Why the New ES&S Digital Scanner Should Not Be Certified

Based on our research into excessive overvoting in Florida's 2008 presidential election, FFEC urges the state of Florida to rescind certification of ES&S' new digital scanner, the intElect DS200, until the vendor has made and tested fundamental changes to its overvote protection feature. We believe that as currently designed the DS200 is ineffective at preventing these types of voter errors and fails to meet the requirements of state and federal law. We urge all states that have not yet certified the scanner to delay certification and insist on changes and testing before reconsideration of approval.

Our research found the following:

- Overvote rates on the DS200 were much worse than for any other Florida voting system. Statewide, 8 of 10 overvotes during in-person voting occurred on the DS200, even though it only served 4 of 10 voters.

- The DS200 did not provide significantly better overvote protection for Florida's Election Day voters than if they had voted by absentee ballot, which offered no overvote protection at all (0.54% for Election Day vs. 0.59% for absentee ballots).

- All counties using the DS200 experienced relatively high overvote rates for Election Day and early voting, regardless of size, demographics, or type of system previously used (optical scan or touchscreen).

- Excessive rates of overvoting on the DS200 in Florida's largest county—Miami-Dade— adversely affected racial and language minority voters more than others. Preliminary research suggests this trend may extend to other counties using the DS200.

- The number of votes lost on the DS200 because of overvoting was significant. More than 11,000 votes in the presidential race were discarded that would have counted if the DS200 had experienced the same overvote rate as the Premier Accu-Vote OS/OSX or the ES&S Optech III-P Eagle.

- In 2008, two systems used in Florida—the Premier Accu-Vote OS/OSX and the ES&S Optech—had much lower rates of overvoting for in-person voting than for absentee ballots. This indicates that overvote protection on these systems was effective at preventing these kinds of voter errors.

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- Two other systems—the Sequoia Insight Plus and the ES&S M-100—also had unacceptably high overvote rates; however, both tabulators had much better overvote rates than the DS200. Changes to these systems should also be required.

- Specific design features of the DS200 were the likely cause of the excessive overvoting, including: (1) retaining rather than rejecting the ballot; (2) counterintuitive use of colors, terminology, and symbols; and (3) confusing and inadequate messages about the nature of the problem and the consequences of continuing with an overvoted ballot. All of these are in violation of the Help America Vote Act and Florida state law.

Florida's Invalid Vote Rate Fueled by Overvoing
In June 2009, FFEC issued a report on Florida's higher-than-expected invalid vote rate in the 2008 presidential election. We found that the increase was driven by a huge spike in overvote rates compared to 2004. Overvoting—too many selections in a race—went up by a whopping 460%, compared to 2004.

When we looked at the overvote rates for in-person voting (early voting and Election day) when overvote protection is required by law, we found even larger increases in overvote rates. Overvoting among early voters in 2008's presidential race increased by nearly 1200% over 2004's rate. Election Day was even worse. Overvoting in the presidential race increased by more than 1600% over 2004, even though Election Day turnout actually declined by more than 20%.

Further investigation revealed that one newly certified optical scanner used for in-person—the ES&S intElect DS200—was responsible for the great majority of the overvotes. More than 8 in 10 of the state's overvotes during in-person voting occurred on the DS200 even though it only served about 4 in 10 of the state's in-person voters.

What is overvote protection?
Because overvoting is usually unintentional, all precinct scanners used in Florida are required by law to provide overvote protection. They must:

- Immediately reject an overvoted ballot,
- Inform the voter about the problem
- Tell the voter the consequences of casting an overvoted ballot—that the vote will not count, and
- Allow the voter to correct the ballot before casting it.

Some overvoting is expected on absentee ballots where voters are not present at the time their ballots are scanned and, therefore, are not able to correct errors. When voters are present for the scanning of the ballot—as they are during early voting and on Election Day—there should be few, if any, overvotes. Indeed, despite the huge increase in the overvote rate, many Florida counties in 2008 had no overvotes whatsoever in the 2008 presidential race.

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Florida's Changes in Voting Equipment
In 2007, the Florida legislature passed a bill mandating that all Florida counties use paper-ballot-based optical scanners as their primary voting equipment, with DREs for disabled accessibility until 2012. The 2008 election cycle was the first time that all 67 Florida counties used optical scanners for most voters.

Eleven of the fifteen former all-touchscreen counties switched to the DS200. Orange and Escambia counties, which had previously used the old Es&S Optech optical scan system, also bought the DS200. Two of the former touchscreen counties bought the Sequoia Insight Plus, also a digital scanner. The remaining two touchscreen counties—Sarasota and Hillsborough—bought the Premier/Diebold digital scanner.

The remaining 54 counties continued to use the optical scan systems they had used in the past—31 used the Premier Accu-Vote OS, 14 used the ES&S M-100, and 5 used the ES&S Optech III-P Eagle.

Comparison of Overvoting by Voting System
The following table shows overvote rates by voting system for Florida counties:

Table 1. In-Person Overvoting, by Voting System, Florida's 2008 Presidential Race

Voting System	In-Person Turnout	In-Person Overvotes	In-Person Overvote Rate
Sequoia Insight Plus	521,364	1262	0.24%
Premier OS or OSX	2618392	848	0.03%
ES&S DS200	2814242	12181	0.43%
ES&S M-100	324348	640	0.20%
ES&S Optech	240873	68	0.03%
State total	6519219	14999	0.23%

We can see from the above table that the DS200 overvote rate of 0.43% was much higher than that of any other system. Unfortunately, it was also the most widely used tabulator in the state, giving its excessive overvote rate even greater impact. In contrast, the overvote rates on the Premier/Diebold system and the ES&S Optech system were only 0.03%. Thus, the overvote rate for the DS200 was more than *14 times* the rate on these two systems. Two other systems— the Sequoia Insight Plus and the ES&S M-100 had elevated overvote rates, but they still were much lower than the DS200. The overvote rate on the DS200 was nearly double the rate of the Sequoia Insight Plus, which had the second-worst overvote rate for in-person voting and more than double the overvote of the ES&S M-100, which ranked third in overvoting.

Total Votes Lost. In terms of total numbers, the impact of the DS200 overvoting was significant. Of the nearly 15,000 overvotes statewide during in-person voting, more than 12,000 were on the DS200. If the DS200 had experienced the same overvote rate as the two best-performing systems, more than 11,000 votes in the presidential race would been counted

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instead of being discarded. As we Floridians well know, this is certainly more than enough to change the result of a close election.

Consistent Across Counties. Another important fact is that all thirteen of the DS200 counties experienced high rates of overvoting, regardless of the type of system they had previously used. So it seems that the excessive overvote rates on the DS200 cannot be attributed to problems in particular counties, but to the system itself.

Overvote Protection vs. No Overvote Protection on the DS200. Perhaps the most telling statistic involving the overvote protection on the DS200 is the comparison of overvote rates for absentee ballots and Election Day voting. The rate of overvoting on absentee ballots, with no overvote protection, should be much higher than on Election Day when voters had the benefit of overvote protection on the DS200. Yet the overvote rate for absentees was nearly the same as for Election Day (0.59% vs 0.54%).   By comparison, in the Premier and Optech counties, overvote rates for absentee ballots were much higher than they were for Election Day voting. This is what we would expect when the precinct tabulator provides effective overvote protection.

Overvoting during early voting in the DS200 counties, however, was much lower than either for absentees or Election Day, although it was still much higher than the other systems. Without more research, we can't say exactly why this is the case. But we believe that this offers important clues about the extent and nature of the overvoting problems with the DS200.

Disproportionate Vote Loss Among Miami-Dade Minority Voters
Miami-Dade County, Florida's largest DS 200 user, had the worst overvote rate in the state in the 2008 presidential race at 0.70%. This is 2 ½ times the overall state overvote rate (0.28%) and more than 23 times the rate for the Premier and Optech counties (0.03%). Miami-Dade also had the highest Election Day overvote rate at 0.87%; its early voting overvote rate was the fourth worst in the state, but substantially better—0.37%--than at the precincts.

Miami-Dade is the state's largest electoral jurisdiction; thus, its poor overvote rate translated into a large number of lost votes—more than 6,000. Of these, more than 4,000 were lost during in-person voting on the DS200.

Nearly half (46%) of the county's majority black precincts and more than a quarter (26%) of its majority Hispanic precincts had overvote rates of more than 1.00%. In contrast, less than 6% of its majority white precincts had an overvote rate this high. Preliminary research suggests that other DS200 counties also had disproportionate vote loss among their minority voters.

Making Overvoting Easier Results in More Overvotes
In April 2007, after observing a demonstration of the DS200 in Sarasota County, we sent an e-mail to Lester Sola, Miami-Dade Supervisor of Elections, expressing concern that the overvote feature on the new digital scanner might lead to higher overvotes.

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We were dismayed to discover that the override button for the DS200, which would force the machine to accept an overvoted ballot, was readily accessible to either the voter or the poll worker, without having to seek authorization. On the Premier system, the poll worker must obtain a key and open a locked compartment to gain access to the override button.

The difference is obvious: In one case, it is relatively easy to override an overvoted ballot; in the other, it is much more difficult. It is hardly surprising that making it easier to force the machine to accept an overvoted ballot would result in more overvotes.

When we investigated the physical configurations of the overvote feature on the five Florida systems, it confirmed our hypothesis. The Premier and Optech systems had override buttons that were difficult to access; the other three systems—the DS200, the Sequoia Insight, and the ES&S M-100—all had override buttons on the outside of the cabinet. All three of these systems had much higher overvotes than the two with buttons that were difficult to access.

Overvote Protection vs. Overvote Facilitation

The following figures show the overvote protection feature on the DS200.

Figure 1: The ES&S DS200 Overvote Screen
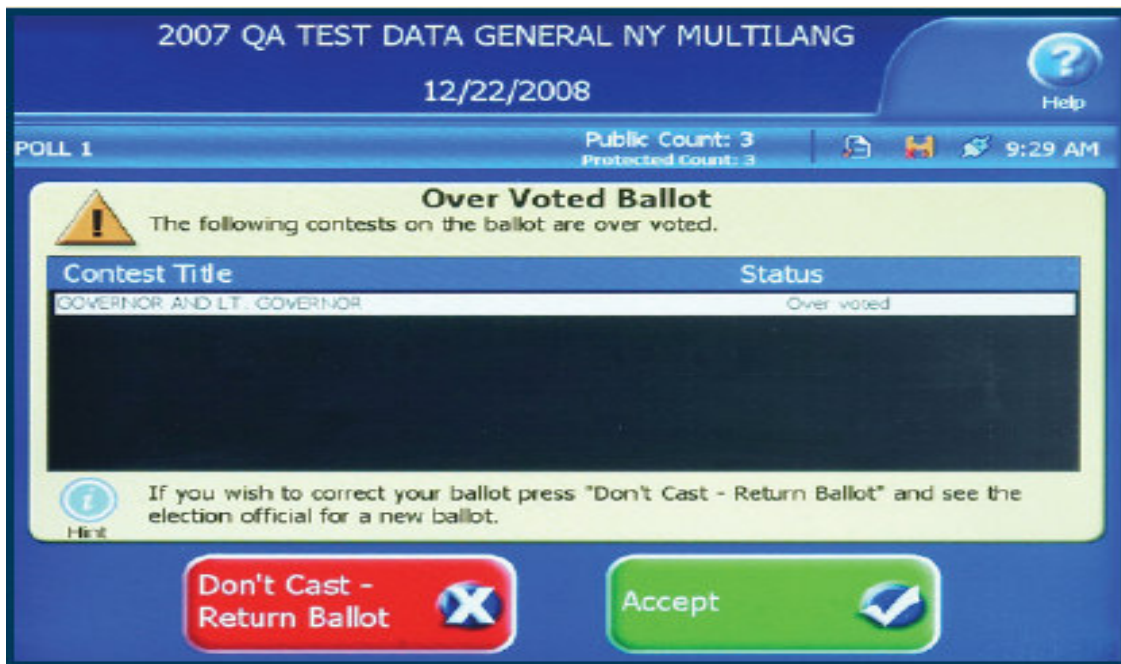
Source: ES&S IntElect DS200, Product Overview, Election Systems & Software,
http://www.essvote.com/HTML/docs/ES&S_intElec'[]t_DS200_V1_01-09.pdf

Now let's imagine the voter's experience who mistakenly overvotes on this machine. After waiting in line for a couple of hours to vote, he quickly marks his ballot and then inserts it into the machine only to have it begin emitting loud beeping noises and display a confusing message. The voter, who probably knows nothing about voting machines, is asked if he wants his ballot "accepted" or "returned." Voting has come to a stop as he tries to figure out what to

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do. Those behind him in line begin grumbling. The machine operator has to explain what has happened—that the voter has overvoted and has the option of correcting his ballot. Does he want his ballot accepted or returned?

At this point, the voter wants the embarrassing beeping noises to stop so that he will cease being the focus of attention. "Accepted" sounds like the right choice, and it will immediately solve the problem. Plus, the accept button is a cheery green with a check mark while the return button is an ominous red with an X. But an "accepted" ballot means his vote has been discarded. The psychology is all on the side of losing this vote.

Now imagine the voter's experience who overvotes on the Premier or Optech machine. When he attempts to insert his ballot, the machine automatically rejects it. The Premier machine displays a message and the Optech machine issues a small tape to inform the voter that a particular race is overvoted. The ballot is still in the voter's hand because the machine will not take it. The machine operator explains what has happened and offers the voter the chance to go to another table and get a new ballot. If he does, voting can continue. But let's say the voter demands to vote the ballot as it is. The machine operator informs him that voting must stop while the operator goes over to the poll clerk, gets the key, comes back and unlocks the machine so that he can hold down the override button as the ballot is inserted. He has to do this because the override button is next to the memory card inside the machine. This time the easiest and least embarrassing choice is to correct the ballot. The psychology here favors saving this vote.

Why the DS200 Had the Worst Overvote Rate
All three voting systems with elevated overvotes—the DS200, the M-100, and the Insight Plus— have one thing in common—they retained the ballot rather than immediately rejecting it as required by law. (See Figure 2 below.) On the other hand, both systems with low overvote rates immediately rejected an overvoted ballot. As the above discussion shows, it should be no surprise that making it easier to override rather than correct overvoted ballots resulted in an increase in the number of overvotes.

Figure 2: ES&S M-100 Overvote Screen
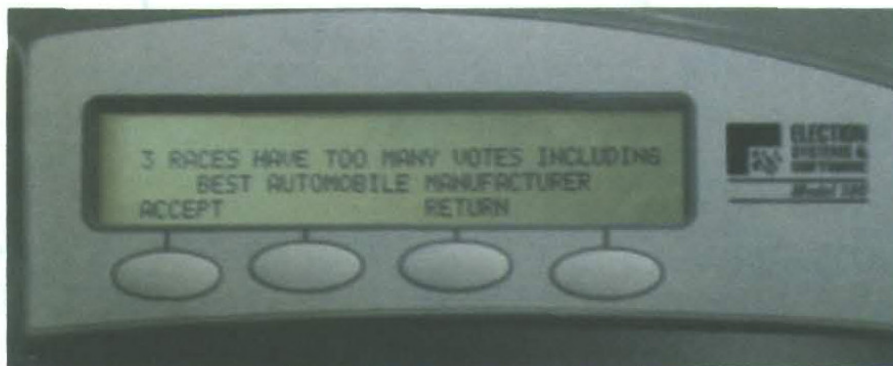
Source: "Instructions for Using Optical Scan Ballot, M-100 Ballot Scanner, and AutoMark," Kanawha County Guide for Voters, http://www.kanawha.us/shared/content/Page_objects/pdfs/county_clerk/Optical%20Scan%20Ballot.pdf

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The question remains; however: If all three systems have this same flawed feature, then why is the DS200 overvote rate so much worse than on the other two?

While the above figure confirms that the "accept" and "return" features are the same, it illustrates the profound differences between the DS200 and the other scanners in the design of the overvote screen. The DS200's large touchscreen offers many more design options—a much larger space for the message as well as the ability to use color and graphics along with text to convey the message. Intuitively, we would think that this greater flexibility would be a good thing for counties—allowing them to design the screen to meet their specific requirements, such as the need to provide overvote information in several languages as is the case in Miami-Dade. But we know that the overall effect was not positive. This design engendered more, now fewer, votes.

We believe that the answer lies in precisely those features—color, graphics, and size:

- Color and Symbols as Visual Cues: The confusing and counterintuitive use of color and graphics in this case tends to reinforce the likelihood that votes will be lost. The "accept" button is a cheery green, with a check mark while the "return" button is an ominous red with an X. Green generally conveys an action that is good, positive; red is the color used for warnings, caution, negative actions. Likewise, a checkmark is a sign that something is right; while an X means something is wrong or incorrect.

- Juxtaposition of Color and Black-and-White Text: The use of color can actually serve to obscure black-and-white text. The colorful design of this overvote screen may have made it less likely that voters would notice and read the overvote message itself, which conveyed the information to the voter.

- Size: The large touchscreen is also a potential problem. When information is displayed over a large area with considerable space between chunks of text, it is more difficult for the reader to see it as one image. This creates a greater chance that the voter will miss some of the information.

- Content: Finally, even with less room on the display, the M-100 has a more informative message. It tells the voter that he or she has made too many choices in three races. The DS200 screen says that a race is "overvoted," which isn't likely to mean much to a voter. Futhermore, translating the term "overvoted" into other languages is likely to be problematic. Unfortunately, neither screen tells the voter that if he hits the accept button his vote won't count. The content of the message, however, does not require a change in design—only a requirement to put the right information on the screen. Further, we do not know the actual content of the messages used in each county.

Finally, the disproportionate impact on minority voters—particularly language minority voters—may be partially explained by their greater reliance on visual cues to understand the message.

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Conclusions and Findings
Precinct tabulators are required to offer overvote protection so that voters do not lose their vote unnecessarily when they make a stray mark, attempt to change their vote, or misunderstand the instructions. Overvote protection also safeguards voters from overvotes that may result through no fault of their own, but from machine misalignment or calibration problems.

The data show that the overvote protection offered on the optical scanners that have long been in use in Florida and across the country has been effective in preventing these kinds of errors. Why then are we certifying equipment that basically changes the dynamics of this overvote protection to favor losing rather than saving votes? Even worse, this new digital scanner seems to discriminate against groups of voters. If the point of overvote protection is to protect against overvoting, then the DS200 fails miserably.

If the ballot is immediately returned to the voter, there is no need for the confusing 'accept" and "return" terminology. In fact, there is no reason to make this part of the process at all. Ballots should, in accordance with state law and HAVA requirements, be immediately returned to the voter. There are several advantages to this:

1. The voter has his ballot in hand when making the decision about correcting the ballot.
2. Voting can continue while he makes his decision.
3. It decreases the potential for voters or poll workers to hit the override button before the voter understands the consequences.

Need for Usability Testing
Finally, we should not be making decisions about overvote screens based on their visual appeal, but rather on their effectiveness at preventing overvoting. Yet, how can we expect to know what is effective if we do not conduct the appropriate testing? If we required usability testing on all voter interfaces before approving systems for use, we would be able to anticipate problems before they resulted in lost votes. This testing should be conducted with various racial, ethnic, and language minority groups so that we can be sure that our voting systems do not unnecessarily disadvantage any particular group.

We strongly urge all election officials to delay certification of the ES&S intElect DS200 and insist that changes are made to the overvote protection and tested to ensure that this system will not unnecessarily disenfranchise voters.

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