Testing Before the Vote:

Best Practices for Verifying the Integrity of Your Election

Election success starts long before the first ballot is formatted, or the first vote is cast. Careful pre-election preparation is vital, including activities ranging from hardware testing and software verification along with strong voter communication.

This preparation can be complex and not well understood by the public, opening the door to mis-information campaigns. Executing the best testing procedures and educating the public about pre-election work builds confidence in a trustworthy election process.

Testing requirements and options

State requirements for pre-election testing vary, and some decisions may be left up to individual jurisdictions. Officials also may be guided by recommendations from their election system partners and preferences of their populations as well as local and state requirements.

This paper will discuss best practices for common pre-election tests, plus links to more in-depth information.

All recommendations presented here are superseded by your state election law, rule, and code. Please incorporate your local requirements.

Examples of testing at the jurisdiction level

Functionality Testing

Does the hardware function as it is intended? For example, does a scanner read marked ballots properly? Are accessibility features working? Functionality tests are built into some voting devices, so ask your election system partner for details.

WHEN: Functionality tests should be completed annually or before every election. Establish a regular schedule.

Work with your election system provider to develop a checklist for functional testing. Depending on your system configuration, the checklist might include testing these components:

- Touchscreen
- Device report printer

Are there mandatory federal guidelines?

No. But, the U.S. Election Assistance Commission's (EAC) Testing and Certification Program provides voting machine testing and certification to help state and local officials.

The EAC's certifications are designed to independently verify that voting systems comply with the functional capabilities, accessibility, and security requirements necessary to ensure the integrity and reliability of voting system operation, as established in the Voluntary Voting System Guidelines (VVSG).

States may choose whether to make these guidelines mandatory.

- Ballot printer
- Vote record printer
- Ballot scanner
- Headphones and tactile devices for accessible voting
- Rechargeable batteries

Procedures should be detailed and consistent, so prepare accordingly.

The value of preventative maintenance

Prepare year round for functionality testing with scheduled maintenance, including:

- Cleaning
- Calibrating
- Replacing batteries and other consumables as recommended by the manufacturer of your voting equipment

---

Logic and Accuracy Test
(LAT or L&A Test)

This test checks the accuracy of the vote count. Test ballots with known results (a 'test deck') are submitted through the ballot counting system and the results are compared.

If the actual test deck count does not match the expected count, then the problem is investigated and corrected. Tests are repeated until issues are resolved and accuracy is assured.

The Logic and Accuracy Test is separate from device functionality testing.

WHEN: State and local guidelines dictate the time frame for performing Logic and Accuracy Tests.

In some jurisdictions additional LATs are required on Election Day or throughout the election cycle. In some states, including Texas, public LAT testing is required before early voting begins.

All LAT recommendations and procedures presented here are superseded by your state election law, rule, and code.

It is recommended that you hand count the test deck of pre-marked paper ballots, including overvotes and blanks. Your election system partner may

provide a pre-marked test deck; however, you must always follow state and local rules governing the test deck composition and marking pattern.

Tests such as printing test ballots and running them through your election process help ensure there will be no surprises once the election begins.

Common recommendations for a LAT process:

- Perform before any ballot, in any form, goes to any voter.
- Include votes on every type of device that will be used to capture cast vote records.
- Generate any paper ballots used in the LAT following the same printing method used for official ballots.
- Include any software used for vote tabulation.
- Prepare a spreadsheet or matrix of the test deck marking pattern, for comparison against the tabulated results.

Keep a complete LAT Log

Record and print an inventory of checklists, reports and pertinent LAT data and retain all with signatures of participants.

> **Jurisdictions may have different requirements about who witnesses the tests. Inviting public witnesses is a good idea. Be prepared to answer questions about the purpose, conduct, and outcome of the testing.**

File the LAT log, test deck, and other materials securely.

Hash Testing

A hash value is the digital 'fingerprint' of a software application. Hash testing can show whether tampering has occurred.

Hash values of the installed software are compared to archived hash values of the software certified by the EAC or other regulatory body. Both values should be identical.

WHEN: Hash testing can be performed at any time. Some states have specific requirements for testing and frequency. In some states, hash testing is voluntary.

Contact your Secretary of State's office for additional information concerning hash testing requirements.

Example procedure for ballot print testing

Use test ballots produced from the same source as your official election ballots. This means:

- Test ballots created using the same election ID and version as your official ballots.

- Test ballots printed using the same method and equipment as official election ballots.

- If you will be using multiple sources to print official ballots (in-house, third-party printing, etc.) then make sure ALL sources are included when printing test ballots.

- Test ballots from each precinct and/or ballot style.

HART *intercivic*™
www.hartintercivic.com

What is hash?

A paper record of a hash function uses a secure algorithm to generate a unique hash value (a digital fingerprint) from input data.

In this illustration, CAT is the original input data. If CAT is changed to DOG, the hash function will generate a new hash value.

A hash function is one-way only, meaning that a hash function cannot be translated back into the original data, a further security step.
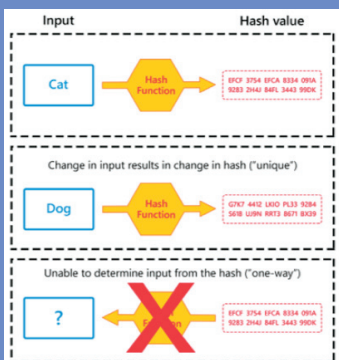
At the jurisdiction level, hash testing will check that software on workstations and voting devices has not been altered since its initial installation. The locally installed software is compared to a "trusted build" that has been certified by a regulatory agency. Note: Best practice would be to do the hash testing on your own rather than hiring a 3rd party vendor or asking the original vendor to do it.

The hash test will show if hacking, tampering or other unauthorized changes have been attempted. Any attempts to alter the function of the software would be apparent when the hash values are compared. If hash values do not match the hash values of the original software, there has been a change that should be investigated.

Who should conduct testing?

Ideally, the staff at each jurisdiction should understand their equipment and systems well enough to perform local testing as part of a smooth and secure election.

Voting system partners may provide checklists, training and resources that ensure consistent, reliable testing procedures.

Some jurisdictions require self-testing. Others are allowed to hire third party companies instead.

Advantages to internal vs. third party testing:

- A third-party handoff may create the impression that local officials are not informed or able to perform these tasks, harming credibility.
- Adding third parties to chain of custody may create actual or perceived security vulnerabilities.
- Potential miscommunication and misunderstanding.
- Additional expense hiring a third party.

Sharing results builds confidence

"Nothing works better than showing people what you do in person."

—Pam Fessler, Telling Our Story: An Elections Communication Guide

Invite the public to witness testing and share the results of your efforts widely. Transparency and insight into your processes builds confidence in your equipment, your staff and the entire election process.

Additional resources

Election Readiness
https://www.hartintercivic.com/election-readiness/

EAC Testing and Certification Program
https://www.eac.gov/sites/default/files/TestingCertification/EAC_Testing_and_Certification_Program.pdf

Voting Equipment FAQ
https://eac.gov/voting-equipment/frequently-asked-questions

Communicating Election and Post-Election Processes Toolkit https://www.eac.gov/election-officials/communicating-election-and-post-election-processes-toolkit

Telling Our Story: An Elections Communication Guide https://www.electionsgroup.com/telling-our-story-guide

Choosing How to Communicate with Voters, Center for Civic Design https://civicdesign.org/fieldguides/choosing-how-to-communicate-with-voters/

Rumor Control Start Up Guide https://www.cisa.gov/sites/default/files/publications/rumor-control-startup-guide_508.pdf

- Publicize opportunities and welcome observers to pre- and post-election tests and audits. Educate the public to avoid confusion and counteract mis-information.

- Explain what they will see and how tests prove that equipment and processes are working properly. A fact sheet or FAQ page on your website can be a good resource. (See the Rumor Control Page Start-Up Guide, left.)

- Include all stakeholders: voters, nonvoters, political campaigns, civic groups. Enlisting reporters and media outlets can help amplify your message. Remember, you have nothing to hide. (See Telling Our Story: An Elections Communications Guide, left.)

- Expect a larger crowd as public interest in the election process is growing.

- Keep reporting your success. Emphasize that test results show the integrity of your system. Make use of local media connections, social media streams and press releases.

Plain language works best. Don't overload your messaging with jargon and acronyms. Say "Our testing showed that each piece of equipment works as expected." Not "LAT testing was completed."

About Hart

Working side-by-side with election professionals for more than 100 years, Hart is committed to helping advance democracy one election at a time. Hart's mission fuels our passionate customer focus and a continuous drive for technological innovation. The result is Verity® – truly different election technology. Reimagined from the inside out, Verity Voting promises to provide jurisdictions with a future-proof investment in secure, transparent voting.

HART *intercivic*™
www.hartintercivic.com