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## 10

### Who's Minding the Store?

#### A free press? Public officials? Anyone?

“Our citizens may be deceived for awhile, and have been deceived; but as long as the presses can be protected, we may trust to them for light.”<sup>1</sup>

—Thomas Jefferson to Archibald Stuart. 1799.

Has the free press been reined in by corporate interests? Certainly not, I would have told you a year ago. You just have to make sure that you give them something newsworthy. Journalists are seekers of the truth, a balanced truth — this I still believe.

Managing editors understand that our government will become corrupt without critics, and that an honest and fearless press is the only method available to our citizenry to get at the truth — a year ago, I believed that they had such an understanding. But having seen the reluctance of some of our most important editors to consider issues of vested interests and electronic ballot fraud, I have to say that mainstream press support for investigative reporting barely has a pulse.

More insidious than failure to cover important stories as soon as they come out is this: Some members of the press now use their own failure to cover an issue as proof that the issue has no merit.

“If what you say is true, why hasn't it been in the *New York Times*?”

Well I don't know. You'll have to ask the *New York Times* — in the meantime, I have a tape recording I'd like you to take a look at,

a document you should see, some internal memos that someone should examine.

“The press [is] the only tocsin of a nation. [When it] is completely silenced ... all means of a general effort [are] taken away.”<sup>2</sup>

—Thomas Jefferson to Thomas Cooper  
November 29, 1802

Our press is far from “completely silenced,” but its voice in matters of great importance has become, at the very least, muffled.

Investigative reporter Greg Palast did an important investigation into the illegal purge of more than 50,000 citizens, who were not felons, from the Florida voter roles.<sup>3</sup> If your name was Bob Andersen of Miami, and Robert Anderson of Dallas was convicted of a felony, there was a nasty possibility that you might not be allowed to vote in Florida.

Explosive stuff. Proven stuff. Stuff that should be on the CNN news crawler, especially since these wronged voters, even after the case was proven, did *not* get their right to vote back in November 2002. These facts were documented, confessed-to, and validated in a court of law, but they were not covered at all by most news outlets.

One reason: Early on, some reporters called the office of Governor Jeb Bush and asked whether Florida had purged voters whose rights had been restored in other states, and Jeb’s office told them it wasn’t so. That was a lie, and documents proved it to be a lie, and an important part of the news story was, in fact, the uttering of that lie, but here’s what happened: Reporters decided not to report the story at all, justifying their decision not to cover it by pointing to the lie, without checking to see if it was the truth. After all, it was a statement from the office of the governor.

That is *not* what our founding fathers had in mind when they envisioned the role that a free press must play to protect democracy.

“No government ought to be without censors ... and where the press is free, no one ever will ... it would be undignified and criminal to pamper the former [the government] and persecute the latter [its critics].”<sup>4</sup>

—Thomas Jefferson

But in today's media age, a Nebraska senator can have his votes counted by a company that he chaired and still partially owns, but even while he is actively running for office, the Nebraska press will not inform Nebraska citizens of the conflict of interest (the lone exception: Lincoln TV *Channel 8 News*).

*Atlanta Journal-Constitution* reporter Jim Galloway told me he felt that it was more important to write about a state flag controversy than to inform Georgia voters that an illegal program modification had been made to 22,000 voting machines right before an election.<sup>5</sup>

CNN, Fox News, MSNBC, ABC, CBS and NBC were unable to tear themselves away from promising us weapons of mass destruction in Iraq (a story that turned out to be false) in order to spend five minutes asking a single question about the integrity of our voting system, even after a Stanford computer-science professor and more than one thousand computer-security experts insisted that it could not be trusted.

When Diebold, with machines in 37 states, left its voting system out on the Web for six years (free for the hacking), not a single editor from the *Wall Street Journal* or *USA Today* or *Newsweek* magazine bothered to assign anyone to look at the files so they could form an opinion as to the importance of this security gaffe.

It wasn't because they didn't know. I sent more than 100,000 bulletins directly to the appropriate editors and producers, in which I offered documents, cited sources and listed phone numbers of many experts to call. Everyone got the material — investigative, political, government, high-tech, national-news journalists — many have been receiving regular updates since October 2002. Not only has most of the press done a poor job (or at least a delayed one) of informing American citizens about this issue, most reporters didn't even look at the documents to assess the credibility of this story.

So much for the mainstream news media minding the store. If you want to know where the free press is nowadays, here it is:

Alastair Thompson was a reporter for many years before starting his Internet news site, *Scoop Media* ([www.scoop.co.nz](http://www.scoop.co.nz)) — which was launched out of a garden shed in Wellington, New Zealand, and won the New Zealand Internet Awards for “Best Online Writing” and “Best Content.” Yeah, I know: It's just New Zealand and only the Internet.

Thompson didn't wait for the *New York Times*. He covered the story of the insecure Diebold FTP site on February 10, 2003, just 18 days after the site was discovered.<sup>6</sup>

On February 13, I sent the “rob-georgia” story about last-minute program modifications on Georgia voting machines. *Scoop Media* covered it, but not the *Atlanta Journal-Constitution* (where it happened) — even though I provided phone numbers so reporters could call election officials themselves to confirm the story.<sup>7</sup>

Since the story broke, some good work has been done. Van Smith of *The Baltimore City Paper* published a detailed statistical analysis of anomalies in the November 2002 Georgia election,<sup>9</sup> even though he was working for a local paper in Baltimore. He realized it was important: Maryland was planning to buy the same machines.

*Salon.com* has been writing about concerns with electronic voting for some time now, and Salon's tech writer, Farhad Manjoo,<sup>10</sup> continues to write accurate and groundbreaking investigative stories.

Rachel Konrad of The Associated Press has been covering this issue fearlessly since February, 2003.

Kim Zetter of *WiredNews* wrote a series of e-voting articles.<sup>12</sup>

Julie Carr-Smyth of the *Cleveland Plain Dealer* broke the news about Diebold CEO Wally O'Dell's promise to “deliver the votes” for Bush in 2004.<sup>13</sup>

Erika D. Smith of the *Akron Beacon Journal* reported that Diebold's Mark Radke said that the new Diebold TSx machines will substitute wireless communication of votes for land-line modems. Radke all but admitted the system could be hacked when he made a startling (and cavalier) admission:

“But even if that burst of election data were intercepted, all the hacker would get are unofficial results.”<sup>14</sup>

(Um, Mr. Radke? Hacking can put data in as well as take data out.)

If you want to find the free press nowadays, look to these folks, who prove we do have one, though it may not be quite where you've been looking for it. And if you really want to locate the free press, don a pair of hip boots and get one of those caver's hats with a light on it, wade into the Internet, shove the crud aside and you'll find some of the best investigative reporting ever.

Given the abundance of leads, the wealth of information on this

topic and its importance, this issue has largely been ignored. Is the paucity of news coverage because reporters have just now learned of the vulnerabilities of electronic voting? Is it because electronic voting is new?

Not exactly. The first major article about electronic voting appeared in *The New Yorker* fifteen years ago, by investigative reporter Ronnie Dugger.<sup>15</sup> He wrote of many of the same concerns you are reading about in this book, but no one paid attention.

Though not covered in the mainstream press until late 2003, word of the Diebold FTP site spread through the Internet as soon as New Zealand's *Scoop Media* broke the news in February. And this, you see, is why true freedom of the press is so important: It informs the citizenry, and galvanizes us to engage in the scrutiny that is our duty. Thank goodness for the Internet, for without it this story would never have been fully exposed.

Despite a virtual blackout by major media outlets for nearly a year, ordinary people like you, many of whom had never done any activism in their lives, decided to get involved in this issue.

\* \* \* \* \*

Efforts by just a handful of people have gotten us to this point, where problems with voting machines are at last reaching public consciousness. Drs. Rebecca Mercuri and Peter Neumann have put forth Herculean efforts, toiling nearly in the dark for fourteen years, while newspapers often chose to print press releases about how much "fun" it is to vote on machines instead of examining the more difficult subject matter brought to light by these computer scientists.

When news of the 22,000 illicit patches in Georgia broke, a small contingent of Georgians decided to do something about it. I'm going to refer to them simply as "Georgia activists" because they have asked me not to call them out by name. They discovered that asking questions about our voting system is like trying to walk up the down escalator.

One of the Georgia activists hunted up the law pertaining to putting modifications on the voting system:

"11. Any modification to the hardware, firmware, or software of an existing system which has completed Qualification, Certification, or Acceptance testing in accordance with these Rules will invalidate the State certification unless

it can be shown that the change does not affect the overall flow of program control or the manner in which the ballots are interpreted and the vote data are processed, and the change falls into one or more of the following classifications:

- (i) It is made for the purpose of correcting a defect, and test documentation is provided which verifies that the installation of the hardware change or corrected code does not result in any consequence other than the elimination of the defect.
- (ii) It is made for the purpose of enhancing the utility of the system or adding additional audit or report generating capability.
- (iii) It is made for the purpose of enabling interaction with other general purpose or approved equipment or computer programs and databases, and procedural and test documentation is provided which verifies that such interaction does not involve or adversely affect vote counting and data storage.
- (iv) It is made for the purpose of enabling operation on a different processor or of utilizing additional or different peripheral devices, and the software is unaltered in structure and function.

(From RULES OF OFFICE OF THE SECRETARY OF STATE ELECTION DIVISION, CHAPTER 590-8-1: CERTIFICATION OF VOTING SYSTEMS<sup>16</sup>)

When you change software to correct for a problem, the procedure is to assign a bug number. You test it. You document everything. You append a new number to the end of the release. Then it has to be approved. And according to Georgia law, it must be certified. Writing up a fix, sticking it on the Internet, and then running around putting it on voting machines is not legal. Georgia citizens have a right to be incensed, because the state violated the law, and Georgia taxpayers now realize that their votes may have been thrown out the window.

The Carter Center, under the auspices of former President Jimmy Carter, seeks to prevent and resolve conflicts, protect freedom and enhance democracy. One of the activists approached them, but was told that, according to its charter, the Carter Center can only monitor elections *outside* the United States.

Computer programmer Roxanne Jekot contacted Lieutenant Governor Mark Taylor's office, who told her to send information. She sent details about the FTP site, rob-georgia, Georgia law and the unexamined program modifications. After that, they quit taking her calls.

Georgia legislators were not enthusiastic about discussing computer-security issues and usually were willing to give up no more than three minutes in the hallway, between sessions, to listen to concerns.

Several attempts were made to meet with Secretary of State Cathy Cox, but citizens were only allowed to speak with Assistant Director of Elections Michael Barnes, who was not helpful. They met with Tom Murphy, a former Speaker of the House in the Georgia state legislature.

“He knows where all the bones are buried,” confided a self-appointed helper named Chris Hagin, who said he was an ambassador under President Clinton. Tom Murphy called upon Cox to meet with the activists, but she didn’t; instead, Barnes told them on March 6 that Cox would be booked up “until July.”

What about the American Civil Liberties Union? Activists met with ACLU attorney C. Knowles, but he told them he couldn’t take on electronic voting machines because he had fought against the punch cards. ACLU attorney Laughlin McDonald, Director of the Voting Rights Project, was unconvinced.

“Where’s the harm?”he said. (“Harm” is a legal requirement needed for some types of lawsuits.)

Citizen concern continued to grow. In New York, author Mark Crispin Miller asked what he could do to help. One of Miller’s Georgia contacts, Denis Wright, began joining the agitation to have someone — anyone — look into irregularities with Georgia’s voting system.

Wright filed a formal request to produce Georgia documents, which yielded this odd response to his simple query about the certification documents:

From Denis Wright to Kara Sinkule, March 19, 2003:

“Hi Kara. Hope you are doing well. I need some more help, please. I am hoping that I can get hard copies of the following documents, per the Freedom of Information Act: (1) According to state law, any changes in the voting machine software (GEMS and Windows) require documentation in writing. I would like to get copies of any such documentation. (2) A copy of the actual certification letter from the lab (certifying the version of the software which was used on election day) as well as any related memos, letters, etc...

\* \* \* \* \*

From Clifford Tatum, Assistant Director of Legal Affairs, Election Division To Denis Wright, March 25, 2003; Open Records Request  
 "Our office has received your request under the Georgia Open Records Act, O.C.G.A. § 50-18-70 regarding electronic voting information... In response to your first category, we have determined that no records exist regarding a change to software used by the voting system. In response to your second category, we have determined that no records exist in the Secretary of State's office regarding a certification letter from the lab certifying the version of software used on Election Day. Please be advised that any records of this type may have been submitted to the Georgia Technology Authority (GTA) in response to the Request for Proposal that was issued by GTA. Accordingly, a request for this type of information should be submitted to Gary Powell with GTA for response. By copy of this letter, I am advising Mr. Powell of your potential request ..."

### **What have we learned so far?**

Uncertified program modifications can allow a single programmer to penetrate election security for millions of votes, a critical breach of electoral integrity.

Georgia requires certification and reports for program modifications, according to the Rules of Office of the Secretary of State Election Division Chapter 590-8-1, Certification of Voting Systems, No. 11.<sup>16</sup>

Diebold knew Georgia required recertification for modifications, according to a Diebold internal document titled "Certification Requirement Summary."<sup>17</sup>

Assistant Director of Elections Michael Barnes; Chris Riggall, press secretary for Cathy Cox; Kara Sinkule, press secretary for Cathy Cox; and Dr. Britain Williams, chair of the NASED Voting Systems Board Technical Committee all admit that modifications were done.

Michael Barnes and Dr. Britain Williams admit that the program modifications were not certified. Clifford Tatum admits there is no documentation for the program modifications.<sup>18</sup>

Dr. Britain Williams later reversed himself and claimed that uncertified patches were impossible in Georgia. On April 23, 2003, Dr. Williams wrote:

"... This comment ["A patch to Windows can slip through without scrutiny."]



assumes that the State of Georgia allows changes and/or upgrades to the Microsoft operating system. This is not the case.

"The vendor, Diebold, submits to the ITA a specific version of the operating system and a specific version of the election software. This specific version of the operating system and the election software undergoes ITA testing and State Certification testing. The State Certification is for this specific version of the Microsoft operating system and the Diebold election system. After State Certification any change to either the Microsoft operating system or the Diebold election system voids the State Certification.

"If a change to either the Microsoft operating system or the Diebold election system becomes desirable or necessary, this change voids the State Certification. The revised system must then go back through the entire ITA Qualification and State Certification."<sup>19</sup>

Michael Barnes and Dr. Britain Williams say no one downloaded anything from the FTP site.<sup>20</sup>

Diebold officials decided that modifications were not done at all. In an interview with *Salon.com*, Joseph Richardson, a spokesman for Diebold, denied that a patch had been applied to the Georgia machines, saying, "We have analyzed that situation and have no indication of that happening at all."<sup>21</sup> I was so incredulous when I read this that I decided to call him to see if he was misquoted:

*Harris*: "Did you say, when interviewed by *Salon.com*, in reference to whether patches were put on machines in Georgia, 'We have analyzed that situation and have no indication of that happening at all'?"

*Richardson*: "Well, that is what I said at the time; however, we have continued to investigate the matter and ... (very, very long pause) Yes that is what I said to *Salon.com*."

*Harris*: "Do you stand by that now?"

*Richardson*: "We have continued to look into the matter."

*Harris*: "As you have continued to investigate this, do you have any new information as to whether patches were put on in Georgia?"

*Richardson*: "No."

*Harris*: "Has anyone thought to just call them up and ask? The Secretary of State's office?"

*Richardson*: "I can't say."

*Harris:* “What was the rob-georgia file? Who is responsible for it?”

*Richardson:* “I’m not privy to that information.”

*Harris:* “Who would be able to answer that question?”

*Richardson:* “I can’t tell you. <sup>22</sup>

\* \* \* \* \*

Blessed are the whistle blowers. They may save this democracy yet. On March 13, 2003, I received this e-mail:

*Hi Bev;*

*I read your recent article about Diebold Elections systems. Just wanted to let you know that I am the Rob in Georgia that they claimed they didn?t [sic] know about.*

*Thanks,*

*Rob Behler*

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## 11

### Noun and Verb?



rob-georgia.zip

So, what or who is rob-georgia?

When you interview voting system officials, you spend twice as much time following up on their dodgy answers as you do asking the questions in the first place. Flip back to the end of Chapter 10 and take a look at Joe Richardson, who I believe you might also find in *Webster's Dictionary* defining the word “stonewall.” Compare him with Rob’s straight-talking interview.

*Harris:* “What was your position with Diebold in Georgia?”

*Rob:* “I was a server technician and then Product Deployment Manager for the Georgia project.”

*Harris:* “What was the FTP site for?”

*Rob:* “One of the problems we had was an issue with the GEMS database. They had to do an update to it, so they just post the update to the Web site.”

*Harris:* “What was rob-georgia?”

*Rob:* “I believe what that file was for, I did a — well, there were a ton of holes with the programs on those machines. When they all came into the warehouse, I did a quality check; this was something I did on a Saturday. I found that 25 percent of the machines on the floor would fail KSU testing —”

*Harris:* “What is KSU testing?”

*Rob:* “Kennesaw State University. We knew basically what they would be testing and the trick was to make sure the machines would pass the testing. So I went and checked a pallet and found it was bad. And I checked another, and another, and I knew we had a problem. ...

“I’d come in on a Saturday, I had two of my sons with me, and I thought, ‘I’m going to just look,’ and it was bad. Then first thing Monday morning I raised the question, I said ‘hey guys, we’ve got a problem — there’s 20-25 percent of the machines that are palletized that are failing ...’ ”

*Harris:* “What kind of problems were you seeing?”

*Rob:* “...One of the things we had wrong was the date wasn’t sticking in the Windows CE. The real time clock would go to check the time on the motherboard, and it would have an invalid year in it, like 1974 or something. ...

“They had to do an update in [Windows] CE to fix all those dates. So the way we did that in the warehouse was, they would post whatever the update was on the FTP site. James [Rellinger] would go get the file and put it on the [memory] cards. Because you load everything through the PCMCIA cards. You boot it up using the card and it loads the new software. ...

“I went over to Dekalb [County]. We updated 1,800 machines in basically a day and a half. I still remember ol’ Rusty, down at the warehouse, we ended up touching every single machine off the pallet, booting ’em up, update it, we had a couple hundred machines done when in comes a new update over the phone ... They’d say ‘oh, no, no, the way we had you do, that’s not going to work, here’s another thing to do.’ Okay, we just did a few hundred machines, now we gotta do it this way. ...”

For some reason, the techs were told to use their own laptops to download files from the Diebold FTP site. According to Rob, he was instructed by Diebold not to discuss anything with Georgia’s voting-machine examiner (Dr. Brit Williams) or other state officials. This was awkward because Dr. Williams was working alongside Rob at times, and when Dr. Williams asked questions, Rob made the mistake of answering. This infuriated Diebold managers.

*Rob:* “They used my laptop. It was not secure, either. They just

used the laptop to repro the cards. Diebold never gave us anything [any laptops] with a PCMCIA slot. Then they'd tell us 'go download this,' so we'd have to get out our own laptop to do it."

*Harris:* "Who instructed you about the FTP site? Was it a Diebold employee?"

*Rob:* "It was Diebold."

*Harris:* "Was it the people in Ohio or the people in Texas?"

*Rob:* "The people in McKinney [Texas]."

*Harris:* "Who were some of the Diebold people? Do you remember any names?"

*Rob:* "One of the main guys we dealt with was a guy named Ian. He was actually involved in the design of the motherboard. He was very much involved in trying to figure out how to fix the problems..."

*Ian Piper was a stockholder in the company acquired by Diebold, Global Election Systems. The staff directory lists him as Manufacturing Manager, Research & Development division.*

*Harris:* "As I understand it, they send the system to Wyle labs for certification and also to Ciber to test the software. But from what you are describing, I can't understand how the machines got through what they are telling us is 'rigorous testing.' "

*Rob:* "From what I understand, they ended up figuring out that the cards that we were loading, that fix that Diebold provided for us, well, they were never tested. They just said 'oh, here's the problem, go ahead and fix it.' "

*Harris:* "So what is your opinion about the certification testing?"

*Rob:* "No, it's not just that. *Nobody* even tested it. When I found that out — I mean, you can't not test a fix — I worked for a billing company, and if I'd put a fix on that wasn't tested I'd have gotten fired. You have to make sure whatever fix you did didn't break something else. But they didn't even *test* the fixes before they told us to install them."

(Time out.) Dr. Brit Williams told us this is not possible. "*After state certification any change to either the Microsoft operating system or the Diebold election system voids the state certification,*" Williams wrote. "*The revised system must then go back through the entire ITA Qualification and State Certification.*"<sup>1</sup>

*Rob:* “Look, we’re doing this and 50 to 60 percent of the machines are still freezing up. Turn it on, get one result. Turn it off and next time you turn it on you get a different result. Six times, you’d get six different results.”

*Harris:* “Can you give me an example of different results?”

*Rob:* “Meaning the machine does something wrong different each time you boot it up. One time and it would freeze on you, next time it would load the GEMS program but have a completely different type of error, like there’d be a gray box sitting in the middle of it, or you couldn’t use a field.”

*Harris:* “Was this all due to the clock?”

*Rob:* “I don’t know for sure. They [the machines] were not originally doing it. Then they fixed the real time clock, and it was supposed to make it work normal. It fixed the clock problem — the clock problem had caused it to come up and not show the battery at one point. ... I mean, you don’t have the machine plugged in, you boot it up, and it starts, and says it ‘has no battery.’ That’s like saying ‘this morning I got out of bed and I stood up and I had no brain.’ ”

A memo from Talbot Iredale dated July 2, 2002, confirms the clock problem. “*The new WinCE 3.00 release is now on the FTP site,*” it says. The memo directs the user to get a file called WCE300-020702.zip and says that the purpose of installing this modification is to “*fix problem with getting and setting persistent Real Time Clock values,*” among other things.

Not only was this modification to Diebold’s customized version of Windows CE not certified, but Iredale also indicates at one point that he wants to avoid letting Wyle (the certifier for the touch-screen firmware) look at Diebold’s special Windows source code at all. In a memo dated April 15, 2002, Iredale writes:

“We do not want to get Wyle reviewing and certifying the operating systems. Therefore can we keep to a minimum the references to the WnCE 3.0 operating system.”

Whatever was on the special Windows system cooked up by Iredale and others at Diebold, it didn’t seem to work very well.

*Rob*: “And then when we loaded the software to fix that, the machines were still acting ridiculous. I was saying ‘this is not good! We need some people that know what this stuff is supposed to do, from McKinney, *now*. These machines, nobody knows what they’re doing, but Diebold, you need some people to fix them that know what’s going on.’ They finally brought in guys, they ended up bringing in about four people. ...”

You’d think that with such troubles, someone might follow standard company procedure and write up a “bug report.”

“*All bugs ever reported have bug numbers,*” wrote Ken Clark in a memo dated Jan. 10, 2003, pointing out that the whole collection can be found in “Bugzilla.” So I went looking for Bugzilla reports from Georgia. My goodness. They weren’t there.

Bugzilla report numbers 1150–2150 correspond with June–October 2002, but although hundreds of these bug numbers are mentioned in memos and release notes, I only found 75 Bugzilla reports for this time period, none from Georgia. Strange. I was looking forward to reading the explanations about how computers can get up in the morning and announce that they have no brain.

Aha! Here’s a memo about missing Bugzilla files. It’s dated 8 July 2002, from principal engineer Ken Clark: *Subject: bugzilla down, we are working on it.*

“We suffered a rather catastrophic failure of the Bugzilla database,” he writes. He warns that recovery of the bugzilla reports “will be ugly” and adds that “there will be a large number of missing bugs.”

In a follow-up note on July 16, Clark says, “Some bugs were irrecoverably lost and they will have to be re-found and re-submitted, but overall the loss was relatively minor.”

To understand the significance of these two e-mails, you must realize that among programmers, people are fired for not performing a daily system backup. One wonders what happened to their backup. By my estimation, almost a thousand bug reports are missing, including all the Georgia bugs.

*Rob*: “We assembled the machine and we ran it through a series of tests. We’d check the power cord, boot up the machine, check the printer, bar-code it, update Windows CE, then send it on to Brit. He

did the KSU testing. The L&A [Logic & Accuracy] was done at the county level, right before the election.”

*Harris:* “So ... the L&A was not done at acceptance testing?”

*Rob:* “It got so there wasn’t time. They did it before the election.”

Now, supposedly, this L&A testing procedure is kind of a “mock election,” which you do by entering practice votes. I pictured people pushing the touch screen and wondered how many test votes you push before your finger gets really tired. Not that many, apparently.

*Rob:* “The L&A testing — you would just enter, like, one vote and — you just choose one — you don’t need to be specific on which one.

I see. One vote. But then I found out that some of their L&A test involves no touching at all:

## 6.1. Test Count

- performing a manual Logic and Accuracy Test
- performing an automated Logic and Accuracy Test

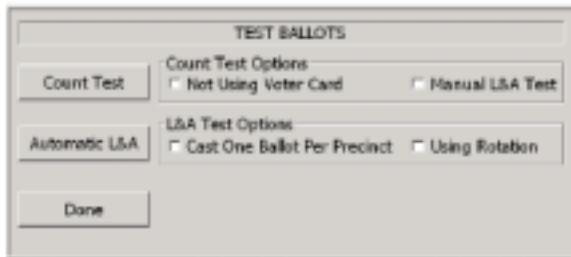


Figure 6-2: Test Ballots Screen

Ballot Station Users Guide: “The automatic L&A test, on the other hand, allows a pre-determined combination of ballots to be automatically selected and marked, according to the voting options selected.”

*Rob:* “I worked there from mid-June to mid-July. The whole time they were upgrading the software and doing some sort of fix to it. ...

“ ‘You’ve gotta go take care of this JS [junk shit] equipment,’ I told them. Finally, I raised it as high as you go. I raised it to Bob



Urosevich. He's the head of it. [Urosevich was president of Diebold Election Systems]. I told him personally 'this is bad. I don't see us putting an election on with these machines.'

"That's where they finally assembled the teams. They got some big ol' vans; we loaded up as many people as could fit in."

*Who paid for the vans? Diebold? Who paid for the people piling into the vans?*

Because now I'm having a hard time understanding why Diebold says it had no indication that these patches were done at all.

*Rob:* "... And then you know, ironically, later on, right before I exited, they were scrambling for a date. They were trying to get us, the teams, into Fulton County to do Fulton County's 1,900 machines.

"They were in the most horrific spot. The place they warehoused them was like 1,900 machines in a little office space. ... I'm talking to this guy ... him and I were scheduling this, figuring it out how to get to these machines and do the update before KSU has to test them. We cannot be doing this at the same time as KSU. ...

"I go back to the office. Brit [Dr. Britain Williams] was there, and he says 'what's it look like for Fulton?'

"I said 'there's no way we're going to be able to get to Fulton County by Thursday.' I said we could probably be out there by Friday or Saturday. He said 'there's no way we can do it at the same time. You know that. ...' "

But Dr. Williams, when interviewed by Kim Zetter of *WiredNews*, "denied that Rob ever mentioned patches to him and said, to his knowledge, no uncertified patches were applied to the machines. He said he would be very concerned if this happened."<sup>2</sup>

The scenario that Dr. Williams describes just does not correspond with what we are learning from Rob. Williams writes:

"... there must be in place well defined and strictly enforced policies and procedures that control who has access to the system, the circumstances under which they can access the system, and the functions that they are allowed to perform on the system."

I must have missed the section of the operating manual that describes people piling into vans and driving around updating voting programs with uncertified patches, using cards they made on their laptops.

“Finally, there must be in place physical security; fences, doors, locks, etc.; that control and limit access to the system.”

Well, at least they have our voting machines under lock and key.

*Rob:* “They were actually swapping parts out of these machines that were on site. They’d cannibalize a machine with a bad printer or whatever, they’d grab the screen off of that to put on another machine with a failing screen, they’d retest it. They were not just breaking them down, they were taking pieces off and putting it back together.

“Even the machines that are updated, that had the right release of the software, exactly like the company wanted it, you’d boot it up and all kinds of crazy things would happen. That led to my belief that when voting took place, there would be problems.”

*Harris:* “Do you remember what release number it was?”

*Rob:* “Release — I don’t remember the number because what they did was it was always the date. ...

“The date was ... let me see ... June 28. No, the last one, the date that was supposed to be on there was July 5. There was about three updates, the CE software, the date that would come up would be the last. After that they came up with another fix; that’s the August one at that point.”

The more you examine this “electronic patch” thing, the more out of control it looks. From the memos, it appears there were so many patches that the garment might have changed color altogether:

*From Talbot Iredale, 13 Jun 2002:* “The new WinCE 3.00 and bootloader are on the ftp site. The file is WCE300-020607.zip...”

*From Talbot Iredale, 2 Jul 2002:* “The new WinCE 3.00 release is now on the ftp site. The file is WCE300-020702.zip...”

*From Talbot Iredale, 4 Jul 2002:* “The new WinCE 3.00 release is now on the ftp site. The file is WCE300-020704.zip ...”

*From Talbot Iredale, 5 Jul 2002:* “ ... This is fixed in the July 05, 2000

(sic) release which is now on the ftp site ...”

*From Talbot Iredale, 8 Aug 2002:* “The WCE300-020802 release is on the ftp site ...”

*From Ian S. Piper, 9 Oct 2002; Subject: AV-TS R6 Bootloader and WinCE version numbers:* “... another method for determining the version number of the install files, prior to installation, is to view the creation date of the file on the flash memory card and compare it to the list below. (Unless you trust that someone has labeled the flash card correctly.) ... I’ve created a list of the file creation dates, and their versions...

Bootloader (filename “fboot.nb0”)

Mar. 14th, 2001 Rev 1.00

Jan. 28th, 2002 Rev 1.01

Jun. 7th, 2002 Rev 1.02

Windows CE Image (filename “nk.bin”)

May 25th, 2001 WinCE 2.12

Jan. 28th, 2002 WinCE 3.0

Jun 7th, 2002 WinCE 3.0

Jul. 2nd, 2002 WinCE 3.0

Jul. 5th, 2002 WinCE 3.0

Aug. 8th, 2002 WinCE 3.0

“... Someone with the BallotStation install file archives can create a list of BS [Ballot Station software] versions if they want to bother.”

There were more patches — the “clockfix.zip” patch is a little addition dated July 7, 2002. According a memo dated Aug. 6, 2002, Kansas may have caught a few bugs from Georgia:

“Steve, it was believed that only units built for Georgia would be affected. However, Lesley had 38 units shipped to Johnson County around the same time, so she was affected as well. There should be no others (famous last words) ...”

The techs were stitching new updates into the voting machines right up to Nov. 5, 2002 — Election Day.

*Rob:* “This guy came in from McKinney; he was about the second in command. He’s a good friend of Bob Urosevich. About sec-

ond to Bob, at least now, he got a promotion. Greg? Something like that. He flew in and I went to DeKalb County and I tested and together we went through, and we wrote down every single error, and he booted them himself and was looking at the results and seeing how sporadic they were. ...

“Greg Loe is his name. [Greg Loe, controller] I drove him out there. Brit [Dr. Britain Williams] was there; KSU was doing their testing. They were bombing these machines out left and right.

“I’m telling him ‘they’re all like this.’ ... We couldn’t get enough from the factory because so many were bad. You’d get a shipment of 300, but 75 were bad; they couldn’t put them out fast enough to replace all the defects. ...

*Harris:* “I understand they did a big demonstration during the summer with the machines.”

*Rob:* “I was there when they told me I needed 1,100 machines for a demo. I thought ‘the trick is coming up with 1,100 machines that actually work.’ ”

*Harris:* “Do you know who was writing the fixes?”

*Rob:* “He had a weird name. He came out of Canada. ... That’s it, Talbot Iredale, [he] would actually fix it and say ‘oh, here’s the problem,’ and stick it on the FTP site. We’d grab it, stick it on the card and make a bunch of copies and use it.

“They produced it and got it to us in 24 to 48 hours. If I’d known they hadn’t tested it, I simply wouldn’t have installed it. My background tells me that’s a no-no.”

*On the concept of locks, keys, fences and warehouse security:*

*Harris:* “How secure were the machines, from what you saw?”

*Rob:* “I’ll tell you something else — we didn’t have badges. People could just walk right in and get to the machines.”

*Harris:* “Do you think anybody could have tampered with a machine, if they wanted to?”

*Rob:* “Well, when we did the quality-control check, we’d open it up. They have a little box for the printer. We would find the key still in the printer. Someone could literally take that. We found cards left in the machine. [Voter cards activate the vote; memory cards store the votes.] I wondered what would happen if the wrong person got it. ...”

*Harris*: “Were there any protections to keep you from duplicating memory cards, or to have them serial numbered or whatever?”

*Rob*: “The memory cards, you can just duplicate them. You have to have the proper info on the card for the machine to boot up, but you can just make copies of the cards.”

If what Rob is describing sounds pretty slipshod to you, you’re not alone. In a September 2003 letter from a member of the Georgia Elections Board to Secretary of State Cathy Cox, we learn that voting-machine security is rather lacking.

“A missing DRE [touch-screen voting machine] for the State Board of Elections is tantamount to a missing ATM for a bank,” J. Randolph Evans states in his letter. He then goes on to report that voting machines have been found in hallways, stairwells and trunks of cars.<sup>3</sup>

Now every good fiasco has a little shoutin’ and lyin’. This one has it all — office politics, regular politics and people scrambling to protect the company checkbook.

*Harris*: “When I asked Diebold if there was anyone named Rob in Georgia, they said no. Did they know about you?”

*Rob*: “They knew me and they knew me well. I met Bob Urosevich [president of Diebold Election Systems] a couple different times, and Ian, and then Greg Loe, he got promoted, he was basically Bob’s right-hand man.

“You know, one of the main things that really just made me so upset, they were just, like ‘this Brit guy, don’t even speak to him, it’s a political game, you’ve gotta play the politics.’ Well, he walks in and says ‘what are you guys doing?’

“I said ‘we’re putting in an update.’ He said ‘will it change what it does?’ We said ‘just do your normal test, we’re supposed to get the machines ready for you.’

“He tells someone at the office and they freaked out. They were like ‘what the heck are you doing?’

“I wasn’t supposed to talk to him at all, I guess. The guy had a flannel shirt on; he was kicking it and he was very genuine and open and there we are in the same room together, but because I actually spoke to him I got reprimanded. They said ‘if they ask you any question, you gotta say, “Talk to Norma, to one of us. ...” ’”

*Harris:* “What did you say to him, anyway?”

*Rob:* “He [Williams] said he wanted to talk to me, so I met him in this little side office and [he] asked me what was going on. I basically said I was updating the machines, doing a quality check making sure the machines are the same, making sure they had the right release of Windows.

“Essentially, when I got back there was a meeting called. Urosevich was in it with a conference call. I went in, la-dee-dah, thinking I’d been doing a great job, and it caught me by surprise. It just totally blew me away that they would be so incensed and just absolutely angry about something so frivolous as the basic information I gave Dr. Williams. I’ve never been told to shut up so many times by so many people.”

*Harris:* “You mean, ‘Shut up in this meeting,’ or shut up by not talking to other people?”

*Rob:* “I’ll tell you exactly, I’ll give you a quote — this came from Urosevich: He said ‘we don’t need you airing our dirty laundry.’

“It was during that meeting the details came to light for me about patches and certifying them. I wasn’t aware of that before. There was this big discussion about what needed to be certified. In the course of trying to determine whether they needed to be certified, they were saying ‘what do we tell Kennesaw State?’ Everybody went around and gave opinions except for James Rellinger, who didn’t know. Wes [Krivanek], Norma [Lyons], Darrell [Graves], Bob [Urosevich] on the phone, each gave opinions on how it should be spun as to what we were trying to do. During the course of the conversation I said ‘can’t we just tell them? What’s wrong with that?’

“[They said] ‘No you can’t do that, it may be a certification issue.’ We were sitting around tables with Urosevich on speaker phone, trying to decide whether to tell the truth, half the truth, or a complete lie.”

*Georgia had just ordered up \$53.9 million in voting machines, and the ink on the check wasn’t quite dry.*

“If they started erring in mass quantities, Kennesaw State’s going to raise a red flag, the secretary of state’s going to raise a red flag and Diebold wouldn’t get paid,” Behler told Kim Zetter of *WiredNews*.

## Certification Requirements Summary

Governing Entity	Certification Required	Need NASED #	Need Wyle Cert	Need CIBER Cert	Modification Requires Recertification	Submission Form Required	Technology Escrow Required
Alabama	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alaska	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arizona	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arkansas	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
California	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Colorado	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecticut	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
District of Columbia	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Florida	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Georgia	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Diebold officials knew they weren't supposed to modify programs without certifying the changes. This was found in a file in the Diebold memos.*

“I understand if a company has information they need to keep under tight lip. But when you sit around discussing lying to a client in order to make sure you're getting paid ... it's an ethics issue.”

*Rob:* “The rumor around the office was that Diebold lost maybe \$10 million on the Georgia thing. I mean, they only sold the machines for, what, \$2,000 or \$2,500, and then you have to build them and then you're paying people \$30 an hour and you are out touching 22,000 machines *four times* — there's no way they didn't lose money on this deal. ...

“The gist of the conversation was, you screw around with this and they might decide not to pay us.”

### How credible is Rob Behler?

Dr. Brit Williams told *WiredNews* that Behler was a disgruntled employee who was fired by Diebold and Automated Business Systems and Services. Rob's personnel records discredit this assertion.

“ ‘He was released because his part of the project was completed,’ ” [ABSS's vice president for the southwest region, Terrence] Thomas told *WiredNews*, explaining that there was no performance issue with Behler's work.”

James Rellinger, a Diebold contractor who worked with Rob, also rejects Williams' interpretation of events. Rellinger told *WiredNews* that both Diebold and ABSS seemed happy with Rob's work.

But there are additional reasons to believe Rob.

I spoke with Rob in March 2003. He had no way of knowing which files were sitting on the Diebold FTP site in January 2003 since he had not worked for the company in months — yet in his interview, he mentions specific files, and I found the files he mentioned among those on the Diebold FTP site. The file dates matched exactly, and the information in the accompanying release notes supports Rob's story.

Rob could not know that internal memos from Diebold would surface. He recalled that people with the names "Talbot Iredale" and "Ian" were involved with the fixes. Now we know that memos written by Talbot Iredale and Ian Piper reveal patches exactly like those reported by Rob. These 2002 memos, which were leaked on July 29, 2003, contain 13-character passwords that open files found on the Diebold FTP site in January — files which had never been opened because they were locked with complex passwords.

I interviewed Rob in March 2003. Kim Zetter from *WiredNews* interviewed him in September 2003. I interviewed him again in October. He never evaded questions, and his answers stayed consistent over this six-month period.

Rob was told to download information to his laptop. He has saved several files. He has the notes taken while demonstrating problems to Greg Loe and has provided a copy of his notes (and a videotaped deposition) to James Penland, a lawyer who is working on a case with Roxanne Jekot and other Georgia citizens.

*Rob:* "... I went into this Diebold thing with no real knowledge of the voting industry. When I left, I not only had a complete grasp, but I had a complete disrespect for these machines.

"And with the folks in the office who were so — you know, 'I'm the political person; you have to know how the system works' — they were so much more concerned about their own self-importance, they were losing track of do the machines count the vote properly.

"Because that's what the people in Georgia need.

"And I'm one of them."



Rob jeopardized his employment future by stepping forward to tell us what really happened in Georgia. He has never asked for anything. This is especially impressive when you learn about a method that citizens like Rob can use to enrich themselves (albeit at the expense of the public interest).

In cases in which a government agency has spent taxpayer money based on fraudulent claims, the first citizens to file a *Qui Tam* lawsuit can collect as much as 30 percent of the money misspent by the agency in question — in this case, for Georgia, nearly \$54 million. The catch? The case must be filed under seal. In most cases, the information revealed in the case is also kept under seal, and the period of time this information is withheld from the public can be extended over and over. No congressional investigation, no public disclosure, just a secret filing that may or may not get unsealed.

But citizens need to know the details about these voting machines. There are bills pending in Congress and states considering purchase as of this writing. Time is of the essence. Secreting the evidence away just seems wrong.

I told Rob about *Qui Tam* and suggested that he consult someone for guidance to decide whether to pursue this path. He did.

He consulted the Bible. He looked up what the Proverbs have to say and shared their wisdom with me.

“I’m not interested in it,” he decided. Now, Rob Behler is a man who is raising seven children with little material wealth. He could probably use 30 percent of \$54 million. Instead, he has chosen to protect the security of your vote by telling the truth publicly.

In Rob Behler we meet the kind of quiet, patriotic citizen that makes us proud to be Americans.

\* \* \* \* \*

*Harris:* “Do you remember when you got this job back in June?”

*Rob:* “Yes. Late June.”

*Hmm.* To the best of Rob’s recollection, he began work in mid- to late June. Yet the date on the rob-georgia files is June 4. It appears that rob-georgia was created weeks before Rob was hired.

*So who — or what — is “rob-georgia?”*

This free internet version is available at [www.BlackBoxVoting.org](http://www.BlackBoxVoting.org)

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[www.Amazon.com](http://www.Amazon.com)

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## 12

### Open Source Exam

This chapter delves into unavoidably technical areas. This presents a challenge to the reader if, like me, you don't have a computer background. Even if you don't understand the specifics of the flaws uncovered, the gist of the problem is apparent. You will see our evolution from curiosity, to concern, to alarm as we unravel computer programming that runs the Diebold voting system.

Aside from looking at file names, I wasn't much help in analyzing what was in the FTP files. But in June 2003, Diebold voting files began to be examined at a forum called [DemocraticUnderground.com](http://DemocraticUnderground.com), and we learned that people are deeply interested in how their votes are counted.

"This is dangerous," someone explained, to everyone's surprise. "Bad things could happen. Very bad things."

Can someone please explain to me how our "democracy" turned into something where ordinary citizens can get arrested just for looking at how their votes are counted? No, I'm not asking you to explain the "Digital Millennium Copyright Act" (DMCA),<sup>1</sup> which in Internet circles is almost as controversial as the Patriot Act. The DMCA was designed to clamp down on music swapping, but somehow it turned into a tool that can eliminate free speech without due process. It may punish copyright violations with jail time. Some people say the DMCA might be used against anyone who studies the software that counts his votes.

What I want to know is this: How can we call ourselves a democracy if we are so afraid of the consequences that we don't dare to inspect our own vote-counting system? What I'm looking for is an explanation of how *scaring people* who simply want to make sure their votes are counted properly can possibly be the right approach to a robust democracy.

Apparently, this looking at how we count votes is dangerous and (possibly) forbidden — but no one seems to know for sure. Lawyers confess to uncertainty as to whether looking at vote-counting files found on an open Web site can be permitted.

For several months, I considered this issue. As of the writing of this book, I've not yet been able to get a straight answer out of anyone. Here is what I came to believe, after much thought: I think that examining our voting machine software is not only a legitimate activity, but it is also our civic duty. For queasier souls, I offer these statements in defense of this endeavor:

- 1) These files were publicly available.
- 2) Examining them is in the public interest.
- 3) Our objective is study and review, not copying and selling voting systems.
- 4) In a democracy, vote-counting should not be secret in the first place.

The Internet is alive with message boards, chat rooms and forums. People go to these Web sites to meet and converse with each other, using "screen names" so that they can feel free to express any opinion they like. DemocraticUnderground.com (DU) is a rapid-fire political discussion board with more than 35,000 participants. Because this kind of venue provides a feeling of safety and anonymity, citizens used it to examine our voting system.

I perused more than 5,000 comments about voting systems from DU, and I think you'll agree that the excerpts from this body of work (screen names changed) show a remarkable picture of democracy in action.

"I haven't seen the Diebold machines or how they operate," commented "Clever" on DU, "but in my precinct, we have a numbered ballot we fill out that is scanned into a machine. In case of a questionable result, the numbered paper ballots can be used to verify results by a hand count. The Diebold machines should have something similar."

Three months later, Clever got a rude awakening. He learned that

he has indeed been voting on Diebold machines and that a security breach was discovered right in his home county.

After sitting on the files for four and a half months, I was dying to know what was in them.

“What could this thing possibly be doing to need so much source code?” asked “Romeo,” a computer programmer. “I have built systems ten times more complex than any imaginable voting machine in one-hundredth the source code space. Sometimes when programmers don’t know what they are doing this is the result – lots of cut and pasted functions that are almost the same, tons of obsolete but not removed code ... Ugh.”

Another programmer did not find the quantity of code unusual.

“Given that professional programming is complex by its nature and professional programmers are often messy tasteless people by ‘normal’ social standards,” said “mortal,” “I’d be surprised if it didn’t look like this. In fact, while the sample in question is small, it looks like at least half of the source is visual C++ generated from templates by click&drag, by virtue of its unpleasant-to-type words.

“Once the compiler gets hold of it, chops logicals and optimizes loops, you’ll never know how crappy the source looked anyway ... there are actually contests (such as the infamous ‘obfuscated C contest’) to write the most convoluted and inscrutable programs possible.”

A participant called “BettaWatchYerVote” didn’t think we’d find evidence of tampering in the computer code.

“I don’t think it’s likely that you can prove anything with the source code. You won’t find a function called “double\_GOP\_Votes” that does fake counting ... nevertheless, we could very well find back doors, which aren’t that uncommon, that would allow tampering.”

Some participants argued about the discussion process itself.

“The thought struck me after reading the third or fourth message that this dialogue should not be on a public forum,” said “ErgoWeAre.”

“Why not? This is the very underpinning of democracy we’re discussing here. If there was ever a need-to-know issue for the general public, this is it,” replied mortal.

Others suggested the most efficient ways to hunt for vote fraud.

“Have any empirical tests been done?” A citizen we’ll call “Ovaltina” often defended Diebold, and provided an alternate point of view. Here, Ovaltina suggested ways to test the code.

“Meaning, generate a large amount of output with the code, and analyze that output, looking for anything the least bit funny, then going back and then focusing on those funny results to look for foul play.”

A forum participant called “Bibbidi-Bobbidi-Boo” had a different approach.

“OK, so you’ve got your haystack and you’re looking for the needle ... Here’s how I’d approach this problem. ... I’d begin by doing a bit of analysis on how the system is structured. Isolate the important data types (that voter info one is a good example) that someone might be interested in modifying...

“After that, I’d go a few levels deeper with the functions that are doing the data modifications (look at the functions that are called by those functions.) I’d begin to chart out the ‘life of a vote’ in the system...

“...[I’d look for] code that does not appear to do what it’s comments say it’s supposed to do; code that is completely undocumented; any code that seems to be manipulating memory in ‘weird’ or unnecessary ways. God help you because this is in C++.”

One participant pondered new DMCA legal issues.

“Discussion cannot be considered illegal under the DMCA,” said “Clark Kent,” a programmer who had noticed that Diebold passed around other people’s proprietary code on its site. “... By making this third party code available freely, Diebold was violating the DMCA...It’s unfortunate that Diebold allowed Microsoft source code to be publicly available on one of their FTP servers.”

Participants debated whether the curious phrasing in some of the user manuals indicated security weaknesses, or simply imprecise writing.

“Look at this sentence,” said “Jolio,” — “*When you have finished entering the totals for a precinct, all Check values must be zero in order for you to proceed to the next precinct. If necessary, you can make up the difference by putting the number in the Check tally in the Times Blank field if the race is a Vote For One race. If not, you may have to perform some additional calculations to make the Check value equal zero.*”

Several technical writers participated in the analysis. One, who called himself “Crappier Dan!” couldn’t decide whether the previous passage was badly written or contained instructions on how to fudge the numbers.

“I’m a technical writer, and even *I* can’t figure out if that says what we think it says or not. Enter that one in the STC’s ‘Worst Manual of the Year’ contest,” he said.

Citizens examined the built-in “manual entry” feature, wondering what it was used for and what controls were in place to prevent its abuse.

“Why are they entering manual votes?” asked Jolio. “If we have optical scanners reading absentee and touch screens reading polling votes (and the touch screens also read the challenge votes) — what is the purpose of manual entry?”

“My guess,” replied “K3Park,” “[is that] the optical scan machines may not be integrated into the same computer system as they are using to run the GEMS software. So (I am guessing) the data has to be entered manually. Even [if] the optical scan machines WERE on the same computer, it might be necessary to enter the data manually if there is no standard protocol for transferring the data from the “optical scan” app to the GEMS software. Another possibility is write-in votes or provisional ballots.”

This seemed like a good explanation, though an examination of internal memos, which surfaced later, indicated that both touch-screens and optical scans are integrated into the same GEMS program.

Jolio was still concerned. “That could be the reason for it, but if so...what security measures should it have, at a minimum? Because, manual entry might have a legitimate purpose for entering absentee votes, yet provide a back-door for tampering also.”

Clark Kent went looking for the source code which controls the manual entry function.

“Unfortunately, a key piece is missing, manualentry.cpp,” he said. “It’s documented, but is not there.”

The discussions began to attract more programmers. One, who we’ll call “Rummage,” was particularly interested in the central count “GEMS” system, recognizing that it could provide a key attack point.

“That’s right,” he said. “The code for the GEMS Server is the key and it ain’t here.”

Concern soon turned into criticism, as citizens noticed omissions and weak auditing procedures.

“It took ’em three years to log manual entries, said “Lucille Goldman,” a programmer whose criticism stung all the more because she often defended Diebold. “Sheesh!”

“I see the section on manual entry.” said Jolio, after reviewing the user manuals. “Not a word in it on who is allowed to do it — presumably, must be someone with admin privileges, but I note this manual also has a section for remote access to the database (why does any election supervisor need remote access to their computer for voting program tasks?) And uh — wouldn’t you say that a key event to log [in the audit] after launching the election would be to log the closing of the election? Not a peep, they just go on and open another election.”

“You call that an audit log?” asked Lucille Goldman. “Everybody’s [logged in as] ‘admin.’”

“Topper,” who works with government procurement and computer programming, was concerned about holes in the documentation. “More damning ... is that there doesn’t seem to be a document detailing policies and procedures for security both at the user/institutional level and the hardware/software level. There needs to be a document detailing who is entitled to do what with the system.”

A programmer who I’ll call “BlueMac” pointed out a series of agonized comments by Diebold programmers, found in the source code for card readers and touch-screens.

“They have had one hell of a time with standard magnetic card readers. Programmer frustration comments are rampant in this series of modules.”

“The thing that disturbs me,” said a participant we’ll call “OutofTouch,” “is the comment saying ‘add this after it get backs from certification’ (or however it’s worded). While it’s not necessarily nefarious doings — it could be they modified a function, and the mod was crashing, so they didn’t want to insert the update until it was ‘stable’ — the note does imply that there may be a non-certified build in use.”

Of course, anonymous participants on an Internet message board are of no help at all if you want to document problems in a formal way. With the Internet, you never really know whom you are dealing with; a fellow who joins a singles forum may think he’s chatting up a buxom blonde named Inga from Denmark while he’s actually charming a 400-pound farmer from Iowa named Ralph.

Among the advantages of this informal review format was the perception of protected freedom of speech, facilitated by anonymity. A

disadvantage of doing an open source investigation using a public forum was that we knew very little about these people's credentials, except what they volunteered.

This public "open-source investigation" had many drawbacks, but it did attract intellectual talent and ultimately led to the first public evaluations of the software outside the voting industry itself. One of the contributors, whom I'll call "Goody Two-Shoes," explains how he came to be concerned about the Diebold software:

"I'm the poor schmuck who configures brand new, untested, computer systems designed by teams of highly educated hardware engineers and loads brand new untested software designed by highly educated teams of software engineers and then performs the 'debug' to make them work together. The systems rarely, if ever, work the first time. It's been my job to be the final arbiter of the finger pointing battles between the two engineering groups who each claim the others product is at fault."

He goes on to describe how he can quickly locate problem areas in the source code:

"...Programmers tend to be extremely logical thinkers. They exhibit that logical thinking in the way they write their comments into the source code. Each section of code produced by a 'good' programmer has a 'plain english' explanation of what that section does. You might call it a 'professional courtesy' to other programmers who have to work with their code downstream. It's [looking at the comments] a shortcut that quickly lets you know where to focus your attention rather than study every line of code to find what you're looking for."

"When you find comments [in the source code] that say things like: *'this is baloney, you don't have to do this, this function is already built in to XXXXXXXX, just use the XXXXXX command'* or *'the (insert critical flag here) flag is broken so I did this and that to get around it'* and even things like *'I don't know why you want me to do this, it will let this and that happen....unless that's what you want to happen then I guess it's OK'!*

"Comments of this type naturally lead a good programmer looking for problems to investigate what is going on in those routines."

The contributor known here under the screen name "Rummage," studied computer science under a Nobel laureate at Carnegie-Mellon University. In real life and under his normal name, he designs data-



bases for critical applications in the medical field:

“So far, that’s the story of the last few days,” he wrote. “From databases with no foreign keys (read no referential integrity), unprotected transmission code, ample opportunity for buffer overruns right to PCMCIA slots for wireless modems. Not so much nefarious code as a system with so much opportunity for hacking/fraud as to invite cheating.”

“...as for structure and understanding the DB [database], there are no relationships and the Primary keys are not defined as Access Primary keys. This will make reconstructing the schema a little harder. I don’t think a DBA [database analyst] designed this.

“No referential integrity — no autonumber primary keys. Bad for maintaining a reliable database — good for adding and deleting data at will.”

I’ve spoken to many of the participants of the voting machine examination who seemed especially insightful, and they often have impressive credentials, but to most of the world they are anonymous so you can’t really know. These informal forum discussions are more akin to casual conversation in the cafeteria than to academic research.

Here are comments from “t\_device,” a European participant who concurs with “Rummage” about weaknesses in the database design.

“The fact that they’re using Access disallows relationality ... When using a decent database, SQL Server Sybase etc, for example, constraints, triggers, stored procedures, packages, relationships, views, etc are all maintained inside the database — that’s where all the business logic resides in a well crafted modern application.

“With Access, however, you’re dealing with basically a toy database, and since all of the above are missing, it is common to join tables on the fly using the data connection and SQL code embedded into the program itself...

“... I could be wrong, but in Access, if you have write capability, you have delete capability...the security features are very limited.

“Security is not something I would consider claiming to have for *any* Access-based application since about any user can gain access fairly easily ... and if you’d ever tried to upsize from Access you wouldn’t be touting it as a good thing. Data types get changed, boolean fields don’t translate ... it certainly shouldn’t be used in a mission critical voting application.”

On forums, people are free to make opinionated, dogmatic and sometimes mistaken statements, just as we do in casual conversation on the subway or in a bar. The Internet culture uses forums and message boards to consider perspectives and ideas, but never for a definitive answer. One reason: It all depends who's chatting that day.

Lucille Goldman took issue with criticisms posted by t\_device.

“Let's not get into a pissing match,” she wrote. “My upsized applications run very nicely to this day. Yes, it's not perfect, but I've used ERwin for documentation and Access is much easier for smaller projects. You get the application running, produce the relational schema and put it on the server. You may choose to develop on the target system. I prefer my method. I hope we can treat each other respectfully.”

“I believe we have been civil,” said t\_device. “If that's not the case, let me know. Apparently we have a difference of opinion. That's healthy. I have upsized a few Access apps and I've developed in it, so I'm not speaking off the top of my head ... Anyway, let's drop the Access better/worse convo and stick to the voting application.”

Most programmers concurred that Diebold's use of the Microsoft Access program indicated weaker security than desired.

“Go over to slashdot,” said “abcxyz.” Slashdot.org is a forum for computer people. “Try talking about ‘security’ and ‘Access’ in the same breath and see how seriously they take you over there — they won't even dignify you with a response, they'll just laugh at you and spray you with onomatopoeic responses like this:

\*choke\*

\*wheeze\*

bwahahahahahahahahahahah

\*gasp\*

Wait, these things are already in use?!?

\*thud\*

...because all programmers know there is no security in Access.”

“If you want to know why Access is a bad idea,” said Goody Two-Shoes, “just do a Google search for ‘Access, vulnerability’ and browse through the 951,000 hits!”

“Now THAT is a legitimate beef re: Access,” agreed Rummage. “And the lack of referential integrity (which could have been done, but wasn't) only fuels my suspicions.”

By now, many people have read criticisms about the Diebold voting system, but back in June, 2003 no such reports had yet surfaced. I found myself staying up late into the night, just to see what else the programmers would find. They were especially critical of the audit log, cited by Dr. Brit Williams as a key component to the security of Georgia's voting system.

"Good point about database audit log tables," said a programmer we'll call "gandalf." He pointed out that the Diebold audit log was not constructed properly. "Very easy to delete any entries. Though there should be some sort of audit ID (in any good database design) that records the sequence of audit log entries which would indicate that a log entry had been deleted."

The audit log. The more people looked at it, the greater the dismay. What citizens were finding simply did not match claims made by Diebold and its regulators. From Dr. Brit Williams:

"Overall security of any computer-based system is obtained by a combination of three factors working in concert with each other: "First, the computer system must provide audit data that is sufficient to track the sequence of events that occur on the system and, to the extent possible, identify the person(s) that initiated the events."<sup>2</sup>

The following statement, taken from the Diebold document used to sell its system to the state of Georgia, refers to a touch-screen audit trail:

"Generated entries on the audit log cannot be terminated or interfered with by program control or by human intervention."<sup>3</sup>

Not quite. The server at the county that accumulates all the incoming votes (GEMS) is an attractive tampering target, and altering the critically important GEMS audit log is quite easy.

"Bev, in what way is it significant that the audit log can be re-written?" asked a programmer we'll call "Mae West." "I'm puzzled by that," she said, "because as several people said (I among them) early on, physical control of a machine always means you can overwrite whatever you like. The trick is to keep the bad guys from gaining physical control."

“The significance is that in letters from certifiers and in documentation provided to certifiers and to the public, they took the curious position that the ‘audit log’ was a primary means of security protection,” I replied, referencing Dr. Williams’ report.

“Hmmm...did they say in what way?” she asked. “Because if they said it as you implied here (i.e., the existence of an audit file is enough), that would actually be hilariously funny if it weren’t so serious. Nerds the world ’round would be cleaning their keyboards and monitors after failing to laugh and swallow at the same time.”

Looking at the Microsoft Access database used in the county vote tabulation system led to concerns about the integrity of the GEMS program as a whole. Interest in the GEMS program began to take on a life of its own on the forums.

“Here’s the best part,” said BlueMac, “With GEMS (server) installed on my computer, I was able to create a user name (“me”) with a password of my choosing (“mac”) and assign myself ADMIN capabilities. This was without ever signing into GEMS....all I had to do was create a new database and I was in like Flynn.”

Diebold was not without its supporters. “Ovaltina” pointed out that a database maintenance application might provide the security that GEMS was found to lack.

“The votes end up in a database. Whenever there’s a database, it makes sense that there would be a database maintenance application. Always preferable to have such an application controlling data entry, to control access and make sure everything agrees, catch entry errors, log activity, etc.

“Without this data entry procedure, what would stop someone from going directly into the database and committing fraud that way? I think you said before that it’s an Access database? So open up the database with Access and put your phony votes in. So what I’m saying is the mere ability to edit votes isn’t all that menacing to me, because it doesn’t say that there are no procedures to prevent it from being abused. Maybe elsewhere in the system, or maybe completely outside the system.”

The GEMS program at the county, which pulls in all the polling-place votes, would not be as vulnerable if a report was run directly from the voting machines themselves before any data was sent to the county tabulator. That way, if someone tampered with GEMS,

(even if they also tampered with the incoming data from the polling place), the numbers wouldn't match. A forum member called "DanglingChad" who had election experience weighed in:

"Full precinct reports are required by California state law as well as others. The Diebold system better be complying with the requirement ... California Code 19370 states... 'At the close of polls... at the precinct...one copy of the statement of return of votes cast for each machine shall be posted upon the outside wall of the precinct for all to see. The return of votes includes each candidate's name and their vote totals at the precinct. During certification of voting machines, the Voting Systems Panel requires evidence that the procedures of each vendor include this process...'"

If someone tries to hack the GEMS program, posted reports at each precinct (as long as they were printed before any upload of data) would make fraud at the central tabulation stage significantly more difficult, though a clever insider could get around this safeguard. Unfortunately, as you'll learn in the next chapter, this procedure was not followed in the 2003 California gubernatorial recall.

\* \* \* \* \*

Most of us are given some amount of common sense (as long as sex or money isn't involved), and when we meet up in a group and bring our experiences into the picture, we can make some good, solid decisions. People familiar with accounting and bookkeeping began to weigh in on the online voting system examinations, and they sometimes took software engineers to task for their failure to understand basic accounting principles.

At issue in this conversation were statements by computer scientists that it was sometimes permissible to design tabulation systems in which totals could be manually overwritten.

No way, said a citizen who went by the moniker "ItAllAddsUp." "Each and every vote should exist as a distinct and unadulterated record of one citizen's transaction, probably one or more copies should be generated simultaneously, and everything should be 'journalled' ...

"Since voters are not allowed to recast votes, no possible set of circumstances can possibly exist to justify changing those records. ... Every change, every addition or subtraction to votes, has got to

be a separate transaction. As a matter of fact, what reason should ever exist to make a change that has an intrinsic value of more than one?

“If a fifty vote change has to be made, then you had better show fifty transactions ... If you need to cancel fifty votes, then you had better show which fifty votes that you are cancelling. Damn and double damn. There is absolutely no technical reason in the world why this cannot be done.

“One vote today is the same as one vote in 1776, which is the same as one vote in 1876, which is the same as one vote in 1976, which should be the same as one vote in 2076.

“What is so hard to understand about that for these computer geeks?”

“Clever” pointed out that counting votes was a form of book-keeping, and explained why the same kinds of safeguards should be used.

“Accounting practices are double entry, not only because of mistakes, but also fraud. Two sources are better than one. So there should be an accounting trail to verify results, especially when there is a question of accuracy ... It doesn’t have to be paper but it should be a traceable source document.”

Most of all, citizens weighed in with demands for transparency. They chafed at corporate claims to privacy for votes that belong to *us*:

“Government has no business hiding behind proprietary computer code in proprietary voting machines,” said ItAllAddsUp. “If the government wants us to use a number 2 lead pencil to mark the ballot, then we damn well better be able to examine that number 2 lead pencil ourselves. We should be able to buy a box of those very same, identical, number 2 lead pencils if we so desire. The paper used for the ballots has got to be paper that can be examined by any who wish. The boxes where the ballots are stuffed need to be able to be examined ...”

As citizens become more concerned about the security of the Diebold voting system, they began to look for remedies, and found that state law often lacks adequate protections.

“States like Georgia have written provisions into their laws that make it impossible to get a machine in dispute adequately inspected,” said Goody Two-Shoes. “The Georgia law stipulates that three people, a patent attorney and two *mechanics*, be appointed by law to look at

the computerized machines! This is tantamount to appointing two blind men and an attack dog to inspect the machine. If either of the ‘mechanics’ asks about how the machine works the attorney is there to tell them ‘it’s proprietary information’, you’re not allowed to know!”

Every now and then someone still pops up to tell us that the voting system topic has no legs, or that people just don’t care about it. Then explain this: Voting system analysis at DemocraticUnderground.com became kind of an attraction. More and more people tuned in, but at the same time, the subject matter became increasingly technical, while the tone of discussions reflected more urgent concerns. Occasionally someone would sigh and raise their hand:

“Can anyone explain what is happening here in simple language for those of us who are non-techies?” asked a citizen called “SkiBob.” “I can’t make heads or tails about what you may have found here.”

Well, we’re talking about the systems used to count our votes.

“But have you guys found anything? Everybody seems to be talking in very excited tones using terms I can’t understand.”

(Sorry). Yes, people were finding things. Many of the things they found were eventually found also by researchers at Johns Hopkins and Rice universities,<sup>4</sup> in a report that ended up in *The New York Times*. It was the “increasingly excited tones” that directly led to the events that produced that report.

“Attn: Bev Harris... look at the cryptographic routines of the voting system. I’ve just started to go through this system and have a few little snide remarks to make,” said the computer professional who went by the name “Topper.” She was concerned about the possible use of a free, open-source cryptography program which is no longer supported.

“The problem with using open source with no support is getting a timely answer to your question,” she said. “Ergo, if there is a security problem during an election, you are stuck with fixing it — which you may not be able to do yourself in a timely fashion.”

“Actually it’s not so bad,” countered a programmer called “MidniteMunchies.” “I’m a programmer and have used that code before. It isn’t very well documented and the code is very confusing due to some funky overuse of C++ templates.

“... However, I would have to agree that any kind of election software encryption should be based on a standard commercial or government

supported encryption solution rather than someone's hobby encryption project."

Encryption is important because we don't want people intercepting and changing the votes as we record, transfer and tally them up. Used correctly, encryption can prevent some kinds of unauthorized access. Discussions about encryption were about as opaque as it gets on a political discussion board, but even those of us who are not techies could tell that Diebold's encryption was causing significant concern.

"I'm not sure any of the encryption is actually used anywhere," said "PoodieToot." This was not reassuring.

"Since you brought it up, I thought I'd see what algorithm they ended up using. The problem is, I've grepped all over the files, and I don't find any header file inclusions from the crypto library *anywhere*, other than the crypto library. I can't see where the other CVS modules call any of this stuff at all.

"You know," PoodieToot continued, "they *could* have gone with OpenSSL — it's free, and supported by far, far more users (and corporate users, such as Apple and IBM for example). But, then again, it doesn't look like they are using any of it anyway..."

Uh-oh. When answers about Diebold's cryptographic methods were found, they weren't the right ones.

"Mystery solved," said PoodieToot, "but ... oh, no ... I found what they are actually doing for encryption. They have their own implementation of DES in Des.h. Here's the bad news...it looks like the DES encryption key is *hard coded as a macro*!!!!!!

"AAAAIIIIIIIIIIIIIIIIIIIIHHHHHHHHH!!!!!!!!!!!!!!

"I'll leave discovery of aforementioned key as an exercise for the reader... Good God....."

PoodieToot's discovery brought the Internet board alive with the forum equivalent of shrieks and moans.

"Oorah!!!!!! Yeah," said Topper. "I've found the DES.h file...and will start trolling through this... If you've hard coded your key and left it just like the public implementation, then it would not be that hard for a hacker to figure out how to get into your system."

Programmers were beside themselves upon viewing the blatant security flaws, and soon they were finishing each others' sentences.

"—It would end up as a static string in the executable file," said



PoodieToot. “And you can tear the static strings out of an executable to view them faster than you can blink your eyes.”

“In your best 50s announcer voice,” said Romeo sarcastically, “now *that’s* real data security! (cough, cough.)”

The more people learned, the more alarmed they became.

“These things actually use PCMCIA cards?” asked Clark Kent in dismay. “Huge potential security breaches! Think of the new stuff out there. This is Windows CE-based code. Couldn’t the existence of these drivers open up any one of these machines having a PCMCIA based wireless network card installed surreptitiously, allowing remote access via airwaves?”

“They’re using simple PCMCIA ATA disks These things are basically notepad PC’s and the security is almost non-existent. How many local governments will be up on the sophistication required to implement WEP with encryption and hiding SSID’s for wireless networks? Heck, you wouldn’t even have to hack the wireless network to get around these things, all that is necessary is to pop out one hard drive of results and pop in another with new results preconfigured.”

A tech who went by the name “Razmataz” was shocked at finding evidence of wireless communications in the voting system.

“Wireless programming required? Are they nuts? I thought I’d been following all the ‘electronic voting machine’ strategies but that’s one I missed. I’m a techie, 36 years in the business, some of it with reading punch card votes and optical votes. Wireless programming capability is just plain nuts. That’s a security hole the size of a 747.

“That would mean somebody could walk near the voting area (even outside the building), connect to the voting machines via wireless network, and make changes to the voting programs and/or the vote counts”

“I think we’ve found a potential hole where somebody could alter results remotely with nothing going over any wire,” said Clark Kent. “Somebody needs to seriously wardrive elections sites using these things.”

“Ah... That is serious bad news if they are running these terminals wirelessly and only relying on WEP for security,” said “RescueRanger.” “That is enough to fail a security audit at any fortune 1000 company.

Yet, RescueRanger held onto hope for a bit of good news.

“On the other hand, wireless can be extremely secure, more secure in fact than most wired communication if done properly and with the right equipment and design. To do it securely, would require fairly recent (and proprietary) technology...certainly not anything that is anywhere near five years old.”

Perhaps we should all calm down, intoned a forum participant who went by the name “spock.”

“You are assuming no encryption. Because this is wireless does not mean no encryption is being used. WEP anyone? Proprietary encryption perhaps? But then again it could be none is.”

“The onus is on the local election administrators,” said Clark Kent. “though I have my home wireless network locked down so tight most wardrivers will take one look at all of my security measures and drive on down the street to the guy who is advertising an SSID that is the default on the access point he installed and has never changed the admin password.

To most of us, this conversation might as well have been conducted in Greek, but we couldn’t stop tuning in. Clark Kent explained the security flaws in language only a cryptologist could love.

“Even I know that with 128 bit encryption using WEP, no advertised SSID, and a MAC Address list can still be cracked. MAC addresses can be spoofed relatively easily and brute force can break the 128 bit encryption if you’ve got the processor power. Even with encryption, it can be cracked. Now tell me how many of the local election boards you’ve had experience with are sophisticated enough to implement WEP, let alone MAC Address access lists? Add to that the fact that there is a ton of code that could hold back door access and this thing is rife with potential abuse.

“Nope, this doesn’t even compare to the potential for pushing out chads on hundreds of cards with a pin so they register as double votes and thus are spoiled ballots. The potential for abuse is magnitudes above this. If the government does not require an independent code review by at least three different companies, it’s not doing its job.”

Remain calm, spock suggested: “I trust you are aware... The chances of breaking 128 bit encryption with a brute force approach could very well take centuries with just about any computer on the planet?”

No, no, no. “A 128 bit encrypted file and the encryption level on WEP are two different things,” said Clark Kent. “I assure you, WEP is crackable. A PGP file with 128 bit encryption is, as you stated, not easily crackable. And when database files have passwords that are the name of the county where votes are counted, how secure is this system?”

It got worse.

“Perhaps this programmer’s comment in the Results Transfer Dialog file [TransferResultDlg.cpp] will answer that question for you,” said BlueMac. ““Changed the election.dbd file to only store ASCII code not unicode to make it compatible between windowsNT/95/98 and WinCE. The conversion from ASCII to unicode, if required, is done when the data is retrieved from the database. Note: This does not affect RTF data since it is always stored in ASCII.””

Though many of us didn’t exactly understand it, this last news, apparently, was pretty bad.

“Straight ASCII?????????” wrote Clark Kent. “For compatibility with Windows 95/98/NT???? On February 15, 2001?????”

A typographical wink was spock’s response: “Why not? ;o”

“That’s some encryption there! Straight ASCII for backwards compatibility on operating systems that are obsolete,” said Clark Kent. “This makes a lot of sense for a system we are supposed to trust the future of the world to.”

He wasn’t sure it was a disaster, but spock ceased to be at all reassuring.

“I believe it is talking about the unencrypted values for backwards compatibility when being viewed. But then again that’s another problem with leaked source that may or may not be final, you can’t be sure.”

“And that’s the problem with computer voting systems, isn’t it,” said PoodieToot. “You can’t be sure.”

But why not use widely accepted encryption techniques?

“If I were the guys doing openssl, I’d be real pissed off right now,” said mortal. “That blows chunks. I guess assigning a public/private key pair to each networked voting machine is too difficult for the people entrusted with the lifeblood of democracy?”

“Seems a Congressional investigation should be next,” said “SPacific.”

If anything should have a congressional investigation in full view

of TV cameras, the voting industry should, but as of the writing of this book, it hasn't happened.

\* \* \* \* \*

What came next was a quiet phone call on a Sunday morning.

Over the course of a year, I had consulted with about two dozen computer techs. Several are not on DemocraticUnderground.com because they are Republicans. I met one on Free Republic, a conservative forum. Voting-system integrity is a truly nonpartisan subject. Democrats, Republicans, Libertarians and Greens — everyone but the Charlatan Party, I guess — all respond the same way when someone says, *By the way, we won't be auditing the vote, thank you.*

Among my sources is a computer programmer I'll call "Cape Cod." He rarely calls me and has always been irritatingly discreet about his examinations of the Diebold files. When he calls, his clipped, East Coast voice provides no unnecessary words and gives very tidy explanations.

The best programmers explain things in a very concise way. I'll keep asking questions until I understand the answer or the other person starts shouting at me, whichever comes first. But highly skilled programmers are extremely organized thinkers, and it is easy to follow their explanations. Cape Cod is such a person. His explanations of complex computer concepts follow this simple, linear fashion: *Here is A, and I'm going to take you to B. Take hold of A, and walk just this way, and I'll describe the scenery as we go. Now, here we have arrived at B; did you enjoy it?*

He never calls unless he has something to say. He made one efficient, four-minute call to explain how a voting system might be able to cheat with "zero reports," for example:

"It's quite simple, really; your goal is to stuff the electronic ballot box while at the same time generating a report at the beginning of the election which tells you that zero votes have been cast, proving the ballot box has *not* been stuffed.

"Here's what you do: You stuff the ballot box by entering two vote totals that cancel each other out: 'plus 50 for Truman, minus 50 for Dewey.' You have thus created a spread of 100 votes between the candidates before the election begins — yet because +50 and -50 sum to zero, you have added no extra voters.

"To make the report read zero when you start the election, simply

instruct the code to put a string of zeroes into the ‘zero report’ if there are any negative numbers in the ballot-stuffing area, but it must only do this if there are no other votes in the system. And by designing a database without referential integrity, you can arrange for the evidence of this ballot-stuffing area to fall off the radar.”

One Sunday morning while I was still in my bathrobe, I received one of Cape Cod’s rare phone calls.

“Go to your computer. I want to show you something.”

He proceeded to walk me through the process of rigging an election using a real Diebold “GEMS” program, with a version used in a real election, with a vote database for Cobb County, Georgia.

### **Bypassing the supervisor password**

If you install GEMS and make a new “test election,” the manual tells you to use the password “GEMSUSER.” Close your test election and open the same file in Microsoft Access, and you will find an encrypted version of the “GEMSUSER” password. Copy the encrypted password and paste it into any election database. You don’t really need Microsoft Access; a simple text editor can also be used. By doing this, you can bypass the password in any GEMS vote database.

You can grant yourself supervisor privileges by making yourself an “admin.”

You can add as many friends as you want. (I added 50 of mine and gave them all the same password, which was “password.”)

It gets worse: If you go in the back door, you don’t even need a password.

### **A triple set of books**

The GEMS program looks and feels very secure when you work with it. However, running behind the GEMS program is a database using Microsoft Access. When you open an election in GEMS, it places an election database in a folder on your computer. Anyone who can get at the computer, either with physical access or by hacking in, can open this election file; right-click it, open it with a text editor or with Microsoft Access, then just go right in the back door. This technique is not certified or authorized, but it can be done any-

way. You don't need any special computer skills. At the time we examined the files, if you could right-click a file and type, you could alter the votes in GEMS.

Back to "Cape Cod."

"Here's what we're going to do," he said. "We'll go in and run a totals report, so you can see what the election supervisor sees. Then I'll show you something unusual."

I opened the GEMS program and ran a totals report, showing the overall election results. Then I ran a detail report showing the results in each precinct.

"Now, open the file in Microsoft Access."

"Close out of GEMS?"

"No, Access is configured for multiple users."

OK, I didn't know that. Two people can wander around in the vote database at the same time without bumping into each other.

Remember that there are two programs: the GEMS program, which the election supervisor sees, and the Microsoft Access database (the back door) that stores the votes, which she does not see.

You can click a table called CandidateCounter, which shows how many votes the candidate has accumulated for each polling place.

Cape Cod showed me another table in the vote database, called SumCandidateCounter. This table had the same information as CandidateCounter, but we observed that it had two complete sets of the same information. One set was marked by a flag, the number "-1." Notice that this gives us three sets of votes.

"Change some of the vote totals in SumCandidateCounter."

"Now go into GEMS and run the totals report."

The totals report showed my new numbers, proving I could alter the report by going in the back door and replacing vote totals with my own.

"Now go back and look at that detail report."

The detail report had the original votes, not the ones I changed. In accounting, this is called having two sets of books. (Or in this case, three. I never heard what the third set of books does. Cape Cod called it the "Lord only knows" table.)

"Why would it be good to have the detail report show the real votes while the summary shows the ones I changed?"

"Because it would allow a manipulated system to pass a spot check."

## Altering the audit log

Any time you open the GEMS program, it will show up in the GEMS audit log. (If you go in the back door using Microsoft Access, however, your work will not show up in the audit log.) But suppose you need to erase your activities in GEMS?

In the Diebold system, it seems that everyone uses the same name when they go into GEMS (they all call themselves “admin”), but I wanted to see whether I could become someone new, play around in GEMS and then erase myself from the audit log.

I created a new user by the name of “Evildoer.” Evildoer performed various functions, including running reports to check his vote-rigging work, but only some of his activities showed up on the audit log. For some reason, a few of his activities omitted themselves from the audit log even before I tampered with it. But I wanted to erase *all* evidence that Evildoer had existed.

I went in the back door. I expected the audit-log entries to be numbered automatically with something I could not edit. That way, if I erased some Evildoer activities, the numbers would still be there, marking an activity that had disappeared. I was surprised to find that I could just type new numbers over any of the GEMS audit-log numbers, and I could also erase events altogether.

In every version of GEMS that I examined, the autonumbering feature was disabled, allowing anyone to add, change and delete items from the audit without leaving a trace. I simply erased Evildoer.

Going back into GEMS, I ran an audit report to see if Evildoer had indeed disappeared. *Poof!* Gone. As Verbal Kint, in the movie *The Usual Suspects* (1995) said, “The greatest trick the devil ever pulled was convincing the world he didn't exist.”

Another thing that seemed improper in the GEMS program is this: You can enter *negative* votes. It is a simple matter to program the software so that it will never accept a negative number. Why should it? A vote total that is less than zero can only be illicit.

The entire process — bypassing the password, changing the vote totals, cleaning up the audit log — took less than 10 minutes.

\* \* \* \* \*

*Scoop Media's* publisher knew from my communications on the

forums that we had something big.

“Hi, Bev. (New Zealand pronunciation: ‘Bivv’). Alastair here. (New Zealand pronunciation ‘Alasteh’). What’s up?”

“Well, we have a story. With the GEMS program, using one of the databases found on the FTP site, we were able to rig it,” I said.

“Hmm!”

“I’m writing it up. I’m not sure which outlet I’m taking it to, though.”

“You know, I rather thought this might be a good time to publish the link,” said Thompson.

“What link?”

“Oh you know. To the files.”

“The files from the FTP site?”

“It seems like a good time, don’t you think? I think we should come out with your story at the same time. Get people to it, right?”

“Alastair, that set of files is huge. Do you have the bandwidth?”

“Oh, I think we’ll be all right. They have bandwidth to burn.”

The story went out on *Scoop Media* on July 8;<sup>5</sup> Thompson ran my story about the hackability of GEMS, along with his own editorial which he titled “Bigger than Watergate!” He has since been roundly criticized for that choice of title, but remember: Watergate took two years to get as “big as Watergate.”

Just 16 days later, *The New York Times* ran a scathing report on the Diebold voting-system software by computer security experts from Johns Hopkins and Rice universities. They had downloaded the files, originally from the Diebold FTP site, from *Scoop Media*. At least one new story came out every day for the next two months.

## The Johns Hopkins/Rice universities report

On July 24, 2003 *The New York Times*<sup>6</sup> ran an exclusive story about “stunning, stunning security flaws” uncovered by four researchers at Johns Hopkins and Rice universities. The report, titled “Analysis of an Electronic Voting System,” described many of the findings pointed out by the irreverent bunch at Democratic Underground, but these computer scientists — Avi Rubin, Dan Wallach, Adam Stubblefield and Yoshi Kohno — did a gutsy formal study and put their names on it.

The Johns Hopkins/Rice report was blistering. It quoted source



code and delved into Diebold's smart-card security and its cryptographic weaknesses. The report also revealed that one flaw had been pointed out by voting examiners five years ago and still had not been corrected.

Diebold Election Systems came out swinging: The software was never used in any election! Well, it was used in some elections, another Diebold spokesman was reported by *WiredNews* reporter Louise Witt to have said.<sup>7</sup> I called her to ask how solid this quote was. Rock solid, she said, but the quote was pulled a day later in favor of this: "*A small part of the software may have been used in some elections.*"

We were told by Diebold that the problems had been fixed and also that they were never a problem in the first place, because the Diebold software is surrounded by election procedures and physical security, which have neutralized the problems all along. Diebold tells us this, but will not prove it to us.

There are weaknesses in the Hopkins/Rice report. Several sections seem to assume that touch-screen machines are connected to the Internet, but nothing I've seen indicates that to be the case. GEMS servers can connect to the Internet, and GEMS also connects to modems which, in turn, connect back to touch-screens.

The criticism that the Hopkins/Rice report doesn't take into account all the election procedures is, in many ways, correct. It doesn't appear that the authors read the user manuals that go with the software; they apparently did not interview any election officials.

Other areas of the report describe hacks that would be impractical or could not affect many votes at a time. The most publicized security flaw in the report has to do with making extra voter cards (or reprogramming one so that it can vote as many times as you want). These are valid concerns, but checking the number of voters signed in against the number of votes cast is a required safeguard in most states and would reveal such a ploy. This type of hack would also be difficult to achieve on a grand scale; you would have to make rigged smart cards and send people in to cast extra votes at hundreds of polling places at once, which gets into the crazy conspiracy realm.

The biggest taint applied to the Hopkins/Rice report is a conflict of interest on the part of one of its primary authors, Aviel Rubin.

Lynn Landes, a freelance reporter, revealed that Rubin had been an advisory-board member for VoteHere, a company that claims its software solves many of the problems in the Hopkins/Rice report.<sup>9</sup> Rubin also held stock options in VoteHere; he resigned and gave back his stock options after Landes had published her article. Rubin told Landes that he had forgotten about this conflict of interest when he wrote the report.

Three more researchers — Dan Wallach, who is a full professor at Rice University, and Adam Stubblefield and Yoshi Kohno, of Johns Hopkins — also wrote the report, and none of them appears to have any conflicts of interest. It seems unlikely that all three would help Rubin slant a report just to help him sell VoteHere software.

The importance of the Hopkins/Rice report:

1) It correctly identifies weaknesses in Diebold's software-development process. The code seems cobbled together to fix and patch.

2) It identifies very real security flaws that can jeopardize vote data, especially during transmission to the county tabulator.

3) The Hopkins/Rice report pushed media coverage into the mainstream. When you are researching this story, you can't even sneeze without finding something new, so coverage of the integrity of our voting system will continue to gather momentum. The longest leap forward in a single day was attributable to the Hopkins/Rice report.

4) The report triggered another evaluation, this time by the SAIC.

## **SAIC report**

In August 2003, the governor of Maryland, which had placed a \$55 million order for Diebold touch-screen machines, ordered an evaluation by Scientific Applications International Corp.<sup>10</sup>

If Rubin is said to have a conflict of interest, then SAIC had a whopper: The vice chairman of SAIC, Admiral Bill Owens, was the chairman of VoteHere. Like the Johns Hopkins/Rice report, the SAIC report identifies areas for which VoteHere claims to have a solution.

The SAIC report did a bizarre thing: It redacted the version numbers for the software it studied. Now, the version numbers are what is certified by the ITAs, and it is the version number that gets approved by the states. Refusing to say what version number was studied pretty much eliminates the usefulness of this report.

The report also redacted the entire section on GEMS, stating simply that the program was unsatisfactory. All in all, 131 pages out of 200 were redacted, and if we are to believe Washington State Elections Director David Elliott, even state election officials are not privy to this information. Here is what Elliott wrote when I inquired about how he can oversee elections that use GEMS if he can't read the SAIC report:

*“As to your questions about the SAIC report. I share your frustration about the redactions contained in that report. I have read what was published in its redacted form. I have not been able to secure an un-edited copy.”*

If there was ever an indictment of the concept of privatizing a public trust, this is it. Here we have a for-profit corporation asserting privacy over a report commissioned by the state of Maryland, and the state of Washington, which uses the voting program developed by this company, cannot even find out what this government-commissioned report says.

The SAIC report does validate important findings in the Hopkins/Rice report and identifies many new areas of concern. Because it is heavily redacted, we don't know the details on all of the flaws it found, and many are specific to Maryland. Still, these words, taken from the SAIC report, reverberate:

*“The system, as implemented in policy, procedure, and technology, is at high risk of compromise.”*

Or, to put it succinctly: “328 security flaws, 26 deemed critical.”

\* \* \* \* \*

As this book went to print, another independent study was released, this time commissioned by the state of Ohio,<sup>11</sup> and this time, the study examined systems from Diebold, ES&S, Sequoia and Hart Intercivic. The study found multiple, critical security flaws in all four systems.