

# **Election System and Software**

## **Examination Report**

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The following systems were examined in Austin on January 18 and 19, 2007:

AutoMARK Voter Assist Terminal (VAT) – 1.1.2258 – DRE used to mark optical ballots  
AIMS – 1.2.18 – AutoMARK Information Management Software  
UNITY - version 3.0.1.1 – Election setup, accumulation and reporting system.

Subsystems:

Election Data Manager – 7.4.4.0  
ESS Image Manager (w/ Ballot on Demand) – 7.4.2.0  
Hardware Programming Manager – 5.2.4.0  
Data Acquisition Manager – 6.0.0.0  
Election Reporting Manager – 7.1.2.1  
Audit Manager – 7.3.0.0  
iVotronic Image Manager – 2.0.1.0  
iVotronic – 9.1.6.2 – DRE Voter Terminal – with and without ADA attachments  
Gang Burner – 9.1.0.0 – Compact Flash Multi-Card Reader/Writer  
M100 – 5.2.1.0 – Precinct Ballot (optical) Counter  
M650 - 2.1.0.0 – Central Count Ballot (optical) Tabulator

## Outstanding Issues

*Optical scan ballots not being read consistently by the scanners:*

During testing some ballots were marked with a variety of common pens. The ballots were read correctly on both the M100 and M650. ES&S has implemented “Green” sensor mark detection to broaden the type of pens detected. However, the type (not color) of ink is still a factor. For the election day voting this should not be problem as the county should supply the voter with an acceptable pen. ES&S has a document listing the approved pens for their scanners. In the case of absentee ballots, the choice of pen cannot be controlled so this might be a problem.

A pencil may be used for all the scanners except the M100 according to the documentation. Therefore, I recommend that counties not use the M100 to scan absentee ballots.

- *Disk read errors when uploading the same results from the optical scanners into UNITY:*  
This has been fixed.

- *Automatically zero-out results upon entering election-day tabulation on any vote recording or accumulating system:*  
This continues (see my previous reports) to be a problem. No other vendor's system we have examined lacks this safeguard. ES&S argues that this should be done manually as it is documented as part of the election-day process. They claim that a previous election's data or the current election early-voting results could be lost.

Left over votes has been the cause of miscounts in the field and during examinations. This is not a difficult technical issue to resolve. When the systems are booted on election day the software could prompt the operators to archive old data and clear the database **if and only** old data files or votes are found in the database. Ordinarily, this would not be necessary since archiving and clearing is part of the procedure after the previous election or during the pre-election testing. Instead, the ES&S system puts the responsibility on the election day operators to assure that old data is not present. I

believe this should be an automatic task of the software. The software can be written to preserve both old data and the current election's early-voting results.

## **Release Highlights**

There are a few significant changes to the system since the last examination:

**M100** - It can be configured to unconditionally accept, reject, or prompt the user on under-voted contests. It is best to have the user prompted in order to determine if the under-vote was intentional.

**M650** - The aforementioned "green" light sensor improves on mark recognition. The system now has the ability to sort under-voted ballots during tabulation. This will allow the election workers to determine if the under-vote was intentional or because of a undetected mark.

**Ivotronic** - Uses a graphical (instead of character) user interface. Testing the graphical interface revealed that on the iVotronic and the AutoMark, if you touched the screen in the middle of the two column ballot, the candidates on both columns of that row were selected. This could go unnoticed by a voter resulting in an erroneous selection. There should be a dead space in the center between the columns to prevent this from happening.

A RTAL (Real Time Audit Log) has been added. The RTAL records the voter selections as well as other navigational and operation events. The printed record of all significant events and the voters' ballots require more paper than the ballots alone. This may necessitate a paper roll change. Changing the paper roll may be difficult for some precinct workers. There was not a seal on the iVotronic tested but a paper seal should be required. The RTAL is capable of printing a bar code representing the voted ballot, but it did not print a bar code during the examination. If the VVPAT becomes a requirement in Texas, a bar code should be required as this will facilitate a recount.

Regardless of the language used to vote on the DRE, the printed ballot was printed in English. This was stated to be a limitation of the RTAL and not a configuration option. The ballot portion of the log should be in the same language as the DRE screens.

A 4-button ADA volume control has been added.

It is still necessary that all provisional ballots be assigned a number that is unique throughout the county. Numbers are not assigned automatically so the county needs to provide a unique range of numbers to each polling location. Otherwise, if two or more ballots have the same number and are uploaded into UNITY ERM, only one ballot will be received.

Technical bulletin PRBERM0014 states that using PEB's for uploading of early-voting results into UNITY ERM is not recommended: "there are certain conditions where one or more votes might be missed when reading results from these PEB's into ERM". If reading the audit data is necessary for iVotronic early-voting results, the menu option to read from the PEB's should be unavailable. This could be controlled programmatically based on filenames or a file header.

**AutoMark** – AIMS has improved multi-language ballot setup.

ES&S states that they have improved system performance. However, the VAT took too long reading the blank ballot and marking the voted ballot. At the current speed, this device is not appropriate except for the low volume of ADA voters. This is unfortunate because this is an excellent voting terminal for all voters because it prevents over-voting, alerts voters to under-voting, and assures that the ballot will be marked with ink that will be detected by the scanner. An important side benefit is the voted paper ballot which is the ultimate voter record lacking in most current DRE systems. I think the AutoMark combines the best of the DRE technology with the benefit of the optical scan ballot.

**UNITY – ERM** - has been improved so that if a results file will not be loaded a second time if it has the same name and size. This prevents accidental doubling of the results. I believe this occurred in Williamson Co. in November with some of the early voting results. This was tested during the examination and a message was written to the real-time log. However, there was not a message on the console. A message would have been helpful to alert us that an attempt to load the same file was made.

When loading results from the iVotronic in ERM the first time only three ballots were read. Because the examiners knew that this was incorrect, the results were cleared and loaded successfully the second time. There was not an error message for the first upload and the ES&S operator did not have an explanation for what occurred. On the second attempt a different menu option was used than the option used for the first upload. Why are there two options and where did the first upload's three ballots come from. The vendor has stated in a follow-up email that the three ballots were from testing on the previous day. This is a perfect example why the files and database should be cleared when starting ERM on election night. It also is an indication of confusing menu choices. Ironically, the vendor stated during the beginning of the examination that one of the release highlights to UNITY was a simplified ERM interface for reading iVotronic and M650 results.

Technical Bulletin PRBERM0016 states that a COBOL Error 104 will occur when updating a provisional (coded) ballot. This is because the counters were not added in the HPM (Hardware Programming Manager). Why should someone have to think about adding the counters? They should be created automatically whether they will be used or not since it is not a lot of memory. The bulletin states that if you discover the problem on election night there are workarounds. However, this could result in more errors so it is best to prevent the problem altogether.

Technical Bulletin FYIERM0033 states that it is important to keep M100 and iVotronic data separated (on different drives) otherwise, "you will not be able to process this data and combine the totals in ERM". It should be unnecessary to require the operator to setup separate drives in order to keep the data straight. Why not let the program that loads the data from the media create a file name that is unique and based on the source of the data (i.e. **IVxxxx.SPP** or **M100xxxx.SPP**). This is another opportunity for error that can easily be avoided.

**Gang Burner/DAM**– The Gang Burner is a means to provide greater throughput when burning or reading the iVotronic flash cards. The Gang Burner runs on a PC equipped with a sixteen or more flash card readers/writers. The PC should not be part of the network during tabulation since it could be used to manipulate the database and files used by ERM. Instead, the Gang Burner PC can burn a CDROM with the files from the iVotronic flash cards and uploaded into ERM on the ERM PC.

DAM is used on the network with the ERM PC. It collects results that are modem-ed in from the precincts or from results uploaded to it from the various media. Currently, it does not prevent someone from using a SQL client or other utility to gain access to the ERM database or result files. This DAM PC should be prevented from accessing the operating system when the DAM program is running.

## **Conclusion**

The complexity of the system makes it vulnerable to unintentional errors. As witnessed during the examination, even experienced operators can cause errors. This is due to its complexity, lack of operator prompting during the use of the programs, and the lack of exclusion of inappropriate choices. The mistakes are likely to be detected during auditing or the official canvas, but at the expense of lost time and possibly the public's confidence. ES&S should take a long look at improving the user interfaces on all the election-central programs.

In the end, the ES&S system recorded and tabulated the results correctly and provided records so the results could be audited. The system satisfies the requirements outlined in the Texas Election Code. Therefore, I recommend that the systems be certified.

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