

STATE OF NEW JERSEY
DIVISION OF ELECTIONS

**MANDATORY
PRE-ELECTION TESTING PROTOCOLS:
AVC Advantage Voting Machines**

I. Introduction

It is the legal obligation of each county commissioner of registration in the State of New Jersey to prepare all voting machines to be used in an election in a thorough manner that will assure that all votes cast at an election are accurately recorded. Accordingly, the Secretary of State, in her capacity as New Jersey's Chief Election Official, issues the following mandatory AVC Advantage testing protocols.

II. Technician Qualifications

Only those technicians who have received the seal-use protocol training under the auspices of the Division of Elections are permitted to perform the pre-election testing protocols on the county's voting machines. It is the obligation of the county commissioner of registration to ensure such compliance.

III. Maintenance Diagnostics

A. Biyearly Requirement

The county commissioner of registration must ensure that "Maintenance Diagnostics" is performed on each voting machine twice a year, at a minimum. Maintenance Diagnostics is a diagnostic tool that tests the voting machine's internal software and hardware, such as the CPU (central processing unit), operator panel, LCD display, printer and various switches. It is to be performed when the voting machine is not in "election mode" and must be done in a time frame that allows for any necessary repairs and upgrades to be completed before any upcoming election.

B. Additional Requirements

In addition to the bi-yearly requirement, the Maintenance Diagnostics test must be performed if there is any change to a voting machine's hardware and/or software. Furthermore, if any of the main components of a voting machine are replaced, such as the CPU or the VPDs (voter panel drivers), the following steps must be taken after Maintenance Diagnostics is done. As more fully explained below, Setup Diagnostics must be performed on the voting machine, which must then be subjected to a "mock election" in official election mode. The voting machine should stay in this mode, powered off overnight, and then powered on the following day to complete the examination.

IV. Pre-election Testing Sequence

A. Step One – "Setup Diagnostics"

**NOTE: SETUP DIAGNOSTICS MUST BE COMPLETED ON ALL VOTING MACHINES
PRIOR TO USE IN EACH ELECTION.**

“Setup Diagnostics” is a series of diagnostic tests that evaluate the AVC Advantage’s hardware and software to ensure the voting machine will properly perform during an election. Setup Diagnostics tests all the critical components of the AVC Advantage prior to the insertion of the results cartridge, which contains the ballot information for the specific election. The AVC Advantage is designed so that the Setup Diagnostics can only be performed during the 30 day period before the setup for a specific election.

If no issues arise during this process, the technician shall sign the Setup Diagnostics Report and proceed to Ballot Verification.

1.) Troubleshooting

If a voting machine problem arises during Setup Diagnostics, notification of the specific problem will be listed on the operator panel screen and the test will not continue. In such case, the technician immediately must report the problem to the supervisor.

The supervisor must take the following steps:

- a.) Refer to the *AVC Advantage Maintenance Manual* to diagnose and resolve the problem.
- b.) If the problem is resolved, Setup Diagnostics must be restarted from the beginning.
- c.) If the problem cannot be resolved, the voting machine must be set aside for further examination.

B. Step Two – Ballot Verification

NOTE: BALLOT VERIFICATION MUST BE COMPLETED ON ALL VOTING MACHINES PRIOR TO USE IN EACH ELECTION.

“Ballot Verification” is the process by which the technician will visually determine if the voting machine’s paper ballot face corresponds to the grid positions assigned to each candidate and/or public question. If a voting machine has an audio component, the technician must use this component to assure the accuracy of the audio file.

The Ballot Verification Process requires the technician to:

- Verify all switch module buttons are fully operational on the machine (by physically pushing each button).
- Verify that the candidate and/or public question positions on the printed ballot face match the candidate and/or public question positions contained on the voting machine. The technician must push each candidate and/or public question button and then look at the LCD screen on the bottom of the front of the voting machine to make sure the name/question on the screen matches the button pushed.
- Verify the spelling of candidate names and/or public question(s).
- If the voting machine has an audio component, the technician must listen to the audio file.

If no issues arise the technician prints and signs the Ballot Definition Report and proceeds to Test Voting.

1.) Troubleshooting

If at any point during the ballot verification process an issue arises it must be immediately brought to the supervisor for further review and appropriate action. The supervisor must determine if it is a hardware, paper ballot face, or programming issue.

a.) If it is a hardware issue, the supervisor must:

1. Coordinate the repair or replacement of the hardware.
2. Restart the process at Maintenance Diagnostics.

b.) If it is a paper ballot face issue, the supervisor must:

1. Inform the county clerk and obtain a corrected paper ballot face.
2. Restart the process at Setup Diagnostics.

c.) If it is a programming issue, the supervisor must:

1. Correct the programming.
2. Create a new cartridge.
3. Restart the process at Setup Diagnostics.

C. Step Three – Test Voting

NOTE: TEST VOTING MUST BE COMPLETED ON ALL VOTING MACHINES PRIOR TO USE IN EACH ELECTION.

Test voting provides for the testing and simulation of an election in the Pre-Election Logic and Accuracy Test (Pre-LAT) mode using the same ballot control logic that will be used to conduct the official election. Test voting patterns can be an ascending pattern, descending pattern or any combination, but must have each candidate and/or public question listed on the ballot receive at least one vote. No two candidates for the same office or public question options (“yes” or “no”) can receive the same number of votes.

When any contest on the ballot contains the same number of candidates, or there is more than one public question on the ballot, an identical test pattern (e.g. 1-2 pattern for a 2 candidate contest) shall not be repeated in those contests. Each contest on the ballot must use a unique voting pattern to allow an opportunity for vote total discrepancies arising from database programming problems to appear.

1.) Illustration of the Two Alternate Test Voting Patterns by use of this following Mock Ballot:

CONTEST 1 (Vote for One)	President
Candidate 1	John Smith
Candidate 2	Peter Jones
Candidate 3	Sarah Edwards
Write-in	
CONTEST 2 (Vote for Two)	Freeholder
Candidate 1	Tim Johnson
Candidate 2	Todd Murphy
Candidate 3	Jane Adams
Candidate 4	Mary Larsen
Write-in	
Write-in	
CONTEST 3 (Vote for One)	Mayor
Candidate 1	William Harrison
Candidate 2	Donna Jackson
Candidate 3	Ronald Morgan
Write-in	
CONTEST 4	Proposal 1
Response	Yes
Response	No

Example # 1-Ascending Test Pattern

This test pattern is developed in the following order:

1. Determine the largest number of candidates in any one contest, including write-ins.

- Contest 1 has four candidates (including Write-ins)
- Contest 2 has six candidates (including Write-ins)
- Contest 3 has four candidates (including Write-ins)
- Contest 4 has two candidates (“Yes” and “No” for public questions are to be treated as “candidates” therefore Contest 4 is considered to have two candidates)

Result: Contest 2 has the largest number of candidates: six.

2. Assign the number of votes each candidate must receive in each contest, as follows:

- The first candidate in each contest will receive one vote.
- The second candidate in each contest will receive two votes.
- The third candidate in each contest will receive three votes.
- The fourth candidate in each contest will receive four votes.

- The fifth candidate in each contest will receive five votes.
- The sixth candidate in each contest will receive six votes.

3. Because Contest 1 and Contest 3 are both a vote-for-one and have the same number of candidates, a change to the test pattern must be made to Contest 3, as follows.

- The first candidate in Contest 3 will receive two votes.
- The second candidate in Contest 3 will receive three votes.
- The third candidate in Contest 3 will receive four votes.
- The fourth candidate in Contest 3 will receive five votes.

4. Make a table showing how each test voter must vote to execute the Test Vote plan.

CONTEST	VOTER													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
President (Vote for One)														
John Smith	X													
Peter Jones		X	X											
Sarah Edwards				X	X	X								
Write-in							X	X	X	X				
Freeholder (Vote for Two)														
Tim Johnson	X													
Todd Murphy	X	X												
Jane Adams		X	X	X										
Mary Larsen			X	X	X	X								
Write-in					X	X	X	X	X					
Write-in							X	X	X	X	X	X		
Mayor (Vote for One)														
William Harrison	X	X												
Donna Jackson			X	X	X									
Ronald Morgan						X	X	X	X					
Write-in										X	X	X	X	X
Proposal 1														
Yes	X													
No		X	X											

Example #2- Descending Test Pattern

This test pattern is developed in the following order:

1. Determine the largest number of candidates in any one contest, including Write-ins.

- Contest 1 has four candidates (including Write-ins)
- Contest 2 has six candidates (including Write-ins)
- Contest 3 has four candidates (including Write-ins)
- Contest 4 has two candidates (“Yes” and “No” for public questions are to be treated as “candidates” therefore Contest 4 is considered to have two candidates)

Result: Contest 2 has the largest number of candidates: six.

2. Assign the number of votes each candidate must receive in each contest as follows.

- The first candidate in each contest will receive six votes.
- The second candidate in each contest will receive five votes.
- The third candidate in each contest will receive four votes.
- The fourth candidate in each contest will receive three votes.
- The fifth candidate in each contest will receive two votes.
- The sixth candidate in each contest will receive one vote.

3. Because Contest 1 and Contest 3 are both a vote-for-one and have the same number of candidates a change to the test vote pattern must be made in Contest 3, as follows.

- The first candidate in Contest 3 will receive five votes.
- The second candidate in Contest 3 will receive four votes.
- The third candidate in Contest 3 will receive three votes.
- The fourth candidate in Contest 3 will receive two votes.

4. Make a table showing how each test voter must vote to execute the test vote plan.

CONTEST	VOTER																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
President (Vote for One)																			
John Smith	X	X	X	X	X	X													
Peter Jones							X	X	X	X	X								
Sarah Edwards												X	X	X	X				
Write-in																X	X	X	
Freeholder (Vote for Two)																			
Tim Johnson	X	X	X	X	X	X													
Todd Murphy		X	X	X	X	X													
Jane Adams							X	X	X	X									
Mary Larsen									X	X	X								
Write-in											X	X							
Write-in												X							

Mayor (Vote for One)																			
William Harrison	X	X	X	X	X														
Donna Jackson						X	X	X	X										
Ronald Morgan										X	X	X							
Write-in													X	X					
Proposal 1																			
Yes	X	X	X	X	X	X													
No							X	X	X	X	X								

2.) Implementation of either Test Pattern

Once either test table is completed, Test Voting can begin in Pre-LAT mode, as follows:

- First, a zero results report will be printed and must be signed by the technician.
- Second, the votes from the test pattern must be cast on the machine.
- Third, the results report will be printed and must be compared to the test voting pattern.

If the results match the test voting pattern and there are no other issues, the technician must sign the results report to complete the pre-election testing.

The signed report is a certification that:

- All candidate names are correct;
- All voting positions are correct;
- All spelling of names are correct;
- All sequences of candidate names are correct;
- All audio playbacks are correct (if applicable to the machine);
- Every candidate on the report has received the correct number of votes as determined by the test vote plan.

(a.) Troubleshooting

If the results do not match the test voting pattern the results report must be immediately brought to the supervisor for further review and appropriate action.

The supervisor must determine if the test voting pattern was followed correctly or if it is a hardware, paper ballot face, or programming issue.

(1.) If the supervisor determines that the Test Voting should be redone, the following steps must be done:

1. Perform a System Reset.
2. Create a new cartridge.
3. Perform Setup Diagnostics.
4. Perform Ballot Verification.
5. Perform Test Voting.

(2.) If it is a hardware issue, the supervisor must:

1. Perform a System Reset.
2. Coordinate the repair or replacement of the hardware.
3. Create a new cartridge.
4. Perform Maintenance Diagnostics.
5. Perform Setup Diagnostics.
6. Perform Ballot Verification.
7. Perform Test Voting.

(3.) If it is a paper ballot face issue, the supervisor must:

1. Perform a System Reset.
2. Immediately inform the county clerk and obtain a corrected paper ballot face.
3. Create a new cartridge.
4. Perform Setup Diagnostics.
5. Perform Ballot Verification.
6. Perform Test Voting.

(4.) If it is a programming issue, the supervisor must:

1. Perform a System Reset.

2. Correct the programming.
3. Create a new cartridge.
4. Perform Setup Diagnostics.
5. Perform Ballot Verification.
6. Perform Test Voting.

3). Vote Simulation

Vote Simulation is a means by which a county commissioner of registration can partially automate the Pre-LAT testing of the AVC Advantage. Software external to the voting machine is configured with a pre-determined vote pattern. The software is utilized to create a vote simulation cartridge that is placed in the voting machine. **The Vote Simulation process is faster than casting votes by hand and minimizes the potential for human error in the casting process.**

If Vote Simulation is used, the technician must still cast one manual vote for every candidate in every contest. For example, if an ascending test vote pattern is chosen in which six candidates in a contest receive 1-2-3-4-5 & 6 votes; in the Vote Simulation process, the addition of one manual vote for each candidate would produce a Pre-Lat results report showing 2-3-4-5-6 & 7 votes.

Note: Vote Simulation is only available in the Pre-Election and Post-Election testing modes. The AVC Advantage is not capable of using Vote Simulation in the official election mode.