2014 Professional Practices Program

Using a Precision Scale to Count Ballots

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What is it: Mettler Toledo BBK 462 Compact Counting Scale

How is it used in elections? It aids in ballot processing by increasing accuracy and saving time, costs, and worker fatigue. The scale also removes the task of having the boards hand-count ballots and thus increases the number of ballots that each board can pre-inspect per hour.

> **Background:** In this case the scale is used in a Central Count environment using Hart-Intercivic Ballot Processing. Ballots are separated into stacks of approximately 100 or fewer for ease of through-put into our digital ballot scanners. Number counts from the scale for the ballots in each stack are then compared for accuracy with the number that the scanner totals for each stack.
>
> (We would like to acknowledge Clark County, Washington, for sharing the idea of using a counting scale. We think it is a great idea and would like to share our experiences with others.)

What does it do? It weights a known number of ballots, and then calculates an "Average Piece Weight" (APW) that is then used when totaling numbers of pieces in future stacks of ballots.

For example: The operator counts 20 ballots into a stack and places them on the scale. The operator then sets the scale to calculate the average weight per ballot. The scale retains the APW and then displays the number of ballots in the stack that is placed on the scale, instead of displaying the weight of the stack.

Why is it used? We started using the scale to relieve the Election Boards from having to manually count multiple stacks of ballots. We found that using the scale had a higher accuracy rate than the manual hand counts, and increased the numbers of ballots each board could pre-inspect per hour. We found that using the scales, reduced time and board fatigue.

Using the scale to total ballot stacks has translated into a cost savings for labor by reducing the time dedicated to totaling stacks of paper by board workers.

Accuracy of initial totals of numbers of ballots reported in the stack as compared to the batch count when put through the digital scanner has improved dramatically as compared to manual hand counts. This in-turn reduces time spent re-weighing, re-scanning or re-counting the batch by hand to get an accurate batch total.

Another use for the scale is to verify the machine tally of votes and for the hand tally of votes for a re-count. In order to do this, separate the ballots based on votes cast for the candidates or for Yes or No for a measure, and then place the stack of ballots on the scale that is calibrated with the correct APW.

Items of note: The scale has a +/- accuracy. The scale that we use has a precision of 0.0001 lb. A blank 8½" x 11" piece of paper, with no printing, generally weights 0.01 lb. Factors that could influence the paper weight are the amount of ink or toner printed on the ballot and an increase/decrease in humidity. If ballot materials have a change of $\pm$ 0.0002 lbs or 2% (0.0098 - 0.0102 lbs), the margin of error could occur with as few as 25 ballots. The larger the number of ballot variations sampled for the paper product of equal weight will help increase the accuracy of the count.

These factors are easily compensated for by requesting that our ballot printer use the same source and production run of paper for all ballots. When processing ballots, allow the scale to warm up for 30 minutes before use and recalibrate the APW before starting. Periodically recalculate the APW throughout the day. Also recalculate if number discrepancies are seen between the scale and the ballot tabulation equipment.

In conclusion, we feel that the counting scale is now a valued tool in the counting and reconciliation of ballots. The scale has reduced the work load of the boards (saved labor costs), and has improved the accuracy of ballot counts to the tally equipment when used within its operational parameters.

Setting Up The Scale To Count Ballots

1) Set the scale on a level, sturdy table. Limit locations that would cause floor vibrations, and keep away from ventilation systems. The scale is sensitive enough to "weigh" air flow blowing down on the weighting surface.

2) Turn on the scale. For optimal performance, let the scale "warm up" for at least 30 minutes before weighting.

3) Verify that the scale is level. There is a bubble level on the back of the scale and the feet adjust the corner heights to level it.

4) If totaling ballot stacks, the sample count weight should be close to the number of ballots in the batch, i.e. if the batch size is 75-100 ballots, you should calibrate the scale using at least 75 ballots. This will increase the accuracy of the counting. The ballots should also be of equal weight.

    This scale has a precision of 0.0001 lb. A blank piece of paper 8½" X 11", with no printing generally weights 0.01 lb.

5) Place the known hand-counted quantity on the weight platform. Once the scale has displayed a steady weight and the "stability detector" (small ring at the left edge of the weight) disappears, press the "Smpl n" key. Next, press the "Var" key. Using the key pad, type in the number of hand-counted ballots and press the "Ok" button. This will set the "Average piece weight" (APW) for the scale. You are now ready to begin totaling ballots by weight.

6) With each new batch, always wait until the scale has stabilized, then start the totaling process. Double-check with the scanning stations for accuracy of results comparing with the number of ballots scanned.

7)   Remember, counting by weight is only as accurate as the materials being weighted, and sometimes, outside influences affect the ballot weight from day to day. Humidity, foreign materials and even the amount of toner on a page will change the overall weight and thus the accuracy of the count if the batch sizes increase.

If the ballot materials have a change of $\pm$ 0.0002 lbs or 2% (0.0102 & 0.0098 lbs), the margin of error could occur with as little as 25 ballots. A greater number of ballots sampled throughout the product, of equal weight, will increase the accuracy. If the "APW" ballots were all 0.0098 lbs, and then a stack of 0.0102 lb ballots was totaled, it would not take a great number of 0.0102 lb ballots to begin to affect the count accuracy.

Recommended method to get an accurate APW.

Get a random sample of known ballot quantity.   Example: If there are 40 ballot styles, use 2 ballots per ballot style to set the APW weight using a total of 80 ballots.

Verify that the APW is good by counting batches of 60 ballots each from at least 5 different ballot styles. Pick ballot styles based on toner usage - 2 with a lot of contests, 2 with very few contests and 1 in between. Using the scale, total each batch, and then hand-count to confirm scale is set up correctly.

REMEMBER: The greatest thing that will throw off the accuracy of the count is the variance of weight between individual pieces of paper. Try not to use "a mixed bag" of paper weights and types. Mixing 20# bond and 60# bond paper will greatly affect counting accuracy.