



Chapter 15

BUILDING ASSET DEPRECIATION SCHEDULES

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Financial accounting standards and tax accounting laws require that you depreciate an asset in the process of calculating profits. Methods and conventions for doing this vary depending on the asset, the industry, and the party to whom profits are reported. The purpose, however, remains the same: to allocate the cost of the asset over the years it will be used. The five asset depreciation starter workbooks, described in this chapter, automate the preparation of asset depreciation schedules and provide foundations for customizing depreciation schedules. These starter workbooks (and the depreciation convention each uses) are as follows:

- STRAIGHT.XLS (straight-line)
- DECLIN'G.XLS (declining balance)

- SUMYEARS.XLS (sum-of-the-years'-digits)
- ANNUITY.XLS (annuity or sinking fund)
- ACTIVITY.XLS (activity)

EasyRefresher™: Asset Depreciation

Asset depreciation answers the question, “How much does the asset cost per period?” To answer that question, you need to: know the cost of the asset, estimate the number of periods in the asset’s useful life, project any salvage value the asset will have at the end of its useful life, and choose a depreciation method. For example, suppose your business purchases a delivery truck for \$10,000, uses it for five years, and then sells it for \$2,000. Using the simplest depreciation method, straight-line depreciation, you calculate the cost of the truck over the five years as the \$10,000 original cost less the \$2,000 salvage value for a result of \$8,000. Now divide the \$8,000 by the five years of useful life. The result—\$1,600—is the depreciation expense.

Straight-line depreciation is the most popular method because it’s easy to apply and intuitive. The other methods—declining balance, sum-of-the-years'-digits, annuity/sinking fund, and activity—simply allocate the asset cost over the asset’s useful life in different ways.

The declining balance depreciation method expenses more of the cost of the asset in the early periods of an asset’s estimated life than in the later periods. It does so using the following formula:

$$(\text{Declining Balance Percentage}) * (\text{Net Book Value}) / (\text{Estimated Life})$$

For example, suppose you want to recalculate the first year’s depreciation expense for the delivery truck using 200% declining balance depreciation. The declining balance percentage is 200%. The net book value, because no depreciation has occurred, is \$10,000. The estimated life is five years. Accordingly, you calculate the first year’s depreciation expense as:

$$200\% * (\$10,000 / 5 \text{ years})$$

or

$$\$4,000.$$

The declining balance percentage is always greater than 100%. Accordingly, the formula accelerates the depreciation of an asset. Often, federal and state income tax laws determine usage of the declining balance depreciation method. Tax laws allow declining balance depreciation for many types of assets and specify a variety of declining balance percentages



to be used, including 125, 150, 175, and 200%, depending on which year you acquire and begin using an asset. Generally, the tax law in effect when you buy and begin using an asset determines the types of assets for which you can use the declining balance method, as well as the declining balance percentage.

The sum-of-the-years'-digits depreciation method, like the declining balance method, also expenses more of the cost of an asset in the early periods of an asset's estimated life than in the later periods. It does so using the following formula:

$$\text{(Periods Left in Estimated Life)} / \text{(Sum of the Periods' Digits)} * \text{(Original Cost - Salvage Value)}$$

For example, suppose you want to recalculate the first year's depreciation expense for the delivery truck using the sum-of-the-years'-digits method. The periods left in the estimated life, because the asset is still new, is five years. The sum of the periods' (or years') digits is $1+2+3+4+5$, or 15. The original cost less the salvage value is $\$10,000 - \$2,000$, or $\$8,000$. Accordingly, you calculate the first year's depreciation expense as:

$$(5/15) * \$8,000$$

or

$$\$2,667.$$

Because the fraction becomes smaller in each succeeding period, the amount of depreciation expensed each year becomes smaller.

The annuity and sinking fund depreciation methods are mechanically identical, so this book supplies the same starter workbook for both. Both of these methods expense less of the cost of an asset in the early periods of an asset's life than in the later periods, so they are roughly the opposite of the declining balance and sum-of-the-years'-digits methods in this regard. The annuity and sinking fund methods also include in their depreciation expenses a specified return on the investment. Generally, the annuity and sinking fund methods violate the Generally Accepted Accounting Principles (GAAP). (Generally Accepted Accounting Principles are the rules and methods that certified public accountants, with help from business and the government, develop and use for financial accounting. Usually, when people refer to Generally Accepted Accounting Principles, they mean the pronouncements of the Financial Accounting Standards Board, an independent professional group.) Because they are contrary to GAAP and because they are complex, these methods are rarely used in practice except in heavily regulated industries such as public utilities in which governmental rate-setting agencies often specify returns on investment. The annuity and sinking fund depreciation methods use the following formula to calculate depreciation expenses:



$$\frac{(\text{Original Cost} - (\text{Present Value of the Salvage Value}))}{(\text{Present Value Factor of an Ordinary Annuity for } n \text{ Periods at } i\%)}$$

where n equals the estimated life, and i equals the specified return on investment.

For example, suppose you want to recalculate the first year's depreciation expense for the delivery truck using the annuity or sinking fund method. Also suppose that you are assured a 10% return on assets by a state regulatory agency. The 10% is the specified return on investment. The original cost is \$10,000. The estimated life is five years. The present value of the salvage value is calculated as follows: For each year in the asset's estimated life, the \$2,000 salvage value is divided by the sum of 1 plus the specified return on investment, or $(1+10\%)^5$, or \$1,241.84.

You can then calculate the present value of an ordinary (\$1) annuity for 5 periods using a 10% discount rate using the PV function as follows:

`=PV(.10, 5, 1)`

for a result of 3.7908. Accordingly, you calculate the depreciation expense as:

$$(\$10,000 - \$1,241.84) / 3.7908$$

or

$$\$2,310.37.$$

This depreciation amount also includes assumed investment revenue of 10% on the asset cost of \$10,000, or \$1,000, meaning the actual amount of the asset being expensed in this period is \$2,310.37 minus \$1,000 or \$1,310.37. In other words, the depreciated value of the truck after one year under this method is \$8,689.63.

As the net book value of the asset becomes smaller over its useful life, the assumed investment revenue becomes smaller. Consequently, the \$2,310.37 of depreciation represents less assumed investment revenue and more actual asset being expensed. The assumed investment revenue amounts to the assumed return on assets allowed by the regulatory agency.

The activity method depreciates an asset as it's used, instead of as time passes, by calibrating the estimated life of an asset in units of use. It does so by using the following formula:

$$(\text{Period Units of Use} / \text{Estimated Life in Units of Use}) * (\text{Original Cost} - \text{Salvage Value})$$

For example, suppose you want to recalculate the first year's depreciation expense for the delivery truck using the activity depreciation method. If a delivery truck lasts for 100,000 miles and you anticipate driving the truck 30,000 miles the first year, you calculate the first year's depreciation expense as:

$30,000/100,000 * (\$10,000 - \$2,000)$

or

$\$2,400.$

In general, financial accounting standards and the tax laws guide you in determining asset cost, useful life, and salvage value and in selecting a depreciation method. Accordingly, if you're building a depreciation schedule to use for tax accounting, your best resources are the publications of the Internal Revenue Service and your tax adviser. Alternatively, if you're building a depreciation schedule to use for financial accounting, your best resources are the publications of the Financial Accounting Standards Board and your certified public accountant.

TIP *Be consistent in the financial measurement periods you use in depreciating assets. If you're building a monthly forecast, calculate depreciation expenses on a monthly basis and enter the useful life in months. Alternatively, if you're building a quarterly or yearly forecast, calculate your depreciation expenses on a quarterly or yearly basis and enter the estimated life of an asset in quarters or years.*

Using the Asset Depreciation Starter Workbooks

You can use the asset depreciation starter workbooks shown in Figures 15-1 through 15-5 to construct depreciation schedules using a variety of asset depreciation conventions.

Given three parameters—original cost, salvage value, and estimated life—these starter workbooks calculate the period depreciation, the accumulated depreciation, and the net book value for each period of the forecasting horizon. You need this information to calculate business profits and losses, to report asset balances on the balance sheet, and to calculate any gains or losses on the disposal of assets.

To enter your own data in an asset depreciation starter workbook, follow these steps:

- 1. Open the appropriate asset depreciation starter workbook from the companion CD.**

Use the straight-line depreciation starter workbook if you want to use straight-line depreciation. Use the declining balance depreciation starter workbook if you want to use declining balance, such as double-declining balance, depreciation. Use the sum-of-the-years'-digits depreciation starter workbook if you want to use sum-of-the-years'-digits depreciation. Use the annuity depreciation starter workbook if you want to use annuity or sinking fund depreciation. Finally, use the activity-based depreciation starter workbook if you want to use activity-based depreciation.



NOTE *The straight-line depreciation starter workbook initially contains the default inputs shown in Figure 15-1. The declining balance depreciation starter workbook initially contains the default inputs shown in Figure 15-2. The sum-of-the-years'-digits depreciation starter workbook initially contains the default inputs shown in Figure 15-3. The annuity or sinking fund depreciation starter workbook initially contains the default inputs shown in Figure 15-4. Finally, the activity depreciation starter workbook initially contains the default inputs shown in Figure 15-5.*

2. Enter the original cost of the asset.

In cell B4, enter the original cost of acquiring an asset and placing it into service. In general, the Original Cost value should be the cost of acquiring and placing into service the asset that you are depreciating. This amount might include the asset purchase price, sales tax, shipping insurance costs, freight charges, and installation costs.

3. Enter the salvage, or residual value, of the asset.

In cell B5, enter the salvage value of the asset or group of assets. If you're using group or composite depreciation, enter the total cost of all the assets in the group. The Salvage Value figure is the residual value of the asset at the end of its estimated useful life.

4. Enter the estimated useful life, or economic life, of the asset.

In cell B6, enter the estimated life of the asset. For tax accounting purposes, the useful life and salvage value sometimes are defined by tax law. For financial accounting purposes, previous experience with an asset might provide historical data for estimating the useful life.

When you're using sum-of-the-years'-digits or annuity depreciation, express the estimated life in integer format. Accordingly, if you're depreciating an asset over two and a half years, instead of entering the estimated life as 2.5 (years), enter the estimated life as 30 (months).

NOTE *If you are using the Annuity Depreciation Worksheet, remember to adjust the specified return on investment according to the guidelines from your regulatory agency.*

If you're using activity-based depreciation, note that you need to specify the useful life in units of useful life.

5. Provide any other data required for the depreciation calculations.

If you're calculating declining balance depreciation, for example, enter the declining balance percentage you've selected or have been directed to use by your tax adviser in cell B7.

If you're calculating annuity-based depreciation, enter the specified return on investment in cell B7.

If you're calculating activity-based depreciation, enter the period units of use, starting in cell B11.

TIP *If you want to fully depreciate the asset using activity-based depreciation, be sure the sum of the period units of use equals the estimated life, calibrated in units of use.*

After you enter the required inputs, the starter workbook makes the calculations necessary to produce a depreciation schedule.

Understanding the Straight-Line Depreciation Starter Workbook

The straight-line depreciation starter workbook has two parts: the Straight-Line Depreciation Calculation Inputs box in the range A2:B6 and the Straight-Line Depreciation Schedule, starting with the title in row 8 (see Figure 15-1).

The screenshot shows an Excel spreadsheet with the following data:

Straight-Line Depreciation Worksheet	
Enter input values into colored cells:	
Original Cost	\$150,000
Salvage Value	\$25,000
Estimated Life	18

Straight-Line Depreciation Schedule			
Period	Period Depreciation	Accumulated Depreciation	Net Book Value
1	\$6,944	\$6,944	\$143,056
2	\$6,944	13,889	136,111
3	\$6,944	20,833	129,167
4	\$6,944	27,778	122,222
5	\$6,944	34,722	115,278
6	\$6,944	41,667	108,333
7	\$6,944	48,611	101,389
8	\$6,944	55,556	94,444
9	\$6,944	62,500	87,500
10	\$6,944	69,444	80,556
11	\$6,944	76,389	73,611
12	\$6,944	83,333	66,667
13	\$6,944	90,278	59,722
14	\$6,944	97,222	52,778
15	\$6,944	104,167	45,833
16	\$6,944	111,111	38,889
17	\$6,944	118,056	31,944

Figure 15-1 The straight-line depreciation starter workbook.

Straight-Line Depreciation Calculation Inputs

The calculation inputs are Original Cost, Salvage Value, and Estimated Life. These are the only three variables you enter, and, unless you turn off cell protection, the three cells containing these values are the only cells within the spreadsheet in which you can enter data.

For convenience and good documentation within the starter workbook, cell B4 contains the original cost and is named `Original_Cost`, cell B5 contains the salvage value and is named

Salvage_Value, and cell B6 contains the estimated life and is named Estimated_Life. The formulas within the Straight-Line Depreciation Schedule use these cell names rather than the cell addresses.

Straight-Line Depreciation Schedule

The Straight-Line Depreciation Schedule has four columns: Period, Period Depreciation, Accumulated Depreciation, and Net Book Value.

Period

The period identifier simply numbers the time periods over which you're depreciating the asset. The first period identifier is stored in cell B11 as the integer 1. Periods that follow are stored as the previous period plus 1.

TIP *Column A is empty in the area next to the period column. You might want to use this space to store ending dates for the accounting periods that correspond with the period depreciation.*

Period Depreciation

Period depreciation is the depreciation expense for the current period. If you're using the starter workbook for depreciable assets accounting, the Period Depreciation expense is the debit component of a depreciation journal entry and ultimately shows up in the profit and loss statement. If you're using the starter workbook as part of a financial forecast, you can include the Period Depreciation expense from other expenses in the profit and loss forecast. Additionally, any income tax effect of this noncash expense ripples through the cash flow statement.

Because the asset is expensed equally in each period in straight-line depreciation, the basic Period Depreciation formula used in the first period is incorporated in the formula for each period of the forecasting horizon:

```
=SLN(Original_Cost,Salvage_Value,Estimated_Life)
```

This formula for subsequent periods is modified to prevent an asset from being depreciated below its salvage value and to deal with an estimated life expressed as a noninteger. Starting in the second period, the basic formula is enclosed in a MIN statement, which selects the smaller of two amounts: the straight-line depreciation expense or the amount yet to be depreciated. For example, the Period Depreciation formula for the second period is:

```
=MIN(SLN(Original_Cost,Salvage_Value,Estimated_Life),E11-Salvage_Value)
```

The E11–Salvage_Value portion of the formula calculates the amount yet to be depreciated. In subsequent periods, this part of the formula uses the Net Book Value amount from previous periods.

Accumulated Depreciation

If you're using the starter workbook for depreciable assets accounting, the incremental increase in accumulated depreciation is the credit component of a depreciation journal entry and ultimately shows up on the balance sheet as an adjustment to the asset's carrying cost. If you're using the starter workbook as part of a financial forecast, you can include the accumulated depreciation from the original cost of the asset in the balance sheet forecast to show the asset's net book value. Alternatively, you might simply use the Net Book Value amount calculated by this schedule.

The formula for the accumulated depreciation balance in the first period is:

```
=SUM(C$11:C11)
```

The formula for the second period is:

```
=SUM(C$11:C12)
```

and so on.

Net Book Value

The net book value is an asset's carrying cost and is the amount that you report either individually or with other assets' net book values on any historical or pro forma balance sheets.

For each period, the Net Book Value amount is the Original Cost amount less any accumulated depreciation. The formula for the first period is:

```
=Original_Cost-D11
```

The formula for the second period is:

```
=Original_Cost-D12
```

and so on.

Understanding the Declining Balance Depreciation Starter Workbook

In general, you use the declining balance depreciation starter workbook (see Figure 15-2) if you've selected or been counseled by your tax adviser to use a declining balance convention, such as Accelerated Cost Recovery System (ACRS) or modified Accelerated Cost

Recovery System (MACRS), for tax accounting. You can also use this starter workbook if you're calculating depreciation for financial accounting and you feel that the declining balance method of depreciation allocates costs in a way that matches economic reality.

The screenshot shows an Excel spreadsheet with the following data:

Declining Balance Depreciation Worksheet			
Enter input values into colored cells:			
Original Cost	\$150,000		
Salvage Value	\$25,000		
Estimated Life	18		
Decline Percent	175%		

Declining Balance Depreciation Schedule			
Period	Period Depreciation	Accumulated Depreciation	Net Book Value
1	\$14,583	\$14,583	\$135,417
2	13,166	27,749	122,251
3	11,886	39,634	110,366
4	10,730	50,364	99,636
5	9,687	60,051	89,949
6	8,745	68,796	81,204
7	7,895	76,691	73,309
8	7,127	83,818	66,182
9	6,434	90,253	59,747
10	5,809	96,061	53,939
11	5,244	101,305	48,695
12	4,734	106,040	43,960
13	4,274	110,314	39,686
14	3,858	114,172	35,828
15	3,483	117,655	32,345
16	3,145	120,800	29,200

Figure 15-2 The declining balance depreciation starter workbook.

Given four parameters—original cost, salvage value, estimated life, and the decline percentage—this starter workbook calculates the depreciation expense, the accumulated depreciation, and the net book value for each period of the forecasting horizon.

NOTE This starter workbook uses the VDB functions default setting, which switches to the straight-line depreciation convention when that method maximizes the expense charged. This convention is employed because the declining balance depreciation formula does not completely depreciate assets with very low salvage values. Without this feature, an asset might not be completely depreciated over its estimated life.

WARNING Declining balance depreciation calculated with the declining balance depreciation starter workbook will not perfectly match the declining balance depreciation calculated using the Internal Revenue Service's rules. The Internal Revenue Service modifies the standard declining balance calculations for a variety of reasons related to technical tax laws and tax regulations.

The declining balance starter workbook has two parts: the Declining Balance Depreciation Calculation Inputs box and the Declining Balance Depreciation Schedule.

Declining Balance Depreciation Calculation Inputs

The calculation inputs are Original Cost, Salvage Value, Estimated Life, and Decline Percent. These are the only four variables you enter, and, unless you turn off cell protection, the four cells containing these values are the only cells within the spreadsheet in which you can enter data.

For convenience and good documentation within the starter workbook, cell B4 contains the original cost and is named `Original_Cost`, cell B5 contains the salvage value and is named `Salvage_Value`, cell B6 contains the estimated life and is named `Estimated_Life`, and cell B7 contains the declining balance percentage and is named `Decline_Percent`. The formulas within the schedules use these cell names rather than the cell addresses.

Declining Balance Depreciation Schedule

The Declining Balance Depreciation Schedule has four columns: Period, Period Depreciation, Accumulated Depreciation, and Net Book Value.

Period

The period identifier simply numbers the time periods over which you're depreciating the asset. The first period identifier is stored in cell B12 as the integer 1. Periods that follow are stored as the previous period plus 1.

TIP *Column A is empty in the area next to the period column. You might want to use this space to store ending dates for the accounting periods that correspond with the period depreciation.*

Period Depreciation

If you're using declining balance depreciation over the asset's entire estimated life, period depreciation is the depreciation expense for the current period. If you're using the starter workbook for depreciable assets bookkeeping, the Period Depreciation expense is the debit component of a depreciation journal entry and ultimately shows up in the profit and loss statement. If you're using the starter workbook as part of a financial forecast, you can add the Period Depreciation expense to other expenses in the profit and loss forecast. Additionally, any income tax effect of this noncash expense ripples through the cash flow statement.

The Period Depreciation formula for the first period in the forecasting horizon is:

```
=VDB(Original_Cost,Salvage_Value,Estimated_Life,B122,B12,Decline_Percent)
```

The formula simply supplies the needed input values for calculating declining balance depreciation to the VDB function. (If you have questions about how the VDB works, refer to Chapter 5.)

Accumulated Depreciation

If you're using the starter workbook for depreciable assets accounting, the incremental increase in accumulated depreciation is the credit component of a depreciation journal entry and ultimately shows up on the balance sheet as an adjustment of the asset's carrying cost. If you're using the starter workbook as part of a financial forecast, you can deduct the accumulated depreciation from the original cost of the asset in the balance sheet forecast to show the asset's net book value. Alternatively, you might simply use the Net Book Value amount calculated by this schedule.

The formula for the Accumulated Depreciation balance in the first period is:

```
=SUM(C$12:C12)
```

The formula for the second period is:

```
=SUM(C$12:C13)
```

The formula for the third period is:

```
=SUM(C$12:C14)
```

and so on.

Net Book Value

The net book value is an asset's carrying cost and is the amount that you report either individually or with other assets' net book values on any historical or pro forma balance sheets.

For each period, the Net Book Value amount is the Original Cost amount less any accumulated depreciation. The net book value formula for the first period is:

```
=Original_Cost-D12
```

The formula for the second period is:

```
=Original_Cost-D13
```

The formula for the third period is:

```
=Original_Cost-D14
```

and so on.

Understanding the Sum-of-the-Years'-Digits Depreciation Starter Workbook

You can use the sum-of-the-years'-digits depreciation starter workbook shown in Figure 15-3 to construct depreciation schedules with the sum-of-the-years'-digits method. In general, you use this starter workbook if you've selected or been counseled by your tax adviser to use the sum-of-the-years'-digits convention for tax accounting. You can also use this starter workbook if you're calculating depreciation for financial accounting and you feel that this depreciation method allocates costs in a way that matches economic reality.

Sum-of-the-Years'-Digits Depreciation Schedule				Straight-Line Depreciation Schedule			
Period	Period Depreciation	Accumulated Depreciation	Net Book Value	Period	Period Depreciation	Accumulated Depreciation	Net Book Value
1	\$13,158	\$13,158	\$136,842	1	\$6,944	\$6,944	\$143,056
2	\$12,427	25,585	124,415	2	\$6,944	13,889	136,111
3	\$11,696	37,281	112,719	3	\$6,944	20,833	129,167
4	\$10,965	48,246	101,754	4	\$6,944	27,778	122,222
5	\$10,234	58,480	91,520	5	\$6,944	34,722	115,278
6	\$9,503	67,983	82,018	6	\$6,944	41,667	108,333
7	\$8,772	76,754	73,246	7	\$6,944	48,611	101,389
8	\$8,041	84,795	65,205	8	\$6,944	55,556	94,444
9	\$7,310	92,105	57,895	9	\$6,944	62,500	87,500
10	\$6,579	98,684	51,316	10	\$6,944	69,444	80,556
11	\$5,848	104,532	45,468	11	\$6,944	76,389	73,611
12	\$5,117	109,649	40,351	12	\$6,944	83,333	66,667
13	\$4,386	114,035	35,965	13	\$6,944	90,278	59,722
14	\$3,655	117,630	32,310	14	\$6,944	97,222	52,778
15	\$2,924	120,614	29,386	15	\$6,944	104,167	45,833
16	\$2,193	122,807	27,193	16	\$6,944	111,111	38,889
17	\$1,462	124,269	25,731	17	\$6,944	118,056	31,944
18	\$731	125,000	25,000	18	\$6,944	125,000	25,000
19	\$0	125,000	25,000	19	\$0	125,000	25,000
20	\$0	125,000	25,000	20	\$0	125,000	25,000

Figure 15-3 The sum-of-the-years'-digits depreciation starter workbook.

Given three parameters—original cost, salvage value, and estimated life—this starter workbook calculates the period depreciation, the accumulated depreciation, and the net book value for each period of the forecasting horizon.

The schedule also calculates the excess accelerated depreciation taken as a result of using the sum-of-years'-digits method, because this amount might be subject to special tax treatment either on a current basis or at disposal. To calculate the excess, this starter workbook incorporates a straight-line depreciation schedule.

The sum-of-the-years'-digits depreciation starter workbook has four parts: the Sum-of-the-Years'-Digits Calculation Inputs box, the Sum-of-the-Years'-Digits Depreciation Schedule, the Straight-Line Depreciation Schedule, and the Excess Accelerated Depreciation Schedule.

Sum-of-the-Years'-Digits Calculation Inputs

The calculation inputs are Original Cost, Salvage Value, and Estimated Life. These are the only three variables you enter, and, unless you turn off cell protection, the three cells containing these values are the only cells within the spreadsheet in which you can enter data.

For convenience and good documentation within the starter workbook, cell B4 contains the original cost and is named `Original_Cost`, cell B5 contains the salvage value and is named `Salvage_Value`, and cell B6 contains the estimated life and is named `Estimated_Life`. The formulas within the actual schedule use these cell names rather than the cell addresses.

Sum-of-the-Years'-Digits Depreciation Schedule

The Sum-of-the-Years'-Digits Depreciation Schedule has four columns: Period, Period Depreciation, Accumulated Depreciation, and Net Book Value.

Period

The period identifier simply numbers the time period over which you're depreciating the asset. The first period identifier is stored in cell B1 as the integer 1. Periods that follow are stored as the previous period plus 1.

TIP *Column A is empty in the area next to the period column. You might want to use this space to store ending dates for the accounting periods that correspond with the period depreciation.*

Period Depreciation

Period depreciation is the depreciation expense for the current period. If you're using the starter workbook for depreciable assets accounting, the Period Depreciation expense is the debit component of a depreciation journal entry and ultimately shows up in the profit and loss statement. If you're using the starter workbook as part of a financial forecast, you can add the Period Depreciation expense to other expenses in the profit and loss forecast. Additionally, any income tax effect of this noncash expense ripples through the cash flow statement.

The Period Depreciation formula for the first period in the forecasting horizon is:

```
=SYD(Original_Cost,Salvage_Value,Estimated_Life,B11)
```

The formula for the second period, however, is modified so that the asset is not depreciated below its salvage value. Starting with the second period, the formula to calculate the Period Depreciation expense is enclosed in an IF statement that first verifies that the asset

hasn't already been fully depreciated. For the comparison, rounded amounts are used so that trailing digits of insignificance don't affect the test. The formula for the second period is:

```
=IF(ROUND(Original_Cost-D11,0)=ROUND(Salvage_Value,0),0,  
    SYD(Original_Cost,Salvage_Value,Estimated_Life,B12))
```

The `Original_Cost-D11` portion is the Net Book Value amount at the end of the previous period. B12 contains the period identifier for the expense that is calculated. In subsequent periods, these parts of the formula change so that the formula always uses the Net Book Value amount from the previous period and the period identifier from the current period.

In other words, this equation states that if the net book value after depreciation equaled the salvage value after the last period, set the depreciation for this period to 0.

Accumulated Depreciation

If you're using the starter workbook for depreciable assets accounting, the incremental increase in the Accumulated Depreciation amount is the credit component of a depreciation journal entry and ultimately shows up on the balance sheet as an adjustment to the asset's carrying cost. If you're using the starter workbook as part of a financial forecast, you can deduct the Accumulated Depreciation amount from the original cost of the asset in the balance sheet forecast to show the asset's net book value. Alternatively, you might simply use the Net Book Value amount calculated by this schedule.

The formula for the Accumulated Depreciation balance in the first period is:

```
=SUM(C$11:C11)
```

The formula for the second period is:

```
=SUM(C$11:C12)
```

The formula for the third period is:

```
=SUM(C$11:C13)
```

and so on.

Net Book Value

The net book value is an asset's carrying cost and is the amount that you report either individually or with other assets' net book values on any historical or pro forma balance sheets.

For each period, the Net Book Value amount is the Original Cost amount less any accumulated depreciation. The formula for the first period is:

```
=Original_Cost-D11
```

The formula for the second period is:

```
=Original_Cost-D12
```

The formula for the third period is:

```
=Original_Cost-D13
```

and so on.

Straight-Line Depreciation Schedule

The Straight-Line Depreciation Schedule has four columns: Period, Period Depreciation, Accumulated Depreciation, and Net Book Value.

Period

The period identifier simply numbers the time periods over which you're depreciating the asset. The first period is stored as the integer 1. Periods that follow are stored as the previous period plus 1.

Period Depreciation

Period depreciation is the depreciation expense for the current period. If you're using the starter workbook for depreciable assets accounting, the Period Depreciation expense is the debit component of a depreciation journal entry and ultimately shows up in the profit and loss statement. If you're using the starter workbook as part of a financial forecast, you can add the Period Depreciation expense to other expenses in the profit and loss forecast. Additionally, any income tax effect of this noncash expense ripples through the cash flow statement.

Because the asset is expensed equally in each period in straight-line depreciation, the basic Period Depreciation formula used in the first period is incorporated in the formula for each period of the forecasting horizon:

```
=SLN(Original_Cost,Salvage_Value,Estimated_Life)
```

The formula for subsequent periods is modified to prevent an asset from being depreciated below its salvage value. Starting in the second period, the basic formula is enclosed in a MIN statement, which selects the smaller of two amounts: the straight-line depreciation expense or the amount yet to be depreciated. For example, the period expense formula for the second period is:

```
=MIN(SLN(Original_Cost,Salvage_Value,Estimated_Life),J11-Salvage_Value)
```

The J11-Salvage_Value portion calculates the amount yet to be depreciated. In subsequent periods, this part of the formula uses the Net Book Value amount from the previous period.

Accumulated Depreciation

If you're using the starter workbook for depreciable assets accounting, the incremental increase in the Accumulated Depreciation amount is the credit component of a depreciation journal entry and ultimately shows up on the balance sheet as an adjustment to the asset's carrying cost. If you're using the starter workbook as part of a financial forecast, you can deduct the accumulated depreciation from the original cost of the asset in the balance sheet forecast to show the asset's net book value. Alternatively, you might simply use the Net Book Value amount calculated by this schedule.

The formula for the Accumulated Depreciation balance in the first period is:

```
=SUM(H$11:H11)
```

The formula for the second period is:

```
=SUM(H$11:H12)
```

and so on.

Net Book Value

The net book value is an asset's carrying cost and is the amount that you report either individually or with other assets' net book values on any historical or pro forma balance sheets.

For each period, the Net Book Value amount is the Original Cost amount less any accumulated depreciation. The formula for the first period is:

```
=Original_Cost-I11
```

The formula for the second period is:

```
=Original_Cost-I12
```

and so on.

Excess Accelerated Depreciation Schedule

In certain situations, excess accelerated depreciation is accorded special income tax treatment. The calculated results in the one-column Excess Accelerated Depreciation Schedule are simply the difference between the Net Book Value amount for each period calculated in the Sum-of-the-Years'-Digits Depreciation Schedule and the Net Book Value amount calculated in the Straight-Line Depreciation Schedule. The formula for the first period is:

```
=J11-E11
```

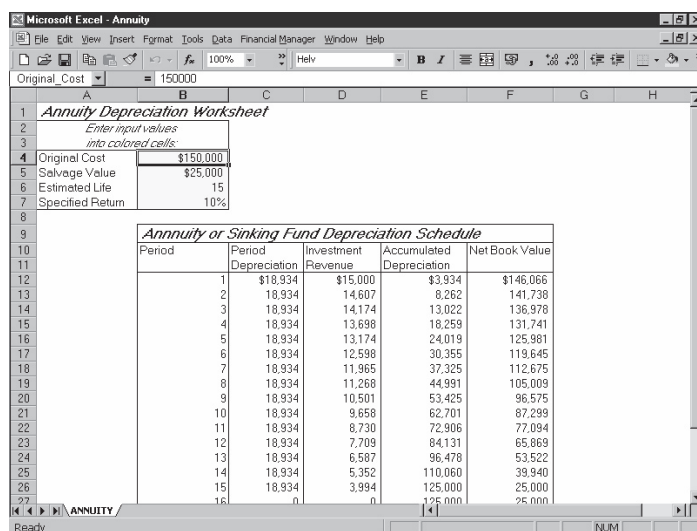
The formula for the second period is:

=J12-E12

and so on.

Understanding the Annuity or Sinking Fund Depreciation Starter Workbook

You can use the annuity or sinking fund depreciation starter workbook, shown in Figure 15-4, to construct depreciation schedules with the annuity or sinking fund depreciation methods. The annuity and sinking fund depreciation methods include, as part of the depreciation expense, a return on the asset being depreciated. In general, this method violates the Generally Accepted Accounting Principles, and, for this reason, you are unlikely to need this starter workbook. However, public utilities sometimes use these methods for calculating depreciation expenses—a practice that's defensible because the rate-setting process often assumes a guaranteed return on investment. In general, you can use this template if management feels that the rate setting virtually assures a specific return on assets and the annuity or sinking fund method has been selected and approved by management, appropriate regulatory agencies, and your external auditors.



Annuity or Sinking Fund Depreciation Schedule				
Period	Period Depreciation	Investment Revenue	Accumulated Depreciation	Net Book Value
1	\$18,934	\$15,000	\$3,934	\$146,066
2	18,934	14,607	8,262	141,738
3	18,934	14,174	13,022	136,978
4	18,934	13,698	18,259	131,741
5	18,934	13,174	24,019	125,981
6	18,934	12,598	30,355	119,645
7	18,934	11,965	37,325	112,675
8	18,934	11,268	44,991	105,009
9	18,934	10,501	53,425	96,575
10	18,934	9,658	62,701	87,299
11	18,934	8,730	72,906	77,094
12	18,934	7,709	84,131	65,869
13	18,934	6,587	96,478	53,522
14	18,934	5,352	110,060	39,940
15	18,934	3,994	125,000	25,000
16	0	0	125,000	25,000

Figure 15-4 The annuity or sinking fund depreciation starter workbook.

Given four parameters—original cost, salvage value, the estimated useful life, and the specified return on investment—this schedule calculates the period depreciation, the accumulated depreciation, the imputed (or assumed) investment revenue, and the net book value



for each period of the forecasting horizon. You need this information to calculate business profits and losses, to report asset balances on the balance sheet, and to calculate any gains or losses on the disposal of assets.

The annuity or sinking fund depreciation starter workbook has two parts: the Annuity or Sinking Fund Depreciation Calculation Inputs box and the Annuity or Sinking Fund Depreciation Schedule.

Annuity or Sinking Fund Depreciation Calculation Inputs

The calculation inputs are Original Cost, Salvage Value, Estimated Life, and Specified Return. These are the only four variables you enter, and, unless you turn off cell protection, the four cells containing these values are the only cells within the spreadsheet in which you can enter data.

For convenience and good documentation within the starter workbook, cell B4 contains the original cost and is named `Original_Cost`, cell B5 contains the salvage value and is named `Salvage_Value`, cell B6 contains the estimated life and is named `Estimated_Life`, and cell B7 contains the specified return and is named `Specified_Return`. The formulas within the actual schedule use these cell names rather than the cell addresses.

Annuity or Sinking Fund Depreciation Schedule

The Annuity or Sinking Fund Depreciation Schedule has five columns: Period, Period Depreciation, Investment Revenue, Accumulated Depreciation, and Net Book Value.

Period

The period identifier simply numbers the time periods over which you're depreciating the asset. The first period identifier is stored in cell B12 as the integer 1. Periods that follow are stored as the previous period plus 1.

TIP *Column A is empty in the area next to the period column. You might want to use this space to store ending dates for the accounting periods that correspond with the period depreciation.*

Period Depreciation

Period depreciation is the depreciation expense for the current period. If you're using the starter workbook for depreciable assets accounting, the Period Depreciation expense is the debit component of a depreciation journal entry and ultimately shows up in the profit and loss



statement. If you're using the starter workbook as part of a financial forecast, you can include the Period Depreciation expense with other expenses in the profit and loss forecast. Additionally, any income tax effect of this noncash expense ripples through the cash flow statement.

The basic Period Depreciation formula is:

```
=-(Original_Cost -(Salvage_Value/(1+Specified_Return)^Estimated_Life))/
PV(Specified_Return,Estimated_Life,1)
```

The minus sign at the beginning of this formula is necessary because the PV function returns a negative value when all of its arguments are positive. You may note how this corresponds to the original equation for Period Depreciation as explained earlier in this chapter:

```
(Original Cost-(Present Value of the Salvage Value))/(Present Value
Factor of an Ordinary Annuity for n Periods at i%)
```

The Present Value of the Salvage Value variable takes the final Salvage Value and factors it based on the specified return for the estimated life of the asset.

The formula for the second period, however, is modified so that the asset is not depreciated below its salvage value. Starting with the second period, the formula to calculate the Period Depreciation expense is enclosed in an IF statement that first verifies that the asset hasn't already been fully depreciated. For the comparison, rounded amounts are used so that trailing digits of insignificance don't affect the test. The formula for the second period is:

```
IF(ROUND(Original_Cost-E12,0)=ROUND(Salvage_Value,0)0,
-(Original_Cost-(Salvage_Value/(1+Specified_Return)^Estimated_Life))/
PV(Specified_Return,Estimated_Life,1))
```

In other words, this equation states that if the net book value after depreciation equaled the salvage value after the last period, set the depreciation for this period to 0.

Investment Revenue

Investment revenue is the assumed investment return on the asset. If you're using the starter workbook for depreciable assets accounting and have selected the annuity depreciation method, the investment revenue for a period is credited to an investment revenue account and ultimately shows up in the profit and loss statement. If you're using the starter workbook for depreciable assets accounting and have selected the sinking fund depreciation method, the investment revenue for a period is credited to the depreciation expense account. This results in a net debit to the depreciation expense account equal to the return of the asset principal and the increase in the accumulated depreciation expense for the period. The net depreciation expense ultimately shows up in the profit and loss statement. If you're using

the template as part of a financial forecast, you can add the investment revenue to other miscellaneous revenues in the profit and loss forecast.

The first-period Investment Revenue value is the Original Cost value times the Specified Return value. The formula for the first period is:

```
=Specified_Return*Original_Cost
```

The formula for the second period, however, is modified so that the previous Net Book Value amount is used and so that investment revenue isn't calculated when the asset is fully depreciated. Starting in the second period, the formula to calculate the Investment Revenue amount is enclosed in an IF statement that first verifies that the asset hasn't already been fully depreciated. For the comparison, rounded amounts are used so that trailing digits of insignificance don't affect the test. The formula for the second period is:

```
=IF(ROUND(Original_Cost-E12,0)=ROUND(Salvage_Value,0),
```

```
Specified_Return*(Original_Cost-E12))
```

The Original_Cost-E12 portion is the Net Book Value amount at the end of the previous period. In subsequent periods, this part of the formula changes so that it always uses the Accumulated Depreciation amount from the previous period.

Accumulated Depreciation

If you're using the starter workbook for depreciable assets accounting, the incremental increase in the Accumulated Depreciation amount is the credit component of a depreciation journal entry and ultimately shows up on the balance sheet as an adjustment to the asset's carrying cost. If you're using the starter workbook as part of a financial forecast, you can include the Accumulated Depreciation amount with the original cost of the asset in the balance sheet forecast to show the asset's net book value. Alternatively, you might simply use the Net Book Value amount calculated in this schedule.

The first period's Accumulated Depreciation balance is the cumulative return of principal calculated as the cumulative depreciation expense net of the cumulative assumed investment revenue. The formula for the first period is:

```
=SUM(C$12:C12)-SUM(D$12:D12)
```

The formula for the second period is:

```
=SUM(C$12:C13)-SUM(D$12:D13)
```

and so on.

Net Book Value

The net book value is an asset's carrying cost and is the amount that you report either individually or with other assets' net book values on any historical or pro forma balance sheets.

For each period, the Net Book Value amount is the Original Cost amount less any accumulated depreciation. The formula for the first period is:

=Original_Cost-E12

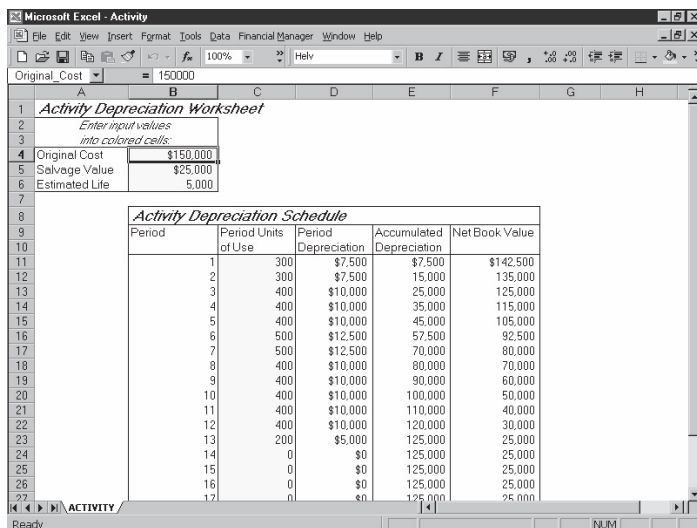
The formula for the second period is:

=Original_Cost-E13

and so on.

Understanding the Activity Depreciation Starter Workbook

You can use the activity depreciation starter workbook shown in Figure 15-5 to construct depreciation schedules with the activity method. The activity method is unique among depreciation methods because it expenses the original cost of an asset based on use rather than on time. In general, you use this starter workbook if you're calculating depreciation for financial or managerial accounting and you feel that its allocation of costs matches economic reality.



Activity Depreciation Worksheet	
Enter input values into colored cells:	
Original Cost	\$150,000
Salvage Value	\$25,000
Estimated Life	5,000

Activity Depreciation Schedule				
Period	Period Units of Use	Period Depreciation	Accumulated Depreciation	Net Book Value
1	300	\$7,500	\$7,500	\$142,500
2	300	\$7,500	15,000	135,000
3	400	\$10,000	25,000	125,000
4	400	\$10,000	35,000	115,000
5	400	\$10,000	45,000	105,000
6	500	\$12,500	57,500	92,500
7	500	\$12,500	70,000	80,000
8	400	\$10,000	80,000	70,000
9	400	\$10,000	90,000	60,000
10	400	\$10,000	100,000	50,000
11	400	\$10,000	110,000	40,000
12	400	\$10,000	120,000	30,000
13	200	\$5,000	125,000	25,000
14	0	\$0	125,000	25,000
15	0	\$0	125,000	25,000
16	0	\$0	125,000	25,000
17	0	\$0	125,000	25,000

Figure 15-5 The activity depreciation starter workbook.

Given the four parameters—original cost, salvage value, estimated useful life (expressed in units of use rather than time), and period units of use—this schedule calculates the depreciation expense, the accumulated depreciation, and the net book value for each period of the forecasting horizon.

The activity depreciation starter workbook has two parts: the Activity Depreciation Calculation Inputs box and the Activity Depreciation Schedule.

Activity Depreciation Calculation Inputs

The calculation inputs and the period units of use are the only variables you enter, and, unless you turn off cell protection, these are the only cells in which you can enter data.

Most often, the financial accounting standards or internal managerial accounting conventions that apply to your modeling assumptions determine the method you use to calculate these variables.

For convenience and good documentation within the starter workbook, cell B4 contains the original cost and is named `Original_Cost`, cell B5 contains the salvage value and is named `Salvage_Value`, and cell B6 contains the estimated life and is named `Estimated_Life`. The formulas within the actual schedule use these cell names rather than the cell addresses.

Activity Depreciation Schedule

The Activity Depreciation Schedule has five columns: Period, Period Units of Use, Period Depreciation, Accumulated Depreciation, and Net Book Value.

Period

The period identifier simply numbers the time periods over which you're depreciating the asset. If you're using the starter workbook as a building block for a financial projection, use the same number of periods in your depreciation schedule as you use in the other schedules that make up your financial forecasting model. The first-period identifier is stored in cell B11 as the integer 1. Periods that follow are stored as the previous period plus 1.

TIP *Column A is empty in the area next to the period column. You might want to use this space to store ending dates for the accounting periods that correspond with the period depreciation.*



Period Units of Use

The Period Units of Use isn't calculated by a formula. You enter either the actual or the forecasted units of use for each period of the forecast as input values. You should check that the total of this column equals the value that you entered for estimated life; it is not absolutely required, as you will see in the following discussion on Period Depreciation.

Period Depreciation

Period depreciation is the depreciation expense for the current period. If you use the starter workbook for depreciable assets accounting, the Period Depreciation expense is the debit component of a depreciation journal entry and ultimately shows up in the profit and loss statement. If you use the starter workbook as part of a financial forecast, you'll probably add the Period Depreciation expense with other expenses in the profit and loss forecast.

The activity depreciation method expenses a portion of an asset's depreciable cost based on the ratio of that period's units of use to the estimated life, calibrated in units of use. For example, the formula for the first period is:

```
=(C11/Estimated_Life)*(Original_Cost-Salvage_Value)
```

The formula for subsequent periods is modified to prevent an asset from being depreciated below its salvage value (as might be the case if you accidentally entered more period units of use than the estimated life in units of use). Starting in the second period, the basic formula is enclosed in the MIN statement, which selects the smaller of two amounts: the activity depreciation expense or the amount yet to be depreciated. For example, the period expense formula for the second period is:

```
=MIN(C12/Estimated_Life*(Original-Cost-Salvage_Value),F11-Salvage_Value)
```

The F11-Salvage_Value portion calculates the amount yet to be depreciated. In subsequent periods, this part of the formula uses the Net Book Value amount from the previous period.

Accumulated Depreciation

If you use the starter workbook for depreciable assets accounting, use the incremental increase in accumulated depreciation as the credit component of a depreciation journal entry, and it will ultimately show up on the balance sheet as an adjustment to the asset's original cost. If you use the starter workbook as part of a financial forecast, you might deduct the accumulated depreciation from the original cost of the asset on the balance sheet forecast to show the asset's net book value. Alternatively, you can use the Net Book Value amount calculated in this schedule.

The first period's Accumulated Depreciation balance is the first Period Depreciation expense. The formula is:

```
=SUM(D$11:D11)
```

The formula for the second period is:

```
=SUM(D$11:D12)
```

and so on.

Net Book Value

Net book value is an asset's original cost minus its accumulated depreciation and is the amount that you would report, either individually or with other assets' net book values, on any historical or pro forma balance sheets.

For each period, the Net Book Value figure is the Original Cost amount less any accumulated depreciation. The formula for the first period is:

```
=Original_Cost-E11
```

The formula for the second period is:

```
=Original_Cost-E12
```

and so on.

Customizing the Asset Depreciation Starter Workbooks

You can use the asset depreciation starter workbooks for a wide variety of depreciation calculations. However, you might want to change the starter workbooks so that they more precisely meet your requirements. For example, you can add text that describes the asset, describes the units of use that calibrate its estimated life, or identifies the supporting documentation for the schedule. You can also increase or decrease the number of periods.

NOTE *Before you change anything in the asset depreciation starter workbooks other than the input parameters, unprotect the document.*

Changing the Number of Periods

You can easily increase or decrease the number of periods shown in any of the asset depreciation schedules. To increase the number of periods, remove the border from the last row of the depreciation schedule and then copy the current last row of the schedule (the row for Period 20) down as needed. To decrease the number of periods, simply delete any unneeded rows from the bottom of the schedule.

TIP *If you're using the starter workbook for accounting and bookkeeping, use a number of periods that is equal to or greater than the estimated life of the asset. However, if you're using the starter workbook as a building block for a financial projection, you'll probably want the number of periods in your depreciation schedule to correspond to the number of periods in the other schedules that make up your financial forecasting model.*