The Artificial Horizon

Adjustments, and displays

The Ultra^2 artificial horizon has three controls – a button and two rotary switches. The button on the top of the electronics base controls the zero offset, direction, type of display, and horizon on/off. The switches are accessible via holes on the port side of the base. One switch controls the "range" of the display and the other the "rate."

The button on top

Pushing the button for less than 1 second will reset the sled level (sets the "zero offset").

Place a small bubble level on a surface parallel to the bottom frame of your camera (usually the dovetail plate works well). Angle and hold the sled until this bubble reads level, then push and release the horizon button quickly. The display should now read "level."

Pressing the button for more than one second but less than three will flip the display direction – useful for going to low mode and back. The center two LED's on display will flash to confirm that a mode change has occurred. Be sure to re-set the zero offset when going to low mode and back.

Pressing the button for three to five seconds will switch the LED display from bar graph mode to "night rider" dot mode. Again, the center two LED's on the display will flash to indicate that a mode change has occurred.

Pressing the button for five to thirty seconds turns horizon system off or on. All LED's will be off.

Pressing button for more than 30 seconds resets everything to default values.

Level

Off-level, "Night-Rider" mode

Off-level, "Normal" mode

Choosing a Range

The range switch sets the sensitivity of the display. The smaller the range, the more sensitive the display will be. The default setting is “0” or +/– 5 degrees. We suggest you experiment with settings 1 through 6. The range choices beyond 5 degrees might be useful if one wanted to hold a specific Dutch angle. Setting “F (15)” is the full range of the sensor.

Range Choices

Setting	+/- Degrees
0 (default)	5
1	2
2	2.5
3	3
4	3.5
5	4
6	4.5
7	5
8	5.5
9	6
A (10)	6.5
B (11)	7
C (12)	8
D (13)	9
E (14)	10
F (15)	180

The range switch interacts with the rate switch. Typically, the smaller the range, the less integration you will need. Ranges or rates significantly larger than the default values are not typically used.

Setting a Rate

The rate switch sets the integration (or averaging) time. The longer the integration time (the lower the frequency or Hz), the slower the system responds. A longer integration time avoids the big, erroneous signals as you accelerate or decelerate. The faster the integration time, the more the indicator will jump around. Experiment and pick the “rate” you like.

There are sixteen positions, from zero to nine, and A through F. The default setting is “0” which equals 5Hz, a good compromise. Position one (.75Hz) has the most integration and slowest response. Position F has the least integration and fastest response.

Rate Choices

Low Pass filter settings (6-Pole IIR filter)

Setting	Hz
0 (default)	5
1	0.75
2	1
3	2
4	3
5	4
6	5
7	6
8	7
9	8
A (10)	10
B (11)	12
C (12)	13
D (13)	16
E (14)	18
F (15)	40