The “Automatic” Point Count Stage

Point counting is used to determine accurate mineral modes of rock samples. Similar techniques are used in the ceramics and metallurgical industries to determine the modes of phases in synthetic materials. The basic process is to set up a grid of points on a thin section and identify the mineral at each grid point. Although actual grids are sometimes used for very coarse-grained samples or outcrops, these grids are cumbersome. With thin sections the grid is usually determined by a pre-set incremental movements of a mechanical stage. At each grid point, the mineral lying exactly under the crosshair intersection at each grid point is identified and counted. In general you want the grid to cover the entire area of the thin section.

The spacing of the grid points is determined by changing the movement settings on the mechanical point count stage. The number of grid points necessary for a given rock or thin section is determined by the coarseness of the rock and the precision needed for the modes: the more points, the higher the precision. Sedimentary petrologists generally do 200-300 points, whereas igneous petrologists typically do 250-1000 points. Rabid point counters do 2000 or more points per sample, and for special purposes many thousands may be necessary on one section. The percentage of each mineral in the sample is given by the formula:

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\text{\% mineral in rock} = \frac{100 \times \text{(points counted on mineral)}}{\text{Total points counted}}
\]

THE POINT COUNT STAGE

We have an electromechanical point count stage that makes point counting relatively easy. The device has two parts: the stage, which holds and moves the section (Figure 1), and the electronic counter (Figure 2).

Electromechanical Stage Parts (Figure 1)
A) Stepping lever: Pressing this lever down moves the thin section in the Y-axis direction 1/6 mm. To move farther, press the lever more times. The stepping lever doesn't work when the knurled knob is out.

B) Manual shift knob: Moves the thin section in the Y-axis direction. This knob works in only one direction when the knurled knob is in, but moves the thin section in both directions when the knurled knob is out. The manual shift knob is usually used to reset the thin section to the zero Y-axis position.

C) Knurled knob: When the knob is in, the manual shift knob works in only one direction. When the knurled knob is out, the manual shift knob works in both directions so that the section can be reset to the zero Y-axis position. The stepping lever doesn't work when the knurled knob is out.

D) Carriage release knob: This knob has two settings. When the carriage release knob is turned all the way counterclockwise, it lets the thin section frame slide freely along the X-axis.
When turned all the way clockwise it sets a ratchet for the point count traverse. The ratchet should usually be engaged.

E) Carriage return knob: Pull on this knob when the grid ratchet is engaged (carriage release knob turned clockwise) to reset the thin section to the zero X-axis position.

The diagrams show in Figure 1 that the X-axis movement per step can be changed from 0.05 to 0.33 mm per step. With the STAGE INTERVAL setting, this can be automatically increased up to 3 mm per step.

The Electronic Counter (Figure 2)
TOTAL WINDOW: Shows the total number of points counted if the REVIEW SWITCH is off, shows the current channel number if the REVIEW SWITCH is on.

COUNT WINDOW: Gives the number of counts in the current channel. Turn the REVIEW SWITCH to on to review each channel.

SAMPLING TARGET: The counter will sound an alarm when the total number of counts reaches the number set. The alarm is very loud, so I suggest you just set the SAMPLING TARGET to some big number (9999) and never let it go off.

RESET: Resets the total count and all channel counts to zero. Do this only after you record the data.

STAGE INTERVAL: Sets the number of ratchet intervals that the stage moves in the X-axis direction each time a counter key is pressed. For example, if the ratchet increment on the stage is 0.1 mm and the stage interval is set to 6, the stage will move 0.6 mm each time a key is depressed.

CHANNELS 1-12: Each of these keys corresponds to one mineral or kind of grain. Press the proper key for the mineral that is directly under the microscope crosshairs.

OFF-ON SWITCH: Power switch that turns on or off the machine.

STAGE ONLY KEY: This key moves the stage without changing the total count or the count in any of the channels. It is used to skip over void space, plucked areas, or grains that you don't want to count.

% SWITCH: When off, the TOTAL and COUNT windows show the actual number of total counts and the number of counts in the current channel, respectively. When the % SWITCH is on the TOTAL WINDOW displays the current channel number, and the COUNT WINDOW displays the percent of the mineral in the current channel, according to the number of points counted so far (beware of rounding errors).

REVIEW SWITCH: When off, pressing a channel key adds one to the channel and one to the total, and the stage moves in the X-axis direction. When the REVIEW SWITCH is on, pressing
a channel key shows the number of points (if the % key is off), or the percent of each mineral (if the % key is on), in the COUNT WINDOW.

ISOLATE CHANNEL 12: If off, pressing the channel 12 key adds 1 to channel 12 and 1 to the total. When the ISOLATE key is on, pressing the channel 12 key adds 1 to channel 12 but does not add 1 to the total. This is useful if you want to keep track of void space separate from the totals of the different mineral grains.
The stage interval value is multiplied by the X movement distances, shown in the table to the left, to get the distance that the stage actually moves in the X-axis direction when you press one of the stage movement keys on the controller. For example, if the stage interval is set to 6, and the gears in the gear box are set for an X movement distance of $\frac{1}{6}$ mm, then $6 \times \frac{1}{6} = 1$ mm.
Electronic Point Counter Controller

FIGURE 2.