

# *TechGAP*

## **Inventory Control**

### **Appendix F—Average and Replacement Cost Formulas**



# Average Cost Formulas

The formulas used to calculate Average Cost are listed below. For Average Cost calculation, all of the numbers used for the calculation must come from the same file. For example—

- When Average Cost is calculated for ICMAST, the Original Average Cost and Original Qty On Hand come from ICMAST.
- When Average Cost is calculated for a warehouse, the Original Average Cost and Original Qty On Hand come from ICWHSE.

## Calculating Average Cost

Average Cost is recalculated whenever a transaction affects the OnHand Quantity of an item. Transactions in the following modules can affect the OnHand Quantity and cause Average Cost to be recalculated:

Inventory Control	Inventory Management
Purchase Orders	Counter Point
Warehouse Transfer	Job Cost
Order Entry	Job Billing
Production Management	Work Order
ProTrak	

## Original Inventory Value

In every case the *Original Inventory Value* must be determined before recalculating the Average Cost.

Original Inventory Value = Average Cost × Original OnHand Qty

**Note:** Most prices and costs are based on an individual item—these formulas and examples are based on individual pricing. (*Prices/Costs are Per* field in *Inventory Control/Setup/Products* is **1**.) For products where prices and costs are not based on an individual item, see calculations in the *Price and Cost Not Individual* section later in this Appendix.

## Transaction Value

The Transaction Value used depends on the entry in the *Each/All* field in *Posting* for each transaction.

- If **E**(ach) was entered, the transaction cost is for each item:  
Transaction Value = Transaction Qty × Transaction Cost
- If **A**(ll) was entered, the transaction cost is for all items:  
Transaction Value = Transaction Cost

## Average Cost

Calculate the new average cost as follows:

$$\text{Average Cost} = \frac{\text{Original Inventory Value} \pm \text{Transaction Value}}{\text{Original Qty} \pm \text{Transaction Qty}}$$

Note: When a transaction increases the inventory, you add the Transaction Value and Quantity. When a transaction decreases the inventory, you subtract the Transaction Value and Quantity.

### Example of Average Cost Calculation

Average Cost = \$2.00  
On Hand Quantity = 10

*Two Items Are Purchased at a cost of \$5.00 each*

$$\text{Original Inventory Value} = \text{Avg Cost} \times \text{Orig OnHand Qty} = 2.00 \times 10 = 20.00$$

$$\text{Transaction Value} = \text{Transaction Qty} \times \text{Transaction Cost} = 2 \times 5.00 = 10.00$$

$$\text{Avg Cost} = \frac{\text{Orig Inv Value} + \text{Trx Value}}{\text{Original Qty} + \text{Trx Qty}} = \frac{20.00 + 10.00}{10 + 2} = \frac{30.00}{12} = 2.50$$

On Hand Quantity = 12  
Average Cost = \$2.50

*One Item Is Sold at a cost of \$2.50 each*

$$\text{Original Inventory Value} = \text{Avg Cost} \times \text{Orig OnHand Qty} = 2.50 \times 12 = 30.00$$

$$\text{Transaction Value} = \text{Transaction Qty} \times \text{Transaction Cost} = 1 \times 2.50 = 2.50$$

$$\text{Avg Cost} = \frac{\text{Orig Inv Value} + \text{Trx Value}}{\text{Original Qty} + \text{Trx Qty}} = \frac{30.00 - 2.50}{12 - 1} = \frac{27.50}{11} = 2.50$$

On Hand Quantity = 11  
Average Cost = \$2.50

# Inventory Adjustments

When using average cost, Inventory adjustments to General Ledger may be needed. Any necessary adjustments are made by transactions to the Inventory Adjustment account. When the following transactions are created, Average Cost will be recalculated and an adjustment transaction may be necessary:

Inventory Control transaction types:

0–Issue Not Reserved	7–Transfer
1–Issue Reserved	12–Receipt of Cost
2–Receipt Not Ordered	16–Add Additional Cost
3–Receipt Ordered	LS–Lost
4–Return Inward	SP–Scrap
5–Return Outward	TI–Trade In
6–Stock Adjustment	

Purchase Orders transaction types:

PO–Purchase Order (Costing)	CM–Credit Memo (Costing)
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Warehouse Transfer transaction types:

WT–Warehouse Transfer (Receiving)
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When an adjustment is necessary and how it is calculated are detailed in the Calculation Criteria and Inventory Adjustment Calculation sections which follow.

## Avg Cost/Inventory Adjustment Calculation Criteria

The criteria for calculating Average Cost and Inventory Adjustments in the *Inventory Control*, *Purchase Orders*, and *Warehouse Transfer* modules follows:

Original On Hand Qty	Transaction Qty +/-	Resulting On Hand Qty	Effect on Average Cost Effect on Inventory Adjustment
POS	+	more POS	Average Cost will be recalculated. No Inventory Adjustment.
POS	-	less POS	Average Cost does NOT change. Inventory Adjustment transaction will be created.
POS	-	ZERO	Current Transaction Cost moves to Average Cost. Inventory Adjustment transaction will be created.
POS	-	NEG	Current Transaction Cost moves to Average Cost. Inventory Adjustment transaction will be created.
ZERO	+	POS	Current Transaction Cost moves to Average Cost. No Inventory Adjustment.
ZERO	-	NEG	Current Transaction Cost moves to Average Cost. No Inventory Adjustment.
NEG	-	more NEG	Average Cost will be recalculated. No Inventory Adjustment.
NEG	+	less NEG	Average Cost does NOT change. Inventory Adjustment transaction will be created.
NEG	+	ZERO	Current Transaction Cost moves to Average Cost. Inventory Adjustment transaction will be created.
NEG	+	POS	Current Transaction Cost moves to Average Cost. Inventory Adjustment transaction will be created.

# Inventory Adjustment Calculations

Inventory Adjustment Transactions are used to keep General Ledger in balance.

- ❑ When average cost is re-calculated, no adjustments are necessary, since the inventory balance is used to determine the new average cost.
- ❑ When average cost is not re-calculated, an adjustment transaction is necessary to make sure the inventory account balance equals the current inventory value (average cost x new quantity on hand).

Three values are used to determine the amount of any Inventory Adjustment transaction:

- ❑ Original Inventory Value (using the original qty and average cost)  
Original Inventory Value = Average Cost × Original OnHand Qty
- ❑ Transaction Value (using the transaction quantity and cost)  
Transaction Value = Transaction Qty × Transaction Cost  
when **E**(ach) was entered in the *Each/All* field in *Posting*  
Transaction Value = Transaction Cost  
when **A**(ll) was entered in the *Each/All* field in *Posting*
- ❑ Current Inventory Value (using the new quantity and average cost)  
Current Inventory Value = Average Cost × Current OnHand Qty

The Inventory Adjustment transaction balances the Current Inventory Value with the Original Inventory Value plus the Transaction Value. It is calculated as follows:

$$\text{Inventory Adjust} = \text{Curr Value} - (\text{Orig Value} + \text{Transaction Value})$$

**Note:** If the adjustment does not automatically update the Inventory Adjustment account, the message “Manual Adj. to Inventory: \$xxxx.xx” prints on the journal. You must post this amount to the Inventory Adjustment account you designated in the *Inventory Adjustment General Ledger Number* field in *System Administrator/Application Options/Inventory Control*.

## Calculation Examples—Avg Cost with Adjustment Transaction

**Example 1:** Postive OnHand increasing to a more positive OnHand  
20 units On Hand; Receive 5 units @ \$13.00

Original OnHand 20 @ \$10.00 Avg Cost = \$200.00 Original Value  
Received 5 @ \$13.00 Trans Cost= \$65.00 Transaction Value  
Current OnHand 25

1. Recalculate Average Cost

$$\text{Avg Cost} = \frac{\text{Orig Inv Value} + \text{Trx Value}}{\text{Original Qty} + \text{Trx Qty}} = \frac{200.00 + 65.00}{20 + 5} = \frac{265.00}{25} = 10.60$$

2. No Adjustment Calculation necessary.

3. General Ledger Entries

Accounts Payable		65.00 CR
Inventory	65.00 DR	

**Example 2:** Postive OnHand decreasing to a less positive OnHand  
20 units On Hand; Relieve 7 units @ \$8.00

Original OnHand 20 @ \$10.00 Avg Cost = \$200.00 Original Value  
Relieved (7) @ \$8.00 Trans Cost= (\$56.00) Transaction Value  
Current OnHand 13

1. Do not change average cost.

$$\text{Cur Inven Val} = \text{Avg Cost} \times \text{Curr Qty} = 10.00 \times 13 = 130.00$$

2. Calculate Adjustment

$$\begin{aligned} \text{Inventory Adjust} &= \text{Curr Value} - [\text{Orig Value} + \text{Transaction Value}] \\ &= 130.00 - [200.00 + (56.00)] = (14.00) \end{aligned}$$

3. General Ledger Entries

Accounts Payable		56.00 DR
Inventory		70.00 CR
Inventory Adjustment	14.00 DR	

**Example 3: Postive OnHand decreasing to Zero OnHand**  
 20 units On Hand; Relieve 20 units @ \$12.00

Original OnHand 20 @ \$10.00 Avg Cost = \$200.00 Original Value  
 Relieved (20) @ \$12.00 Trans Cost= (\$240.00) Transaction Value  
 Current OnHand 0

1. Move Transaction Cost of \$12.00 to Average Cost.

$$\text{Cur Inven Val} = \text{Avg Cost} \times \text{Curr Qty} = 12.00 \times 0 = 0$$

2. Calculate Adjustment

$$\begin{aligned} \text{Inventory Adjust} &= \text{Curr Value} - [\text{Orig Value} + \text{Transaction Value}] \\ &= 0 - [200 + (240)] = 40 \end{aligned}$$

3. General Ledger Entries

Accounts Payable	240.00 DR	
Inventory		200.00 CR
Inventory Adjustment		40.00 CR

**Example 4: Postive OnHand decreasing to a negative OnHand**  
 20 units On Hand; Relieve 23 units @ \$14.00

Original OnHand 20 @ \$10.00 Avg Cost = \$200.00 Original Value  
 Relieved (23) @ \$14.00 Trans Cost= (\$322.00) Transaction Value  
 Current OnHand (3)

1. Move Transaction Cost of \$14.00 to Average Cost.

$$\text{Cur Inven Val} = \text{Avg Cost} \times \text{Curr Qty} = 14.00 \times (3) = (42.00)$$

2. Calculate Adjustment

$$\begin{aligned} \text{Inventory Adjust} &= \text{Curr Value} - [\text{Orig Value} + \text{Transaction Value}] \\ &= (42.00) - [200.00 + (322.22)] = 80.00 \end{aligned}$$

3. General Ledger Entries

Accounts Payable	322.00 DR	
Inventory		242.00 CR
Inventory Adjustment		80.00 CR

**Example 5: Zero OnHand increasing to a positive OnHand**  
 0 units On Hand, Receive 14 units @18.00

Original OnHand	0	@ \$20.00	Avg Cost =	\$0.00	Original Value
Received	14	@ \$18.00	Trans Cost=	\$252.00	Transaction Value
Current OnHand	14				

1. Move Transaction Cost of \$18.00 to Average Cost.

2. No Adjustment Calculation necessary.

3. General Ledger Entries

Accounts Payable		252.00 CR
Inventory	252.00 DR	

**Example 6: Zero OnHand decreasing to a negative OnHand**  
 0 units On Hand, Relieve 8 units @ 19.00

Original OnHand	0	@ \$20.00	Avg Cost =	\$0.00	Original Value
Relieved	(8)	@ \$19.00	Trans Cost=	(\$152.00)	Transaction Value
Current OnHand	(8)				

1. Move Transaction Cost of \$19.00 to Average Cost.

2. No Adjustment Calculation necessary.

3. General Ledger Entries

Accounts Payable	152.00 DR	
Inventory		152.00 CR

**Example 7:** Negative OnHand decreasing to a more negative OnHand  
(20) units On Hand, Relieve 5 units @ 28.00

Original OnHand (20) @ \$30.00 Avg Cost = (\$600.00) Original Value  
Relieved (5) @ \$28.00 Trans Cost= (\$140.00) Transaction Value  
Current OnHand (25)

1. Recalculate Average Cost.

$$\text{Avg Cost} = \frac{\text{Orig Inv Value} + \text{Trx Value}}{\text{Original Qty} + \text{Trx Qty}} = \frac{(600) + (140)}{(20) + (5)} = \frac{(740)}{(25)} = 29.60$$

2. No Adjustment Calculation necessary.

3. General Ledger Entries

Accounts Payable	140.00 DR	
Inventory		140.00 CR

**Example 8:** Negative OnHand increasing to a less negative OnHand  
(20) units On Hand, Receive a 7 units @ 28.00

Original OnHand (20) @ \$30.00 Avg Cost = (\$600.00) Original Value  
Received 7 @ \$28.00 Trans Cost= \$196.00 Transaction Value  
Current OnHand (13)

1. Do not change Average Cost.

$$\text{Cur Inven Val} = \text{Avg Cost} \times \text{Curr Qty} = 30.00 \times (13) = (390)$$

2. Calculate Adjustment

$$\begin{aligned} \text{Inventory Adjust} &= \text{Curr Value} - [\text{Orig Value} + \text{Transaction Value}] \\ &= (390.00) - [(600.00) + 196.00] = 14.00 \end{aligned}$$

3. General Ledger Entries

Accounts Payable		196.00 CR
Inventory	210.00 DR	
Inventory Adjustment		14.00 CR

**Example 9: Negative OnHand increasing to Zero OnHand**  
 (20) units On Hand, Receive 20 units @ 25.00

Original OnHand (20) @ \$30.00 Avg Cost = (\$600.00) Original Value  
 Received 20 @ \$25.00 Trans Cost= \$500.00 Transaction Value  
 Current OnHand 0

1. Move Transaction Cost of \$25.00 to Average Cost.

$$\text{Cur Inven Val} = \text{Avg Cost} \times \text{Curr Qty} = 25.00 \times 0 = 0$$

2. Calculate Adjustment

$$\begin{aligned} \text{Inventory Adjust} &= \text{Curr Value} - [\text{Orig Value} + \text{Transaction Value}] \\ &= 0 - [(600.00) + 500.00] = 100.00 \end{aligned}$$

3. General Ledger Entries

Accounts Payable		500.00 CR
Inventory	600.00 DR	
Inventory Adjustment		100.00 CR

**Example 10: Negative OnHand increasing to a positive OnHand**  
 (20) units On Hand; Receive 28 units @ 32.00

Original OnHand (20) @ \$30.00 Avg Cost = (\$600.00) Original Value  
 Received 28 @ \$32.00 Trans Cost= \$896.00 Transaction Value  
 Current OnHand 8

1. Move Transaction Cost of \$32.00 to Average Cost.

$$\text{Cur Inven Val} = \text{Avg Cost} \times \text{Curr Qty} = 32.00 \times 8 = 256.00$$

2. Calculate Adjustment

$$\begin{aligned} \text{Inventory Adjust} &= \text{Curr Value} - [\text{Orig Value} + \text{Transaction Value}] \\ &= 256.00 - [(600.00) + 896.00] = (40.00) \end{aligned}$$

3. General Ledger Entries

Accounts Payable		896.00 CR
Inventory	856.00 DR	
Inventory Adjustment	40.00 DR	

## Price and Cost Not Individual

Price and cost do not need to be based on an individual item. When price and cost are based on multiple units, this is shown by the entry in the *Prices/Costs are Per* field in *Inventory Control/File Setup/Products*. Formulas to calculate Inventory Value and Average Cost shown below reflect this pricing/cost basis. (Note: The Cost Denom is the value in the *Prices/Costs are Per* field.)

$$\text{Inventory Value} = \frac{\text{Average Cost}}{\text{Cost Denom}} \times \text{OnHand Quantity}$$

$$\text{Avg Cost} = \frac{\text{Orig Inven Value} \pm \text{Transaction Value}}{\text{Orig Qty} \pm \text{Transaction Qty}} \times \text{Cost Denom}$$

Example:

Quantity on Hand: 200

Average Cost: \$10.00

Prices/Costs are Per: 12

Receive: 20 @ \$1.00 each

Transaction Value: \$20.00

$$\text{Original Inventory Value} = \frac{10.00}{12} \times 200 = 166.67$$

$$\text{Avg Cost} = \frac{166.67 + 20.00}{200 + 20} \times 12 = 10.18$$

## Multiple Warehouse Calculation

In a multiple warehouse system, a transaction affects both the product record (ICMAST) and the warehouse record (ICWHSE). The same average cost formula is used to calculate average cost for ICMAS<sup>T</sup> and average cost for ICWHSE. When calculating average cost for ICMAS<sup>T</sup>, you must use the Original OnHand Quantity and Original Average Cost from ICMAS<sup>T</sup>. When calculating average cost for ICWHSE, you must use the Original OnHand Quantity and Original Average Cost from ICWHSE.

$$\text{Original Inventory Value} = \text{Average Cost} \times \text{Original OnHand Qty}$$
$$\text{Transaction Value} = \text{Transaction Qty} \times \text{Transaction Cost}$$
$$\text{Average Cost} = \frac{\text{Original Inventory Value} \pm \text{Transaction Value}}{\text{Original Qty} \pm \text{Transaction Qty}}$$

## Warehouse Transfers

Warehouse transfers move inventory from one warehouse to another. The average cost of the shipping warehouse will not change since the cost of the warehouse transfer transaction defaults from the average cost of the shipping warehouse at the time of shipping and cannot be changed. The average cost of the receiving warehouse will be recalculated unless the cost of the warehouse transfer is the same as the average cost of the receiving warehouse.

# Replacement Cost Calculation

The Replacement Cost of an item is equal to the unit posting cost. The unit posting cost is affected by entries in two fields:

- ❑ the *Each/All* field in *Posting* for the transaction
- ❑ the *Prices/Costs Are Per* value in *Inventory Control/File Setup/Products* for each product.

When **E**(ach) is in the *Each/All* field in *Posting* for the transaction, the transaction cost is for 1 item. This individual cost must be multiplied by the value in the *Prices/Costs Are Per* field to determine the Replacement Cost.

$$\text{Replacement Cost} = \text{Transaction Cost} \times \text{Prices/Costs Are Per}$$

When **A**(ll) is in the *Each/All* field in *Posting* for the transaction, the transaction cost is for all the items received and must be divided by the receiving quantity to yield an individual cost. This individual cost must be multiplied by the value in the *Prices and Costs Are Per* field to determine the Replacement Cost.

$$\text{Replacement Cost} = \frac{\text{Transaction Cost}}{\text{Transaction Quantity}} \times \text{Prices/Costs Are Per}$$

## Examples of Replacement Cost Calculation

Example 1:

Original Replacement Cost = \$20,000

Prices/Costs Are Per = 1000

8 additional items are received at a cost of \$40 **E**(ach):

$$\text{New Replacement Cost} = 40 \times 1000 = 40,000$$

Example 2:

Original Replacement Cost = \$10,000

Prices/Costs Are Per = 1000

8 additional items are received at a cost of \$40 **A**(ll):

$$\text{New Replacement Cost} = \frac{40}{8} \times 1000 = 5,000$$

**Example 3:**

**Original Replacement Cost = \$20**

**Prices/Costs Are Per = 1**

**8 additional items are received at a cost of \$40 E(ach):**

$$\text{New Replacement Cost} = 40 \times 1 = 40$$

**Example 4:**

**Original Replacement Cost = \$10**

**Prices/Costs Are Per = 1**

**8 additional items are received at a cost of \$40 A(11):**

$$\text{New Replacement Cost} = \frac{40}{8} \times 1 = 5$$