Case

Tree Trimming Project

Wil Fence is a large timber and Christmas tree farmer who is attending a project management class in the fall, his off season. When the class topic came to earned value, he was perplexed. Isn't he using EV?

Each summer Wil hires crews to shear fields of Christmas trees for the coming Holiday season. Shearing entails having a worker use a large machete to shear the branches of the tree into a nice, cone shaped tree.

Will describes his business as follows:

A. I count the number of Douglas Fir Christmas trees in the field (24,000).
B. Next, I agree on a contract lump sum for shearing with a crew boss for the whole field ($30,000).
C. When partial payment for work completed arrives (5 days later), I count or estimate the actual number sheared (6,000 trees). I take the actual as a percent of the total to be sheared, multiply the percent complete by total contract amount for the partial payment [(6,000/$30,000 = 25%), (.25 × $30,000 = $7500)].

1. Is Wil over, on, or below cost and schedule? Is Wil using earned value?
2. How can Wil set up a scheduling variance?

Case

Scanner Project

You have been serving as Electroscan's project manager and are now well along in the project. Develop a narrative status report for the board of directors of the chain store that discusses the status of the project to date and at completion. Be as specific as you can using numbers given and those you might develop. Remember, your audience is not familiar with the jargon used by project managers and computer software personnel; therefore, some explanation may be necessary. Your report will be evaluated on your detailed use of the data, your total perspective of the current status and future status of the project, and your recommended changes (if any).

Appendix 13.1

The Application of Additional Earned Value Rules

The following example and exercises are designed to provide practice in applying the following three earned value rules:

- Percent complete rule
- 0/100 rule
- 50/50 rule

See the chapter for an explanation of each of these rules.

Page 500

Electroscan, Inc.
555 Acorn Street, Suite 5
Boston, Massachusetts

29 In-store Scanner Project
(thousands of dollars)
Actual Progress as of January 1

Name	PV	EV	AC	SV	CV	BAC	EAC_t
Scanner project	420	395	476	–25	–81	915	1103
H 1.0 Hardware	92	88	72	–4	16	260	213
H 1.1 Hardware specifications (DS)	20	20	15	0	5	20	15
H 1.2 Hardware design (DS)	30	30	25	0	5	30	25
H 1.3 Hardware documentation (DOC)	10	6	5	–4	1	10	8
H 1.4 Prototypes (PD)	2	2	2	0	0	40	40
H 1.5 Test prototypes (T)	0	0	0	0	0	30	30
H 1.6 Order circuit boards (PD)	30	30	25	0	5	30	25
H 1.7 Preproduction models (PD)	0	0	0	0	0	100	100
OP 1.0 Operating system	195	150	196	–45	–46	330	431
OP 1.1 Kernel specifications (DS)	20	20	15	0	5	20	15
OP 1.2 Drivers	45	55	76	10	–21	70	97
OP 1.2.1 Disk drivers (DEV)	25	30	45	5	–15	40	60
OP 1.2.2 I/O drivers (DEV)	20	25	31	5	–6	30	37
OP 1.3 Code software	130	75	105	–55	–30	240	336
OP 1.3.1 Code software (C)	30	20	40	–10	–20	100	200
OP 1.3.2 Document software (DOC)	45	30	25	–15	5	50	42
OP 1.3.3 Code interfaces (C)	55	25	40	–30	–15	60	96
OP 1.3.4 Beta test software (T)	0	0	0	0	0	30	30
U 1.0 Utilities	87	108	148	21	–40	200	274
U 1.1 Utilities specifications (DS)	20	20	15	0	5	20	15
U 1.2 Routine utilities (DEV)	20	20	35	0	–15	20	35
U 1.3 Complex utilities (DEV)	30	60	90	30	–30	100	150
U 1.4 Utilities documentation (DOC)	17	8	8	–9	0	20	20
U 1.5 Beta test utilities (T)	0	0	0	0	0	40	40
S 1.0 System integration	46	49	60	3	–11	125	153
S 1.1 Architecture decisions (DS)	9	9	7	0	2	10	8
S 1.2 Integration hard/soft (DEV)	25	30	45	5	–15	50	75
S 1.3 System hard/software test (T)	0	0	0	0	0	20	20
S 1.4 Project documentation (DOC)	12	10	8	–2	2	15	12
S 1.5 Integration acceptance testing (T)	0	0	0	0	0	30	30

SIMPLIFYING ASSUMPTIONS

The same simplifying assumptions used for the chapter example and exercises will also be used here.

1. Assume each cost account has only one work package, and each cost account will be represented

as an activity on the network.
2. The project network early start times will serve as the basis for assigning the baseline values.
3. Except when the 0/100 rule or 50/50 rule is used, baseline values will be assigned linearly, unless stated differently. (Note: In practice estimated costs should be applied "exactly" as they are expected to occur so measures of schedule and cost performance are useful and reliable.)
4. For purposes of demonstrating the examples, from the moment work on an activity begins, some actual costs will be incurred each period until the activity is completed.
5. When the 0/100 rule is used, the total cost for the activity is placed in the baseline on the early finish date.
6. When the 50/50 rule is used, 50 percent of the total cost is placed in the baseline on the early start date and 50 percent on the early finish date.

Page 501

APPENDIX EXERCISES

1. Given the information provided for development of a product warranty project for periods 1 through 7, compute the SV, CV, SPI, and CPI for each period. Plot the EV and the AC on the PV graph provided. Explain to the owner your assessment of the project at the end of period 7 and the future expected status of the project at completion. Figure A13.1A presents the project network. Figure A13.1B presents the project baseline noting those activities using the 0/100 (rule 3) and 50/50 (rule 2) rules. For example, activity 1 uses rule 3, the 0/100 rule. Although the early start time is period 0, the budget is not placed in the time-phased baseline until period 2 when the activity is planned to be finished (EF). This same procedure has been used to assign costs for activities 2 and 7. Activities 2 and 7 use the 50/50 rule. Thus, 50 percent of the budget for each activity is assigned on its respective early start date (time period 2 for activity 2 and period 11 for activity 7) and 50 percent for their respective finish dates. Remember, when assigning earned value as the project is being implemented, if an activity actually starts early or late, the earned values must shift with the actual times. For example, if activity 7 actually starts in period 12 rather than 11, the 50 percent is not earned until period 12.

FIGURE A13.1A

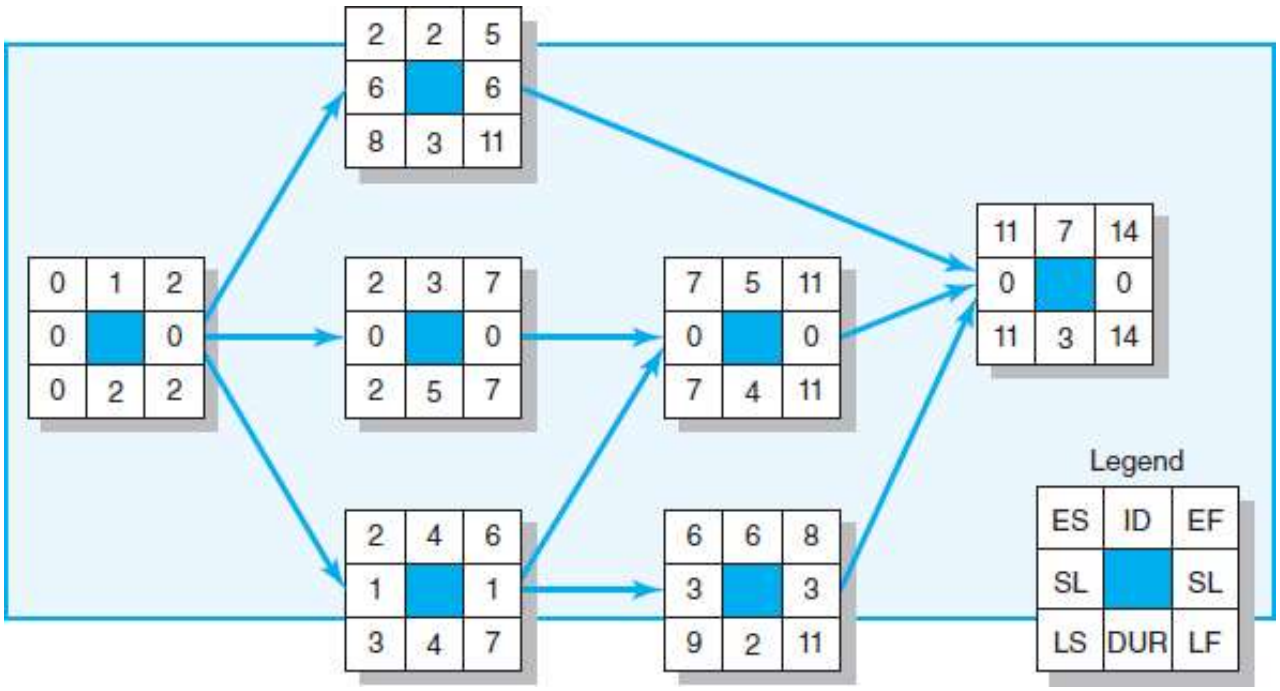


FIGURE A13.1B

Schedule information							Baseline budget needs													
EV Rule	ACT/ WP	DUR	ES	LF	SL	Total PV	Time period 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
3	1	2	0	2	0	6		6													
2	2	3	2	11	6	20			10		10										
1	3	5	2	7	0	30			9	6	6	6	3								
1	4	4	2	7	1	20			8	2	5	5									
1	5	4	7	11	0	16								4	4	4	4				
1	6	2	6	11	3	18							9	9							
2	7	3	11	14	0	8												4		4	
Total PV by period							0	6	27	8	21	11	12	13	4	4	4	4	0	4	
Cumulative PV by period							0	6	33	41	62	73	85	98	102	106	110	114	114	118	

Rule
1 = %complete
2 = 50/50
3 = 0/100

Status Report: Ending Period 1

Task	%Complete	EV	AC	PV	CV	SV
1	0%	——	3	0	——	——
Cumulative Totals		——	**3**	**0**	——	——

Status Report: Ending Period 2

Task	%Complete	EV	AC	PV	CV	SV
1	Finished	6	5	——	——	——
Cumulative Totals		**6**	**5**	——	——	——

Status Report: Ending Period 3

Task	%Complete	EV	AC	PV	CV	SV
1	Finished	6	5	——	——	——
2	0%	——	5	——	——	——
3	30%	——	7	——	——	——
4	25%	——	5	——	——	——
Cumulative Totals		——	**22**	——	——	——

Status Report: Ending Period 4

Task	%Complete	EV	AC	PV	CV	SV
1	Finished	6	5	——	——	——
2	0%	——	7	——	——	——
3	50%	——	10	——	——	——
4	50%	——	8	——	——	——
Cumulative Totals		——	**30**	——	——	——

Status Report: Ending Period 5

Task	%Complete	EV	AC	PV	CV	SV
1	Finished	6	5	——	——	——
2	50%	——	8	——	——	——
3	60%	——	12	——	——	——
4	70%	——	10	——	——	——
Cumulative Totals		——	**35**	——	——	——

Status Report: Ending Period 6

Task	%Complete	EV	AC	PV	CV	SV
1	Finished	6	5	——	——	——
2	50%	——	10	——	——	——
3	80%	——	16	——	——	——
4	Finished	——	15	——	——	——
Cumulative Totals		——	46	——	——	——

Status Report: Ending Period 7

Task	%Complete	EV	AC	PV	CV	SV
1	Finished	6	5	——	——	——
2	Finished	——	14	——	——	——
3	Finished	——	20	——	——	——
4	Finished	——	15	——	——	——
5	0%	——	0	——	——	——
6	50%	——	9	——	——	——
Cumulative Totals		——	63	——	——	——

Period	SPI	CPI	PCIB
1	——	——	——
2	——	——	——
3	——	——	——
4	——	——	——
5	——	——	——
6	——	——	——
7	——	——	——

SPI = EV/PV
CPI = EV/AC
PCIB = EV/BAC

FIGURE A13.1C

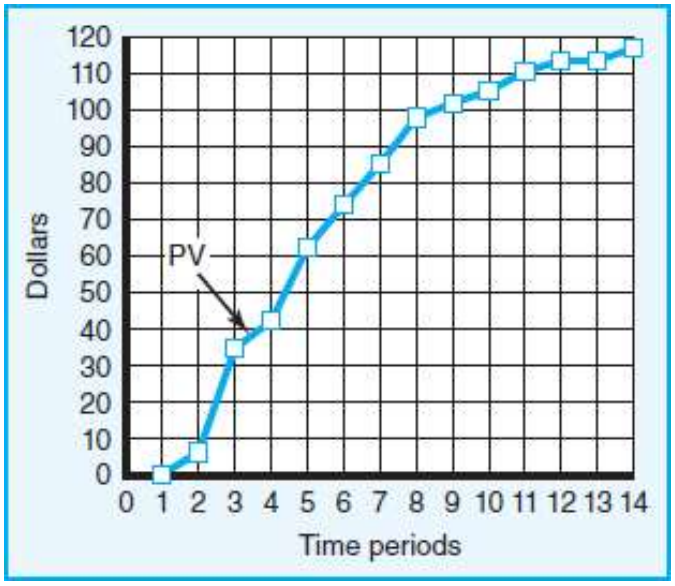
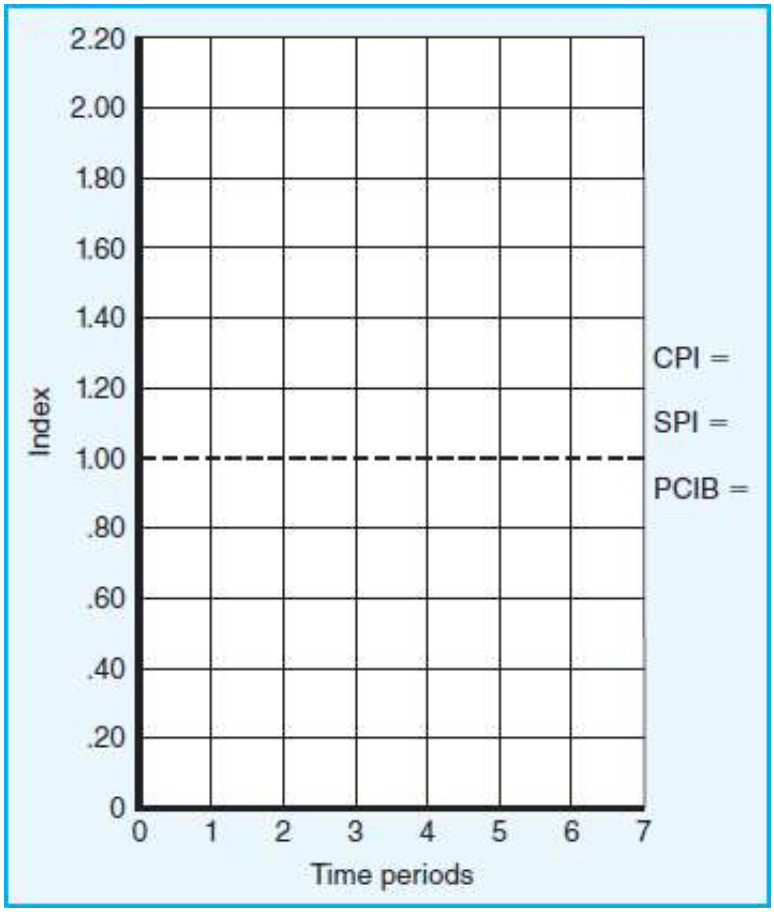


FIGURE A13.1D



2. Given the information provided for development of a catalog product return process for periods 1 through 5, assign the PV values (using the rules) to develop a baseline for the project. Compute the SV, CV, SPI, and CPI for each period. Explain to the owner your assessment of the project at the end of period 5 and the future expected status of the project at the completion.

Page 504

FIGURE A13.2A

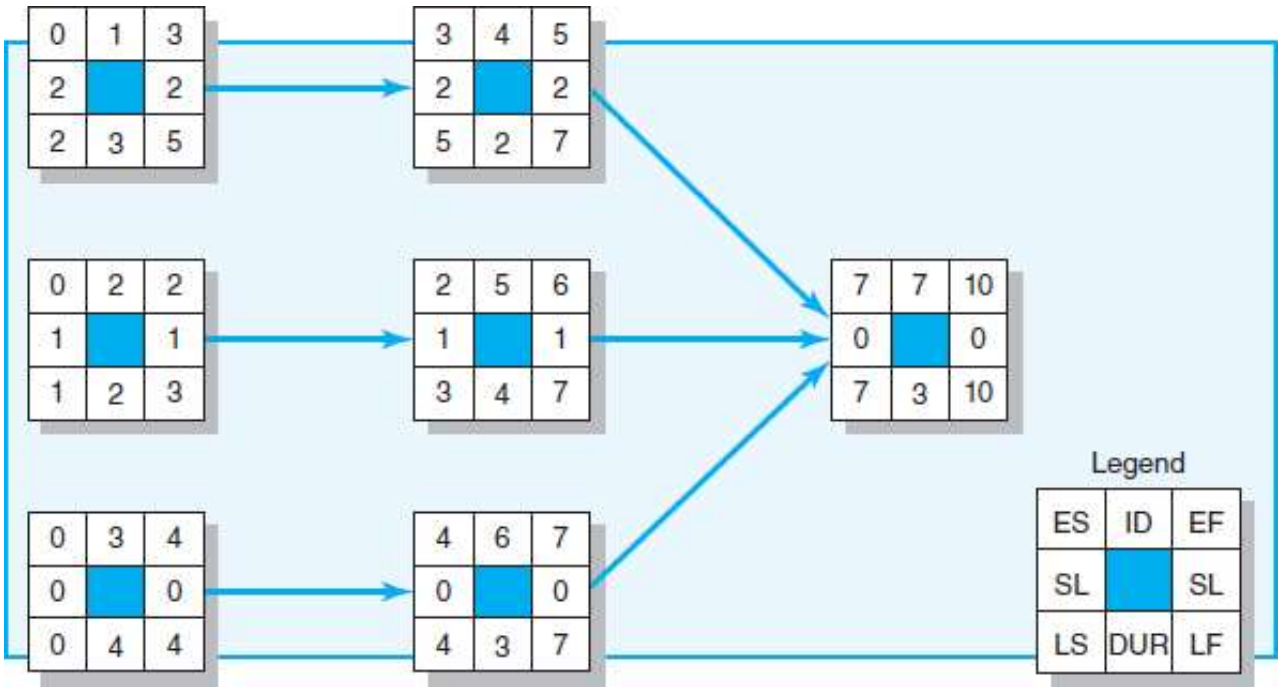


FIGURE A13.2B

Schedule information							Baseline budget needs
EV Rule	ACT/ WP	DUR	ES	LF	SL	Total PV	Time period 0 1 2 3 4 5 6 7 8 9 10
2	1	3	0	5	2	30	
3	2	2	0	3	1	20	
2	3	4	0	4	0	30	
3	4	2	3	7	2	10	
2	5	4	2	7	1	40	
1	6	3	4	7	0	30	
1	7	3	7	10	0	60	
						Total PV by period	
						Cumulative PV by period	

Rule
1 = %complete
2 = 50/50
3 = 0/100

Status Report: Ending Period 1

Task	%Complete	EV	AC	PV	CV	SV
1	40%	——	8	——	——	——
2	0%	——	12	——	——	——
3	30%	——	10	——	——	——
Cumulative Totals		——	**30**	——	——	——

Status Report: Ending Period 2

Task	%Complete	EV	AC	PV	CV	SV
1	80%	——	20	——	——	——
2	Finished	——	18	——	——	——
3	50%	——	12	——	——	——
Cumulative Totals		——	**50**	——	——	——

Status Report: Ending Period 3

Task	%Complete	EV	AC	PV	CV	SV
1	Finished	——	27	——	——	——
2	Finished	——	18	——	——	——
3	70%	——	15	——	——	——
4	0%	——	5	——	——	——
5	30%	——	8	——	——	——
Cumulative Totals		——	**73**	——	——	——

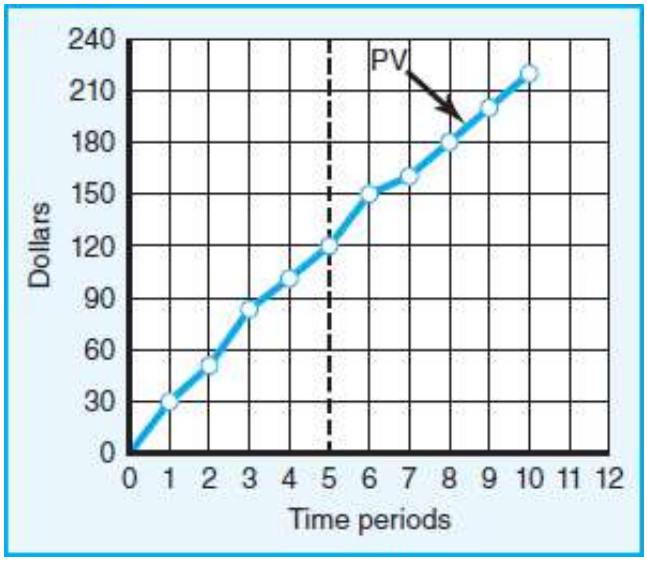
Status Report: Ending Period 4

Task	%Complete	EV	AC	PV	CV	SV
1	Finished	——	27	——	——	——
2	Finished	——	18	——	——	——
3	Finished	——	22	——	——	——
4	0%	——	7	——	——	——
5	60%	——	22	——	——	——
Cumulative Totals		——	**96**	——	——	——

Status Report: Ending Period 5

Task	%Complete	EV	AC	PV	CV	SV
1	Finished	——	27	——	——	——
2	Finished	——	18	——	——	——
3	Finished	——	22	——	——	——
4	Finished	——	8	——	——	——
5	70%	——	24	——	——	——
6	30%	——	10	——	——	——
Cumulative Totals		——	**109**	——	——	——

FIGURE A13.2C



Period	SPI	CPI	PCIB
1	____	____	____
2	____	____	____
3	____	____	____
4	____	____	____
5	____	____	____

SPI = EV/PV
CPI = EV/AC
PCIB = EV/BAC

Page 506

Appendix 13.2

Obtaining Project Performance Information from MS Project 2010[4]

The objective of this appendix is to illustrate how one can obtain the performance information discussed in Chapter 13 from MS Project 2010. One of the great strengths of MS Project is its flexibility. The software provides numerous options for entering, calculating, and presenting project information. Flexibility is also the software's greatest weakness in that there are so many options that working with the software can be frustrating and confusing. The intent here is to keep it simple and present basic steps for obtaining performance information. Students with more ambitious agendas are advised to work with the software tutorial or consult one of many instructional books on the market.

For purposes of this exercise we will use the Digital Camera project, which was introduced in Chapter 13. In this scenario the project started as planned on March 1 and today's date is March 7. We have received the following information on the work completed to date:

Design Spec.s took 2 days to complete at a total cost of $20.

Shell & Power took 3 days to complete at a total cost of $25.

Memory/Software is in progress with 4 days completed and two days remaining.

Cost to date is $100.

Zoom System took 2 days to complete at a cost of $25.

All tasks started on time.

STEP 1 ENTERING PROGRESS INFORMATION

We enter this progress information in the TRACKING TABLE from the GANTT CHART VIEW ▶ VIEW ▶ TABLES ▶ TRACKING:

TABLE A13.2A Tracking Table

ID	Task Name	Act. Start	Act. Finish	% Comp.	Act. Dur.	Rem. Dur.	Act. Cost	Act. Work
1	Digital Camera Prototype	3/1	NA	61%	6.72 days	4.28 days	$170.00	272 hrs
2	Design Spec.s	3/1	3/2	100%	2 days	0 days	$20.00	32 hrs
3	Shell & Power	3/3	3/7	100%	3 days	0 days	$25.00	40 hrs
4	Memory/Software	3/3	NA	67%	4 days	2 days	$100.00	160 hrs
5	Zoom System	3/3	3/4	100%	2 days	0 days	$25.00	40 hrs
6	Assemble	NA	NA	0%	0 days	3 days	$0.00	0 hrs
7	Test	NA	NA	0%	0 days	2 days	$0.00	0 hrs

Note that the software automatically calculates the percent complete and actual finish, cost, and work. In some cases you will have to override these calculations if they are inconsistent with what actually happened. **Be sure to check** to make sure the information in this table is displayed the way you want it to be.

Page 507

The final step is to enter the current status date (March 7). You do so by clicking PROJECT ▶ PROJECT INFORMATION and inserting the date into the status date window.

STEP 2 ACCESSING PROGRESS INFORMATION

MS Project provides a number of different options for obtaining progress information. The most basic information can be obtained from PROJECT ▶ REPORTS ▶ COSTS ▶ EARNED VALUE. You can also obtain this information from GANTT CHART view. Click VIEW ▶ TABLE ▶ MORE TABLES ▶ EARNED VALUE.

TABLE A13.2B Earned Value Table

ID	Task Name	PV	EV	AC	SV	CV	EAC	BAC	VAC
2	Design Spec.s	$20.00	$20.00	$20.00	$0.00	$0.00	$20.00	$20.00	$0.00
3	Shell & Power	$15.00	$15.00	$25.00	$0.00	($10.00)	$25.00	$15.00	($10.00)
4	Memory/Software	$100.00	$70.00	$100.00	($30.00)	($30.00)	$153.85	$100.00	($53.85)
5	Zoom System	$35.00	$35.00	$25.00	$0.00	$10.00	$25.00	$35.00	$10.00
6	Assemble	$0.00	$0.00	$0.00	$0.00	$0.00	$120.00	$120.00	$0.00
7	Test	$0.00	$0.00	$0.00	$0.00	$0.00	$30.00	$30.00	$0.00
		$170.00	$140.00	$170.00	($30.00)	($30.00)	$373.85	$320.00	($53.85)

When you scale this table to 80 percent you can obtain all the basic CV, SV and VAC information on one convenient page.

Note: Older versions of MS Project use the old acronyms:

BCWS = PV

BCWP = EV

ACWP = AC

and the EAC is calculated using the CPI and is what the text refers to as EAC_f.

STEP 3 ACCESSING CPI INFORMATION

To obtain additional cost information such as CPI and TCPI click from the GANTT CHART view click VIEW ▶ TABLE ▶ MORE TABLES ▶ EARNED VALUE COST INDICATORS, which will display the following information:

TABLE A13.2C Earned Value Cost Indicators Table

ID	Task Name	PV	EV	CV	CV%	CPI	BAC	EAC	VAC	TCPI
1	Digital Camera Prototype	$170.00	$140.00	($30.00)	−21%	0.82	$320.00	$373.85	($53.85)	1.2
2	Design Spec.s	$20.00	$20.00	$0.00	0%	1	$20.00	$20.00	$0.00	
3	Shell & Power	$15.00	$15.00	($10.00)	−66%	0.6	$15.00	$25.00	($10.00)	
4	Memory/Software	$100.00	$70.00	($30.00)	−42%	0.7	$100.00	$153.85	($53.85)	
5	Zoom System	$35.00	$35.00	$10.00	28%	1.4	$35.00	$25.00	$10.00	
6	Assemble	$0.00	$0.00	$0.00	0%	0	$120.00	$120.00	$0.00	
7	Test	$0.00	$0.00	$0.00	0%	0	$30.00	$30.00	$0.00	

Note: For MS Project 2007 users the instructions are very similar except you can access the Tables option directly from Gantt View.

STEP 4 ACCESSING SPI INFORMATION

Page 508

To obtain additional schedule information such as SPI from the GANTT CHART view, click VIEW ▶ TABLE ▶ MORE TABLES ▶ EARNED VALUE SCHEDULE INDICATORS, which will display the following information:

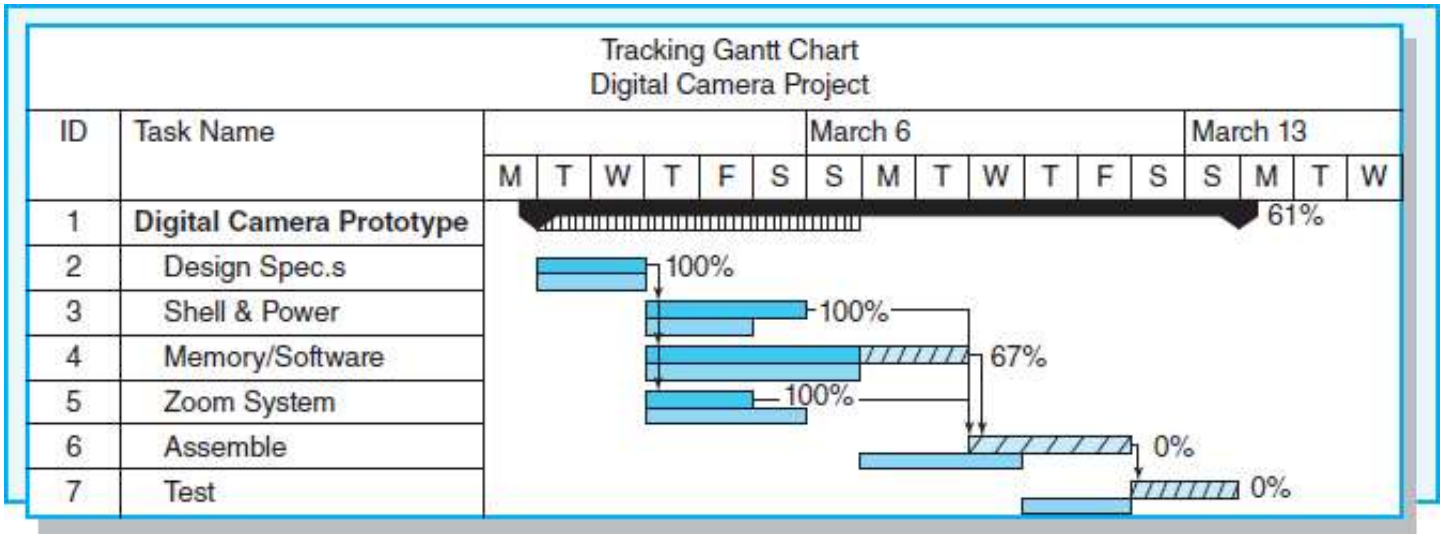
TABLE A13.2D Earned Value Schedule Indicators Table

ID	Task Name	PV	EV	SV	SV%	SPI
1	Digital Camera Prototype	$170.00	$140.00	($30.00)	−18%	0.82
2	Design Spec.s	$20.00	$20.00	$0.00	0%	1
3	Shell & Power	$15.00	$15.00	$0.00	0%	1
4	Memory/Software	$100.00	$70.00	($30.00)	−30%	0.7
5	Zoom System	$35.00	$35.00	$0.00	0%	1
6	Assemble	$0.00	$0.00	$0.00	0%	0
7	Test	$0.00	$0.00	$0.00	0%	0

STEP 5 CREATING A TRACKING GANTT CHART

You can create a Tracking Gantt Chart like the one presented on page 460 by simply clicking TASK ▶ GANTT CHART (upper left hand corner) ▶ TRACKING GANTT ▶ TRACKING GANTT.

FIGURE A13.2E Tracking Gantt Chart



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[1] See Fleming and Koppelman for a more complete earned value description.

[2] Cited by Q. W. Fleming and J. M. Koppleman, *Earned Value Project Management* (Newton Square, PA: Project Management Institute, 2010), pp. 39–42.

[3] See S. Keifer, "Scope Creep … Not Necessarily a Bad Thing," *PM Network,* 10 (5), 1996, pp. 33–35.

[4] For MS Project 2007 users the instructions are very similar except you can access the Tables option directly from Gantt View.