2012 Minnesota Voting Equipment Testing Guide

March 2012

Office of the Minnesota Secretary of State
180 State Office Building
100 Rev. Dr. Martin Luther King Jr. Blvd.
St. Paul, MN 55155

Phone: (651) 215-1440
Toll Free: 1-877-600-8683
Minnesota Relay Service: 1-800-627-3529

Email: elections.dept@state.mn.us
Website: www.sos.state.mn.us

TABLE OF CONTENTS

Page

1.0 VOTING EQUIPMENT TESTING OVERVIEW 3

2.0 TESTING PREPARATIONS 3
2.1 Ballots 3
2.1.1 Ballot Programming 3
2.1.2 Ballot Proofing 4
2.2 Test Deck 5
2.2.1 Requirements 5
2.2.2 Marking the Test Deck 7
2.3 Diagnostic Testing 9
2.3.1 Ballot Counters 9
2.3.2 Assistive Voting Devices 9

3.0 PRELIMINARY TESTING 10
3.1 Materials 10
3.2 Testing Process 11
3.3 Post-Test Procedures 11

4.0 PUBLIC ACCURACY TESTING 13
4.1 PAT Overview 13
4.2 Testing Process 13
4.3 Post-Test Procedures 13

5.0 TESTING ASSISTIVE VOTING DEVICE ONLY 15
5.1. Testing Preparations 15
5.2 Preliminary Testing 15
5.3 Public Accuracy Testing 16

GLOSSARY 18

APPENDIX A (Sample Certifications) 20
APPENDIX B (Sample Test Deck Spreadsheets) 22
APPENDIX C (Creating Test Deck Spreadsheets) 26

1.0 VOTING EQUIPMENT TESTING OVERVIEW

Prior to every election in which an electronic voting system is used, the election jurisdiction must conduct both preliminary testing and a public accuracy test of its electronic voting systems to verify that the equipment and programming function properly. The equipment that must be tested includes all ballot counters (precinct and central count) and all assistive voting devices that will be used in the election. (M.S. 206.83)

Ballot counters are tested using a test deck of ballots with a predetermined set of votes marked on them, and comparing the totals from the ballot counter with the expected totals. The test deck must be set up so that a variety of vote conditions are tested. These include overvotes, undervotes, and cross-party voting. An assistive voting device is tested by marking a set of ballots with the device.

Two kinds of testing are required in Minnesota law. Preliminary testing precedes the Public Accuracy Test (PAT), and tests all electronic equipment to be used in all precincts, including spares. It gives jurisdictions a chance to identify and remove or repair malfunctioning equipment. The purpose of the PAT is to demonstrate the accuracy of the electronic voting system to the public. The PAT differs from the preliminary testing in some significant ways:

- It must occur within a certain timeframe (less than 14 days before the election)
- It is open to the public, and a notice must be published at least 48 hours before
- Election judges with party balance must be present
- Depending on a jurisdiction's size, only some of its equipment may have to be tested.

In addition to general testing practices, this guide contains step-by-step procedures for creating test deck spreadsheets which meet the testing requirements established by Minnesota Statutes 206.83 and Minnesota Rules Chapter 8220. This guide also contains sample test deck spreadsheets to illustrate the various steps in developing test deck spreadsheets and marking test decks.

2.0 TESTING PREPARATIONS

2.1 BALLOTS

2.1.1 Ballot Programming

Prior to voting equipment testing, voting equipment programming and ballot printing should be complete. You must test the equipment and ballots exactly as they will be used on election day. There are two programming deadlines in Minnesota Rules:

- Five days after candidates' names are certified by the secretary of state, the election jurisdiction responsible for requesting the computer program must provide the programmer with complete ballot information including the office order, candidate names, base rotation, ballot questions, and the rotation algorithm. (M.R. 8220.0850)

- The computer program for any election and an exact duplicate of the program for use as a backup must be completed and delivered to the election jurisdiction or the county auditor in charge of a central counting center at least 21 days prior to the election. (M.R. 8220.0850)

If you are working with a vendor to program your election and/or print your ballots, the vendor will provide you with a calendar of deadlines for particular tasks.

2.1.2 Ballot Proofing

It is important to fully proof ballots early in the process to ensure any errors are caught and corrected. Ballot proofing supplies may include:

- List of precincts (with May 1 voter registration counts and school district splits noted)
- Example ballots from the Secretary of State
- Certification of candidates for federal and state offices
- Affidavits of candidacy
- Certificate of base rotation sequence
- Resolutions from councils or boards that contain ballot questions
- A precinct table that indicates which districts each precinct is in
- Election law book

Use only source documents such as affidavits of candidacy, certified candidate lists from the state, and board resolutions (in the case of ballot questions). Have a copy of the current example ballot on hand, and always read required language from the appropriate law or rule. Secondary documents increase the chance of error.
Proof your ballots methodically and by element. Ensure that you have a ballot for every precinct. For precincts split by more than one school district where at least one has a race on the ballot, make sure there is a different ballot style where necessary. Sometimes it is helpful to have some “fresh eyes” to proof the ballots. The person who did the programming may miss some errors.

On each ballot verify:

- The correct races and questions are present
- The ballot matches the example ballot
- Candidate rotation is correct. Use reporting from your ballot programmer or software
- Ballot heading is correct and offices are in order
- Each office’s title and “vote for #” are correct
- Incumbent judges are designated
- Candidate names are printed exactly as entered on each affidavit or as on the certified candidate list.
- Party names are spelled correctly
- Language for each ballot question matches the authorizing board resolution
- Number of write-in lines equals the number to vote for on each race. (General Election only)

Proceed only after you are confident that you have fully proofed your ballots and are certain that they are correct. Likewise, municipal or county attorneys should sign off on the ballots only after they have been fully proofed. (M.S. 204D.04)

2.2 TEST DECK

The test deck is a set of ballots for each precinct that has been marked with a predetermined variety of votes for each position in each office and question on the ballot. Sections below detail what needs to be tested with the test deck, and how the ballots must be marked. Test decks may be prepared as soon as the withdrawal period is over. See appendices for instructions on how to create test deck spreadsheets that conform to the requirements. (M.R. 8220.1050)

When possible, verify that the ballot counter accepts your ballots by running a sampling of ballots through your ballot counter as soon as you receive them to identify any serious programming errors right away.

207	automark	automark	automark	automark	automark	automark											FULLY MARKED	OVER VOTE1	OVER VOTE2	BLANK	TOTALS
ballot#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
MAYOR																					
nelson, b	1																x	x			1
wells		1		1													x	x			2
write in			1		1	1											x				3
undervotes							1	1	1	1	1	1	1	1	1	1			1	1	12
overvotes																	1	1			2
ballot#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

Note: A full-sized sample of this form is available in the appendix of this guide

2.2.1 Test Deck Requirements

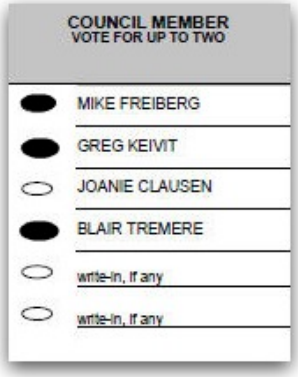
In general, all targets for each office or question must be tested for each ballot style in each precinct of a jurisdiction. Additional specific requirements under M.R. 8220.1150 are noted below.

2.2.1.1 Number of Votes

The total valid votes for each ballot position in an office or question should be unique (i.e. candidate A has one vote, candidate B has two votes, candidate C has three and so on), so it is easier to identify if a vote is not being assigned to the correct candidate. The total number of valid write-ins for a multi-seat office should also be a unique number for each write-in position.

2.2.1.2 Overvotes

Each office and question must have at least one overvote, where more targets are marked than are allowed for that office or question. The number of overvotes for an office or question is determined by the number of votes allowed for that particular office or question. For example, in a vote for two contest, three marks would be still be two overvotes.



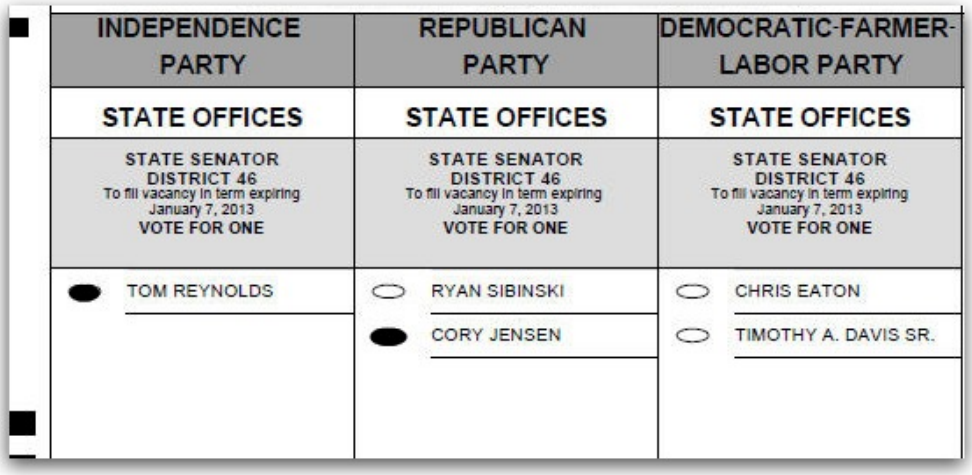
One ballot for each ballot style must have all targets filled in. It is convenient to designate this ballot as one to be marked with an assistive voting device, as the “Test” mode will produce a fully marked ballot.

2.2.1.3 Blank ballots and undervotes

Each ballot style test deck is required to have at least one totally blank ballot. They must also include undervotes, where fewer targets are marked than the maximum allowed for that office. When you follow the suggested patterns of test votes in this guide, this happens automatically.

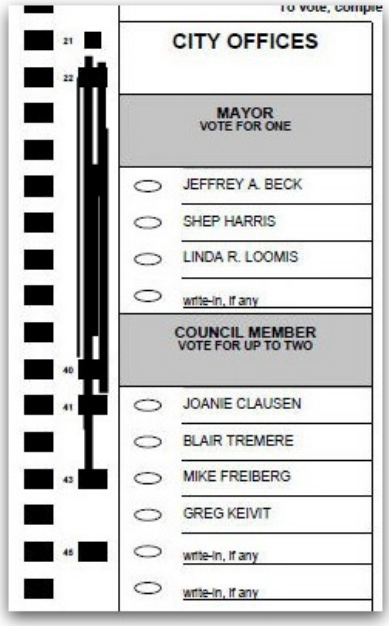
2.2.1.4 Partisan primary ballots

Partisan primary voters may vote for only one party. Ballot counters must be programmed to check for cross-party voting , which is when a voter selects candidates from more than on party on the same primary ballot. Cross-party voting must be tested for each possible combination of parties on the ballot. Ballots with cross voted races should also include some nonpartisan votes when possible, to ensure that they are counted. In addition, at least one ballot must be prepared with valid votes in the partisan section and an overvoted race in the nonpartisan section. These tests must be done for each ballot style.



2.2.1.5 Marks in precinct identifier, timing track or ballot style indicator

No results will be tallied for the ballot in which the precinct identifier, ballot style indicator or timing channel has been marked. This ballot should be rejected by the ballot counter. The object of this test is to demonstrate that a ballot cannot be counted for a precinct other than what it was printed for. If it is not included in the edit listing you must add it. When you insert this ballot into the ballot counter, it will not increment the public counter.



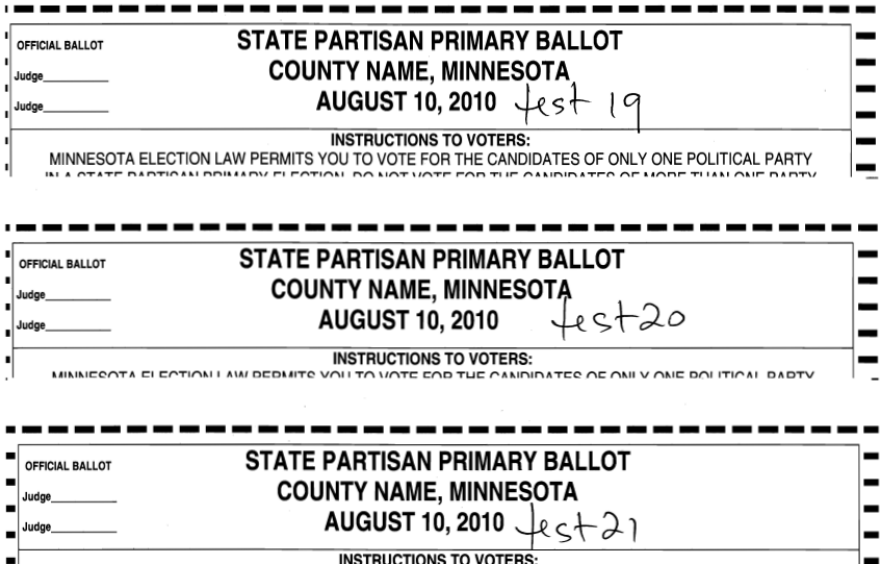
2.2.2 Marking the Test Deck

There are different ways to mark test deck ballots:

- by hand,
- by assistive voting device
- by the ballot vendor.

Some ballots must be marked using an assistive voting device, as described below in section 2.2.2.2. It is important that ballots marked in a variety of ways are tested, even if a majority have been marked a certain way. It is also expected that all types of ballots that may be read by the ballot counter should also be included in the testing, including On-Demand ballots and Federal-only ballots (if they will not be duplicated).

All ballots in the test deck must be marked “TEST,” and numbered to correspond to the ballot number on the test deck spreadsheet. Marking the ballots in this way is useful for trouble-shooting if the test results do not match the spreadsheet.


OFFICIAL BALLOT
Judge_____
Judge_____
STATE PARTISAN PRIMARY BALLOT
COUNTY NAME, MINNESOTA
AUGUST 10, 2010 test 19
INSTRUCTIONS TO VOTERS:
MINNESOTA ELECTION LAW PERMITS YOU TO VOTE FOR THE CANDIDATES OF ONLY ONE POLITICAL PARTY

OFFICIAL BALLOT
Judge_____
Judge_____
STATE PARTISAN PRIMARY BALLOT
COUNTY NAME, MINNESOTA
AUGUST 10, 2010 test20
INSTRUCTIONS TO VOTERS:

OFFICIAL BALLOT
Judge_____
Judge_____
STATE PARTISAN PRIMARY BALLOT
COUNTY NAME, MINNESOTA
AUGUST 10, 2010 test21
INSTRUCTIONS TO VOTERS:

2.2.2.1 Marking Ballots by Hand

When testing ballot counters, ballots marked by hand should be marked with a variety of pens, including those that will be used at precincts. Ballots should also be marked in a variety of ways. For example, targets might be filled in a sloppy or partially, using Xs, etc. If a target is mostly filled in, results should be consistent.

2.2.2.2 Ballots marked with assistive voting device

The assistive voting device must be used to mark all targets on each ballot style in each precinct at least once. Since these marks should be subsequently read by the ballot counter, an AutoMARK ballot printed in test mode is not sufficient for this requirement.

2.2.2.3 Vendor-supplied test decks

Some jurisdictions order test deck spreadsheets and pre-marked test decks from their ballot vendor. Jurisdictions are ultimately responsible for complying with Minnesota Statutes and Rules regarding testing, and should review the test deck and test deck spreadsheet to ensure that they comply with all requirements.

Even when using vendor provided test decks, you must test all targets on a ballot with your assistive voting device. The vendor will indicate which ballots to mark with the AutoMARK on their test deck spreadsheets.

Effective testing requires that counties using pre-marked test decks substitute some of the pre-marked ballots (or add to them) with ballots marked by hand, and other types of ballots that may be used (i.e.—On Demand, Federal only ballots).

2.3 DIAGNOSTIC TESTING

It is important to make sure that basic functions are working properly on ballot counters and assistive voting devices.

2.3.1 Diagnostic Testing for Ballot Counters

While not required by law, it is recommended to test the following on each ballot counter:

- The printer prints clearly and does not jam
- The diverter operates correctly, sorting write-in ballots to one side of ballot box
- The LCD display or monitor works
- The battery is charged
- the The system will run on both AC and battery
- Modem is able to transmit (if equipped) operates
- System memory (if possible)
- Memory cards
- Date and time will be correct on election day, taking into account the beginning or end of DST
- Locks and doors operate correctly and the ballot counter is in good shape

2.3.2 Diagnostic Testing for Assistive Voting Devices

While not required by law, it is recommended to test the following on each assistive voting device:

- That all labels, headers and audio messages presented by the device conform as closely as possible to the example ballot and Minnesota Rules, Chapter 8220.
- That the device's printer prints clearly and does not jam
- That the display is clear, and the contrast function, screen on/off, and zoom functions work
- The touch screen's calibration is accurate
- The audio is clear and the volume and tempo controls work.
- Repeat function works. Repeat function works. Repeat function works.
- Date and time will be correct for the election (as before, take into account Daylight Savings Time-DST*)
- Buttons work, including arrow keys
- Locks and doors operate correctly and the device is in good shape
- The battery is charged
- Summary/review screen is accurate
- Print tray is set for the proper ballot size (that the wheels are up or down as they should be)
- Case/shell/hinges are not damaged

* On M100 ballot counters, an automatic DST mode can be set. However, it will not use the same dates as the current DST law. It is recommended that users disable this mode and set DST manually, taking into account that the time may change between testing and the election.

3.0 PRELIMINARY TESTING

Preliminary testing takes place before the Public Accuracy Test, any time after ballots are received. It is intended to prove that the ballot counter will accurately count votes and provide the voter an opportunity to correct their ballot if it is improperly marked. This testing also is intended to test the ability of the assistive voting equipment to properly mark ballots. Each ballot position, each ballot type and each precinct should be tested on all equipment used in each election. Every piece of equipment used in counting absentee ballots must be tested for all ballot styles that will be counted on them. (M.R. 8220.1350)

Testing is intended to determine that a ballot counter functions properly. A properly functioning ballot counter:

- Accurately records properly marked votes on ballots
- Rejects ballots that are improperly marked (such as overvotes, cross-party votes and stray marks in the timing track or code channel)
- Prints an accurate zero tape with candidates in the exact order as they appear on the ballot for that precinct.
- Accurately records and reports votes marked on ballots
- Notifies voters when they have deposited a blank ballot.

Assistive voting devices must be tested to determine:

- That it accurately prints the voter's choices on a ballot
- That it prevents overvotes and cross-party voting
- That it rejects ballots where the timing marks or code channel have been damaged.

3.1 MATERIALS

To ensure testing goes smoothly, testing materials should include:

- Ballot counter with:
    - Fully charged battery
    - New roll of paper
    - Full set of keys
    - Memory cards (original and back up)
    - New ink cartridge (for Accuvotes)
    - Header cards (for Accuvotes)
- Test deck (marked except for ballots to be marked in assistive voting device)
- Corresponding test deck spreadsheet
- Envelopes for sealing test deck
- Seals for voting equipment
- Seal certification form
- Assistive voting device with:
    - Fully charged battery
    - Full set of keys
    - New ink cartridge
- Extra ballots and pen
- Some jurisdictions include:

- Surge protectors
- Dryer sheets (for static on the diverter)

3.2 TESTING PROCESS

The preliminary testing process begins with running the "zero tape" on the optical scan machine. The zero tape shows all contests and issues in the order they appear on the ballot, and displays zero counts for each. Compare the order of offices, questions and candidates on the zero tape with those on the ballot for the precinct(s) you are testing – **they must exactly match**. (M.R. 8220.1350)

Next, follow the test deck spreadsheet and mark any ballots designated for the assistive voting device in the device specified for that precinct. While marking these ballots, also test each of the device's functions as described above. Be sure to return these ballots to the test deck before testing the ballot counter.

Once all ballots are properly marked, run the test deck for each precinct through that precinct's ballot counter, varying your feed among the four ballot orientations (Face-up, Face-down, Top-first, Bottom-first). Optical scan ballot counters used to count votes in the precinct must be programmed to inform the voter if the ballot is improperly voted, completely blank, or cannot be read. During testing, the ballot counter must return ballots with overvotes or cross-party votes. When such a ballot is returned, use the ballot counter's override function to refeed and accept the ballot. Although one race/question on a ballot may be improperly voted, others must be counted. The ballot that is marked in the precinct identifier or ballot style indicator (timing track or code channel) should be rejected by the tabulator (M.S. 206.80)

While testing the ballot counter, also test each of the device's functions as described above.

After all test ballots have gone through the machine, run the results tape on the ballot counter. Compare the test results tape from the ballot counter for the precinct to the predetermined results on the test deck spreadsheet. The tape must show the same vote totals as the spreadsheet. Repeat the test using the other memory card. Note that if the back-up memory card is tested first, the original memory will be in the ballot counter at the end of testing, which will save a step later.

If test results don't match during preliminary testing, try the following:

- Put the ballots in order
- Determine which race has the error
- Compare the race on the spreadsheet and on the ballots to determine which ballot was marked incorrectly
- If necessary, mark a new ballot
- You must retest until the results match the test deck spreadsheet

3.3 POST-TEST PROCEDURES

After an errorless count has been made on all precincts, the election jurisdiction providing the computer program must:

- Mark on each results tape whether the memory card used was the original or backup.
- Secure the test decks, test results, and predetermined results chart in a sealed container in a secured area.

- Zero out the results on the original and backup memory cards.
- Secure the precinct memory cards by sealing the card into the ballot counter, noting the seal number. If using one ballot counter for multiple precincts, seal the memory card into the respective ballot counter, and note the seal number for each precinct. Also record the serial number of the ballot counter.
- Secure the backup memory cards in a location apart from the original memory card.
- (AccuVote only) Put the memory cards into election mode!

Prepare a Certificate of Preliminary Testing which states that all precincts have been tested using the test deck prepared under the direction of the election jurisdiction and that the results agree with the predetermined results of the test deck. See Appendix E for a sample certificate. The certificate must contain the seal numbers used to secure the memory cards. The Certificate of Preliminary Testing may be combined with the Certificate of Public Accuracy Test. (M.R. 8220.1450)

The OSS recommends that jurisdictions use preliminary test results to test modems and ERS upload during designated ERS testing periods. This tests all of the codes programmed into the equipment, as well as accumulation and reporting by ERS. Do not zero the results on the memory cards until the modems have been tested and the results have been uploaded.

City/Township of _____
Preliminary Testing Certificate
Date of election:_____

I hereby certify that errorless counts have been made using the test decks prepared by (election jurisdiction) for the City/Township of _____, Precincts _____, and that the results tape agree with the predetermined results of the test decks.

Enclosed herein are the results tapes of the preliminary testing.

I further certify that the original memory cards for said precincts have been sealed with the following numbers:

Precinct 1_____
Precinct 2_____
Precinct 3_____

After completion of the preliminary testing, a transfer case containing duplicate copies of the precinct memory

Note: A full-sized sample of this form is available in the appendix of this guide

4.0 PUBLIC ACCURACY TEST (PAT)

4.1 PUBLIC ACCURACY TEST OVERVIEW

The purpose of the Public Accuracy Test (PAT) is to demonstrate the accuracy of the computer program and voting system to be used at the election to the public. The test must be conducted in accordance with Minnesota Statutes 206.83.

Each jurisdiction that operates electronic voting equipment must hold a PAT within 14 days of the election. Public notice of the time and place of the test must be given at least two days in advance by publishing notice at least once in the official newspaper, and by posting notices in the county auditor's office and in the office of the local election official conducting the test. The test is open to the public. At least two election judges from different parties must be on hand to witness the test. The official conducting the test must explain the procedures related to testing the accuracy of the voting system, and make the Certificate of Preliminary Testing (see above) part of the official record. (M.S. 206.83, M.R. 8220.1550)

In election jurisdictions with three or fewer precincts, all precincts must be tested. If there are more than three precincts, at least three precincts must be tested, including one precinct from each congressional district, legislative district, county commissioner district, ward, and school district on the ballot. The official conducting the election will select the precincts to be tested. It is not necessary to test backup memory cards at the PAT. Many jurisdictions also use the PAT as an election judge training session, where they review procedures together and test the equipment as a group.

4.2 TESTING PROCESS

The procedure for performing the PAT is the same as that for preliminary testing except that diagnostic procedures need not be performed, and it may only involve a subset of the voting equipment in a jurisdiction.

Open the sealed container with the test deck and test deck spreadsheet from the preliminary testing – these materials will be used for the Public Accuracy Test. Memory cards on the equipment should remain sealed from the preliminary testing. Print the Zero Tape. Run the test deck through the ballot counter, following the process described in section 3.2.

Minnesota Rules require ballots be marked by an assistive voting device as part of the PAT. The OSS recommends that you mark at least three ballots at your PAT and substitute them in your test deck.

Just as with preliminary testing, any discrepancies in the results of the PAT must be resolved, and an errorless count must be made on all precincts tested. The official conducting the test may adjourn the test to a time and date certain. (M.S. 206.83, M.R. 8220.1550)

4.3 POST-TEST PROCEDURES

When the test is complete, prepare the Certificate of Public Accuracy Test, which certifies that an errorless count has been made, and have it signed by the witnesses. The certificate may be combined with the certificate required for the preliminary test. See Appendix A for a sample certificate. (M.R. 8220.1750)

After certification of the test results, zero out the memory cards, properly secure all test decks, results tapes, and predetermined results charts into the container and seal. Attached to or inside the container must be a certificate, signed by the witnesses, describing the contents. The memory cards used in the PAT must remain sealed in the tabulator. After the test, do not forget to put the ballot counter into election mode (AccuVotes only)! Retain materials for 22 months. (M.R. 8220.1850)

City of _____
Public Accuracy Certificate
[DATE]

Seals Opened:

_____ _____

_____ _____

We hereby certify that errorless counts have been made for the City of _____, Precincts 1-3, using the test decks provided by (election jurisdiction) and that the results tape agree with the predetermined results of the test decks.

Enclosed herein are the results tapes of the Public Accuracy Test.

After the Public Accuracy Test the original memory cards for said precincts were sealed with the following numbers:

Note: A full-sized sample of this form is available in the appendix of this guide

5.0 TESTING ASSISTIVE VOTING DEVICE ONLY

Each election jurisdiction must have a preliminary and public accuracy test of the assistive voting device to ensure that it will correctly mark ballots using all methods supported by the system. Jurisdictions using optical scan ballot counters will test their assistive voting device at the preliminary and public accuracy test in conjunction with the other testing. Jurisdictions counting ballots by hand, but which are required to use an assistive voting device, must perform preliminary and public accuracy testing on the assistive voting device alone. The testing involves creating a test deck according to a predetermined test deck marking scheme with the equipment to be hand counted to ensure that the equipment accurately marks ballots. (M.S. 206.83).

5.1 TESTING PREPARATIONS

Jurisdictions testing only an assistive voting device should still follow the preparation guidelines in Section 2 regarding Ballots, Test Decks and Diagnostic Testing. Test Decks must be planned so that each target on the ballot is marked with at least one valid vote, and that the device is tested to make sure that invalid voting practices (overvotes and cross-party voting) are not allowed by the device.

5.2 PRELIMINARY TESTING

Prior to the public accuracy test, the election jurisdiction providing the computer programs must test the AVD (Assistive Voting Device) to ensure that it will correctly mark the votes for all offices and questions. The test must be conducted on all machines that may be used in the election and on all ballot styles in all precincts.

5.2.1 Materials

To ensure testing goes smoothly, it is recommended to have the following materials on hand:

- Ballots for test deck, and extras
- Test deck spreadsheet
- Envelopes for sealing test deck
- Seals for voting equipment
- Seal certification form
- Assistive voting device with:
    - Fully charged battery
    - Power cord
    - Full set of keys
    - New ink cartridge

5.2.2 Testing

Use the assistive voting device to mark each ballot as indicated on the test deck spreadsheet. Ballots should be marked using the different assistive voting functions of the system, including touchscreen, keypad, and headphones with audio. Mark the ballots for each precinct in the assistive voting device specified for that precinct. While marking the ballots, test each of the device's functions: the volume control, tempo control, contrast function, screen on/off, and zoom function.

Assistive voting devices must be tested to determine:

- That it accurately prints the voter's choices on a ballot
- That it prevents overvotes and cross-party voting
- That it rejects ballots where the timing marks or control channel have been damaged
- That it notifies the voter of an undervote, but allows the voter to proceed

Count the ballot results by hand. Results must match the totals on the test deck spreadsheet.

5.2.3 Post-Test Procedures

After the preliminary testing, the election jurisdiction performing testing must:

- Ensure that the program card is sealed into the assistive voting device unit, and the seal number recorded.
- Place test decks and test deck spreadsheets into a sealed container.
- Secure the duplicate memory cards.
- Prepare the Certificate of Preliminary Testing which states that a valid test has been run on all precincts. The certificate must contain the number of any seals used to secure the memory units. The Certificate of Preliminary Testing may be combined with the Certificate of Public Accuracy Test, and must be filed with the county auditor. See Appendix A for sample certificates.

5.3 AVT ONLY PUBLIC ACCURACY TESTING (PAT)

5.3.1 PAT Overview

The purpose of the Public Accuracy Test (PAT) is to demonstrate the accuracy of the computer program and voting system to be used at the election to the public. The test must be conducted in accordance with Minnesota Statutes 206.83.

Each jurisdiction that operates electronic voting equipment must hold a PAT within 14 days of the election. Public notice of the time and place of the test must be given at least two days in advance by publishing notice at least once in the official newspaper, and by posting notices in the auditor's office and in the office of the local election official conducting the test. The test must be open to any member of the public. At least two election judges from different parties must be on hand to witness the test. The official conducting the test must explain the procedures related to testing the accuracy of the voting system, and make the Certificate of Preliminary Testing (see above) part of the official record. (M.S. 206.83, M.R. 8220.1550)

In election jurisdictions with three or fewer precincts, all precincts must be tested. If there are more than three precincts, at least three precincts must be tested, including one precinct from each congressional district, legislative district, county commissioner district, ward, and school district on the ballot. The official conducting the election will select the precincts to be tested. Many jurisdictions also use the PAT as an election judge training session, where they review procedures together and test the equipment as a group.

5.3.2 Testing Process

The procedure for performing the PAT is the same as that for preliminary testing except that diagnostic procedures need not be performed, and it may only involve a subset of the voting equipment in a jurisdiction.

Open the sealed container from the preliminary testing – the test deck spreadsheet from the preliminary testing will once again guide the marking of the test deck with the assistive voting device. Memory cards in the equipment should remain sealed from the preliminary testing. Follow the same testing procedures as in the preliminary testing.

Hand count the marked ballots when complete and compare the total with the spreadsheet. Just as with preliminary testing, any discrepancies in the results of the PAT must be resolved, and an errorless count must be made on all precincts tested. The ballots should be counted and compared to the test deck spreadsheet to ensure that all targets were marked that should have been, even though the AutoMARK will not ultimately count ballots. The official conducting the test may adjourn the test to a time and date certain. (M.S. 206.83, M.R. 8220.1550)

5.3.3 Post-test Procedures

When the test is complete, prepare the Certificate of Public Accuracy Test, which certifies that an errorless count has been made, and have it signed by the witnesses. The certificate may be combined with the certificate required for the preliminary test. See Appendix A for a sample certificate. (M.R. 8220.1750)

After certification of the test results, properly secure all test decks and test deck spreadsheets into the container and seal. Attached to or inside the container must be a certificate, signed by the witnesses, describing the contents**. Retain materials for 22 months**. (M.R. 8220.1850)

GLOSSARY

Assistive Voting Device: Defined as device "used with an electronic ballot marker that assists voters to use an audio or electronic display ballot in order to cast votes." Main example in use today is the AutoMARK. (M.S. 206.56)

Ballot counter: The device in which ballots are cast and counted. Examples in use today include the M100 and Accuvote OS.

Ballot on Demand: Some jurisdictions have the capability of printing ballots onto ballot stock using a laser printer in their office .

Ballot Style: A discrete set of races, questions and candidate rotations on a ballot.

Base Rotation Sequence: The initial order that candidate names are listed on ballots. This order is varied by an algorithm to change the order across precincts so that names appear in the same position (first, last, in between) roughly an equal number of times. (M.S. 206.61, M.R. 8220.0825)

Computer Program: Firmware and software that contain programming required to conform to Minnesota Election Law and Rules that contains races, candidates and question programming required to count votes cast in a specific election.

Cross-Party Voting: Voting for candidates from more than one party in a partisan primary. Also known as crossover voting, ticket splitting or ballot splitting. (M.S. 206.80)

Election Reporting System (ERS): A system provided by the OSS that facilitates election reporting statewide. The system includes office identification, candidate entry, results accumulation and reporting.

Electronic Voting System: Defined in statute as "a system in which the voter records votes by means of marking a ballot, so that votes may be counted by automatic tabulating equipment in the polling place where the ballot is cast or at a counting center." Mainly includes ballot counters and assistive voting devices. (M.S. 206.56)

Memory Card: A removable media used in a ballot counter necessary to allow the device to accept specific election programming. Media in current use includes PCMCIA cards (M100), Compact Flash (AutoMARK) and 40 pin EPSON (AccuVote).

Optical Scan Ballot: a single ballot card on which all ballot information is included that is read and counted by a ballot counter.

Overvote: When a voter marks more targets than allowed for an office or question. (M.S. 206.80)

Preliminary Test: A test by the election jurisdiction of the electronic voting system for all precincts, using the test deck conducted prior to the Public Accuracy Test. (M.R. 8220.1350, 8220.1450)

Public Accuracy Test (PAT): A public test by the election jurisdiction to demonstrate the accuracy of the electronic voting system. It must be held less than 14 days before the election, with 48 hours notice, and with the presence of at least two election judges of different parties. For larger jurisdictions, it may only test a sampling of precincts' equipment. (M.S. 206.83, M.R. 8220.1550, 8220.1750)

Ballot Question: A proposition in the form of a constitutional amendment, local ordinance, charter amendment, or other ballot question submitted to the voters for approval at an election.

Split Precinct: A precinct that contains more than one school district.

Target: Generally in the form of ovals, they are the location on a ballot where the voter makes a mark to indicate their choice.

Test Deck: A set of ballots that has been marked with a predetermined number of valid votes for each position in each office and issue. It is used in the preliminary and public accuracy tests to test the assistive voting device and ballot counters. (M.R. 8220.1050, 8220.1150)

Test Deck Spreadsheet: A chart that shows the predetermined results to be marked on the test deck. (M.R. 8220.1150)

Undervote: When a voter marks fewer targets than the maximum allowed for an office or question. May be completely blank, or just fewer than the number allowed to vote for in the case of multi-seat offices.

APPENDIX A

City/Township of _____
Preliminary Testing Certificate
Date of election:_____

I hereby certify that errorless counts have been made using the test decks prepared by (election jurisdiction) for the City/Township of _____, Precincts ____, and that the results tape agree with the predetermined results of the test decks.

Enclosed herein are the results tapes of the preliminary testing.

I further certify that the original memory cards for said precincts have been sealed with the following numbers:

Precinct 1_____
Precinct 2_____
Precinct 3_____

After completion of the preliminary testing, a transfer case containing duplicate copies of the precinct memory cards, test decks and predetermined results of the test decks was sealed at my direction with the signatures of all individuals who attended the preliminary testing.

_____
(Name)
(Title)
City of_____

City of _____
Public Accuracy Certificate
[DATE]

Seals Opened:

_____ _____

_____ _____

We hereby certify that errorless counts have been made for the City of _____, Precincts 1-3, using the test decks provided by (election jurisdiction) and that the results tape agree with the predetermined results of the test decks.

Enclosed herein are the results tapes of the Public Accuracy Test.

After the Public Accuracy Test the original memory cards for said precincts were sealed with the following numbers:

Precinct 1_____
Precinct 2_____
Precinct 3_____

After completion of the Public Accuracy Test, a transfer case containing the Preliminary Testing Certificate, results tapes, test decks, and predetermined results of the test decks was sealed with our signatures. The duplicate copies of the precinct memory cards were sealed with our signatures.

Signature of all individuals who attended the Public Accuracy Test:

_____ _____

_____ _____

_____ _____

_____ _____

APPENDIX B
SAMPLE TEST DECK SPREADSHEETS

General Election Test Deck Spreadsheet – Method 1

207	automark	automark	automark	automark	automark	automark											FULLY MARKED	OVER VOTE1	OVER VOTE2	BLANK	TOTALS
ballot #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
MAYOR																					
nelson, b	1																x	x			1
wells		1		1													x	x			2
write in			1		1	1											x				3
undervotes							1	1	1	1	1	1	1	1	1	1			1	1	12
overvotes																	1	1			2
ballot #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
COUNCIL																					
mason	1																x				1
dahl	1	1															x				2
talso		1	1					1									x				3
butler			1	1				1	1								x		x		4
white				1	1				1	1			1				x		x		5
write in					1	1				1	1		1	1			x		x		6
write in						1	1				1	1		1	1	1	x		x		7
undervotes							1					1			1	1		2		2	8
overvotes																	2		2		4

General Election Test Deck Spreadsheet – Method 2

BLAINE D1P2 2008 State General											ANOKA CO.															
BALLOT NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	TOTAL
SCHOOL DISTRICT NO.	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	12	13	
AUTOMARK BALLOT	A			A			A		A			A							A		A		A	A		
PRESIDENT & VICE-PRESIDENT																										
A	1	1																					T	X	B	2
B			1	1	1																X		I	X	L	3
C						1	1	1	1														M	X	A	4
D										1	1	1	1	1								X	I	X	N	5
WRITE-IN															1	1	1	1	1	1	X	X	N	X	K	6
OVERVOTES																					1		G	1		2
UNDERVOTES																									1	1
BALLOT NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	TOTAL
SCHOOL DISTRICT NO.	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	12	13	
U.S. SENATOR																										
J	1	1																			X		M	X		2
K			1	1	1																X		A	X		3
L						1	1	1	1							x							R	X		4
WRITE-IN										1	1	1	1	1		x							K	X		5
OVERVOTES																1								1		2
UNDERVOTES															1		1	1	1	1	1	1			1	8
BALLOT NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	TOTAL
SCHOOL DISTRICT NO.	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	12	13	
U.S. CONGRESSIONAL DIST 6																							T	X		
O	1	1																					I	X		2
P			1	1	1					X											X		M	X		3
WRITE-IN						1	1	1	1	X											X		I	X		4
OVERVOTES										1													N	1		2
UNDERVOTES											1	1	1	1	1	1	1	1	1	1	1	1	G		1	13
BALLOT NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	TOTAL
SCHOOL DISTRICT NO.	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	12	13	
ST REP DIST 51A																										
Q	1	1								X											X		M	X		2
R			1	1	1					X											X		A	X		3
WRITE-IN						1	1	1	1														R	X		4
OVERVOTES										1													K	1		1
UNDERVOTES											1	1	1	1	1	1	1	1	1	1	1	1			1	13
BALLOT NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	TOTAL
SCHOOL DISTRICT NO.	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	12	13	
CONSTITUTIONAL AMENDMENT 1																										
YES	1	1								X											X			X		2
NO			1	1	1					X											X			X		3
OVERVOTES										1														1		1
UNDERVOTES						1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1		1	18
BALLOT NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	TOTAL

Partisan Primary Test Deck Spreadsheet

2008 PARTISAN PRIMARY																	
Ballot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
AutoMark Ballot	A	A			A	A			A	A					A		
US Senator - (IP)																	
Cand A	1													T	X	B	1
OVERVOTED														I		L	0
UNDERVOTED		1	1	1										M		(1)A	4
Ballot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
US Rep - 6 (IP)																	
Cand B	1											X		I	X	N	1
OVERVOTED														N		K	0
UNDERVOTED		1	1	1										G		1	4
Ballot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
St Rep - 53A (IP)																	
Cand C	1			X					X						X		1
Cand D		1	1	X					X						X		2
OVERVOTED				1													1
UNDERVOTED																	3
Ballot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
US Senator (R)																	
Cand E					1			X	X						X		1
Cand F						1	1	X	X						X		2
OVERVOTED								1									1
UNDERVOTED																1	2
Ballot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
US Rep - 6 (R)																	
Cand G					1										X		1
OVERVOTED																	0
UNDERVOTED						1	1									1	3
Ballot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
St Rep - 53A (R)																	
Cand H					1										X		1
OVERVOTED																	0
UNDERVOTED						1	1									1	3
Ballot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
US Senator - (DFL)																	
Cand I									1			X			X		1
OVERVOTED																	0
UNDERVOTED										1	1		1			1	4
Ballot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
US Rep - 6 (DFL)																	
Cand J									1				X		X		1
Cand K										1	1		X		X		2
OVERVOTED													1				1
UNDERVOTED																1	1
Ballot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
St Rep - 53A (DFL)																	
Cand L									1						X		1
OVERVOTED																	0
UNDERVOTED										1	1		1			1	4

Multi-seat Office in a Split Precinct

BALLOT NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	TOTAL
SCHOOL DISTRICT NO.	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	13	12	12	12	12	12	
AUTOMARK BALLOT	A						A				A						A									A		
ISD 12 BOARD MEMBERS AT LARGE (3)																												
Cand A	1																							X	T	X	B	1
Cand B	1		1																					X	I	X	L	2
Cand C	1		1		1																			X	M	X	A	3
Cand D			1		1		1						1											X	I	X	N	4
Cand E					1		1		1				1		1										N	X	K	5
Cand F							1		1		1		1		1		1								G	X		6
WRITE-IN									1		1				1		1		1		1		1			X		7
WRITE-IN											1															X		1
WRITE-IN																	1									X		1
OVERVOTES																								1		1		2
UNDERVOTES																			2		2		2				3	9
BALLOT NO	1	2	3	4	5	6	7	8	9	10	11	13	13	14	15	16	17	18	19	20	21	22	23	24	58	59	60	TOTAL

APPENDIX C
CREATING TEST DECK SPREADSHEETS

Setting up the spreadsheet

Create the table in a spreadsheet program such as Excel.

1. On the first row, identify the election jurisdiction being tested, the ward/precinct number or ballot card number.
2. On the second row, number sequentially across the spreadsheet for each ballot used, and a Total column at the end.
3. If this precinct is split between multiple school districts, alternate school district numbers in the next row. Alternate them regularly to ensure that each target on each ballot is tested.
4. Use the next row to indicate if this ballot is to be marked in an AutoMARK (for example, with an "A").
5. Using the information from the ballot, list all offices, candidates, and yes/no responses to ballot questions down the left-hand margin. Indicate the number to vote for on each race. At the end of each office or question, include the correct number of rows for write-ins, and add two additional rows, one for overvotes and one for undervotes. NOTE: For the primary, identify each party affiliation following the office name in the partisan section of the ballot above the names of the candidates for each party.
6. Set up your spreadsheet to sum the votes automatically by highlighting the candidate rows from ballot 1 to the total column and hit the Σ key (Sum formula). See your particular application's help file if you have difficulty setting up formulas.

Marking Votes on the Spreadsheet

The process of marking votes will differ depending on the office or question—see the notes below for each particular circumstance. In all cases, marking a "1" for a valid vote will allow the Sum formula to work correctly. The procedures below ensure that all candidates are tested on all ballot styles, and that each candidate is marked on a different number of ballots, which should make it easier to accurately compare the predetermined results with the results gained through testing.

The patterns described below should be continued until all candidates, write-ins, and ballot questions have received valid votes. For partisan primaries, the patterns must be repeated for each party for partisan offices, but the non-partisan ones may be treated as normal.

Single seat office

There are two patterns that are used to mark single seat offices. In all cases, the candidates will be marked at least once on each ballot style, and each candidate's votes should be incremented so that each has a different total.

In one pattern, each candidate is marked in turn until the number of votes they are going to receive is exhausted. For example, the first candidate will receive one mark on the Ballot 1, the second get one mark on Ballot 2, and so on until all candidates and write-ins have received one mark. The next set of marks will be the same, except starting with the second candidate. The third set of mark would start with the third candidate, etc.

Ballot	1	2	3	4	5	6
Cand.V	1					
Cand.W		1		1		
Cand.X			1		1	1

In the other pattern, the number of marks each candidate receives is marked successively. For example, the first candidate will receive one mark on Ballot 1. The second candidate will be marked twice, on the next two ballots. This will continue, with each subsequent candidate receiving one more vote than the previous candidate.

Ballot	1	2	3	4	5	6
Cand.V	1					
Cand.W		1	1			
Cand.X				1	1	1

Ballot Question or Constitutional Amendment

Mark ballot questions and constitutional amendments just as you would mark a single seat, two candidate race. Determine how many votes the first position will be assigned, based upon how many school districts exist in the precinct, and mark the second position with one more vote than given the first. For example, in a precinct with two school districts, vote “yes” twice and “no” three times.

Multiple seat local race

Mark votes for the first candidate equal to the number of school districts in the precinct, starting at Ballot 1. Assign the second candidate one more vote, also starting at Ballot 1. If this is a “vote for 3” office, the third candidate’s marks would also start in Ballot 1. Then, for each subsequent candidate, find the next ballot that is not yet fully voted, and start that candidate’s marks there.

VOTE FOR TWO					
Ballot	1	2	3	4	5
I.S.D.	88	99	88	99	88
Cand. X	1	1			
Cand. Y	1	1	1		
Cand. Z			1	1	1

School district races

For school district races, such as school boards, follow the processes outlined above. In precincts with more than one school district (i.e. more than one ballot style), you must make sure that the votes for school district races are only put on the correct school district ballots.

Write-in votes

For write-ins, assign the first write-in position one more vote than you gave the last candidate in that race. In multiseat races, assign the remaining write-ins one vote in each school district in the precinct. Write in votes will be aggregated on the results tape.

Other testing issues

Additional tests are required by M.R. 8220.1150, and should be shown on the spreadsheet. See below for information on overvotes, blank ballots, undervotes, marks in the precinct identifier and partisan primary

ballots. When the equipment returns a blank ballot to you, be sure to re-insert it while forcing the counter to accept it.

Overvotes

Each office and question must have at least one overvote. Overvotes are tallied when a particular office or question receives more than the allowed number of votes. An "x" on the chart represents an overvote, alerting the person tallying the vote totals to exclude this vote from the candidate vote totals and to update the overvote tally instead. The number of overvotes for an office or question is determined by the number of votes allowed for that particular office or question. For example, if the ballot instructs the voter to "vote for two", but the voter votes for three candidates, then two overvote is tallied. If the ballot instructs the voter to "vote for one", but the voter cast three votes, then one overvote is tallied.

One ballot for each school district must have all targets filled in. It is convenient to designate this ballot as an AutoMARK ballot, as the Test mode will produce a fully marked ballot.

Blank ballots and undervotes

Each ballot style is required to have at least one totally blank ballot, and at least one ballot that includes undervotes.

For M100 and M650 ballot counters, undervotes are determined by subtracting the number of votes cast for a particular office or question from the number to "vote for." For example, if the ballot instructs the voter to "vote for one", but the voter refrains from voting for that particular office or question, one undervote is tallied. If the ballot instructs the voter to "vote for two" but again no votes are cast, then two undervotes are tallied. If the ballot instructs the voter to "vote for two" and the voter votes for only one of the two positions, then only one undervote is tallied. For completely blank ballots, assign undervotes for each office/question on those ballots.

For Accuvote equipment, an undervote for a single seat office is termed "blank voted," while a vote for fewer than the number to be elected in a multiple seat office is termed an "undervote," and is counted at one undervote per vote not marked. Adjust spreadsheets for Accuvote equipment accordingly.

Marks in precinct identifier timing track, or ballot style indicator

No results will be tallied for the ballot in which the precinct identifier or ballot style indicator has been marked. Don't count undervotes or overvotes for this ballot, since it should be rejected without being reinserted into the ballot counter.

Partisan primary ballots

Partisan primary voters may vote for only one party. So, ballots must be prepared to check for ticket splitting (cross-party voting), where a voter votes in two parties' primaries on the same ballot. When crossover voting the partisan section of the primary ballot, do not assign any undervotes or overvotes to any of the partisan races because the crossover will render the partisan portion of the ballot invalid, and will override these functions. On a cross voted ballot that has been refed and accepted, votes are counted normally on properly voted nonpartisan races .

In addition, at least one ballot must be prepared with valid votes for one party in the partisan section, and an overvoted race in the non-partisan section.

Make sure that the tests above (crossover voting and the overvoted non-partisan section) are done for each school district in a precinct.

Finishing the spreadsheet

After all ballot columns on the chart are marked, ensure that the total votes on the spreadsheet are calculated properly. Also tally the undervotes and overvotes for each contest and include it in the Total column.

Mark in the spreadsheet's AutoMARK row to indicate which ballots should be marked on the AutoMARK. Consider shading those columns gray to highlight them. Distribute AutoMARK ballots to ensure that each target on each ballot in use in each precinct is tested by marking it in an AutoMARK.