


Exhibit H



"Shawn Southworth"
<ssouthworth@ciber.com>
04/01/2005 05:28 PM

To "Hancock, Brian" <bhancock@eac.gov>
cc
bcc

Subject Hart System 4.0 report

History:  This message has been forwarded.

Brian,

I have attached the Hart System 4.0 final report for the committee to review.

Thanks,

Shawn



2005-03-31 Hart System 4.pdf

Hart InterCivic Software Qualification Test Report

Original Report for Hart System 4.0 created 03/31/05

Prepared For:

The National Association of State Election Directors

Prepared By: _____

**CIBER, Inc.
Independent Test Authority**

ciber

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Proprietary

1 INTRODUCTION

CIBER is pleased to submit this report summarizing the qualification testing of the Hart InterCivic software System 4.0.

1.1 TEST AGENCY TEST AGENCY HISTORY AND CAPABILITY

CIBER Inc. has been providing IT consulting services for over 20 years. Although the Independent Test Authority (ITA) division name has changed due to an aggressive acquisition and merger market, the ITA division of the company has had the same leadership in place since inception. Founded in 1974, the company's consultants now serve client businesses from 60 CIBER, 10 DigiTerra, 5 Solution Partners and 4 Enspheerics offices in the U.S., Canada and Europe. With offices in 10 countries, CIBER's 6,000 IT specialists continuously build, test and upgrade our client's systems to "competitive advantage status." CIBER provides a single source for IT solutions, including:

Full-solution ASP services

Applications maintenance and support

- Testing and IQA
- Web and database hosting
- Enterprise solutions, including SAP, Oracle and Peoplesoft
- Application outsourcing
- eBusiness, from architecture through execution
- Knowledge management and training

The company has been involved in numerous QA and IQA testing projects for commercial, state, and federal government customers. CIBER has an interim accreditation as an ITA through the National Association of State Election Directors (NASED).

1.2 DOCUMENT OVERVIEW

This document consists of five main sections: Introduction, Qualification Test Background, System Identification, System Overview, and Qualification Test Results. The Qualification Background gives general information about the qualification test process. The System Identification Section gives information about the Hart InterCivic software and supporting hardware. The System Overview describes the software and the Qualification Test Results Section provides a summary of the results of the testing process.

Detailed information including the Technical Data Package (TDP) Review, Source Code Review, and Functional Test Review are included as appendices to this report.

2 QUALIFICATION TEST BACKGROUND

The primary purpose of Software Qualification Testing is to demonstrate compliance with levels of design, performance, and quality claimed for them by manufacturers. The tests are also intended to demonstrate that the system meets or exceeds the requirements of the Federal Election Commission (FEC) 2002 Voting System Standards (VSS).

The scope and detail of the requirements for qualification have been tailored to the design and complexity of the software submitted by Hart InterCivic for testing. The qualification test procedure is intended to discover defects in software design and system operation which, should they occur in actual election use, could result in failure to complete election operations in a satisfactory manner.

The tests have been designed to evaluate system compliance with the requirements of the 2002 FEC VSS. The examination will include selective in-depth examination of software, the inspection and evaluation of system documentation and optional tests verifying system performance and function under normal and abnormal conditions.

A definition of terms and nomenclature found in the Hart voting system is listed below:

ATA Reader	Multiple ballot box bay card-reading devices.
BOSS	Ballot Origination Software System used to define the election.
Ballot Now	Paper ballot management system.
DAU	Disabled Access Unit. An eSlate with additional hardware capable of accepting input from jelly switches, storing audio files, and playing audio through a speaker.
JBC	Judge's Control Booth. The controller unit for up to 12 eSlate/DAU units. The controller unit is used to generate access codes for the voter.
MBB	Mobile Ballot Box: an ATA flash card containing election definition and cast ballot information.
Rally	Software application used to send election results from satellite locations.
Tally	Software application used to tabulate election results.
Servo	Election-records and recount-management system

3 SYSTEM IDENTIFICATION

The system submitted by Hart InterCivic for qualification testing consisted of the following software, hardware and documentation:

Software

- BOSS version 4.0.48
- Ballot Now version 3.0.24
- Rally version 2.0.11
- Tally version 4.0.25
- eCM Manager 1.0.7
- Servo 3.0.17
- COTS software: MS Windows 2000 Professional, Service Pack 4

Test Support Hardware

- computer Tally-workstation, Dell PC
- computer-Rally workstation, Dell PC
- computer-Boss workstation, Dell PC
- JBC Firmware Version 3.0.15
- eSlate Firmware Version 3.0.15
- Scanner, Kodak 1500D
- Scanner, Fujitsu M4099D
- Scanner, Fujitsu M4097D
- Scanner, Kodak 3520D
- Scanner, Kodak i830

Documentation

Document	Doc. No.	Revision
Product Description	6000-060	40B
Hart Glossary	6000-124	A
System 4.0 Requirements Spec.	6000-192	10-40A
Software Release Doc	6000-254	A
Ballot Now Functional Spec	6000-072	30-40B
Ballot Now Product Requirements	6000-074	30-40C
BOSS Functional Spec	6000-039	40-40B
BOSS Product Requirements	6000-001	40-40B
Rally Functional Spec	6000-127	20-40C
Rally Product Requirements	6000-128	20-40C
SERVO Functional Spec	6000-099	30-40F
SERVO Product Requirements	6000-098	30-40A
Tally Functional Spec	6000-047	40-40C
Tally Product Requirements	6000-048	40-40C
eCM Manager Functional Spec	6000-232	20-40B
eCM Manager Product Requirements	6000-231	20-40B
Ballot Now Design Spec	6000-073	30-40A
Ballot Now Database Design Spec	6000-238	40-30A
BOSS Design Spec	6000-256	40-40A
BOSS Database Design Spec	6000-242	40-40A
Rally Design Spec	6000-126	20-40A
Rally Database Design Spec	6000-239	40-20A
SERVO Design Spec	6000-100	30-40A
SERVO Database Design Spec	6000-241	40-30A
Tally Design Spec	6000-244	40-40A
Tally Database Design Spec	6000-240	40-40A
eCM Manager Design Spec	6000-247	10-40A
MBB Software Requirements Spec	6000-012	40-00A
System Security Requirements	6000-166	E
System Security Functional Spec	6000-174	B
Ballot Now Functional Security Spec	6000-140	A
BOSS Functional Security Spec	6000-118	A
Rally Functional Security Spec	6000-106	20-40C
SERVO Functional Security Spec	6000-139	30-40C
Tally Functional Security Spec	6000-107	40-40B
eCM Functional Security Spec	6000-243	20-40A
Security Library Functional Test Scripts	7000-083	40A
Security Library Functional Test Results	7000-084	40A
BOSS Test Plan	7000-011	40-40A
BOSS Test Scripts	7000-013	40-40A
BOSS Test Results	7000-014	40-40A
eCM Test Plan	7000-071	10-40A
eCM Manager Test Scripts	7000-073	10-40A
eCM Manager Test Results	7000-074	10-40A
Tally Test Plan	7000-021	40-40A
Tally Test Scripts	7000-023	40-40A

Tally Test Results	7000-024	40-40A
Ballot Now Test Plan	7000-061	30-40A
Ballot Now Test Scripts	7000-063	30-40A
Ballot Now Test Results	7000-064	30-40A
Rally Test Plan	7000-041	20-40A
Rally Test Scripts	7000-043	20-40A
Rally Test Results	7000-044	20-40A
SERVO Test Plan	7000-051	30-40A
SERVO Test Scripts	7000-053	30-40A
SERVO Test Results	7000-054	30-40A
Ballot Now User Manual	6100-067	30-40C
BOSS User Manual	6100-019	40-40C
Rally User Manual	6100-114	20-40D
SERVO User Manual	6100-102	30-40B
Tally User Manual	6100-049	40-40C
eCM Manager User Manual	6100-080	10-40B
eSlate™ System Management and Tasks Training Manual	6300-001	40A
Procedure - Configuration Management	6060-589	B
Procedure - Configuration Management Audit	6060-521	A
Configuration Management Audit Checklist	6060-717	A
Procedure - System Versioning	6060-503	A
Process - Software Development	6060-302	A
BOSS Power Builder Naming and Code Standards	6000-040	E
Standard - C++ Application Coding Standards	6060-776	A
Standard - Software Development Lifecycle Model	6060-812	A
Standard - Software Component Breakdown	6060-813	A
Process - Documentation for Software Engineering	6060-304	A
Procedure - Source Control	6060-562	A
Template - Test Script	6060-714	A
Template - Test Plan	6060-713	30A
Process - Test	6060-306	A
Procedure - Corrective Action	6060-504	A
Procedure - Risk Management	6060-588	A
Procedure – Supplier Evaluation	6060-543	A
Procedure - Peer Review	6060-518	A

Referenced Documents		
PVS Functional Security Spec	6000-183	30-40A
PVS Test Plan	7000-031	30-40A
PVS Test Scripts	7000-033	30-40A
PVS Test Results	7000-034	30-40A
eSlate™ Polling Place System Early Voting Desk Reference;	6300-131	4xA
eSlate™ Polling Place System Election Day Desk Reference	6300-132	4Xa
eSlate™ Support Procedures Training Manual;	6300-006	4Xa
Principles - Software Engineering	6060-110	A
Policy - Hart Process Overview	6060-106	A
Principles - Requirements Management	6060-101	C

Work Instructions - Object Cycle	6060-561	A
Guideline - Risk Management	6060-511	A
Guideline - Requirements Analysis	6060-514	A
Work Instructions - Software Development	6060-568	A
Policy - Resource Management	6060-134	A
Policy - Management Responsibility	6060-136	A
Policy - Product Realization	6060-137	B
Policy - Measurement, Analysis, & Improvement	6060-135	A
Policy - Documentation	6060-138	A
eSlate Functional Spec	6000-051	30-40A
eSlate Product Requirements	6000-005	20-30A
JBC Functional Spec	6000-050	30-40A
JBC Product Requirements	6000-007	30-40A
eSlate Design Spec	6000-006	30-40B
JBC Design Spec	6000-008	30-40A
Design Process Training Module 6		2/5/2005

4 SYSTEM OVERVIEW

The Hart InterCivic Voting System supports both paper ballots and electronic voting. The systems applications execute on a standard PC configured with a Windows 2000 Professional Operating System. The following peripherals are connected to the PC:

- Laser printer for printing election ballots and reports
- Scanners for scanning complete ballots (BN only)
- ATA Card reader/writer for accessing MBBs
- eCM (eSlate Cryptographic Module)

The user defines a ballot using the BOSS application on the PC. The definition can include a selection of foreign languages and audio for visually disadvantaged voters. Ballot definitions are written to one MBB for each voting booth controller (JBC). If paper ballots are to be used, an MBB is created for the Ballot Now (BN) Application. Separate MBBs are created for “test” scenarios based on the election. An additional MBB is also created for each JBC that will be used for “early voting”.

An MBB must be inserted into the JBC to open election booths. Up to twelve booths are attached to one controller. The controller assigns a random four-digit number to each voter. The voter activates an eSlate in the voting booth by entering his/her four-digit code. The voter may then enter votes and cast the ballot.

The Hart InterCivic system provides an early election capability that allows the MBB to be inserted to accept votes for a specified time period before election day. In this mode, the card is “suspended” at the end of the day and is reinserted the next day, allowing votes to be collected during the specified early voting period. Election day cards are “locked” when the polls are closed.

If paper ballots are used, the MBB is inserted into the PC MBB card reader and read by the BN. The BN application allows the user to print multiple batches of ballots and will optionally assign a serial number to each ballot. Bar codes are printed on each ballot that identify the election and contain other information necessary to read the ballot.

When the ballots are returned for scanning, the user can scan them in batches. The user must resolve each scanned batch. The BN application locates ballots with overvotes, undervotes, or write-ins and presents these ballots to the user for visual examination and resolution. The resolution consists of entering the vote as intended by the voter when this can be determined, accepting the undervote, or ignoring the overvote. The user must also examine write-in names and assign them to certified write-in candidates. The resolved votes are written to the MBB.

Rally was developed for the purpose of reducing the amount of time required to process an election quantity of MBBs, and support the physical movement of equipment. Rally is a stand-alone application. Primary functions include reading and processing MBB's, reporting, logging and transmission of consolidated cast vote record information. In a typical large installation, the collection of votes is spread over a wide geographic area. Reporting of election results in a timely manner on election night is a critical performance parameter. As such it is desired to distribute the reading of MBBs to various Rally Stations. These Rally stations read MBBs, consolidate the information, which is then transferred to the Tally system.

The Tally software runs on the PC and tallies the votes that were written to the MBB cards by the JBC and the BN. It also reads the ballot definition created by the BOSS application. It uses that information to validate each MBB containing votes. As the votes are entered, they are tallied and reports are provided.

The eCM Manager is a software application that reads and writes to a USB security key. This key is required for access to secure functions in the BOSS, Tally, Rally, Ballot Now, and SERVO applications.

All of the applications provide extensive audit trails. Security features insure that only the MBB cards and paper ballots created for a specific election can be used with that election. The application does not allow reuse of cards or incorrect sequencing of cards.

5 QUALIFICATION TEST RESULTS

5.1 TECHNICAL DATA PACKAGE (TDP) REVIEW SUMMARY

The TDP contains requirements, design, configuration management, quality assurance, and system operations information. The FEC requirements state that at a minimum, the TDP shall contain the following documentation: system configuration overview; system functionality description; system hardware specifications; software design and specifications; system test and verification specifications; system security specifications;

user/system operations procedures; system maintenance procedures; personnel deployment and training requirements; configuration management plan; quality assurance program; and system change notes.

The FEC Standards also state in volume 2 section 2.1.1.2 “Systems in existence at the time the revised standards are released may not have all required developmental documentation. When such a system is subject to evaluation as a result of system modification, the vendor shall provide what information they can.”

The documents were reviewed for accuracy and completeness as a part of the TDP review process. The documents from the TDP also served as the basis for verifying the Software Test Plan that was used for functional testing.

Upon final review of the aforementioned documents, CIBER concludes that the TDP submitted Hart InterCivic meets the requirements under the FEC standards of 2002.

5.2 SOURCE CODE REVIEW SUMMARY

The code was reviewed in order to evaluate its compliance with the FEC standards for source code. These standards are intended to ensure that the overall objectives of the logical correctness, system integrity, reliability, and accuracy are being met. It was also reviewed for its adherence to any Hart InterCivic coding standards.

The Hart Interactive Voting System Version 4.0 application source consists of the following components:

- BOSS version 4.0.48
- Ballot Now version 3.0.24
- Rally version 2.0.11
- Tally version 4.0.25
- eCM Manager version 1.0.7
- Servo version 3.0.17
- JBC Firmware Version 3.0.15
- eSlate Firmware Version 3.0.15

It was determined that Hart Voting System 4.0 meets the standards required by the 2002 VSS.

5.3 FUNCTIONAL TEST SUMMARY

The main goal of functional testing was to verify that the Hart InterCivic Voting System Version 4.0 application met the FEC standards. The software that was tested consisted of six “applications”. Ballot Organization Software System (BOSS) application, Ballot Now (BN), Rally, Tally, eCM Manager and SERVO applications were submitted for full functional testing under the 2002 Federal Standard. The testing included end-to-end tests that provided a regression test of all the software applications.

After completion of final functional testing, CIBER concludes that Hart InterCivic Voting System Version 4.0 meets the functional requirements provided by the 2002 VSS as well as the additional requirements stated or derived from the TDP.

5.4 RECOMMENDATION FOR QUALIFICATION

It has been demonstrated through the TDP review, source code review, and functional testing that the Hart InterCivic System Version 4.0 successfully meets the required acceptance criteria of the FEC Voting System Standards of 2002.

It is upon completion of this testing that CIBER recommends to the NASED committee that Hart InterCivic System Version 4.0 be certified.

APPENDIX A

TECHNICAL DATA PACKAGE (TDP) REVIEW

TDP REVIEW - APPROACH AND FINDINGS

The TDP review is an evaluation for compliance with FEC guidelines for TDP completeness and quality. The FEC standards state that vendor documentation relating to voting system hardware shall be submitted with the system as a precondition of qualification testing. These are the items necessary to define the product and its method of operation; to provide vendor technical and test data supporting the vendor's claims of the system's functional capabilities and performance levels; and to document instructions and procedures governing system operation and field maintenance.

The documents included in the TDP review are listed in Section 3 of this document. Initial TDP review revealed anomalies that were reported to Hart InterCivic. Anomalies were addressed and corrected prior to final TDP review.

APPENDIX B

SOURCE CODE REVIEW

SOURCE CODE REVIEW APPROACH AND FINDINGS

The source code review is an evaluation for compliance with FEC guidelines and Hart InterCivic standards for software quality.

This report details the results of the Hart InterCivic system software evaluation, which was performed on BOSS, Ballot Now, Rally, Tally, eCM Manager, JBC, eSlate and SERVO. The evaluations of each are an assessment of the source code considering the following characteristics:

- Selection of programming languages: High-level programming language shall be used.
- Software integrity: Self-modifying, dynamically loaded, or interpreted code is prohibited.
- Software modularity and programming: Software shall be designed in a modular fashion. Modules shall have a specific function which can be tested and verified independently, shall be uniquely and mnemonically named, shall be small enough to be easily followed and understood, shall have a single entry point, and process flow within the module shall be restricted.
- Control constructs: Software must adhere to acceptable constructs.
- Naming conventions: Names shall be chosen to enhance readability and intelligibility of the program, shall be consistent, and shall be unique within an application.
- Coding conventions: Software shall adhere to basic coding conventions.
- Comment Conventions: All modules must contain headers and provide header comments describing information contained in the header. Descriptive comments shall be provided to identify objects and data types.

Evaluation

Hart System 4.0 uses a combination of C++ and PowerBuilder languages to construct a sophisticated set of applications for election data processing. These languages facilitate and enforce the object oriented design and programming methodology, resulting in an understandable and maintainable code set.

Findings

The following is the list of components that were reviewed as a part of this version release. All source code was reviewed to the 2002 standards. All the anomalies found in this review were corrected. The Hart System 4.0 meets the standards of the 2002 VSS.

BOSS version 4.0.48

Language: PowerBuilder

Ballot Now version 3.0.24

Language: C++

Rally version 2.0.11

Language: C++

Tally version 4.0.25

Language: C++

eCM Manager 1.0.7

Language: C++

Servo 3.0.17

Language: C++

JBC Firmware Version 3.0.15

Language: C++

eSlate Firmware Version 3.0.15

Language: C++

APPENDIX C

FUNCTIONAL TEST REVIEW

FUNCTIONAL TEST APPROACH

This section provides a summary of the test planning and execution performed to validate the BOSS, BN, Rally, Tally, eCM Manager and SERVO software. The table in this Section identifies the test cases that were executed. The Hart InterCivic software was evaluated against each of the requirements as stated in the FEC Voting System Standards of 2002 that are applicable to the qualification testing of voting system software.

Approach

The ITA utilized a software test plan provided by Hart that included six system test cases. These test cases exercised all of the functionality of the Hart system and met the requirements of the 2002 VSS. Five of the system tests were started from importing of the election definition. One of the six system tests was started from the election definition phase. These tests were designed to test both the functionality and ballot logic capabilities of the system. Hardware utilized to conduct the test cases is listed in section 3 System Identification in the Test Support Hardware section.

Test Case	Description
Election 1 General Election	Retrievable Early Voting Ballots JBC Tally Tape - Allow to print Include Provisional Ballots in Vote Totals 2 precincts, 1 split District and Precinct contests Straight Party Contest Office contest linked to the Straight Party Office contest not linked to the Straight Party Office Contest for multiple precincts Office contests with write-in candidate Office contests without write-in candidate Office Contest Write-in only candidate Office Contest - N of M Non-cumulative candidates Office Contest - N of M Cumulative candidates Office Contest - No Declared Candidate Issue contest (Proposition) No Rotation Inclusive: Parent/Child contests where a specific option must be selected to activate the child contest.

<p>Election 1 E – Early General Election</p>	<p>Retrievable Early Voting Ballots JBC Tally Tape - Allow to print Include Provisional Ballots in Vote Totals 2 precincts, 1 split District and Precinct contests Straight Party Contest Office contest linked to the Straight Party Office contest not linked to the Straight Party Office Contest for multiple precincts Office contests with write-in candidate Office contests without write-in candidate Office Contest Write-in only candidate Office Contest - N of M Non-cumulative candidates Office Contest - N of M Cumulative candidates Office Contest - No Declared Candidate Issue contest (Proposition) No Rotation Inclusive: Parent/Child contests where a specific option must be selected to activate the child contest.</p>
<p>Election 2 General Election</p>	<p>JBC Tally Tape - Allow to print 2 precincts, 1 split District and Precinct contests Straight Party Contest Office contest linked to the Straight Party Office contest not linked to the Straight Party Office Contest for multiple precincts Office contests with write-in candidate Office contests without write-in candidate Office Contest Write-in only candidate Office Contest - N of M Non-cumulative candidates Office Contest - N of M Cumulative candidates Office Contest - No Declared Candidate Issue contest (Proposition) Exclusive: Parent/Child contests where a specific option must be selected to activate the child contest. Rotation - No Rotation Multi-Language</p>

<p>Election 3 General Election</p>	<p>10 precincts, 2 split District and Precinct contests Straight Party Contest Office contest linked to the Straight Party Office contest not linked to the Straight Party Office Contest for multiple precincts Office contests with write-in candidate Office contests without write-in candidate Office Contest Write-in only candidate Office Contest - N of M Non-cumulative candidates Office Contest - N of M Cumulative candidates Office Contest - No Declared Candidate Issue contest (Proposition) Inclusive: Parent/Child contests where a specific option must be selected to activate the child contest. Rotation by Split Precinct</p>
<p>Election 4 Closed Primary</p>	<p>10 precincts, 2 split District and Precinct contests Partisan Office Contest Non-partisan Office Contest Non-partisan Issue Contests (Proposition) Rotation - Equal time - eSlate Only</p>
<p>Election 5 General Election</p>	<p>10 precincts, 2 split Retrievable Early Voting Ballots selected JBC Tally Tape - Allow to print - selected Include Provisional Ballots in Vote Totals - Selected District and Precinct contests Partisan Office Contest Non-partisan Issue Contests (Proposition) No Rotation</p>

Summary of Report and Addendums

Original Report 2005-03-31

System	Hardware	Software
Hart System 4.0	JBC Firmware Version 3.0.15 eSlate Firmware Version 3.0.15 COTS Scanner, Kodak 1500D COTS Scanner, Fujitsu M4099D COTS Scanner, Fujitsu M4097D COTS Scanner, Kodak 3520D COTS Scanner, Kodak i830	BOSS version 4.0.48 Ballot Now version 3.0.24 Rally version 2.0.11 Tally version 4.0.25 eCM Manager version 1.0.7 Servo version 3.0.17

Original report consisted of full TDP and source code review, along with functional system integration test. All components listed above were qualified to the 2002 FEC Voting System Standards.