

# Computerized Systems for Voting Seen as Vulnerable to Tampering

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WASHINGTON, July 28 — The computer program that was used to count more than one-third of the votes cast in the Presidential election last year is very vulnerable to manipulation and fraud, according to expert witnesses in court actions challenging local and Congressional elections in three states.

The allegations that vote tallies calculated with the widely used computer system may have been secretly altered have raised concern among election officials and computer experts. That is because of the rapidly increasing use of such systems, the lack of Federal or state standards that mandate specific safeguards and the widespread lack of computer skills among most local voting authorities.

## Potential for Problems

"There is a massive potential for problems," said Gary L. Greenhalgh, director of the International Center on Election Law and Administration, a consulting group in Washington. He added that the problem with computer-assisted voting systems was that they "centralized the opportunity for fraud."

Mr. Greenhalgh said that while lever-type voting machines could have

their counts rigged only machine by machine, counting votes by computer was done at one central site in most counties.

With computer systems, a voter usually punches holes in thin cardboard ballots and the computer program then "reads" the holes in the cards and totals them, presumably counting all votes and counting them only once each, on commands from an operator.

## Challenges in 4 States

The vote counting program that has been challenged in Indiana, West Virginia and Maryland was developed by Computer Election Systems of Berkeley, Calif. In Indiana and West Virginia, the company has been accused of helping to rig elections. The computer program has also been challenged in Florida, but so far experts there have not been permitted to examine the program in connection with the challenge.

John H. Kemp, president of Computer Election Systems, said in a telephone interview that he absolutely denied the company was involved in fraudulent schemes. County officials involved in the cases have also catego-

Continued on Page B4, Column 3

# Vulnerability to Fraud Seen in Computer Voting

Continued From Page 1

rically denied participation in fraud.

But Mr. Kemp also said that any computer system could be tampered with. "It is totally economically infeasible to have a fraud-proof system," he said. Such a system, he suggested, might cost \$1 billion.

Mr. Kemp said that while there were some differences in the programs used by various jurisdictions, the company's fraud-prevention controls had remained "essentially unchanged" in recent years. He added that the company's six or seven programmers "always are looking for ways to prevent fraud."

In 1984, Computer Election Systems provided more than 1,000 county and local jurisdictions with equipment and computer programs that collected and counted 34.5 million of the 93.7 million votes cast for President, along with all votes for other offices and issues in those jurisdictions.

## 60% Voted on Computer System

The areas that the company served in 1984 include major jurisdictions like Cook County, Ill., with more than 2.7 million registered voters, and tiny areas like Archuleta County, Colo., with 2,490 voters.

Although it dominates the computer voting market, Mr. Kemp said the company has eight competitors. According to the Federal Elections Commission, approximately 60 percent of American voters used some kind of computerized election system in 1984. No allegations have been leveled against the other companies.

Most of the other votes cast in the United States were collected and processed on mechanical-lever machines such as those used in all of New York and Connecticut and most of New Jersey. Computer Election's equipment is used by voters in the New Jersey counties of Salem, Sussex and Warren, while Gloucester County used the computerized system of a competitor.

## Federal Recommendations

Concern about weaknesses in preventing computer fraud led separate Federal agencies in 1978 and 1981 to recommend adopting a series of safeguards. But state and Federal officials acknowledged that the recommendations from the National Bureau of Standards and the Federal Elections Commission have not resulted in significant improvements.

A panel of the election commission is scheduled to meet Aug. 4-6 to discuss, among other things, standards for computer vote counting.

In three of the four legal challenges brought against Computer Election Systems, the losing candidates hired separate computer consultants who have said in court affidavits, testimony and interviews that their examination of the company's program showed it had been designed in such a way that vote totals could be altered without leaving any sign of tampering.

Eva Waskell, a Reston, Va., writer on computer and scientific matters who was among the first to become aware of the court cases pending against the company, said she was astonished because it appeared that "even when local officials learned of the problems, little apparent effort was made to correct them."

## 'Assaults on the System'

The allegations that the Computer Election system was open to manipulation were supported by two other experienced computer consultants who independently examined material obtained in the pending court cases for The New York Times.

One of the experts was Howard Jay Strauss, the associate director of the Princeton University Computer Center. Mr. Strauss, who formerly worked at Bell Laboratories, the National Aeronautics and Space Administration and the RCA Corporation, said the program used to count Indiana votes was vulnerable to manipulation. "Extra votes may be entered in the form of bogus ballots on punched cards, or vote totals may be altered through the use of control cards," Mr. Strauss said. "Either of these assaults on the system could be performed successfully by a computer novice."

Mr. Strauss added that someone with a "fair amount of computer knowledge" could turn off the portion of the program designed to document any changes made in either the program or the votes being counted by the program.

The Times's second consultant was Eric K. Clemons, an associate professor of decision sciences at the Wharton School of the University of Pennsylvania. He said that because of the excessive complexity of the program, "a doctored version of the code could be used to modify election results, and it would take weeks of study to determine what had happened."

## 'Very Difficult to Trust'

"Code this complex is very difficult to trust," Mr. Clemons said. One particular flaw he cited was that "the main program does not log all invalid ballots." Another was that the printed log of error messages could easily be edited or altered.

The civil cases brought by defeated candidates against Computer Election Systems involve elections held in 1980, 1982 and 1984. In West Virginia and Indiana, where most of the contested races involved in the suits were quite close, the company's representatives have been directly accused of being involved in vote rigging. These suits, which the company and county election officials won in lower courts, are pending before Federal appeals courts. In Maryland and Florida, the cases were brought in state courts and are still pending.

In West Virginia, a former Democratic Congressman and three-term Mayor of Charleston, John Hutchinson, charged in his suit that several Kanawha County election officials and Computer Election representatives suc-

cessfully conspired to deprive him of his re-election in November 1980.

Mr. Hutchinson, in an interview, said he lost the election by a margin of 52.5 percent to 47 percent. He said, however that, the totals in Kanawha County, where he lost by 6,000 votes, were totally unexpected because pre-election polls had shown him an overwhelming winner there.

Mr. Hutchinson's expert witness was Dr. Wayne Nunn, a computer architect with the Union Carbide Corporation, who also operates an independent computer consulting concern. Dr. Nunn said that from his examination of the Computer Election system used in the disputed election, "it was entirely possible for a knowledgeable operator to make vote changes without leaving any 'fingerprints.'"

Federal District Judge Charles Haden found the company and the county officials not guilty, saying that much of the evidence presented appeared to be "purely speculative and mere suspicion."

In Indiana, Richard Clay Bodine, a Democrat who lost his 1982 bid for election to Indiana's Third Congressional District, and several other candidates have brought suits charging that the counting and certification of the votes were "false and fraudulent." The suit names both the Elkhart County Election Board and Computer Election Systems as defendants.

## No Record of Changes

Mr. Bodine's computer consultant was Deloris J. Davisson, the chairman of the Department of Computer Science of Ancilla College in Donaldson, Ind. After studying a Computer Election printout describing how the disputed votes were counted in 1982, the computer expert said in her affidavit that because of the lack of necessary systems to audit changes made in the program "it is impossible to know exactly how the program tallied the vote for the Nov. 2, 1982, election."

She further contended that a Computer Election representative had in fact changed the computer's instructions that night, but that it was impossible to know what the changes were because they "were not documented or overseen by any knowledgeable or interested person."

Federal District Judge William C. Lee dismissed the case, saying there were "no allegations in the record for this court of any willful conduct" undermining the election.

Both the West Virginia and the Indiana cases are under appeal.

## Question of Adequate Safeguards

In Maryland, Wayne Cogswell, a can-

didate for the Carroll County seat, was defeated again, has resolved most of the questions concerning the election. However, the case has not been withdrawn.

But Mr. Cogswell's computer consultant, Emily Johnston, said in an interview that on the basis of her examination of the computer program used to count the Carroll County vote last November, she agreed with the Indiana consultant that the Computer Election system did not have adequate safeguards to prevent fraud.

In Palm Beach County, Fla., David Anderson, the unsuccessful 1984 candidate for county property appraiser, charged in his suit that the election had been run on "machines that permit a means of changing the result on the ballots contrary to the votes cast by the electors through an alter system in the commands in the computer program."

Although Mr. Anderson's suit is aimed at local election officials and does not mention Computer Election Systems by name, lawyers for the company have obtained a court order forbidding him from studying the company's program in connection with his suit. They said disclosure of the program and documentation "would breach the security of the system, and thereby cast doubt upon the results of C.E.S. election programs" in jurisdictions all over the United States.

## U.S. Recommends Protections

In 1978, the Information Technology Division of the National Bureau of Standards, recommended that all computer processing programs and systems include a number of protective procedures that it felt were essential to maintaining an accurate vote count.

The division emphasized that a complete system for documenting all changes and alterations should be maintained. "Every change to a program, even those involving only one statement, should be authorized, approved and documented with no exceptions" the agency said. "Otherwise, control is lost and the programming becomes anarchistic."

In a 1981 report to Congress on the need to develop national voting standards, the Federal Election Commission reported that the commercial concerns selling voting equipment to local jurisdictions have "paid little attention to data quality assessment features."

The commission also noted a lack of information at the state level on problems caused by voting equipment. Deborah Seiler, for example, is the chief of the California elections division, a state that in 1986 expects to cast all of its votes on computerized elections systems.

In a recent interview, she said that while her division certified all of the computers, it had not examined the computer programs used to instruct the equipment how to count the votes. "At this point we don't have the capability or the standards to certify software and I am not aware of any state that does," she said.