

# The State of Texas



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Gwyn Shea  
Secretary of State

## REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S OPTECH EAGLE PRECINCT BALLOT SCANNER

### PRELIMINARY STATEMENT

On May 23, 2002, Election Systems and Software, Inc. (the "Vendor") presented its Optech Eagle precinct ballot scanner for reexamination in compliance with House Bill 1419, 77<sup>th</sup> Legislature, which requires reexamination of all voting systems of each county to determine whether the voting system continues to comply with the minimum applicable standards prescribed by law. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system; the examiners thoroughly examined the system. Examiner reports on the system are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF OPTECH EAGLE

The Optech Eagle is a precinct count system for tabulating mark-sense ballots. The system scans ballots for marks, which it interprets as votes and accumulates totals. The versions presented for examination were v. HPS 1.28, APS 1.50, CPS 1.02a.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

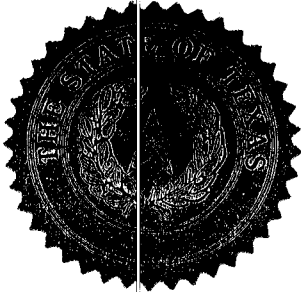
The Optech Eagle voting system:

1. Preserves the secrecy of the ballot;
2. Is suitable for the purpose for which it is intended;
3. Operates safely, efficiently, and accurately;
4. Is safe from fraudulent or unauthorized manipulation;
5. Permits voting on all offices and measures to be voted on at the election;
6. Prevents counting votes on offices and measures on which the voter is not entitled to vote;
7. Prevents counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevents counting a vote on the same office or measure more than once;
9. Permits write-in voting;
10. Is capable of permitting straight-party voting; and
11. Is capable of providing records from which the operation of the system may be audited.

CONCLUSION

The examiners recommended recertification. I hereby certify the Optech Eagle v. HPS 1.28, APS 1.50, CPS 1.02a for continued use in elections in Texas.

Certified under my hand and seal of office, this 1<sup>st</sup> day of August, 2002.



*Dwain Shea*  
Dwain Shea  
Secretary of State

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Secretary of State

## REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S PCBT PUNCH-CARD TABULATOR

### PRELIMINARY STATEMENT

On May 23, 2002, Election Systems and Software, Inc. (the "Vendor") presented its PCBT punch-card voting system for reexamination in compliance with House Bill 1419, 77<sup>th</sup> Legislature, which requires reexamination of all voting systems of each county to determine whether the voting system continues to comply with the minimum applicable standards prescribed by law. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system; the examiners thoroughly examined the system. Examiner reports on the system are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF PCBT

The PCBT is a punch-card reader system designed to be used at the central counting station. The version presented for reexamination was 11.11a.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

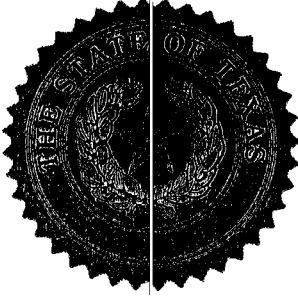
The PCBT:

1. Preserves the secrecy of the ballot;
2. Is suitable for the purpose for which it is intended;
3. Operates safely, efficiently, and accurately;
4. Is safe from fraudulent or unauthorized manipulation;
5. Permits voting on all offices and measures to be voted on at the election;
6. Prevents counting votes on offices and measures on which the voter is not entitled to vote;
7. Prevents counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevents counting a vote on the same office or measure more than once;
9. Permits write-in voting;
10. Is capable of permitting straight-party voting; and
11. Is capable of providing records from which the operation of the system may be audited.

CONCLUSION

The voting system examiners recommended recertification. I hereby certify the PCBT v.11.11a for continued use in elections in Texas.

Certified under my hand and seal of office, this 31 day of July, 2002.



*Gwyn Shea*  
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Secretary of State

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Secretary of State

## REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S OPTECH IV-C OPTICAL SCAN VOTING SYSTEM

### PRELIMINARY STATEMENT

On May 23, 2002, Election Systems and Software, Inc. (the "Vendor") presented its Optech IV-C optical scan voting system for reexamination in compliance with House Bill 1419, 77<sup>th</sup> Legislature, which requires reexamination of all voting systems of each county to determine whether the voting system continues to comply with the minimum applicable standards prescribed by law. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system; the examiners thoroughly examined the system. Examiner reports on the system are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF OPTECH IV-C VOTING SYSTEM

The OPTECH IV-C is an optical scan ballot scanner designed to be used at the central counting station. The version presented for reexamination was 1.06a.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

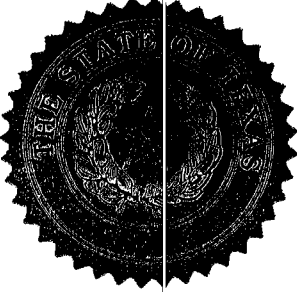
The Optech IV-C voting system:

1. Preserves the secrecy of the ballot;
2. Is suitable for the purpose for which it is intended;
3. Operates safely, efficiently, and accurately;
4. Is safe from fraudulent or unauthorized manipulation;
5. Permits voting on all offices and measures to be voted on at the election;
6. Prevents counting votes on offices and measures on which the voter is not entitled to vote;
7. Prevents counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevents counting a vote on the same office or measure more than once;
9. Permits write-in voting;
10. Is capable of permitting straight-party voting; and
11. Is capable of providing records from which the operation of the system may be audited.

CONCLUSION

The examiners recommended that the system be recertified. I hereby certify the Optech IV-C v. 1.06a for continued use in elections in Texas.

Certified under my hand and seal of office, this 1<sup>st</sup> day of August, 2002.



*Gwyn Shea*  
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Secretary of State

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Secretary of State

## REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S iVOTRONIC VOTING SYSTEM

### PRELIMINARY STATEMENT

On May 23, 2002, Election Systems and Software, Inc. (the "Vendor") presented its iVOTRONIC Voting System for reexamination in compliance with House Bill 1419, 77<sup>th</sup> Legislature, which requires reexamination of all voting systems of each county to determine whether the voting system continues to comply with the minimum applicable standards prescribed by law. The reexamination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system; the examiners thoroughly examined the system. Examiner reports on the system are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF iVOTRONIC

The iVotronic is a direct recording electronic system (DRE) used for precinct voting and accumulation. The system consists of one or more voting terminals and a supervisor Personalized Electronic Ballot (PEB), which election officials use to activate and load the appropriate ballot into the terminal. The examined version was iVotronic, v. 7.2.5.0.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

The iVOTRONIC Voting System:

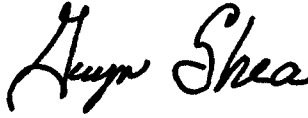
1. Preserves the secrecy of the ballot;
2. Is suitable for the purpose for which it is intended;
3. Operates safely, efficiently, and accurately;
4. Is safe from fraudulent or unauthorized manipulation;
5. Permits voting on all offices and measures to be voted on at the election;
6. Prevents counting votes on offices and measures on which the voter is not entitled to vote;
7. Prevents counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevents counting a vote on the same office or measure more than once;
9. Permits write-in voting;
10. Is capable of permitting straight-party voting; and
11. Is capable of providing records from which the operation of the system may be audited.

The examiners felt that the refresh option, which allows an election setup to be updated while the system is in operation should be disabled once the polls are open. This office disagrees and believes that the option is a necessary feature and should be retained for emergency situations.

CONCLUSION

Accordingly, I hereby grant the Vendor's application for certification of the iVOTRONIC voting system.

Certified under my hand and seal of office, this 26<sup>th</sup> day of September, 2002.



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Gwyn Shea  
Secretary of State





**DEPARTMENT OF INFORMATION RESOURCES**

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June 12, 2002

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RE: Re-examination of the Unity Election System Version Release 2.2 from  
Election Systems and Software (ES&S)

Dear Ms. McCeehan:

I attended a scheduled examination May 23, 2002, at 9:30 am, for the purpose of  
examining the voting systems from Election Systems and Software (ES&S). The  
report below summarizes my findings.

**Voting Systems Versions**

**Hardware/Software Version**

**Date Previously Certified**

**Unity Election System v2.2**

EDM – Election Data Manager v7.0.1.0

Opt-IM – Optech Image Manager v3.0.0.0

CES-IM – Punch Card Image Manager v4.0.0.0

HPM – Hardware Program Manager v3.5.3 Rel 4/8/02

DAM – Data Acquisition Manager (Host) v2.2

DAM – Client v4.21

ERM – Election Reporting Manager

**Tabulation Systems (all currently certified)**

Optech IV-C Central Count Opscan v1.06a (currently certified)

Optech Eagle Precinct Count Opscan

V HPS 1.28 APS 1.50 CPS 102.a (Currently certified)

PCBT – Punch Card Documentation Reader v11.11a (currently certified)

**DRE voting systems**

Ivotronic DRE audio balloting system v7.2.5.0

6.2.0.3

**System description**

Unity is an umbrella marketing designation that includes all of the software  
modules noted above. The modules are upgraded as a single package; none of  
them can be upgraded individually.

According to the demonstration, the core functionality certified in prior versions  
has not been changed. The software appeared to perform all functions specified  
by the Texas Secretary of State (SOS). The tallying software appeared to count  
votes correctly, and handled over votes and under votes appropriately.

The issue of vote tallying came up again. It appears that the Personal Electronic  
Ballot (PEB) device accumulates, or summarizes, votes, but it does not collect

June 13, 2002

Page 2

Ms. Ann McGeehan

ballot images. Thus it seems to fall under the SOS definition of a device that must have a real-time log printer during vote tallying activities. However it is infeasible to have a real-time log printer on it or attached to it.

The PEB keeps track of all voting units at a polling location and will be aware of any units that are not accumulated into the final count when polls are closed. The security and auditability of the device are superior to any real-time log. A paper trail can be easily faked but the internal programming and circuitry of a PEB make it a very unlikely target for a hacker to use to commit vote fraud.

#### Recommendations

It would seem that rather than a real-time audit log, it would be more effective to combine near-real-time asset tracking software with activity log auditing. In an ideal situation the election office should be able to electronically log and track at least the following:

- Exactly which devices went to what locations,
- Who was in charge of the devices during each change of custodian,
- When the devices were returned to the warehouse, and by whom.

The voting devices themselves should be able to electronically transfer the following data to the tracking software at the elections office during vote tallying:

- Any administrative functions performed prior to opening the polls,
- The time the devices were opened for voting,
- All ballot images
- The time the devices were closed for voting,
- Any administrative functions performed after closing the polls.

The software would then note which devices were missing from any polling location or not returned to the warehouse, which were opened or closed irregularly, and other anomalies.

To extend this transparency further, the report could be made part of the real-time election night reporting available to the media. Such public scrutiny would go a long way toward deterring some forms of vote fraud such as irregular closing times for the polls.

It is suggested that some such functionality be made part of the requirements for all electronic election systems in the near future.

The Department of Information Resources (DIR) finds no technical objection to certifying the Unity Election System version 2.2 as demonstrated at this examination.

Respectfully,



Nick Osborn  
Systems Analyst

CP:MM:NO:sk

## ES&S

The ES&S systems were examined in Austin on May 23, 2002. The systems comprised a suite of ES&S's voting systems used in Texas. The names and current releases are as follows:

Unity - version 2.2 - an election setup, and central accumulator and reporting system  
Optech IV-C - version 1.06a - optical central-counting scanner  
Optech Eagle - version HPS 1.28 APS 1.50 CPS 1.02a - optical precinct-counting scanner  
PCBT - version 11.11a - punch-card reader system  
iVotronic - version 7.2.5.0 - DRE voting machine

The system as demonstrated requires the following corrections in order to satisfy the requirements of the Texas Election Code:

The "refresh" option which causes the recent early-voting problem in Dallas should be unavailable once the election has been opened for voting. This feature is designed to facilitate last minute changes to the ballot but once the polls are opened it must be disabled.

The operator was able to continue accumulating results, etc. in Unity even though the real-time audit-log printer was not printing.

The iVotronics' results are accumulated onto a single PEB at each precinct. There is no real-time printed log of the accumulation. This has been a requirement for some time yet the vendor representative has stated that it is not possible without a total redesign of the iVotronic system.

A separate device with a printer attached (I believe it was used with the Votronic systems) could be used to acquire the results from each of the iVotronics. If the results were not accumulated properly at the precinct, it is unlikely the error will be discovered until the canvass. If the precinct's accumulated results are transmitted via modem at a regional site, then the communication system has a printed tape which indicates how many ballots were cast from each iVotronic. The totals from each iVotronic would have to be compared against the precinct's signature roster to discover ballots were missing. This procedure is not likely to happen on election night. The precinct judge is in a better position to uncover the error if he has a printed audit tape.

## **Conclusion**

The Unity system and the iVotronic system when used as an accumulator, do not meet the standards outlined in the Texas Election Code. I do not recommend certification of these systems until the problems outlined above are corrected. I recommend certification of the Optech IV-C, Optech Eagle and PCBT systems.

Tom Watson  
Examiner

**Barney Knight  
& Associates**

**Attorneys at Law**

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May 24, 2002

Ann McGeehan  
Deputy Assistant  
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Re: Election System & Software ("ES&S")-Unity Election System V. 2.2; iVotronic DRE audio balloting system, Version 7.2.5.0; Optech IV-C Central Count Opscan, Version 1.06a; Optech Eagle Precinct Count Opscan, Version HPS 1.28, APS 1.5, CPS 1.02a; PCBT Punch Card Documentation Reader, Version 11.11a; Election Data Manager, Version 7.0.1.0; Optech Image Manager, Version 3.0.0.0; IM Punch Card Image Manager, Version 4.0.0.0; Data Acquisition Manager (Host), Version 2.2; Hardware Program Manager, Version 3.5.3; Data Acquisition Manager (Client), Version 4.2.1; and the Election Reporting Manager, Version 6.21.

Dear Ms. McGeehan:

Pursuant to my appointment as an examiner under §122.035 of the Texas Election Code, I examined the above referenced software and hardware (collectively the "Election Systems") as presented by ES&S for examination by ES&S. I examined the Election Systems with respect to Texas Election Law and procedure on May 23, 2002.

This report is concerned solely with the ability of the Election Systems, and each individual increment thereof, to function in compliance with Texas Election Law. No opinion is expressed regarding the suitability of the either system for the purposes of or use by any jurisdiction.

All of the above referenced programs and equipment function under the umbrella of the Unity Election System, Version 2.2. The Election Data Manager, Version 7.0.1.0 is used to set-up the election and jurisdiction area covered by the election. The Optech Image Manager, Version 3.0.0.0 is used to construct the ballot for each election. The IM Punch Card Image Manager, Version 4.0.0.0 is used for only those jurisdictions that use a punch card. The Data Acquisition Managers, Versions 2.2 and 6.21, are used as an integral part of and with each of the alternative election systems. The Election Reporting Manager, Version 6.21, functions at election central for the tabulating and reporting of results. The Optech IV-C Central Count Opscan, Version

Ann McGeehan  
Deputy Assistant Secretary of State  
Re: Election System & Software-Election Systems

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May 24, 2002

1.06a, is used as the central tabulation device at election central for larger jurisdictions that use punch cards. The Optech Eagle Precinct Count Opscan, Version HPS 1.28, APS 1.5, CPS 1.02a, is used to scan and tabulate paper ballots at the precinct. The PCBT, Version 11.11a, functions as a necessary part of the system that tabulates punch cards. And, the iVotronic DRE, Version 7.2.5.0, consists of voting stations and a precinct controller, using PEBs for the casting, recording and tabulation of votes at the precinct level.

With the two exceptions noted in subsequent paragraphs, the Unity Election System, Version 2.2, Election Data Manager, Version 7.0.1.0, Optech Image Manager, Version 3.0.0.0, IM Punch Card Image Manager, Version 4.0.0.0, Data Acquisition Managers, Versions 2.2 and 6.21, Election Reporting Manager, Version 6.21, Optech IV-C Central Count Opscan, Version 1.06a, Optech Eagle Precinct Count Opscan, Version HPS 1.28, APS 1.5, CPS 1.02a, PCBT Punch Card Documentation Reader, Version 11.11a, and, the iVotronic DRE, Version 7.2.5.0, appeared to function accurately and efficiently, and in a manner to meet the requirements of *Chapt. 122, Subchapt. A, Texas Election Code* for use in an election. Subject only to the two possible exceptions set forth in the following paragraphs as to the iVotronic and the Election Reporting Manager, I recommend these versions, programs and segments of the ES&S Election Systems be certified by the Secretary as meeting the requirements of the Texas Election Code.

The iVotronic also functioned accurately and appropriately at the precinct level. However, no log printer was present when downloading vote totals to the supervisor PEB or from the PEB to the controller and the supervisor PEB/controller tabulating those results for the precinct report. The downloading and function of the supervisory station at the close of polls constitutes the tabulation of ballots. No real time log printer is present during this process, and the only record is the original information on each voting station, and the aggregate information deposited on the supervisor PEB/station, i.e. there are separate electronic logs in each station and those are aggregated and not recorded separately on the supervisor PEB. Unless (1) the iVotronic is modified at the precinct level to include and require a real time log printer, that identifies each voting station, time, date, etc. for which the voting totals are downloaded to the supervisor controller; or (2) the iVotronic software is modified so that the results of each voting station is downloaded, stored and reported separately on the PEB, rather than being added to the totals previously loaded on the PEB; or (3) your office makes an administrative decision that an electronic aggregation of the votes from multiple voting stations at the precinct does not constitute tabulation, I recommend the iVotronic not be certified as in compliance with the requirements of *Chapt. 122, Subchapt. A, Texas Election Code*.

The Election Reporting Manager, Version 6.21 "ERM 6.21"), appeared to accurately tabulate, report total vote summaries, and function in compliance with the Texas Election Code, with one potentially notable exception. During the examination of the ERM 6.21 there appeared to be a momentary malfunction that allowed the operating of the system without a real-time log printer. Only when the temporary malfunction ended were all intervening inputs, entries, etc. printed out on the log printer. The ERM 6.21 functioned for a material time without the log

Ann McGeehan  
Deputy Assistant Secretary of State  
Re: Election System & Software-Election Systems

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May 24, 2002

printer being required to be in operation. Notwithstanding that in the continuing examination ERM 6.21 would not function when the log printer was turned off from any one of the three possible, external disconnects, this may be a material issue. It is particularly a material issue if the log printer can be internally disabled for any reason or if the BIOS of the computer is not sufficient to enable the log printer to function dependably under all circumstances. I recommend

the Secretary certify the above listed Election Systems, with the exception of the iVotronic and the ERM 6.21. Further: (1) if an administrative decision is made by your office that a real time log printer is not required for the iVotronic precinct voting system, then I recommend the iVotronic be certified; and (2) if an examination by your staff determines that the computer capacity/software function of the ERM 6.21 will not allow the tabulation and reporting of results to continue unless the real time log printer is functioning, I recommend the ERM 6.21 be certified by your office. Additionally, with regard to the iVotronic, since your office examines and certifies voting systems and programs that are intended to accommodate the visually or physically impaired, I did not examine the audio function of the iVotronic.

Sincerely,



Barney L. Knight

## The State of Texas



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Gwyn Shea  
Secretary of State

TO: Ann McGeehan  
Elections Division Director

FROM: Glenn Glover  
Voting System Examiner

DATE: May 28, 2002

A voting systems certification examination was held at the Office of the Secretary of State, Elections Division on Thursday, May 23, 2002. Election Systems & Software, Inc. (ESS) presented for State of Texas recertification the Unity Election System Software ver 2.2 and the following tabulation systems:

Optec IV-C - version 1.0.5a (Central Count Optical Scanner)  
Optech Eagle - version HPS 1.28 APS 1.50 CPS 1.02a (Precinct Count Optical Scanner)  
PCBT - version 11.11a (Punch Card Documentation Reader)  
iVotronic - version 7.2.5.0 (DRE audio balloting system)

The Unity Election System Software ver. 2.2 consists of the following modules:

EDM - Election Data Manager	version 7.0.1.0
Opt-IM Optech Image Manager	version 3.0.0.0
CES - IM Punch Card Image Manager	version 4.0.0.0
HPM - Hardware Program Manager	version 3.5.3 rel 4/8/02
DAM - Data Acquisition Manager (Host)	version 2.2
DAM - Client	version 4.21
ERM - Election Reporting Manager	version 6.21

The Unity Election System Software is an integrated suite of modular software programs that enable an election official to enter and maintain a database of jurisdiction and election information, format ballot layouts and program election equipment. The Unity system components also collect, accumulate, and reports the voting results. The ERM component of Unity can now upload totals from the Eagle system (via modem) and from the Optech IV-C (via diskette) and also from iVotronics units (via a PEB that reads individual iVotronic totals).

All comments and recommendations made in my capacity as a voting systems examiner are based on documentation and demonstrations provided by ESS. As a result, three issues, which I observed, were noteworthy and are included within this report.



One issue identified is that the iVotronic DRE allows a name on the ballot to be changed or a candidate's name to be added, after an election has been opened. ESS suggests that this feature permits a misspelled name to be corrected any time before or during an election. However, it also allows an additional candidate's name to be added when an election is open and in progress. This proved to be problematic in the recent May 2002 election in Dallas when additional steps necessary for adding a candidate's names to an election in progress, were not followed.

As a result of the problems in the Dallas May 2002 election, I do not recommend recertification of the iVotronic system until this feature - allowing the addition of candidates once an election is open - is eliminated.

Texas law requires that voting tabulation devices shall include a continuous feed printer dedicated to a real-time audit log. Many components of the Unity system have voting tabulation functionality. One component is the ERM software application which can collect ballots from different precincts (using ESS products) then tabulate and aggregate the results within ERM. During the examination, the examiners witnessed the operability of the ERM while the audit log printer was turned off. However, when the ERM system was reinitialized, the system worked as required. We could not duplicate this event with ERM but it is noted in this report.

Another component with vote tabulation functionality is the iVotronics PEB (Personalized Electronic Ballots) unit used to collect election totals from each individual iVotronics unit at the polling place. A single PEB unit has an internal database where the election information is stored. Once the election is closed, the PEB is plugged into each iVotronic and the counts for that election is collected from the individual iVotronic unit and copied to the PEB's internal database. After the iVotronic unit's election results is collected, then the PEB is extracted and placed into the next iVotronic unit and increments the PEB's internal elections database with the new individual iVotronics election results. In effect, the PEB becomes a vote tabulation device. However, the unit is not capable of supporting an attached printer because of its size and design though an audit log is contained within the PEB unit that records significant events.

In my opinion, I believe the iVotronic's PEB unit vote tabulation functionality should be recertified (pending the elimination of adding a candidate to an open election - addressed above) though the law states that real-time printing is required. The PEB's design makes it tamper proof and includes audit capabilities though the audit log can only be printed at a later stage in the tabulation process. The real-time printing requirements is to prevent tampering with vote tabulations but I believe the PEB's design supercedes this real-time print requirement and is the basis for my recommendation of the suspension of the real-time printing requirement for the PEB.

In summary, I recommend the iVotronic DRE system version 7.2.5.0 be not certified at this time.

However, I do recommend the recertification of the Optech IV-C - version 1.0.6a, Optech Eagle - version HPS 1.28 APS 1.50 CPS 1.02a, and PCBT - version 11.11a.

I also recommend the recertification of the Unity Election System 2.2 and it's components including EDM version 7.0.1.0, Opt-IM version 3.0.0.0, CES - IM version 4.0.0.0, HPM - version 3.5.3 rel 4/8/02, DAM - (Host) version 2.2, DAM - (Client) version 4.21, and ERM - version 6.21

## Voting System Examination Election Systems & Software (ES&S)

Prepared for the  
Secretary of State of Texas

James Sneeringer, Ph.D.  
Designee of the Attorney General

This report comprises the findings of the Attorney General's designee from an examination of the equipment listed, pursuant to Title 9, Chapter 122 of the Texas Election Code, section 122.036(b).

<b>Examination Date</b>	May 23, 2002
<b>Report Date</b>	May 25, 2002

ES&S offers a complete line of products for every aspect of conducting an election, including election setup, DRE, optical scanning, punch-card reading, tallying and reporting.

Type	Component	Version	Concerns (see below)
DRE	iVotronic audio balloting system	7.2.5.0	1, 2
Unity	EDM – Election Data Manager – Election Setup	7.0.1.0	1
Unity	Opt-IM Optech Image Manager – Ballot Layout	3.0.0.0	1
Unity	CES – IM Punch Card Image Manager – Ballot Layout	4.0.0.0	1
Unity	HPM – Hardware Program Manager – Programs PEES, EPROMS, etc from election definition	3.5.3 rel 4/8/02	1
Unity	DAM – Data Acquisition Manager (Host)	2.2	1
Unity	DAM – Data Acquisition Manager (Client)	4.21	1
Unity	ERM – Election Reporting Manager	6.21	1, 3
Scan	Optech IV-C Central Count Opscan	1.06a	1
Scan	Optech Eagle Precinct Count Opscan	HPS 1.28, APS 1.50, CPS 1.02as	1
Card	PCBT – Punch Card Documentation Reader	11.11a	1

### Characteristics of the iVotronic DRE

Election Setup	Flash memory cartridge (Personalized Electronic Ballot, or PEB) created with Unity software. Nothing is pre-programmed in the terminals; all the election information is in the PEB.
Zero-total report	On the thermal printer in the communication pack.
Authorization to vote / Ballot selection	There are two modes: <ul style="list-style-type: none"> <li>• Voter inserts a flash memory cartridge (PEB) created with Supervisor station and a supervisor PEB, both of which are red to distinguish them from voting stations. The PEB cannot be reused without re-activation.</li> <li>• Poll worker inserts a PEB, immediately removes it, and selects the appropriate ballot. The PEB is retained by the poll worker and is reusable without re-activation.</li> </ul>
View / Vote	LCD display / touch screen
Vote Storage	Three redundant flash memories
Precinct Consolidation	Allowed using PEB cards. There is no real-time audit log printer.
Transfer Results	PEB transported or transmitted by modem to Unity software (or a regional site from which data is sent to the Unity software at central counting). The PEB is protected by a Cyclical Redundancy Check (CRC).
Print precinct results	On thermal printer in the communication pack.
Straight party / crossover	Yes. A straight-party votes cannot cancel crossover votes that have already been selected, which protects the voter against mistakenly canceling a crossover vote.
ADA	Yes. Because it is battery-powered, the iVotronic can even be taken to the curbside for voting. However, this was not demonstrated, because the Secretary of State verifies ADA compliance.

### Characteristics of the Unity Tabulation System

Tamper Resistance	Cyclical Redundancy Check (CRC) on each record in the election files.
OS access	Not permitted during tabulation.
Real-Time Audit Log	Yes.
Data Integrity	There are no special transaction-processing features. However, according to ES&S, there is no need, because all the data is written in a single write statement, making it impossible for partial results to be entered into the database. Also, it is easy to recalculate everything if a problem is suspected, and everything is automatically re-calculated when you request a canvass report. Since a canvass report would always be requested, this is satisfactory. In short, it is nearly impossible to get an incorrect result and not know it.

Notes	<ul style="list-style-type: none"> <li>• The Data Acquisition Manager is used in regional centers to collect precinct data for forwarding to central counting by modem or by carrying a PEB.</li> <li>• The Data Acquisition Manager does not need to know election-specific data or understand the results. It does not tabulate.</li> </ul>
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**Fixed Problems from Previous Examinations**

ERM	System Startup is now recorded on the real-time audit log printer.
ERM	Duplicate attempts to re-load votes from a precinct are now recorded on the real-time audit log printer, even if canceled.

**Concerns**

All Components	1. No independent test report was submitted. (There may be ITA reports for the components that have not been modified recently, but they were not provided to the examiners.) <i>Nothing should be certified until ITA reports are provided.</i>
iVotronic DRE	2. Because the PEB tabulates the ballots from the voting location at the end of the day, as they are being transferred to the supervisor terminal, there is a requirement for real-time audit log to be printed. I do not perceive this as a great risk, but it does not comply the Secretary of State's administrative regulations. <i>iVotronic should not be certified until this is corrected, or the regulations are changed.</i>
Election Reporting Manager (ERM)	3. During the exam, we were able to load votes from a precinct into the ERM without printing anything on the real-time audit log printer. The ES&S people rebooted the system and tried again, and the system then refused to load votes when the printer was unplugged or offline. My conclusion is that there is a flaw in the ES&S software that causes it not to notice that the printer is not working in certain, unknown circumstances. <i>This system should not be certified until ES&amp;S finds out what the problem is, explains it, and explains how they fixed it.</i>

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Gwyn Shea  
Secretary of State

## REPORT OF EXAMINATION OF MODIFICATIONS TO ELECTION SYSTEMS AND SOFTWARE, INC.'S iVOTRONIC VOTING SYSTEM

### PRELIMINARY STATEMENT

On September 11, 2002, Election Systems and Software, Inc. (the "Vendor") presented modifications to its iVotronic voting system for examination and certification. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system, followed by review and testing by the examiners. Examiner reports on the system are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF iVOTRONIC

The iVotronic is a direct recording electronic system (DRE) with accessibility components used for precinct voting and accumulation. The system consists of one or more voting terminals and a supervisor Personalized Electronic Ballot (PEB), which election officials use to activate and load the appropriate ballot into the terminal. The examined version was iVotronic, v. 7.4.5.0. The last version certified for use in Texas is 7.2.5.0.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

The modifications to the iVOTRONIC Voting System, subject to the condition below:

1. Preserve the secrecy of the ballot;
2. Are suitable for the purpose for which it is intended;
3. Operate safely, efficiently, and accurately;
4. Are safe from fraudulent or unauthorized manipulation;
5. Permit voting on all offices and measures to be voted on at the election;
6. Prevent counting votes on offices and measures on which the voter is not entitled to vote;
7. Prevent counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevent counting a vote on the same office or measure more than once;
9. Permit write-in voting;
10. Are capable of permitting straight-party voting; and
11. Are capable of providing records from which the operation of the system may be audited.


CONDITION

The vendor must submit revised user instructions to the Secretary of State designed to re-emphasize the need to test for the presence of votes on the PEB prior to opening the system for voting.

CONCLUSION

The examiners were disturbed by the ability to run a logic and accuracy test with votes resident on the PEB. The vendor demonstrated that this is an administrative issue, but one that may put pressure on election officials not as familiar with the system as the vendor. Accordingly, I hereby grant the Vendor's application for certification of the above modifications to the iVOTRONIC voting system, subject to the above condition.

Signed under my hand and seal of office, this 11<sup>th</sup> day of December, 2002.

  
Gwyn Shea  
Secretary of State

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Gwyn Shea  
Secretary of State

## REPORT OF EXAMINATION OF MODIFICATIONS TO ELECTION SYSTEMS AND SOFTWARE, INC.'S VOTRONIC VOTING SYSTEM

### PRELIMINARY STATEMENT

On September 11, 2002, Election Systems and Software, Inc. (the "Vendor") presented modifications to its Votronic voting system for examination and certification. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system, followed by review and testing by the examiners. Examiner reports on the system are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF VOTRONIC

The Votronic is a direct recording electronic system (DRE) used for precinct voting and accumulation. The system consists of one or more voting terminals and a supervisor Personalized Electronic Ballot (PEB), which election officials use to activate and load the appropriate ballot into the terminal. The examined version was Votronic, v. 5.1.9. The last version certified for use in Texas is 5.1.5.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

The modifications to the VOTRONIC Voting System, subject to the condition below:

1. Preserve the secrecy of the ballot;
2. Are suitable for the purpose for which it is intended;
3. Operate safely, efficiently, and accurately;
4. Are safe from fraudulent or unauthorized manipulation;
5. Permit voting on all offices and measures to be voted on at the election;
6. Prevent counting votes on offices and measures on which the voter is not entitled to vote;
7. Prevent counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevent counting a vote on the same office or measure more than once;
9. Permit write-in voting;
10. Are capable of permitting straight-party voting; and
11. Are capable of providing records from which the operation of the system may be audited.

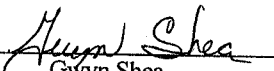
CONDITION

The vendor must submit revised user instructions to the Secretary of State designed to re-emphasize the need to test for the presence of votes on the PEB prior to opening the system for voting.

CONCLUSION

The examiners were disturbed by the ability to run a logic and accuracy test with votes resident on the PEB. The vendor demonstrated that this is an administrative issue, but one that may put pressure on election officials not as familiar with the system as the vendor. Accordingly, I hereby grant the Vendor's application for certification of the above modifications to the VOTRONIC voting system, subject to the above condition.

Signed under my hand and seal of office, this 11<sup>th</sup> day of December, 2002.

  
Gwyn Shea  
Secretary of State



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Gwyn Shea  
Secretary of State

## REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S UNITY ELECTION SYSTEM

### PRELIMINARY STATEMENT

On September 11, 2002, Election Systems and Software, Inc. (the "Vendor") presented its Unity Election System for reexamination in compliance with House Bill 1419, 77<sup>th</sup> Legislature, which requires reexamination of all voting systems of each county to determine whether the voting system continued to comply with the minimum applicable standards prescribed by law. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated Unity and the examiners then examined the system. Examiner reports on the systems are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF UNITY

Unity is an integrated suite of modular software programs that enable an election official to enter and maintain a database of jurisdiction and election information, format ballot layouts, and program election equipment. The system also collects, accumulates, and reports the voting results. The overall version presented for reexamination was 2.2 and consisted of the following components:

EDM - Election Data Manager	version 7.1.1.0
HPM - Hardware Program Manager	version 3.6.0.0
DAM - Data Acquisition Manager (Host)	version 2.5
DAM - Client	version 4.3
ERM - Election Reporting Manager	version 6.3.2.0.

The last version of Unity certified for use in Texas is 1.1.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

The Unity Election System, subject to the condition below:

1. Preserves the secrecy of the ballot;
2. Is suitable for the purpose for which it is intended;
3. Operates safely, efficiently, and accurately;
4. Is safe from fraudulent or unauthorized manipulation;
5. Permits voting on all offices and measures to be voted on at the election;
6. Prevents counting votes on offices and measures on which the voter is not entitled to vote.

7. Prevents counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevents counting a vote on the same office or measure more than once;
9. Permits write-in voting;
10. Is capable of permitting straight-party voting; and
11. Is capable of providing records from which the operation of the system may be audited.

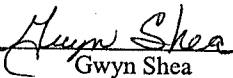
#### CONDITION

The vendor must submit changes to the Secretary of State in order for her staff to verify that the audit log provides clear information that can easily be understood by the user and that demonstrates consistency of the date/time stamp.

#### CONCLUSION

The majority of examiners determined that the Unity system's audit trail was confusing and required interpretation by the vendor, when it should provide clear information. The log also had an inconsistent date/time stamp. These issues can be corrected and verified by Secretary of State personnel rather than through a full re-examination. Accordingly, I hereby certify the Unity Election System v. 2.2 for use in elections, subject to the above condition.

Signed under my hand and seal of office, this 11<sup>th</sup> day of December, 2002.

  
\_\_\_\_\_  
Gwyn Shea  
Secretary of State

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Gwyn Shea  
Secretary of State

## REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S MODEL 550/150 OPTICAL SCAN VOTING SYSTEMS

### PRELIMINARY STATEMENT

On September 11, 2002, Election Systems and Software, Inc. (the "Vendor") presented modifications to its Model 550/150 optical scan voting systems for examination. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the systems, followed by review and testing by the examiners. Examiner reports on the systems are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF MODEL 550/150 OPTICAL SCAN VOTING SYSTEMS

The Model 550/150 are optical scan ballot scanners designed to be used at the central counting station. The firmware version of the Model 150/550 presented for examination was 2.0.1.0. The last version certified for use in Texas is 1.4.2.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

The Model 550/150 voting systems, subject to the condition below:

1. Preserve the secrecy of the ballot;
2. Are suitable for the purpose for which it is intended;
3. Operate safely, efficiently, and accurately;
4. Are safe from fraudulent or unauthorized manipulation;
5. Permit voting on all offices and measures to be voted on at the election;
6. Prevent counting votes on offices and measures on which the voter is not entitled to vote;
7. Prevent counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevent counting a vote on the same office or measure more than once;
9. Permit write-in voting;
10. Are capable of permitting straight-party voting; and
11. Are capable of providing records from which the operation of the system may be audited.

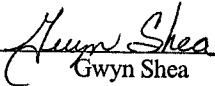
CONDITION

The vendor must submit changes to the Secretary of State in order for her staff to verify that the audit log is not an optional component and that its contents are clear and easily understood by the average user.

CONCLUSION

The examiners were concerned that the audit log appeared to be an option on the system as demonstrated rather than a requirement as under state administrative rule. Further, the audit log was not clear and contained confusing information. We note that the vendor states that this was easily remedied, but this was not demonstrated at the examination. Accordingly, I hereby grant the Vendor's application for certification of the Model 550/150 v. 2.0.1.0 for use in elections in Texas, subject to the above condition.

Signed under my hand and seal of office, this 11<sup>th</sup> day of December, 2002.

  
Gwyn Shea  
Secretary of State

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Secretary of State

## REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S MODEL 100 OPTICAL SCAN VOTING SYSTEM

### PRELIMINARY STATEMENT

On September 11, 2002, Election Systems and Software, Inc. (the "Vendor") presented its Model 100 optical scan voting system for examination. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the systems, followed by review and testing by the examiners. Examiner reports on the systems are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF THE MODEL 100 OPTICAL SCAN VOTING SYSTEM

The Model 100 is an optical scan ballot scanner designed to be used at the precinct polling place. The version of the Model 100 presented for examination was 4.8.0.0. The last version certified for use in Texas is 4.7.6.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

The Model 100 voting system:

1. does not preserve the secrecy of the ballot;
2. is not suitable for the purpose for which it is intended;
3. does not operate safely, efficiently, and accurately;
4. is not safe from fraudulent or unauthorized manipulation;
5. is not capable of providing records from which the operation of the voting system may be audited

### CONCLUSION

The Model 100 lacked a real-time printed audit log as demonstrated at the examination. Accordingly, I hereby deny the Vendor's application for certification of Model 100 v. 4.8.0.0.

Signed under my hand and seal of office, this 11<sup>th</sup> day of December, 2002.

Handwritten signature of Gwyn Shea in cursive script.  
Gwyn Shea  
Secretary of State

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## REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S MODEL 650 OPTICAL SCAN VOTING SYSTEM

### PRELIMINARY STATEMENT

On September 11, 2002, Election Systems and Software, Inc. (the "Vendor") presented its Model 650 optical scan voting system for examination. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneideringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system; the examiners then examined its accuracy and security features. Examiner reports on the system are attached hereto and incorporated herein by this reference.

### BRIEF DESCRIPTION OF THE MODEL 650 OPTICAL SCAN VOTING SYSTEM

The Model 650 is an optical scan ballot scanner designed to be used at the precinct polling place. The version of the Model 650 presented for examination was 1.1.9.1. The last version certified for use in Texas is 1.1.8.0.

### FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

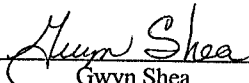
The Model 650 voting system:

1. Preserves the secrecy of the ballot;
2. Is suitable for the purpose for which it is intended;
3. Operates safely, efficiently, and accurately;
4. Is safe from fraudulent or unauthorized manipulation;
5. Permits voting on all offices and measures to be voted on at the election;
6. Prevents counting votes on offices and measures on which the voter is not entitled to vote;
7. Prevents counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevents counting a vote on the same office or measure more than once;
9. Permits write-in voting;
10. Is capable of permitting straight-party voting; and
11. Is capable of providing records from which the operation of the system may be audited.

CONCLUSION

The examiners recommended certification of the Model 650 optical scanner. Accordingly, I hereby certify the Model 650 v. 1.1.9.1 for use in elections in Texas.

Signed under my hand and seal of office, this 11<sup>th</sup> day of December, 2002.

  
\_\_\_\_\_  
Gwyn Shea  
Secretary of State

## The State of Texas



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Gwyn Shea  
Secretary of State

TO: Ann McGeehan  
Elections Division Director

FROM: Glenn Glover  
Voting System Examiner

DATE: October 17, 2002

A voting systems certification examination was held at the Office of the Secretary of State, Elections Division on Wednesday, September 11, 2002. Election Systems & Software, Inc. (ESS) presented for State of Texas recertification the following voting systems and versions:

iVotronic DRE Voting System	7.4.5.0
Votronic DRE Voting System	5.1.9
Model 100 OMR Precinct Counter	4.8.0.0
Model 150/550 OMR	2.0.1.0
Model 650	1.1.9.1
Unity Election System Software	2.2
Consists of	
Ballot Image Manager	7.1.1.0
EDM – Election Data Manager – Election Setup	7.1.0.0
HPM – Hardware Program Manager –	3.6.0.0
DAM – Data Acquisition Manager (Client)	4.3
DAM – Data Acquisition Manager (Host)	2.5
ERM – Election Reporting Manager	6.3.2.0

The Unity Election Systems Software is an integrated suite of modular software programs that enable an election official to enter and maintain a database of jurisdiction and election information, format ballot layouts and program election equipment. The Unity system components also collect, accumulate, and reports voting results.

Unity's real-time audit log proved confusing in noting significant events during vote tabulation and also printed wrong timestamps. The vendor provided an explanation but I believe the audit log functionality should be rewritten and provide clearer descriptions of tabulation events, and accurate date and time stamping. At this time I do not recommend certification of the Unity 2.2 based on the shortcomings of the audit features.



The iVotronic DRE Voting System was presented to the examiner for evaluation. During the presentation, the iVotronic tabulation appeared to give erroneous results of the examiner's test ballots. The examination was effectively suspended while the vendor tried to reconcile the apparent erroneous results. My opinion is that the iVotronics PEB (Personalized Electronic Ballots) unit used to collect election totals from each individual iVotronic unit at the polling place, lends itself to procedural confusion in the administration of an election. A single PEB unit has an internal database where the election information is stored. Once the election is closed, the PEB is plugged into each iVotronic and the counts for that election is collected from the individual iVotronic unit and copied to the PEB's internal database. After the iVotronic unit's election results is collected, then the PEB is extracted and placed into the next iVotronic unit and increments the PEB's internal elections database with the new individual iVotronics election results. The procedural confusion can be addressed with effective training of the administering officials and election workers but nonetheless problems can arise as witnessed at the examination. Also, a zero totals printout should be printed when the election opens on each iVotronics device; currently it is an option. As a result of the problems encountered with the result tabulation of the iVotronic device, I do not recommend the use of the iVotronic device at this time. I believe ESS can successfully demonstrate the iVotronic tabulation functionality and encourage them to return to the examination board for iVotronic certification.

During the examination, the Model 550 Central Count device initially had its audit log function turned off. The examination board recommended that the Model 550 used in Texas jurisdictions eliminate the audit log option and always require it to be operational. With the Model 550 audit log printing enabled, the audit printout proved to be difficult in identifying significant events during the tabulation of the ballots. I recommend not certifying the Model 550 until the audit log function is mandatory and presents clearer information of significant events.

The Model 100 which is currently being phased out in Texas and has no audit log printing capabilities should not be certified for use.

The Model 150 and Model 650 appeared to have no apparent problems during the examination and as a result I would recommend these models for Texas certification.

In summary, I recommend the certification of ESS Model 150 and Model 650 Central Ballot Scanner. I do not recommend the certification of the iVotronic at this time nor do I recommend the certification of Model 100, Model 550 and Unity 2.2 until the issues stated above are addressed.



## DEPARTMENT OF INFORMATION RESOURCES

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October 2, 2002

CAROLYN PURCELL  
Chief Information Officer  
State of Texas

— ♦ —  
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Ms. Ann McCeehan  
Deputy Assistant  
Office of the Secretary of State  
1019 Brazos Street  
Austin, TX 78701

RE: Re-examination of the Unity Election System Version Release 2.2 and  
Firmware for vote tabulation devices from Election Systems and Software  
(ES&S)

Dear Ms. McCeehan:

I attended a scheduled examination September 11, 2002, at 9:30 am, for the  
purpose of examining the voting systems from Election Systems and Software  
(ES&S). The report below summarizes my findings.

### Voting Systems Versions

#### Hardware/Software Version

##### Unity Election System v2.2

EDM – Election Data Manager v7.1.1.0

Ballot Image Manager v7.1.0.0

HPM – Hardware Program Manager v3.6.0.0

DAM – Data Acquisition Manager (Host) v2.5

DAM – Client v4.3

ERM – Election Reporting Manager v 6.3.2.0

#### Tabulation Systems (all currently certified)

Model 100 Precinct Count System Firmware v4.8.0.0

Model 150/550 Central Count v 2.0.1.0

Model 650 Central Count v1.1.9.1

#### DRE voting systems

Ivotronic DRE audio balloting system v7.4.5.0

Votronic DRE Voting System v5.19

#### System description

Unity is an umbrella marketing designation that includes all of the software  
modules noted above. The modules are upgraded as a single package; none of  
them can be upgraded individually.

The core functionality demonstrated in prior versions has not been changed.  
ES&S personnel explained that changes they were demonstrating were mostly

cosmetic changes. For instance, the Model 100 was upgraded to handle longer ballots, and a ZIP drive was added to the model 650.

The software appeared to perform all functions specified by the Texas Secretary of State (SOS). The tallying software appeared to count votes correctly, and handled over votes and under votes appropriately.

However, the Unity software appeared to demonstrate some audit log anomalies. The log printer that appeared to function correctly in prior examinations did not print correctly this time until ES&S personnel reset a configuration switch in the election definition. It is suggested that ES&S engineering support institute QA procedures to ensure that key parameters such as the log printer settings are not overridden when they deliver firmware upgrades to customers.

#### **System performance**

This examination came the day after another highly publicized vote tabulation dispute in Florida, so it was interesting to note how these systems performed. A key problem in the Florida election was that each unit took as much as ten minutes to initialize. So a polling location that expected to be open at 7 am would have to begin setting up machines at 5:30 am to have ten voting units ready for voters. Even in the test systems examined here, each system took well over a minute to load ballots before it was ready for voting.

The slow initialization was probably due to the infrared interface between the master controller and the voting devices. The huge ballot in Florida had to be rendered in three languages (English, Spanish, and Creole). This is something the equipment was not designed to handle. Retrofitting the machines with a faster interface would likely be prohibitively expensive for the counties and/or the vendor. Thus potential customers would be well advised to examine their potential ballot styles to ensure that the equipment can handle the growth of ballots in the foreseeable future.

#### **Recommendations**

The Department of Information Resources (DIR) finds no technical objection to certifying the Unity Election System and firmware demonstrated at this examination.

Respectfully,



Nick Osborn  
Systems Analyst

CP:MM:NO:sk

## Voting System Examination Election Systems & Software (ES&S)

Prepared for the  
Secretary of State of Texas

James Sneeringer, Ph.D.  
Designee of the Attorney General

This report comprises the findings of the Attorney General's designee from an examination of the equipment listed, pursuant to Title 9, Chapter 122 of the Texas Election Code, section 122.036(b).

<b>Examination Date</b>	September 11, 2002
<b>Report Date</b>	September 26, 2002

ES&S offers a complete line of products for every aspect of conducting an election, including election setup, DRE, optical scanning, punch-card reading, tallying and reporting.

Components Examined	Type	Version	NASED*
iVotronic DRE Voting System	Voting	7.4.5.0	7-30-02
Votronic DRE Voting System	Voting	5.1.9	8-30-02
Model 100 OMR Precinct Counter	Scanner	4.8.0.0	7-2-02
Model 150/550 OMR	Scanner	2.0.1.0	7-2-02
Model 650	Scanner	1.1.9.1	8-22-02
Unity Election System Software	Setup & Tabulation	2.2	7-30-02
Ballot Image Manager	Part of Unity	7.1.1.0	"
EDM - Election Data Manager - Election Setup	Part of Unity	7.1.0.0	"
HPM - Hardware Program Manager - Programs PEBS, EPROMS, etc from election definition	Part of Unity	3.6.0.0	"
DAM - Data Acquisition Manager (Client)	Part of Unity	4.3	"
DAM - Data Acquisition Manager (Host)	Part of Unity	2.5	"
ERM - Election Reporting Manager	Part of Unity	6.3.2.0	"

\* ES&S provided letters from Wyle Laboratories, which stated that the components were certified, but did not give NASED numbers. I have listed the dates of the letters from Wyle.

### Voting: Characteristics of the Votronic and iVotronic DRE

Election Setup	Flash memory cartridge (Personalized Electronic Ballot, or PEB) created with Unity software. Nothing is pre-programmed in the terminals; all the election information is in the PEB.
Zero-total report	On the thermal printer in the communication pack.

Authorization to vote / Ballot selection	There are two modes: <ul style="list-style-type: none"> <li>• Voter inserts a flash memory cartridge (PEB) created with Supervisor station and a supervisor PEB, both of which are red to distinguish them from voting stations. The PEB cannot be reused without re-activation.</li> <li>• Poll worker inserts a PEB, immediately removes it, and selects the appropriate ballot. The PEB is retained by the poll worker and is reusable without re-activation.</li> </ul>
View / Vote	LCD display / touch screen
Vote Storage	Three redundant flash memories
Precinct Consolidation	Allowed using PEB cards. There is no real-time audit log printer.
Transfer Results	PEB transported or transmitted by modem to Unity software (or a regional site from which data is sent to the Unity software at central counting). The PEB is protected by a Cyclical Redundancy Check (CRC).
Print precinct results	On thermal printer in the communication pack.
Straight party / crossover	Yes. A straight-party vote cannot cancel crossover votes that have already been selected, which protects the voter against mistakenly canceling a crossover vote.
ADA	Yes. Because it is battery-powered, the iVotronic can even be taken to the curbside for voting. However, this was not demonstrated, because the Secretary of State verifies ADA compliance.

#### Setup & Tabulation: Characteristics of the Unity System

Tamper Resistance	Cyclical Redundancy Check (CRC) on each record in the election files.
OS access	Not permitted during tabulation.
Real-Time Audit Log	Yes.
Data Integrity	There are no special transaction-processing features. However, according to ES&S, there is no need, because all the data is written in a single write statement, making it impossible for partial results to be entered into the database. Also, it is easy to recalculate everything if a problem is suspected, and everything is automatically re-calculated when you request a canvass report. Since a canvass report would always be requested, this is satisfactory. In short, it is nearly impossible to get an incorrect result and not know it.
Notes	<ul style="list-style-type: none"> <li>• The Data Acquisition Manager is used in regional centers to collect precinct data for forwarding to central counting by modem or by carrying a PEB.</li> <li>• The Data Acquisition Manager does not need to know election-specific data or understand the results. It does not tabulate.</li> </ul>

#### Concerns

Unity	1. The real-time audit log has a bug that prints extraneous lines with an incorrect timestamp. This is extremely confusing. <i>This should be fixed</i>
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	<i>before Unity is certified.</i>
iVotronic and Votronic DRE	2. Because the PEB tabulates the ballots from the voting location at the end of the day, as they are being transferred to the supervisor terminal, there is a requirement for real-time audit log to be printed. I do not perceive this as a great risk, but it does not comply with the Secretary of State's administrative regulations. <i>These should not be certified until this is corrected, or the regulations are changed.</i>

## **Barney Knight & Associates**

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September 20, 2002

Ann McGeehan  
Deputy Assistant  
Secretary of State  
P.O. Box 12060  
Austin, Texas 78711-2060

Re: Election System & Software ("ES&S")-Unity Election System V. 2.2; iVotronic DRE, V. 7.4.5.0; Votronic DRE, V. 5.19; Model 100 Precinct Count System, V. 4.8.0.0; Model 150/550 Central Count, V. 2.0.1.0; Model 650 Central Count, V. 1.1.9.1; Election Data Manager, V. 7.1.1.0; Ballot Image Manager, V. 7.1.0.0; Data Acquisition Manager (Host), V. 2.5; Hardware Program Manager, V. 3.6.0.0; Data Acquisition Manager (Client), V. 4.3; and the Election Reporting Manager, V. 6.3 2.0 (collectively the "ES&S Unity Election System" or "Election Systems").

Dear Ms. McGeehan:

Pursuant to my appointment as an examiner under §122.035 of the Texas Election Code, I examined the above referenced software and hardware as presented by ES&S for examination. I examined the Election Systems with respect to Texas Election Law and procedure on September 11, 2002. Each reference to one or more of the above components is a reference to the version number of such component listed above.

This report is concerned solely with the ability of the Election Systems, and each individual component thereof, to function in compliance with Texas Election Law. No opinion is expressed regarding the suitability of the either system for the purposes of or use by any jurisdiction.

All of the above referenced programs and equipment function under the umbrella of the Unity Election System. The Election Data Manager is used to set-up the election and jurisdiction area covered by the election. The Ballot Image Manager is used to construct the ballot for each election. The Data Acquisition Managers are used as an integral part of and with each of the alternative election systems. The Election Reporting Manager functions at election central for the tabulating and reporting of results. The Model 650 Central Count OpScan is used as the central tabulation device at election central for larger jurisdictions that use punch cards. The

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Model 150/550 Central Count Opscan is used as the central tabulation device at election central for smaller and medium size jurisdictions that use punch cards. The Model 100 Precinct Count Opscan is used to scan and tabulate paper ballots at the precinct. The Votronic and the iVotronic DRE consists of voting stations and a precinct controller, using PEBs for the casting, recording and tabulation of votes at the precinct level.

#### **Minimum Requirements Generally Satisfied**

Although numerous problems were encountered in the course of the examination, these were ultimately overcome and a successful examination was completed, with the above listed components and whole of the Unity Election System functioning in compliance with the minimum requirements of the Texas Election Code. With the exception noted below, the ES&S Unity Election System ultimately appeared to function in a manner to meet the minimum requirements of *Chapt. 122, Subchapt. A, Texas Election Code* for use in an election. Subject only to the possible exception set forth in the following paragraph as to the Votronic and iVotronic, I recommend these versions, programs and segments of the ES&S Unity Election System be certified as meeting the minimum requirements of the Texas Election Code.

#### **Real-time Log Printer Issue**

The Votronic and iVotronic were ultimately demonstrated to function at the precinct level in a manner to comply with the minimum requirements of the Texas Election Code. However, no log printer was present when downloading vote totals to the supervisor PEB or from the PEB to the controller and the supervisor PEB/controller tabulating those results for the precinct report. The downloading and function of the supervisory station at the close of polls constitutes the tabulation of ballots. No real time log printer is present during this process, and the only record is the original information on each voting station, and the aggregate information deposited on the supervisor PEB/station, i.e. there are separate electronic logs in each station and those are aggregated and not recorded separately on the supervisor PEB. Unless (1) the Votronic and iVotronic are modified at the precinct level to include and require a real time log printer that identifies each voting station, time, date, etc. for which the voting totals are downloaded to the supervisor controller; or (2) the Votronic and iVotronic software is modified so that the results of each voting station is downloaded, stored and reported separately on the PEB, rather than being added to the totals previously loaded on the PEB; or (3) your office makes an administrative decision that an electronic aggregation of the votes from multiple voting stations at the precinct does not constitute tabulation, I recommend the Votronic and iVotronic not be certified as in compliance with the requirements of *Chapt. 122, Subchapt. A, Tex. Elec. Code*.

#### **Reservations and Recommendations**

Notwithstanding the above opinion that the ES&S Unity Election System meets the minimum requirements of the Texas Election Code, I recommend the Secretary consider requiring or



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Deputy Assistant Secretary of State  
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advising modifications be made by ES&S to: (1) the operating programs for the ES&S Unity Election System; and (2) the written instructions and procedures for the Election Systems. Such recommendations are based on the September 11, 2002 examination, and prior examinations, with one assumption being made. The assumption is that the personnel presented by ES&S to participate in the examination are as well or much better trained in the operation of the ES&S Unity Election System than is the average election worker.

These Reservations and Recommendations result from the following incidents during the examination.

**ES&S Model 550 Ballot Scanner.** As initially examined, the Model 550 produced a minimal and largely unusable real time log printer result. After considerable confusion and contacts by ES&S with the home office, it was discovered that the real-time log printer function had been "turned off" during the election set-up for the examination election. The software program for election set-up gives the election official the option to disable the real-time log printer function. This function had not been turned off for the Model 650, and corrections were ultimately made that enabled the examination of the Model 550 with a functional real-time log printer.  
**Recommendation.** I recommend the Secretary require ES&S to eliminate the capability to disable the real-time log printer, for election systems made available in the State of Texas.

**Votronic and iVotronic.** Notwithstanding the knowledge and skills of the ES&S personnel available to participate in the examination, after simulated voting at the election precinct level the tabulation of the results for the Votronic resulted in a larger number of votes being tabulated than were cast in the simulated voting. After some time and confusion, it was discovered that ES&S personnel had failed to clear the prior test results from the system prior to the start of voting. As a result, the Votronic and iVotronic were ultimately demonstrated to function in compliance with the minimum requirements of the Texas Election Code, subject only to the ability of the election judges to follow all required procedures. The confusion and difficulties encountered during the examination also distracted from this examiner assuring certain functions.  
**Recommendation.** I recommend the Secretary consider requiring ES&S to modify the operating programs for the Votronic and iVotronic so that the Election Administrator cannot program the election in a manner to not require a zero totals tape being printed when the election is opened. Further, I recommend the Secretary have staff examine and make certain that a voter station cannot be connected to the Votronic or iVotronic precinct system after the zero total votes tape is printed, without a zero total votes tape being printed for that station. In this regard, it would appear to lessen the opportunity for operator error if there was only one procedure for opening the voting stations and the supervisor terminal for voting. See Section 5, pages 51-54, of the Certification Materials, for the potential for confusing election judges.

**Real-Time Audit Log.** The real-time audit log for the Model 150, Model 550 and Model 650 and other central tabulation appeared ultimately to function in a manner to meet the minimum requirements of the applicable regulations. **Reservations.** The audit log was confusing and

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unnecessarily complicated. Persons attempting to use the audit log to investigate seemed irregularities, or to actually audit the tabulation of ballots, would eventually (with ES&S help) be able to audit the tabulation events. As an example, at the end of the examination, two examiners, a member of the Secretary's staff, the lead ES&S presenter and a seemingly very competent ES&S staff member, required almost thirty minutes to ascertain the events logged for a tabulation that required less than five minutes.

#### Summary and Recommendation for Certification

The following is subject to the Secretary's decision regarding a real-time log printer for tabulation by an electronic voting system at the precinct level. When proper procedures were followed, the ES&S Unity Election System was demonstrated to function in compliance with the minimum requirements of the Texas Election Code. Those procedures included the following: (1) the official creating the election not selecting a log printer option that is not authorized in Texas; (2) the official creating the election not selecting an option for the zero tapes total for the iVotronic or iVotronic precinct level that is not authorized in Texas; and (3) the clearing of the iVotronic and iVotronic PCs and voting stations at the precinct level prior to the opening of the polls for voting. Nevertheless, when proper procedures are followed the ES&S Unity Election System meets the minimum requirements of the Texas Election Code.

Sincerely,



Barney L. Knight

## ES&S

The ES&S systems were examined in Austin on September 11, 2002. The systems comprised a suite of ES&S's voting systems used in Texas. The names and current releases are as follows:

Unity - version 2.2 - an election setup, and central accumulator and reporting system  
Model 100 - v. 4.8.0.0 - optical precinct-counting scanner  
Model 150/550 - v. 2.0.1.0 - optical central-counting scanner  
Model 650 - v. 1.1.9.1 - optical central-counting scanner  
iVotronic - version 7.4.5.0 - DRE voting machine  
Votronic - version 5.19 - DRE voting machine

There have been improvements since the last examination in May. The "refresh" option has been modified in the iVotronic but is still available as before in the Votronic. Dallas County had a problem in a recent election because of the option on the Votronic. It should be modified in both DRE systems. The modified option does not restrict the county from making last minute spelling corrections to the ballot.

Another improvement is that the Unity operator can no longer continue with the real-time audit log offline. Additional changes to the systems were not substantive.

The individual systems were able to record and count the ballots correctly but the Unity demonstration illustrated that the system as a whole is complex. The demonstrators had some difficulty tabulating the results from all the machines and precincts. They had to zero-out the results and start over at least once in order to get an accurate tally.

The following corrections must be made in order to satisfy the requirements of the Texas Election Code:

- The Unity audit log had in-consistent date/time stamps. The explanation given was that the report header should not have been on the log. The log is generally confusing to read. A call to the developer was required to explain how it should be interpreted because the demonstrators were unable explain the entries. It can easily be improved.
- The 550's audit log was not enabled. This is said to be an option of the election setup. This should not be optional in Texas. A log is required for any central-counting system.
- The 100 does not have a log printer and therefore should not be used/sold in Texas for a central-counting system even though it would otherwise be appropriate for a county with a very small voting population.
- The supervisor PEB's used by the DRE systems to open the polls in an early voting locations can have results from the previous day(s) stored on it. This is one of the problems experienced during the examination. The vendor needs to do a better job preventing this. If the vendor can make this mistake, an election worker certainly might.

## **Conclusion**

The 650 is the only system which is not mention in the problems above and so I recommend certification. The other systems need a little more work to in order to meet the standards set forth in the Texas Election Code. I do not recommend certification of these systems until the problems outlined above are corrected.

Tom Watson  
Examiner