The Accuracy of Counting Inventory
A Ten-Year Analysis of Physical Inventory Counts
By Dan O'Haver

Keeping accurate inventory counts is an exhaustive and elusive task. Like my Golden Retriever "Stella" chasing her tail, we go round and round, counting and counting just to end up where we started: at Commodity Group 10 to spin around again. Perhaps we should pause, take our eyes off our tails and assess the situation. A reasonable person might think that once a good count is taken then a little maintenance through cycle counting will sustain that holy grail of absolute inventory accuracy; but experience suggests this is not the case. Even with solid inventory procedures and practices in place, we can stroll down our aisles with an inventory report or wireless gun and a cycle count will reveal many inaccuracies.

At our store we've been using computer generated orders for over 20 years and we still struggle to keep accurate counts. After all these years it seems that we would have it all worked out; but we still make over 5,000 inventory adjustments a year (about 14 per day) through cycle counting. It's logical to assume that a portion of these adjustments are caused by theft, breakage and/or cashiering errors—but the sheer volume begs the question: *are all 5,000 adjustments correcting shrinkage of this type?* Or is the traditional cycle counting process itself flawed in a way that it introduces a significant amount of counting errors into our systems?

Maybe through cycle counting we are acting a lot like my dog Stella, going round and round only to make and correct counting errors. The goal of this analysis is to answer the question by determining a method for measuring cycle count errors and then use this method to look at our data over the past 10 years. Before we get into much more detail let me grab your attention by divulging the results of this analysis: **almost 40% of our downward inventory quantity-on-hand adjustments are erroneous and the errors cause us to carry an additional $10,000 of inventory at a low turn rate.** The rest of this paper will show the results of the analysis in detail and finally make some recommendations to help reduce our error rates and achieve better labor utilization.

Stella the tail chaser

Overview

Inventory shrinkage is an unfortunate but normal part of retail business. Industry statistics suggest that shrinkage can cost around 2% of a store's sales on an annual basis (our industry tends to average higher). When we take a look at our store's inventory shrinkage over the last decade, it hovers around 1% of sales per year, which is significantly better than the average. But even a shrinkage rate of 1% can cause havoc for those of us using computer generated orders (CGO) since the computer system cannot account for stolen or broken merchandise automatically.

In our store, even a shrinkage rate of 1% means that we need to discover and adjust over 3,300 items per year or we run the risk of running out of stock on those shrunken items! The traditional method used to discover these items is called a cycle count: counting every item in the inventory system file, section by section; when a discrepancy is found between the physical shelf count and the computer count, the computer count is adjusted. With over 25,000 items to count, this traditional way of cycle counting is a manual, laborious, and never-ending process.

The next sections will discuss counting errors in detail, but it is important to remember that they only focus on *inventory adjustment errors*. An overwhelming majority (~96%) of the items counted will not need to be adjusted since their counts will match the computer's records. However, of the items that are adjusted, many are made in error causing the computer's inventory accuracy to suffer and mitigating the effectiveness of the count itself.

The traditional cycle counting process, by its very nature, is laborious and difficult (maybe impossible) to perform with a great deal of accuracy. The practice of spending serious labor hours to verify accurate inventory counts and make doubtful adjustments has to be questioned.

Background

The tale of a shrunk-out SKU: 11203 (BIX Stripper, Gallon)

There I was, gazing at my computer screen with SKU 11203 showing a Quantity On Hand (QOH) of minus two. Now, I might not be the sharpest tool in the shed but a QOH of -2 can't exist. It's an obvious error and we try to correct this type of error every day as part of our inventory control procedure. But this SKU I've seen before, it had shown up on a shrink report just a few days earlier. A little investigation shows the quantity-on-hand change history (shrink history) in the table below:

Row No.	Date	From	To	Type	Upward Shrink Correction Type
1	8/6/96	4	2	False Shrink	
2	8/20/96	-1	0	Correction	Passive
3	3/10/97	-1	0	Correction	Passive
4	**12/18/97**	**3**	**2**	**True Shrink**	
5	8/14/02	3	0	False Shrink	
6	8/28/02	1	4	Correction	Active
7	5/1/07	2	0	False Shrink	
8	5/4/07	-2	0	Correction	Passive

Table 1

Let's take a look at Table 1 to understand what's happening to this SKU. On 8/6/96 the SKU was adjusted downward from 4 to 2 on hand during a cycle count. The next two rows seem to indicate that line 1 was really some sort of count error and it resolves itself over the course of the next seven months: going negative as a result of point-of-sale (POS) activity on 8/20/96 and then again on 3/10/97. During this period, there had been multiple sales and purchases and the error was ultimately revealed and corrected through this activity. Then on 12/18/97 we see another shrink episode, but this time we do not see any correlating reversing shrink—this looks to be the only true shrink event out of the item's entire history. Next we see another downward shrink (row 5) which turns out to be another count error since it is corrected 14 days later (row 6). On 5/1/07 we see a count error yet again, this time being resolved by selling through at POS.

Detecting shrink errors through upward shrink

We can see from the above example that when an item's QOH is changed *from a lower quantity to a higher quantity* on hand (upward shrink) it is likely to be a correction to a previous downward shrink error. If we look back at Table 1, we can be quite certain that rows 1, 5 and 7 are count errors because there is no other logical explanation for their corresponding upward shrink entries. Thus, if we can correlate a downward shrink episode with a corresponding upward shrink episode then we can be confident that the downward shrink was some type of human counting error.

Passive vs. active upward shrink

If we understand that upward shrink can point to a previous downward shrink error then we should look at how upward shrink events occur. By looking at Table 1 we see two types of upward shrink corrections. They are similar in that they both increase QOH, but differ in the way in which they are made: one is made **passively** when the item "sells out" and its QOH goes negative via the POS system as it subtracts the item's sales quantity from its QOH. The other is made when a physical count is taken and the adjustment is manually made to the system (**active**). Either one can take quite a bit of time to be discovered and resolved (more on that later). For a passive adjustment to be revealed, the item needs to "sell out" on the shelf which only happens when there is low stock availability or unusually high customer demand. At this point the item's QOH will go negative and hopefully someone will correct it through some sort of negative QOH reporting procedure. On the other hand, an active adjustment is made during a scheduled cycle count, or if an employee happens to notice an unusually high supply of an item and makes the adjustment on the spot.

True shrink vs. false shrink

Obviously, not all downward shrink is erroneous in nature. Theft and breakage are common and we need to account for it by updating the system counts. I call this type of adjustment "true shrink" since the inventory system needs to be updated when the shrink event occurs to maintain accuracy. The other type of shrink adjustment I like to call "false shrink" since there is no physical shrink event that occurs to precipitate the inventory adjustment. The inventory system is adjusted downward for some reason, but the physical item(s) are still in the store; these are count errors.

True Shrink

Theft	Breakage	Spoilage	Cashiering errors

False Shrink	**Description/Example**
Counting Errors	Counted 7 when there were really 8
Keying/writing errors	Typed a 3 instead of an 8
Keying timing errors	Item sold/returned between time count taken and entered
Receiving timing errors	Count taken out-of-sync with back office receiving
Orphaned Items	Items located in/on adjacent bins/hooks or random places in store
Double faced items	Missed counting of multi-faced items
Multiple item location	Items in other locations missed in count
On display	Additional items in display window/area not counted
In return bin	Items in returns bins not counted
On special order shelving	Items in special order area not counted
Back stock	Items in back stock room/shelves not counted

By looking at the lists above, we see how easy it is to introduce count inaccuracies or false shrink during the cycle count process. In fact, with all the things that can go wrong with counts, it's not surprising to see our error rate approaching 40%.

Back to SKU: 11203 *(BIX Stripper, Gallon)*
Remember our previous BIX example? It was caused by the failure to account for overstock on the shelf above. I reviewed the most recent episode on our security camera system: intent on performing the cycle count task at hand, the employee didn't even bother to look for overstock, he counted the empty hole as zero and then went right on counting the rest of the section to get the job done (and ignored a few customers along the way). But let's not be quick to place fault on the employee; we have capable staff and very capable overstock and inventory systems/procedures in place. Human nature is tough to overcome and we'll see that our error rates have been sustained over a long period of time. Maybe it's the nature of cycle counting that is at fault.

How much time does it take for errors to be revealed?
In 2003 for example, we had 5,228 downward shrink events, of these 1,942 (37%) were false shrink and 3,286 were true shrink (63%). So we introduced 1,942 errors to fix the 3,286 true shrink events. But that's not the whole story. If we look at the time period it takes for a downward shrink event to be resolved, it can take anywhere from 1 day to 10 years. So we have not yet fully resolved all the 5,228 downward shrink events from 2003. When we take future corrections into account, we will expect the real error rate to be 3 points higher (40%) as we uncover more (139 expected) errors over the next few years.

The more we looked at the time factor, the more we discovered that it plays a significant role in the whole detection/correction process. Our data show that it takes an average of 1.2 years for a count error to be resolved but these data have a wide distribution (see appendix 2). The time effect is a crucial component to understand because it shows that once an error is introduced, it tends to stick around for a few years. It also means that it takes a chronologically long data set to determine an accurate error rate.

The Numbers

Year	Passive	Active	Total
2006	2.5%	7.8%	10.3%
2005	8.9%	13.5%	22.5%
2004	10.5%	21.0%	31.5%
2003	7.9%	25.8%	33.7%
2002	5.7%	31.5%	37.1%
2001	5.2%	29.7%	34.9%
2000	4.2%	33.4%	37.6%
1999	4.4%	35.4%	39.8%
1998	3.7%	33.1%	36.8%
1997	9.0%	35.8%	44.8%
1996	5.8%	33.3%	39.2%

Table 2, as of 12/31/2006

Table 2 shows error percentages by correction type as a percentage of total downward shrink episodes. Notice how the total error rate appears to trend downward over time[1], especially in the most recent years. But if it takes a few years for errors to be uncovered then this downward trend is deceptive: the errors are there but they have not yet been discovered. We must factor in future expected corrections into our table to get a more realistic view of our current and total error rates.

The distribution of errors
For me, the most fascinating part of our findings is when we look at the length of time between the false shrink episode and the correlating reversal. The average length of time is about 1.2 years (440 days) but the values are widely dispersed with the maximum time being 10 years!

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[1] We started changing our negative QOH correction procedure (passive column) in 2003 from weekly to daily correction. We found that potential passive corrections were getting masked by receiving timing: if an item goes negative and then gets purchased and received before the next report then it is missed. This change has nearly doubled our passive error detection/correction rate.

Time Distribution of Error Reversals (2006)
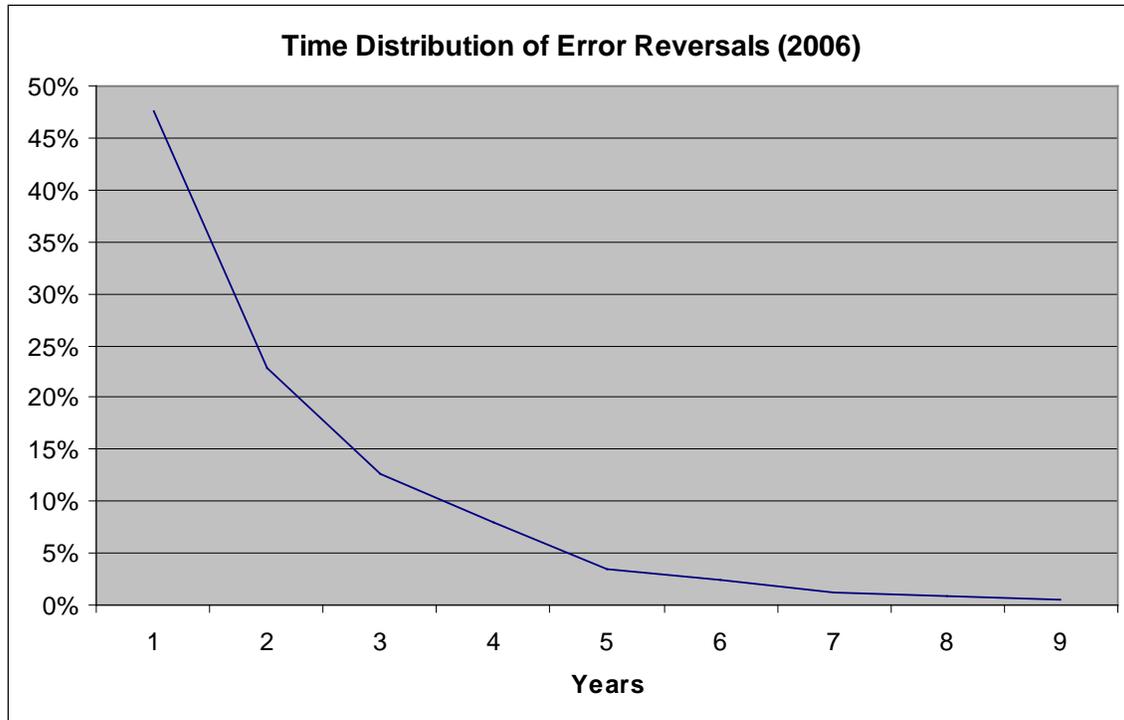
Figure 1

Figure 1 is a graph showing the time-value distribution of error corrections in year 2006. That is, out of all the errors corrected in 2006, what percent corrected errors made in the same year, the previous year, etc. We can see that around 47% of the reversals corrected false shrink events made within the 1st year (2006). 23% corrected errors made in the 2nd year (2005) and 13% a year before that (2004), etc. There were even a small amount of corrections to errors that were made 8, 9, and 10 years ago! From the shape of this graph we should be able to reasonably predict how many errors made in 2006 might be corrected in 2008, 2009, 2010, etc. Therefore, if we assume this graph represents an average distribution shape (it is) then we can use it to help predict our real current error percentages by adding in the expected future corrections to our already realized percentages.

Count Errors as a Percentage of Downward Shrink
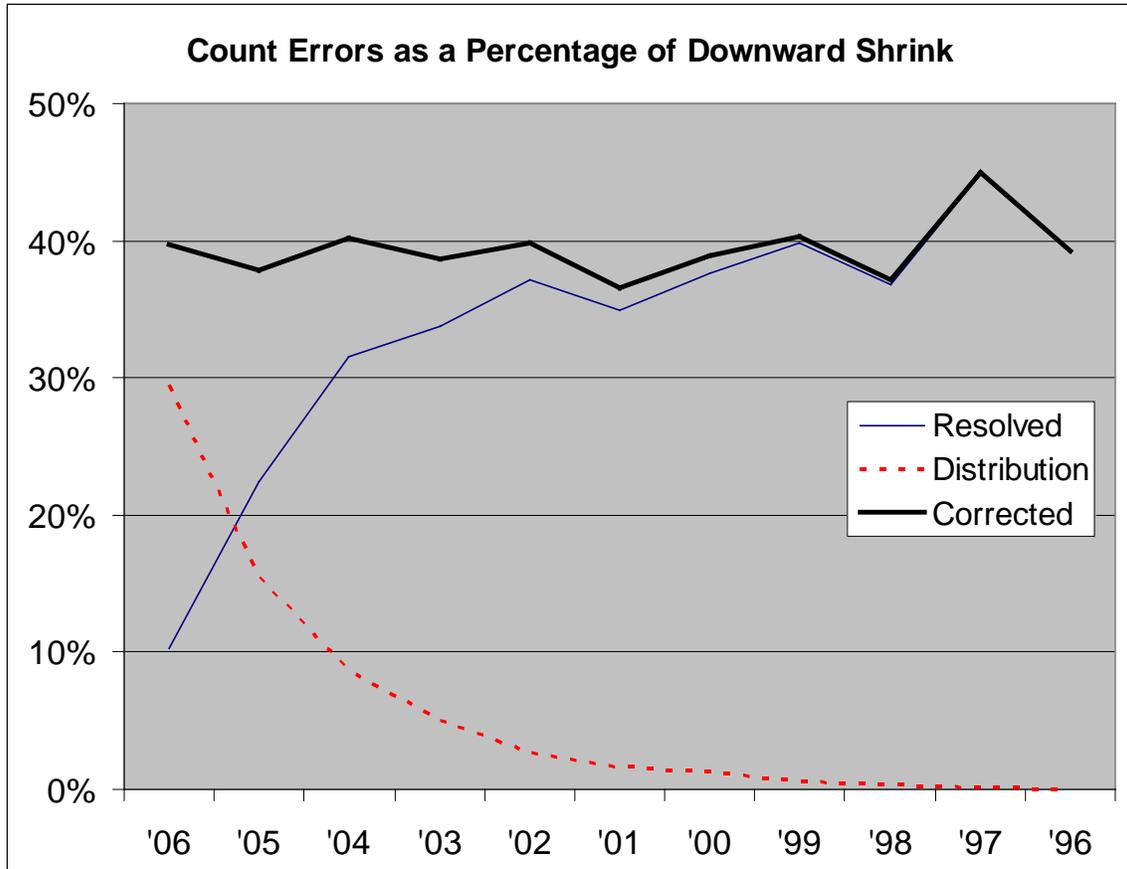
Figure 2

Figure 2 shows our time-corrected error rate. The thin blue line shows the values from table 2 which are current realized error rate percentages. The red dashed line shows the average distribution of errors from our previous discussion, and the heavy black line shows the expected error rate factoring in both the current and the future errors. This line seems to hover between 35% and 40% and represents the expected actual error rate over time. Notice how the blue (actual) and black (expected) converge over time, but it takes about five years for the vast majority of errors to be resolved. So expect that the errors your staff made yesterday to take a few (or more) years to work themselves out. And also be ready to pay hard cash for any errors that caused merchandise to be ordered.

Impact

The results of our analysis show that two out of every five downward shrink adjustments turn out to be incorrect. Fortunately, most of these errors are eventually found and corrected within a few years; however, through the cycle of counting, the cadence of introducing and correcting errors leaves its mark on payroll and inventory expenses.

Let me go out on a limb and suggest that we should consider any payroll dollars spent doing regular cycle counting to be wasted. It's not a lot different than paying staff to dig holes and then paying them again to fill them back up. It is hard to fathom any regular business procedure that can tolerate this kind of error rate, even if it's halved. From a pure statistical standpoint, if a sample cycle count introduces 40 random errors for every 100 it corrects then the sample will need to be recounted 10 times to achieve a 99% error rate. In reality, our errors are not completely random but the point remains: we do not have enough room in our payroll budgets to significantly increase the number of cycle counts—and if we did, I suspect that we would see our error rate increase.

Other than payroll, many downward shrink errors result in increased inventory carrying costs since any shrink that causes an item's QOH to cross its order point threshold will be ordered during the next order cycle. If there is any good news about our cycle count error rates it is that the extra inventory carrying costs are much lower than one would suspect: when shrink errors are corrected, the excess inventory eventually sells through. Interestingly, if we look at purchases that have resulted from erroneous shrink, all but $2,300 ($230 per year) have sold through. But the good news ends there when we consider excess purchases in the time lag between false shrink and its correction. In this gap, we fund a permanent inventory increase which works out to be about $10,000 in extra inventory. Since the extra inventory is essentially overstock, it tends to sell at a very low turn rate and our results show a GMROI of about 0.26.

Greater than payroll and inventory expenses, however, traditional cycle counting impacts our ability to achieve full inventory accuracy. This is a big deal because physical inventory accuracy is the bedrock of computer generated orders and count discrepancies not only limit the computer's value, they also chip away at the staff's confidence level which is so important in getting these systems up and running effectively.

Recommendation

After digesting the data and thinking about this problem for a long time, I have formed an opinion: stop cycle counting and move towards a more intelligent count procedure that uses local sales data combined with peer store data to suggest items that need to be considered for counting.

Let's take a step back and look at the big picture. We have about 25,000 SKUs in our store, which is not much different than a typical store. In a year, we might have 3,300 true shrink events that need to be discovered and adjusted. With a traditional twice-a-year cycle count, let's assume that we find one third of these shrink events during the first count and another third during the second cycle or 1,100 events per cycle count; and we'll assume the remaining third will be discovered by spot checking inventory throughout the year. Without factoring in the error introduction rate, we are utilizing our precious labor hours to verify and re-verify inventory that is already represented in the system accurately (~96% accuracy rate). Considering the amount of time it takes and a high natural error rate, we must take this opportunity to use technology instead of brute force labor to help us weed out and fix the problem SKUs and true shrink in our stores. That is, why count 100% of our inventory twice a year, every year when we are only looking for a fractional amount of inaccurate items (only 4% expected).

For the most part, we already have the data and technology to create intelligent reports that can suggest the 4% piece. Additionally, and with these reports, a count procedure could be graduated so that it focuses on large impact items; we can look at these more often. Maybe we only need to count 0.5% of the right inventory to achieve the same benefit (or better) as a full cycle count.

Our sales and inventory data give us the ability to develop more intelligent reports to help us zero in on our inventory inaccuracies by pinpointing procedural and/or human problems.

Tools

Smart Physical Count & Opportunity Report (See Appendix 4)

Let's revolutionize the cycle count.
If we compare one store's (or a peer group of stores) item sales against another store's then we can suggest items that are selling in one store(s) but not in the other. This is a powerful report since it can tell us two things: 1) which items need to be investigated, and 2) which items might sell well but are not currently carried in our store.

Physical Count Report
1) If we assume that currently selling items have reasonably accurate counts then we need only look at items that are in our inventory file, but are not selling compared to peer stores; especially if these items once sold well in our store too. Most likely these are items that have been lost due to shrink. If we adjust the parameters correctly, we will be able to hone in on the exact subset of items that need to be counted to achieve a full count. I will suggest that this report alone can replace the typical full-scale cycle count of 25,000 items by only counting a fraction of the items, 1,000 in our stores with similar or better results with significantly less labor hours.

Opportunity Report
2) A side benefit from the report above is its cousin: the opportunity report. We can suggest items that are selling in peer stores, but are not in our store's inventory file. When we first created these reports for our stores, they suggested over 2,000 items between the stores with an annual incremental sales potential of over $40,000. This is a powerful tool since parameters can be tweaked to catch regional and/or national trends.

Overstock Reporting System (See Appendix 5)
A simple overstock program can print a daily report suggesting what items to fill from overstock based on the previous day's sales. It is very simple to maintain and extremely effective. This system leads to reduced overstock and increased sales not to mention more accurate inventory counts.

Smart Negative QOH Report (See Appendix 6)
When an item goes negative as a result of POS activity then we should let the computer do some investigative leg work. If we can correlate the error with a corresponding downward shrink event then we know the negative QOH has fixed itself and very little needs to be done other than to verify the real QOH. On the other hand, if it is not a shrink reversal then we can intelligently look at previous POS activity to see if similar items sold in the shopping basket; if there are then we might have a previous cashiering mistake or a scanning error where the cashier has entered a sales quantity incorrectly on two similar items.

Conclusion

Traditional cycle counting introduces too many errors to be helpful in maintaining accurate inventory counts. It contributes to the mistrust of our systems: "the computer is never right" which can be hurtful to those who are trying to get on board with computer generated order points. With only a finite number of hours in a day and a finite payroll budget, we will be better served if we spend more time looking for items that have disappeared from our shelves rather than focusing the majority of our time on items that are already on our shelves and selling (the traditional cycle count).

Through intelligent analysis and reporting, we can allow computers to zero in on a subset of items that deserve counting and consideration. For example: a high-velocity item that has stopped selling locally but is still selling well in peer stores is one such item that needs attention. With the ability to report in this capacity we can reduce the human effort involved and greatly increase the effectiveness of our inventory counting.

Moreover, we can schedule and coordinate our entire organization to review commodity groups together **at the same time**. This will result in increased compliance at the store level and we will benefit from collective wisdom through group discussions.

For the most part, we have already made the difficult investment in standardized technology that will allow these recommended reports to be made available to retailers. The human effort involved in creating these smart reports will result in increased sales and a more efficient utilization of labor hours in our stores.

About the author

Dan O'Haver has a degree in computational mathematics from Albion College and owns two Ace Hardware stores in Southeastern Michigan. He grew up working in the store he now owns (since 1996) and opened a new store in 2005. Previously, he co-founded an award winning software development and consulting company. He is a board member of United Bank and Trust – Washtenaw and has chaired his town's Downtown Development Authority since 2001. He lives in Dexter, Michigan with his lovely wife Abby, two-year old son Will, newborn daughter Annabel and dog Stella. He can be reached via email at
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Appendix 1

About our store
We are a typical downtown hardware store in a small neighborhood community doing about $1.7 million in annual sales. We are probably a lot like the average store in many ways including the way we physically count inventory. It would not be surprising to find that the average store has similar (or worse) downward shrink error rates.

Data collection
We collected the data used in this analysis in an automated way through our Activant POS system using their Request program which allows capturing and transferring of many of the system files including the physical change file detail. We store the resultant data on a separate system in normalized database structures.

Data structures
It turns out that the required database structure is as about as simple (and I like simple) as it gets for the bulk of this analysis: one table with these fields: date, SKU, QOH_to, and QOH_from. The real difficulty lies not in its complexity, but in capturing and maintaining these data through the years.

Excluded items
For this study, we excluded certain noisy error-prone categories like the fastener department and cut & measure categories from all totals and percentages. We also limited our data set to Ace SKU items only; and further excluded items that were shrunk and then subsequently deleted from the inventory file within 5 days.

Method of determining error percentage
Upward shrink turns out to be a fool-proof indicator of a previous error as there can be no other earthly explanation. The difficulty lies in correlating the upward shrink event with a corresponding downward shrink, but it can be done. This is a simple and accurate way of proving the existence of errors, when they were made and when/how they were corrected.

Appendix 2
Error Reversal Data & Statistics

The table below shows the actual number and percentages of our error reversals over the years. It does not include expected future reversals.

Year	Total # Downward Shrink	Total # Passive Reversals	% Passive of Total Downward	Total # Active Reversals	% Active of Total Downward	Total # of Reversals	% Total of Reversals
2006	2787	70	2.5%	217	7.8%	287	10.3%
2005	3388	303	8.9%	458	13.5%	761	22.5%
2004	3807	398	10.5%	801	21.0%	1199	31.5%
2003	4393	347	7.9%	1134	25.8%	1481	33.7%
2002	5228	297	5.7%	1645	31.5%	1942	37.1%
2001	5468	282	5.2%	1626	29.7%	1908	34.9%
2000	4791	203	4.2%	1598	33.4%	1801	37.6%
1999	3919	172	4.4%	1387	35.4%	1559	39.8%
1998	3044	112	3.7%	1008	33.1%	1120	36.8%
1997	3285	150	4.6%	1177	35.8%	1327	40.4%
1996	2927	171	5.8%	976	33.3%	1147	39.2%
Total	43037	2505	5.8%	12027	27.9%	14532	33.8%

- without projected future corrections

The table below lists statistical data regarding the number of days between the shrink event and its corresponding reversal.

	Passive	Active
Average	469 days	429 days
Median	305 days	242 days
STD	524 days	525 days
Min	1 day	1 day
Max	3,661 days	3,772 days

This table shows the likelihood of a current reversal to correct an error made in the current or chronologically preceding years. That is, a reversal made today has a 47.6% chance of correcting an error that was made in the past 365 days, a 22.9% chance of correcting an error that was made between 366 and 730 days ago, etc.

Year	%
1st Year	47.6%
2nd Year	22.9%
3rd Year	12.6%
4th Year	7.9%
5th Year	3.5%

Year	%
6th Year	2.5%
7th Year	1.2%
8th Year	0.8%
9th Year	0.6%
10th Year	0.3%
11th Year	0.2%

Appendix 3
Inventory cost analysis

If we assume we purchase one item per false shrink event and we assume the average item cost is $4.51 (our average on unresolved shrink) then we can calculate our expected inventory cost. Additionally, if we look at annual gross profit dollars derived from sales of items that have gone negative passively, we can determine a GMRIO for this additional inventory.

Year	Resolved False Shrink %	Future False Shrink %	Total Expected False Shrink #	Number of False Shrink Yet to be Resolved #
2006	10.3%	29.4%	2787	820
2005	22.5%	15.4%	3388	523
2004	31.5%	8.7%	3807	331
2003	33.7%	5.0%	4393	219
2002	37.1%	2.7%	5228	139
2001	34.9%	1.6%	5468	89
2000	37.6%	1.3%	4791	61
1999	39.8%	0.6%	3919	22
1998	36.8%	0.3%	3044	10
1997	40.4%	0.1%	3285	5
1996	39.2%	0.05%	2927	1

Total Events	2,220
Avg. Item Cost	$4.51
Total Inventory Cost	$10,013.78
Neg. QOH Gross Margin Dollars	$2,617.00
GMROI	0.26

Appendix 4
Physical Inventory & Maintenance Report

This example report is taken from a real report run for our store in June. It
suggests maintenance, physical count, and item additions for Commodity Group
10. The "peer store" data is based on our other store but could easily be a group
of peer stores, which would make the report significantly more meaningful.

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Physical Inventory & Maintenance Report Commodity Group 10          06/06/07
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ROP Protected SKUs that were Out of Stock, last 90 days
SKU             Description      Total Days Out of Stock
11372   50# BAG OIL ABSORBANT              17


SKUs that were manually cut from the order that were out of stock, last 90 days
None


SKUs that have been out-of-stock more than 2 times in the last 90 days
# times OUT  SKU     Description                       QOH   Popularity
   4         1005412 CLEANR GLAS19OZ SPRAYWAY           4       E
   3         11372   50# BAG OIL ABSORBANT              4       D


Warehouse cancelled items still in file
SKU      Description                QOH
12456    PLASTIC CLEANER AEROS cancelled   1
10370    BRUSH STOVE BRASS 3/4" cancel     2
1069384  SWEEPER PLEDGE GRAB-IT cancel     2
19108    FRESHNR AIR XPLUG TROPCL cancel   2
1214808  REFILLS GRAB-IT CITRS20C cancel   3


Physical Count Listing: items that have not sold in 2 years or more
SKU      Description                QOH     Ext. Cost   Discovery
1149475 TOILET CLEANR REFL LYSOL    12       37.08       NBR
1307719 GEL-GLOSS 8 OZ              11       31.02       NONE
1202399 CLEANR MARBLE 32OZ          6        30.60       NBR
1207430 CLEANR HSEWSH KRD KTR32O    4        26.72       NONE
1200724 REMOVR STAIN TECH GALLON    2        25.06       NONE
1001247 REFILL TWISTNMOP            5        20.05       CON
19240   MOPHEAD REFILL 5"X36"       3        17.49       NBR
10037   CLEANR MOBILHOME GL N&EZ    2        15.96       NONE
1069384 SWEEPER PLEDGE GRAB-IT cancel 2      14.22       NONE
10518   REFILL LG DUSTMOP (10517)   3        13.26       NBR
12060   WHL/FNDR BRSH 8-1/2 NAT     6        10.68       SUP
1214808 REFILLS GRAB-IT CITRS20C cancel 3     9.48       NONE
1182237 REMOVR CONTRACTR SOLVENT    2         7.52       NONE
10009   NAVAL JELLY RUST NEUTRALIZER 2         7.50       SUP
17694   GUARDSMAN POLISH SPRAY 16 OZ. 2        6.38       SUP
10272   CLEANR DIRTEX 4-1/2#        1         5.51       NONE
1014927 CLEANR ANTIBACTERL 22OZ     2         4.22       SUP
12454   TUB'N SINK JELLY 8OZ        2         4.20       NONE
13898   VAC BAG 5PK PORTAPOWER      2         3.44       NBR
17540   DUSTPAN+BRUSH MINI BUTLR    2         2.14       CON
12278   VAC BAG 3PK HOOVER TYPEG    2         2.06       NBR
12720   VAC BAG 3PK QUICKBROOM E    2         2.06       NBR
10062   HOOVER VAC BAGS STYLE M     1         1.72       CON
13410   FRESHNR AIR STIKUPCIT2PK    2         1.56       NONE
10403   FEATHER DUSTER              0         0.00       CON
12603   MINI-BLIND CLEANER          0         0.00       CON
17249   WEBSTER A/P DUSTER 70       0         0.00       CON
17554   SCRUBR STAINLSS 3"          0         0.00       CON
1009026 DUSTBUSTER FILTER BAGS      0         0.00       CON
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1026871 EUREKA SUPER BROOM VAC         0       0.00      CON
1038058 DIRT DEVIL HAND VAC ULTRA      0       0.00      CON
18988   CLEANR LYSL TUB+TL29.3OZ       0       0.00      NONE


Convenience Items not in Inventory
SKU      Description                   Class
1205186 CLEANR FORM409 ORNGE 22O       103
10125   CLEANR FBRGLS GELGLOS PT        105


Neighborhood Items not in Inventory
SKU      Description                   Class
1221167 POLISH GLASS NOSTREEK160       105
13816   LITE & THIRSTY WET MOP          111
1260991 RESOLVE DUAL POWER 22OZ         112
17250   DUSTR POLY DUSTIN 20"           116
1032127 DUSTR FLUFF&DUST 15"           116
12014   SWIFT SWEEP SWEEPER             123
13606   CORDLESS SWEEPER BLUE           123
1099969 VAC/CLEANR SPOTLFTR PWR         123
1147156 THE SHARK HAND VAC             123
1202746 SCORPION QUICK FLIP VAC         123
1204320 SUPER SHARK HAND VAC           123
1215318 SWEEPER CORDLESS"SHARK"        123
1226851 VAC TEMPO UPRIGHT              123
1228592 MAXIMA VAC 12A                 123
1229269 PERFECT SWEEP SWEEPER          123
1229764 DUSTBUSTER HAND VAC 9.6V       123
1235332 FLIP-IT BARE FLOOR CLENR       123
1255439 DYNAMITE PLUS QUICK VAC        123
1255496 DIRT DEVIL BROOM VAC           123
10648   VAC BAG HOOVER "J" PK3          155
12318   VAC BAG EURKA S&M BG4PC         155
12723   VAC BAG KENMORE PK2             155
13007   VAC BELT TYPE PH 2PK            155
18907   VAC BELT BROOM2PK D DEVL        155
1005198 VAC BAG 3PK STYLE Y            155
1009224 VAC BAG MIGHTYMITE"N"PK3       155
1009414 VAC BAG ROYAL STICK VAC        155
1030865 VAC BAG HOUSEKPR+"P" PK2       155
1066356 VAC FILTER CUP BV2000          155
1082106 VAC BELT2PK ROOMMAT RPLC       155
1084276 VAC FILTER2PK ROOMMATE         155
1101229 VAC BAG 3PK TYPE "J"           155
1198795 VAC FILTR DBUST "V"SERIS       155
1204403 VAC BAG MICOR ORECK PK3        155
1212216 VAC FILTER THE SHARK           155
```

```
SKU      Description                   Peer GP Dollars  Discovery
1242981 DEEP CLEANSING DET 128OZ       277              NONE
12934   PAIL SHEET GALV 10 QT          180              NONE
1174184 CLEANR BLEACH OUTDOOR          176              NONE
10522   HEAVY DUTY CORN BROOM          168              SUP
12647   REMOVR MILDEW GAL X-14         167              NONE
10554   ACE NO DUST SWP CMPD OIL  50 LB 162             NONE
1003185 ACE SPONGE MOP AUTO            154              NONE
1005263 SMELLS B GONE 24OZ             150              NONE
13786   PINESOL CLEANER GAL.           146              SUP
1087360 ACE SPRAY BOTTLE 40 OZ. HVY DUTY 126            NONE
19817   ONCE AND DONE FLOOR CL 1/2 GAL 124              SUP
12039   ROOF BRUSH 7" NAT FIBRE        117              NONE
12174   GEN PURP ADHESV REMOVER QT 3 M 108              NONE
17539   CLIP ON BUTL DUST PAN          103              NONE
17441   O-CEL-O SPONGES 4 PAK           89              NONE
1073261 OXO SQUEEGEE-HOUSEHOLD          88              NONE
1013325 CLEANR+DEGREASE CTRS GAL        84              NONE
1059492 BRUSH DECK 10" PALMYRA          81              NONE
13758   SQUEEGE BRASS18" ETTORE         79              SUP
1211440 BRSH SQUIRT/SCRB HOMEPRO        75              NONE
```

```
1107499 MOP MICROPLUS & PAD                          74              NONE
1093285 PROTECTR CAMP DRY 12OZ                        73              NONE
1032275 ACE STAINLESS CLEANER                         69              NONE
1221290 PUMACE TOILET BWL RING                        68              NONE
1004027 SOAP MURPHY OIL-- 1 GAL.                      67              NONE
```

Count Report: items selling in peer stores, in store file but not selling

```
SKU     Description                      Peer GP Dollars  QOH    Discovery
1207414 CLEANR KRUD KUTTER 32OZ                   105      4       NONE
17249   WEBSTER A/P DUSTER 70                      95      6       CON
10539   BROOM PUSH18"BLEND ACE                     89      2       SUP
18341   DUST PAN ALUMINUM 9"HANDLE                 80      2       NBR
10574   DUST PAN JANITOR                           63      3       CON
1182237 REMOVR CONTRACTR SOLVENT                   58      7       NONE
12468   DRIVEWAY APPLICATOR *18"*                  55      3       CON
13410   FRESHNR AIR STIKUPCIT2PK                   46      8       NONE
12240   EURK VAC BAG MIGHTY MITE C                 45      2       CON
1236645 FLIP-IT WOOD CLEANR32OZ                    40      2       CON
17694   GUARDSMAN POLISH SPRAY 16 OZ.              39     13       SUP
12454   TUB'N SINK JELLY 8OZ                       38      9       NONE
1038058 DIRT DEVIL HAND VAC ULTRA                  33      1       CON
12060   WHL/FNDR BRSH 8-1/2 NAT                    32      2       SUP
10154   KIWI BLK PASTE 1-1/8OZ                     32      1       NBR
10009   NAVAL JELLY RUST NEUTRALIZER               31     11       SUP
1190222 PAIL 19QT 2 WELL PLASGRY                   30      7       CON
10517   FLOOR DUST MOP 24"                         28      2       NBR
1200732 STAIN REMOVER STAIN TECH 8OZ               27      6       NONE
10118   GUARDSMAN POLISH CONCENTR 16 OZ            25      3       CON
15893   FLITZ METAL POLISH 50 GRAM                 24      2       NONE
10518   REFILL LG DUSTMOP (10517)                  24      1       NBR
10272   CLEANR DIRTEX 4-1/2#                       22      3       NONE
12353   VACUUM BAGS STYLE B                        22      3       CON
10153   KIWI BRN PASTE 1-1/8OZ                     22      1       NBR
10332   HAGERTY SILVER FOAM CLEANER 7 OZ           21      2       CON
1307719 GEL-GLOSS 8 OZ                             21      7       NONE
1256809 SWIFFER CARPET FLICK KIT                   21      4       NBR
13763   SQUEEGE REFIL 18" ETTORE                   20      3       NBR
13351   "TREWAX" TILE SLATE TERRAZZO               18      2       CON
18218   SILICONE GROUT SEALER 4.3 OZ               17      1       CON
1001247 REFILL TWISTNMOP                           16      1       CON
19239   MOP DUST COTTON 5"X36"                     15      1       NONE
1219062 BLEACH PEN CLOROX 2 OZ                     14     13       CON
1202266 MOP SWIFFER WET JET                        13      1       CON
10403   FEATHER DUSTER                             13     12       CON
1013366 FRESHNR PLNG 3PK REF TRP                   11      2       CON
17554   SCRUBR STAINLSS 3"                         11      2       CON
1202696 CLEANR ORANGE CLEAN 22OZ                   11      1       NONE
1026871 EUREKA SUPER BROOM VAC                      9      1       CON
10062   HOOVER VAC BAGS STYLE M                     8      2       CON
12603   MINI-BLIND CLEANER                          6      1       CON
1211416 BRUSH VEGGIE HOMEPRO                         5      4       CON
1080944 EVERY WHICH WAY REFILL                      4      1       CON
1256932 SWIFFER CARPET FLICK REF                    3     10       NBR
18278   HOOVER VAC BAGS STYLE "R"                    2      1       NBR
1229616 OUST FAN CITRUS SCENT                        1      0       NONE
```

Cross-linked UPC Report: the two SKUs show a UPC correlation problem that needs
to be checked
```
X-linked SKU    to SKU
10038           x  10039
10470           x  1204908
10480           x  10484
13192           x  13191
1062389         x  1091495
```

Order Multiples that can be reduced
```
SKU     Description                      Store OM   ACE OM   Popularity
1003771 SCRUBBER DISPENSER REFIL             2         1        H
1004548 MOP SPONGE HOMEPRO                   6         4        H
10124   ENDUST ORIGNL SCENT 10 OZ           12         1        H
10151   KIWI SADDLE SOAP                     2         1        H
```

```
10392    TOILET BWL BRSH PLAS WHT          2        1        F
10397    WHISK BROOM BXD ALL CORN         2        1        H
1092170 HOOVER TYPE Y MICROFILTRATION     2        1        E
1102037 DUSTER SWIFFER PROC&GAMB          9        1        F
1149574 MOP HARDWOOD REF15-1/2X9          2        1        F
11616    HOOVER SPIRIT BAG                2        1        H
11936    REMOVR RUST NAVL JELY PT         2        1        H
11953    S.O.S. 18 COUNT                  2        1        F
1201250 POLISH ORANGE GLO 16OZ           12        6        F
1219294 CLNR DISHWASHR MAGICPLUS         12        1        H
1226596 TERRY TOWEL WHT 4PK               2        1        F
1228857 SWIFFER DUSTER REFILLS            6        1        F
12320    CLEANR LYSL LQ FRSH 28          12        9        F
1256809 SWIFFER CARPET FLICK KIT          3        1        X
17399    ARM-HAMMER BAKING SODA 1 LB.     2        1        E
17404    GLADE COUNTRY GARDEN SPRAY 7 OZ. 2        1        F
17611    SPRAYER 12OZ CRYSTL COLR          2        1        H
18169    MOP SPONG AUTO 2-3/4X9"           6        4        F
19144    SPOT SHOT CARPET CLEANE 14 OZ     2        1        F

Order Multiples that can increased because of popularity
None
End of report
```

Appendix 5
Overstock Reporting System

This is an extremely simple system that needs only the overstock item's shelf/peg capacity. From there, the system can suggest items that need to be filled from back stock. We automate this report to run daily and fill from it every morning. Occasionally we audit our overstock room and add/adjust shelf quantities appropriately.
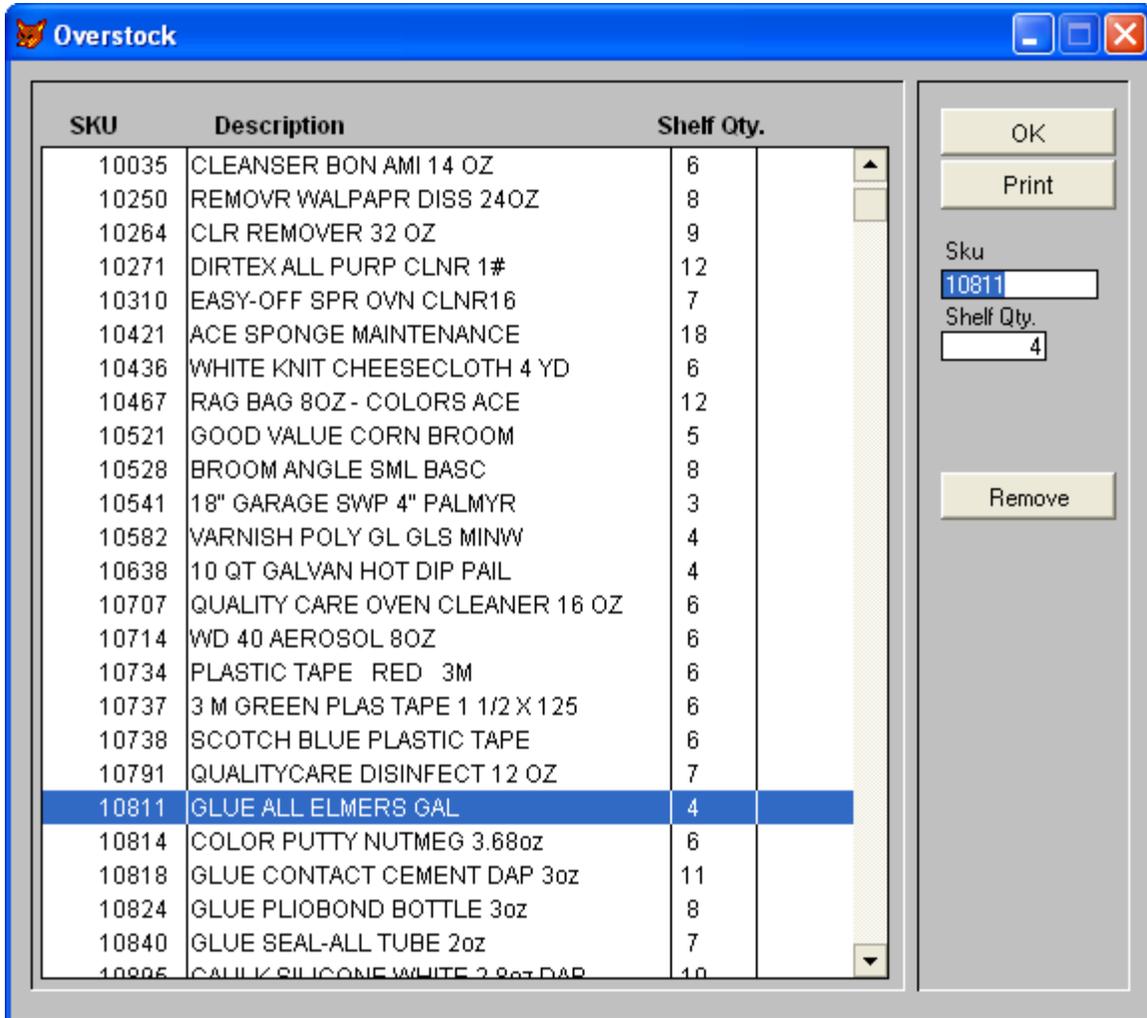
Here is our overstock report for 06/06/07

```
Overstock Report 06/06/07

SKU            Description                      QOH    Shelf Qty   Suggest Fill Qty
---            -----------                      ---    ---------   ----------------
17005          ENML SPRY CHNESE RD              29      21              2
17371          GLUE GOOP HOUSEHOLD 3.7oz         6       5              1
19225          ACE 6 IN 1 CARPET CLEANER-128OZ   3       2              1
19232          CLEANR RUG PRESPOT QT AC         11       4              1
64435          PAPER PLATES 9" 100CT             9       7              1
70732          PIC FLY RIBBON                   27      22              1
```

```
72224       INSECT BUG STOP GAL RTU           5          3          1
72674       KILLR HSE/GRD ACE 13.5OZ         12          6          1
75945       BAIT  BLOCK                       7          6          1
76911       TROWEL POLY HANDLE               20          6          1
80023       ACE HD30 1 QT PLASTIC            16          6          3
86917       ACE 10W30  1 QUART PLASTIC       12         11          1
88880       HUMMINGBIRD FEEDER  8 OZ          3          2          2
150010      Gorilla Brand duct tape          22          6          1
6065411     PAPER YARD WASTE BAG             23         20          1
7062755     SOIL ALL PURPOSE POT 8QT         10          6          1
7097579     CITRONELLA LAMP OIL              24          5          2
7114176     TRIAZICIDE GRANULES 10LB         11          4          1
```

Appendix 6
Daily Exception Reporting

Here is an example of our Daily Exception Report. Although much of the information on the report is outside the scope of this paper, the shrink section is relevant as it provides some detail on each shrink event and some analysis on each reversal (a few examples are highlighted). Every shrink event should be investigated in full, reviewing CCTV if necessary and/or possible.

```
Hackney's Daily Exception Report: Thursday, 06/07/07
Sales per customer: $14.82, Margin 46%, GPPCV: $6.86

Price Exceptions
Date     Time   QTY SKU        Description             Actual  System   Diff Cashier
06/07/07  8:11    1 40972      TAPE TEFLON JOINT1/2X100   0.79    0.99   -20% Mike
06/07/07  8:11    1 47818      BLACK TEE 1/2             1.03    1.29   -20% Mike
06/07/07  8:11    2 4127544    NIPPLE 1/2 X CLOSE BLK    0.52    0.65   -20% Mike
06/07/07  8:11    1 47822      BLACK CAP 1/2             0.79    0.99   -20% Mike
06/07/07  8:11    1 40969      PIPE THREAD CMPND 2 OZ.   1.03    1.29   -20% Mike
06/07/07 10:07    1 8110116    BATTERY GARDEN GT-R      26.39   32.99   -20% Mike
06/07/07 10:40    5 744        PIPE MACHINE LABOR        1.50    0.00 *****% Clara
06/07/07 10:54    1 2130060    SOCKET SET SAE/METRIC 58 49.99   59.99   -17% Mike
06/07/07 12:50    4 80337      QUAKER STATE OIL 10W30    1.99    2.49   -20% Donny
06/07/07 13:44    2 90442      CANDY GUMMI WORMS 2.75    0.50    0.59   -15% Pam
06/07/07 14:14    1 743        "LABOR" REPAIRS-SCREEN & 24.99    0.00 *****% Laura
06/07/07 18:51    1 743        "LABOR" REPAIRS-SCREEN & 14.49    0.00 *****% Dale
06/07/07 18:51    1 743        "LABOR" REPAIRS-SCREEN & 24.99    0.00 *****% Dale
06/07/07 11:28   -1 47822      BLACK CAP 1/2            -0.79   -0.99    20% Pam
06/07/07 13:03   -1 1010354    TAPE MASK2"X60YD 3M      -5.99   -7.49    20% Pam
06/07/07 15:21   -1 56         FASTENERS               -1.40    0.00 *****% James
Total Discounts:   $   21.64
Total HHC Coupons: $   55.00

Sales to General Departments  06/07/07  --
Date     Time  SKU            Description                Amount  Cashier
06/07/07  9:54 34             ELECTRICAL SUPPLIES          1.50  Donny
06/07/07 16:18 34             ELECTRICAL SUPPLIES          2.67  Pam
06/07/07 13:41 40             PLUMBING SUPPLIES            0.76  Clara
06/07/07 10:55 40             PLUMBING SUPPLIES            5.97  Dan

New Items Sold  06/07/07  --
Date     Time  SKU            Description                Qty  Cashier  Date Added
06/07/07  7:33 58330          SOCKET FURN CASTR 1/2CD4    2   Mike     03/21/07
06/07/07  9:49 4072435        O-RING 5/8ODX3/8IDX1/8      1   Donny    04/11/07
06/07/07 10:07 8110116        BATTERY GARDEN GT-R         1   Mike     06/04/07
06/07/07 18:32 8090144        LIGHT BI-COLOR BOW CPZ      1   Matt     04/10/01
06/07/07 19:44 2127017        MOUSE SANDPPR MEGACRSCD5    1   Matt     04/26/07

Inventory change  06/07/07  --
Date     Change                                      SKU     Description
06/07/07 New SKU                                   72731 BURLAP 3X12
06/07/07 New SKU                                 1205590 PORCELAIN CHIP FIX ALMND
06/07/07 New SKU                                 3224706 FLASHLITE SNAP-ON 3D/2AA
06/07/07 New SKU                                 3224771 WORKLITE SNAP-ON LED ANG
06/07/07 New SKU                                 7188170 SNAP-ON LTHR GLOVE MED
06/07/07 New SKU                                 7188204 SNAP-ON LTHR GLOVE LG
06/07/07 New SKU                                 7188212 SNAP-ON LTHR GLOVE XL


SHRINK  06/07/07  --
Date     Time SKU                                        From  To  Ext. Cost
06/07/07 1213 28745   PROTECTR HEAR EARPLUG3PK             2    0     2.04
 Last purch: 05/25/07 2, Last sale: 06/07/07  Sale     1

06/07/07 1746 10033   CAULK SILICONE BRONZE DAP           10   11    -2.94
 Fixes count error: 01/03/07, no action necessary

06/07/07 1747 10064   CAULK SILICONE CLEAR GE             11   21   -24.60
 Fixes count error: 05/24/07, no action necessary

06/07/07 1748 10324   CAULK LATEX TUB/TILE WHITE DAP       9   10    -2.68
 Fixes count error: 04/20/05, no action necessary
```

```
06/07/07 1748 10895   CAULK SILICONE WHITE 2.8oz DAP               12   11      2.21
 Last purch: 02/13/07 12, Last sale: 02/08/07   Sale      1

06/07/07 1753 10898   CAULK SILICONE CLEAR 2.8oz DAP               3    1      4.42
 Last purch: 10/31/06 12, Last sale: 06/06/07   Sale      1

06/07/07 1754 10909   CAULK SILICONE CLEAR DAP                     3    7    -10.12
 Fixes count error: 05/31/07, no action necessary

06/07/07 1755 10911   CAULK LATEX CONCRETE GRAY DAP               15   16     -1.77
 Last purch: 05/08/07 12, Last sale: 06/04/07   Sale      1
 Fixes count error: 04/20/05, no action necessary
```

<mark>06/07/07 1845 4128849 NIPPLE ¾ X 1-1/2 BLK   -1   0   -0.26</mark>
<mark> Possible scanning error, check video and count similar items.</mark>

```
Total Shrink:      -33.70

End of Report: Daily Exceptions
```