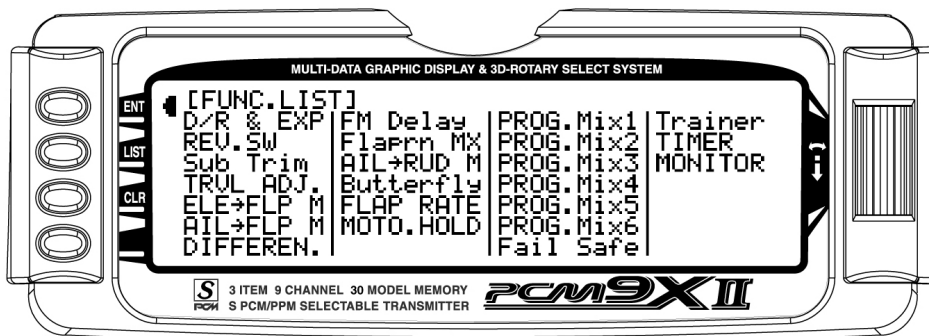itch menu. Rotate the Selector to highlight the desired channel then press the Selector to reverse the selected channel's direction. Check the direction of all servos and reverse as necessary. Press the LIST button to return to the Function Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM

[REV.SW]                  REV.
                          NORM

   LAI  RAI  ELE  RUD  MOT  FLP  AX2  AX3  AX4

   S   3 ITEM  9 CHANNEL  30 MODEL MEMORY   PCM9XII
  PCM  S PCM/PPM SELECTABLE TRANSMITTER
```
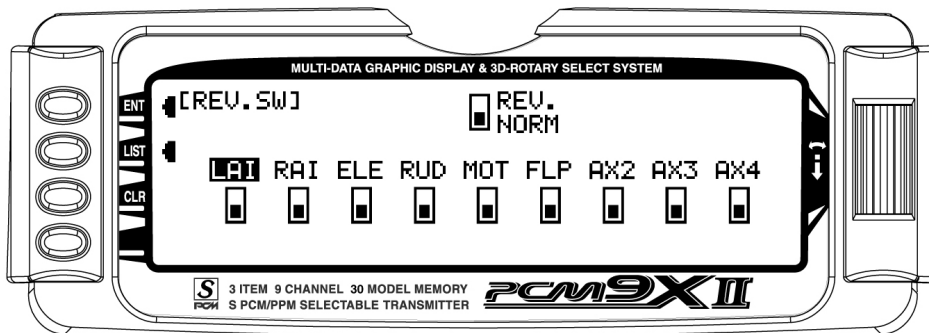
Note: Channel labels may vary due to channel assignments, eg. RUD = RFL and MOT = LFL

# Step #12 Sub Trim

In **FUNC.LIST** rotate the Selector until **Sub Trim** is highlighted. Press the Selector to access the Sub Trim menu. Rotate the Selector to highlight the desire channel then press the Selector to change the sub trim value of the selected channel. Sub trim all functions so that they are in the neutral position (see flap note below). Press the LIST button to return to the Function Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM
[Sub Trim]
        LAIL    0     MOTO    0
        RAIL    0     FLAP    0
        ELEV    0     AUX2    0
        RUDD    0     AUX3    0
                      AUX4    0
```
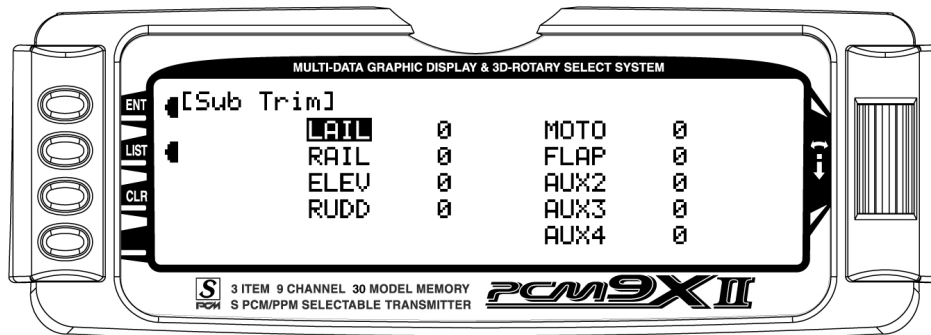
Note: Typical flap geometry requires that the sub trim be significantly offset to provide adequate down flap throw. This issue exists because flaps typically have a large travel down (80 to 90 degrees) but very little travel up (less than 15 degrees). To achieve proper flap travel, it is necessary that the right flap sub trim be set at 225 down and th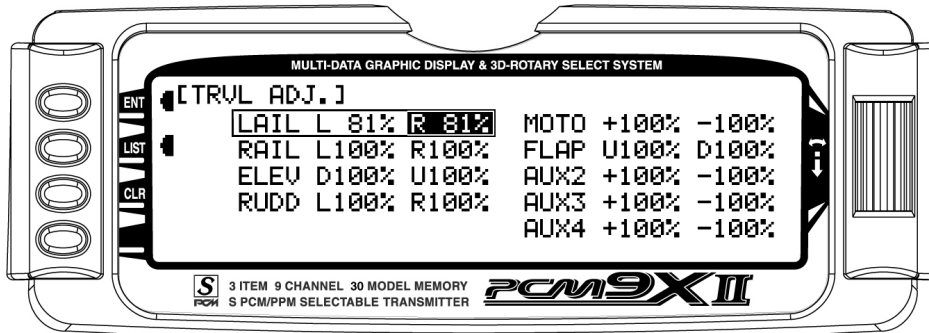e left flap sub trim be set at 225 up as a starting point. Then when attaching the flap servo arms be sure the spoiler stick is in the up position and camber lever is in the middle position. Install the flap servo horns such that they are angled approximately 30% toward the trailing edge, then adjust the flap linkage such that the flaps are level.

BOTTOM CONTROL HORN

30°

30°

TOP CONTROL HORN
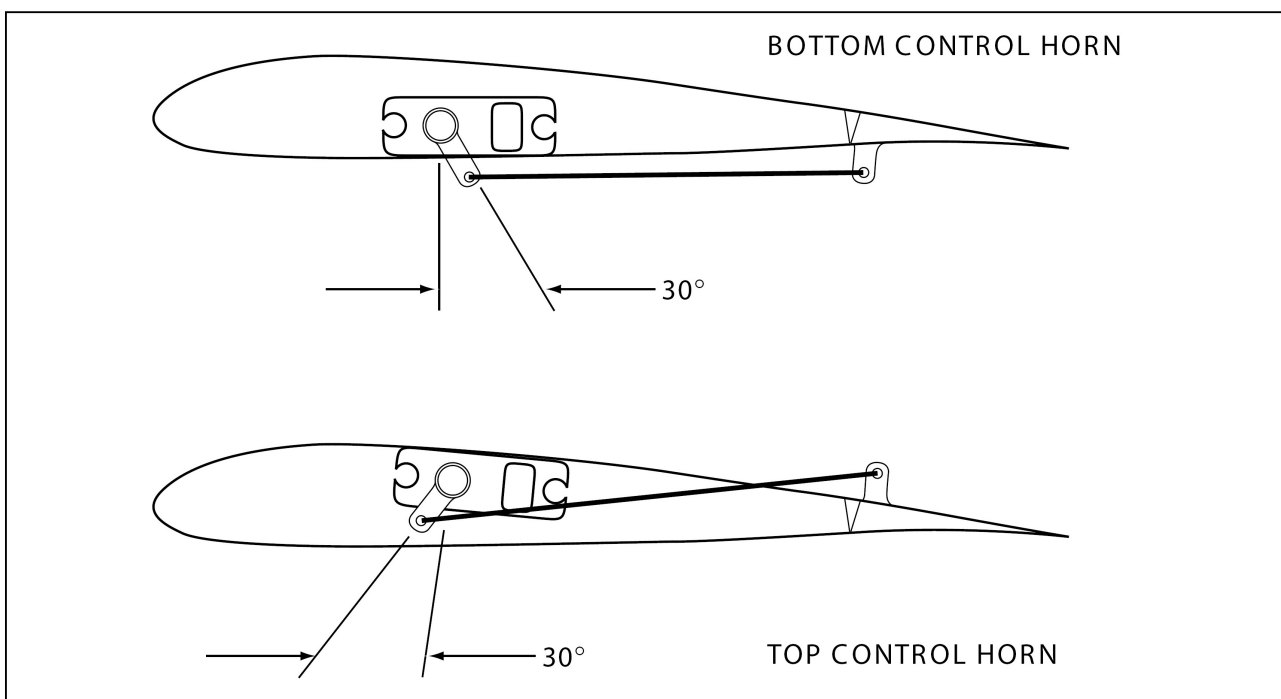
## Step #13 Travel Adjust

In **FUNC.LIST** rotate the Selector until **TRVL ADJ** is highlighted. Press the Selector to access the Travel Adjust menu. Rotate the Selector to highlight the desired channel then press the Selector to change the sub trim value of the selected channel. Moving the applicable control stick o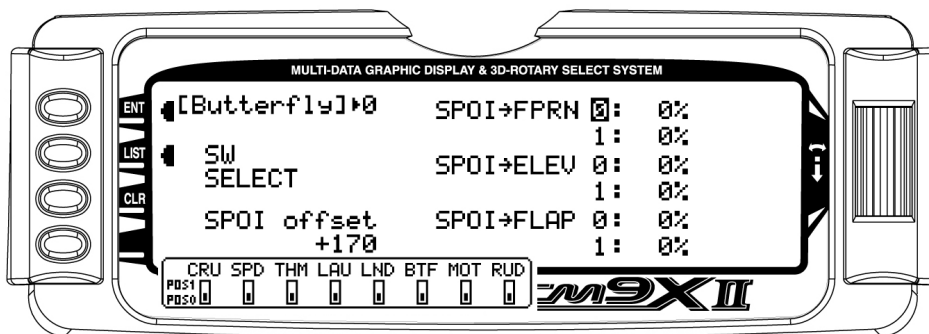r switch changes the direction in which the travel adjustment is made (right/ left, up/down). Set the travel adjust for all functions except flaps at this time. Press the LIST button to return to the Function Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM
[TRVL ADJ.]
LAIL L 81% R 81%    MOTO +100% -100%
RAIL L100% R100%    FLAP U100% D100%
ELEV D100% U100%    AUX2 +100% -100%
RUDD L100% R100%    AUX3 +100% -100%
                    AUX4 +100% -100%
```

3 ITEM  9 CHANNEL  30 MODEL MEMORY
S PCM/PPM SELECTABLE TRANSMITTER  PCM9XII

## Step #14 Butterfly (Landing Flaps)

In **FUNC.LIST** rotate the Selector until **Butterfly** is highlighted. Press the Selector to access the Butterfly menu. Note the default setting for offset is at +170%. With this setting, the flap's neutral position (trailing edge level) occurs when the spoiler stick is in the full up position. Note that this default results in no deadband in the flap stick. Joe Wurts recommends using a value of +156 for the SPOI offset, so that you don't accidentally get a little flap deflection when putting in rudder inputs. Rotate the Selector to highlight **SW select** and press the Selector to access the available switches. Rotate the Selector and select the **BTF** switch and press the Selector to move the switch to **Pos0**. Be sure all switches in this screen are set at zero. This is necessary to allow the Butterfly function to always be on. Rotate the Selector to highlight **SPOI→FLAP 0** then depress the Selector to access the spoiler-to-flap value. Move the spoiler stick to the full down position and adjust the value by rotating the Selector until the desired down flap position is achieved. Press the Selector to store the flap value then rotate the Selector to access the **SPOI→FPRN 0** function. Depress the Selector to access this value and with the spoiler stick in the low position, adjust the flaperons (ailerons as flaps) to the desired position. You may wish to adjust the **SPOI→ELEV** at this time, however, there is a curve mix in P-mix 1 that will allow several points on a curve to be adjusted for flap-to-elevator mixing that we will be covering in Step #15 below. Press the LIST button to return to the Function Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM
[Butterfly]▸0      SPOI→FPRN 0:    0%
                             1:    0%
SW                 SPOI→ELEV 0:    0%
SELECT                       1:    0%
SPOI offset        SPOI→FLAP 0:    0%
        +170                 1:    0%
     CRU SPD THM LAU LND BTF MOT RUD
POS1 □  □  □  □  □  □  □  □
POS0 □  □  □  □  □  □  □  □
```

PCM9XII

# Step #15 Spoiler to Elevator Curve Mix (Programmable Mix 1)

On most sailplanes, deploying flaps causes the aircraft to pitch up. This pitching is non-linear and typically the airplane pitches up dramatically the first 25% of flap travel but becomes less dramatic during the 25% through 50% range, and very little additional up pitching occurs from 75 to 100% flaps. The PCM9X II incorporates a preprogrammed curve mix that mixes the spoiler stick (landing flaps) to the elevator.

In FUNC.LIST rotate the Selector until PROG Mix1 is highlighted. Press the Selector to access the Programmable mix 1 spoiler-to-elevator curve mix. Rotate the Selector to highlight the desired point then press the Selector to access the point's value. Rotate the Selector to change the value. All points on the curve can be adjusted using this method. The below curve shows the typical values that are needed for a common performance sailplane. Press the LIST button to return to the Function Mode screen.
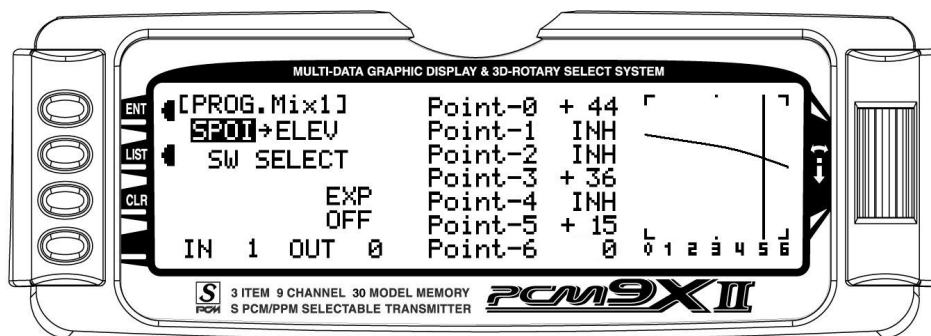
## Setting-up Flight Modes

Up to this point we have established the foundational programming that will be common to all flight modes. Now we will focus on the specifics of setting up each individual flight mode.

We will be individually programming the following parameters for each of the selected flight modes(Launch, Cruise, Land).

• Dual and Exponential rates for Aileron, Elevatorand Rudder

• Setting preset positions for the Camber, Flaperon and Elevator
• Elevator-to-Flap Mixes
• Aileron-to-Flap Mixes
• Aileron Differential
• Flight Mode Delay
• Camber Adjustment
• Aileron-to-Rudder Mixes
• Spoiler-to-Elevator Curve Mix (elevator compensation)

## Launch Mode Setup

In Step #8, Establishing Flight Modes, flight modes were programmed to operate from the left front 3-position switch. To select Launch mode, the left 3-position switch must be moved in the upper position. In the main (info) screen LAUNCH will appear in the upper portion of the display when Launch mode is selected.

When making programming changes/adjustments in Launch mode, this 3-position switch must remain in the upper position during the process to allow the results of those adjustments to be seen on the model.

## Step #16 Launch Pre-sets

The PCM9X II offers a sophisticated program that allows easy preset trim positions for the elevator, flaps, flaperons (and even the aileron and rudder if you choose). The system can remain active in flight, allowing you to fine trim presets in each flight mode or can be locked in so they cannot be altered in flight. Flight mode presets are automatically selected via the flight mode switch and are adjusted with the digital elevator trim, the digital flap trim and the digital auxiliary trim (flaperon). While the presets are adjusted via the digital trims, their positions are recorded in the servo monitor.

To access the servo monitor, in **FUNC.LIST** rotate the Selector until **MONITOR** is highlighted. Press the

Selector to access the Monitor menu then press the Selector again to access the camber digital preset screen. To adjust the presets move the flight mode switch to the launch mode (upper) position. Adjust the preset positions via the flap trim, auxiliary trim and elevator trim on the transmitter. The values will be displayed in the screen and then will be memorized for that flight mode. If you wish to have these preset values be fixed (not active in flight) once the values are established, return to the Trim Step screen in the system mode and reduce the value of the desired channel to 0. The preset values for all flight modes will be stored and no longer accessible with the digital trims.
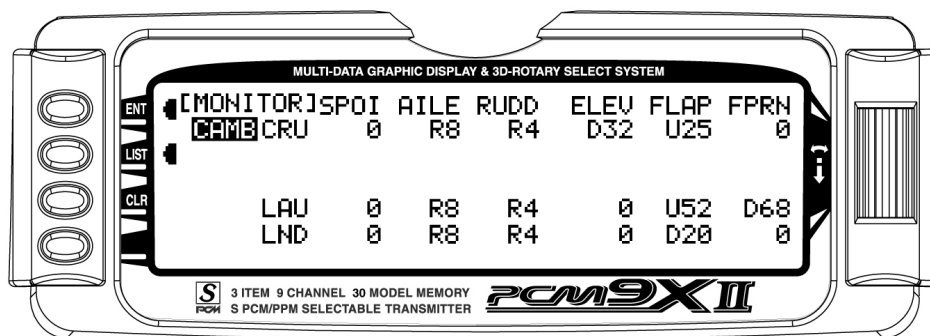
## Step #17 Dual Rate and Exponential - Launch Mode

In **FUNC.LIST**, rotate the Selector until **D/R & EXP** is highlighted. Press the Selector to access the Dual Rate and Exponential menu. Rotate the Selector to highlight the channel (AILE, ELEV OR RUDD) then press the Selector to select the desired channel that you wish to adjust the dual and expo rates for. Rotate to select then press the Selector to store the desired channel.

Note that three **D/R** and **EXPO** positions (values) are available (Pos0, 1 and 2). Under **AUTO** on the right of the screen, rotate the Selector until **LAUN** is highlighted and press the Selector. Select **Pos1** as the active position for the launch mode by rotating the Selector and then pressing the Selector when **Pos1** is highlighted. This will automatically access dual rate and

expo values that are programmed into position 1 whenever the launch mode is selected. Now rotate the Selector to Pos0 and depress the Selector to highlight the D/R values. Rotating the Selector changes these values. Displacing the aileron stick right or left allows the dual rate to be independently adjusted in each direction. Depress the Selector to store the desired D/R values. Rotate the Selector to the **EXP Pos1** values and adjust these values in the same manner pressing the Selector to store the desired value.

Now go back to channel and do the same thing for the two remaining channels. Press the **LIST** button to return to the Function Mode screen.
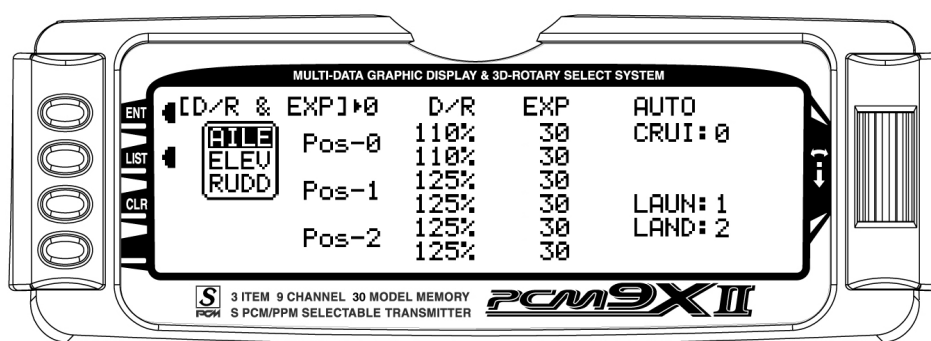


## Step #18 Elevator-to-Flap Mix - Launch Mode

This function is normally not used in launch mode. It will be addressed in setting up the Cruise mode below.

## Step #19 Aileron-to-Flap - Launch Mode

This function gives added roll response by mixing ailerons to flaps such that the entire trailing edge functions as an aileron. In **FUNC.LIST** rotate the Selector until **AIL→FLP M** is highlighted. Press the Selector to access the Aileron-to-flap mix. Rotate the Selector to highlight **LAU** then press the Selector selecting **Pos1**. Rotate the Selector to highlight Pos1 above and press the Selector to access the aileron-to-flap values. With the flight mode switch in the upper launch position, move the aileron control stick full right and hold while adjusting the aileron-to-flap value by rotating the Selector until the desired mix is achieved. Press the LIST button to return to the Function Mode screen.
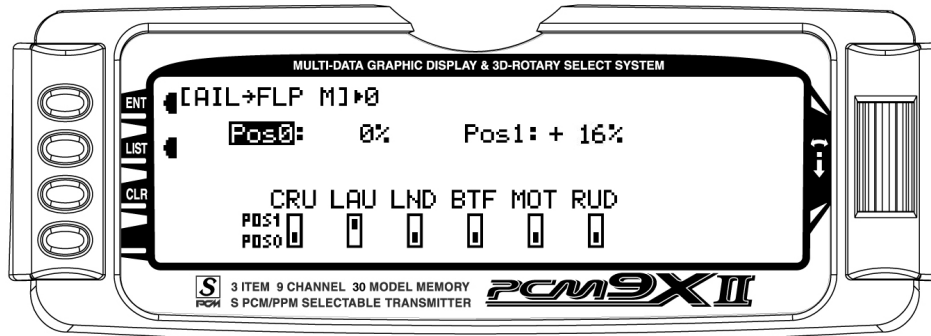


## Step #20 Aileron Differential - Launch Mode

In **FUNC.LIST** rotate the Selector until **DIFFEREN.** is highlighted. Press the Selector to access the Aileron differential menu. Rotate the Selector to highlight the launch aileron value then press the Selector to access that value. With the flight mode switch in the upper launch mode, give a full right aileron command and rotate the Selector to achieve the desired aileron differential for launch. Pressing the Selector will store the value. Now rotate the Selector to highlight the launch flap value and adjust it to the desired position. Press the LIST button to return to the Function Mode screen.
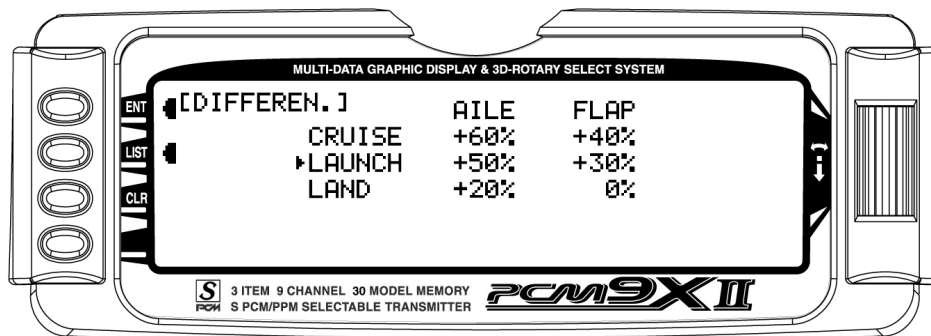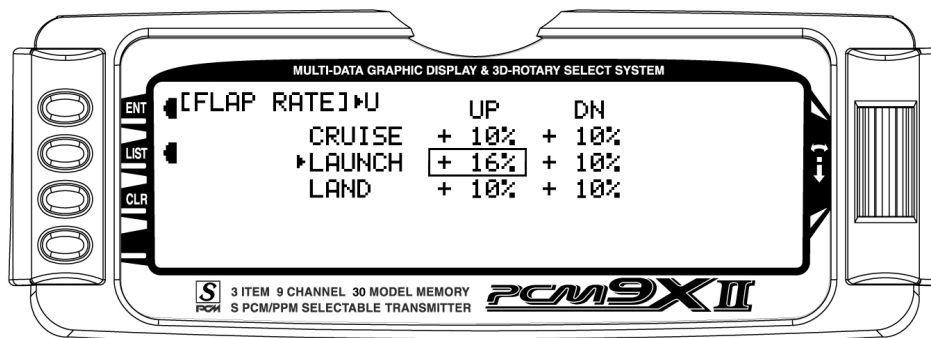
# Step #21 Flap Rate, Flaperon Mix and Flight Mode Delay - Launch Mode

Many pilots prefer to have variable camber adjustment during launch. This enables adjustments to be made at the last minute or even during launch, based on wind and winch conditions.

> **Important**: The flaperon and elevator values in the camber mix menu are based on a percentage of the programmed flap rate. The flap rates are defaulted to 0% from the factory, so flaperon and elevator mix values have no effect until the flap rate values are set. Because of this, it's mandatory to first adjust the flap rates before adjusting the flaperon and elevator camber mixes. Also remember that changing the flap rate values also affects the flaperon and elevator camber mix.

## Flap Rate

In **FUNC.LIST** rotate the Selector until **FLAP RATE** is highlighted. Press the Selector to access the Flap Rate menu. Rotate the Selector to highlight the launch down value then press the Selector to access this value. With the flight mode switch in the upper launch mode, move the left side lever to the lower most position and adjust the down value to the desired flap position. Now, with the flight mode switch still in the upper launch mode, move the left side lever to the uppermost position and adjust the up value to the desired flap position. Press the LIST button to return to the Function Mode screen.
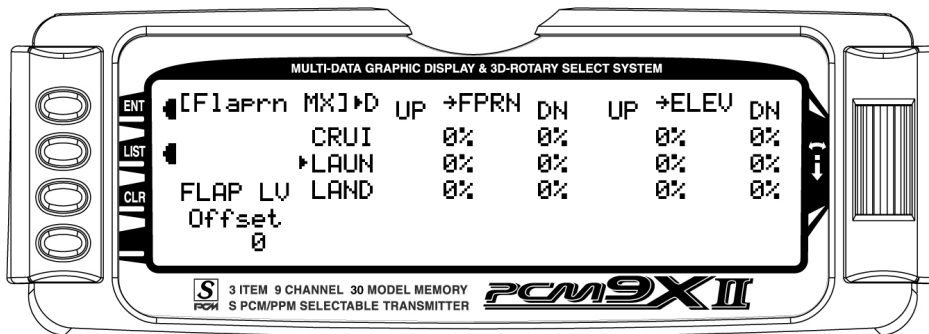
# Step #21 Flap Rate, Flaperon Mix and Flight Mode Delay (cont.)

## Flaperon (camber) Mix

**Note**: Flap rate must be set before flaperon mix.

In **FUNC.LIST** rotate the Selector until **Flaprn MX** is highlighted. Press the Selector to access the Camber Mix menu. Rotate the Selector to highlight the launch FPRN down value then press the Selector to access this value. With the flight mode switch in the upper launch mode, move the left side lever to the lower most position and adjust the down value to the desired

flaperon position. Press the Selector to store the value. Now with the flight mode switch still in the upper launch mode, move the left side lever to the uppermost position and adjust the up value to the desired flaperon position and store by pressing the Selector. Repeat the process for the up and down elevator camber mix. Press the LIST button to return to the Function Mode screen.
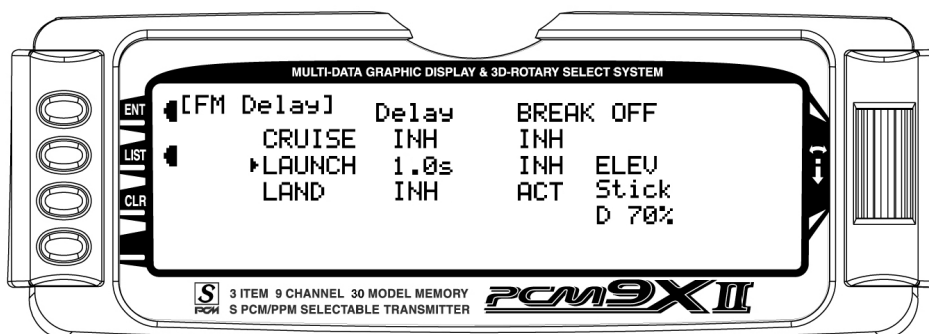
```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM
[Flaprn MX]►D  UP →FPRN DN   UP →ELEV DN
            CRUI    0%   0%     0%   0%
           ►LAUN    0%   0%     0%   0%
   FLAP LV LAND     0%   0%     0%   0%
    Offset
       0
```
S PCM   3 ITEM  9 CHANNEL  30 MODEL MEMORY   PCM9XII
       S PCM/PPM SELECTABLE TRANSMITTER

## Flight Mode Delay

The flight mode delay menu allows the programming of a delay from 0 to 2 seconds. This delay affects the flap, flaperon and elevator presets when switching from one flight mode to another. When inhibited, no delay occurs and the servo immediately transitions from one preset trim position to another when the flight modes are switched. With a delay programmed the transition is smooth relative to the delay time. A break-off function is available that can be programmed to override the delay,

based on a selected elevator stick position. For this setup, we will program a 1.0 second delay for Launch.

In **FUNC.LIST** rotate the Selector until **FM DELAY** is highlighted. Press the Selector to access the Flight Mode Delay menu. Rotate the Selector to highlight the launch delay value then press the Selector to access this value. Rotate the Selector to adjust the value to 1.0s (seconds) Press the Selector to store the value. Press the LIST button to return to the Function Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM
[FM Delay]   Delay    BREAK OFF
    CRUISE   INH      INH
   ►LAUNCH   1.0s     INH   ELEV
    LAND     INH      ACT   Stick
                            D 70%
```
S PCM   3 ITEM  9 CHANNEL  30 MODEL MEMORY   PCM9XII
       S PCM/PPM SELECTABLE TRANSMITTER

## Step #22 Aileron-to-Rudder Mix - Launch Mode

In **FUNC.LIST** rotate the Selector until **AIL→RUD M** is highlighted. Press the Selector to access the Aileron-to-Rudder mix menu. Rotate the Selector to highlight the launch left value then press the Selector to access that value. With the flight mode switch in the upper launch mode, give a full left aileron command and rotate the

Selector to achieve the desired left rudder throw. Pressing the Selector will store the value. Now rotate the Selector to highlight the launch right value and adjust it to the desired position. Press the LIST button to return to the Function Mode screen.
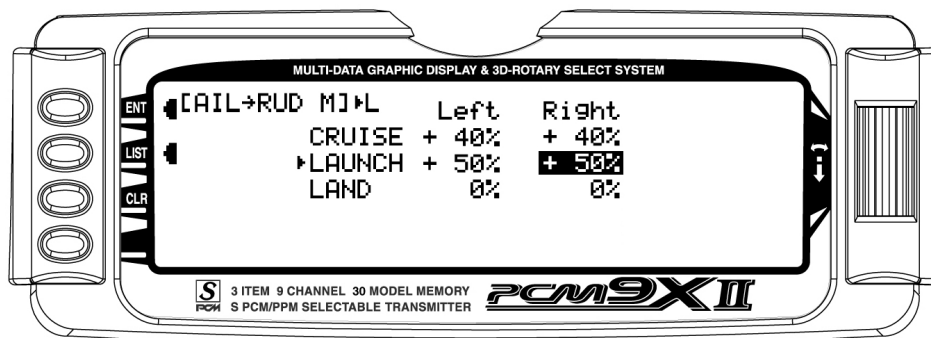
## Setting up Cruise Mode

In Step #8, Establishing Flight Modes, flight modes were programmed to operate from the left front 3-position switch. To select Cruise mode, the left 3-position switch must be moved to the middle position. In the main (info) screen **CRUISE** will appear in the upper portion of the display when Cruise mode is selected.

When making programming changes/adjustments in Cruise mode, this 3-position switch must remain in the middle position during the process to allow the results of those adjustments to be seen on the model.

## Step #23 Cruise Pre-sets

This function is normally not used in the cruise mode, however, it is active and all trim adjustments will be automatically stored when the cruise mode is selected.
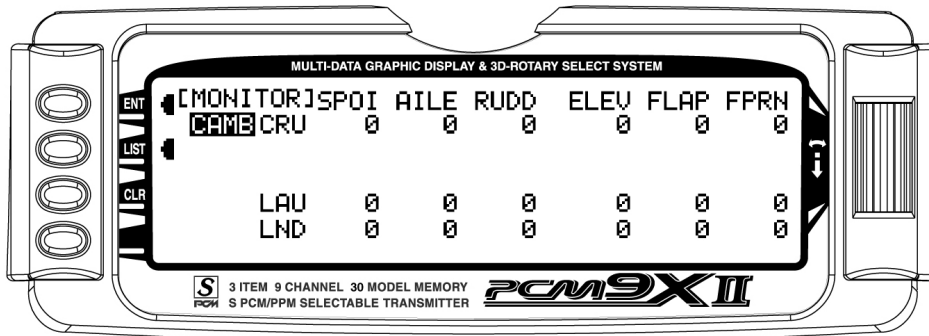


## Step #24 Dual Rate and Exponential – Cruise Mode

In **FUNC.LIST**, rotate the Selector until **D/R & EXP** is highlighted. Press the Selector to access the Dual Rate and Exponential menu. Rotate the Selector to highlight the channel (aile, elev or rudd) then press the Selector to select the desired channel that you wish to adjust the dual and expo rates for. Rotate to select then press the Selector to store the desired channel.

Note that three D/R and EXPO positions (values) are available (Pos 0, 1 and 2).

Under **AUTO** on the right of the screen, rotate the Selector until **CRUI** is highlighted and press the Selector. Select **Pos0** as the active position for the cruise mode by rotating the Selector and then pressing the Selector when **Pos0** is highlighted. This will

automatically access dual rate and expo values that are programmed into position 0 whenever the cruise mode is selected. Now rotate the Selector to **Pos0** and depress the Selector to highlight the D/R values. Rotating the Selector changes these values. Displacing the aileron stick right or left allows the dual rate to be independently adjusted in each direction. Depress the Selector to store the desired D/R values. Rotate the Selector to the **EXP Pos0** values and adjust these values in the same manner, pressing the Selector to store the desired value.

Now go back to channel and do the same thing for the two remaining channels. Press the LIST button to return to the Function Mode screen.
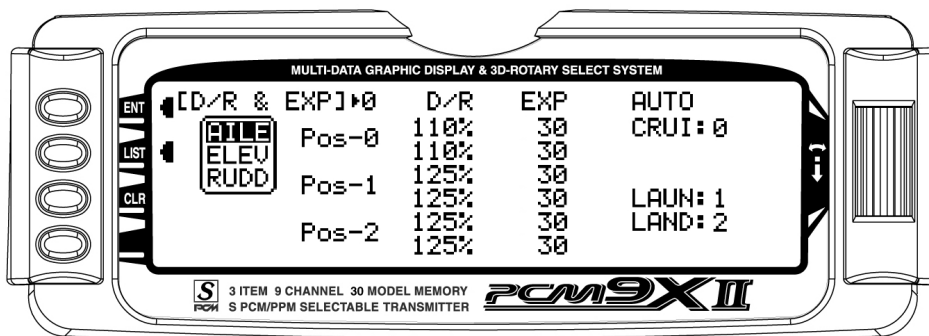
## Step #25 Elevator-to-Flap Mix – Cruise Mode

In **Function Mode** list, rotate the Selector until **ELE➔FLP M** is highlighted. Press the Selector to access the Elevator-to-Flap mix menu. Note that two elevator-to-flap mix values are available, Pos0 and Pos1, and that the elevator-to-flap values can be independently adjusted up and down. Also the offset (the stick position where the mixing changes from up to down) can be adjusted. This offset allows the programming of snap-flaps, a common sailplane function that gives greater full up elevator pitch authority for tighter turns. With snap-flaps, no flap mixing occurs during small to medium up elevator inputs, but at about 80% up elevator, the flaps are mixed to give down flaps, causing greater up pitch authority.
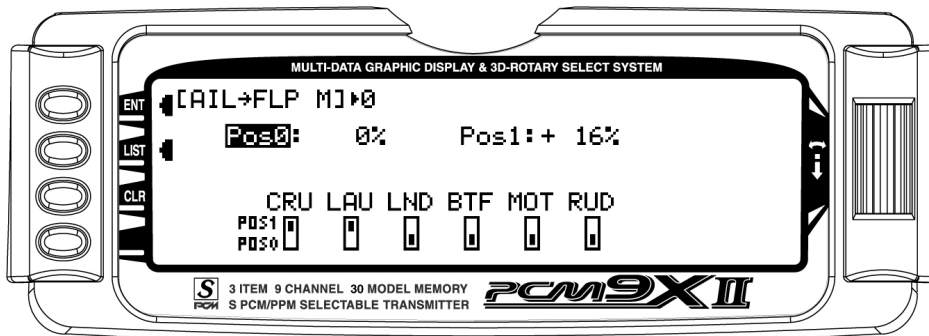
Rotate the Selector to highlight **CRU** (cruise mode) at the bottom of the screen and depress the Selector to select Pos1. If you choose to program snap-flaps, rotate the Selector until the Offset Pos1 is highlighted and depress the Selector to access this value. A 0 value locates the offset position when the elevator is centered. The adjustment range is -200 to +200. Negative values move the offset in the up elevator direction. Set a value of –100 to start, as this will locate the offset at 80% up elevator. Press the Selector to store this offset value. Rotate the Selector to highlight Pos1 UP and depress the Selector to access the position 1 up elevator mixing. With the 3-position switch in the middle (cruise) position, give a full up elevator command and hold while adjusting the Pos1 up value until the desired down flap position is achieved. Press the LIST button to return to the Function Mode screen.
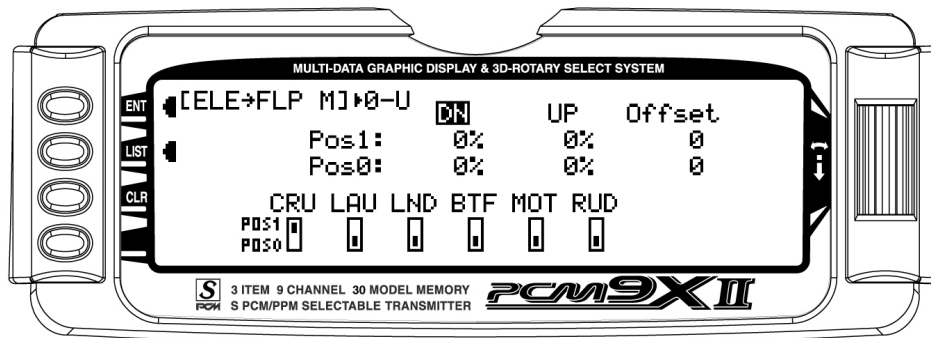
## Step #26 Aileron-to-Flap – Cruise Mode

This function gives added roll response by mixing ailerons to flaps such that the entire trailing edge functions as an aileron. In **FUNC.LIST** rotate the Selector until **AIL→FLP M** is highlighted. Press the Selector to access the Aileron-to-flap mix. Rotate the Selector to highlight **CRU** then press the Selector selecting **Pos1**. This will apply the same vales as selected previously in the launch mode to the cruise. Alternatively, you can choose a different aileron-to-flap value for the switches selecting **Pos0**. In this case select **Pos0** and adjust the **Pos0** value to achieve the desired results. Press the **LIST** button to return to the Function Mode screen.



## Step #27 Aileron Differential – Cruise Mode

In **FUNC.LIST** rotate the Selector until **DIFFEREN.** is highlighted. Press the Selector to access the Aileron differential menu. Rotate the Selector to highlight the cruise aileron value then press the Selector to access that value. With the flight mode switch in the middle cruise mode, give a full right aileron command and rotate the Selector to achieve the desired aileron differential for cruise. Pressing the Selector will store the value. Now rotate the Selector to highlight the cruise flap value and adjust it to the desired position. Press the LIST button to return to the Function Mode screen.
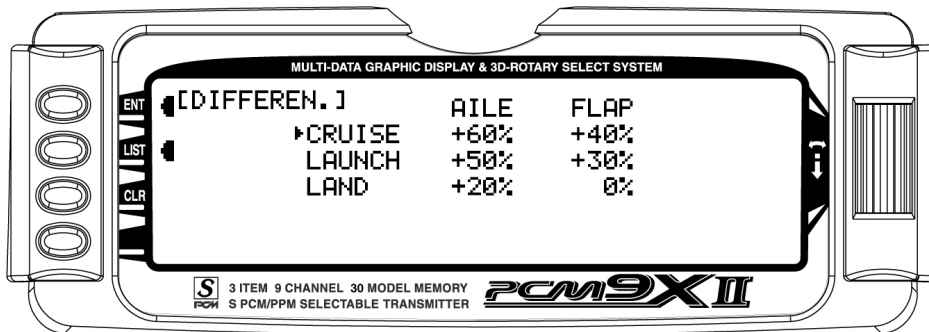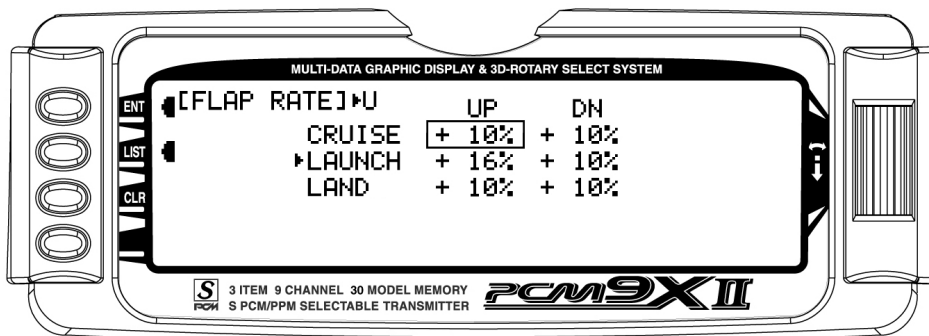
# Step #28 Flap Rate, Flaperon Mix and Flight Mode Delay – Cruise Mode

Most pilots prefer to have variable camber adjustment during cruise. This enables fine adjustments to be made in flight-based conditions.

**Important**: The flaperon and elevator values in the camber mix menu are based on a percentage of the programmed flap rate. The flap rates are defaulted to 0% from the factory, so flaperon and elevator mix values have no effect until the flap rate values are set. Because of this, it's mandatory to first adjust the flap rates before adjusting the flaperon and elevator camber mixes. Also remember that changing the flap rate values also affects the flaperon and elevator camber mix.

## Flap Rate

In **FUNC.LIST** rotate the Selector until **FLAP RATE** is highlighted. Press the Selector to access the Flap Rate menu. Rotate the Selector to highlight the cruise down value then press the Selector to access this value. With the flight mode switch in the middle cruise mode, move the left side lever to the lowest position and adjust the down value to the desired flap position. Now with the flight mode switch in the middle cruise mode, move the left side lever to the uppermost position and adjust the up value to the desired flap position. Press the LIST button to return to the Function Mode screen.



## Flaperon (camber) Mix

**Note**: Flap rate must be set before flaperon mix.

In **FUNC.LIST** rotate the Selector until **Flaprn MX** is highlighted. Press the Selector to access the Flaperon Mix menu. Rotate the Selector to highlight the cruise FPRN down value then press the Selector to access this value. With the flight mode switch in the middle cruise mode, move the left side lever to the lowest position and adjust the down value to the desired

flaperon position. Press the Selector to store the value. Now with the flight mode switch still in the middle cruise mode, move the left side lever to the uppermost position and adjust the up value to the desired flaperon position and store by pressing the Selector. Repeat the process for the up and down elevator camber mix. Press the LIST button to return to the Function Mode screen.
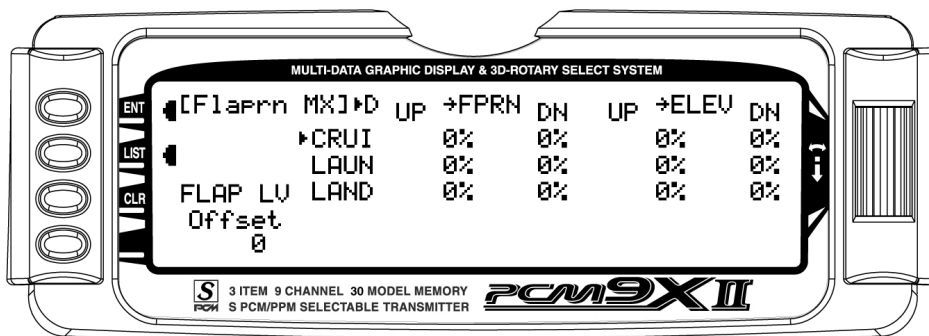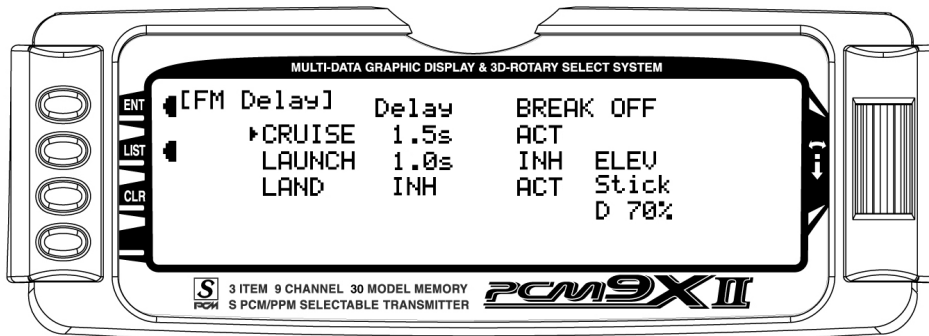
## Step #28 Flap Rate, Flaperon Mix and Flight Mode Delay (cont.)

### Flight Mode Delay

The flight mode delay adjust menu allows the programming of a delay from 0 to 2 seconds. This delay affects the flap, flaperon and elevator presets when switching from one flight mode to another. When inhibited, no delay occurs and the servo immediately transitions from one preset trim position to another when the flight modes are switched. With a delay programmed, the transition is smooth relative to the delay time. A break-off function is available that can be programmed to override the delay, based on a selected elevator stick position. For this setup, we will program a 1.5 second delay for cruise.
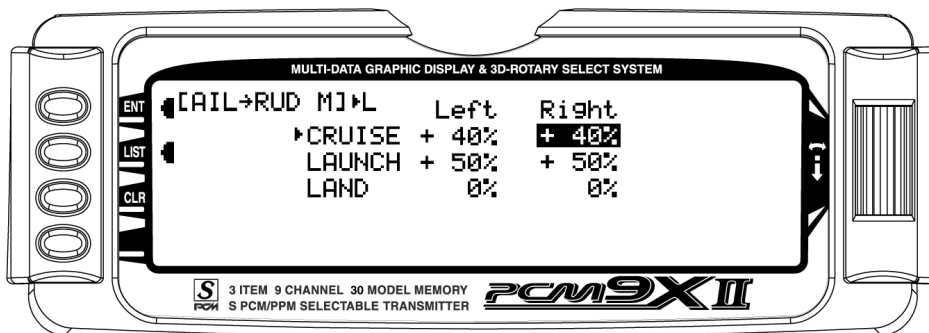
In **FUNC.LIST** rotate the Selector until **FM DELAY** is highlighted. Press the Selector to access the Flight Mode Delay Adjust menu. Rotate the Selector to highlight the cruise delay value then press the Selector to access this value. Rotate the Selector to adjust the value to 1.5s (seconds) Press the Selector to store the value. Press the LIST button to return to the Function Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM

[FM Delay]   Delay    BREAK OFF
      ►CRUISE  1.5s    ACT
       LAUNCH  1.0s    INH    ELEV
       LAND    INH     ACT    Stick
                              D 70%

S    3 ITEM  9 CHANNEL  30 MODEL MEMORY    PCM9XII
PCM  S PCM/PPM SELECTABLE TRANSMITTER
```

## Step #29 Aileron-to-Rudder Mix – Cruise Mode

In **FUNC.LIST** rotate the Selector until **AIL➔RUD M** is highlighted. Press the Selector to access the Aileron-to-rudder mix menu. Rotate the Selector to highlight the cruise left value then press the Selector to access that value. With the flight mode switch in the middle cruise mode, give a full left aileron command and rotate the Selector to achieve the desired left rudder throw. Pressing the Selector will store the value. Now rotate the Selector to highlight the launch right value and adjust it to the desired position. Press the LIST button to return to the Function Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM

[AIL➔RUD M]►L   Left    Right
       ►CRUISE  + 40%   + 40%
        LAUNCH  + 50%   + 50%
        LAND       0%      0%

S    3 ITEM  9 CHANNEL  30 MODEL MEMORY    PCM9XII
PCM  S PCM/PPM SELECTABLE TRANSMITTER
```

## Setting Up Land Mode

In Step #8, Establishing Flight Modes, flight modes were programmed to operate from the left front 3-position switch. To select Land mode, the left 3-position switch must be moved to the lower position. In the main (info) screen **LAND** will appear in the upper portion of the display when Land mode is selected. When making programming changes/adjustments in Land mode, this 3-position switch must remain in the lower position during the process to allow the results of those adjustments to be seen on the model.

## Step #30 Land Pre-sets

The PCM9X II offers a sophisticated program that allows easy preset trim positions for the elevator, flaps, flaperons (and even the aileron and rudder if you choose). The system can remain active in flight allowing you to fine trim presets in each flight mode or can be locked in so they cannot be altered in flight. Flight mode presets are automatically selected via the flight mode switch and are adjusted with the digital elevator trim, the digital flap trim and the digital auxiliary trim (flaperon). While the presets are adjusted via the digital trims, their positions are recorded in the servo monitor.

To access the servo monitor, in **FUNC.LIST** rotate the Selector until **MONITOR** is highlighted. Press the Selector to access the Monitor menu then press the Selector again to access the camber digital preset screen. To adjust the presets, move the flight mode switch to the land mode (down) position. Adjust the preset positions via the flap trim, auxiliary trim and elevator trim on the transmitter. The values will be displayed in the screen and then will be memorized for that flight mode. If you wish to have these preset values be fixed (not active in flight) once the values are established, return to the Trim Step screen in the system mode and reduce the value of the desired channel to 0. The preset values for all flight modes will be stored and no longer accessible with the digital trims.
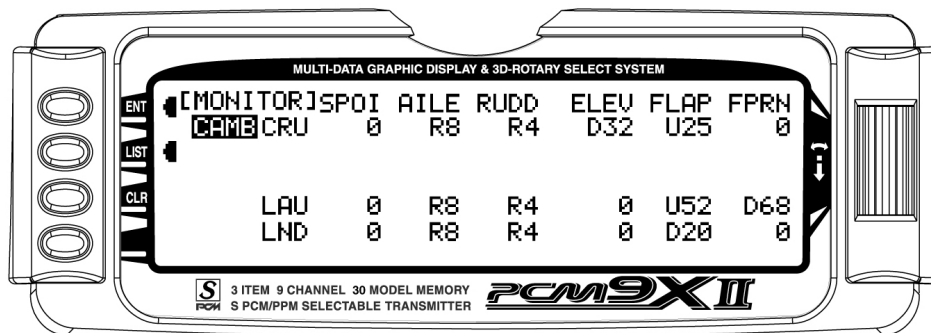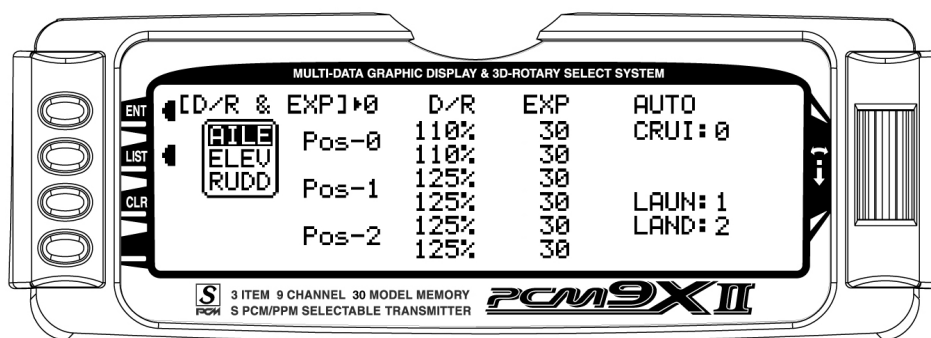
## Step #31 Dual Rate and Exponential – Land Mode

In **FUNC.LIST**, rotate the Selector until **D/R & EXP** is highlighted. Press the Selector to access the Dual Rate and Exponential menu. Rotate the Selector to highlight the channel (AILE, ELEV OR RUDD) then press the Selector to select the desired channel that you wish to adjust the dual and expo rates for. Rotate to select then press the Selector to store the desired channel.

Note that three D/R and EXPO positions (values) are available (Pos0, 1 and 2).

Under **AUTO** on the right of the screen, rotate the Selector until **LAND** is highlighted and press the Selector. Select **POS2** as the active position for the land mode by rotating the Selector and then pressing the Selector when **POS2** is highlighted. This will automatically access dual rate and expo values that are programmed into position 2 whenever the land mode is selected. Now rotate the Selector to **POS2** and depress the Selector to highlight the D/R values. Rotating the Selector changes these values. Displacing the aileron stick right or left allows the dual rate to be independently adjusted in each direction. Depress the Selector to store the desired D/R values. Rotate the Selector to the **EXP Pos2** values and adjust these values in the same manor, pressing the Selector to store the desired value.

Now go back to channel and do the same thing for the two remaining channels. Press the LIST button to return to the Function Mode screen.



## Step #32 Elevator-to-Flap Mix – Land Mode

This function is normally not used in Land mode. It was addressed above in setting up the Cruise mode.

## Step #33 Aileron-to-Flap – Land Mode

This function is normally not used in Land mode. It was addressed above in setting up the Launch and Cruise modes.

## Step #34 Aileron Differential – Land Mode

In **FUNC.LIST** rotate the Selector until **DIFFEREN**. is highlighted. Press the Selector to access the Aileron differential menu. Rotate the Selector to highlight the land aileron value then press the Selector to access that value. With the flight mode switch in the lower land mode, give a full right aileron command and rotate the Selector to achieve the desired aileron differential for land.

Note: Reverse differential is common for landing mode to give greater roll control when the flaps are deployed.

Pressing the Selector will store the value. Now rotate the Selector to highlight the land flap value and adjust it to the desired position. Press the LIST button to return to the Function Mode screen.
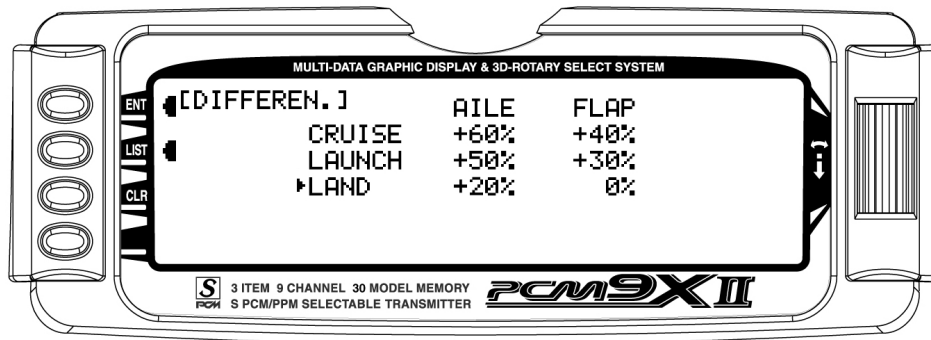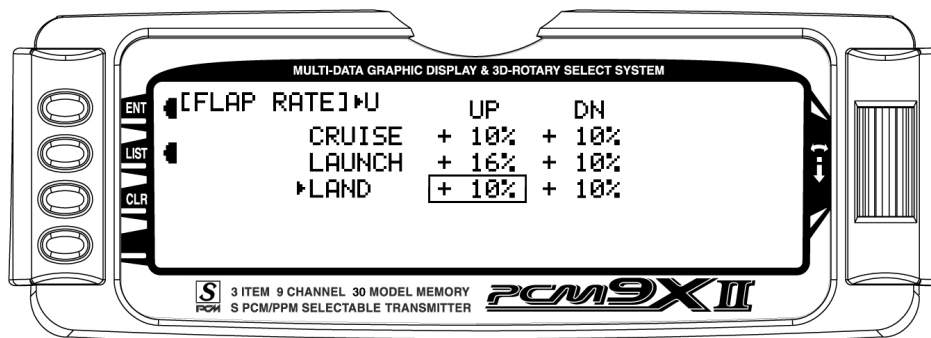


## Step #35 Flap Rate, Flaperon Mix and Flight Mode Delay – Land Mode

A few pilots prefer to have variable camber adjustment during landing. This enables last minute adjustments to be made based on wind and winch conditions.

> Important: The flaperon and elevator values in the camber mix menu are based on a percentage of the programmed flap rate. The flap rates are defaulted to 0% from the factory, so flaperon and elevator mix values have no effect until the flap rate values are set. Because of this, it's mandatory to first adjust the flap rates before adjusting the flaperon and elevator camber mixes. Also remember that changing the flap rate values also affects the flaperon and elevator camber mix.

### Flap Rate

In **FUNC.LIST** rotate the Selector until **FLAP RATE** is highlighted. Press the Selector to access the Flap Rate menu. Rotate the Selector to highlight the land down value then press the Selector to access this value. With the flight mode switch in the lower **LAND** position, move the left side lever to the lowest position and adjust the down value to the desired flap position. Now with the flight mode switch still in the lower land mode, move the left side lever to the uppermost position and adjust the up value to the desired flap position. Press the LIST button to return to the Function Mode screen.
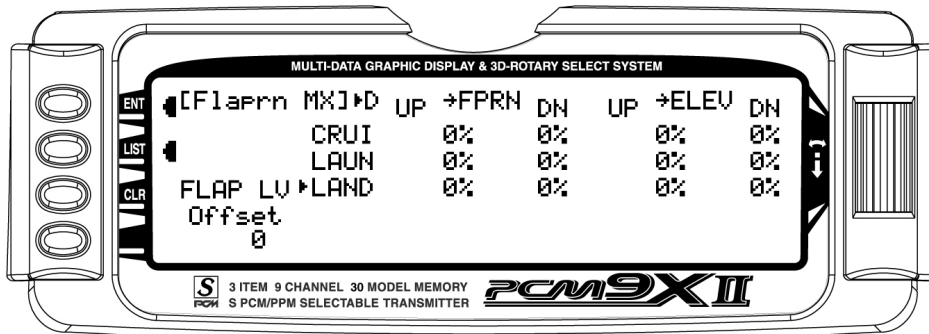
## Flaperon (camber) Mix

**Note**: Flap rate must be set before flaperon mix.

In **FUNC.LIST** rotate the Selector until **Flaprn MX** is highlighted. Press the Selector to access the Flaperon Mix menu. Rotate the Selector to highlight the land **FPRN** down value then press the Selector to access this value. With the flight mode switch in the lower **LAND** mode, move the left side lever to the lowest position and adjust the down value to the desired flaperon position. Press the Selector to store the value. Now with the flight mode switch still in the lower land mode, move the left side lever to the uppermost position and adjust the up value to the desired flaperon position and store by pressing the Selector. Repeat the process for the up and down elevator camber mix. Press the LIST button to return to the Function Mode screen.



## Flight Mode Delay

The Flight Mode Delay menu allows the programming of a delay from 0 to 2 seconds. This delay affects the flap, flaperon and elevator presets when switching from one flight mode to another. When inhibited, no delay occurs and the servo immediately transitions from one preset trim position to another when the flight modes are switched. With a delay programmed, the transition is smooth relative to the delay time. A break-off function is available that can be programmed to override the delay, based on a selected elevator stick position. For this setup, we will program a .5 second delay for Land.

In **FUNC.LIST** rotate the Selector until **FM DELAY** is highlighted. Press the Selector to access the Flight Mode Delay menu. Rotate the Selector to highlight the land delay value then press the Selector to access this value. Rotate the Selector to adjust the value to .5s (seconds) Press the Selector to store the value. Press the LIST button to return to the Function Mode screen.
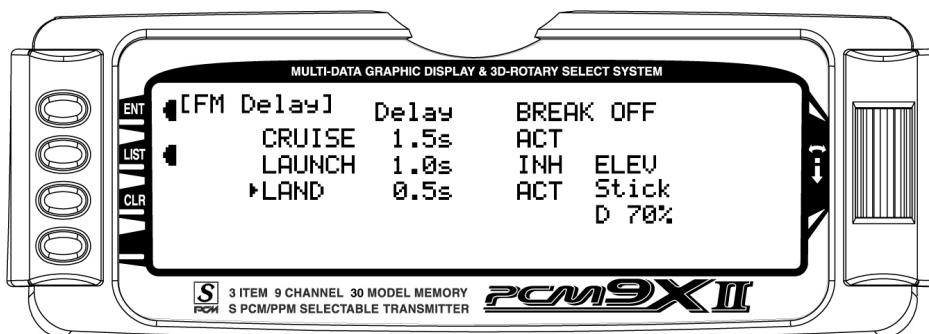
# Step #36 Aileron-to-Rudder Mix – Land Mode

In **FUNC.LIST** rotate the Selector until **AIL➔RUD M** is highlighted. Press the Selector to access the Aileron-to-Rudder mix menu. Rotate the Selector to highlight the land left value then press the Selector to access that value. With the flight mode switch in the lower **LAND** mode, give a full left aileron command and rotate the

Selector to achieve the desired left rudder throw. Pressing the Selector will store the value. Now rotate the Selector to highlight the land right value and adjust it to the desired position. Press the LIST button to return to the Function Mode screen.

```
MULTI-DATA GRAPHIC DISPLAY & 3D-ROTARY SELECT SYSTEM

[AIL→RUD M]►L    Left    Right
          CRUISE  + 40%   + 40%
          LAUNCH  + 50%   + 50%
        ►LAND       0%      0%

 S   3 ITEM  9 CHANNEL  30 MODEL MEMORY     PCM9XII
PCM  S PCM/PPM SELECTABLE TRANSMITTER
```