Ballot Now 1.5.09 Survival Guide

Beware: Mapping Z: drive
The Ballot Now directory must be shared and mapped to the Z: drive or else BNIP won't delete files after processing. The disk will eventually fill up.
Survival tip: Map the Z: drive to the shared Ballot Now directory when setting up the machine.

Beware: Switching elections
For example, changing from Test mode election to Election mode election without closing Ballot Now in between can corrupt the database.
Survival tip: Always close Ballot Now when changing elections (inserting an MBB for a different election). After closing Ballot Now, make sure the SQL database engine is closed. See Appendix A for details.

Beware: MBB recovery
This defect can cause replication of CVRs if an MBB recovery must be performed after the Ballot Now application is closed, then reopened. See Appendix B for details.

Beware: MBB fills up with CVRs
Should only be an issue if the MBBs are written with "Small Logs" set in the registry. But this issue is included for the sake of completeness. See Appendix C for details.

Beware: Not learning from past experiences.
See Appendix D for a Ballot Now post-mortem of the Nov 2002 Harris County election, a large election using this version of Ballot Now.

Appendix A – Switching Elections

This local (election) database corruption occurs because the ODBC database driver does not release the connection to the BN database. When this happens, an election MBB for a different election will be connected to the wrong database, causing that database to become corrupt.

The sequence of events to reproduce the problem:

1. Open and log into BN
2. Insert an MBB and Select that election
3. View a BN report (for example, printed ballots)
4. Without removing the MBB, select that same election again.
5. View a BN report (for example, printed ballots)
6. Exit BN

If this procedure is followed, the ODBC driver maintains a connection to the BN local (election) database. This can be confirmed by observing the Sybase database connection icon running in the system tray.

At this point, if a different MBB is inserted into BN, and that election is selected, the information from the new MBB will be written into the previously selected election's database, causing that database to be corrupted.

To prevent this from happening, always use this procedure when switching elections in Ballot Now:

1. Exit the BN application.
2. Look for the Sybase connection icon in the system tray. If it is present, right click on it and select 'Exit' from the popup menu.
3. Confirm that the icon disappears, indicating that the ODBC connection has been terminated.
4. Start BN, and insert the desired MBB.
5. Select the desired election using the normal procedures.
6. If you wish to verify that BN has connected to the proper database, view any of the BN reports and confirm that the appropriate election title is displayed in the report header.

To recover the database, delete the rows that were added by the 'open election' process. Delete the foreign keys first, then the row from the election database

```
/* SQL command sequence */
drop trigger tda_counter;
drop trigger tda_election;
delete from counter where electionid = 2;
delete from counter_audit where electionid = 2;
delete from election where electionid = 2;
delete from election_audit where electionid = 2;
```

Appendix B – MBB Recovery

This script addresses the "MBB Recovery" defect in Ballot Now version 1.5.09. This defect results in the wrong number of CVR's written to the MBB if the MBB is recovered after Ballot Now has been closed.

The probability of this defect affecting a customer is low because it is only exposed when the customer actually loses an MBB and must make an MBB recovery. However, in case this event does occur, a workaround is needed so that if the customer does execute an MBB recovery, the recovery is successful.

Recovery Process:

1. Using Sybase ISQL, connect to the Ballot Now local database created above.
2. Execute the following SQL statements in order:
    a. DROP TRIGGER tua_scannedballot
    b. UPDATE scannedballot SET written = 0
3. Close ISQL.

Note:
If this procedure is repeated, then do not repeat the first SQL script that drops the trigger. At that point, the trigger will no longer exist in the database and an error will result if the SQL statement is repeated. The trigger is not necessary for the proper functioning of Ballot Now.

Appendix C - MBB fills up with CVRs

When an MBB is written with "small logs", it is possible that Ballot Now will contain more CVRs in its database than can fit on the MBB. This document describes a procedure that can be used to recover all CVRs from Ballot Now when this occurs.

Additional utility software necessary:

- A database utility capable of executing SQL commands against the Ballot Now database, for example Sybase ISQL or BossRead.

Ballot Now state:

- All ballots scanned and resolved.

Procedure:

1. Write all CVRs to the MBB. Note the number of CVRs saved.
2. Review the Scanned Ballots By Batch report. On the last page of the report, there is a summary of Total Ballots and Ballots Written To MBB. If the report indicates that not all ballots have been written to the MBB, continue with this procedure. Otherwise, the MBB(s) written by Ballot Now contain all the CVRs from Ballot Now.
3. Exit Ballot Now. Exit all BNIPs that may be running against Ballot Now.
4. Make a backup of the Ballot Now Local database by copying BallotNow.db from the election subdirectory (for example '011' for the Harris November 2002 eleciton) to a backup location.
5. Run the database SQL utility, and execute the following SQL statement:
   "DROP TRIGGER tdb_scannedballot" (only execute once)
   "DROP TRIGGER tda_scannedballot" (only execute once)
   "DELETE FROM scannedballot WHERE written != 0"
6. Close the database SQL utility.
7. Restart Ballot Now, and insert a new Ballot Now MBB for this election.
8. When Ballot Now prompts if you want to do a card recovery, answer 'Yes' to all prompts.
9. Repeat this procedure until all CVRs have been written to MBBs. However, do not execute the "drop trigger" SQL statements more than once. If you do, you will get an SQL error but that will have no effect on the rest of the procedure.

Appendix D – Learn from past experiences

1 PROCESS ISSUES/PROBLEMS

- The county did not organize by mail ballot processing sufficiently enough to ensure timely results
  - Envelopes containing ballots were not opened until 2:15 pm Saturday afternoon. The law allows opening mail as soon as polls close (7:00 pm Friday evening). This delay meant that the first ballots were not scanned until 4:00 pm on Saturday.
  - Insufficient ballot board members were not available and scheduled to keep up with the by mail ballots. This resulted in inefficient usage of the available scanners.
- The county did not provide sufficient trained personnel to operate the scanners.
  - I ended up providing much of the scanning labor, along with at least 3 other Hart employees (who were available only on a limited basis)
  - I suggest that a team of two people be assigned to each scanner. One to prepare batches and send them through the scanner, and the other to review scan batch reports for rejected ballots and handle the logistics of scanned batches.
  - A separate, independent team needs to be assigned to check ballots before they are scanned. This team checks ballots for proper orientation, dog-eared barcodes, missing sheets, and correct serial numbers. When this team was reviewing ballots, scanning throughput doubled.
- The county did not know whether the ballot board or the county employees should resolve ballots.
  - The county initially had the ballot board resolve ballots.
  - After conferring with the county attorney, they decided that county employees should resolve ballots.
  - There were not sufficient county employees trained and available to perform ballot resolution.
- There was insufficient floor space initially to keep the workflow organized.
  - As time progressed, we had to expand the workflow area four different times.
- There were insufficient supplies to keep the workflow organized
  - Three Ballot Now systems were used to scan General Election ballots, and a fourth system was used to scan the Special Election ballots. Each system had a printer, which should have had different color paper to print reports. The county ran out of the different colored paper and so it was difficult to identify which batches were associated with which system.
- More than a few ballots were mailed out with mis-matched serial numbers.
  - For example, sheet one had serial number 9,667 and sheet two had serial number 9,668. The county needs to do a better job reviewing the ballots they send out.
- The county did not have an appropriate process for duplicating ballots.

  - Ballots that needed to be duplicated were duplicated by just one person from the ballot board. The county should have set up a team consisting of two ballot board members, one from each party, for duplicating ballots.
- The county did not have sufficient equipment set up to run the Ballot Now process.
  - When I arrived Friday afternoon, none of the equipment was set up. I spent Friday afternoon setting up the system and identifying missing equipment.
  - Hart had to provide two scanners and four computers to the county for their Ballot Now setup. There weren't enough printers for every system, and we didn't get the missing printers until Sunday afternoon.
- The county did not have on hand scanner cleaning kits or replacement consumables
  - I had brought cotton swabs and cleaning sheets, but did not carry on the airplane the necessary chemicals.
  - I also brought a spare pick roller (replacement consumable)
  - Hart will incur the expense of replacing the cleaning swabs and cleaning sheets.
- The county did not produce sufficient MBBs to ensure efficient workflow
  - When the Ballot Now MBBs were sent to Central Count, there were no MBBs left to continue operation.
  - Operations that could have continued included printing replacement ballots for duplication.
- The county did not use the recommended paper stock for printing ballots
  - Ballot Now requires the use of 80 lb. offset stock. The county used 20 lb. bond.
  - This caused many ballots to be rejected during scanning. See the *Hardware Issues* section.

2 SYSTEM ISSUES/PROBLEMS

- Ballot Now did not provide a search by serial number feature.
  - Occasionally a question arose if a certain ballot had been already scanned. A search by serial number feature would help answer this question.
  - If ballots are scanned on different machines, there is no automatic cross-checking of serial numbers across machines. Ballot Now should be implemented with a single central database server to allow cross-checking of serial numbers across machines. This concept has already been defined as the "Ballot Now Enterprise" architecture.
- Ballot Now did not reject single sheet ballots
  - Occasionally, a ballot was scanned that did not have its second sheet. To improve throughput, Ballot Now should have an option to reject a ballot with a missing sheet.
  - This operation is as-designed, but should be changed.
- One of the scanners had a bit of dirt on the CCD window. This caused a black streak down through the scan. If this streak happened to overlay option boxes, mis-marking of the ballot could result.

  - Ballot Now should include a feature to observe scanned ballot images as they are being scanned so the operator can catch this situation should it occur.
- The source of the Ballot Now votes could not be set to anything other than "Absentee".
  - The system should allow setting the Ballot Now CVR source to any source.
- If ballots were autoresolved for undervotes, and then it was determined that the ballot's straight party contest was overvoted and the vote needed to be awarded to one of the parties, it was cumbersome to undo the autoresolve and award the straight party vote to that ballot.
  - Ballot Now should not autoresolve undervotes on a ballot if the straight party contest needs resolving.
- I was unable to get a tape backup of the Ballot Now databases because the systems were still in use by the time I left.
  - Steven is getting backups onto a hard drive that he will send me.

2.1 HARDWARE ISSUES

- Many ballots were rendered unscannable when they were printed.
  - Barcodes were smeared when they were printed.
  - The fusing rollers of the printer caused creases to become embedded through the barcodes.
  - The ballot dog-eared through the printer, causing the barcode to become damaged
  - Many of these problems could have been prevented if the county used the recommended paper stock.
- Two of the computers that Hart provided were defective.
  - On one computer, the SCSI port worked but the LPT1: port didn't.
  - On the other computer, LPT1: worked but the SCSI port didn't.
  - Between the two, I was finally able to get one system working as a Ballot Now system. The other was set up as a BNIP.
- One of the scanners provided by Hart was not cleaned when it was set up.
  - The Kodak 1500 had dirt on the CCD window, and caused streaks on the scanned image.
- The county did not have the drivers for one of the printers it provided, so I had to download the driver from the web.

3 POSITIVES

- When the batches were carefully checked for proper serial numbers and no missing sheets, hundreds of batches including thousands of ballots were scanned with no rejected ballots.