

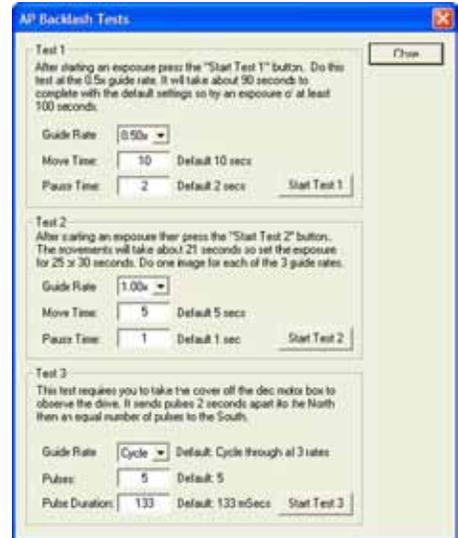
# DECLINATION AXIS BACKLASH TESTS

## PulseGuide™

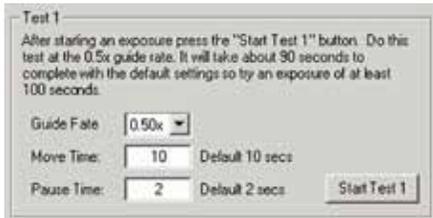
PulseGuide™ is a free software program, developed by Ray Gralak, to provide keypad-like functionality using a computer. It offers the additional feature of a Dec. axis backlash test. You can download it through a link from the AP website.

Once you have started the PulseGuide™ application and have connected to the mount, go to the "PEM/other" tab and click the "Backlash Tests" button to bring up three tests suggested by Roland Christen to test the health of your declination axis. Roland posted some tests that you can run on your AP mount to see if it has a potential problem with Dec movement.

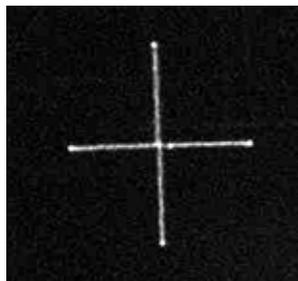
**IMPORTANT: Before running tests 1 and 2 set the mount's backlash to 0. Also while performing the tests do not try to auto-guide.**



### Dec Backlash Test 1



Before starting Test 1 set up your camera control program (e.g. MaximDL™, CCDOps™, etc.) to do a 100 second exposure (but do not autoguide). You can also set up an auto-dark exposure, but make sure that you start the test when the camera control software is exposing the light image.



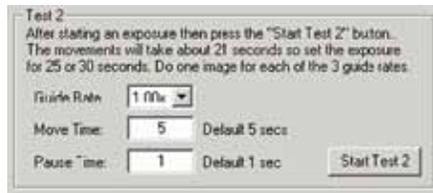
Once you start the exposure press the Start Test 1 button. With the default settings (recommended) the entire procedure will take about 90 seconds.

Test 1 will move the scope in this manner: East - pause - West - pause - East to center - North - pause - South - pause - North to center.

The stars in the resulting exposure should look something like the image to the right. The scale might be different but you should see what looks like many plus signs in the image.

If you take the image near Dec=0 the height and width will be about the same. Although not shown in this particular image the East and West points will be slightly brighter than the North/South points. This will make it easy for Roland to establish the orientation of the camera.

### Dec Backlash Test 2



You will run Test 2 three times, once for each of the guide rates. Before starting this test set up your camera control program (e.g. MaximDL™, CCDOps™, etc.) to do a 25 second exposure but do not try to autoguide. You can also set up an auto-dark exposure, but make sure that you start the test when the camera control software is exposing the light image.

Start by setting the Guide Rate to 1x. Once you start the exposure press the Start Test 2 button. With the default setting (recommended) the entire procedure will take about 16 seconds.

**0.5x**



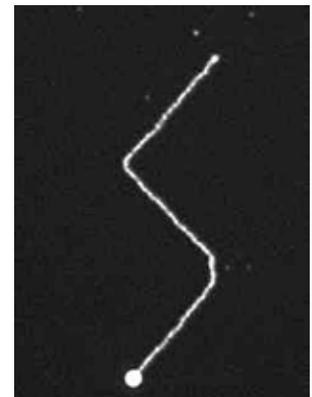
Although the scale might be different, the stars in the resulting exposure should look something like the image shown.

**0.25x**



For reference the actual movement in Test 2 is: North+West - South+West - West only (the pause setting) - North+West.

Now you will need to repeat the tests at 0.50x and 0.25x. The star patterns will look similar but smaller because the movement rate is slower. Here are two examples taken with a Traveler:



**1.0x**

## AFTER RUNNING TESTS 1 AND 2

If you see star patterns different from the above images then crop a bright star in each of the four images and save them as a high-quality JPEG. Please make sure to “stretch” each image appropriately so that it is not too dim or overexposed. If you do not know how to stretch and create a jpeg then save the cropped image in FITS format.

Then send the 4 files (preferably zipped to save bandwidth) to Roland at [chris1011@aol.com](mailto:chris1011@aol.com).

After submitting these tests AP will advise you if anything appears anomalous and if so what can be done about it.

## Dec Backlash Test 3

This test moves the declination motor at regular intervals to check that the gears move properly.

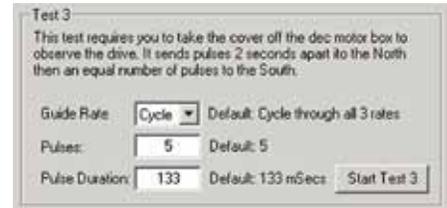
To do this test you will need to remove the cover from the declination motor housing (contact Astro-Physics for directions if you need).

The Guide Rate combo-box has 4 choices: 0.25x, 0.50x, 1.00x, and Cycle. You can choose a specific rate or Cycle to have *PulseGuide*™ repeat the test at each rate.

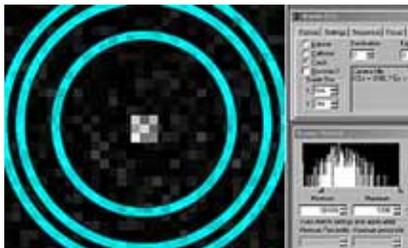
While watching the uncovered declination gears click the Start Test 3 button. *PulseGuide*™ will send 5 pulses spaced 2 seconds apart (or however many you entered in the Pulses edit box). Each pulse will be of the same duration – that which you enter in the Pulse Duration edit box. 133 milliseconds is the default. Watch carefully to make sure the pulses look evenly timed and that the fastest moving gear moves equally each time.

Once all pulses have been sent in one direction, an equal number of pulses are sent in the reverse direction. It is normal on reversal of direction that there is a slight delay in movement because of backlash. If this happens you may wish to increase the pulse count.

If you see erratic movement please contact Astro-Physics for instructions.

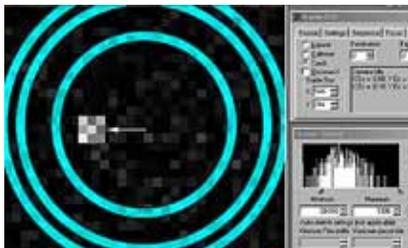


## MaxImDL™



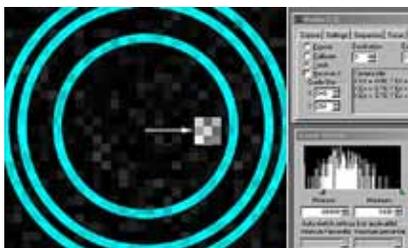
### Step 1

Acquire a reasonably bright guide star and begin guiding in R.A. only - turn off Dec. guiding. Use a 1 second or faster refresh rate so you can see the motion of the guide star as you begin to move it around. Magnify the screen to 1600x and place the cursor in the middle as shown. Check to make sure that the mount is guiding adequately in R.A. and that the guide star is not bouncing around due to poor seeing. Best results will be achieved when the R.A. guiding is 0.5 pixels average in R.A.



### Step 2

Put the keypad button rate at 0.5x. Press the keypad North button until the guide star has moved approximately 6 pixels from the center. Now press the South button in very short pulses and note which direction the star moves. It should move back toward the middle after a few button presses. It might move slightly up or down, or it might continue to move further away from the middle, or any combination. Please note exactly how far, and in which direction, the guide star moves (pixel position is displayed in the guide box at right in Maxim). Please allow a moment for the star to settle down after each button press.



### Step 3

Press the South keypad button until the star has moved 6 pixels off the center in the opposite direction. Repeat Step 2 and note exactly the motion of the guide star as you move it with the pulsed motion at 0.5x.

You may wish to enable Track Log to record the numbers for further study. Please note on the log what you did at what time so the results will be useful later. You have now characterized the Dec. axis.