Inventory Management and Production Planning and Scheduling

by E.A. Silver, D.F. Pyke and R. Peterson
Third Edition, John Wiley & Sons, 1998

This list contains errors last updated June 4, 2008. If you are aware of errors not listed here, please submit them to the authors at http://mba.tuck.dartmouth.edu/pages/faculty/dave.pyke/inventory_management/submit_error.htm
Instructors should note that the spreadsheets available with the Instructor's Resource Guide may have slightly different equation and table numbers from the text.

Error	**Corrected**	**Fixed in Printing Number?**	**Page**
majoram	majorem	2	iii
The Phrases	The Phases	2	xvi, section 3.11
New York, 1988	New York, 1989	2	8, Source of table
International Society of Inventory Research	International Society for Inventory Research	2	12
although Chapter 7 alone provides a	although Chapters 5 and 7 alone provide a	2	23, line 9
a. Consider the typical company	Assume that inventories are 34 percent of current assets. a. Consider the typical company	2	25, problem 2.9
Eighth	Eight	2	26, Garvin reference
Pyke (1977)	Pyke (1997)		26, Henig, et al reference
	Add reference: Droms, W. G. (1979). *Finance and Accounting for Nonfinancial Managers*. Reading, Massachusetts: Addison-Wesley.	2	26, after the reference by Dean
Sections 3.3 and 3.5	Sections 3.3 to 3.5	2	27, line 4
Decoupling stock	*Decoupling stock*	2	31, beginning of fourth paragraph
Number of segments	Number of market segments	2	37, point 3 of Figure 3.2
(hence $\bar{I}$ is the average	(hence $\bar{I}v$ is the average	2	45, line just below 3.1
1988	1888	2	48, footnote 12
model. Moreover	model. (See Section 2.4 of Chapter 2.) Moreover		62, line 10 of 3.11.4
$\exp[-(\ln x_0 - a)^2 2b^2]$	$\exp[-(\ln x_0 - a)^2 / (2b^2)]$		66, equation 3.2
Section 4.4.5	Section 4.5.5		98, line 5
Also Eq. 47.1	Also Eq. 4.71		119, line 16
1. Transaction size estimates are not updated	1. Transaction size estimates are not updated, i.e. $\hat{z}_t = \hat{z}_{t-1}$		128, line 11
4.23 b. . . . employ exponential smoothing to update	4.23 b. . . . employ exponential smoothing with trend to update	2	138
Vollman	Vollmann	2	140
In general, if the lead time is longer than the time between replenishments, the reorder point is given by . . . equal to *X*.	If the lead time is longer than the time between replenishments, the order should be placed when the on-hand plus on-order level drops to *DL*.	2	172, footnote 14

	add an "x" at the current operating point of Figure 5.11	2	181, Figure 5.11
TCS	TACS	2	186, two places
TCS	TACS	2	187, two places
For the hypothetical firm in the appendix to Chapter 3 we have that *n* = 849,	For a hypothetical firm (MIDAS, discussed in the supplemental materials) *n* = 849,	2	187
TCS	TACS	2	188, two places
It is shown in Figure 3.9.	It is nearly identical to a figure like the one shown in Figure 5.11	2	188
exact curve in Figure 3.9—such	exact curve—such	2	188
The latter was developed by a complete item-by-item computation. It is nearly identical to a figure like the one shown in Figure 5.11. The lognormal approximation of Eq. 5.44 falls a negligible amount above the exact curve – such a small amount	The latter was developed by a complete item-by-item computation. The lognormal approximation of Eq. 5.44 falls a negligible amount above the exact curve – such a small amount		188, corrected for the third printing from the above two changes.
TCS	TACS	2	190, two places in problem 5.12
comptroller	controller	2	190, line +2 in right hand column
Heuts, M. J.	Heuts, R. M. J.	2	197
$0.05	0.05 $/$		225, problem 6.10
$0.10	0.10 $/$		226, problem 6.11
$1.05	0.02 $/$/month		228, problem 6.17
for optimal the inventory	for the optimal inventory	2	246, line 2
Jinsson	Jönsson	2	246, line 13
	Eliminate "Safety stock" from Figure 7.5. Safety stock is the expected value, not the individual realization	2	250, Figure 7.5
	Add a column in Table 7.4 Heading is "Net Stock Just Before Replenishment Arrives" Entries are: 2, 1, 0, -1, -2	2	251
Thus, the safety stock, or the expected amount on hand just … is 0.4 units. So the …cost is	Thus, the safety stock, or the expected net stock just before the replenishment arrives, is -0.2 units. (The safety stock can be found more simply by recognizing that it is the reorder point minus the average demand in the lead time, here 2 – 2.2 or – 0.2 units.) So the expected annual holding cost is approximately	2	251, first sentence
(10.4)($10) = $104	(9.8)($10) = $98	2	251, first equation
Note that we could express expected safety stock as	The exact value of the average on hand just before a replenishment	2	251, just before Eq. 7.5

	arrives can be computed as		
if *X* is the lead time demand.	where *X* is the lead time demand. In our example, this gives 0.4 instead of –0.2, which would lead to an expected annual holding cost of $104.	2	251, just after Eq. 7.5
Again, note that	Note that	2	252, line 4
optimal reorder point is 4.	optimal reorder point is 4, using either the exact or the more simple approximate expression for the holding cost.	2	252, line 4 of the Total Cost section
	Three Headings: *s* Exact Total Annual Cost[a] Approximate Total Annual Cost[b] Column 1: as is Column 2: as is Column 3: $419 $330 $263 = 99 + 98 + 66 $229 $217 $227 Footnotes on the table: [a]using *Q*/2 + expected on hand just before a replenishment arrives [b]using *Q*/2 + safety stock		252, New Table 7.6
However, extensive simulation studies by Ehrhardt (1979) have revealed that performance is not seriously degraded by using $\hat{\sigma}_L$ instead of σ_L (see also Problem 7.5).	(See problem 7.5.)		253 last line, and 254, first two lines
in a lead time	in a lead time = $p_{u\geq}(k)$		254, Figure 7.6
estimation of σ_L.	estimation of σ_L. See also Ehrhardt (1979).		256, footnote 12
Note the similarity with Eq. 7.5. So,	So,	2	257, just before Eq. 7.9
A useful graph of this equation is	A useful graph of Equation 7.14 is	2	259, line 4
both values of σ_L.	both values of σ_L, as are the ordering costs *AD*/*Q*.		262, line 5
The total cost	The expected total cost		264, just prior to the total cost expression
$\sigma_x = 36.64$	$\sigma_x = 34.64$		283, Situation 1
	Insert "TSS" after P_2 in the Outputs column of Figure 7.14		287, Figure 7.14

x_1	$\hat{x}_1$	2	303, Problem 7.9a.
Problem 7.22	Delete the problem – it is not specified correctly		306, Problem 7.22
Jînsson	Jönsson		308
Heuts, R.	Heuts, R. M. J.	2	309
IEE Transactions	*IIE Transactions*		309, Lau and Lau (1993) reference
$\frac{p_{po}\left(s+1 \mid \hat{x}_L\right)}{p_{po\le}(s+1 \mid \hat{x}_L)}=\frac{r}{DB_2}$	$\frac{p_{po}\left(s+1 \mid \hat{x}_L\right)}{p_{po\le}(s \mid \hat{x}_L)}=\frac{r}{DB_2}$		321, Eqn 8.4
$\frac{\sum_{j=1}^{Q} p_{po}\left(s+j \mid \hat{x}_L\right)}{\sum_{j=1}^{Q} p_{po\le}\left(s+j \mid \hat{x}_L\right)}=\frac{r}{B_2 D}$	$\frac{\sum_{j=1}^{Q} p_{po}\left(s+j \mid \hat{x}_L\right)}{p_{po\le}\left(s \mid \hat{x}_L\right)}=\frac{Qr}{B_2 D}$		323, Eqn 8.5
Using Eq. 8.34 we find, by trial and error, that	Using Table B.1 or Appendix C.1 we find that		341, first line
KAhn	Kühn	2	343
See the large section at the end of this document.	See the large section at the end of this document.		346 - 347
$\frac{p_x\left(s+1\right)}{p_{x\le}(s+1)}=\frac{r}{DB_2}$	$\frac{p_x\left(s+1\right)}{p_{x\le}(s)}=\frac{r}{DB_2}$		347, line 4 after Eqn 8.40
$\frac{\sum_{j=1}^{Q} p_{po}\left(s+j \mid \hat{x}_L\right)}{\sum_{j=1}^{Q} p_{po\le}\left(s+j \mid \hat{x}_L\right)}=\frac{r}{B_2 D}$	$\frac{\sum_{j=1}^{Q} p_{po}\left(s+j \mid \hat{x}_L\right)}{p_{po\le}\left(s \mid \hat{x}_L\right)}=\frac{Qr}{B_2 D}$		349, problem 8.2b
$ETRC(s)=\nu r\sum_{j=1}^{Q}\frac{1}{Q}\sum_{x_0=0}^{s+j}(s+j-x_0)p_{po}\left(x_0\right.$ $+B_2\nu D\sum_{j=1}^{Q}\frac{1}{Q}\sum_{x_0=s+j}^{x}p_{po}\left(x_0 \mid \hat{x}_L\right)$	$ETRC(s)=\nu r\sum_{x_0=0}^{s}\left(s-x_0\right)p_{po}\left(x_0 \mid \hat{x}_L\right)$ $+B_2\nu D\sum_{j=1}^{Q}\frac{1}{Q}\sum_{x_0=s+j}^{\infty}p_{po}\left(x_0 \mid \hat{x}_L\right)$		349, problem 8.2a
$Q=\sqrt{\frac{2AD+DB_2\nu\sigma_L G_u(k)}{r\nu}}$	$Q=\sqrt{\frac{2AD+2DB_2\nu\sigma_L G_u(k)}{r\nu}}$	2	Problem 8.18, page 352
a Poisson process.	a Poisson process and no further replenishments are to be made.	2	370, two lines before 9.14
$p_x < (x_0)$	$p_{x<}(x_0)$	2	386, Figure 10.1
penalty for	penalty (beyond the lost profit) for	2	387, line 10
(or exceeds) the target is of	(or exceeds) the optimal expected profit target is of	2	390
penalty for	penalty (beyond the lost profit) for	2	393, definition of B_i
	larger dots for M = 1.667, M = 0.7094, M = 0.5833, and M = 0.5107	2	394, Figure 10.2
the value of M very quickly	the value of M for any budget very quickly	2	396

Hammond, Obermeyer	Obermeyer, Hammond		398, line –11
Romeijn.	Romeijn (1995).		403, line 3
large)	small)	2	405, two lines above 10.17
$h(a_2(y), y)a_2(y) - h(a_1(y),$	$h(a_2(y), y)\frac{da_2(y)}{dy} - h(a_1(y), y)\frac{da_1(y}{dy}$	2	405
J. H. Hammond, W. R. Obermeyer	W. R. Obermeyer, J. H. Hammond		417, 1994b Fisher, et al reference
van der Laan, E., M. Salomon, R. Kuik, L. Kroon, and E. Romeijn.	van der Laan, E., M. Salomon, R. Kuik, L. Kroon, and E. Romeijn (1995).		420
Reference to Eq. “11.2”	11.12	2	446
Yano (1977)	Yano (1997)		448, line 7
11.42	11.4.2	2	460, problem 11.11 a.
5,000	50,000	2	461, problem 11.17 data table, p_i for item 1
DeBodt, M. L	DeBodt, M. A.	2	464
Günther reference out of order	Below Güder reference	2	465
Karmarker	Karmarkar		467, line 1
game.”	game.” Sterman, 1995.	2	472
deKok	de Kok (Private communication, 1996)		473, footnote 4
higher average	higher constant average	2	474, footnote 5
Therefore often	Therefore they often	2	476, line –10
material $v_W^{'}$	material ($v_W^{'}$	2	481, line 6
Heuts, R.	Heuts, R. M. J.	2	522
DeBodt, M. L	DeBodt, M. A.	2	524
Computed	Compound		525, Forsberg (1995) reference
Muckstadt, J.	Muckstadt, J. A.	2	528, 2 places
missing reference	Sterman, J. D. (1995). The Beer Distribution Game. In J. Heineke & L. Meile (Eds.), *Games and Exercises for Operations Management* (pp. 101-112). Englewood Cliffs, N.J.: Prentice Hall.	2	530
Van Wassenhove, L. V.	Van Wassenhove, L. N.	2	530
Van der Laan	van der Laan		531
de Kok, T.	de Kok, A. G.	2	531, in Verrijdt et al (1995) reference
Stewart 1977	Stewart 1997	2	621, line –15
Robbe	Robb	2	686, line 8
V-shaped on the	V-shaped in the		689, line 20
OPT	OPT®	2	Chapter 16, many places
$\sqrt{1+a^2}\, p_{u\geq}\left(\frac{b}{\sqrt{1+a^2}}\right)$	$p_{u\geq}\left(\frac{b}{\sqrt{1+a^2}}\right)$	2	722, right hand side of equation B.11
$u_0 = (x_0 - \hat{x})\sigma_x$	$u_0 = (x_0 - \hat{x}) / \sigma_x$		722, line – 3
	Add reference: Silver, E. A., and D. J. Smith (1981). Setting Individual Item Production Rates under Significant Lead Time	2	738, before Tijms reference

	Conditions. *INFOR*, 19(1), 1-19.		
Corston, J. D., 343	Delete entry		740
Croston, J. D., 128-129, 375	Croston, J. D., 128-129, 343, 375		740
Jînsson, H., 246	delete entry		742
Jönsson, H., 402, 498	Jönsson, H., 246, 402, 498		742
546, 546,	546,	2	744, line 8, left column
Shrage, L., 209	delete entry		745
Schrage, L., 451, 482	Schrage, L., 209, 451, 482		745
Venemia	Vendemia		746
missing reference	Echelon stock, 479	2	750, first entry for "E"
	added to index: inflation, 165	2	751, line 2, center column, after Heuristic approaches, 201
	added to index: special opportunity, 176	2	751, line 13, center column, after Silver-Meal, … 607
	added to index: position, 233	2	751, center column after pipeline, 31
	added to index: turnover ratio, 7-8, 16, 155		751, center column after safety stock, 31
	added to index: Turnover ratio, 7-8, 16, 155		754, right column after Trend component
(0.10)	(10)		Instructor's Resource Guide, page 97, part c, line 1.
552	522		Instructor's Resource Guide, pages 105 and 106, five times in part b.

Current text: pages 346 – 347:

$$p_{NS}(n_0) = \text{Prob}\{x = S - n_0\} \qquad \text{Equation 8.39}$$

where

$p_{NS}(n_0)$ = probability that the net stock at a random point in time takes on the value n_0

x = total demand in the replenishment lead time

The expected on-hand inventory ($\bar{I}$) is the expected *positive* net stock, that is,

$$\bar{I} = \sum_{n_0=0}^{S} n_0 p_{NS}(n_0)$$
$$= \sum_{n_0=0}^{S} n_0 p_x(S - n_0)$$

where

$p_x(x_0)$ = probability that total time demand is x_0

Substituting, $j = S - n_0$, we have

$$\bar{I} = \sum_{j=0}^{S} (S-j)p_x(j)$$

Furthermore, with Poisson demand, the probability that a particular demand requires backordering is equal to the probability that the net stock is zero or less; that is,

$$\text{Prob \{a demand is not satisfied\}} = p_{NS\leq}(0)$$

Using, Equation 8.39 we have

$$\text{Prob \{a demand is not satisfied\}} = p_{x\geq}(S)$$

The expected shortage costs per unit time (C_s) are

$$\begin{aligned} C_s &= \text{(Cost per shortage)} \times \text{(Expected demand per unit time)} \\ &\quad \times \text{Prob \{a demand is not satisfied\}} \\ &= B_2 vDp_{x\geq}(S) \end{aligned}$$

Expected total relevant costs per unit time, as a function of S, are

$$\begin{aligned} \text{ETRC}(S) &= \bar{I}vr + C_s \\ &= vr \sum_{j=0}^{S} (S-j)p_x(j) + B_2 vDp_{x\geq}(S) \end{aligned}$$

Notice the similarity … after simplification,

$$\frac{p_x(S)}{p_{x\leq}(S)} = \frac{r}{DB_2} \qquad \text{Equation 8.40}$$

However, because $Q = 1$, we have that

$$s = S - 1$$

Therefore, Equation 8.40 can be written as

$$\frac{p_x(s+1)}{p_{x\leq}(s+1)} = \frac{r}{DB_2}$$

Corrected text, pages 346 – 347:

$$p_{NS}(n_0) = \text{Prob}\{x = S - n_0\} \qquad \text{Equation 8.39}$$

where

$p_{NS}(n_0) =$ probability that the net stock at a random point in time takes on the value n_0
$x =$ total demand in the replenishment lead time

Furthermore, with Poisson demand, the probability that a particular demand requires backordering is equal to the probability that the net stock is zero or less; that is,

$$\text{Prob \{a demand is not satisfied\}} = p_{NS\leq}(0)$$

Using, Equation 8.39 we have

$$\text{Prob \{a demand is not satisfied\}} = p_{x\geq}(S)$$

The expected shortage costs per unit time (C_s) are

$$C_s = \text{(Cost per shortage)} \times \text{(Expected demand per unit time)}$$
$$\times \text{ Prob \{a demand is not satisfied\}}$$
$$= B_2 v D p_{x\geq}(S)$$

The expected on-hand inventory ($\bar{I}$) at the end of the lead time is the expected *positive* net stock at that time,

$$\bar{I} = \sum_{n_0=0}^{s} n_0 p_{NS}(n_0)$$
$$= \sum_{n_0=0}^{s} n_0 p_x(s - n_0)$$

where

$p_x(x_0)$ = probability that total demand in the replenishment lead time is x_0

Substituting, $j = s - n_0$, we have

$$\bar{I} = \sum_{j=0}^{s} (s - j) p_x(j)$$

Expected total relevant costs per unit time, as a function of S, are

$$\text{ETRC}(S) = \bar{I} vr + C_s$$
$$= vr \sum_{j=0}^{s} (s - j) p_x(j) + B_2 v D p_{x\geq}(S)$$

Notice the similarity … after simplification,

$$\frac{p_x(S)}{p_{x\leq}(S-1)} = \frac{r}{DB_2} \qquad \text{Equation 8.40}$$

However, because Q = 1, we have that

$$s = S - 1$$

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$$\frac{p_x(s+1)}{p_{x\leq}(s)} = \frac{r}{DB_2}$$