

How to effectively audit ballot interpretation machines

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1. Boulder County relies on computerized ballot interpretation machines to determine elector intent.
2. We use these machines under the assumption that they determine voter intent with roughly the same results that human election judges would.
3. But this assumption is never effectively tested.
4. Existing logic and accuracy tests are statistically insufficient to assess the accuracy of these devices.
5. Furthermore, the LATs are done on test ballots – not live ballots. The accuracy of the count of live election ballots is not effectively tested at all.
6. To test these machines, we need to hand-count a portion of the live ballots and compare that information to what the ballot interpreting machines produce.
7. Unfortunately, most existing audit plans count a large number of ballots, but still result in a low degree of statistical significance – because they are comparing their totals to machine totals.
8. We can fix those problems by applying a unique serial number to each ballot, and by requiring that the ballot interpretation machines generate a “Ballot Interpretation Report.” This report shows the machine's interpretation of each vote on each ballot, listed by ballot serial number.
9. Under these conditions, in a county with 150,000 or more voters, a hand-count team would only need to review 921 randomly-selected ballots – less than 1% - to guarantee that the machines are interpreting at least 99.5% of the ballots correctly in 99 out of

100 elections.

10. This method protects against software and hardware errors and fraud in the ballot interpretation device – without relying on source code inspection or other techniques.
11. The ballot interpretation reports can then be used to audit the vote tabulation process by loading the reports into standard spreadsheet software and summing the columns.
12. Any difference from the results from the vote tabulation machine or process would demonstrate a problem in the tabulation process.
13. The plan is based on a well-known, peer-reviewed acceptance sampling plan written by a fellow of the American Statistical Association and the American Society for Quality Control.
14. The serial numbers can be applied when the ballots are printed, or preferably, immediately before the ballots are scanned. The latter approach helps protect voter anonymity.
15. This plan is only possible if the vote interpretation process is auditable. DREs without VVPATs, for example, are not auditable. This system would not work for those devices. This method does work for elections using optical scan systems (including opscan systems using ballot marking devices like the Vogue Automark) and also DREs with VVPATs. Fortunately, this component of Boulder County's voting system is auditable.
16. This plan is a powerful and efficient way to assess a potentially significant source of election error and fraud. But there are many other aspects of an election which require auditing and careful security, including the ballot printing process and the absentee balloting process. Therefore, although this plan is a necessary part of election security, its use alone is not sufficient to guarantee election accuracy.