

Computer Counting

including 2008 Case Studies

Local Government
Post Election Information Series

INTRODUCTION

The Victorian Electoral Commission first developed its computer count application to support the counting and calculation of election results for Local Government elections in 1999. The application has successfully been implemented for subsequent Local Government elections involving preferential or proportional representation count methods and for the Legislative Council count at the 2006 Victorian State election.

An independent auditor has certified the VEC's computer count application. The audit confirms that the system conforms with legislative requirements.

This document outlines the process that the VEC follows in conducting computer counts at Victorian Local Government elections and includes case studies to demonstrate the accuracy of computer counting at Local Government elections.

COMPUTER COUNT PROCESS

Overview

The following steps summarize the main elements of a computer count:

- the Returning Officer determines the total number of ballot papers to be accounted for in the count. (See the VEC booklets *Ballot Paper Tracking – Attendance elections and Ballot Paper Tracking – Postal elections* which are part of the VEC's Local Government Election Information Series);
- all completed ballot papers that appear to be formal are batched into 50s;
- ballot papers that are obviously informal are grouped into one batch;
- data entry operators enter the preferences recorded on each formal ballot paper into the computer application. The application tests each ballot paper for formality and rejects any ballot papers identified as informal. These are removed to the informal batch. The formality rules for Victorian Local Government elections require a full sequence of consecutive numbers to appear on each ballot paper from 1 up to the number of candidates. One square may be left blank if all other squares contain sequential numbers and the only missing number is the last number in the sequence. The system will not accept ballot papers that have the same number repeated.
- informal ballot papers are checked manually by election officials in the presence of scrutineers;
- once data entry is complete and all informal ballot papers have been checked, the total number of informal ballot papers is recorded against batch 1 in the computer application.
- the number of ballot papers in each formal batch is reconciled against the number of ballot papers in the equivalent batch recorded on the computer count application;
- the result is calculated and the progress of the count is projected onto a screen for those present to view;
- distribution reports are provided to interested parties for review prior to the formal declaration of the election; and
- the result is formally declared by the Returning Officer.

Preparation of ballot paper batches

Prior to the batching of ballot papers, a rough sort of ballot papers is conducted to remove ballot papers that are obviously informal into one batch.

Remaining ballot papers are counted and batched into 50s. A numbered batch cover slip is attached to each batch.

The Returning Officers completes a *Batch Advice Summary Form* (M555) for each set of ballot papers. This travels with the ballot papers to the count site and is reconciled by the Team Leader at the count venue prior to the count commencing.

Data entry

Formal batches are allocated to data entry operators who enter preferences from each ballot paper into the computer application.

The computer count application tests for the formality of each ballot paper during data entry. Informal ballot papers that are identified are not saved to the database and the ballot paper is physically removed from the batch – folded by the data entry operator and placed on the top of the batch. i.e. preferences are saved for formal ballot papers only.

During data entry there may be some batches that are identified with less or more than 50 ballot papers due to a miscount during batching.

At the completion of each batch, data entry operators record on each batch cover slip:

- the total ballot papers in the batch;
- the number of formal ballot papers saved; and
- the number of informal ballot papers discovered in the batch during data entry.

Completed batches are collected by floor staff.

The numbers recorded on the batch cover slip are then reconciled against the information stored in the computer. If the numbers do not match, the batch is reviewed to identify and rectify the discrepancy.

When the batch is reconciled, any informal ballot papers at the top of the batch are removed for manual checking. The formal batch is stored until the completion of data entry.

Manual check of informal ballot papers

The informal ballot papers identified during data entry and those that were ruled as informal during the initial batching process are removed to a separate area during the count. Scrutineers are able to observe the Returning Officer or an appointed staff member checking and ruling on these. Any ballot papers determined to be formal during this check are rebatched in a formal batch for data entry.

Completion of data entry

Once data entry is complete, the final number of informal ballot papers is recorded against batch 1 on the computer.

The total number of formal and informal ballot papers recorded on the computer is reconciled against:

- the Returning Officer's initial balance figure (this may vary slightly where batches were not exactly 50); and
- the total number of formal and informal ballot papers recorded on the completed batch cover slips at the end of data entry.

Final computer validation ensures that the expected batches have been entered, that totals are valid and that the calculation of results may proceed.

Calculation of the Result

Once reconciliation has been completed and the computer records have been validated, the result is calculated. The Returning Officer presses the calculate button on the computer and observers watch the progress of the count projected onto a screen.

Scrutineers and candidates are provided with a printed distribution report showing the full record of the count as soon as practicable after the calculation of the result. This is provided at the count venue.

Scrutineers and candidates are given time to inspect the report prior to the conduct of the declaration by the Returning Officer.

SCRUTINEERS AND TRANSPARENCY

Each candidate can be represented by one scrutineer for every election official involved in the count and scrutineers are able to observe all aspects of the computer count process.

During data entry, the Returning Officer generates and displays for scrutineers hard copy reports showing the progressive first preference results for each candidate. Copies are also made available to scrutineers on request.

Scrutineers may also request that a particular batch or batch range be scrutinised further. This may be done via a computer terminal or a report can be generated that shows the preferences recorded for each ballot paper for a defined batch or batch range.

This allows scrutineers to verify the accuracy of data entry by comparing the preferences shown on each ballot paper in a batch against the preferences recorded for the corresponding batch on the computer. A small example of the *Ballot Paper Details* report is included in Appendix A.

Scrutineers may also challenge the validity of individual ballot papers by noting the batch and ballot paper number. These are extracted from completed batches and are ruled upon by the Returning Officer.

RECOUNTS

Following the calculation of the result, but before the official declaration by the Returning Officer, a candidate may request that a re-count be conducted.

A recount may also be conducted at the discretion of the Returning Officer.

A computer recount involves the following steps:

- A check of all rejected ballot paper envelopes to ensure that all envelopes to be admitted to the count have been included;
- A full re-check of all informal ballot papers. Before proceeding to a full recount, where the preferences on all formal ballot papers are re-keyed by data entry operators, the Returning Officer may decide that any formal ballot papers identified during this check are added as an additional formal batch, and the result recalculated;
- If proceeding to a full re-count, the preferences on each ballot paper are re-entered into the computer application. When saving each paper, the application checks that the preferences as re-entered are the same as they were for the corresponding ballot paper at the original count. If they are the same, the original record is maintained on the database. If they are not the same, the operator is alerted to check their data entry, and if confirmed, the original preferences for that ballot paper are overwritten with the confirmed preferences.
- At the completion of data entry and a final check of informal ballot papers, the result is re-calculated and a new distribution report is generated.

CASE STUDIES - RECOUNTS

The VEC has conducted a number of full or partial computer recounts at Local Government elections since 1999.

At the 2008 Local Government elections, full computer recounts were conducted for Greater Shepparton City Council, Alpine Shire Council and Macedon Ranges Shire Council - West Ward. Partial computer recounts were conducted for Wodonga City Council and Melton Shire Council – Coburn Ward.

The recount results in each case confirmed the original result with very little change in the “critical margin”. The “critical margin” may be the final margin or the margin observed at a critical exclusion during the count.

Analysis of the preferences on 4,000 ballot papers data entered for an election involving 11 candidates has shown that data entry errors occurred on 4 ballot papers – i.e. a 99.9% accuracy rate. This is not unexpected for Local Government elections where a data entry error would usually result in an informal sequence of numbers and therefore the error would be identified and corrected by the operator at the time of the initial entry.

Analysis of the 1st preference results for the 2008 elections where computer recounts were conducted shows that there are varied movements of ballot papers between the original count and the recount but the impact on the final margin is very small. (See Appendix B)

During these recounts the following observations were made:

1. Ballot papers previously considered to be “informal” – move to “formal”. The number in this category generally increases as the number of candidates contesting an election increases. It is often observed that the spread of 1st preferences on these ballot papers across candidates reflects the same spread observed for other formal ballot papers. In general, the change to the critical margin is small. See the statistics relating to the 2008 recounted elections on the

next page. Greatest change to critical margin is 5 or 0.026% of the total votes counted (Wodonga City Council);

2. Ballot papers previously recorded as “formal” can move to “informal” however, there are very few instances where this occurs given that ballot paper preferences entered by an operator can only be saved to the database if they meet the formality criteria. This situation will only arise if an error occurs while entering preferences from an informal ballot paper and the error makes the ballot paper “formal”;
3. Changes in the total number of ballot papers may occur. This will take place if additional ballot paper envelopes are admitted to the count, or where there was a manual counting error on the final number of informal ballot papers in the informal batch. The number of formal ballot papers stored by the computer are counted by the computer and are therefore 100% accurate; and
4. A small number of data entry errors up to 0.1% (See analysis above) may occur where the error does not give rise to an informal sequence of numbers. This will give rise to minor changes in the distribution of preferences.

Statistics for the 2008 computer recounts are included below:

**Greater Shepparton City Council - Full Recount
19 Candidates for 7 vacancies**

	Formal BPs	Informal BPs	Total BPs	Critical Margin
Original	31580	2380	33960	1
Recount	31595	2372	33967	1
Difference	15	-8	7	0
Variation	0.05%	-0.34%	0.02%	0.000%

**Alpine Shire Council - Full Recount
15 Candidates for 7 vacancies**

	Formal BPs	Informal BPs	Total BPs	Critical Margin
Original	8398	410	8808	3
Recount	8397	411	8808	2
Difference	-1	1	0	-1
Variation	-0.01%	0.24%	0.00%	-0.011%

**Macedon Ranges West Ward - Full Recount
11 Candidates for 3 vacancies**

	Formal BPs	Informal BPs	Total BPs	Critical Margin
Original	8222	308	8530	2
Recount	8222	308	8530	2
Difference	0	0	0	0
Variation	0.00%	0.00%	0.00%	0.000%

**Wodonga City Council - Part Recount
20 Candidates for 7 vacancies**

	Formal BPs	Informal BPs	Total BPs	Critical Margin
Original	17969	1455	19424	47
Recount	17993	1431	19424	42
Difference	24	-24	0	-5
Variation	0.13%	-1.68%	0.00%	-0.026%

**Melton Shire Council Coburn Ward - Part Recount
22 Candidates for 3 vacancies**

	Formal BPs	Informal BPs	Total BPs	Critical Margin
Original	18950	1718	20668	11
Recount	18967	1701	20668	9
Difference	17	-17	0	-2
Variation	0.09%	-1.00%	0.00%	-0.010%

General Observations

- The biggest changes in recounts are caused by ballot papers moving from "informal" to "formal".
- The greatest change to the critical margin observed in these examples was 5 or 0.026% of the total ballot papers.

Full distribution reports for each of the 2008 Local Government elections where a full or partial recount occurred are included on CD in Appendix C.

Appendix A – Ballot Paper Details Report

Ballot Paper Details report

Date:02/05/2005

Time:15:10

The Little City Council

Major Ward

Ballot Paper Details - Report

Total formal batches included in report - 4

Total informal batches included in report - 0

Total formal ballot papers included in report - 40

Batch No. 2

Ballot Paper Preferences Recorded Against Candidates in Ballot Paper Order

1	1	2	4	3	5
2	1	2	4	3	5
3	1	2	4	3	5
4	1	2	4	3	5
5	1	2	4	3	5
6	1	2	4	3	5
7	1	2	4	5	3
8	1	2	4	5	3
9	1	2	4	5	3
10	1	2	4	5	3

Batch No. 3

Ballot Paper Preferences Recorded Against Candidates in Ballot Paper Order

1	1	2	4	5	3
2	1	2	4	5	3
3	3	1	2	4	5
4	5	1	2	4	3
5	5	1	2	3	4
6	4	1	2	3	5
7	4	1	2	3	5
8	2	3	1	4	5
9	5	4	1	3	2
10	5	4	1	3	2

Batch No. 4

Ballot Paper Preferences Recorded Against Candidates in Ballot Paper Order

1	5	4	1	3	2
2	5	4	1	3	2
3	5	4	1	3	2
4	3	4	5	1	2
5	3	4	5	1	2
6	3	4	5	1	2
7	3	4	5	1	2
8	3	4	5	1	2
9	3	4	5	1	2
10	3	4	5	1	2

Batch No. 5

Ballot Paper Preferences Recorded Against Candidates in Ballot Paper Order

1	3	4	5	1	2
2	3	4	5	1	2
3	3	4	5	1	2
4	3	4	5	2	1
5	3	4	5	2	1
6	3	4	5	2	1
7	3	4	5	2	1
8	3	4	5	2	1
9	3	4	5	2	1
10	3	4	5	2	1

Appendix B - Computer Recount Analysis - 1st preferences

Greater Shepparton City Council

COUNT	LITTLE, Bruce William	CHRISTOE, Ian	MUTO, Milvan	MACKALL, Bertan	RYAN, Kevin Gunna	TERLICH, Dallas	FALSETTA, Adrian John	TEASDALE, Diane Marie	CAHILL, Paul	HAZELMAN, Chris	HOUJHAN, Jenny	JOHNSON, Sondrae	BIHAMBIA, Immaculate	POLAN, Michael	RICHARDSON , Marty	WILSON, Bruce	DOBSON, Geoffrey Dennis	NEFF, Steve	CRAWFORD, Cherie	TOTAL FORMAL	TOTAL INFORMAL	TOTAL
Original	759	1248	3005	420	3038	1122	1095	929	299	2723	3323	970	938	1461	511	1562	5761	840	1576	31580	2380	33960
Recount	760	1247	3009	421	3040	1123	1095	929	298	2728	3322	969	939	1462	512	1562	5761	841	1577	31595	2372	33967
Diff (Rec - Orig)	1	-1	4	1	2	1	0	0	-1	5	-1	-1	1	1	1	0	0	1	1	15	-8	7
% change	0.13%	-0.08%	0.13%	0.24%	0.07%	0.09%	0.00%	0.00%	-0.33%	0.18%	-0.03%	-0.10%	0.11%	0.07%	0.20%	0.00%	0.00%	0.12%	0.06%	0.05%	-0.34%	0.02%

Change in critical
margin

0

Alpine Shire Council

COUNT	VONARX, Jan	SCOTT, Geoff	LEE, Greg	ROBINSON, John	VACCARO, Mario	CAIN, Narda	STEVEN, Mark	MAUTONE, Nino	COCKS, Graham	ROPER, Peter W.	DYER, Ray	PEARCE, Daryl	KEEBLE, Tony	DIXON, Ray	LESCHEN, Zuvelo	TOTAL FORMAL	TOTAL INFORMAL	TOTAL
Original	1323	357	455	353	439	535	533	785	419	1008	463	676	527	187	338	8398	410	8808
Recount	1324	356	456	353	439	534	533	786	419	1008	462	676	526	187	338	8397	411	8808
Diff (Rec - Orig)	1	-1	1	0	0	-1	0	1	0	0	-1	0	-1	0	0	-1	1	0
% change	0.08%	-0.28%	0.22%	0.00%	0.00%	-0.19%	0.00%	0.13%	0.00%	0.00%	-0.22%	0.00%	-0.19%	0.00%	0.00%	-0.01%	0.24%	0.00%

Change in critical
margin

-1

Macedon Ranges Shire Council - West Ward

COUNT	GYORFFY, Tom	MANNING, Neil	PEELER, Len Ian	JUKES, Roger	LIVINGSTO NE, Liz	BENSON, Henryka	YARDLEY, Russell	WILSON, Brian John	TODD, Alan	HARVEY, Noel	DRAGO, Joan E.	TOTAL FORMAL	TOTAL INFORMAL	TOTAL
Original	954	812	447	1810	574	673	559	214	574	1185	420	8222	308	8530
Recount	953	813	447	1810	574	673	559	214	572	1187	420	8222	308	8530
Diff (Rec - Orig)	-1	1	0	0	0	0	0	0	-2	2	0	0	0	0
% change	-0.10%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.35%	0.17%	0.00%	0.00%	0.00%	0.00%

Change in critical
margin

0

Wodonga City Council

COUNT	FERGUSO N, Chris	MAHONY, John William	MAHOOD, Lisa	BLAIR, Ken	WANGMAN , Rodney	SLADE, Bob	FREEMAN, Dean P.	BLACK, Dennis G.	FRASER, Michael J.	EMMINS, Julie	EDGAR, Marilyn	HANUSKA, Jenny	FOULSTO N, Edward	WICKS, Brian	BYATT, Mark	DE KRUIFF, John	BENNETT, Kieran	BROWN, David Anthony	COLLINS, Angela Cyrilla	SPEEDIE, Anna	TOTAL FORMAL	TOTAL INFORMAL	TOTAL
Original	1241	666	2597	227	2360	327	582	344	755	622	151	716	1096	415	1556	440	302	737	1506	1329	17969	1455	19424
Recount	1243	668	2601	227	2361	327	582	344	756	622	152	719	1097	415	1558	442	302	739	1508	1330	17993	1431	19424
Diff (Rec - Orig)	2	2	4	0	1	0	0	0	1	0	1	3	1	0	2	2	0	2	2	1	24	-24	0
% change	0.16%	0.30%	0.15%	0.00%	0.04%	0.00%	0.00%	0.00%	0.13%	0.00%	0.66%	0.42%	0.09%	0.00%	0.13%	0.45%	0.00%	0.27%	0.13%	0.08%	0.13%	-1.65%	0.00%

Change in critical
margin

-5

Melton Shire Council - Coburn Ward

COUNT	KEAN, Brady	FILES, Tiffany	TURNER, Bob	SAUER, Dirk	RAMSEY, Sophie	BORG, Broden	KIRK, Karily	DOBSON, Helen	STRANG, Troy	DEMPOSEY, Graham James	AGG, Barry	WARREN, David	STEWART, Joseph Adrian	VAN LIESSUM, Tracy	GIBLETT, Zac	TRAINOR, Denise	ROSS, Jessica A.	ROWAN, Bruce	PHILLIPS, Lauren	WRIGHT, Sharon	MATALEW SKI, Michael	DAVIS, Craig Peter	TOTAL FORMAL	TOTAL INFORMAL	TOTAL
Original	691	195	1635	163	3218	2024	351	644	193	1958	134	713	534	602	634	416	256	2534	992	308	252	503	18950	1718	20668
Recount	692	195	1635	163	3220	2027	351	644	193	1960	135	713	535	602	634	417	256	2537	993	309	253	503	18967	1701	20668
Diff (Rec - Orig)	1	0	0	0	2	3	0	0	0	2	1	0	1	0	0	1	0	3	1	1	1	0	17	-17	0
% change	0.14%	0.00%	0.00%	0.00%	0.06%	0.15%	0.00%	0.00%	0.00%	0.10%	0.75%	0.00%	0.19%	0.00%	0.00%	0.24%	0.00%	0.12%	0.10%	0.32%	0.40%	0.00%	0.09%	-0.99%	0.00%

Change in critical
margin

-2

Appendix C – Case Studies – Distribution Reports

(Available to download on web site)

© State of Victoria 2009

This publication is copyright.

No part may be reproduced by any process except in accordance with the provisions of the Copyright Act 1968.

Address all enquiries to the Victorian Electoral Commission,
Level 8, 505 Little Collins Street, Melbourne, Victoria 3000.

Revision: 1 October 2009