



Optical Scan Survey Results

New York State has voted exclusively on lever machines¹ for generations. Because we lack experience with any other voting systems, our local and state officials sometimes accept false or misleading information about precinct based optical scan systems from supporters of touchscreen/pushbutton style voting machines (DREs). Alarmist statements that ballot printing costs are high, that more scanners are required than is actually the case, or that scanner technology cannot satisfy HAVA compliance have been disseminated by vendors and some election officials in an effort to dissuade New York from purchasing what in practice is a reliable, mature, auditable and cost-effective voting system.

In fact, 46% of counties, 36% of precincts and 35% of voters used optical scan in the United States during the last election², and these systems have been performing very well for 20 years. If the statements made about optical scan by DRE proponents were true, many states would abandon their existing systems to replace it with something better. But almost no states who are currently using precinct based optical scanners are abandoning this technology at a moment when they could do so. State after state currently using optical scanners are planning to keep them or expand their usage³ as they move towards full HAVA compliance in 2006.

In New York State, there seems to be a fundamental misunderstanding about how optical scan systems work in the real world. In order to improve understanding of optical scan voting, New Yorkers for Verified Voting is conducting a survey of states with many years of experience with this technology. Election officials from these states are able to describe their experience and give us realistic costs of acquisition, training and operation.

We're continuing with our survey, but the responses we have received so far show a wealth of positive experiences with optical scan systems. We're publishing this preliminary data in order to counter some of the inaccurate statements being made about this popular, robust voting technology.

How We Conducted the Survey

We obtained a list of 865 counties in the United States which use precinct based optical scan systems. We requested by phone or email answers to a set of survey questions related to usage of their systems. This is a laborious process, as connecting with a knowledgeable person can take multiple contact attempts and lots of "phone tag". At the time of this writing, we have received responses from 20 counties in 16 states. Typically, respondents answered some, but not all, of the survey questions. In several cases, we got an email summarizing their experience with scanners rather than specific responses to our questions (some of these are reproduced here).

Survey Questions Asked

We asked questions in the following categories:

- Typical Duration Times for Voters Using Paper Ballots and Optical Scanners
- Maintenance Costs and Lifetime of Optical Scanners
- Training Costs for Poll Workers and Voters
- Number of Ballots Printed Per Election
- Ballot Printing Costs
- Formula for Determining Required Number of Optical Scanners
- Procedures –Testing, Election Day Set Up, Close Down Procedures
- Poll worker and Voter Training

¹ With the exception of several precincts in Saratoga County which use DREs.

² Election Data Services, http://www.electiondataservices.com/VotingSummary2004_20040805.pdf.

³ Michigan, Arizona, Oklahoma, South Dakota, North Dakota, Rhode Island, and West Virginia among others are going 100% optical scan in 2006.

Typical Duration Times for Voters Using Paper Ballots and Optical Scanners

Average time to fill out ballots in privacy booth	
Alabama	Varies – usually no more than a minute
Arizona, Cochise City	Depends on ballot
Arizona, Graham City	5 minutes
Arizona, Maricopa	10 to 15 minutes
Arkansas	5 to 10 minutes
California	Depends on ballot
Colorado	5 minutes
District of Columbia	Rarely more than a minute or two
Florida	A few minutes.
Iowa, Chickasaw Co.	Less than 5 minutes
Iowa, Scott Co.	A few seconds. depends upon lines
Minnesota	Depends on election, from 15 seconds to several minutes
North Carolina	Less than 5 minutes
Oklahoma	Depends – faster than touch screen – no scrolling
Rhode Island	Depends on ballot
Vermont	2 to 5 minutes
Washington	5 to 10 minutes

Average time for scanner to scan ballots, per voter	
Alabama	A few seconds
Arizona , Cochise City	Instant
Arizona , Graham City	Instant
Arizona , Maricopa	Instant
Arkansas	Instant
California	Instant
Colorado	Instant
District of Columbia	A few seconds
Florida	A few seconds
Iowa , Chickasaw Co.	Instant
Iowa , Scott Co.	2 seconds
Minnesota	Instantaneous
North Carolina	Instant
Oklahoma	Insignificant
Rhode Island	Instant
Vermont	Instant
Washington	Instant

Do lines form waiting to use scanners?	
Alabama	No
Arizona , Cochise City	No
Arizona , Graham City	Sometimes
Arizona , Maricopa	No
Arkansas	No
California	No
Colorado	No
District of Columbia	Rarely – when several people walk up at once
Florida	Rarely
Iowa , Chickasaw Co.	No
Iowa , Scott Co.	No lines
Minnesota	No, they form waiting to use booths and to register to vote
North Carolina	No
Oklahoma	No lines.
Rhode Island	No
Vermont	No
Washington	No

Maintenance Costs and Lifetime of Optical Scanners

How long have optical scanners been used?	
Alabama	Most since 1980's – some early 1980's
Arizona, Cochise City	Since 2001
Arizona, Graham City	Since 1998
Arizona, Maricopa	10 Years
California	Since 1999
Colorado	Since August 2002
District of Columbia	Since 2002
Florida	Since mid 1990's
Iowa, Chickasaw Co.	Since 1991
Iowa, Scott Co.	Six years
Minnesota	4 years. Ramsey County has used optical scan since 1987
North Carolina	Since 1970's
Oklahoma	Since 1990
Rhode Island	Since 1998
Vermont	Since 1986
Washington	About 10 years

What is the anticipated life expectancy of the scanners in use?	
Alabama	10 to 20 years
Arizona, Cochise City	10-12 years
Arizona, Graham City	15+ years
Arizona, Maricopa	15+ years
Arkansas	20 Years
California	20 Years
Colorado	10 years
District of Columbia	10 years
Florida	10 years
Iowa, Chickasaw Co.	20 Years
Iowa, Scott Co.	12+ years
Minnesota	10 years
North Carolina	20+ Years if well maintained
Oklahoma	15 years or more
Vermont	15 + Years
Washington	20+ years

What is the failure rate of scanners as a percentage of the total?	
Alabama	No failures and only minor repairs
Arizona, Cochise City	0%
Arizona, Graham City	0%
Arizona, Maricopa	None
Arkansas	Less than 1%
California	2%
District of Columbia	None
Florida	Unknown – not reported
Iowa, Scott Co.	None with precinct based scanners
Minnesota	.03% per election.
North Carolina	0.01%
Oklahoma	1 of 3,000
Vermont	0%
Washington	0%
How much is budgeted for maintenance cost of scanners?	
Alabama	No separate budget line, but vendor contract by counties – fee unknown
Arizona, Cochise City	\$22,000 service contract
Arizona, Graham City	\$4,000 per year
Arizona, Maricopa	\$600,000 contract
Arkansas	\$700 per year
District of Columbia	No special budget line – routine
Florida	Varies by county
Iowa, Chickasaw Co.	\$6,000 per year
Iowa, Scott Co.	Less than mechanical lever machines
Minnesota	App. \$125 per year
North Carolina	Varies by county
Oklahoma	Routine
Vermont	\$150 per year
Washington	\$2,000

Training Costs

What are approximate poll worker training costs?	
Alabama	Vendor provides as per county contracts
Arizona, Cochise City	Minimal
Arkansas	None
District of Columbia	Unknown
Florida	No state data
Iowa, Chickasaw Co.	1-1/2 Hour training prior to election, less than \$500
Iowa, Scott Co.	About same as with mechanical lever machines
Minnesota	App. \$45.00/election judge/year
North Carolina	Minimal
Oklahoma	None
What are approximate voter training costs?	
Alabama	Vendor provides as per county contracts
Arkansas	None
District of Columbia	Unknown – machines available for trial at several locations before election
Florida	No state data
Iowa, Scott Co.	Nothing special
Minnesota	App. 1¢ per voter/year
North Carolina	None
Oklahoma	None

Number of Ballots Printed Per Election

How many ballots are printed (as a percentage of registered voters)?	
Alabama	Varies – largest number of ballots cast over last four elections plus margin as determined by county
Arizona, Cochise City	101%
Arizona, Graham City	101%
Arizona, Maricopa	101%
Arkansas	100%
California	100%
Colorado	60%
District of Columbia	110%
Florida	110%
Iowa, Chickasaw Co.	100%
Iowa, Scott Co.	100%
Minnesota	118% for Federal General Elections (Local General Elections and primary vary by turnout)
North Carolina	110%
Oklahoma	90%
Rhode Island	100%
Vermont	100% General Elections, 50% Primary Elections
Washington	105%

Formula for Determining Required Number of Optical Scanners

How do you determine the required number of scanners?	
Alabama	One precinct counter for each 2400 registered voters/precinct
Arizona, Cochise City	One per polling place
Arizona, Graham City	One per polling place
Arizona, Maricopa	One per polling place
Arkansas	One per polling place
California	One per polling place
Colorado	One per polling place
District of Columbia	One scanner per polling place
Florida	There is no statewide formula. Counties decide.
Iowa, Chickasaw Co.	Usually one, for larger districts (greater than 2000 voters) 2
Iowa, Scott Co.	One scanner per polling place
Minnesota	One per polling location
North Carolina	One per polling place (2000 voters per)
Oklahoma	One scanner per polling place
Rhode Island	One scanner per polling place
Vermont	By number of voters
Washington	One per polling place

What is the price of printing ballots?	
Alabama	Less than 30 cents
Arizona, Cochise City	28¢
Arizona, Maricopa	28¢
Arkansas	27¢ (For General Elections)
California	18 inch - 40¢, 11 inch - 31¢
Colorado	29¢ to 50¢
District of Columbia	Unknown – not a concern
Florida	Varies by county
Iowa, Chickasaw Co.	Less than 10¢
Iowa, Scott Co.	Cheaper by provider
Minnesota	\$0.14 to 0.17
North Carolina	Inexpensive
Oklahoma	~incl. UPS, less than \$200,000 per statewide [2 million]
Vermont	22¢
Washington	31¢

Election Day Procedures

How long does it take to prepare a polling place on Election Day?	
Alabama	About one hour – few minutes for scanners
Arizona, Cochise City	1 Hour
Arizona, Graham City	1 Hour
Arizona, Maricopa	25 to 30 minutes
Arkansas	2 Hours
California	1 Hour
Colorado	30 - 45 minutes
District of Columbia	Varies by size – never more than 1.5 hours
Florida	No more than an hour
Iowa, Chickasaw Co.	1 Hour
Iowa, Scott Co.	Less than one hour
Minnesota	1 hour
North Carolina	3 - 5 hours
Oklahoma	Not sure – a few minutes
Washington	1 1/2 Hour

What procedure is followed if a scanner fails during an election?	
Alabama	Seal and continue paper ballots in alternate storage. Some precincts have more than one device and may use that alternative.
Arizona , Cochise City	Troubleshooters throughout county to make repairs
Arizona , Graham City	Extra machine, keep extra cards on hand
Arizona , Maricopa	Troubleshooters with extra machines on hand
Arkansas	Ballots are held until machine is operational. Later scanned by clerks.
Colorado	On site support from vendor. Spare machines are kept on hand.
District of Columbia	Scanner can be swapped or ballots isolated.
Florida	Counties determine. May use alternate scanner, save ballots, or destroy ballot and switch to DRE.
Iowa , Chickasaw Co.	Call auditor's office, machine replaced.
Iowa , Scott Co.	Deliver a substitute –no delay as paper ballots are then collected and scanned by poll workers.
Minnesota	Try to resolve issue over the phone, then replace scanner by election staff if necessary.
North Carolina	Ballots stored in backup ballot box. Bi-partisan precinct judges scan after machine is repaired.
Oklahoma	Secure ballots and continue to vote.
Rhode Island	Field technicians replace failed scanners. Ballots are stored in the machine, then scanned by poll
Vermont	Hold ballots until machine is back up
Washington	Machine replaced, ballots scanned

Close Down Procedures

Please describe ballot handling procedures at end of day	
Alabama	Witness, seal, and hold locally. Deliver memory module and printout to central location.
Florida	Paper ballots are retained by precinct until 90 days after election certification.
Minnesota	Write ins are separated and sealed. voted ballots are sealed and stored for 22 months.
What procedures are used to move ballots to central storage?	
Alabama	If not counted centrally they are held locally for a period of 90 days unless challenged.
Arizona, Cochise City	Boxed and audited, moved to Treasurers vault.
Arizona, Graham City	Secured after election by pollworkers.
Arizona, Maricopa	Board members deliver ballots to receiving site.
Arkansas	Locked vault, moved to storage by clerks.
California	Ballots moved by 2 workers to local drop off site.
Colorado	Moved in sealed boxes. Election judges deliver to courthouse.
District of Columbia	Bonded carrier.
Florida	Physical delivery of memory module by certified poll workers.
Iowa, Chickasaw Co.	Ballots sent in locked vault.
Iowa, Scott Co.	Sheriff's posse member stores data box in bag and carries to central office.
Minnesota	They are brought in by the election judges.
North Carolina	Moved election night by election workers.
Oklahoma	Poll workers deliver along with the memory module from the scanner. Oklahoma does not send the data from the polls via telecomm – only the memory modules delivered by certified poll workers.
Rhode Island	Security cases used to transport ballots to municipal headquarters by 2 workers.
Vermont	Clerks with 2 election workers. Ballots observed by election officials.
Washington	Election workers transport ballots to municipal building.

Testing Procedures

How is testing done?	
Alabama	Not more than 14 days prior – again at closing of polling, prior to certifying result.
Arizona, Cochise City	Test Ballots
Arizona, Graham City	Test Ballots
Arizona, Maricopa	Accuracy Test
Arkansas	Test Deck
California	Test Deck
Colorado	Test Deck
District of Columbia	Vendor's test stack
Florida	By counties
Iowa, Chickasaw Co.	Test Deck
Iowa, Scott Co.	Run tape and sign
Minnesota	A test deck is run through a ballot counter and then the results are compared to the pre-audited result.
North Carolina	Check for zero count by 3 bi-partisan judges
Oklahoma	Each one with 100 marked ballots
Rhode Island	Test Ballots
Vermont	Test Deck
Washington	Test Deck

Is testing done at a central location or in each precinct?	
Alabama	Precinct
Arizona, Cochise City	Central location
Arizona, Graham City	Central location
Arizona, Maricopa	Central location
Arkansas	Precinct
California	Central location
Colorado	Precinct
District of Columbia	Central location
Iowa, Chickasaw Co.	Central location
Iowa, Scott Co.	At storage facility
Minnesota	Testing is done by each city
North Carolina	Central location
Oklahoma	Precinct
Rhode Island	Central location
Vermont	Central location
Washington	Central location

Are test decks pre-printed by vendor or filled out by local election workers?	
Alabama	Either
Arizona , Cochise City	Vendor pre-printed
Arizona , Graham City	Election workers
Arizona , Maricopa	Election workers
Arkansas	Election workers
California	Vendor
Colorado	Election workers
District of Columbia	Vendor
Florida	Pre-printed
Iowa , Scott Co.	Vendor
Minnesota	Filled out by local workers
Oklahoma	Precinct
Rhode Island	Hire Temps to fill out ballots
Vermont	Election workers
Washington	Election workers
If done by local election workers, how long does it take to complete test decks?	
Alabama	Less than 5 minutes
Arizona , Graham City	30 minutes per precinct
Arizona , Maricopa	20 minutes
Arkansas	2 - 3 Hours
California	5 minutes
Colorado	15 - 20 minutes, including running scanners
Minnesota	Depends on the ballot, but always between 5 minutes and 30 minutes
Oklahoma	Varies by locale
Rhode Island	1 Week
Vermont	1-1/2 Hours
Washington	1/2 hour

How long does it take to run test decks through the scanners?	
Alabama	Less than 5 minutes
Arizona, Cochise City	20 minutes
Arizona, Graham City	5 minutes
District of Columbia	Several minutes per scanner
Florida	Several minutes
Minnesota	One machine can be completely tested within 30 minute
Oklahoma	A few minutes
Washington	20 minutes

Poll Worker and Voter Training

How easy or difficult is training for poll workers?	
Alabama	Very easy and no complaints
Arizona, Cochise City	Easy
Arizona, Graham City	Easy
Arizona, Maricopa	Easy
Arkansas	Easy
California	Easy
District of Columbia	Some are resistant
Iowa, Chickasaw Co.	Easy
Iowa, Scott Co.	They love it!
Minnesota	2 hours, every other year
North Carolina	Easy
Oklahoma	No difficulty
Rhode Island	Easy
Vermont	Easy
Washington	Easy

Average age of poll workers?	
Alabama	Unknown, but many retired and older
Arizona, Cochise City	65
Arizona, Graham City	55+
Arizona, Maricopa	60
Arkansas	60
California	75% over age 60, 25% are 17-18
District of Columbia	Unknown – most over 50
Florida	Tend to be older people
Iowa, Chickasaw Co.	60
Iowa, Scott Co.	App. 65
Minnesota	Between 45 and 65, depending on the municipality
North Carolina	Greater than 60 years.
Oklahoma	Mostly mature women – exact unknown
Rhode Island	50 – 60
Vermont	80's
Washington	70

Do older poll workers have difficulty learning or using scanners?	
Alabama	None. No recollection of problems with the transition from lever machines. Older workers still remark about preferring scanners.
Arizona, Cochise City	No
Arizona, Graham City	No
Arizona, Maricopa	No
Arkansas	No
California	No
District of Columbia	No, problems are mainly with procedures.
Florida	None reported
Iowa, Chickasaw Co.	No
Iowa, Scott Co.	None
Minnesota	No
North Carolina	No
Oklahoma	No
Rhode Island	No
Vermont	No
Washington	No

How easy or difficult is training for voters?	
Alabama	Very easy
Arizona, Cochise City	Easy
Arizona, Graham City	Easy
Arizona, Maricopa	Easy
Arkansas	Easy
California	Easy
District of Columbia	No problems reported – some chronic marking errors
Iowa, Chickasaw Co.	Easy
Iowa, Scott Co.	Easier than any known alternative
Minnesota	Relatively easy, voters only need to be instructed to fill in the target
North Carolina	Easy, no problems
Oklahoma	Voters find intuitive
Rhode Island	Easy
Vermont	Easy
Washington	Easy

Email Responses

In some cases, respondents did not complete the survey questions but simply sent an email with their thoughts on their usage of paper ballots and optical scanners. Following are two.

Michigan Email Response

Date: Tue, 26 Apr 2005 09:56:11 -0400

Thank you for your email. I'm happy to discuss Michigan's experience with optical scan. We have chosen optical scan as our statewide voting system.

We have qualified three vendors (ES&S, Diebold and Sequoia) to sell equipment in Michigan. Each county chooses a vendor for the entire county.

We chose to go with optical scan for many of the reasons you discuss. We have concerns about paper trail and Michigan has had good experiences with optical scan systems for more than a decade. Michigan is a heavy recount state and we find that optical scan ballots are quite compatible with recounts. We are not opponents of DRE systems. We simply feel that optical scan is a better choice for our state.

We have not yet chosen a disability system, but we are looking closely at Automark and similar technologies.

It is true that optical scan ballots are a cost that DRE equipment does not have and the cost can be substantial. It is my strong sense, however, that the initial investment in DRE equipment and its ongoing costs (optical scan equipment can easily last 15-20 years; I would be surprised if the same is true of DRE) more than even out the total costs of ownership. Storage of DRE equipment requires much more space and environmental considerations than optical scan.

It's also worth mentioning that no DRE system can handle Absentee Ballots, so most DRE states use optical scan for AV processing. Therefore, DRE systems do not eliminate the cost of ballots.

As part of our contract negotiations with optical scan vendors, we negotiated ceilings on the cost of producing ballots. The website below provides comparisons of ballot costs for our three vendors. Election officials can negotiate lower prices if they are able to do so. We also "encouraged" vendors to open up the printing process to as many printers as possible for the purpose of allowing market forces to drive down the price.

We have considerable other information available on our website that you might find helpful:

http://www.michigan.gov/sos/0,1607,7-127-1633_11619_27151-91711--,00.html

Please let me know if I can provide you with any additional information.

Timothy M. Hanson
Director, Program Development Division
Michigan Bureau of Elections

North Dakota Email Response

Date: Thursday, 21 Apr 2005

North Dakota made the decision to stay with paper ballots read by optical scanners for several reasons that I will detail below. We are confident in our decision because it was reached by way of consensus among state election officials, local election officials, advocacy groups, political parties, and other interested parties.

* Prior to HAVA, 48 of the state's 53 counties used some form of optical scan technology for ballot tabulation. This meant that most of us are comfortable in knowing how to cast a vote. The difference now, since we are using precinct optical scanners rather than central scanners, is that voters are notified by the tabulation equipment if they have made an error in voting and are offered the chance to spoil their present ballot and vote a replacement ballot. We were a little concerned that voters might be intimidated by this "second chance voting" feature, but we are pleased that voters have been thankful in knowing that their vote for a certain office will not count if the ballot is cast as is. For example, it used to be that all the votes on the political party portion of ballot were not counted on nearly 20% of the ballots cast in Primary Elections because the voters failed to follow the instructions directing them not to cross vote between the parties. Last June, election workers across the state heard people say that they never knew that those votes weren't counted if they voted for people from different political parties and they were glad to now have the chance to make their votes count. Some people fail to read instructions even when they are printed several times on the ballot.

* Certainly a DRE is much better at making sure that voters cannot over vote, cross vote, or any of the other common voting errors, yet we needed to evaluate the cost of all of the voting equipment. In order to provide DRE's for every voter, we would need to spend far more money on equipment than we are receiving from HAVA payments. The ballots from a polling location serving 1000 voters can be tabulated by one precinct optical scan at a cost of around \$5,000, but that same precinct using DRE's would require five machines at a cost of no less than \$15,000. And that is before any VVPT device would be added.

* Another factor taken into consideration was that many of the state's senior citizen population said that they would not go to the polls to vote if they had to vote on a "computer," which is what they think of the DRE machines. Based on this reaction by a large portion of our population, we were led to believe that absentee voting would increase dramatically. Being that paper ballots would be needed for absentee voters, our counties would still be hit with the cost of printing many paper ballots and this would add even greater costs to elections.

* North Dakota was not immune to the concerns that a ballot cast on a DRE would not leave a physical ballot for a paper trail. This fear may have developed from people who are not aware of all of the facts, nonetheless it is still something that made people wonder if they could trust the system.

The cost of establishing confidence in DRE's in a state used to optical scan technology could not be determined.

* The AutoMARK has been far and away the voting system of choice for all those who cannot complete their ballots by hand. Time and time again the people in our state with disabilities have said how much they like the fact that they are given the same ballot as someone who can fill out their ballot without the assistance of a machine. And the fact that a ballot marked by the AutoMARK can be reinserted into the AutoMARK for audio verification of votes recorded gives tremendous confidence to blind voters who cannot rely on their sight for verification. Many individuals who are blind are anxiously waiting for June 2006 so that they can vote independently for the first time in their lives.

* It is our opinion that voting with DRE's could only be lower in cost if everyone voted using the machine. Printing the first paper ballot for a precinct is the most expensive ballot of all. The cost per ballot is only decreased by quantity. Since there will always be voters who will choose to vote absentee, a jurisdiction will need to print paper ballots for every election. Therefore, where would any savings be found especially when it is considered that additional equipment would be needed to tabulate absentee ballots.

I apologize that I have not given hard concrete numbers for you to crunch, but I hope my thoughts will be helpful in your deliberations. Our system works in ND, but we realize that it would not necessarily be the best for every other state in these United States. I hope your process goes well.

Jim Silrum, Deputy Secretary of State