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!

[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.

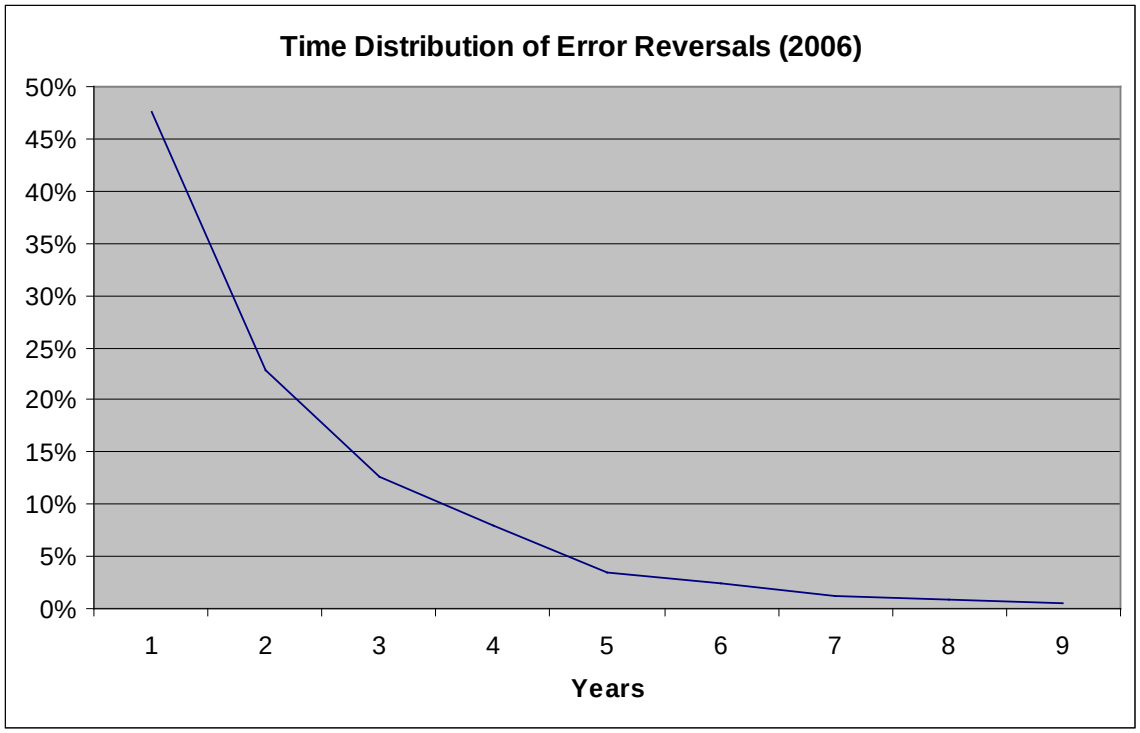


Figure 1

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.

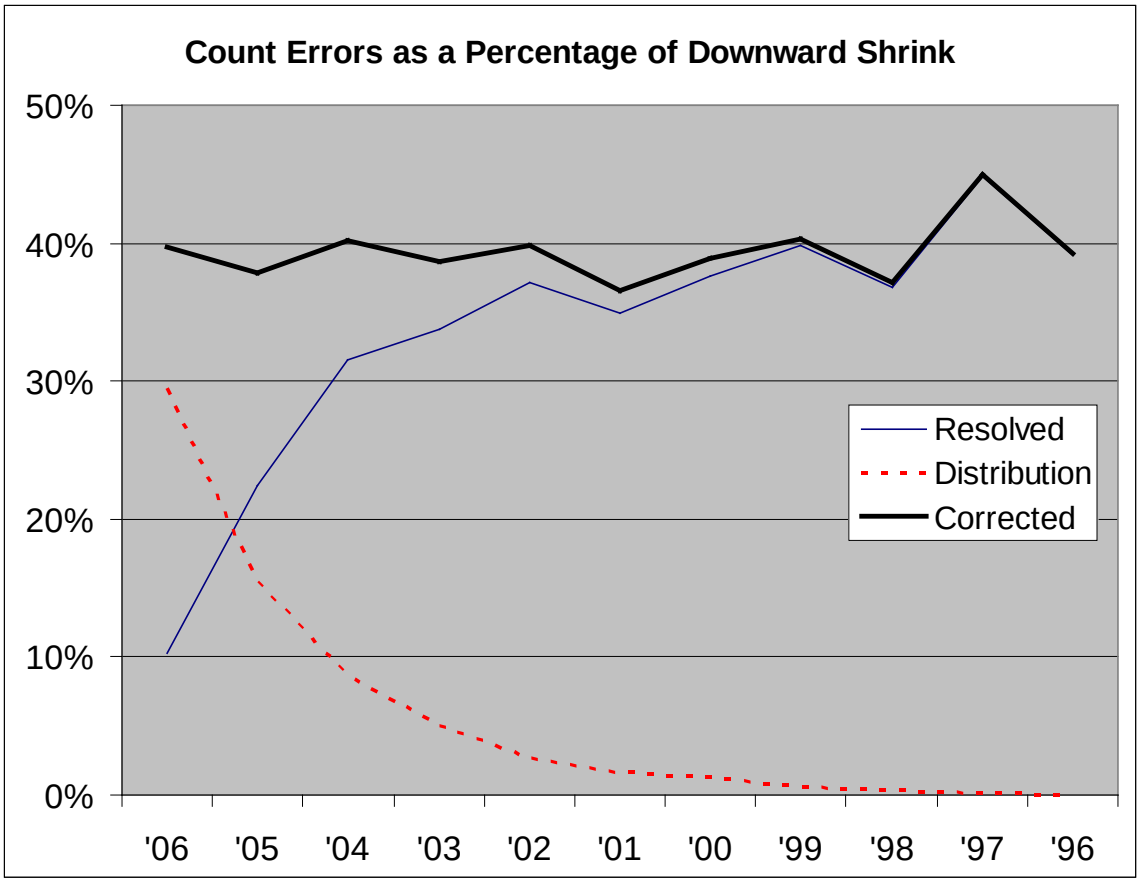


Figure 2

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 dano@hackneyhardware.com

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%

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.

Physical Inventory & Maintenance Report Commodity Group 10 06/06/07

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

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

Opportunity Peer Report: items selling in peer stores but not in store file

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

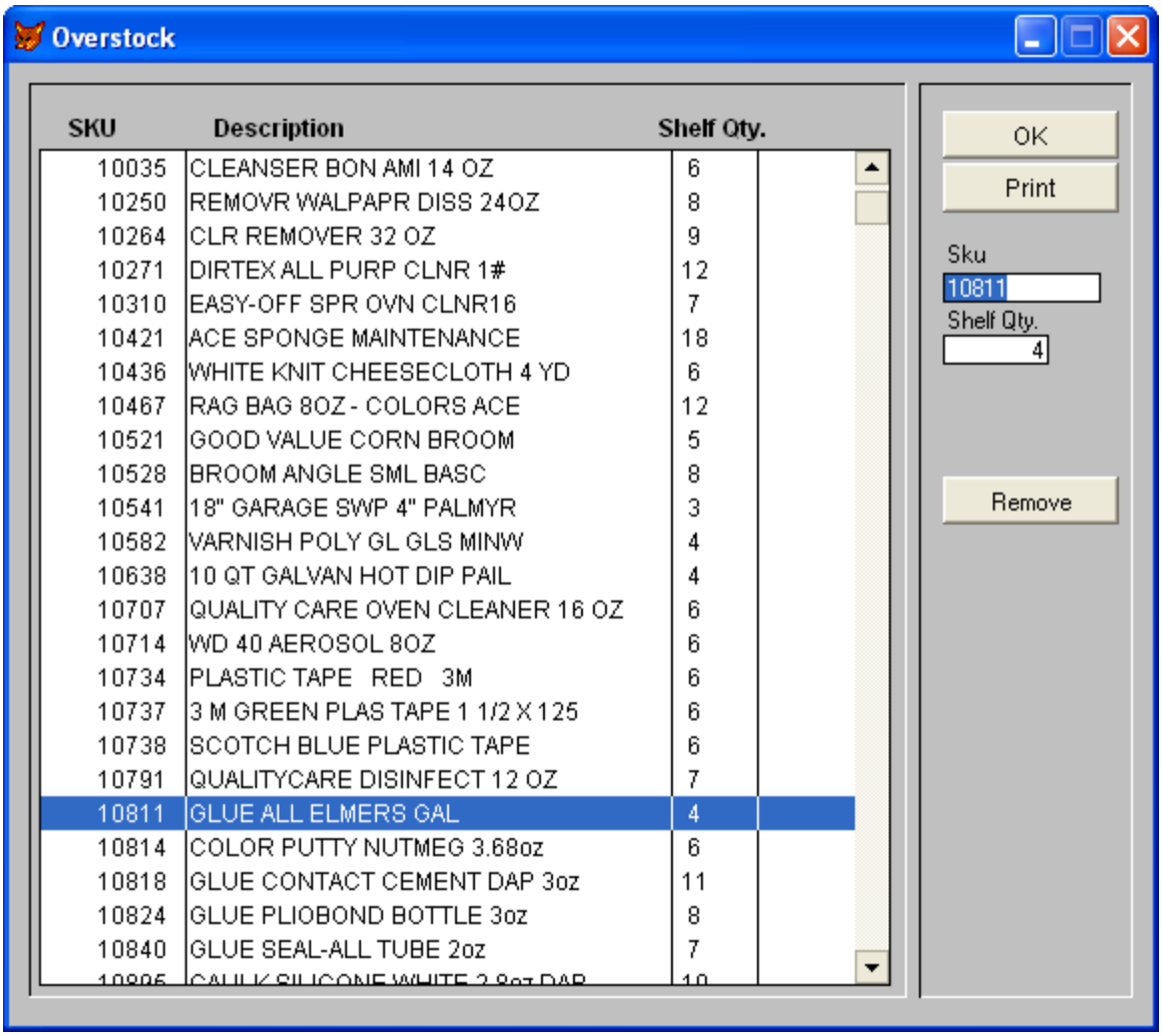
SKU	Description	Store OM	ACE OM	Popularity
1003771	SCRUBBER DISPENSER REFIL	2	1	H
1004548	MOP SPONGE HOMEPRO	6	4	H
10124	ENDUST ORIGNL SCENT 10 OZ	12	1	H
10151	KIWI SADDLE SOAP	2	1	H

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

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

Total Shrink: -33.70

End of Report: Daily Exceptions