★ VIRGINIA ★
DEPARTMENT of ELECTIONS

Commonwealth of Virginia Logic and Accuracy Testing Guidelines

Voting Systems and Electronic Pollbooks

February 2025

Purpose

The purpose of this document is to establish uniform testing guidelines for voting systems and electronic pollbooks prior to the start of Mailed Ballots/Early Voting and Election Day. These

guidelines are provided to address the various components and processes involved in the administration of elections.

All voting systems (optical scan/digital scan voting machines, ADA ballot marking devices, and ballot on demand printers) and electronic pollbooks used by localities must be certified for use in the Commonwealth of Virginia.

Pre-testing of voting systems and electronic pollbooks for logic and accuracy (L&A testing) is required by Code and is completed for equipment used for Mailed Ballot/Early Voting (MD/EV) and for Election Day (ED).

L&A testing is intended to ensure each voting equipment type is working properly and in concert with one another. Complete and thorough L&A testing aids officers of election with successful election morning set-up and results in fewer Election Day complications, less confusion, and prompt results reporting on election night.

1. Overview of Logic and Accuracy Testing for Voting Systems

Voting Systems include (i) optical scan/digital scan voting machines, (ii) ADA ballot marking devices (ADA, ADA BMD), and (iii) ballot on demand printers (BOD). L&A testing involves testing every precinct ballot style and all components of the voting systems prior to every election (**prior to distribution of any ballots to voters**). The L&A testing audit trail is a foundation of each election and ensures that the election has been programmed correctly and validated through extensive testing of all components of the systems.

Key components of any test include:

1. Separation of duties
2. Chain of custody
3. Proofing
4. Dual signature sign-off at each level of the testing process.

Document all steps on the audit sheets or checklists you use for recordkeeping.

The high-level L&A steps include:

1. Ensuring the election definition file of the voting equipment vendor was programmed in accordance with the locality's specifications
2. Setting up the voting equipment for In-person Absentee Voting Central Absentee precinct (includes satellite early voting equipment), Pre-processing Central Absentee Precinct, Election Day Central Absentee Precinct, Post-election Central Absentee Precinct, each precinct (polling place) and, if applicable, Provisional Meeting ballot counter
3. Loading the election definition file on each device
4. Opening the election

5. Printing a zero tape on each device
6. Casting a known pattern of votes on each ballot style
7. Closing the election
8. Printing the vote totals tape on each device
9. Comparing the printed vote totals to the expected outcome for each precinct
10. Printing all reports and comparing to the expected overall outcome for the election.

NOTES: Staffing limitations may require the use of a contractor to assist with programming the election definition file. However, a staff member should run the L&A testing. Individuals other than those who program the equipment should assist in conducting the L&A testing.

The L&A testing audit trail begins with an audit sheet or checklist containing the following information for each voting system device: election date, serial number, and date of test, protected count number pre and post-test, public count number pre and post-test, and step-by-step instructions for the tester. Attach to the audit sheet or checklist and the paper tape from the device, which has the opening zeros, to the printed vote totals at the end of the test. The final step is to clear the test election from all voting system devices.

Separation of duties best practices should be followed, including the assignment of a different person to compare and verify the outcomes of the test to the expected outcome for each device. The individual conducting the test and the individual comparing and verify the outcomes initial and date each form.

Secure all marked test ballots in a sealed container marked “Test Ballots”. Secure and archive all audit documentation relating to the Logic and Accuracy test and retain per the Library of Virginia’s GS-01 schedule.

All voting system devices must then be locked and sealed with numbered seals and be stored in a secured area until delivery to polling places.

The Registrar, or designee, shall complete and submit the ELECT-633/EV/ED Logic and Accuracy Testing & Certification survey twice to the Virginia Department of Elections, first prior to the start of early voting and second prior to election day for every election event.

1.1. Recommended Step-by-Step Procedures for Logic and Accuracy Testing

1. Assemble the ballot box and attach the scanner unit:
    a. Plug the scanner into an AC outlet
    b. Check the ballot bin to ensure it is cleared of any ballots or other materials
2. If a Test Deck is not provided, mark a predetermined number of ballots:
    a. A 1-2-3 pattern may be used

i. For each office on the ballot, the first candidate receives one vote, the second candidate receives two votes, and the third candidate receives three votes, etc.

b. One or more blank ballots are scanned. Mark each of these ballots as "BLANK" in the header card area
c. One or more "under-voted" ballots are scanned. Mark each of these ballots as "UNDER-VOTE" in the header card area
d. One or more "over-voted" ballots are scanned. Mark each of these ballots as "OVER-VOTE" in the header card area
e. Mark ADA ballots (some systems have an automated system that allows you to choose your pattern Vote 1, Vote 1-2, Vote 1-2-3 and it automatically prints the ballots) voting the ADA manually, vote expectations must be written down i.e. Vote 1st position on each contest, vote for write-in, etc.
f. Produce and mark print on demand ballots so that each precinct ballot is tested in the manner described above.
g. Incorporate, if possible, Election Day precinct ballots into the test deck to ensure that the ballots can be read by the optical scanner. Follow the marking methodology established above.
Use a tally sheet to determine the votes for each candidate, write-in, over-vote, and under-vote

NOTE: All capabilities of each ADA machine must be tested (e.g. ballot styles, precincts, audio, visual, etc.). It is recommended that ADA units are programmed to accept all ballot styles in the locality since they are a marking device, not a tabulating device. *Reminder: Mixing in ADA write-in votes within the test deck is recommended.*

3. Loading the Election Media:
    a. Insert the election media and power up the tabulator as described in the vendor instructions
    b. Verify and record the firmware version number on the audit sheet or checklist
    c. Always run a calibration or diagnostics test on each scanner and ADA touch screen prior to scanning ballots
4. Open the Polls and Scan Ballots
    a. Open Poll
        i. The scanner will print a zero totals tape, keep that tape on the scanner until the end of testing
        ii. Verify election and precinct information
        iii. Verify date and time
        iv. Confirm all contest votes are "0"
        v. Verify number of signature lines

   b. Insert the test deck of ballots into the scanner one at a time, including ADA marked, print on demand, if applicable, and Election Day ballots
      i. Test different orientations (right side up, face down, head-first, bottom first)
      ii. Test query for over-vote, under-vote, blank ballot, multiple ballots
      iii. Monitor the public count to insure it increases by one for each ballot inserted
5. Close the Polls
   a. Close Polls
      i. The results total tape will print. Tear the tape from the scanner and attach it to the audit form or checklist
      ii. The team member performing the test should initial the audit form or checklist
   b. Check the date and time for accuracy and make any changes necessary
      i. The results totals tape will print. Tear the tape from the scanner and attach it to the audit form or checklist
      ii. The team member performing the test should initial the form or checklist
6. Verification of scanner test
   a. Verify results by comparing the test deck results to the expected results
      i. If the results match, the team member comparing and verifying the results should initial the audit form or checklist.
      ii. If the results do not match, review the test ballots for errors, count the ballots to make sure all ballots are accounted for from each scanner, if the discrepancy cannot be resolved, zero the totals from the scanner and repeat the test steps.
      iii. If the results do not match after the second test, contact the person who programmed the election.
7. Securing Equipment after verified results
   a. Close and lock each scanner
   b. Remove all test ballots from the ballot box/container
   c. Seal equipment with numbered seal
   d. Record numbered seal on audit form or checklist
   e. Verify numbered seal at the precinct from the list provided by the GR
   f. The sealed voting equipment and keys must remain in the custody of the electoral board pending delivery to the polling place
8. Reset machines to a public count of 0
   a. Verify the deletion of the test election file and results from all scanner devices. Confirm the deletion by initialing the audit sheet or checklist

b. Verify the deletion of the test election database in the Tabulation Reporting Computer, if you have a computer tabulation reporting program. Confirm the deletion by initialing the audit sheet or checklist

9. Audit Trail
    a. Document test process on Logic and Accuracy Test Audit Form
    b. Document results on tape
    c. If a printed Test Deck is not used, on each official ballot used for testing:
        i. Write **TEST** and initial on each ballot (in the header area)
        ii. Strike through and initial the Electoral Board Seal on the back of the ballot

Save this documentation for the applicable records retention period.

IMPORTANT: Store audit forms or checklists for each component of the voting systems used in the election in a separate file folder.

1.2. Summary

The voting system L&A testing is designed to:

1. Fully test the programming of each election
2. Validate that votes for each candidate on each ballot style are counted correctly
3. Ensure that final cumulative results are distributed and counted correctly for all candidates within all precincts and districts

L&A testing is a "simulated" election using all ballots in all precincts in a predetermined test pattern, using **all** equipment to be deployed in the election, and ending in a "simulated" election night scenario of uploading all media devices and printing cumulative reports.

The documentation from the L&A testing is considered as verification that the election has been programmed correctly, and that all equipment has been tested prior to deployment.

REFERENCES:

- Code of Virginia, Sections 24.2-632 and 24.2-633
- Virginia Department of Elections, the Handbook, Chapter 4, Voting Equipment, Section 4.8, August 2024
- Examples of Logic & Accuracy Audit forms or Checklist

2. Overview for Electronic Pollbooks

L&A testing for electronic pollbooks is a two-step process. The first step relates to the hardware device(s). The second step includes the download of voter registration files and/or ballot identification data and confirmation of its accuracy.

Key components of any test include:

1. Separation of duties
2. Chain of custody
3. Proofing
4. Dual signature sign-off at each level of the testing process.

Develop audit forms or checklist for all steps in preparing the pollbooks for use during early voting, pre-processing, on Election Day; keep these audit forms for recordkeeping.

Steps in the L&A testing include:

1. Confirming contents in Precinct Pollbook equipment cases
    - Contents will differ across election event types, e.g. single primary, dual primary, or a general and special election
    - Law or regulation changes requiring new or revised EPB peripherals
2. Reviewing pollbook device settings
    - EPB officer of election prompts will change based on the type of EPB used, e.g., prompts for Election Day will vary from Early voting or Pre-processing
3. Downloading voter data
    - VERIS data will differ between a primary, dual primary, and general and special elections
4. Merging ballot identification data to voter precinct/split-precinct
5. Proofing voter/ballot ID data
6. Confirming election-specific information
7. Confirming the EPB has a "Zero" voter check-in count
8. Sealing equipment cases for delivery to polling places.

NOTE: Staffing limitations may require the use of a contractor to assist in the downloading of voter data to the electronic pollbooks. However, a staff member should run the L&A testing. Individuals other than those who download the voter data should be responsible for verifying the accuracy of the data.

2.1. Recommended Step-by-Step Procedures for L&A Testing

1. Organize equipment by precinct and number of devices
    a. Confirm that precinct ID tags are correct
    b. Verify supplies in each case, such as:
        i. Power cords
        ii. ID tray
        iii. USB power adapter
        iv. Stylus pens

v. Printer (if applicable)
vi. Printer power cord adapter
vii. Printer power cord
viii. Printer paper roll
ix. Cleaning cloth for screen

2. Review device settings
    a. Confirm software version number
    b. Confirm pollbook device number
    c. Confirm correct time
    d. Confirm wi-fi is “not connected”
    e. Confirm name of election and election date
    f. Confirm polling location identifier
    g. Confirm that camera setting is “on” (to scan ID barcode)
3. Download voter data
    a. Confirm jurisdiction wide voter count via screen or through a report provided
    b. Confirm number of voters in precinct via screen or through a report provided
    c. Confirm when downloading the voter data that the check-in count is zero (0)
4. Merge ballot ID to voter data
    a. Review and confirm the ballot ID to precinct/split-precinct data prior to uploading to pollbooks
    b. Test a designated number of voter names in each precinct/split-precinct to validate correct ballot ID
5. Prepare equipment for delivery to polling place
    a. Confirm battery life is 100%
    b. Confirm voter check-in count is zero (0)
    c. Verify equipment is turned off
    d. Clean screens
    e. If applicable, seal the case and record seal number for that precinct

2.2. Summary

The electronic pollbook L&A testing provides audit documentation that each device is in operating order and all components have been packaged for delivery to polling places. If voter data is provided through a contract vendor, after you download the files from VERIS, any reports or data provided should be compared and verified by a full-time staff member. Likewise, the ballot style identification to voter districts and precincts must be compared and verified by a full-time staff member. The signed testing audit forms or checklist becomes the office's validation that (i) the voter data has been downloaded correctly, (ii) ballot style identification is correct, and (iii) the equipment is prepared for deployment.

Save this documentation for the applicable records retention period.

REFERENCES:

- Code of Virginia, Sections 24.2-103 24.2-611
- Virginia Administrative Code section 1VAC20-60-70
- Virginia Department of Elections, the Handbook, Chapter 4, Voting Equipment, Section 4.8, August 2024
- Examples of Pollbook Pre-Election Testing Checklists

3. Overview for Ballot on Demand Systems

Ballot on Demand systems are included in the definition of voting systems (See VA Code §§ 24.2-101). As a result, Ballot on Demand (BOD) systems are subject to the requirements of Logic and Accuracy testing.

L&A testing for ballot on demand systems (BODs) requires access to the devices and an optical digital scanner to confirm that the ballots printed by the BOD were accurate and readable by the scanner.

Key components of any test include:

1. Separation of duties
2. Chain of custody
3. Proofing
4. Dual signature sign-off at each level of the testing process.

Document all steps on audit forms or checklists for recordkeeping.

3.1 Recommended Step-by-Step Procedures for Logic and Accuracy Testing

1. Confirm the printer is programmed as required to produce the ballots on the voting system vendor's scanners
2. Confirm the locality's voting system precinct (or central count) scanners are loaded with the election file
3. Confirm ballot files being selected by voter or by style are processed correctly by the BOD. If the processing unit is an electronic pollbook (EPB) confirm the voter was given voting credit
4. Print precinct ballot styles for the number of precincts in the locality
5. Mark the printed ballots with the testing pattern established for all ballot styles printed
6. Insert the marked printed ballots in the locality precinct (or central count) scanner(s)
7. Close the election on the precinct (or central count) scanner(s)

8. Ensure the election results are printed correctly on the tape and within the BOD's software or system.
9. Confirm the results match the predicted outcome
10. Confirm the processing unit provides a report of the number of ballots printed by precinct ballot style

4. Attestation to ELECT

Once complete with the appropriate L&A testing, the locality office should complete the formsite attestation. This form provides some additional details on the recommended locality process, allows ELECT to confirm localities have followed the central requirements of L&A testing, and provides a transparent record for localities to refer to if asked about the process.

- Make sure to select the proper L&A that was conducted (Early Voting EPB, Early Voting Voting System, Election Day EPB, Election Day Voting System) and the appropriate vendor for each.
- Upload the audit form or checklist used for the L&A test. A single one for the type of equipment is fine, please do not submit a separate checklist for each poll book or machine tested. This is to ensure ELECT has a record of the form used on the attestation.
- Pay close attention to the advisory ELECT sends on the completion of the attestation to ensure deadlines and reporting requirements are followed.