

**Report of the
Committee to Review Physical and Operational Security
of the
Danaher Controls 1242 Electronic Voting Machine
June 22, 2004**

Department of Elections for New Castle County
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**Report
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Danaher Controls 1242 Electronic Voting Machine**

I--Purpose

The purpose of this committee was to review the physical and operational security of the Danaher Controls 1242 Electronic Voting Machine as used by the Department of Elections for New Castle County and to make recommendations to the Board. This review included a review of the processes used in tabulating each citizen's vote.

II--Introduction

The State of Delaware was the first state to use Direct Recording Electronic Voting Machines statewide. Delaware uses the Danaher Controls Electronic 1242 Voting Machine Model 6T. Additional information about this machine is on the manufacturer's website:
<http://guardianvoting.com/gvs/vs.html>

With the on-going implementation of the Help America Vote Act and the increased interest in the measures taken nationwide to insure that each citizen's vote is recorded anonymously and accurately, it became clear to the Department of Elections for New Castle County (DOE-NCC) that a public review of the equipment and processes used in our elections would be prudent even though Delaware has not experienced any security issues with the Electronic 1242.

The Board of Elections for New Castle County formed a committee to review security practices in order to determine if there were any significant flaws in the equipment and processes used by the DOE-NCC. Our observations and findings are part of this report.

The committee included members of the DOE-NCC, and representatives from the Democratic and Republican Parties, The League of Women Voters and Common Cause.

III--Committee Members

Committee Members:

Letitia Diswood	League of Woman Voters Volunteer	478-8224
Nina Bawa	Democratic Volunteer	762-4942
Harold Shira	Republican Volunteer	737-9365
Jack and Gemma Buckley	Common Cause	652-3315

Board of Elections Members:

William Baker		998-6526
Orval Foraker	President	998-4437
Ed Kryzanowski		655-5615

Paul Lanouette	328-5707
James Sterling	792-2560

Technical Advisors:

Elaine Manlove	Administrative Director	577-3464
Howard G. Sholl Jr.	Deputy Administrative Director	577-3464
Stanley E. Anderson	Information Systems Administrator	577-3464
Drew Brooks	Warehouse Manager	328-8652

IV--Acknowledgement

The committee greatly appreciates the technical support provided by the DOE-NCC. Many of the committee's questions could not have been satisfactorily answered without their expertise.

V--Scope of Observations

The committee was most concerned about the protection of the voting machines, unauthorized access to the vote tabulation process and the possibilities of machine and human errors in all the processes involved.

One specific item of concern was the possibility of fraud via the Internet. The voting process used in Delaware does NOT use the Internet for recording or storage of the votes or the results. The unofficial election night results and the Official results of Primary and General Elections are published to the Internet from data residing on the State's mainframe computer. The state's voting machines are not connected to the Internet at any time; therefore, such fraud is not possible with this system.

A second concern is the issue of a voter verifiable paper receipt. The accuracy of the machine used in Delaware and the safeguards set in place by the DOE-NCC are such that a receipt is unwarranted at present.

The DOE-NCC trains its election-day polling place workers prior to each election in the applicable election law, polling place procedures, the set-up, opening and closing of the Electronic 1242 voting machine, and the procedures for dealing with Election Day problems. This training is mandated by Delaware Code, Title 15, and plays a vital role in providing the citizens of New Castle County a fair, secure and efficiently run election.

The committee reviewed the election process and hardware controls utilized by the Department of Elections of New Castle County Delaware as described herein.

VI--Items and Processes Examined

A. Electronic Voting Machine

1. Design Features

a. Error Indicators and Messages

The Electronic 1242 has several internal self-checks, displays and messages to indicate error conditions. These were observed and determined to be designed such that the tabulated vote totals are protected in the event of machine problems. Errors that would prevent votes from being properly tabulated result in the machine being disabled to prevent voters from using it.

b. Front Panel Bezel Security

Particular attention was given to the physical security of the paper ballot on the face of the machine and the bezel and panel that secure this ballot to the machine (see Fig. 3). It was determined that the existing design and strap seal used would make unauthorized access to a voting machine configured for an election easily detected.

c. Power Supply and Battery Backup

In the event of a power outage the Electronic 1242 is equipped with a battery backup adequate to maintain normal operation for up to 16 hours. The internal power supply (see Fig.18) maintains the battery charge when power line voltage is normal to assure that the backup battery is fully charged and immediately ready for use if the AC power fails. (See Appendix A, Question 2.)

d. Vote Selection Switch Design

The design of the vote selection switches (see Figs. 5, 6 & 7) that are activated when the voter selects a candidate was investigated by the committee. In the event of switch failure the vote indicator lamp would not come on and a vote would not be recorded (see Appendix A, Question 3).

Another critical component related to the vote selection switch is the vote indicator lamp. If this lamp fails, then a visual indication would not be present when the voter selects the candidate represented by that lamp/switch combination. The proper vote would still be recorded provided the candidate selection switch was pressed one or any odd number of times. However, should the voter press the candidate selection switch twice or any even number of times the vote for that candidate only would not be recorded when the voter presses the large green “Vote” button to finalize his/her choices (see Figs. 3 & 5 and Section VII—Recommendation 3).

2. Testing Prior to Each Election

a. Functional Testing

Battery and Battery Maintenance

The backup batteries (see Fig.18) are charged before each election. The DOE-NCC has developed a testing protocol for the backup batteries that identifies batteries that

need replacement. The Department is in the process of testing all the backup batteries and results to date show that at least 33% of the batteries need to be replaced. Most of the Department's voting machines have the original battery that the manufacturer believes would be good for between 6 and 10 years. This means that most of the batteries in the Department's voting machines are at the end of the useful life expected by the manufacturer. The Department is considering whether to replace just those batteries that testing shows to be defective or all of the original batteries and will consult with the Board of Elections for New Castle County before making the purchase. The testing protocol during the first half of each even-numbered year will test the batteries ability to hold a charge.

Printer

The internal thermal printer (see Fig. 5) is thoroughly tested before each election via a service code procedure that prints a demonstration of the complete character set. Any problems are corrected before the machine leaves the warehouse.

b. Preventative Maintenance

Prior to each election, front panel vote selection switches, lamps, including the vote indicator lamps and error indicators, are checked for functionality. Built-in diagnostics are utilized to ensure all systems are functioning correctly. Any problems detected are corrected and appropriate maintenance records are completed.

3. Control of Access to Machines

a. Seals

Uniquely numbered tamperproof strap seals, which can be removed only by destroying them, are installed in two critical locations on each machine when configured for an election. These seals would clearly indicate any unauthorized entry into the various parts of the voting machine that would be necessary to corrupt or change the vote totals in any way. Each seal is recorded by number and documented for each machine before the machine is transported to the polling place. These numbers are checked against documentation used by Election Officers at the polling place to assure the machine has not been compromised. The Department requires Election Officers to immediately report any seal or counter discrepancies to the DOE-NCC's Election Day Command Center.

b. Physical Control Practices

The voting machines are stored in a locked warehouse with a specific numbered location for each machine. Access to this locked facility is limited to staff of the DOE-NCC and personnel hired by them to transport the machines to and from the polls. The DOE-NCC has specially trained personnel to maintain and repair the machines. Only the machine manufacturer has access to the specialized electronic

equipment and program code necessary to change those processes which control the manner in which the machines sense, record, store and tabulate the voters' choices.

c. Verification Process

Before shipment from the warehouse the DOE-NCC staff insures that each machine is properly prepared and has all documentation and supplies for the upcoming election according to Delaware Code, Title 15, 5008A.

B. Ballot and Memory Cartridge Preparation

1. Ballot Preparation Computer and Guardian Software

The personal computer running the Guardian software for ballot preparation is a Windows 98 based operating system. The next version of Guardian software will run on Windows 2000 and Windows XP operating systems. The ballot and memory cartridge are prepared at the DOE-NCC using this system.

Only the executable program code for this process is available. No source code or documentation needed to successfully tamper with the ballot preparation process is available. This source code and documentation is held in escrow by the vendor and is not made available to the public or to the owners of these electronic voting machines. It would be difficult to change the executable code in a manner that would not destroy its functionality. It would be nearly impossible to change it such that a functioning ballot and memory cartridge could be produced without errors being detected.

2. Preparation and Verification of Ballot for each Election District

The State's Election Management System is the source of the candidate and office data used to create ballots for each Election District. DOE-NCC staff enters the remaining information required by the Guardian software. The offices and layout of the ballot for each election district are determined by law. After the election has been programmed, the DOE-NCC conducts repetitive checks of the election configuration and each ballot style. Proof sheets of the data and copies of each ballot are printed and retained. Following this paper verification, the ballot configuration is tested with controlled voting on one machine. The tabulated totals are checked against the votes cast. Once this testing is complete, the DOE-NCC prepares a small set of ballots and memory cartridges for one or more election districts in each of the reporting zones, test votes the system under carefully controlled conditions, verifies the data and then sends the memory cartridges to the State Commissioner of Elections for use in testing the Election night process for gathering the election results.

After DOE-NCC's testing is successfully completed, the Department then prints the ballots and programs the memory cartridges for all machines to be used in the election.

3. Voting Test to Demonstrate and Verify System Operation

After the ballots and memory cartridges are installed on the voting machines, another controlled test is performed by the DOE-NCC to confirm that votes are properly tabulated for each of the candidates and that each memory cartridge and each machine is functioning properly.

4. Storage of Memory Cartridges Between Elections

Between elections the memory cartridges are stored in cases external to the voting machines in the office area of the DOE-NCC located several miles from the warehouse where the voting machines are stored. The machines are not functional until a properly programmed memory cartridge is installed (see Section VII-Recommendation 4).

C. Pre-Election Certification by Board of Elections

Bipartisan teams of the members of the Board of Elections of New Castle County conduct the verification process that examines the physical readiness of the voting machines and the ballot. Before shipment from the warehouse these teams inspect each machine to verify that it is properly prepared for the upcoming election according to Delaware Code, Title 15, § 5008A. This includes:

1. Verification that the ballot on each voting machine is the correct ballot for the Election District to which the voting machine is assigned. This is done by checking voting machine serial number and by checking the offices on the ballot.
2. Verification that the bezels are properly mounted and screws properly tightened.
3. Verification that the numbers on the Protective Counters (total usage counters) agree with the numbers recorded on the appropriate certification documents.
4. Verification that the tamperproof strap seals are installed and serial numbers are accurately recorded on the appropriate certification documents.

D. Training of Election Officers

1. All Election Officers are required to attend pre-election training sessions to instruct them on the proper use of the voting machines, how to set them up, how to use them, how to close them, and how to deal with problems.
2. Each Election Officer is given a manual and a set of checklists that fully describe Election Day procedures, the use of the Electronic 1242 voting machine, and how to deal with problems. These documents have the phone number of the Department's Election Day Command Center (Voting Machine Desk) printed on the bottom of each page.

3. A cell phone is issued to each Election District for use by Election Officers to contact the DOE-NCC for additional assistance if needed.
4. The DOE-NCC deploys trained technicians with spare parts and other items, including spare voting machines, into six service areas for responding to Election Day problems that cannot be resolved via telephone as well as to observe Election Day operations.

E. Tabulation of Results

On Election Day voters cast their ballots on the Electronic 1242 voting machines. At the close of the election, four copies of the vote totals for each machine are printed. Additionally, an image of each voter's ballot (with no information to identify the voter) is created and stored in random order in the machine's non-volatile and in the memory cartridge. These records are not lost even if power is removed from the machine.

During the Election or after the Polls have closed, Election Officers or DOE-NCC staff assisting the Election Officers enter the absentee vote totals into one of the voting machines assigned to each Election District.

Once the Polls are closed, Election Officers close the voting machines and remove the printed vote totals and memory cartridge from each voting machine assigned to the Polling Place. One printed copy is taped to the Polling Place door for public viewing. One copy is sealed in an envelope and delivered to a representative of the Prothonotary's Office. One copy is sealed in an envelope and delivered to DOE-NCC. One copy of the printed report and the memory cartridge from each voting machine are sealed in a Tyvek envelope and delivered to one of six locations designated by the State Election Commissioner. The memory cartridges are electronically read at these locations and the results transmitted via the State's Wide Area Network to a computer in Dover. The results are then transferred to the State Election Management System's Vote Tally sub-system.

The State Election Commissioner is responsible for training the personnel needed to tabulate the results and maintain the security of the vote tabulation process. They retrieve the vote totals found on the memory cartridges. This is done using a device that electronically transfers the totals from each memory cartridge to a secure computer via a process that does not use the Internet.

On Election night the State Election Commissioner updates this unofficial tabulation of the results using the vote totals that are retrieved from the memory cartridges and then posts them on the State's website.

The official results are determined by a canvass process that begins, and usually ends, two days following the election. Primary Election results are certified by the Board of Elections for New Castle County. The Board of Canvass headed by the President Judge and Resident Judge of Superior Court certifies general and Special Election results. The canvass process involves checking the numbers on each tape against the numbers reported on election night.

The only errors detected during this process have been caused by humans who entered absentee totals erroneously or from election results that could not be read from a memory cartridge. These errors were corrected by recounting the original absentee votes in the first case and by gathering from the printed paper machine reports data that could not be read from the memory cartridge in the latter case. In both cases corrections are made to the data in the mainframe computer. At the conclusion of the canvass the State Commissioner of Elections office declares the results official and publishes the Official Results on the State's website.

VII—Recommendations

- 1) The Committee recommends the addition of a removable tray to permit the internal computer hard drive containing the Guardian software to be easily removed and locked in a safe when not in actual use for preparing the ballot and the memory cartridge.
- 2) The Committee is convinced that possibilities for error and/or tampering in the process of entering and tabulating the absentee ballots is far greater than the possibilities of error or tampering with the vote totals generated by the Electronic 1242 Voting Machine. Therefore, the Committee recommends that the process of verifying the absentee vote entry be improved.
- 3) The Committee recommends the DOE-NCC equip each voting machine with a simple sign advising the voters that a light must be on beside each candidate they select before the large green "Vote" button is pressed. If a light fails to show beside each selection made, the voter should inform the Election Officer of this failure at once.
- 4) The Committee recommends that between elections the memory cartridges be stored in a locked cabinet or safe not located at the warehouse where the voting machines are stored.

VIII—Appendix A

Questions

1) Does the 1242 use any versions of Windows software?

Answer: No

2) Is the Power supply properly designed to protect the tabulated vote totals in the event of a power outage?

Answer:

Yes, due to design of the internal power supply and battery additional protection is not needed.

3) Are the vote (front panel) switches single pole or multiple pole? (Multiple pole switches could fail such that a vote might not be recorded but the panel would indicate that it was recorded.)

Answer:

As from Matthew Lilly with Danaher Controls: “The switches on the Matrix Module and Officer’s Control Panel are Single Pole.”

4) Will the vote be recorded even if the LED burns out? Is there some error message generated?

Answer:

As from Matthew Lilly with Danaher Controls: “The 1242 will continue to record voter selections even if the LED light associated with that candidate fails to illuminate. The System does not produce an error message as the result of a failed LED.”

5) Can the LED come on but the vote not be recorded due to a failure of some other downstream component? Are error messages generated?

Answer:

As from Matthew Lilly with Danaher Controls: “Yes, there are situations where an LED will illuminate when a Voter makes a selection for a Candidate, Proposition or Retention and then presses the Vote button to cast their Ballot. If a failure takes place in a “downstream component” of the system, in *all* situations, (emphasis added) the system will produce an error message. Our manual will reference that message indicating the cause and effect of the failure, how to recover and whether the voter’s choices were recorded.”

6) Is there any possibility that the program can be corrupted (tampered with) after the machine leaves the warehouse? How can we know?

Answer:

As from Matthew Lilly with Danaher Controls: “We assume that this question relates to the firmware on the Voting Machine and not the Application used to program the Voting Machine Memory Cartridges. Either way the System is secure. The firmware is a compiled executable and embedded on the integrated circuits within the Central Processing Unit – (CPU) located inside the Machine, or in the case of the System

Software on the CD deployed by Danaher Controls. There are no open ports, network access or capability to de-compile or “get at” the firmware or system software; the Voting Machine is a “stand alone” system with multiple redundancies that cannot be accessed, changed or altered.

The security seals on the machine are designed to break when the machine is opened and as a result, the State would know immediately that the machine has been tampered with.”

- 7) How can we be assured that no machine intermittently drops a vote or records it for the wrong candidate? i.e. How can we be assured that the machine has not been altered to throw votes to the wrong candidate every "X" number of votes?

Answer:

As from Matthew Lilly with Danaher Controls: “There are many procedures in place at the Department of Elections to ensure that each and every 1242 Voting Machine deployed for an Election is accurate, secure and correctly records the will of the voters.

In addition, the 1242 voting Machine has been certified accurate and secure by an independent, third party entity that has been appointed by the National Association of State Election Directors together with the Federal Election Commission to verify the accuracy, security and performance of voting systems marketed within the US.”

- 8) Could the printed ballot cover, which defines the location of the candidates on the switch panel, be changed after the machine leaves the warehouse to cause votes to be recorded to the wrong candidate?

Answer:

Due to control of access to the front shield this is very difficult to do without the change being detected.

As from Matthew Lilly with Danaher Controls: “Yes it could, however, in order for this to take place the perpetrators would first have to break into a voting machine and steal the ballot. Then they would need to align himself or herself with a willing printer (the Software to produce Voting Machine ballots is proprietary and secure at the Board of Elections). The team would then have to produce the “new ballot configuration” and place it back into the original voting machine(s), reprint and re-deploy all of the sample ballots and re-create and re-distribute the paper advertisements and direct mailers with the new ballot configuration – (these may have already been sent by the Board to the Voters).

Finally, they would have to re-attach the Voting Machine security seals exactly as Board of Elections personnel previously installed them. And since these seals are designed to “break” when disturbed the Board would know immediately that the machine was tampered with.”

- 9) Is there a written set of documents covering the full range of all procedures for the voting process?

Answer:

The following written procedures exist:

Machine Design Features

Features to insure votes and vote totals are not tampered with, lost or changed

Tamper proofing procedures

Preparing paper ballot face for each machine

Preparing memory cartridge for each machine

Verifying each machine is in proper working order

Verifying that each machine is properly set up for each polling place

Verifying that each machine has all needed supplies for the polling place

Verifying that all seals and locks are in place and properly recorded

Tabulating, reporting and checking vote totals

IX—Appendix B



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March 30, 2004

Mr. Frank Calio
Commissioner of Elections
State of Delaware
Department of Elections
32 West Loockerman Street, M101
Dover, DE 19904

Dear Mr. Calio,

We have provided our response to each of the concerns from your separate emails dated March 24 and March 25, 2004.

Are the switches single pole or multiple pole?

The switches on the Matrix Module and Officer's Control Panel are Single Pole.

Will the vote be recorded even if the LED burns out? Is there some error message generated?

The 1242 will continue to record voter selections even if the LED light associated with that candidate fails to illuminate. The System does not produce an error message as the result of a failed LED.

Can the LED come on but the vote not be recorded due to a failure or some other downstream component? Any error messages?

Yes, there are situations where an LED will illuminate when a Voter makes a selection for a Candidate, Proposition or Retention and then presses the Vote button to cast their Ballot; if a failure takes place in a "downstream component" of the system, in *all* situations, (emphasis added) the system will produce an error message. Our Manual will reference that message indicating the cause and effect of the failure, how to recover and whether the Voter's Choices were recorded.

Is there any possibility that the program can be corrupted (tampered with) after the machine leaves the warehouse? How can we know?

We assume that this question relates to the firmware on the Voting Machine and not the Application used to program the Voting Machine Memory Cartridges. Either way the System is secure. The firmware is a compiled executable and embedded on the integrated circuits within the Central Processing Unit – (CPU) located inside the Machine, or in the case of the System Software on the CD deployed by Danaher Controls. There are no open ports, network access or capability to de-compile or “get at” the firmware or system software; the Voting Machine is a “stand alone” system with multiple redundancies that cannot be accessed, changed or altered.

The security seals on the machine are designed to break when the machine is opened and as a result, the State would know immediately that the machine has been tampered with.

How can we be assured that no machine intermittently drops a vote or records it for the wrong candidate? i.e. How can we be assured that the machine has not been altered to throw votes to the wrong candidate every "X" number of votes?

There are many procedures in place at the Board of Elections to ensure that each and every 1242 Voting Machine deployed for an Election is accurate, secure and correctly records the will of the voters.

In addition, the 1242 voting Machine has been certified accurate and secure by an independent, third party entity that has been appointed by the National Association of Election Directors together with the Federal Election Commission to verify the accuracy, security and performance of voting systems marketed within the US.

Could the printed ballot cover, which defines the location of the candidates on the switch panel, be changed after the machine leaves the warehouse to cause votes to be recorded to the wrong candidate?

Yes it could, however, in order for this to take place the perpetrators would first have to break into a voting machine and steal the ballot. Then they would need to align himself or herself with a willing printer (the Software to produce Voting Machine ballots is proprietary and secure at the Board of Elections). The team would then have to produce the “new ballot configuration” and place it back into the original voting machine(s), reprint and re-deploy all of the sample ballots and re-create and re-distribute the paper advertisements and direct mailers with the new ballot configuration – (these may have already sent by the Board to the Voters).

Finally, they would have to re-attach the Voting Machine security seals exactly as the Board of Elections previously installed them. And since these seals are designed to “break” when disturbed the Board would know immediately that the machine was tampered with.

How do we maintain the Voting Machine Batteries? (not the Lithium)

The backup Battery Manufacturer recommends the following charging schedule – (this table was taken from the Service Manual):

<u>STORAGE TEMP</u>	<u>DURATION</u>	<u>INTERVAL</u>
-40 to +120 (F)	48 Hours	3 mos.
+120 to +140 (F)	48 Hours	2 mos.
+140 to +158 (F)	48 Hours	1 mos.

The charging system is fully automatic and no longer needs or responds to the fast charge service codes. The system will charge the battery at all times when the AC is on. Service codes for timed charging of the battery will not have any control of the battery charging process and are not necessary.

There is no means to execute a fast charge operation using the S61-68 commands. Please avoid using the service code S-61-68 to avoid damage to the Power Supply Board components.

How long are the batteries supposed to be good for?

The average life of the backup battery as defined by the battery manufacturer is between six and ten years when it is stored at room temperature and properly maintained.

Should all of the batteries be replaced--and if so, could you get a cost for across the board replacement from Danaher?

We do not recommend the State replace 100% of the backup battery inventory; only replace them when they fail to maintain a charge. We can assist the State in identifying an approved Supplier of Voting Machine backup Batteries which will reduce your cost.

Please do not hesitate to contact us to discuss these answers and provide more detail to the State.

Best Regards,

Matthew Lilly
Danaher Controls, EVM

X—Appendix C

COMMITTEE TO REVIEW PHYSICAL AND OPERATIONAL SECURITY OF THE ELECTRONIC 1242 DIRECT RECORDING ELECTRONIC VOTING MACHINE

PURPOSE: To review the physical and operational security of the Electronic 1242 Direct Recording Electronic Voting Machine as used by the Department of Elections for New Castle County to identify vulnerabilities and to make recommendations to correct and/or mitigate those vulnerabilities.

MEMBERSHIP: Board members, DOE staff, and other persons as designated by the Board.

PROPOSAL: The committee would:

Be briefed on the system as deployed.

Review available documentation.

Review of FEC's *Voluntary Voting System Standards* as appropriate.

Review reports on DRE security and vulnerabilities issued by Maryland, Ohio and other states as appropriate.

Review other literature – reports, etc. on the subject.

Review Election process: ballot prep, etc.

Prepare and submit report.

Other actions as determined appropriate by the Committee.

Provide progress reports to the Board.

REPORT: The report would include:

Brief overview of process.

Findings and recommendations to include, if determined appropriate, recommendations regarding the vendor and the vendor's security.

Recommendation as to whether or not the State of Delaware should commission an additional study by an independent authority.

TIMING: Proposed date for submission to Board of Elections for New Castle County – June 1, 2004.

XI—Appendix D

Federal Standards for Voting Machine Certification

Delaware's voting machines and the associated ballot preparation software were certified against the voting system standards issued by the Federal Election Commission (FEC) in 1990. A copy of the 1990 standards is available from the Department of Elections for New Castle County. The FEC issued a new set of voting system standards in 2002. These are available at: <http://www.fec.gov/pages/vssfina/vss.html>

Additional information about voting system standards is available under the “The Administrative Structure of U.S. Elections” heading at <http://www.fec.gov/elections.html> and at the National Association of State Election Directors website at <http://www.nased.org>

XII—Appendix E

Glossary

Absentee Voting – This is a process that enables an eligible voter who cannot go to his/her Polling Place on Election Day for a reason stated in Delaware Code, Title 15 to vote before Election Day. Absentee votes are sent to the appropriate Election Districts where they are certified and counted. The absentee vote totals for each candidate are entered into one voting machine assigned to the Election District on Election Day.

Ballot – This is the printed-paper cover for the front panel of the voting machine which lists the offices, candidates, and their corresponding political parties. A voter can select from this list based upon where they live and according to state and federal law (see Fig. 3).

Bezel – This is a framed clear plastic covering over the paper ballot face on the machine insuring that the ballot cannot be altered (see Fig. 3).

Candidate Selection Switch – This is part of the front panel of the Electronic 1242 located out of view behind the paper ballot face. This component permits the voter to indicate his/her choice of candidates (see Figs. 5, 6 & 7).

Certification (Pre-Election) – This is a final check by bipartisan teams from the Board of Elections for New Castle County. The teams check printer tapes from each electronic voting machine to determine if the printer is functioning properly. Then each electronic voting machine is checked and written documentation is signed indicating that the seals and their respective numbers are in place. The ballot is also checked as part of this process and the protective counter number is recorded.

Danaher Controls Electronic 1242 Voting Machine Model 6T – This is the specific electronic voting machine used by the DOE-NCC to tabulate all votes in an election including absentee votes (see Figs. 1 & 2).

Election Officers – These are the people in each Election District polling place who conduct the election. Political balance among Election Officers is required by Delaware Code, Title 15. All are required to attend a training session before each election.

Help America Vote Act – This is the Federal Law effective with the 2004 General Elections to improve the electoral process.

Internet Voting – This is where voting or the tabulation of votes takes place via the Internet. This does not occur in Delaware.

Memory Cartridge – This device electronically stores the vote totals for each candidate based upon the voters’ choices. The electronic voting machines (Electronic 1242) will not function if this memory cartridge is missing or improperly prepared using the Guardian software. After the election it is removed from the voting machine and sent to a central location to be “read” electronically. This process enables all votes from each Election District for each candidate to be totaled by the State Commissioner of Elections (see Figs. 13 & 14).

Printer – This is found within the electronic voting machine and provides a paper copy of the results stored on the Memory Cartridge (see Fig. 5).

Printed Voter Receipt – This is a printed receipt showing the voter’s choices. This does not occur in Delaware.

Seals – These are straps used to secure the electronic voting machines once they have been certified by a bipartisan team from the Board of Elections for New Castle County (see Fig. 9). They must be physically broken in order to be removed.

Vote Button—This is the large green button located on the lower right hand corner of the voting machine front panel (see Figs. 3 & 6). When pressed, this button causes the voter’s selections to be added to the vote totals accumulated in the machine’s memory and turns off all candidate selection indicator lamps.

XIII—Appendix F

Additional Sources of Information

Danaher Controls: www.dancon.com

Guardian Software: guardianvoting.com/gvs/sw2.html

Voting System: guardianvoting.com/gvs/vs.html

Election Assistance Commission: www.eac.gov/

Federal Election Commission: www.fec.gov/

League of Women Voters: www.lwv.org/

National Association of Secretaries of State: www.nass.org/

National Association of State Election Directors: www.nased.org/

XIV—Appendix G

Danaher Controls 1242 Electronic Voting Machine Pictures



Fig. 1 – Voting Machine Ready for Shipment to Polling Place



Fig. 2 – Danaher Controls 1242 Electronic Voting Machine Ready for Use

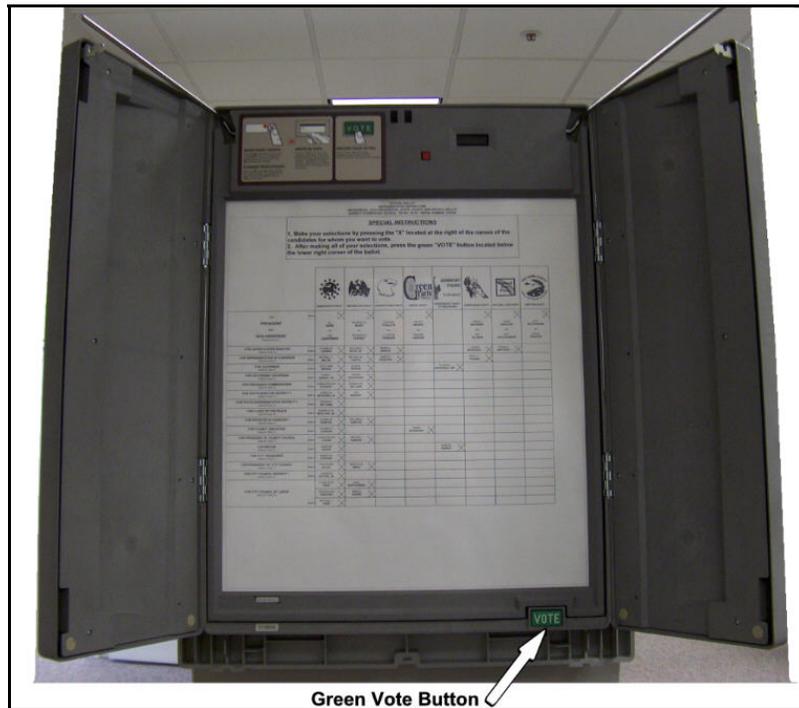


Fig. 3 – Voting Machine with Ballot and Bezel in place



Fig. 4 – Front View with Bezel but no Ballot Installed

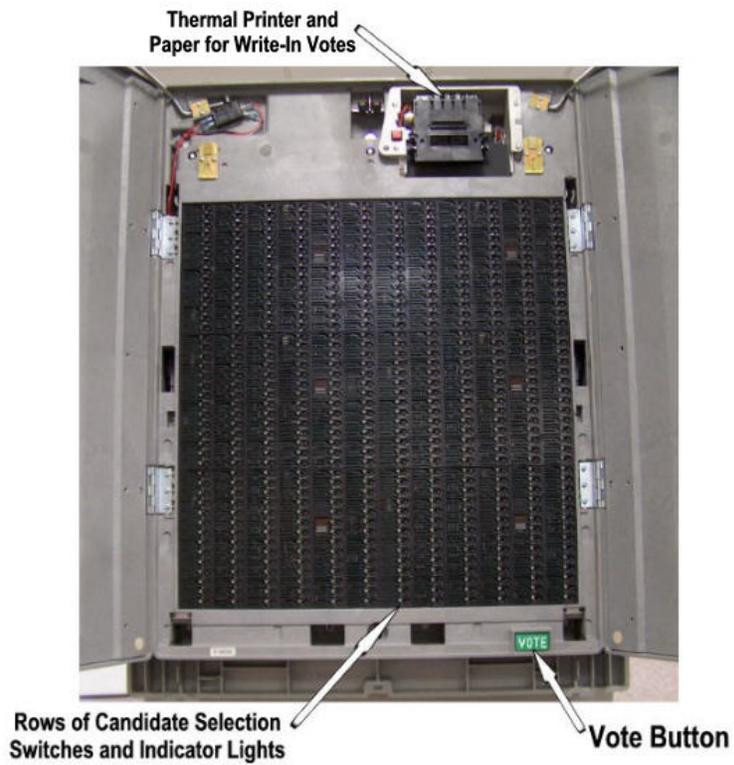


Fig. 5 – Front View without Bezel or Ballot

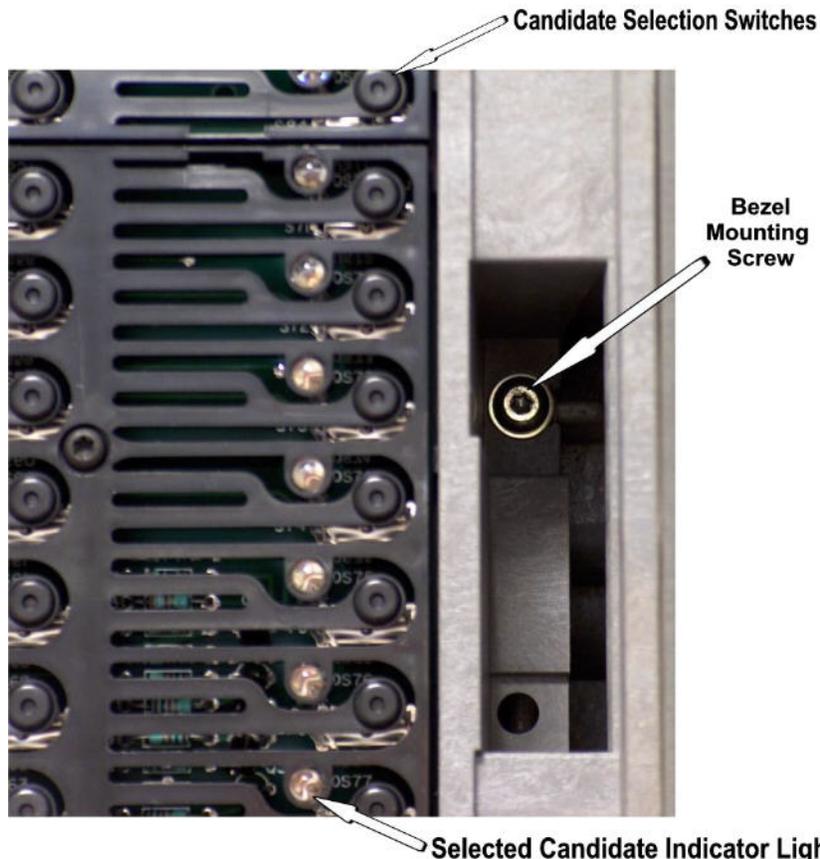


Fig. 6 – Close Up of Candidate Selection Switch Panel—side portion

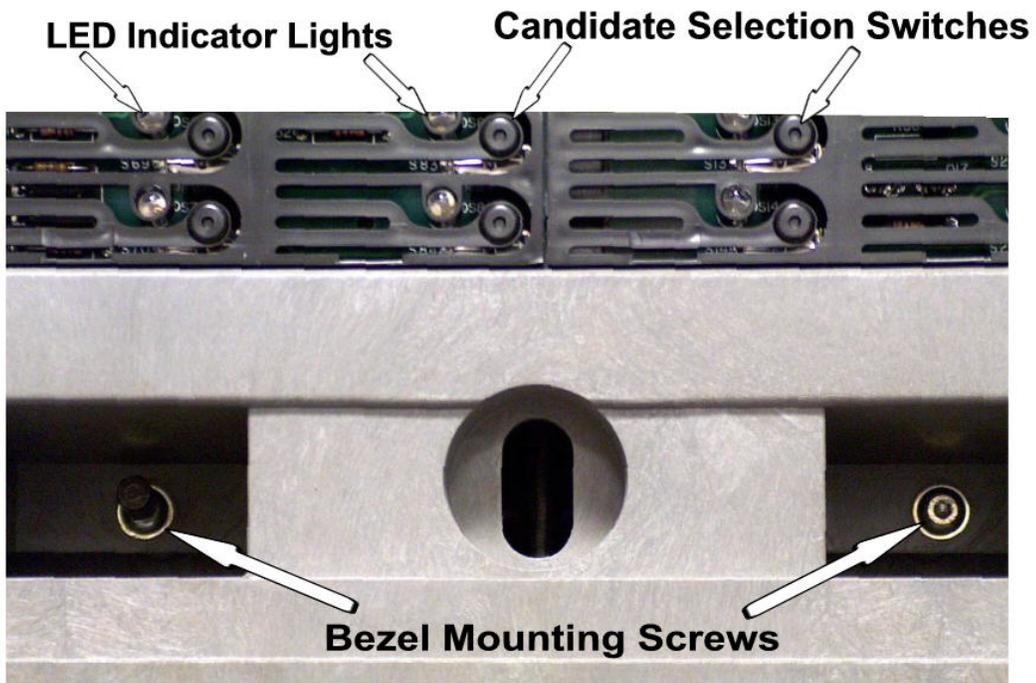


Fig. 7 – Close Up Of Candidate Selection Switch Panel—lower portion

Status Panel Connector for Absentee
Vote Entry Device



Fig. 8 – Rear View of Voting Machine

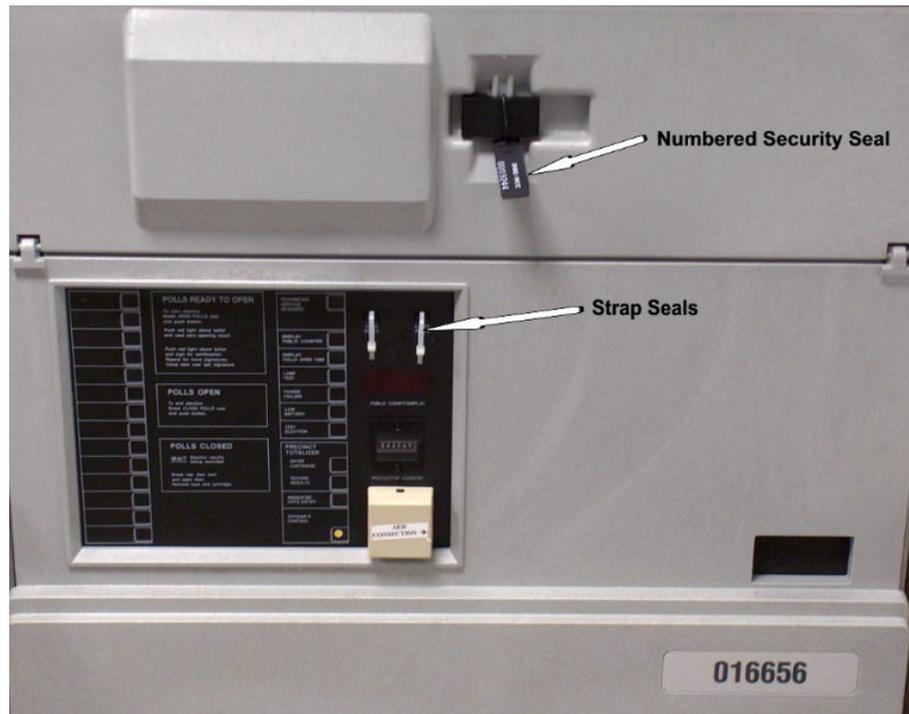


Fig. 9 – Location of External Rear Seals

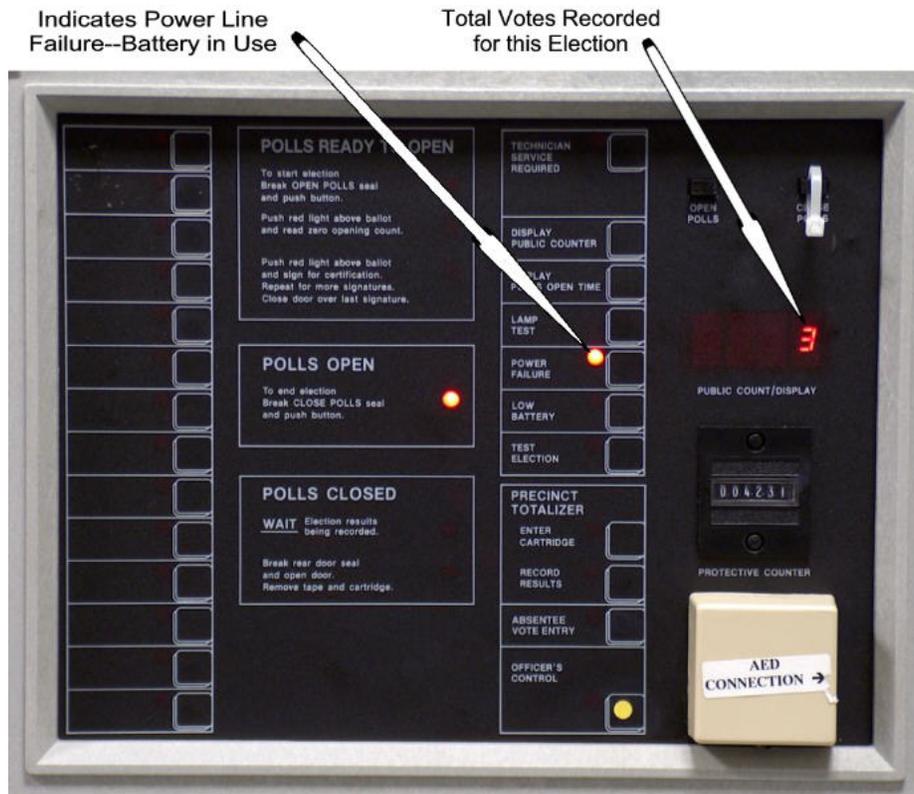


Fig. 10 – Status Panel—Machine Functioning on Battery Power

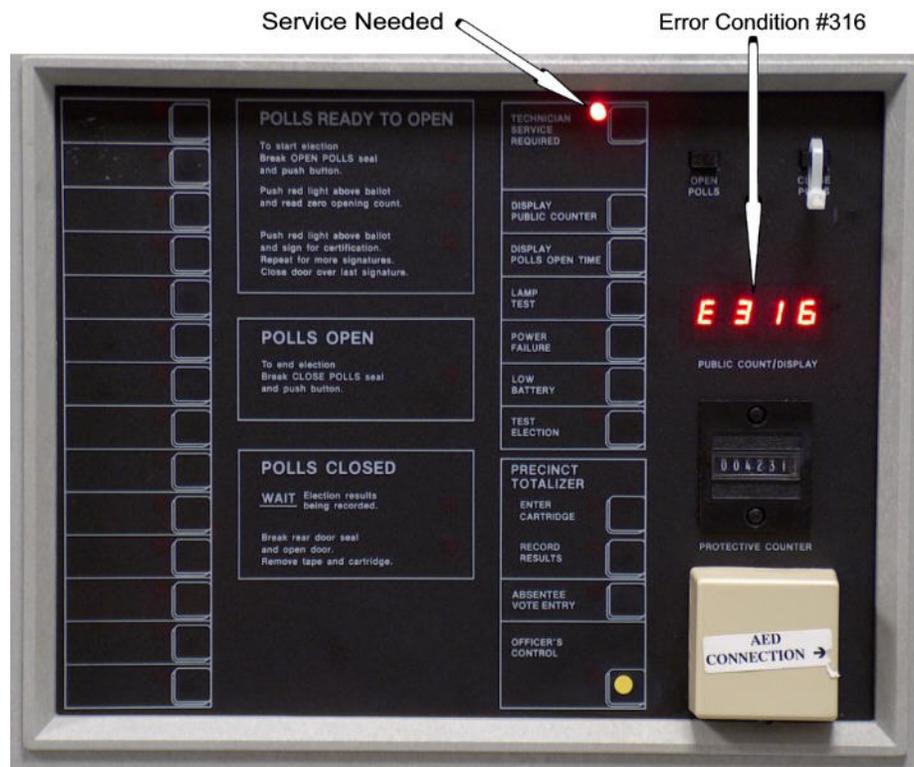


Fig. 11 – Status Panel Showing Error Condition



Fig. 12 – Total Usage Counter

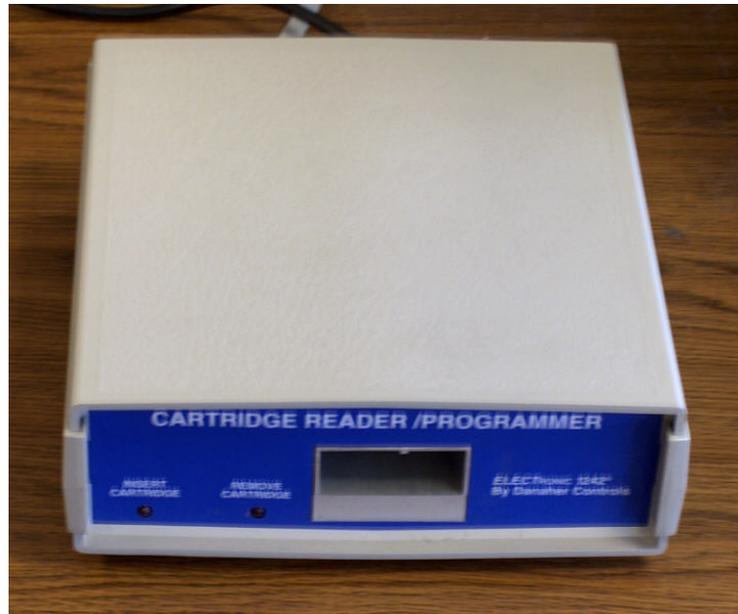


Fig. 13 – Memory Cartridge Reader

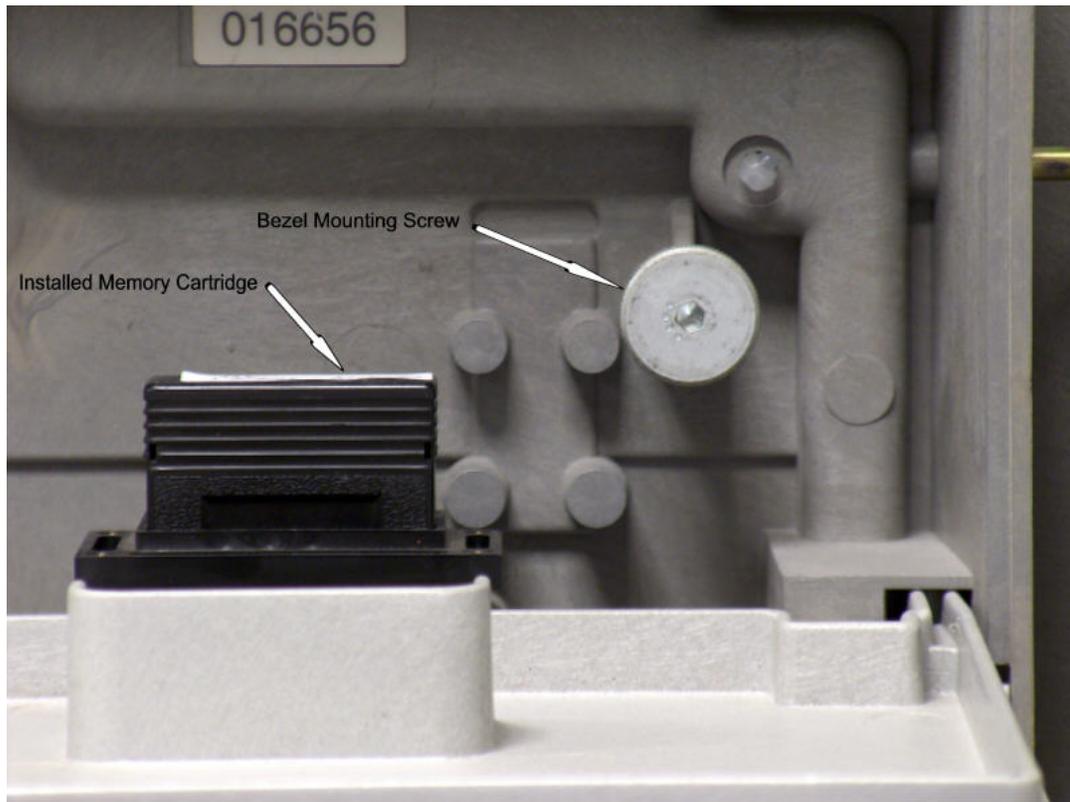


Fig. 14 – Memory Cartridge Installed in Voting Machine

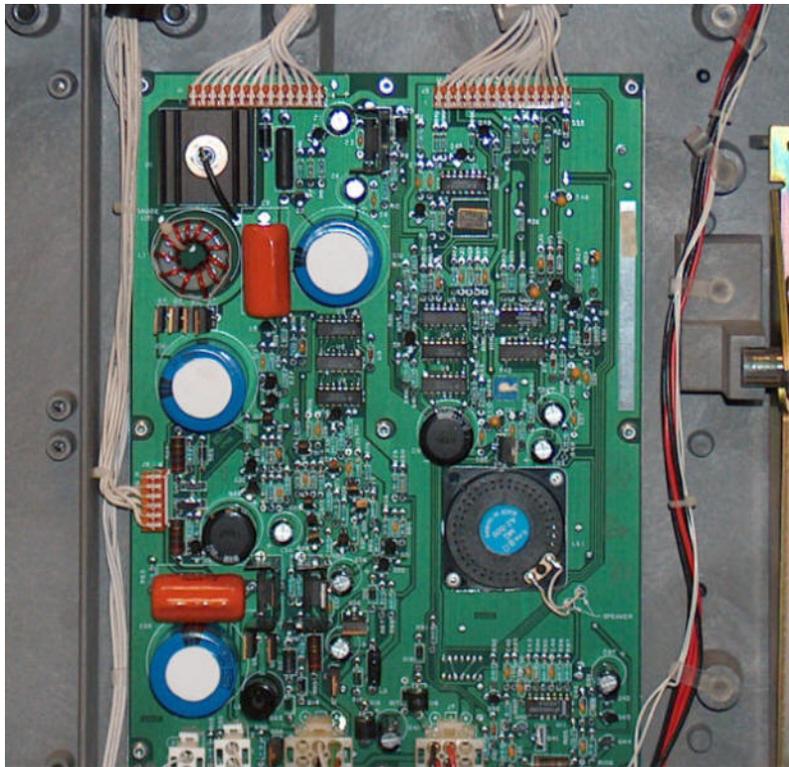


Fig. 17 – Power Supply Circuit Board

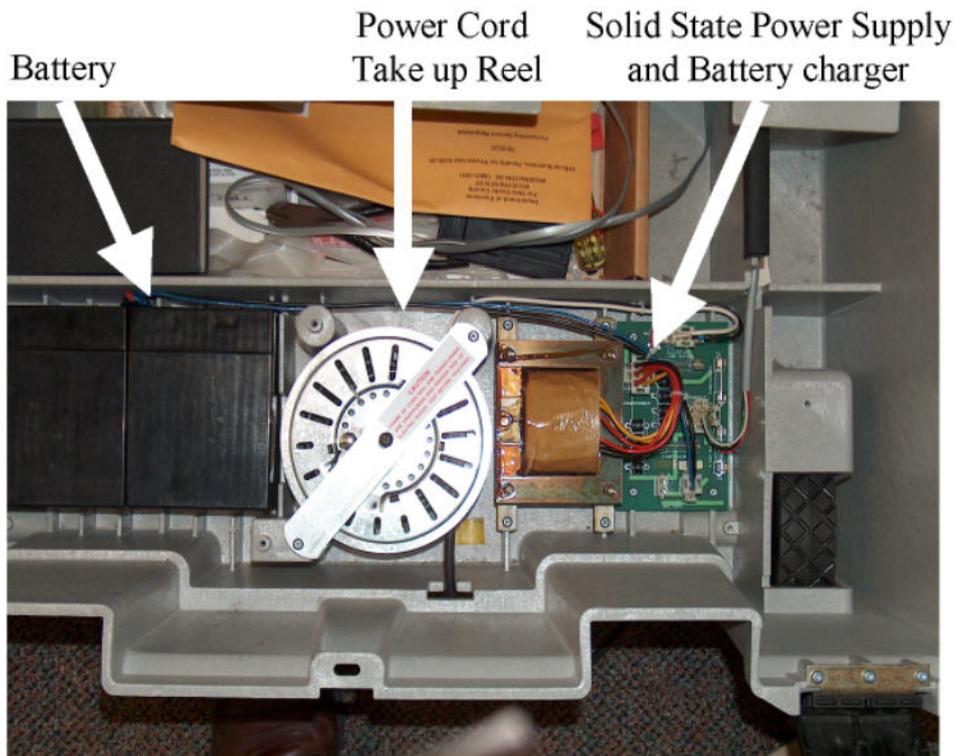


Fig. 18 – Battery and Battery Charger