Primavera Project Planner®

Planning and Control Guide

Version 3.0

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This manual is printed on recycled paper.

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Preface

Primavera Project Planner (P3) provides an easy-to-use approach to project planning with an intuitive interface that makes project planning and control easy and fun, without sacrificing the powerful sophistication of high-end project-management software that you expect from Primavera.

P3 is a multiuser product that operates on popular local area networks such as Novell or Banyan Vines; it is compatible with SureTrak project files, allowing you to share data with other network users, and with anyone who manages projects using Primavera software.

Using P3 Documentation, Help, and Tutorials

If you are new to P3, start with this book for a step-by-step guide to planning and controlling projects using P3. The *Planning and Control Guide* begins with an overview of project management and the planning and updating process; the remainder of the book shows you how to use P3 to effectively implement the process. When you need to know more details, refer to the *Reference* manual. This book is organized as follows:

Part 1 – Overview Provides an overview of project management by presenting the steps in the project planning and control process, suggesting ways to implement and monitor this process, and showing you the different ways to present project data using P3 layouts.

Part 2 – Planning and Implementing the Schedule Provides simple steps for getting started quickly with P3. Follow the process to create a basic schedule with activities and resources. You will also learn how to set up a cost account structure to monitor project costs, specify resource lags and durations, and distribute resources nonlinearly.

Part 3 – Adjusting and Refining the Schedule Describes how to enhance your schedule by setting up additional WBS codes, project codes, activity codes, project IDs, and custom data items to provide richer organization and filtering capabilities. Also learn ways to further refine the schedule by adding or modifying calendars.

Part 4 – Updating and Managing the Schedule Explains how to establish a target plan and record progress on both task and resource-driven activities once you set up a schedule that satisfies your project requirements. The importance of regular updates as the project progresses is emphasized, and methods for updating projects located both on- and off-site are described. A process of monitoring progress through the project life cycle is also explained through use of reports, graphics, Bar chart and PERT layouts, and other tools; examples are provided as output to key questions that arise as the project progresses.

Part 5 – Customizing Presentations Describes how to customize layouts both in the Bar chart and PERT, organize and filter data to review and present only the necessary details in a way that is easy to understand, and print reports and graphics.

Project management online documentation This book is also provided online in .PDF format. To view the online information using the Adobe Acrobat Reader, you must install both the Reader and the online documentation from the P3 Setup CD. Insert the P3 CD-ROM in your computer's disk drive, and click the Documentation button from the initial Setup screen. Select either the Adobe Acrobat Reader or the Online Documentation. Complete the setup instructions as prompted.

In addition to this book, the following documentation is also provided online for your reference:

■   *Reference* manual

■   *Batch and File Structures*

■   *A Guide to the Project Management Body of Knowledge*

InfoMaker online documentation The InfoMaker online documentation provides a general introduction to the InfoMaker application. To view this documentation, first install the InfoMaker Dynatext reader by performing the following steps:

1 Run Setup from the P3 3.0 CD-ROM.

2 Click Install InfoMaker.

3 Select InfoMaker Dynatext.

4   You can install the reader to any drive and folder; the default is C:\PROGRAM FILES\SYBASE\OLBOOKS.

5 Accept the Typical Install option.

6 Browse to the 30SETUP\IM\OLBOOKS folder on the CD-ROM when prompted for the location of online books.

7 When setup is complete, you can view the online books by selecting Start, Programs, Sybase, Online Books (or any other folder you specified when you installed the reader).

InfoMaker online documentation is also available directly from the P3 3.0 CD-ROM and via the internet at http://calas.sybase.com. For a more thorough reference, you may want to purchase the InfoMaker *User's Guide*. For details, contact Sybase via their web site at www.sybase.com or call 1-800-879-2273. If you have a news reader installed with your Internet browser, you can also set up a news account to forums.sybase.com and join the InfoMaker news group. InfoMaker technical documents can be accessed from http://techinfo.sybase.

P3 Help system   P3 provides an extensive help system to supplement the documentation. Use P3 Help to access information about commands and dialog boxes. P3 Help also includes step-by-step procedures for performing each P3 function.

Tutorials   P3 provides several online lessons that teach the basic skills required to use P3. Access the tutorials by choosing Help, Tutorial, from within P3.

Where to Get Support

If you have a question about using P3 that you or your network administrator cannot resolve with information in the P3 documentation or online Help, call Primavera Technical Support at the times and locations listed below.

Please have your software serial number ready when you call. We log each call to help us resolve your questions quickly.

Office	Time Zone	Hours	Telephone	FAX	Internet Address*
Bala Cynwyd, Pennsylvania, U.S.A.	EST	8:00–7:00 (Mon-Fri) 9:00–2:00 (Sat)	610-668-3030	610-667-0652	usatech@primavera.com
London, England, U.K.	GMT	8:30–6:30 (Mon–Thur) 8:30–5:30 (Fri)	44-208-563-5555	44-208-748-9180	uktech@primavera.com
Kowloon, Hong Kong, SAR	GMT+ 8:00	9:00–5:30 (Mon–Fri)	852-2111-8299	852-2111-9477	hktech@primavera.com

*You can also visit Primavera's World Wide Web site at http://www.primavera.com.

In the United States, we periodically and randomly monitor technical support calls to ensure that we are providing the highest quality support to you.

All Primavera products are backed by comprehensive support and training. To request product literature, contact your local dealer, call Primavera at 610-667-8600, or send your request via e-mail to **info@primavera.com** in the United States. In the United Kingdom, call 44-208-563-5500 or e-mail your request to **intlinfo@primavera.com**. In Hong Kong, call 852-2111-8288, or e-mail your request to **hkinfo@primavera.com**.

Overview

In this part: **The Process of Project Management**

P3 Quick Tour

*T*his part of the *Planning and Control Guide* provides an overview of project management. *The Process of Project Management* chapter presents the steps in the project planning and control process, and suggests ways to implement and monitor this process that help you finish projects on time and within budget. Before you start, read the *P3 Quick Tour* chapter for an idea of the many different ways you can look at project data in P3.

The Process of Project Management

Thousands of serious project managers use Primavera Project Planner (P3) every day. It gives them the control they need to accomplish their projects on time, within budget, and at a high level of technical quality.

This chapter outlines project management fundamentals, recommends steps to get started in the planning process, and suggests how and when to update your project to show progress after it starts. Read this chapter to learn more about project management and to discover how P3 supports your project management needs.

Introduction to Project Management

A project is a unique, one-time endeavor with a specific start and end, and a strict budget. Generally, projects are performed by people who have limited experience working together as a team. It's also likely that some project participants will work off-site at several locations. These constraints often make project management difficult and complex.

At the conceptual level, project management is the process of thinking carefully about what you want to accomplish, laying out all the steps, and obtaining the resources required to carry out those steps. At the practical level, project management is your response to the problems, delays, changes, and obstacles—and, sometimes, opportunities—that arise during the course of a project.

Planning a project is fun: working out who does what, when, where, and with whom. The crucial part of successful project management, however, is the actions you take after the plan is created.

Successful project management requires dedication and constant vigilance: finding out what really happened, how much was actually accomplished, what remains to be done, and who will be available to do it. You must be prepared for the future. You need contingency plans that can handle the inevitable everyday realities of running the project.

Although no shortcuts exist for managing projects, some tools and practices can help prepare you for the job. Using project management software can organize your thinking and identify potential problems. Following established project procedures ensures that you inform the team about options, alternatives, and workarounds efficiently and in time. And presenting your project to upper management clearly and convincingly makes it easier to obtain their support when you need it.

These are the most important reasons we created P3—to make managing projects easier, especially when you encounter difficulties.

Process Summary

Before implementing P3 to schedule projects, participants should understand the processes involved in project management and the associated recommendations that help smooth implementation of the software that helps you reach your goals. You should also understand the steps for updating your projects once they are underway. If your projects have already started, you may want to incorporate or adjust your existing methodology for planning new projects or updating existing ones. In the various stages of the project life cycle, the key elements that should guide your decisions are planning, controlling, and managing.

Planning the project means thinking about and documenting what needs to be done—defining and coordinating specific activities and work tasks, preparing work schedules, assigning and allocating resources to competing activities, and developing an acceptable budget.

Controlling the project means staying on course—measuring performance, suggesting corrective action when needed, evaluating options, and devising workarounds. You inform the team about progress and advise them where their performance needs improvement. Then they make the improvements.

Managing means communicating as accurately as possible with the project team, the client, and your own management about what has happened, what may happen, what you will do about it, and what cannot be changed. You motivate the team to do its best. You help the team get support—resources—by presenting accurate and timely information to the right people.

Planning and controlling process The following illustration summarizes the steps in the planning and control process:

```
┌──────────────────┐              ┌──────────────────┐
│ Determine scope  │          ┌──▶│ Determine the    │
│ of work          │          │   │ update output    │
└────────┬─────────┘          │   │ for analysis and │
         │                    │   │ presentations    │
         ▼                    │   └────────┬─────────┘
┌──────────────────┐          │            │
│ Determine project│          │            ▼
│ duration         │          │   ┌──────────────────┐
└────────┬─────────┘          │   │ Establish        │
         │                    │   │ baseline (target)│
         ▼                    │   │ schedule         │
┌──────────────────┐          │   └────────┬─────────┘
│ Determine level  │          │            │
│ of detail        │          │            ▼
│ necessary        │          │   ┌──────────────────┐
└────────┬─────────┘          │   │ Anticipate change│
         │                    │   │ by developing    │
         ▼                    │   │ contingency plans│
┌──────────────────┐          │   └────────┬─────────┘
│ Determine        │          │            │
│ available        │          │            ▼
│ resources        │          │   ┌──────────────────┐
└────────┬─────────┘          │   │ Track work       │
         │                    │   │ progress and     │
         ▼                    │   │ actual costs     │
┌──────────────────┐          │   └────────┬─────────┘
│ Determine        │          │            │
│ distribution of  │          │            ▼
│ work effort      │          │   ┌──────────────────┐
└────────┬─────────┘          │   │ Compare progress │
         │                    │   │ and costs to     │
         ▼                    │   │ target           │
┌──────────────────┐          │   └────────┬─────────┘
│ Determine project│          │            │
│ costs and        │          │            ▼
│ estimate budget  │          │   ┌──────────────────┐
└────────┬─────────┘          │   │ Evaluate         │
         │                    │   │ performance      │
         ▼                    │   └────────┬─────────┘
┌──────────────────┐          │            │
│ Determine        │          │            ▼
│ participants in  │──────────┘   ┌──────────────────┐
│ and frequency of │              │ Forecast,        │
│ updates          │              │ analyze, and     │
└──────────────────┘              │ recommend action │
                                  └──────────────────┘
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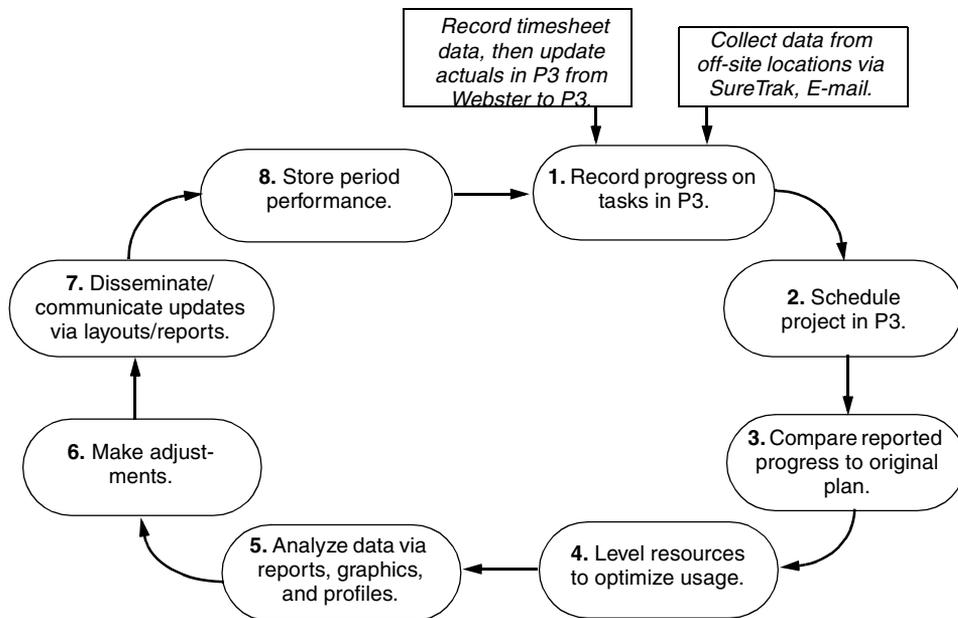
Updating process Once your project schedule is in place, your team members are aware of their roles in controlling it, and you have established a communication system between team members and groups within your organization, you should follow a systematic update process. Updating the schedule on a regular basis and comparing it with the baseline ensures that you are using resources effectively, monitoring project costs against budget, and keeping abreast of actual durations and costs so you can initiate your contingency plan if necessary.

Remember that you can use P3 in combination with other programs to help you assess project goals from an enterprise-wide perspective. Use P3 with SureTrak Project Manager to incorporate smaller projects or project members into the P3 schedule; use it with Monte Carlo for Primavera to analyze risks involved with selected aspects of a project; and use it with Webster for Primavera to collect employee resource hours spent on projects and roll them into actual durations and costs in P3. These Primavera products, in combination with communication and database access tools such as E-mail and Structured Query Language (SQL), can give you the information you need, when you need it, wherever you are.

These steps outline the update process:

Record timesheet data, then update actuals in P3 from Webster to P3.

Collect data from off-site locations via SureTrak, E-mail.

8. Store period performance.

1. Record progress on tasks in P3.

7. Disseminate/ communicate updates via layouts/reports.

2. Schedule project in P3.

6. Make adjust- ments.

3. Compare reported progress to original plan.

5. Analyze data via reports, graphics, and profiles.

4. Level resources to optimize usage.

The following sections discuss each step in the cycle in more detail.

The Update Cycle

Although planning a project is an important first step in project management, we discuss the update cycle first because even the most carefully thought-out plan will fail unless it is regularly monitored and updated. As the project controls coordinator, you should establish a regular time to update projects, such as weekly or biweekly. Set the due dates and stick to them. Simplify the update process by coding activities so you can select the underway activities. Identify policies and procedures for reporting progress and schedule information. Up-front coordination will result in a streamlined scheduling process, and keep you up-to-date on how your project is progressing.

Update activities or driving resources Track who did what and how much it cost so that you can improve future estimates. Record how long it takes to perform each activity or resource, how much of the work is actually accomplished, and how much more time you expect will be required to finish the activity. If you are updating P3 with timesheet data from Webster for Primavera, P3 updates actual-this-period durations, quantities, and costs for you. Make sure the data you use for your analysis are accurate.

Integrate project data from remote sites using the Primavera Post Office application to have off-site personnel update activities using a predefined status sheet, then E-mail them back for scheduling at the manager's site. An Expected Finish constraint column is included on the status sheet so team members updating their status can see when work is expected to finish. You can send E-mail from either P3 or SureTrak. If you do not use the status sheet, you can use the Mail feature in P3 to send and receive project infor-mation and incorporate it in the schedule for updating.

Because all Primavera products use the Btrieve database engine, you can also access information from other Open Database Connectivity (ODBC)-compliant databases, such as Microsoft's Excel, Word, and Access, Corel's Quatro Pro and Paradox, and Lotus 1-2-3, among others. Additionally, you can use report writers such as InfoMaker that communicate with P3 via ODBC. Primavera software also provides import/export capabilities to and from spreadsheet and dBASE applications, which helps expedite data entry in large projects. Communication with other types of software broadens your data-retrieval base so you can access the project information you need whether you are on-site, at a remote office, or traveling.

Schedule the project   Once you gather all the data you need from various sites and other programs/databases, you can schedule your projects. Before you press F9 to calculate a schedule, make sure you have set the Autocost rules in accordance with the project plan and have set up the series reports/graphics to be generated after the scheduling run. You may choose to have P3 automatically schedule whenever you change data that affect calculated schedule dates. You may also want to use the Progress Spotlight and Update Progress features to visually identify which activities were scheduled in the current update period and automatically status their progress if they are on schedule. The project controls coordinator should have previously established schedule/level procedures for all project managers in the company.

Compare reported progress to the original plan   This is the best way to know whether the project is on track. If the team is slipping behind, identify the impact it will have on the schedule and develop a course of action to move forward faster. If you cannot regain time, make sure everyone knows about the delay so they can adjust their own schedule. Consider whether delays early in the project will ultimately save time later. For example, a usability seminar may prevent Designers on the Development team from meeting their deadlines, but the information they glean from the seminar may save development time later.

Level resources   Resolve conflicts with other activities that use the same resources. Check that your schedule doesn't call for more than the normal availability of resources: level your resource plan and examine the resource-use profiles to determine whether the plan contains hard-to-manage peaks and valleys. If you use the Store Period Performance function to store period actuals, you can compare historical and current data to gauge trends in resource use and make future-use projections, or re-evaluate your distribution plan. Use crunching, stretching, and/or splitting leveling techniques for the best resource utilization based on current requirements. You may choose to have P3 automatically level whenever you change data that affect calculated level dates.

Analyze output After you schedule and level, customize layouts to analyze the data onscreen; review the Bar chart onscreen together with resource profiles. If problem areas become apparent, perform a more detailed analysis by examining P3 reports, including matrix reports, resource loading and control reports, custom reports you have set up using the Report Writer, and any schedule reports. You can run all of these automatically through the reporting provided in P3.

You should select reports and graphics that enable you to track work progress and actual costs, compare progress and costs to baseline, and forecast trends so you can recommend action. You need to ask yourself whether project objectives are being met by looking at output or onscreen outcome. Will the project finish on time? Is it within budget? Are resources being used effectively?

Adjust the schedule If, after careful planning, updating, and leveling, the project is behind schedule, the resources promised were reallocated, costs are exceeding your original budget estimate, a sponsor withdrew funding, or any one of many other likely events occurs, you need to implement your contingency plan and/or adapt your schedule to the changed requirements these conditions cause.

Iteratively adjust resource availability in the Resource Dictionary then use leveling until you achieve the results you want. Stretch resource use during some workperiods and crunch it during others, and use these in combination with splitting activities to optimize resource use during noncontiguous workperiods. Use the different types of P3 constraints to make the activity network accurately reflect project requirements. Experiment with these and other methods to maintain control and stay on target.

Communicate, communicate, communicate How you do this must be made clear as part of the project plan. If teams don't know what's going on, they cannot do their job effectively. Decide who should be involved, what needs to be communicated to them, and where and when it will be communicated. You can communicate by distributing the updated schedule at a set time each week, having a monthly status meeting, or sending reports to managers for their specific resources (employees).

Use schedule reports, Bar charts, and timescaled presentations that are easy to understand. Show progress and highlight problem areas. Make the project issues evident. Remember that the level of detail for each report should be appropriate to its audience. Enterprise-wide dissemination of up-to-date project data is the key to reaching your collective goals in the world of project management.

The Project Plan

As the manager responsible for one or more projects, you should establish the scope of your projects(s), then meet with the project controls coordinator to develop an initial plan and determine the level of detail and amount of monitoring that are appropriate to each project for which you are responsible. Consider the following questions as you establish the requirements for each project plan:

- What are the company's goals, and how will the project support those goals?

- What is the overall budgeted estimate (duration and cost) of this project?

- What resources are available to me?

- How detailed a plan is appropriate?

- How often will I update the plan?

- Who needs to receive information about progress?

- What kinds of reports will I prepare?

- What graphics and layouts will help me communicate best?

- How much time can I afford to spend on project management?

Take the time up front to determine how you can effectively communicate the right information to the right people at the right time.

Make a detailed list of activities Estimate how much time will be needed for each activity, and define how activities relate to one another. Assign a responsible person to each activity so that when you update the plan you'll know who to ask for accurate information.

Prepare a network diagram that shows relationships between activities Creating a network diagram is an iterative process best done with the team members who will do the work. No one knows better than the team what has to be done and why, and what sequence makes sense. More often than not, you will modify the diagram several times until the logic is sound and activities seem to flow correctly.

Identify the critical path—the chain of activities that will require the most time to complete Find ways to simplify the project. Explore options to compress the schedule by performing activities in parallel. Consider whether you will have sufficient resources to accomplish several tasks at once. Eliminate negative float by modifying the network.

Build a complete plan When you are satisfied with the basic schedule, apply the resources to the activities. Although the schedule indicates required actions and when they must be done, resources—people, equipment, material, and money—do the work. Make sure you will have required resources when you need them.

Consider the tradeoff of time and money your plan represents Could you deliver the finished project sooner if you had more money or more resources? Are these factors worth thinking about before you seek approval of the plan? Compare costs, list requirements, check assumptions with the project team, and refine the plan. Then obtain agreement—and commitment— from the team and begin work.

Organize your project information Categorize activities by phase, responsibility, department, and location. Set priorities. Make it easy to retrieve and analyze information. Summarize unnecessary detail. Sharpen your presentation by focusing on the key elements.

Ask "what-if?" What could happen that you have not yet anticipated? What would happen if a key resource were diverted to another job? What would happen if the budget were cut by 10 percent? The new design uses less material but will manufacturing be able to hold the tolerances? How much time would redesign cost? Anticipate change, not because disaster will strike, but because you want to have contingency plans in place in case it does. Know how all the pieces fit together, and think about the interaction among the pieces.

Plan, control, manage, communicate, and think This is the process of project management.

What Is Special about P3?

P3 is special because project managers designed it for project managers. Project managers ask many questions—it seems to be their one common characteristic: "When will this be finished?" "Who's doing the work?" "What happens if...?" "Suppose we..."

P3 answers questions quickly, easily, and accurately. You can select information from the database, sort data in dozens of different ways, condense details, and prepare graphic presentations—all without knowing anything about computers or database languages.

P3 helps you build a project network quickly and graphically
P3 helps you from the moment you begin thinking about a project. Building the original network and organizing the project data in P3 are simple. Use PERT to quickly add activities in a logic or flow diagram format, where boxes represent each activity; then use the Bar chart, which is a timescaled spreadsheet, to review the schedule. If you prefer to remain in PERT, you can organize activities using a timescaled PERT layout to review the schedule by early start date.

See a cosmic view of network logic as you add activities.

Create projects using PERT to represent activity relationships in a flow diagram.

Switch to timescaled PERT to see where your activities fit according to early start date.
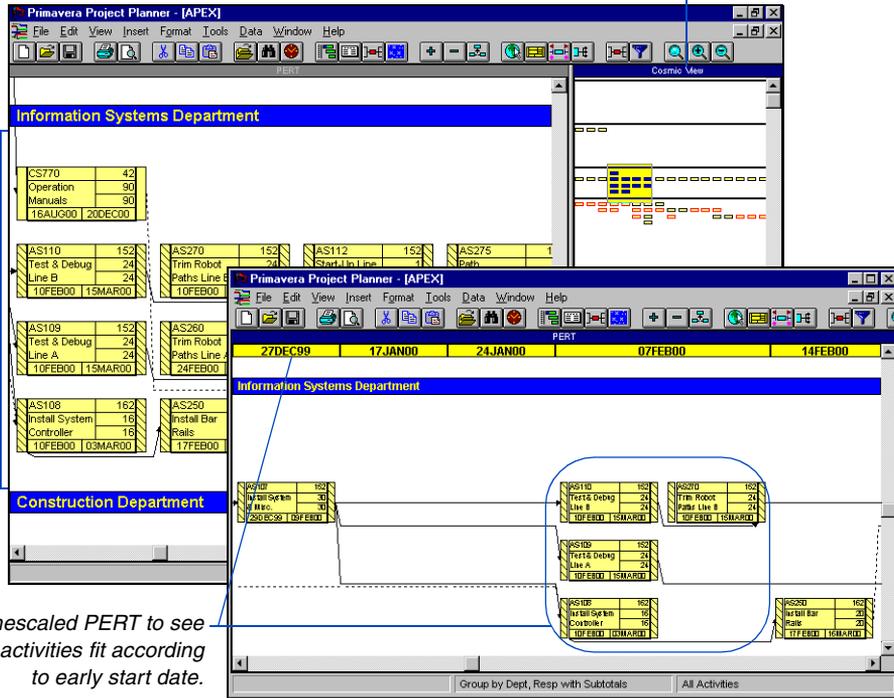

After you develop a list of activities, you can easily connect them to define the network logic by pointing to the finish of one box or bar and dragging a relationship line to the start of the next bar. Or you can select an entire group of activities, click the Link icon on the toolbar, and have P3 automatically define conventional relationships for you. You can also turn on the Autolink feature to create conventional relationships between activities as you add them in either view.

P3 lets you choose activity types P3 offers various activity types so you can model different activity/resource interactions. You can use activity types in conjunction with either base (activity) or resource calendars to support task- and resource-driven activities. Resource calendars enable you to model unique work schedules for the resources in your project.

P3 makes it easy for you to organize project data P3 helps you structure your project data. This structure is the power of the software. Organize projects at the project group level using a common attribute, such as project manager, status, or location. Organize individual projects into multiple groups that are meaningful to you; for example, band activities by responsibility, area, phase, resource, or weekly calendar dates. Make each band a different color and font for effective communication and presentation, or group data items into one band for each combination of values. Focus a presentation by extracting only the information you want, when you want it, the way you want it. You can also design your own data items for activities, resources, and costs and globally enter or modify data using your own calculations to save time.

This layout uses combined bands.
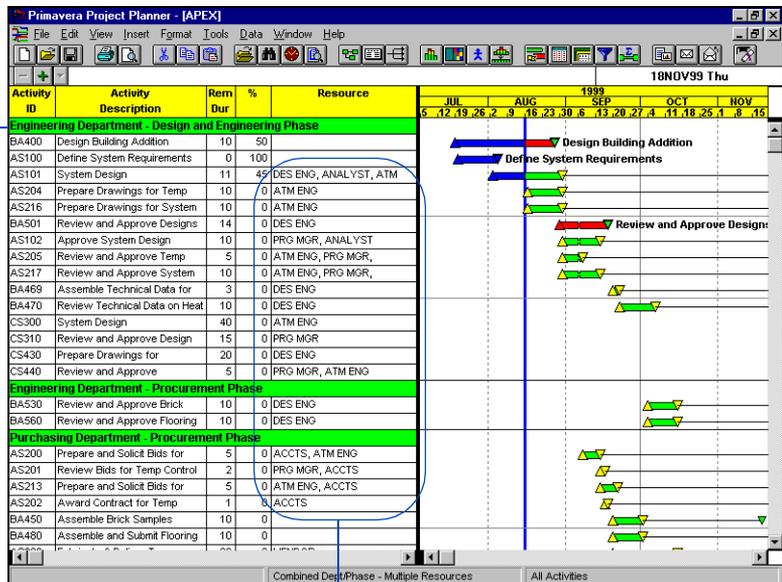
All resources assigned to each activity are shown individually in the Resource column.

P3 simplifies tracking resources and costs P3's resource and cost controls are straightforward. Because all project data are integrated, P3 automatically reflects changes in unit prices throughout the project. As you record actual data, P3 automatically revises estimates to complete. In fact, advanced users specify the method P3 uses to reflect progress by setting simple calculation rules.

P3 helps you assemble achievable plans through its comprehensive approach to resource assignment. Allocate a resource across one or several activity(ies). Identify the activities that are driven by their assigned resources and then let P3 calculate the impact of resource limitations and time constraints on your schedule. P3 quickly identifies potential problems and delays. You can even compare normal vs. overload staffing on your schedule in onscreen histograms and curves. If usage exceeds availability, perform a quick "what-if" analysis by graphically adjusting durations or delaying activities so you can see the effects on resource distribution immediately.

Once your projects are underway, P3 enables you to store actual quantity and cost data per update period so you can compare historical information to the current period using resource profiles and reports.
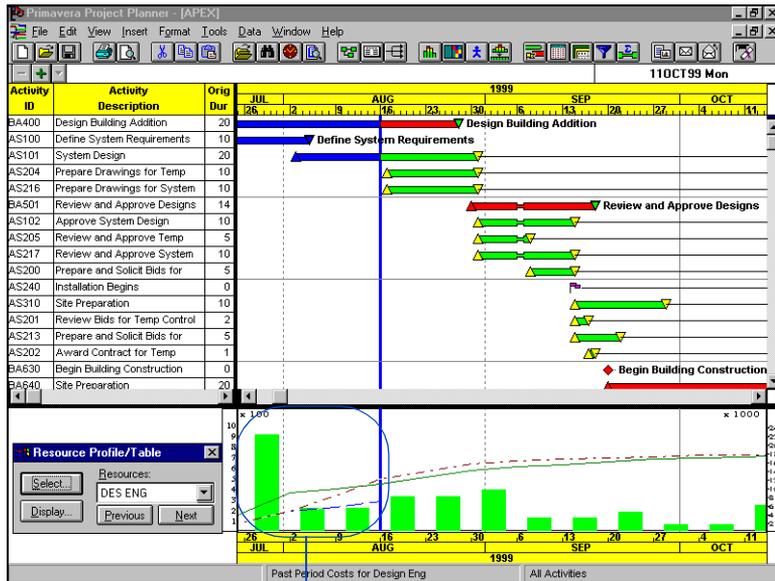
Track historical periods (before the data date) and compare data with the current period to evaluate resource use patterns through the project life cycle.

P3 lets you constrain activities   When you want to impose restrictions on certain activities to meet external requirements, P3 makes it easy by providing 10 types of constraints, such as early start or early finish dates that you enter. You can also invoke different techniques to optimize resource allocation. For example, stretch (reduce) use during some workperiods and crunch (increase) it during others. You can also split resources in either situation so P3 can automatically suspend and resume work during a noncontiguous workperiod. P3 gives you the scheduling flexibility you need without changing original goals.

P3 simplifies the update process   If your project is progressing exactly as planned or if you only need to estimate progress, you can use the Progress Spotlight feature to highlight the activities that should have been worked on during a specified timeperiod. You can also drag the data date line to a specific date to highlight the activities that fall between the last data date and the new data date. Once you spotlight activities, you can automatically status them, manually update them, or cut or copy them.

You can also show a progress line in the Bar chart to graphically trace progress on underway activities to see an overall picture of how a project is performing.

P3 spotlights activities that should have started, progressed, or finished between the previous data date and the new data date.

This layout is organized by the Project Manager project code so the persons responsible can quickly see the activities that should have progress since the last data date.
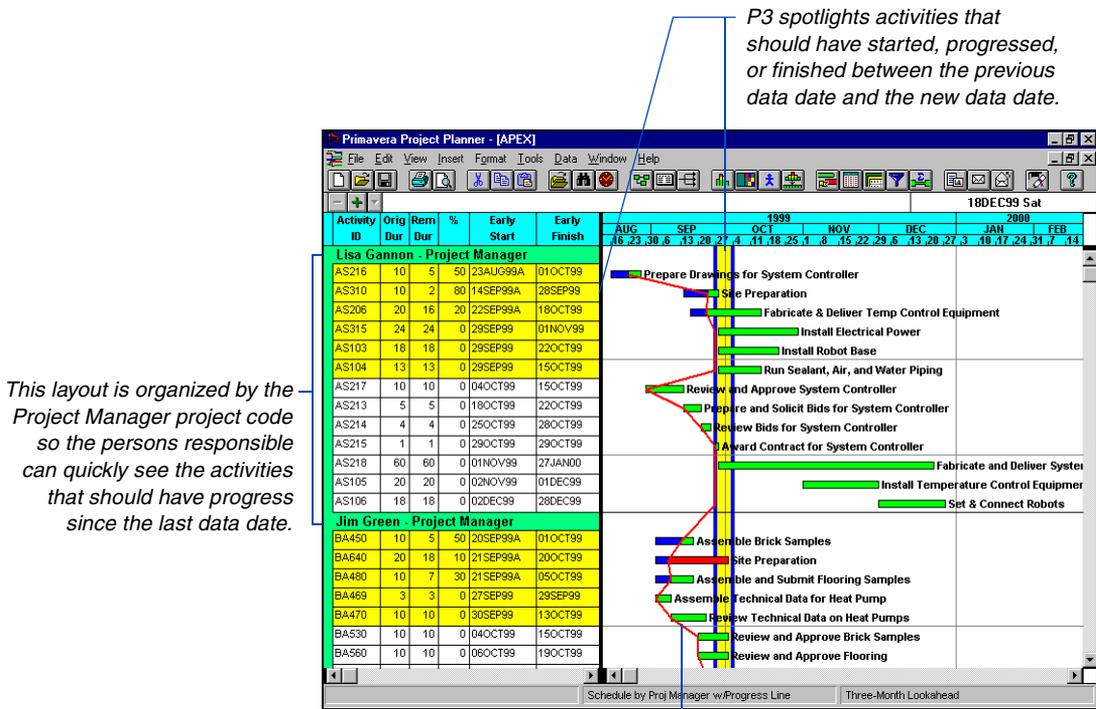
The progress line graphically represents the activities that are behind schedule (as in this example), or ahead of schedule.

P3 helps you update from off-site locations The Primavera Post Office gives you remote control of project integration from off-site locations using your mail system to help you collect data, update activity progress, record resource use, and enter actual costs. You can also update using timesheet data from Webster for Primavera. P3 easily gathers and consolidates information from various sources and updates it according to your scheduling needs. With a project's collective parts potentially existing anywhere in the world, P3 keeps pace.

P3 helps you show and tell You can easily print the PERT or Bar chart information and layout you see onscreen. You can change visual aspects of your project onscreen, preview it, then print it when you are ready. But, if you want to change elements of your onscreen display (such as header or footer information), you can use P3's options for customizing printed displays.

Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish	Total Float	1999 / 2000 Schedule
Engineering Department								
Andy Mason - Director of Development								
BA400	Design Building Addition	20	10	50	19JUL99A	27AUG99	0	Design Building Addition
AS100	Define System Requirements	10	0	100	20JUL99A	04AUG99A		Define System Requirements
AS101	System Design	20	11	45	03AUG99A	30AUG99	97	
AS204	Prepare Drawings for Temp	10	10	0	17AUG99	30AUG99	163	
AS216	Prepare Drawings for System	10	10	0	17AUG99	30AUG99	194	
AS102	Approve System Design	10	10	0	31AUG99	14SEP99	97	
BA469	Assemble Technical Data for	3	3	0	20SEP99	22SEP99	60	Assemble Techn
BA470	Review Technical Data on Heat	10	10	0	23SEP99	06OCT99	60	Revie
CS300	System Design	40	40	0	24JAN00*	20MAR00	8	
CS310	Review and Approve Design	15	15	0	21MAR00	10APR00	8	
CS430	Prepare Drawings for	20	20	0	11APR00	08MAY00	8	
CS440	Review and Approve Drawings	5	5	0	09MAY00	15MAY00	8	
Tim Evans - Program Manager								
AS205	Review and Approve Temp	5	5	0	31AUG99	07SEP99	163	
AS217	Review and Approve System	10	10	0	31AUG99	14SEP99	194	
Acme Motors - Owner								
BA501	Review and Approve Designs	14	14	0	30AUG99	17SEP99	0	Review and Approve Designs
BA530	Review and Approve Brick	10	10	0	04OCT99	15OCT99	34	Review and Approve B
BA560	Review and Approve Flooring	10	10	0	04OCT99	15OCT99	119	
Subtotal		210	190	13	19JUL99A	15MAY00	25	
Purchasing Department								
Meg Foley - Purchasing Manager								
AS200	Prepare and Solicit Bids for	5	5	0	08SEP99	14SEP99	163	
AS201	Review Bids for Temp Control	2	2	0	15SEP99	16SEP99	163	
AS213	Prepare and Solicit Bids for	5	5	0	15SEP99	21SEP99	194	
AS202	Award Contract for Temp	1	1	0	17SEP99	17SEP99	163	
BA450	Assemble Brick Samples	10	10	0	20SEP99	01OCT99	34	Assemble Brick Samples
BA480	Assemble and Submit Flooring	10	10	0	20SEP99	01OCT99	119	
AS214	Review Bids for System	4	4	0	22SEP99	27SEP99	194	
AS215	Award Contract for System	1	1	0	28SEP99	28SEP99	194	
BA411	Prepare and Solicit Bids for	3	3	0	07OCT99	11OCT99	60	Pre
BA412	Review Bids for Heat Pump	2	2	0	12OCT99	13OCT99	60	R
BA413	Award Contract for Heat Pump	1	1	0	14OCT99	14OCT99	60	A

Start Date	19JUL99	Early Bar	APEX		Sheet 1A of 4B	
Finish Date	20FEB01	Float Bar	Acme Motors	Date	Revision	Checked Approved
Data Date	16AUG99	Progress Bar	Plant Expansion and Modernization			
Run Date	25MAY99 11:48	Critical Activity	Float Bars by Department, Resp			

This printed layout includes a five-section, customized footer area.

Facilitate communicating project data with local or worldwide offices by creating reports in HTML format using the Primavera Web Publishing Wizard. Transfer these documents to either the World Wide Web (using FTP) or your office intranet, and view them using an Internet browser. The documents contain hypertext links, or jumps, to other pages in the structure, enabling you to move between projects and reports and from page to page within a report.

You can also use the report and graphic templates provided with P3, add to the list, and tailor content and format to communicate up-to-the-minute project information conveniently and informatively. Produce pure logic charts to help you see the relationships among activities, or create time-scaled diagrams that show progress and responsibility for each activity and highlight critical activities. You can also create your own reports to meet special requirements or conditions, using a format you design. View, modify, and annotate reports and graphics in Look to expand your presentation possibilities.

P3 helps you every step of the way P3 suggests the right answer to every question you ask it and presents the right set of choices whenever decisions are required. And P3's Help system tells you precisely what you need to know, every step of the way.

P3 easily handles large projects P3 handles even the largest, most complex projects being performed today. But this power stays quietly in the background, making no demands of you.

Next Steps

For specifics on performing the tasks in the update and setup processes, refer to the following parts of this book:

■ *Planning and Implementing the Schedule* to create a schedule by adding a project group and projects to the group, set up task-driven and resource-driven activities and get to know the specifics involved in implementing either type of schedule, set up a cost account structure to regulate estimated project costs, specify resource lags and durations, and distribute resources nonlinearly.

■ *Adjusting and Refining the Schedule* to organize data using Work Breakdown Structure codes, activity codes, project code, project IDs, and custom data items; and modify and add calendars.

■ *Updating and Managing the Schedule* to establish a target plan and record progress on both task and resource-driven activities using the various methods available; update off-site projects and publish HTML reports; and use reports, graphics, Bar chart and PERT layouts, and other tools to monitor progress.

■ *Customizing Presentations* to customize the layout, organize and filter data, and print reports and graphics.

P3 Quick Tour

To help you get started, take a quick tour of Primavera Project Planner (P3). This chapter introduces the Bar chart and PERT views and shows you some of the many ways you can customize layouts for managing projects. Learn the basic parts of the P3 project window and the steps for starting P3 and opening an existing project.

P3 includes several sample projects that you can use to familiarize yourself with the features available and to serve as a template for building your own projects. Be sure to read the brief overview of each industry-specific project so you will know which are most similar to the types of projects you will be developing with P3.

The Parts of the P3 Window

The P3 window contains several elements that enable you to access information quickly and easily using either a mouse or the keyboard. The following example shows the parts of the P3 window using the Bar chart view; except for the edit bar, the elements and functionality are the same in either the Bar chart or PERT.

Edit bar *for adding and deleting activities*
and editing data in columns

Group title bands *for grouping*
activities by meaningful codes,
such as department or
responsibility

Each pane contains a horizontal scroll bar,
so you can scroll through it independently.

Layout title

Filter title

The default Bar chart layout consists of Activity columns on the left side and bars on the right side. Determine how much of each side or pane to display by dragging the vertical split bar to the left or right.

What Is a Layout?

You can customize nearly any part of the P3 Bar chart and PERT view to show different aspects of a project. For example, you can format columns and bars to meet your specific needs. Choose from a long list of schedule, resource, cost, and coding items to tailor activity information. Modify the size, endpoints, colors, and schedule dates on bars in the Bar chart and activities in PERT. Organize project information by grouping activities using meaningful codes, such as department or responsibility.

When you customize the Bar chart or PERT view by modifying items such as columns, colors, shapes, fonts, activity selection, and by grouping, you are creating a layout. A layout is one view of project data. You—and anyone else working on the project—can define as many different layouts as you need for a project. For example, you may create a layout just for updating schedule data and another for analyzing resources and costs with your own set of color and font choices. Your manager may want to view only summary information, using colors he or she specifies. You can save layout specifications so that once you create and fine-tune them you can use them again and copy them to other projects.

The next pages illustrate some of the types of layouts you can use to add, review, modify, update, and track projects in P3.

Sample Layouts

P3 enables you to plan, organize, and manage your projects using Bar chart and PERT layouts. A Bar chart layout combines an activity-data spreadsheet (table) with a timescaled Bar chart, while a PERT layout shows the logical flow of activities. Use the spreadsheet to add, review, or modify rows or columns of data. The Bar chart shows the corresponding schedule with activity bars positioned along a timescale. Use PERT to construct your project plan, adding activities and relationships in a logical flow.

Bar Chart

You can adjust the size of each area of the Bar chart to show more or less data. For example, when you're reviewing the schedule, show just the Bar area. This layout compares target bars to early bars and includes group title bands in the Bar area.
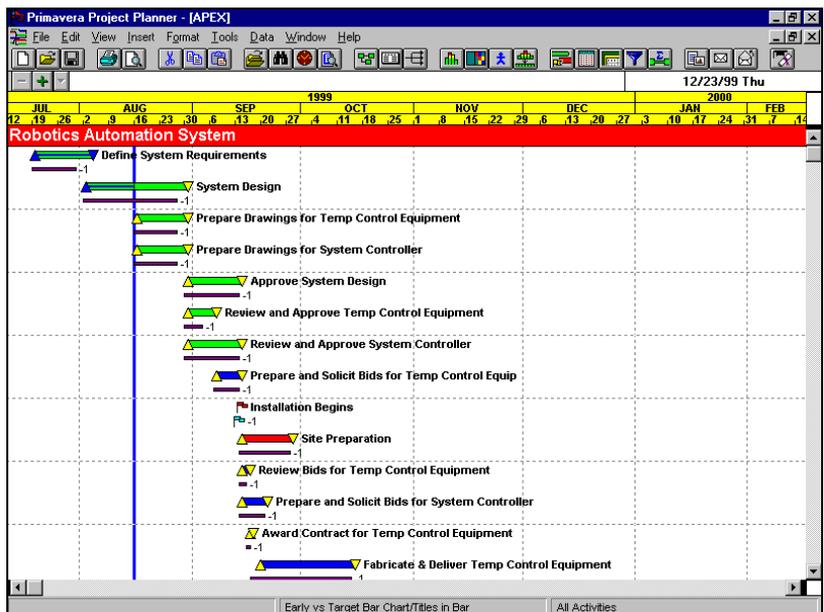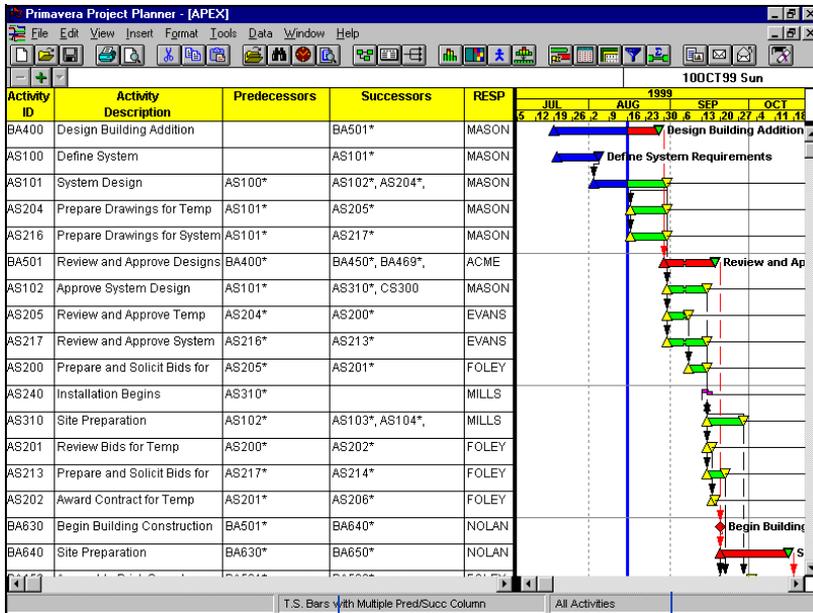
These columns contain all values assigned to individual activities in your project.

Timescaled logic

Activity Columns

To update or review specific activity information, show more columns, as in this example. If you have multiple predecessors, successors, resources, or cost accounts assigned to activities in your project, you can see them for each activity in one column cell. You can also show and add relationships directly on a Bar chart to produce a timescaled logic display. Double-click a relationship line on the Bar chart to edit its type, lag, predecessors, or successors.
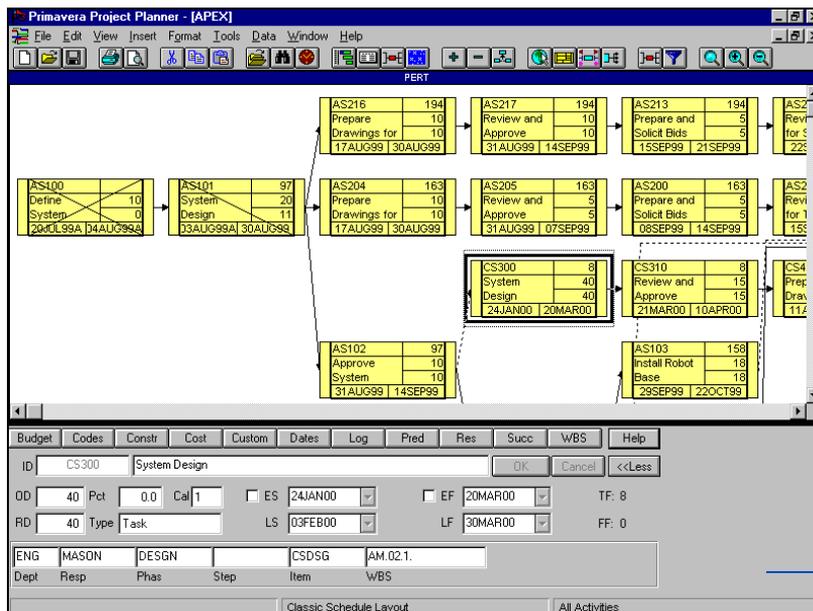
Activity form

PERT

Examine the logical flow of activities in PERT. Build the network and change the sequence of events as the project progresses. You can also show an Activity form at the bottom of either PERT or the Bar chart that shows detailed information about a selected activity.

Timescaled PERT

Timescaled PERT allows you to see activities and relationships along a daily, weekly, or monthly timescale based on relationships or early/actual start date. You can also display Trace Logic in either PERT or timescaled PERT to focus on an activity's predecessors and successors.
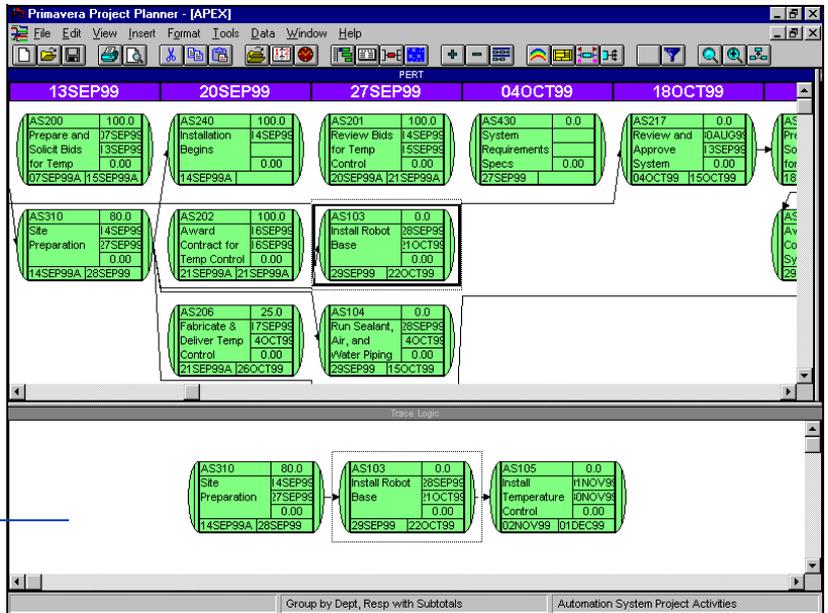
Trace logic —

Activity Detail Forms

Use the Log form as an electronic notepad to enter and track additional information about an activity. You can display logs with the activity bars, as shown in this example. Use the buttons along the top of the Activity form to display other detailed forms in which you can enter and review additional data, such as budgets, resource assignments, predecessors, and successors.
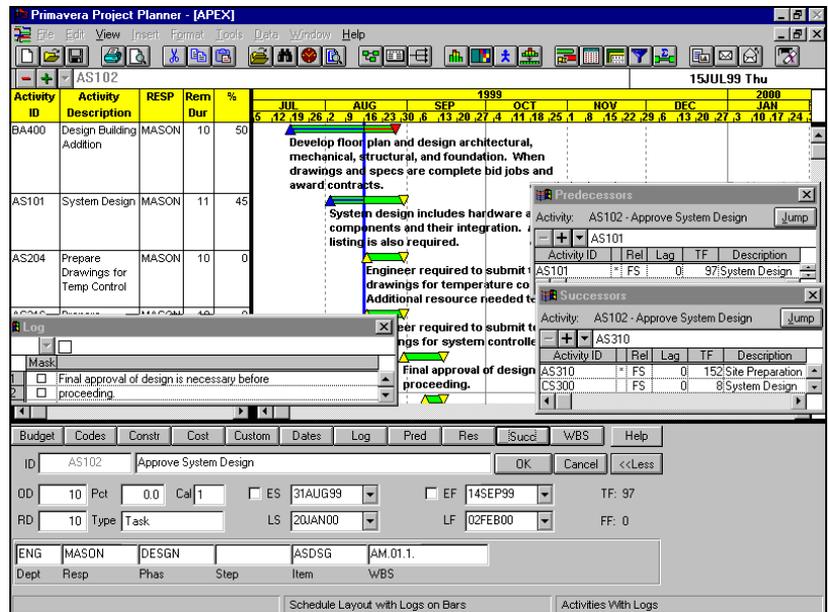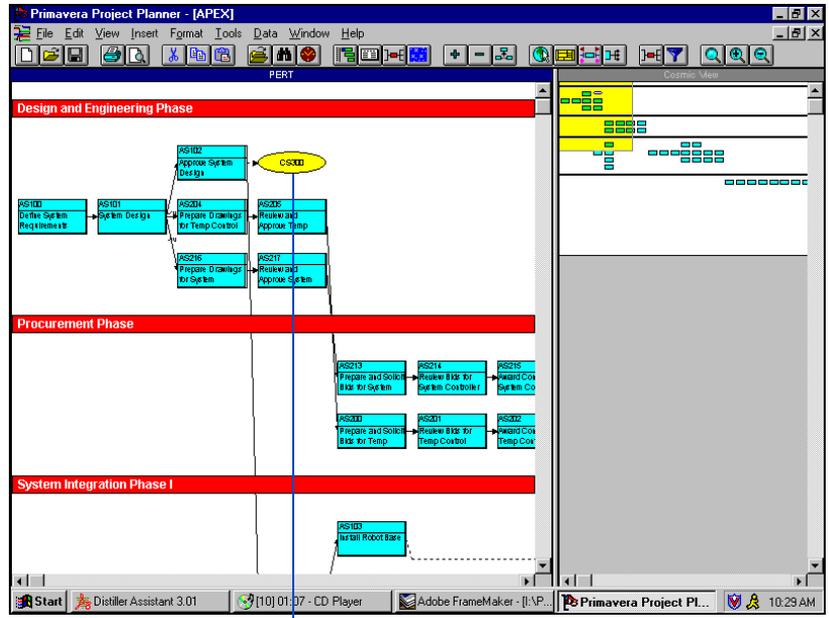
Connector block

Group by Category

You can change the organizational scheme for project data at any time. This example shows activities grouped by the Phase activity code in the Automation System project. The headings on the left, such as Design and Engineering Phase, indicate the specific group. The Cosmic View, to the right of the window shows activities at a smaller zoom level so you can navigate easily through the project.
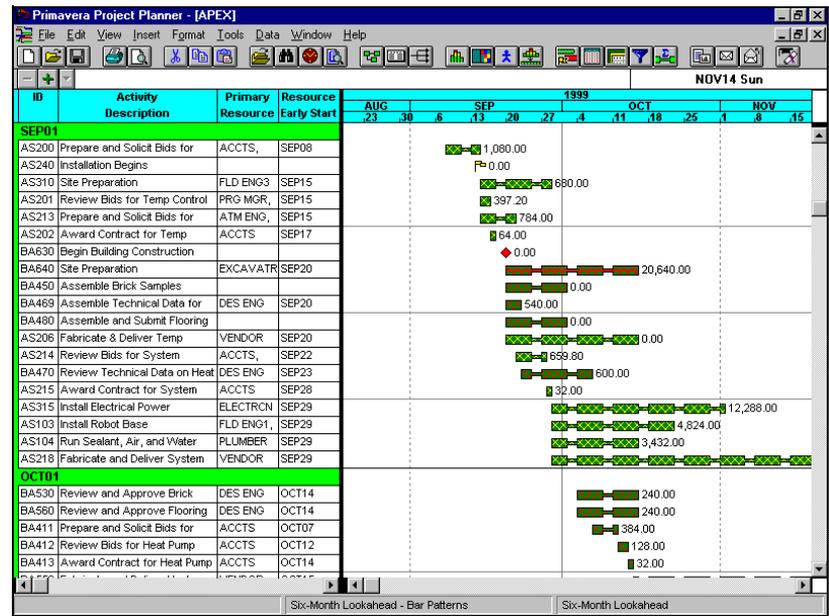
Group by Dates

You can also group activities according to their schedule dates by days, weeks, months, or years on a Bar chart. This example groups early start dates on a monthly basis and focuses on resource use. The bars are customized using a diagonal cross-hatch pattern that is color-coded by project ID. Use this type of display to quickly review activities scheduled in the months ahead.

Group by Resource

Group by resource to produce a detailed list of activities for each resource in a project. You can specify the back-ground color, font, and point size for the title bands when you group. In this example, activities are grouped by resource within each department.
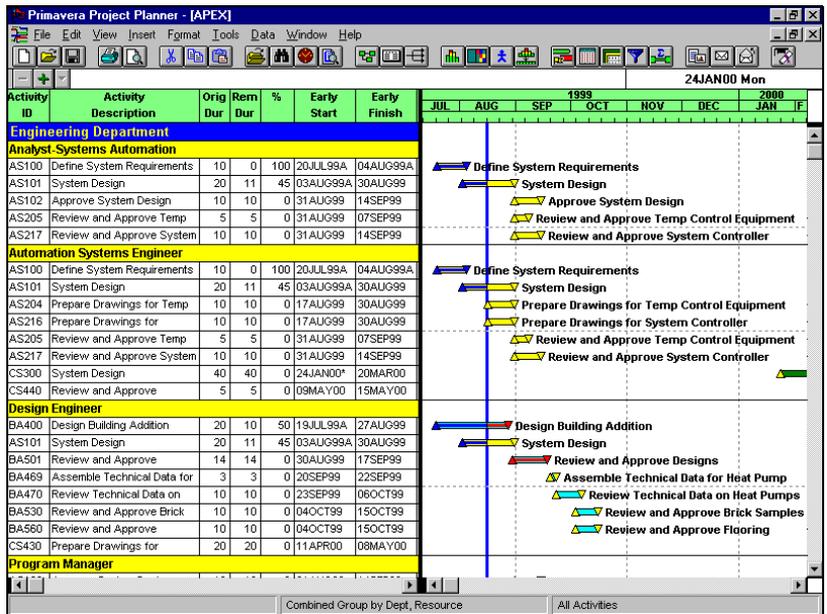
Combine Groups

Consolidate your layout by focusing on all activities that are assigned a specific combination of code values. Select the groups you want, then combine them by clicking a checkbox on the Organize dialog box. For example, combine group bands to see the activities assigned to a specific department and phase, as shown in this layout.
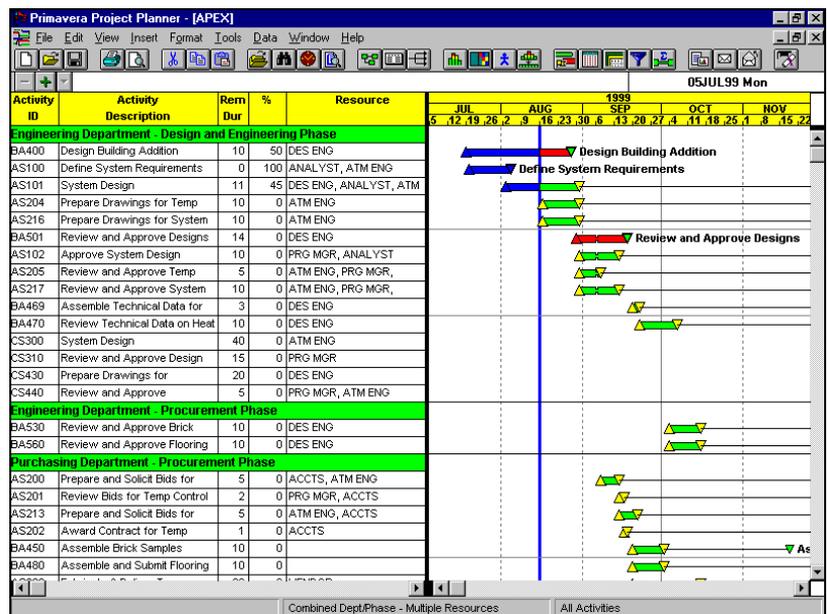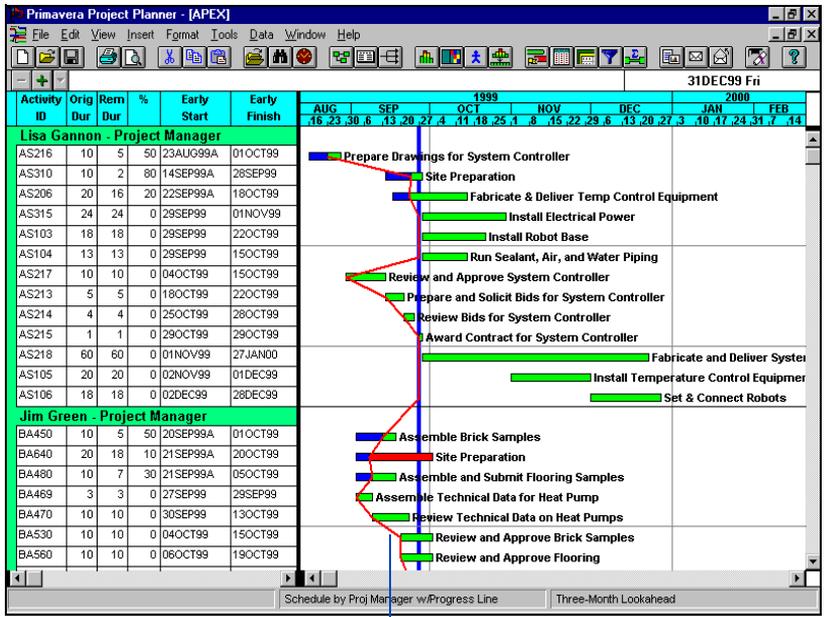
Progress line

Group by Project

If your project group contains many member projects, assign project codes for better manage-ability. This example is organized by the project manager for each project in the group. The Bar chart shows the progress line, indicating which underway activities are ahead or behind schedule, based on target dates.
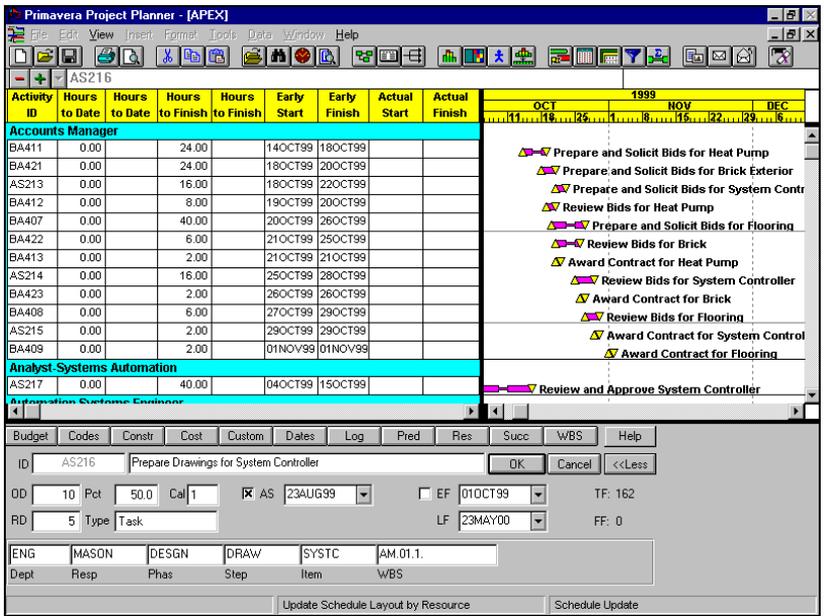
Resource Worksheet

Create a resource update worksheet: group by resource and include hours to complete and date columns for updating by the corresponding resource (employee). You may want to combine these columns with the Activity form to show schedule dates, float values, and activity codes for reference when updating resource use. In this layout, bars indicate resource early start and finish dates instead of activity dates.

Resource/Cost Profile

A resource or cost profile uses the same timescale as the Bar chart so you can analyze resource levels together with the schedule. If resource use exceeds availability, you can modify the logic structure and see the effect on resource use immediately. If you store period performance, actual quantities and costs are saved for each schedule update period so you can compare current and historical data.

Resource/Cost Table

Create a resource loading report onscreen to show resource use or costs expended per timeperiod. You can show total, peak, or average amounts.

WBS Outline

You can also view an outline of a project based on its work breakdown structure (WBS). Define up to 20 levels of WBS codes, with each level indented to show the hierarchy. This layout also summarizes data to level 2 of the WBS—each column of data is totaled, and a summary bar is shown.
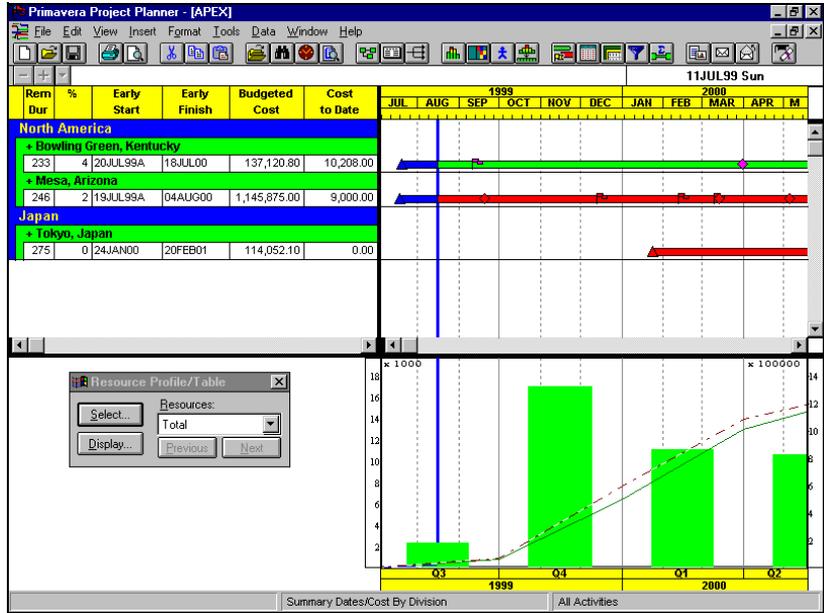
Summary Layout

You can summarize detailed data on a Bar chart—just double-click the title band. P3 summarizes data in the Activity columns and shows a summary bar. In this example, data are rolled up by division. A quarterly cost profile for the summary is also shown.

Start P3 and Open a Project

Start P3 Click Start, Programs, Primavera, and then select Primavera Project Planner. If you selected password protection during Setup, type your user name and password.

Primavera Project Planner [dialog box]

User name: [   ]   OK
Password: [   ]   Cancel
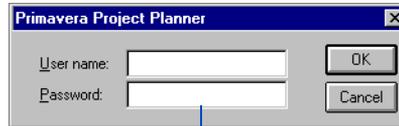
You need not enter the password if it is the same as your user name; click OK to continue.

You can also select a project from a list of recently opened projects at the bottom of the File menu.

Open a project Once you've started P3, you can begin working with a project. Choose File, Open, to access an existing project from the default projects folder. Select a different drive and folder to access projects located elsewhere. You can open up to four projects at the same time. Each project occupies a different window; you can arrange the windows however you want. For example, you may want to build a new project by copying and pasting activities from an existing project.

You can view overview information for an open project by choosing File, Project Overview.
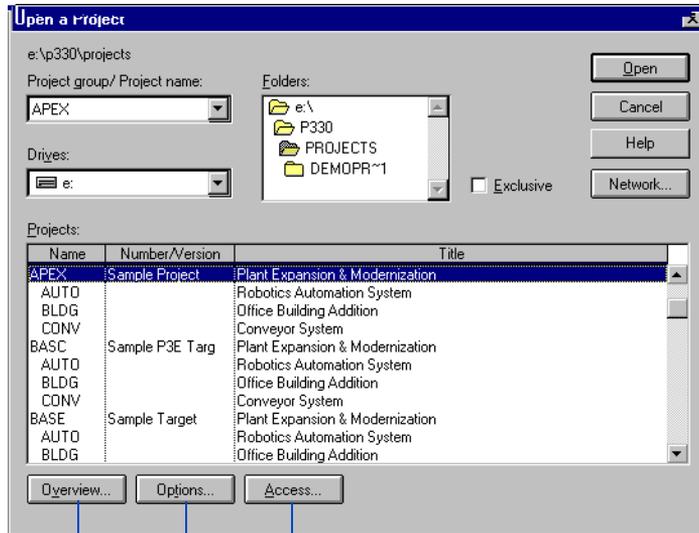
Lists the users who can access the project.

Change the layout and filter associated with the selected project.

Review summary information about the project.

When you open a project, P3 displays the project in the Bar chart or PERT, depending on which view was open when you last saved the layout.

View general project information Choose File, Open, then click Overview. You can edit some of the information in the Project Overview dialog box, including the project title, company name, and the project start and finish dates.

Click to scroll through overviews of other projects in the current folder.

The project end date as calculated by P3

Enter a date to constrain the project end date.

P3 provides several sample projects for your review. Choose one or more of these projects to explore industry-specific approaches to structure, coding, and other project-data characteristics, or to experiment with the numerous P3 features. The following section provides a brief description of each sample project.

About the Sample Projects

P3 is an essential tool for almost any type of project—from construction jobs and engineering projects to software development, product R&D, and plant shutdowns. The sample projects provided with P3 represent simplified versions of typical projects in various industries—choose the one that is most relevant to your type of work. Several of these projects are used in examples throughout this guide.

APEX In APEX (Acme Motors Plant Expansion Project), the Northwest Construction Company needs to expand and modernize Acme Motors car manufacturing plant. This project group involves three major areas of activity:

■   Designing, installing, and testing an automated production system that uses robotics;

■   Designing and installing a new conveyor system to move the automobiles through the various manufacturing stages; and

■   Expanding the office building.

These three areas of the project group are organized into member projects; the first two characters of each activity ID indicate the member project the activity belongs to: AS for AUTO (Robotics Automation System), CS for CONV (Conveyor System), and BA for BLDG (Office Building Addition). You can open the project group, APEX, to review details for all projects in the group, or you can open any member project to examine a major area of the project group.

The work breakdown structure (WBS) for APEX also divides the project group into its major components, Automation System, Conveyor System, and Building Addition; and further subdivides these components into discrete work packages. Layout 04 provides an "outline" view of the project based on the WBS.

Cost accounts represent for APEX the intersection of the WBS and organizational structure. Cost accounts contain five characters, each indicating a unique level. For example, the fifth position of each cost account indicates the manager responsible for the work. This cost account structure enables you to roll up or detail cost data at any level for reports and graphics.

An extensive activity code structure for APEX enables you to group and filter activities for in-depth analysis. Activities are coded by Department, Responsibility, Phase, Step, and Item. Review the Group by Department, Responsibility with Subtotals layout, the Early versus Target Bar Chart/Titles in Bars layout, and the PERT View Organized by Phase layout to see various organizations based on these activity codes.

APEX also uses the standard P3 project codes to organize and filter the member projects at the project group level for analysis by Project Manager, Status, Location, Reason, Industry, Division, Priority, and Currency. Values for each of these project codes are assigned to each project, and are applied automatically to all activities in the project. The Summary Dates/Cost by Division layout provides a summary display paired with a cost profile that is organized by both the Division and Location project codes. The Schedule by Project Manager with Thunderbolt layout groups APEX by the Project Manager project code and also shows the progress line (thunderbolt) so you can gauge the progress of underway activities based on target dates.

APEX requires several resources, including Design Engineers, Automation System Engineers, Programmers, construction workers, and management personnel. Open the Update Schedule Layout by Resource, the Resource Profile with Curves layout, and the Resource Table layout to examine the resource allocation.

The project, which begins on 19JUL99, uses one daily calendar. A complete copy of the baseline plan serves as a target, called BASE. One month of progress has been recorded, and period performance has been stored for five, two-week past update periods. You can review the Early versus Target Bar Chart/Titles in Bars layout to compare the current and baseline schedules. Open the Past Period Costs for Design Engineer to see a cost profile that includes past and current period data recorded for one resource in APEX.

In addition to several layouts, APEX contains a complete set of report and graphic specifications. You can run any of these reports or graphics and review them in Primavera Look or print them. You may want to transfer these specifications to your own project to use as a template and modify them as necessary.

CLIN: pharmaceutical CLIN, a sample clinical research and development project group, contains 59 activities that span 3 1/2 years. Most CLIN activities involve either clinical testing or new drug application (NDA) for the development of two new compounds, PRM-01 and
PRM-02. The CLIN project group consists of three member projects, one for each new compound and one for process scale-up and NDA preparation.

To effectively categorize and summarize project information for communication and management reporting, each activity is assigned code values to identify its Protocol Number, Phase, and Responsibility. (The Grouped by Phase and Responsibility layout shows Bars color-coded by Responsibility.) For example, the phases identified in this sample project include Process Scale-Up, Phase 3 Clinical Development, and Preparation of NDA.

The project has been updated to reflect progress for the first 2 months (January through March 1999). To determine how closely the project is following the original schedule, compare the current schedule dates to the target dates. To determine whether the project is operating within budget, compare original budget data to current expenditures. In project CLIN, both target dates and budget information are stored as custom data items. Current and target data are compared in the Current versus Planned Dates Grouped by Responsibility layout, as well as in some standard schedule reports and custom reports.

P3 tracks key resources for CLIN, including Clinical and Medical Research Associates, Statisticians, and Medical Secretaries. The Time Entry by Resource layout is grouped by resource and includes subtotals for each resource in the columns. Compare resource availability to project requirements using P3's resource profiles or tables.

P3's organization, summary, and selection features in displays and custom reports and graphics are essential for this type of long-range, multiphase project.

ENGR: Concentric AEB Automobile Company uses Concentric Project Management, which uses several Primavera products for complete, enterprise-level project management. They use Parade for top-down planning; P3 to structure projects and perform multi-project analysis; SureTrak to plan and manage individual projects; Monte Carlo to assess and evaluate risk for all projects; and Webster for Primavera to track resource time across projects.

Project ENGR contains a portfolio of both engineering and installation projects for AEB. The sample project group contains 148 activities in three projects that span a total of 18 months (April 2000 to October 2001). The project involves activities that include the proposal, design, analysis, prototyping, and installation phases. Project ENGR has one target project, ENGT, the original plan.

AEB uses P3 to plan and control all their projects for each fiscal year, using a consistent coding structure across all projects. In P3 they can look at all projects and see high-level summary data in the One-Line Roll-Up of All Projects layout. Using the Resource Analysis Across Projects layout, AEB analyzes resource usage across all projects and uses P3's extensive leveling features to resolve any problems they pinpoint.

AEB uses P3 to analyze the schedule and perform "what-if" analysis. Using the PERT View of E101 by Phase layout, AEB can analyze activity data and relationships in PERT when additional design activities are added to project E101. Several layouts show the impact of risk analysis on scheduled durations and resource use. AEB uses Display Monte Carlo Duration Ranges, Display Monte Carlo Probabilistic Branches, Display Monte Carlo Conditional Branching, and Display Monte Carlo Resource Usage Distribution layouts to evaluate the results of a Monte Carlo risk analysis on the current schedule in P3.

Review the Activity Codes Dictionary and the Custom Data Items Dictionary in project ENGR to see how AEB shares data across Primavera products.

HWY1: highway construction HWY1, a subcontracted project group of 57 activities, involves widening a highway from four to eight lanes. To minimize inconvenience and accommodate regular traffic of this heavily travelled highway, temporary roadways need to be built and lane closings must be planned precisely. In addition, progress is reported regularly to ensure that these plans can be modified in a timely manner. For an overview of the network logic, the PERT - Color Coded by Area of Road and PERT - Organized by Lane Closing layouts give a PERT view of the project.

Activity codes have been established to identify, by activity, the affected area of the roadway and any necessary lane closings. The Northbound Lane and Southbound Lane are the affected areas, represented as two phases, or member projects of HWY1. Contract budgets are tracked by activity and progress payments are based on the percent complete reported for each activity assigned to each project.

The project starts in April 1999 and continues through October 2000. Currently, progress has been recorded through December 1999.

Schedule Bar charts and turnaround schedule reports organized by responsibility are very important for reporting progress for this project. Timescaled logic charts also show the critical relationships to make sure everyone knows the impact of delays. The Organized by WBS Structure layout shows timescaled logic, organized by WBS. A different colored band represents each WBS level in the Activity column area.

MFTG: manufacturing MFTG represents a line changeover project group. It is a project group containing 58 activities that span 11 months (February 2000 through December 2000). The project involves the changeover of two potato-chip lines to corn-chip lines. Project MFTG contains a variety of activities spanning the bid/ award and procurement phases through checkout and startup. To coordinate this effort better, MFTG was divided into four member projects: Product Planning & Development, Machine Tooling, Assembly & Production, and Product Delivery. For a graphical representation of the network logic, color-coded by project, open the PERT - Color Coded by Project layout in PERT.

To categorize and summarize project information for internal communication and reporting, each activity is assigned code values to identify its lot number, area/department, milestone, item name, and responsible department.

Progress is recorded for the first four months (February through June 2000). The baseline plan and budget information are stored as custom data items. You can use these items to compare current and target data, as shown in the Planned versus Current by Lot Number layout.

Critical resources, such as Electrical and Mechanical Engineers, are tracked to control costs. You can summarize or level all engineering resource requirements using the hierarchical resource called ENG*. In addition, the one-character cost category is used to indicate resources that are available in-house and those that need to be subcontracted. You can see how resources are utilized for the project using the Resource Analysis layout, which is organized by resource and includes subtotals for each. The bar representing each subtotal line gives a summary representation of work performed per resource; the thinner areas of the bar show nonworkperiods.

P3's Bar chart graphics and matrix reports are especially useful for this type of project. They consolidate a large amount of information in a concise format that makes it easy to understand the current project status and perform "what-if" analyses. Because some project work is subcontracted, schedule comparison reports are important for approving payments to the subcontractors.

OUTG: utility or process Project OUTG represents a maintenance outage project group. It is an hourly project that contains 58 activities and spans a total of 17 days (January 5 through January 22). The project involves shutting down three areas of the plant for routine maintenance. These areas are identified as three member projects of OUTG: Boiler Unit, Turbine Generator, and Auxiliary Systems. The Grouped by Project and Responsibility layout is organized by project and responsibility and includes title bands in the Bar chart for a quick look at activities within each group. View this layout in PERT to see the network logic.

Because each day the plant is shut down means lost revenues for the company, it is crucial for the outage to be completed as quickly as possible. Therefore, this short-duration, high-intensity project is planned using hourly durations. In addition, precise craft allocation and frequent reporting of progress are critical to the project's success.

OUTG uses two calendars, one for each of two workshifts. In multi-calendar projects, viewing activities on the longest path is important because some activities may have large float values due to their calendar assignments, but still be critical to the completion of the project. The Longest Path layout contains activities with the longest path.

Critical resource requirements such as Boilermakers, Electricians, and Machinists are planned and tracked very carefully during the outage. Resources are leveled and work orders are issued daily to ensure that all key resources are available and ready to perform the next day's work. You can analyze resource usage with the Resource Analysis layout, which is grouped by resource so allocation can be quickly determined.

For useful and efficient communication between the planners and the individual crafts, each activity is assigned code values to identify its phase, component, and responsible supervisor. These codes are used to organize project data and produce turnaround schedule reports, which are crucial for recording progress during the outage. As soon as the information is available, actual hours spent and remaining hours are updated for each craft using the Time Sheet Entry layout. This information can be retained to help plan future maintenance outages.

Progress has been recorded for the first three days of the outage. The current schedule dates are compared to original target dates to determine how well the outage schedule is progressing and to gauge its performance relative to the original budget. Target dates and budget information are stored as custom data items. Current and target data are compared in the Current versus Planned Dates Grouped by Responsibility layout, as well as in some standard schedule reports and custom reports.

SWDV: information systems SWDV represents a typical Information Systems (IS) development project group for the TSNS Financial Institution. The SWDV group consists of four member projects that represent analysis through implementation of data conversion to new billing, reporting, and file formats being adopted by TSNS. Phases further subdivide and identify activities within each project. For this reason, activity ID codes representing individual projects and phases in SWDV—a two-character project ID and four-character phase code—enable TSNS to easily identify and track activities throughout the project group life cycle.

Resources are allocated across all SWDV projects; they also share activity codes, cost accounts, and charge-back accounts. SWDV contains 241 activities that span a total of 1 1/2 years (June 2000 through January 2002). Progress is recorded for the first 12 weeks (June through September 2000). Project SWDV has one target project, TARG, the original plan. To compare current and target data, TSNS opens the Target Comparison by Responsible Group layout.

To help manage and communicate the right information to the right people, each activity is classified by sponsoring department, task manager, charge-back account, team leader, director, type of work, resource priority, responsible group, maintenance project, location, division, and mail code (for sending project data to remote personnel via electronic mail). TSNS can monitor projects using the activity custom data items assigned for planned start and finish dates, specification, specification approval/rejection, and change order number. Resource custom data items help TSNS track original costs, budgets, and quantities, so any variances can be noted and addressed. With this extensive coding structure, organization and reporting possibilities are extensive, as the sample layouts and reports demonstrate.

In any IS development project, resource management is important. Each activity in this sample project is assigned resources such as Analysts, Testers, and Writers. TSNS uses hierarchical resources representing individual departments, groups, and skill levels extensively to evaluate usage, allocation, and requirements through leveling and reporting. Resource calendars, based on the three base calendars that represent various workweeks, are also assigned to resources to optimize their use.

Resources (employees) can use the Monthly Update by Resource layout to record actual hours against each activity for project updates. For resource analysis, TSNS uses the Project Group Resource Availability layout which shows resources and all the projects each participant is working on. Analysis of the project plan can be accomplished using the sample PERT layouts. P3's resource tables and matrix reports are also very useful for "what-if" analyses for this type of project. Sample reports, some with customized arithmetic calculations, provide different ways to evaluate project progress.

Planning and Implementing the Schedule

In this part:

*T*his part of the *Planning and Control Guide* describes how to start planning and creating a project. The first chapter, *Determining the Project Structure*, describes how to add projects and project groups; and how to determine whether project activities will work according to their own durations or have durations that depend on the assigned resources.

Read the *Creating a Basic Task-Driven Schedule* chapter to learn how to create a basic schedule. It describes how to add activities and relationships, assign project and activity codes, assign resources, organize project data, and print the layout. The *Creating a Resource-Driven Schedule* chapter describes how to create activities that are driven by their assigned resources. You'll learn how to create a list of resources, specify resource calendars, and examine resource availabilities.

Determining the Project Structure

This chapter describes how to define the project structure. Work with independent projects or use P3's project group feature to manage more than one project at the same time. You can also divide large projects into smaller projects that are easier to control.

Once you establish a project, determine whether you want P3 to schedule the activities in your project according to their own durations or according to the work schedules of their assigned resources.

Adding a Project Group

Use project groups to manage more than one project at the same time. These projects may or may not be interrelated. Some projects may be linked only because they compete for the same resources; for example, a research and development company often manages several ongoing projects that use the same group of engineers and testers. Other multiple projects may be unrelated, but the project manager needs to summarize schedule data for all of them in one report or bar chart.

You can also use project groups to control multiple projects that are managed at remote locations, even if they are not networked. For example, suppose you are responsible for a multimillion-dollar project involving several subcontractors who manage their own projects. Once you set up the framework for the project group and its member projects, you can back up each project and send it through E-mail to the responsible subcontractor. Each project manager can restore their part of the project on his or her own computer (provided it has a licensed copy of P3) and work with it as they would normally. Then, every week (or other designated interval) you can update the project group by restoring each project from the subcontractor's backups.

In a multiple-project environment, the project group is the central point of control. All project data feeds into the project group, keeping it constantly updated. Similarly, changes in the project group can be automatically transferred to its projects.

Ideally, one person is responsible for controlling the project group. The project controls coordinator creates a shell that defines basic project information and sets standard options before any projects are added.

You can follow the same steps to add a stand-alone project.

Add a project group Choose File, New.

Type a unique four-character name for the project group.

Enter descriptive information.

Add a New Project

Current folder:	e:\p330\projects

Browse...

Project name: APEX

Number/Version: Sample Project

Project title: Plant Expansion and Modernization

Company name: Acme Motors

Planning unit: Day
Workdays/week: 5
Week starts on: Monday

Project start: 19JUL99
Project must finish by:
Decimal places: 2

☐ Add this new project to a project group

Project group:

Project ID:

Add   Cancel   Help

Set calendar defaults and specify the project start date.

For details on adding activities, see the *Creating a Basic Task-Driven Schedule* chapter.

Once you click Add to add the project group, P3 displays the Bar chart view and prompts you to add the first activity.

Define access rights The project controls coordinator should establish access rights that designate who can work in the project group. Choose File, Open; select the project group; and then click Access.
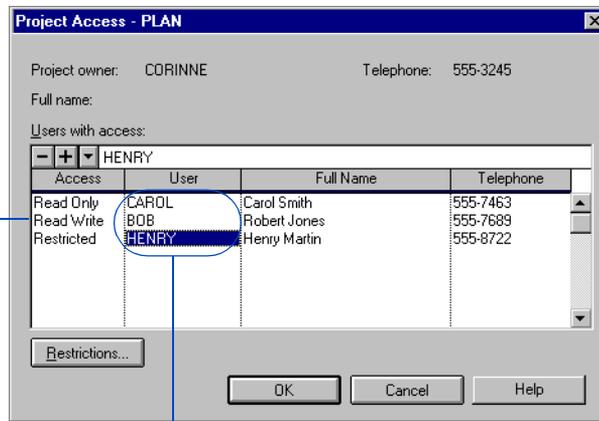
Each member project can also have a unique access list that is different from the project group access list.

Assign access rights for every person who needs access to the project group.

Assign Read Write access to anyone who will be adding a project to the project group.

The project controls coordinator should also perform the following functions from the project group:

■   Define calendars, project codes, activity codes, resources, cost accounts, custom data items, and a WBS outline that satisfies the needs of all projects.

Base calendars and dictionaries can only be edited from the project group; resources, code values, and other dictionary items can be added (but not deleted) from a project.

■   Determine whether to allow scheduling and leveling of member projects. Choose Tools, Schedule, then choose Options to set options for scheduling and leveling.

For consistency across projects, these data are entered one time in the project group and are available to each project; however, it is important to agree on these issues before the project starts because some information cannot be modified at the project level. Participants should also establish guidelines to coordinate updates to the schedule, schedule calculations, and any other necessary changes.

Adding Member Projects to a Project Group

Member projects are portions of a larger project group. A separate project manager usually controls each member project in the group. Member projects can be complete, independent projects; however, they are treated as member projects to simplify analyzing the effects of shared resources or reporting across multiple projects.

Add a member project to a project group Choose File, New. Enter a unique four-character name in the Project name field.

The project start date cannot be earlier than the project group start date.

Skip these fields since calendar information is inherited from the project group.

Mark this checkbox and choose the project group to which you want to add the project. You can also type the name of a new project group to add both at the same time.

P3 automatically assigns a project ID that appears as the first two characters in the activity IDs.

Assign project IDs When you add a member project to a project group, P3 automatically assigns a project ID to identify the project. This ID occupies the first two positions in the activity IDs for that project. You can accept the default ID or type your own ID; however, at least one of the two characters must be alphabetic.

Assign access rights Each member project in a project group has its own access list. The project controls coordinator assigns access rights at the project group level, while each project manager assigns rights to his or her own project. Choose File, Open and select the project, then click Access.

Managing a Project Group

You can link member projects by adding relationships in the project group. Projects can be simply connected, for example, one starting after another finishes; or they can be connected by relationships between activities.

You can view relationships to other projects from a member project, but you cannot edit or delete them; relationships between member projects can be controlled only from the project group.

Schedule project groups and projects As the project controls coordinator, you should calculate the overall project schedule from the project group at the start of the project and again at regular intervals. When you schedule the project group, P3 also schedules all member projects. You can base the late dates for each member project on its own finish date or on the end date of the entire project group. Choose Tools, Schedule, then click Options to set scheduling options.

Individual project managers can also calculate schedules for member projects (if authorized from the project group). When scheduling a project, the effects of relationships to other projects and to the project group can be considered, or you can disregard any external ties.

Schedule automatically P3 can automatically schedule the project group whenever you change information that affects the schedule. If automatic scheduling is turned on, P3 uses the scheduling options set in the Schedule/Level Calculation Options dialog box.

Level resources When several projects compete for the same resources, sufficient quantities may not always be available when needed; in fact, a major cause of project delays is committing the same resources to too many jobs. In P3, you can produce histograms onscreen that show exactly when and where resources are being used—for one member project or across all projects in a project group. A resource may appear to be available for one project, yet when evaluated from the project-group level, its combined use might exceed the amounts available.

To resolve resource conflicts, level resources across all member projects. If one project has precedence over another, set the leveling priorities P3 uses. Then, if two activities from member projects compete for the same resource, P3 assigns the resource to the project with the highest priority first.

Level automatically P3 can automatically level the project group whenever you change information that affects the schedule. If automatic leveling is turned on, P3 uses the leveling options set in the Schedule/Level Calculation Options dialog box.

Report across projects You can produce onscreen Bar charts, PERT diagrams, resource histograms, and other reports and graphics as easily from the project group as from member projects. When evaluating the schedule from the project group, you determine the level of detail. For example, create a layout that details the schedule for one member project, or another that summarizes the overall schedule status.

For more information about using project groups, see the *Creating and Managing Project Groups* and *Setting up and Managing Projects in Project Groups* chapters in the *Reference* manual.

All member projects share layouts and report and graphic specifications of the related project group; however, project managers can add their own specifications. Any layouts added from a member project automatically become available to the other member projects and to the project group, and vice versa. Layouts and printed reports produced from a member project show only the activities from that project.

Analyze projects When reviewing data across member projects, you can simplify your analysis by focusing on specific projects.

P3 adds SUBP as the first activity ID code. Use this code to group, sort, and filter activities by project from within the project group.
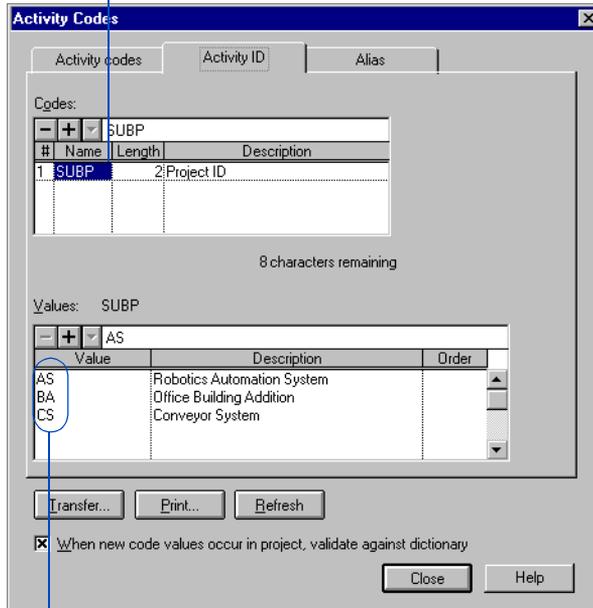
For more details about activity ID codes, see the *Building Additional Data Structures* chapter.

P3 adds the project IDs as activity ID code values.

Track member projects using project codes In addition to structuring data using activity codes, you can set up codes for tracking items at the project level. Within the project group, the project controls coordinator should establish project codes, code values, and descriptions that can be used across all projects. Use project codes to categorize member projects into groups, such as division, funding source, manager, team, and type of work. You can then organize member projects and sort, filter, or report using the codes from the project group. For example, since all activities in the member projects are automatically assigned the project code value, you could organize the project group by manager and filter by an activity code, such as phase, to see the individual managers involved in each phase of the project. Define project codes and values from the project group, then assign the project code values to your member projects.

Determining How Durations Are Estimated

As you plan your project, think about and document what needs to be done and how long the work will take. After you create a list of project activities, consider the following:

■   *Is the duration of the activity dependent on the amount of resources assigned?*

For example, the system integration phase of the sample project, APEX, requires 160 person-hours for testing the software. If you assign 8 person-hours per day, P3 schedules 20 days to complete the activity—doubling the resource amount reduces the testing duration to 10 days. In general, the more resources assigned, the less time is required to complete the activity. In this case, the activity is resource-driven and should be designated as an "independent" activity type.

You may sometimes answer No to this question because the activity takes a certain amount of time to complete, regardless of its assigned resources. For example, several activities must be completed the week before a new highway opens. It doesn't matter whether the resources are available sooner than that week or whether they would otherwise be scheduled for time off during that week; these activities must be scheduled during a specific timeperiod. P3 refers to these types of activities as "task" activities.

■   *Are you using resources that will work according to their own time schedule?*

If so, define specific calendars for those resources. For example, in a cartoon project, several resources (writers and illustrators) may be working on a rough script. Each works according to his or her own workday and vacation calendar; they are not necessarily scheduled to work simultaneously. Each resource has a specified amount of work to accomplish, reflected in individual resource durations. The rough draft starts when the earliest resource starts to work and finishes when the last one finishes. When you define calendars for resources, assign the activity type as "independent."

Most projects contain both task- and resource-driven activities. In a task-driven schedule, you specify a duration when you add the activity. P3 schedules a task activity using the activity's base calendar. The activity starts according to network logic and finishes when its duration has elapsed.

In a resource-driven schedule, you don't specify a duration when you add an activity. Instead, P3 calculates the duration of each driving resource based on its individual calendar. P3 calculates the activity duration from the earliest early start through the latest early finish of all the assigned driving resources.

If your project also includes activities that are resource-driven, see the *Creating a Resource-Driven Schedule* chapter.

The flow chart on the next page shows typical steps for creating initial schedules for task- and resource-driven projects. Follow the process in the next chapter to quickly create a basic schedule that consists of only task-driven activities with nondriving resources.

```
                    ┌─────────────────────┐
                    │ Make detailed list  │
                    │   of activities     │
                    └─────────────────────┘
                               │
                               ▼
                          ╱─────────╲
                    No   ╱    Do      ╲   Yes
              ┌────────╱ resources and  ╲────────┐
              │        ╲their availability╱       │
              ▼         ╲drive durations? ╱       ▼
    ┌──────────────────┐ ╲─────────╱   ┌──────────────────┐
    │ Estimate         │               │ Define list of   │
    │ durations        │               │ resources        │
    └──────────────────┘               └──────────────────┘
              │                                  │
              ▼                                  ▼
    ┌──────────────────┐               ┌──────────────────┐
    │ Link activities  │◄──┐           │ Designate driving│
    │ with             │   │           │ resources        │
    │ relationships    │   │           └──────────────────┘
    └──────────────────┘   │                    │
              │            │                    ▼
              ▼            │           ┌──────────────────┐
    ┌──────────────────┐   │           │ Set resource     │
    │ Calculate        │   │           │ limits/rates     │
    │ schedule         │   │           └──────────────────┘
    └──────────────────┘   │                    │
              │            │                    ▼
              ▼            │           ┌──────────────────┐
    ┌──────────────────┐   │           │ Define resource  │
    │ Review and adjust│   │           │ calendars        │
    └──────────────────┘   │           └──────────────────┘
              │            │                    │
              ▼            │                    ▼
    ┌──────────────────┐   │           ┌──────────────────┐
    │ Assign activity  │   │           │ Add activities   │
    │ and project codes│   │           └──────────────────┘
    └──────────────────┘   │                    │
              │            │                    ▼
              ▼            │           ┌──────────────────┐
    ┌──────────────────┐   │           │ Assign resources │
    │ Assign nondriving│   └───────────│ to activities    │
    │ resources        │               └──────────────────┘
    └──────────────────┘
              │
              ▼
    ┌──────────────────┐
    │ Review resource  │
    │ profiles         │
    └──────────────────┘
              │
              ▼
    ┌──────────────────┐
    │ Level resources  │
    └──────────────────┘
              │
              ▼
    ┌──────────────────┐
    │ Create baseline  │
    │ schedule         │
    └──────────────────┘
              │
              ▼
    ┌──────────────────┐
    │ Begin update     │
    │ process          │
    └──────────────────┘
```

Creating a Basic Task-Driven Schedule

This chapter describes the process for getting started quickly using P3. It covers the essential steps for building a new project that is task-driven—from defining activities to printing a schedule for distribution.

If your project schedule will depend on resource availability, follow the process described in the next chapter, *Creating a Resource-Driven Schedule*.

Process Overview

The following flow chart shows a typical process for creating a basic task-driven schedule. The remainder of this chapter describes this process in more detail.

First, create a list of activities and tie them together using relationships. Calculate and review the schedule according to a timescale, assign the necessary resources required to complete the activity, then customize and print your presentation.

```
┌─────────────────┐                    ┌─────────────────┐
│  Add activities │                    │ Assign responsi-│
│                 │                    │ bility codes    │
└────────┬────────┘                    └────────┬────────┘
         │                                      │
┌────────▼────────┐                    ┌────────▼────────┐
│ Link activities │                    │ Assign resources│
│ with            │                    │                 │
│ relationships   │                    └────────┬────────┘
└────────┬────────┘                             │
         │                             ┌────────▼────────┐
┌────────▼────────┐                    │ Organize and    │
│ Calculate       │                    │ filter layouts  │
│ schedule        │                    └────────┬────────┘
└────────┬────────┘                             │
         │                             ┌────────▼────────┐
┌────────▼────────┐                    │ Print layouts   │
│ Review and      │                    │                 │
│ adjust schedule │                    └─────────────────┘
└────────┬────────┘
         │
┌────────▼────────┐
│ Identify        │
│ critical path   │───────────────────────┘
└─────────────────┘
```
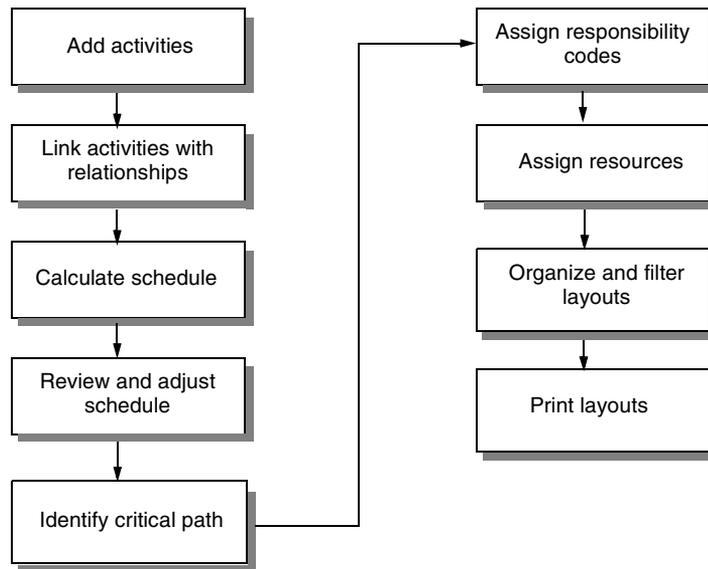
After you create a basic schedule, you may want to define and enhance dictionary data, such as project coding and activity coding, or refine the schedule by modifying calendar definitions; for more information, see *Part 3*, *Adjusting and Refining the Schedule*.

Adding Activities

P3 provides two views for adding activities: Bar chart and PERT. Use the Bar chart when you want to add activities in a tabular list. Use PERT to visualize network logic as you build your project. Choose the method that you are most comfortable with. You may want to quickly add a list of activities in the Bar chart, then refine logic in PERT.

Add an activity in the Bar chart If you just added a new project, P3 displays the Bar chart with the Activity form displayed at the bottom, ready for you to add the first activity. By default, the Activity form is displayed when you initially insert activities. To change this default, choose Tools, Options, Activity Inserting, and clear the Use Activity Form When Inserting an Activity checkbox.

1 Type the first ID for the project, then click OK.

Type up to 10 characters for the activity ID. Activity IDs must be unique; they can consist of letters, numbers, or a combination of both.
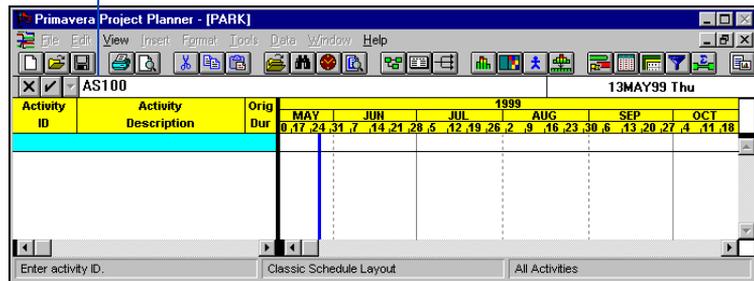
2 Click the Activity Description cell, then click the edit bar and type a description. Click ✔ or press Enter.
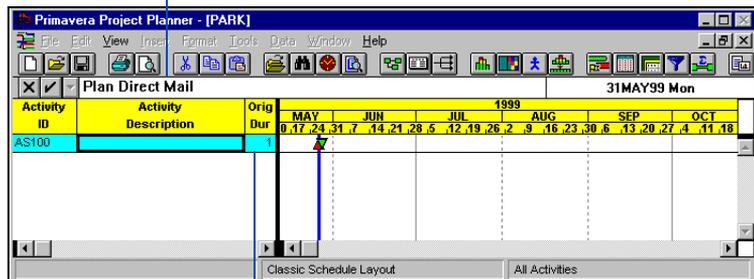
3 Enter the estimated length of time required to complete the activity (the "original duration").

4 Click ⊞, or choose Insert Activity to add another activity.

P3 automatically assigns an activity ID incremented by 10 based on the first ID.
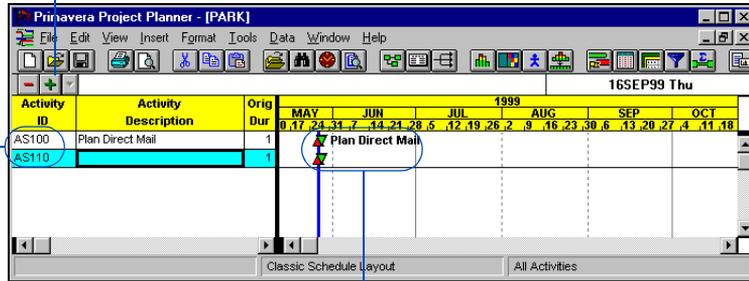
P3 automatically positions the activity bars on the project start date.

Assign activity IDs P3 increments activity IDs based on the currently selected activity. As you build a project, make sure the last activity added is selected (highlighted) when you add a new activity. P3 automatically assigns the project ID as the first two characters of the ID, followed by the incremented number when you add activities to a project that is part of a project group.

Add activities in PERT After you add some activities in the Bar chart, switch to PERT so you can start visualizing the flow of logic as you build your project. Choose View, PERT.

1 Double-click the area where you want to add the new activity. P3 adds the activity and automatically assigns it an ID.
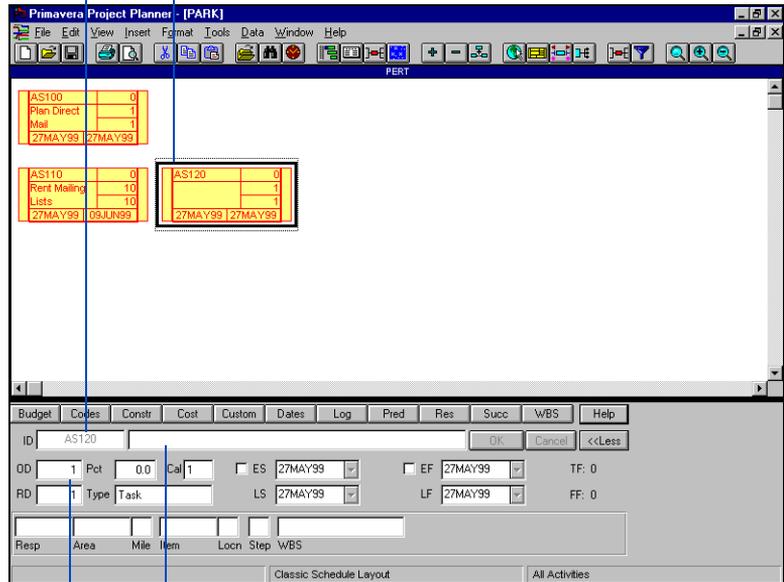
P3 displays the Activity form at the bottom of the screen when you add activities in the PERT view.

2 Enter an activity description.

3 Enter the estimated length of time required to complete the activity (the "original duration", or OD). Click OK to save the activity.

Add an activity between existing activities You may sometimes want to place a new activity in an occupied position. Choose Insert, Activity, to place a new activity exactly where you want it.

Select the activity to the left of the location where you want to place the new activity, then choose Insert, Activity.
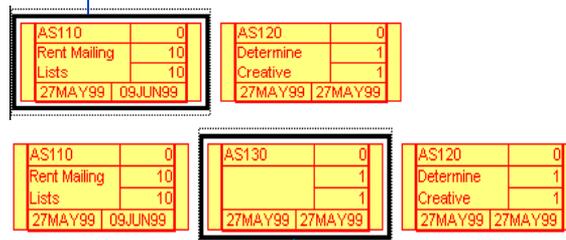
When you use the Insert, Activity command, P3 places the new activity to the right of the selected activity.

To place a new activity between existing activities in the Bar chart, select the activity above the location where you want to place the new activity, then choose Insert, Activity or click ⊞ from the edit bar above the Activity columns. P3 adds the new activity below the one you selected.

Adding Milestones and Flags

You may also want to add activities that have no duration, for example, project milestones or flag activities. Milestones and flags have zero duration. A milestone represents a significant point in a project, such as "Complete Phase 1 Testing." A flag signals the start or finish of the activity's defined predecessors. P3 automatically updates flag activities; you must update milestone activities.

Flag activity

Milestone activity
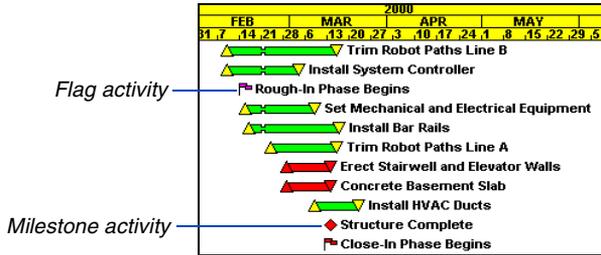
Designate activities as milestones and flags using the Type field in the Activity form.

Linking Activities with Relationships

Relationships indicate dependencies between activities. The conventional type of relationship, finish to start, indicates that a successor activity can start only after its predecessor finishes. For example, in a software development project you can test a new feature only after its coding is complete; in a construction project, you can erect the exterior walls only after the footings are installed. Since most relationships in a project are finish to start, P3 provides a feature called Autolink that automatically assigns finish to start relationships to activities as you add them.

Add activities and relationships at the same time Choose Insert, Autolink before adding activities. As you add activities, P3 automatically connects the currently selected activity to the new activity with a finish to start relationship. (Make sure the new activity's predecessor is selected as you add activities.)

Modify relationship types Once you've added activities and relationships, you can modify or create relationships that aren't finish to start. Create relationships manually by pointing and dragging the mouse to the appropriate ends of the predecessor and successor activities.

Start to start: The start of the successor activity depends on the start of its predecessor.

Finish to finish: The finish of the successor activity depends on the finish of its predecessor.

Start to finish: The successor activity cannot finish until the predecessor starts.

To assign relationships in PERT, drag the mouse between activity ends. The mouse pointer changes to a pitchfork as you define relationships.

AS110	0
Rent Mailing	10
Lists	10
27MAY99 09JUN99	

AS120	0
Determine	1
Creative	1
27MAY99 27MAY99	

AS100

AS110 ——— *In the Bar chart, drag the mouse between endpoints.*
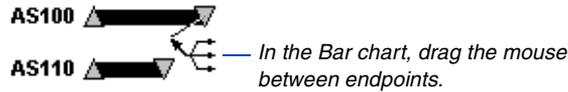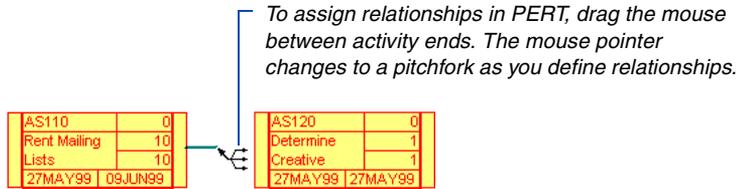
If a successor isn't visible on the current screen, drag the mouse to the edge of the screen to scroll automatically, or release the mouse in a blank space and type the successor activity ID in the dialog box P3 displays.

Specify lag You can also specify a lag between activities. A lag is the delay between the start or finish of one activity and the start or finish of another. For example, if the design of structural components can start
5 days after the design for the process equipment starts, you can specify a start to start relationship with 5 days lag. Lag can be positive or negative (negative lag is also called lead time). To set a lag time between activities, click the relationship line to display the Edit Relationship dialog box.

Edit Relationship

Predecessor: AS104
Run Sealant, Air, and Water Piping
Successor: AS105
Install Temperature Control Equipment

Type: Start-to-start

Lag: 5

OK
Cancel
Delete ——— *Deletes the relationship*
Help

Define a lag length between activities.
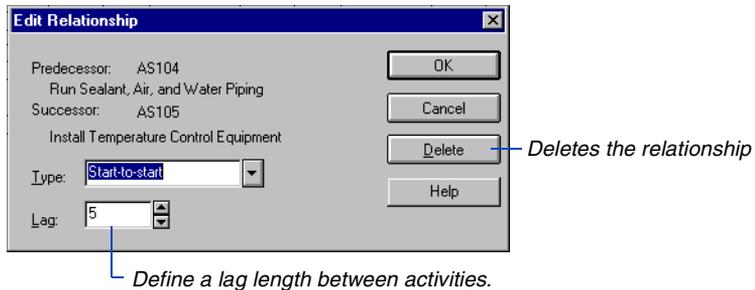
If you click a relationship line that branches to different activities, P3 displays a dialog box to confirm the relationship you want to edit.

This relationship line represents three different relationships.
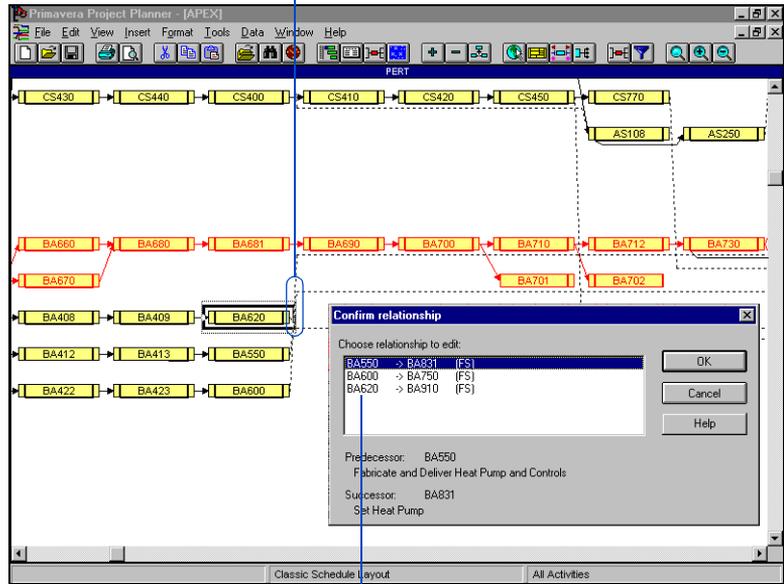
To delete a relationship, you can also click the relationship line and press Delete.

Double-click the relationship you want to edit.

Using Fragnets to Create a Project

"Fragnets"—fragments of networks—are another convenient method to build projects. A fragnet is a set of activities that you copy from an existing project, save, and apply elsewhere in the same project or in another project. They simplify the building of projects for any type of repetitive process.

For example, procurement often consists of the same chain of activities except for the identification of the current item to be procured. You can enter a group of activities and data for one item, select the group, and then store it in a fragnet library. P3 copies most activity data with the fragnet, including activity IDs, titles, durations, relationships, logs, resources, and costs.

Instead of entering the same data for each procurement item, you can retrieve the fragnet, and then adjust it as required. P3 provides a "text replacement" feature that enables you to customize activity titles and codes easily without entirely retyping them.

Using fragnets is more powerful than conventional copy-and-paste techniques because you can copy, store, and retrieve as many fragnets as you need, whenever you need them. P3 provides a set of fragnets for typical processes. Use these fragnets, or create your own.

Choose Tools, Fragnet, Retrieve Fragnet to open the fragnet library.
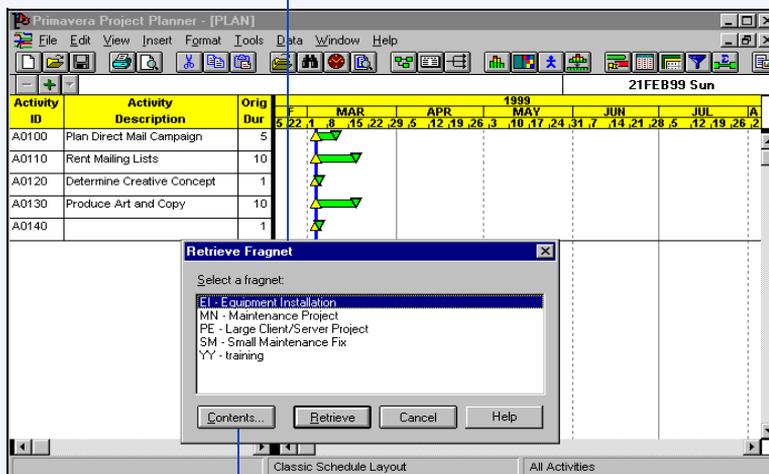
View the list of activities for the selected fragnet.

Calculating the Schedule

After you add activities and define logic in a project, let P3 calculate the schedule to determine schedule dates. Then examine the dates and identify the critical path—the path of activities over the entire project duration that takes the longest time to complete. Verify and refine the schedule, for example, to meet a specific end date. In the Bar chart, stretch or shrink bars to change activity durations and dates; when certain events must occur on a specific date, move the bars to that exact location on the timescale. In PERT, trace one or more network paths to verify and adjust logic.

Calculate schedule dates Press F9 or choose Tools, Schedule.

Enter a data date (the day from which P3 begins calculating a schedule).
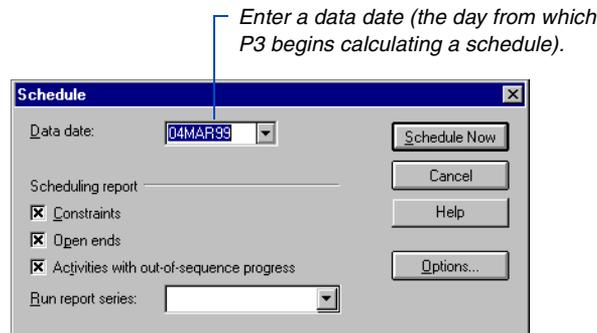
Click ▾ in a date field to display a calendar for choosing dates, then double-click the date you want to select.

At the beginning of a project, P3 uses the project start date as the data date. As you report progress, you should change the data date to indicate the date as of which you recorded progress. For example, if you update the schedule every Wednesday, record progress up to Tuesday night and specify Wednesday's date as the data date.

Each time you schedule a project, you can also produce schedule-related statistical reports and a series of tabular printed reports. Reports containing schedule statistics include listings for constrained activities, activities with no predecessors or successors (open ends), and activities that started before they were logically scheduled to occur (out-of-sequence progress).

To have P3 automatically schedule the project whenever you change data that affects the schedule, such as when you add, change, or delete a duration, relationship, lag, or constraint, click Options and choose the Schedule Automatically option. You can also specify additional options, such as the type of logic used to calculate the schedule and how P3 calculates total float.

Reviewing the Schedule

After you schedule the project the first time, display the Bar chart to examine your schedule positioned along a timescale. You can also use timescaled PERT if you prefer. The Bar chart shows activity data in the Activity columns, with bars along a timescale representing activities. Timescaled PERT shows activities along a daily, weekly, or monthly timescale.

To display the Bar chart from PERT, choose View, Bar Chart. To display a timescaled PERT layout rather than relationship logic, from PERT choose Format, Organize, click the Arrangement tab, and choose the PERT Layout with Timescale option.
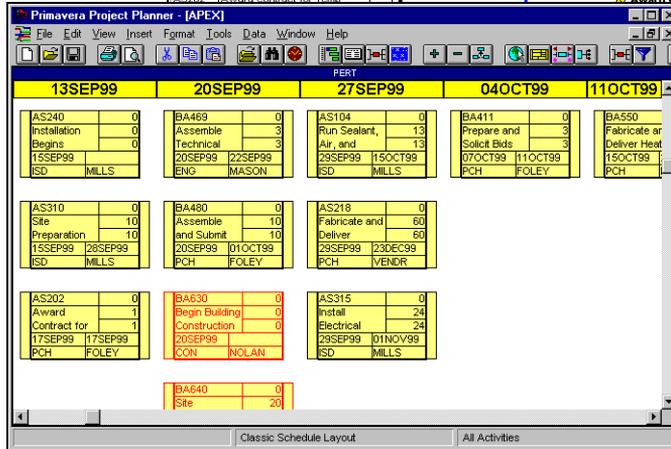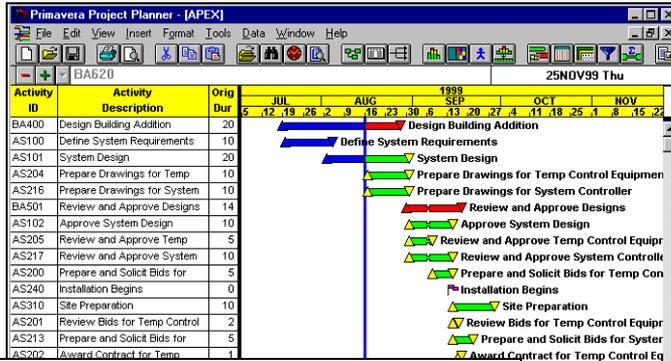
This timescaled PERT layout is arranged by early start date.

You will probably want to make some changes to your project. One method for compressing or adjusting the schedule is to reduce the duration of some activities. The Bar chart provides an easy way to modify durations.

Change the duration of an activity Position the mouse pointer at the end of the activity bar whose duration you want to change. The pointer changes to ↔.

Datometer

Activity ID	Activity Description	Orig Dur	2000
			JAN │ FEB │ MAR │ APR │ MAY
Conveyor System			
CS300	System Design	40	EF:17APR00 Dur:20
CS310	Review and Approve Design	15	
CS430	Prepare Drawings for	20	
CS440	Review and Approve	5	
CS400	Prepare and Solicit Bids for	10	
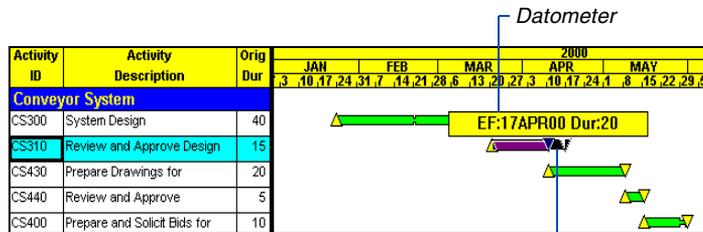
*Drag the end of the bar to the right or left until you reach
the duration you want. The Datometer displays the
finish date and duration as you move the endpoint.*

To display relationships in the Bar chart, press F3 or choose View, Relationships.

Remember that changing the duration or dates of one activity can affect the schedule dates for preceding or succeeding activities. It is helpful to show relationship lines in the Bar chart so you can easily identify any related activities that your changes may affect. In the preceding figure, if you reduce the duration for Review and Approve Design, its successor activity, Prepare Drawings, can start earlier. To reflect this change, you must recalculate the schedule. If Automatic Scheduling is turned on (choose Tools, Schedule, Options), and you change a duration, P3 reschedules the project automatically.

Change the start and finish dates for an activity If you are not organized by resource, you can also move an activity to a different time, retaining the original duration. Position the mouse pointer in the center of the activity bar. The pointer changes to +.

Activity ID	Activity Description	Orig Dur	2000		2001
			OCT │ NOV │ DEC	JAN │ FEB	
CS700	Install Conveyor 211	14	
CS710	Install Conveyor 212	50	
CS740	Field Piping	50	
CS750	Field Wiring	50	
CS720	Install Conveyor 213	10	ES:22DEC00
CS730	Install Conveyor 214	30	EF:22JAN01
CS760	Field Painting	20	
CS305	Start-Up & Debug System	20	
CS800	Conveyor System Complete	0	
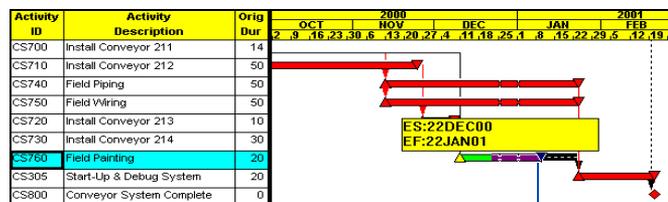
*Drag the bar to the right or left and release the mouse
button when you reach the timeframe you want.*

You can also move activity boxes in timescaled PERT to a different week or month. In PERT, choose Format, Organize, then click Arrangement. Choose the PERT Layout with Timescale option, then choose the applicable increment—weekly, or monthly. Click Organize then drag the activity box to the new time interval.
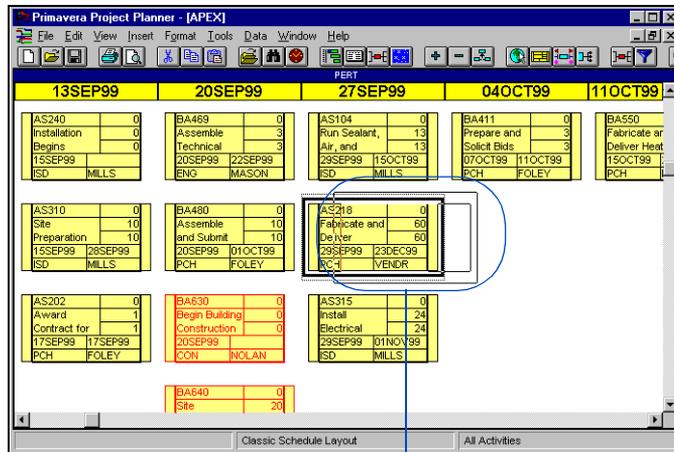
Drag the activity box to
a different week.

For details on assigning constraints to activities, see the *Refining the Schedule* chapter.

If you disregard relationships and constraints when you move an activity, P3 restores the logic when you schedule the project again. For example, moving an activity may cause its start date to occur before its predecessors have been completed. When you calculate the schedule, P3 returns this activity to its logically scheduled timeframe. To anchor an activity to a specific timeframe, you must make other adjustments, such as imposing constraints or revising logic.

Scheduling in P3

In a "forward pass" through the network, P3 calculates the early start and finish dates for each activity, starting with the first activity in the network. These dates are the earliest possible times an activity can be performed if all the activities that precede it are also completed by their early dates. Correspondingly, the late start and finish dates indicate when an activity must be completed so that the project finish date will not slip.

Certain activities have "float," which permits them to start later than their early dates. "Total float" is the number of days an activity can be delayed without a possible affect on the finish of the project. Correctly controlled, this float is valuable in regulating the use of labor, materials, cost, and other resources, and in scheduling the activities that have positive float.

An activity with zero float has no flexibility. It must start precisely on time and finish on or before its schedule finish date, or it will delay project completion. Negative float alerts you that one or more activities can occur only after their late dates and that the project will be delayed

unless you make changes. The greater the negative-float value, the longer the delay. P3 calculates negative float only when you impose a project finish date or other constraint on the schedule.

Critical activities control project duration. Together, they make up one or more continuous chains of zero-float activities extending from the first activity to the final activity in the schedule—the "critical path."

You can easily identify the critical path by highlighting critical activities. P3 automatically colors critical activities red. In the Bar chart, use distinctive bar and endpoint configurations to further distinguish critical activities. In PERT, use different activity shapes.

In the following Bar chart, a solid bar represents the early start through the early finish of an activity; a triangular endpoint represents the late finish. When the late finish and the early finish dates are the same, the activity is critical. A thin solid line extending from the early finish date to the late finish of each activity represents positive float.
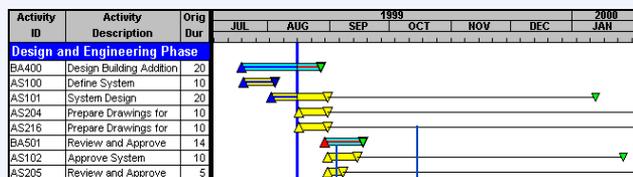
Critical activity ⎯   ⎯ Positive float

Identifying the Critical Path

You can trace logic in PERT to examine a path of activities while still viewing the entire project. Use the trace logic window while viewing a PERT layout for a closer look at your project's critical path and to help you determine why specific activities have negative float.

Trace logic Choose View, Trace Logic, then select the activity in the PERT layout where you want to begin tracing logic.

You can set different zoom levels for PERT and Trace Logic.

Drag the horizontal split bar up or down to resize the Trace Logic area.
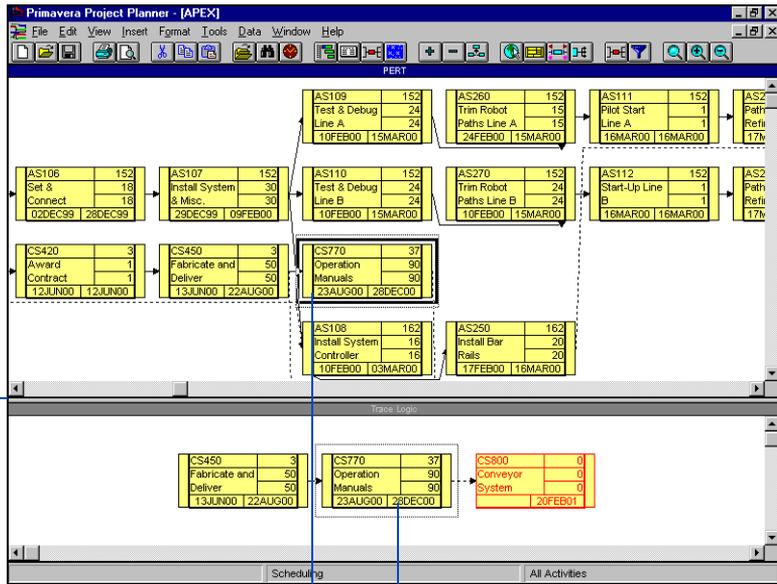
P3 displays the selected activity and its immediate predecessor and successor in the Trace Logic area.

To move through the chain of activities, click a predecessor or successor.

To trace the critical path of your project, configure Trace Logic to show only activities with driving relationships. Choose Format, Trace Logic.
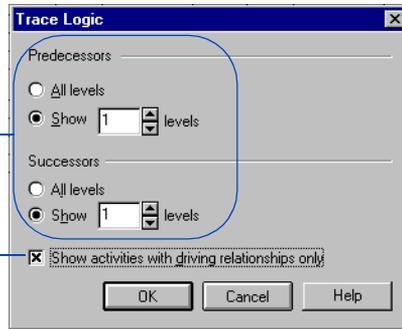
Control the number of prede-cessors and/or successors that appear in the Trace Logic window.

Mark this checkbox to focus on the critical path in your project.

You can also change the Trace Logic view to a movable window you can place anywhere on the workspace. Click the right mouse button anywhere in Trace Logic, then choose Undock Trace Logic.
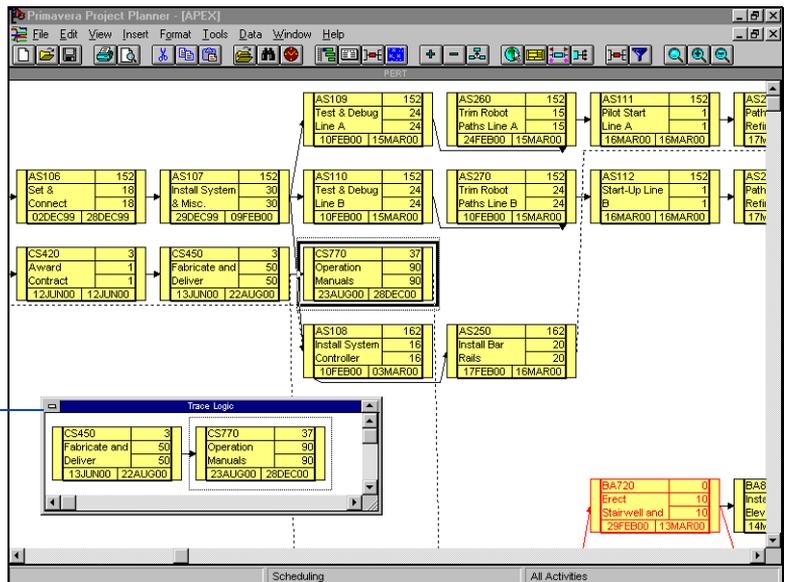
Place the Trace Logic window anywhere on your screen. To change the window back to a full view, click the right mouse button and choose Dock Trace Logic.

To close Trace Logic, choose View, Trace Logic again.

Assigning Codes

Whether your project contains 50 activities or thousands of activities, you should organize activity data in ways that are most meaningful and useful for planning and managing your project. You can divide the work involved in most projects into groups. For example, a building construction project might be separated into disciplines such as architectural/structural, mechanical, electrical, and so on. Research and development projects often involve designing, prototyping, testing, and manufacturing new technology.

You can also organize the member projects in a project group according to specific categories, such as location and manager. Categorize projects to fulfill filtering, sorting, and reporting requirements. This is especially helpful when a project group comprises many member projects.

P3 provides activity codes and project codes as methods for organizing your projects. You can categorize activities into as many as 20 levels, such as responsibility, area, department, phase, location, division, or type of work.

This Bar chart groups activities by responsibility.
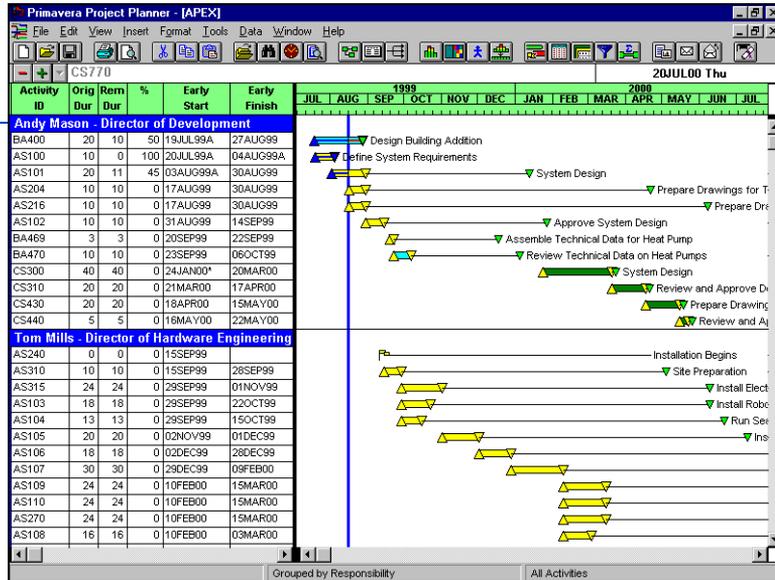
P3 provides a set of standard activity codes for every new project. These codes enable you to categorize activities by responsibility, area/department, milestone, item, location, and step. You can use the codes supplied or define your own coding structure in the Activity Codes Dictionary. To start, you may just want to assign responsibility codes so you can easily identify and filter activities by the appropriate responsible person. Later, you can define and assign additional codes to enhance your ability to organize activities.

For details on creating activity codes, see the Building Additional Data Structures *chapter.*

If you use project groups, you can set up codes for tracking items at the project level. For example, define project codes to categorize member projects into groups that can be combined in a single band on a layout. You can also use these codes to sort, filter, and report using project-level data. Set up project codes by project group, then define the values that will be assigned to member projects and assign the values to the projects.

This layout is grouped to identify each project manager for the individual member projects in the project group.
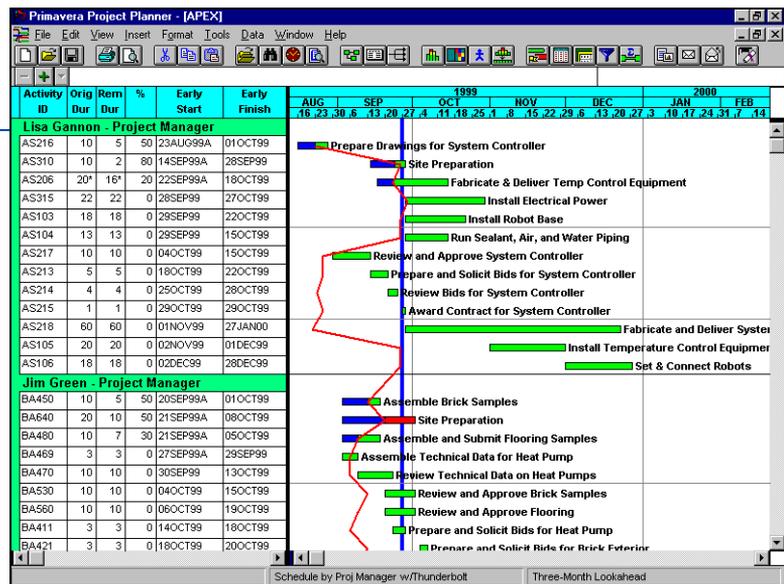
P3 supplies 10 default project codes. This is the maximum number of codes that can be assigned to a project group in the Project Codes Dictionary. You can use these codes as described and define your own values for each one, or you can change the descriptions to better suit your organization. For example, you may want to replace the default Project Manager code description with Team Leader.

Assign responsibility code values to individual activities
Select an activity, then choose View, Activity Form.

The bottom of the Activity form contains fields for entering code values for each defined activity code.

Click ▼ in the Resp field to display a list of defined responsibility code values, or type a code value. If you enter a new value, P3 prompts you to add it to the Activity Codes Dictionary.

Once you select a value for the current activity, select another activity. P3 automatically saves your edits to the current activity when you select another one. You can also choose OK in the Activity form to save edits, then choose Next to select the next activity automatically.

For information about adding Activity columns, see the *Customizing the Bar Chart* chapter.

Assign responsibility code values to multiple activities
Include a column for the responsibility code, then enter a value for each activity. For activities assigned the same value, use the fill-cell feature to save time.

1 Click the cell containing the responsibility code value you want to copy.

2 Select the activities to which you want to copy the same code value. In the Activity columns, drag the mouse up or down to select a group of contiguous activities.

If activities are not contiguous, press and hold Ctrl and click each activity to which you want to copy the value. Make sure the last cell you click contains the value you want to copy.

3 Choose Edit, Fill Cell.

The Fill Cell command copies NOLAN to all selected activities.
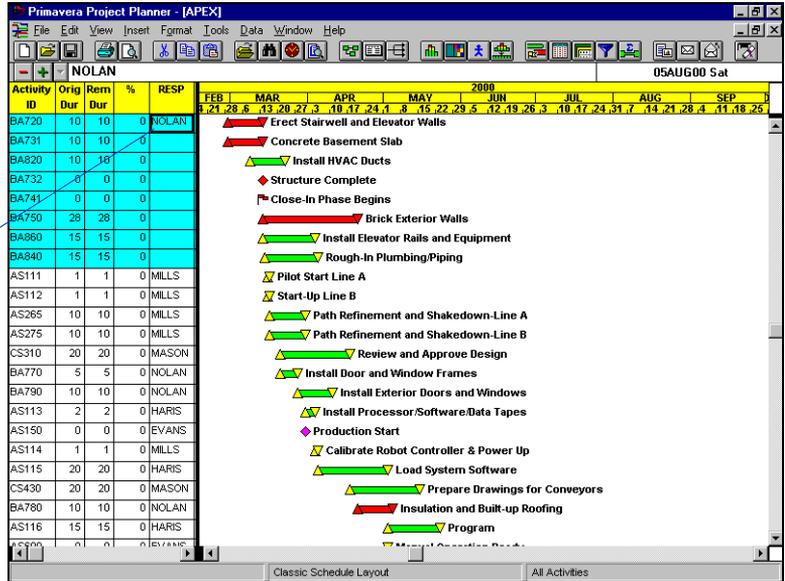
Assign project code values Open the member project for which you want to assign project code values. Choose Data, Project Codes, and click the Values for Project tab. You can also choose File, Project Overview, then click Project Codes. The project codes predefined in the project group are displayed in the Code column. Click the Value cell for the applicable code, then select the value from the drop-down list in the edit bar.
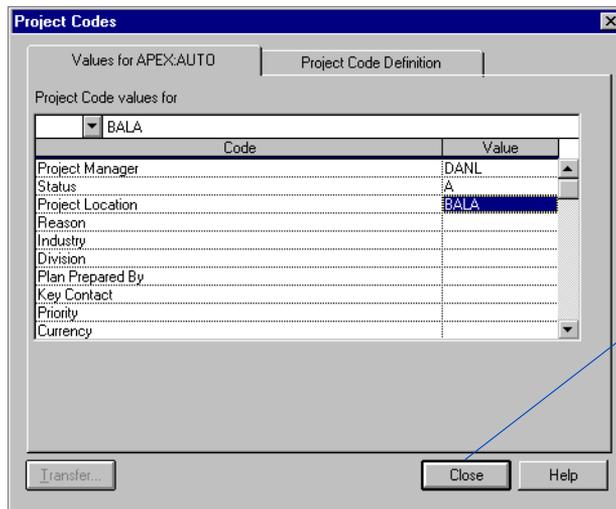
Click when you finish assigning project code values to the member project.

All activities in the project are automatically assigned the project code value.

Analyzing Risk with Monte Carlo

Monte Carlo is a Primavera product that enables you to analyze the risks involved with selected aspects of a project and to quantify their impacts. You can run simulations and produce graphics that represent one or more possible project outcomes.

Monte Carlo gives you the information you need to anticipate problems, develop contingency plans, and manage project risk based on realistic probabilities. It provides you with the knowledge to make the right decisions if your project schedule or cost estimates are threatened by events or conditions beyond your control, such as poor weather or materials or labor shortage. And it gives you the tools— reports and graphics—to communicate risk and uncertainty to clients, management, and other decision makers clearly and effectively.

Activities in P3 projects have fixed durations, and total project length is based on the longest path through the project. In Monte Carlo, you establish a range of duration estimates in the form of optimistic, most likely, and pessimistic values for project activities; this range of estimates enables you to assess the project completion date more accurately than with using fixed activity durations. In P3, an activity is on the critical path based on a deterministic schedule; after a Monte Carlo simulation, the number of times that activity falls on the critical path (for example, 50 times out of 100 iterations), indicates its criticality.

How do you determine estimates for the range of values in a project? Monte Carlo's QuickRisk feature enables you to enter plus and minus percentages to create a range, which Monte Carlo uses for the simulation to calculate pessimistic and optimistic durations.
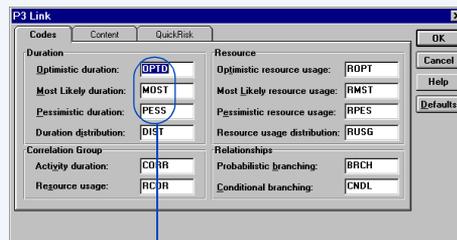
The optimistic, pessimistic, and most likely duration estimates are stored in activity codes in P3.

The standard activity code structures needed to share data between P3 and Monte Carlo are provided with P3 in a file called CODES.CNT (located in your PROGLOC directory). These include optimistic, most likely, and pessimistic codes, and a probabilistic branching code that enables you to define the percentage likelihood an activity will occur after another activity of the same predecessor. You need to rename CODES.CNT to CODES.STD to use these codes.

After you run risk analyses in Monte Carlo, you can compare the deterministic values to the probabilistic values using P3's Bar chart, organization, and layout capabilities.

Assigning Resources

Develop a resource plan by building a list of the resources needed to accomplish the activities. P3 provides several methods for assigning resources to activities. A quick and simple method is to use the Insert Resource Assignment dialog box.

Assign resources Select one or more activity(ies), then choose Insert, Resource Assignment.

2 Optionally associate the resource's cost with a particular cost account.

1 Select from a predefined list of resource names, or type a new name.

3 Enter the budgeted quantity or the number of units per timeperiod to work on the selected activity(ies).

4 Assign the resource.

If you enter a new resource name in the Insert Resource Assignment dialog box, P3 prompts you to add the new resource to the Resource Dictionary. You can also define resources in the Resource Dictionary, then assign them to activities using the Insert Resource Assignment dialog box. Click ▣ in the Resource field and choose a predefined name.

Allocate the amount of the resource to use for the selected activity(ies) by specifying the quantity of time required for the resource to complete the activity(ies) and/or specify the units per timeperiod—the length of the workday (in hours) the resource will devote to the activity(ies). For example, if you specify four hours per day, and the workday is eight hours, P3 calculates a rate of four hours per day, or 50 percent.

In the Quantity field, if you are assigning a nondriving resource to the activity(ies), you only need to specify a total budget quantity in person-hours; P3 then calculates the number of units per day based on the activity's remaining duration.

In a daily project such as APEX, you can express resource units as person-hours per day, person-days per day, quantities of material to be installed per day (such as linear feet), or any other type of unit. The timeperiod depends on the planning unit for your project.

Display the Resources form Open the Resources form to see resource details. Right-click a selected activity, then choose Activity Detail, Resources.

You can also add resource assignments using the Resources form; click ⊞ to assign each resource, then specify a budgeted quantity or units per time-period.
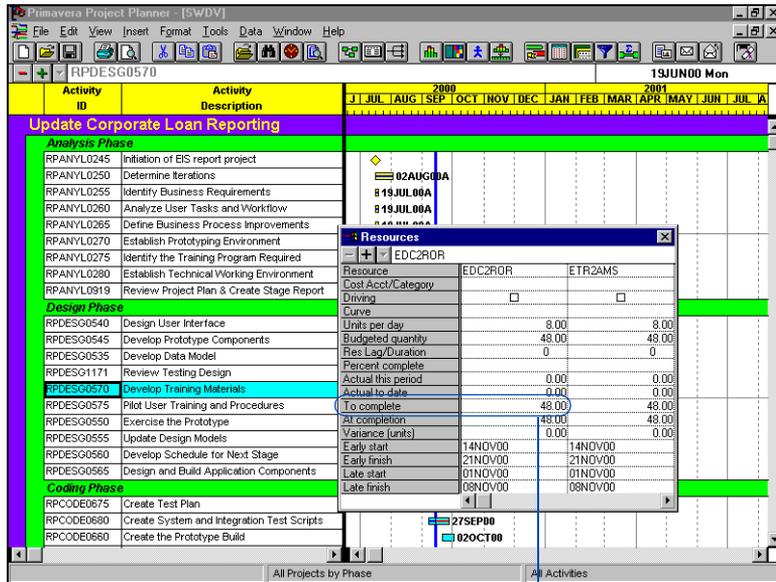
P3 automatically calculates a quantity to complete.

P3 calculates the quantity to complete by multiplying the number of units per timeperiod by the number of days required to complete the activity:

Quantity to Complete = Remaining Duration x Units Per Day

At the start of a project, P3 sets the budgeted (total estimated effort) and forecasted quantities equal to the quantity to complete.

The testing manager is assigned eight person-hours per day for seven days, totaling 56 person-hours to complete the activity.

When you add or change resource data using the Resources form, P3 saves your edits automatically when you select another activity in the Activity columns.

For information on assigning driving resources, see the *Creating a Resource-Driven Schedule* chapter.

Resource Lags and Durations

When you assign resources in P3, they begin when the associated activity starts and continue until the activity finishes. However, you can use resource lags and durations to control the dates when resource use begins and ends. A lag is a delay between the start of the activity and the start of the resource use; for example, a resource may not be needed until a few days after an activity begins. If a resource isn't needed throughout the length of an activity, you can specify a resource duration.

┌ *Lag*   ┌ *Duration*

Resources			✕
− + ▾		3	2
Resource	ATM ENG	ACCTS	
Cost Acct/Category	11233 L	11233 L	
Driving	☐	☐	
Curve			
Units per day	8.00	8.00	
Budgeted quantity	24.00	16.00	
Res Lag/Duration	0 3	3 2	
Percent complete			
Actual this period	0.00	0.00	
Actual to date	0.00	0.00	
To complete	24.00	16.00	
At completion	24.00	16.00	
Variance (units)	0.00	0.00	
Early start	15SEP99	20SEP99	
Early finish	17SEP99	21SEP99	
Late start	22JUN00	27JUN00	
Late finish	26JUN00	28JUN00	

The Accounts Manager does not start work until three days after the activity begins, and then works for two days.

For more details on using resource lags and durations, see the *Planning Resources and Costs* chapter in the *Reference* manual.

If you assign resource lags and/or durations, you need to update these numbers manually as you record progress. P3 does not change the resource lag and duration based on changes to the activity duration unless the resource is driving.

Distributing Resources Nonlinearly

Although you can use resource lags and durations to define the beginning and end of resource use, by default P3 uses the same number of units each day of the activity. However, resources are sometimes used unevenly over time; for example, materials are usually paid for on delivery.

You can describe precisely how you want to distribute resources across an activity by using resource curves. Allocate most resource use at the beginning of the activity duration using a front-loading curve, or use a back-loading curve to place most resource use at the end. Use a bell curve when resource use begins slowly, gradually increases as the activity

progresses, and tapers off at the finish of the activity.

P3 provides a standard set of nine curves for all new projects; you can use them as provided, modify them, or add your own. Choose Data, Resource Curves.

Create a resource curve. Click ⊞ and enter a resource designator from 1 to 9 or A through F. Enter a description for the curve. P3 saves the curves you define for the current project only.

Assign a resource curve. Once you set up curves, assign them to resources in the Resource form. Enter the valid curve ID. Curves apply to the resource and its associated cost.

Resource curve designator

Click to show four curves at the same time.

Define a curve by allocating a percentage of resource use for each given percent of activity duration.

This profile shows the Ironworker's nonlinear distribution for activity BA710.

Organizing and Filtering Layouts

After you establish your project, organize activities to view the project from different perspectives. For example, group activities by the Project Manager project code and the Responsibility activity code to produce a detailed list of activities for each project manager and department manager.

Group title bands identify manager's activities. You can customize the colors and fonts of the title bands for added emphasis.
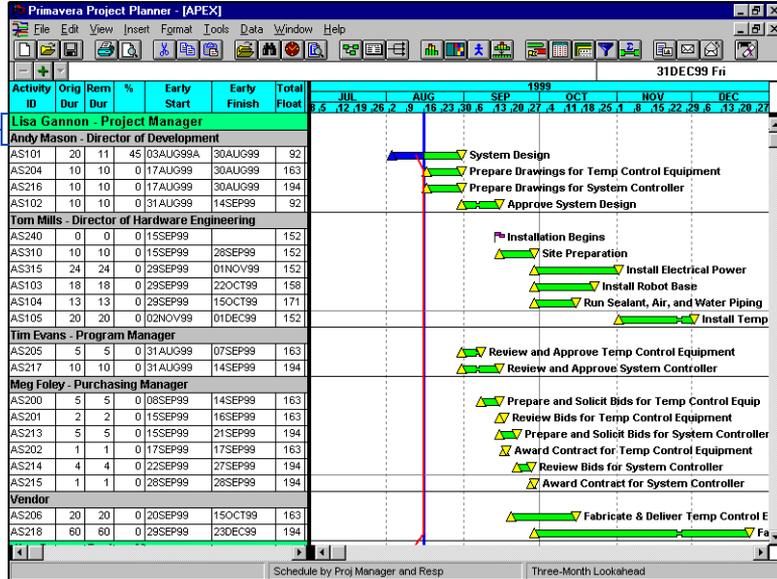
You can also change the sequence of the list of activities in the Bar chart. For example, arrange activities by total float to see the most critical activities first.

Order and/or group activities Choose Format, Organize.

You can also outline activities based on the project's work breakdown structure (WBS).

You can group activities by many activity data items, including dates, float, resources, and cost accounts.

Mark to combine values for the data items into individual bands.

Select up to 20 items for sorting activities.

Filter projects and activities Use filters to limit the projects and activities shown onscreen and in printed layouts. For example, to analyze the schedule, you may want to list only activities having zero total float. Choose Format, Filter.

Use a filter supplied with P3 or create your own.

For details on sorting, grouping, and filtering projects and activities, see the *Organizing Data* chapter.

Printing Layouts

When your project looks the way you want it onscreen, you can print it as is or adjust various settings for the printed output. You should first preview the layout to see how it will look when printed. Choose File, Print Preview. To enlarge a specific area of the page, drag the mouse across the page until the mouse pointer *changes to a* 🔍*, then click to zoom in on that area.*

Displays all pages of the layout.

Click the header or footer icon to customize information shown at the top or bottom (or both areas) of the layout.

Use the horizontal or vertical scroll bars to view other pages in the layout.
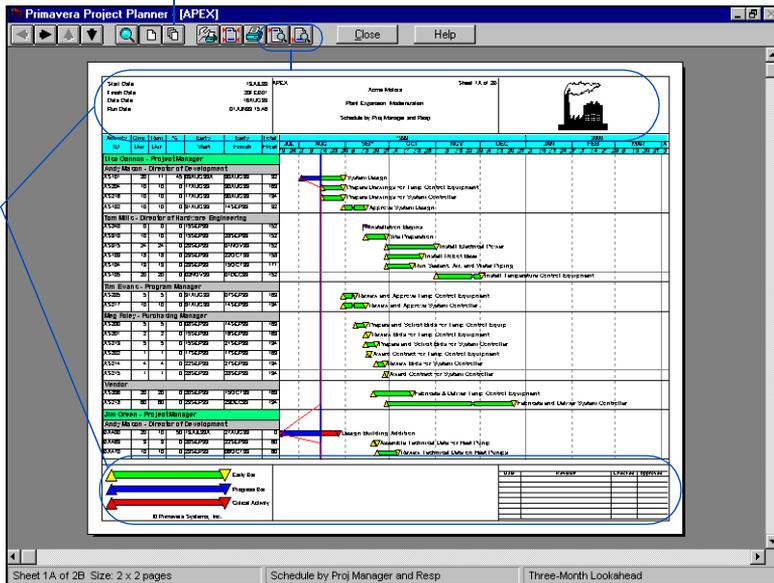
To customize settings for printing the Bar chart or PERT, choose File, Page Setup, or click the Page Setup icon in Print Preview.

Choose a specific timeframe to print for the Bar chart.

Page Setup

Print

Start date: [CAL] 13JUL99   End date: [CAL] 13FEB01

Show or hide certain elements of the Bar chart.

☒ Activity columns   ☒ Bars
☒ Show visible columns only   ☐ Resource/Cost display

Page settings

Fit to   0 ⊟ pages wide.   Timescale placement: Top

Top: 0.25 ⊟   Bottom: 0.25 ⊟   Margin units: Inches

Left: 0.25 ⊟   Right: 0.25 ⊟   ☒ Show timescale/titles on all pages
☐ Repeat group title at page breaks
☐ Mask interior page borders

Resource/Cost profile maximum height: 0.00 ⊟ inches.

Header...   Footer...   Grayscale...

OK   Cancel   Help

Specify page titles, dates, and a revision box, legend, and logo.

View all activities in the PERT view or only the activities currently shown in a Trace logic view.

Page Setup

Print

◉ PERT view   ○ Trace logic view

Page settings

Compress the output to a specific number of pages.

Fit to   0 ⊟ pages wide, and   1 ⊟ pages tall.

Top: 0.00 ⊟   Bottom: 0.00 ⊟   Margin units: Inches

Left: 0.00 ⊟   Right: 0.00 ⊟   ☐ Allow page breaks to split an activity box

☐ Mask interior page borders

Header...   Footer...   Grayscale...

OK   Cancel   Help

For details on printing layouts, see the Printing Layouts, Reports, and Graphics chapter.

When you are satisfied with the preview of your Bar chart or PERT, print it by clicking the Print icon from Print Preview or choosing File, Print. Select a range of pages for printing and the number of copies.

Creating a Resource-Driven Schedule

This chapter describes the process for building a project when the amount of resources you have and their availability are crucial to determining the project end date.

Define a resource plan by building a list of resources needed to accomplish the project goals and assigning these resources to activities. Quickly check whether the schedule requires more resources than are available by producing resource profiles and reviewing them onscreen. If several activities require the same critical resource during the same time interval, you may want to level resources to spread their assignment over time.

Process Overview

The availability and skills of resources heavily drive most projects or parts of projects. Several ongoing projects often compete for the same resources. For example, in the Information Systems industry, "what-if" scenarios are common. "Two software engineers working part-time on design and implementation of a new automated credit-card system need 30 days to complete; but what if they could work full-time on this project?" As a project controls coordinator, you need to constantly monitor resource allocations and schedule deadlines and be ready to reassign resources where they will have the most impact.

The following flow chart shows a typical process for creating a resource-driven schedule.

```
┌──────────────────┐          ┌──────────────────┐
│ Define list of   │          │ Assign resources │
│ resources        │          │ to activities    │
└────────┬─────────┘          └────────┬─────────┘
         │                             │
┌────────▼─────────┐          ┌────────▼─────────┐
│ Set resource unit│          │ Estimate budgets │
│ rate limits      │          │ and rates of use │
└────────┬─────────┘          └────────┬─────────┘
         │                             │
┌────────▼─────────┐          ┌────────▼─────────┐
│ Define resource  │          │ Review resource  │
│ calendars        │          │ profiles         │
└────────┬─────────┘          └────────┬─────────┘
         │                             │
┌────────▼─────────┐          ┌────────▼─────────┐
│ Add activities   │─────────▶│ Level resources  │
│ and relationships│          │                  │
└──────────────────┘          └──────────────────┘
```
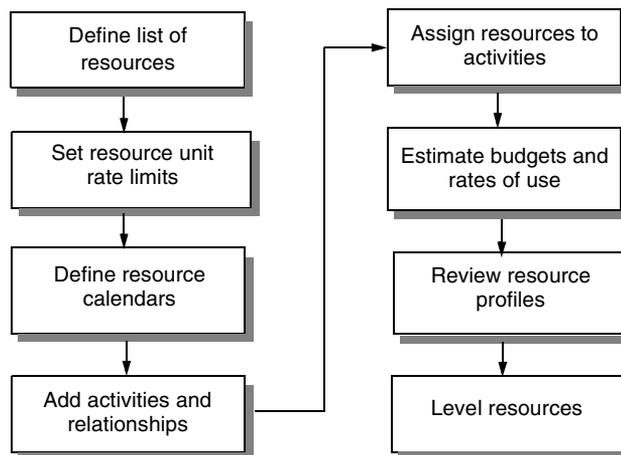
When you work in the type of environment where resources drive the schedule, you should designate resources as "driving," which means that the number of resources assigned to an activity determines its duration. You can also assign unique calendars for each resource that define specific work schedules.

Once the resource list is complete, add activities and designate them as "independent." P3 uses the calendars of driving resources to schedule independent activities. P3 calculates the activity duration from the earliest early start through latest early finish of its assigned resource(s).

Once you have created a resource plan, show onscreen resource profiles to check resource availability. You may need to level some resources to redistribute them across the schedule.

Defining a List of Resources

Anything required to accomplish an activity can be considered a resource—labor, materials, and equipment. Create a list of resources required to accomplish the activities in your project.

Define resources Choose Data, Resources. Click ⊞ and enter a resource name, using up to eight characters.

Double-click the Driving checkbox to make each resource driving.
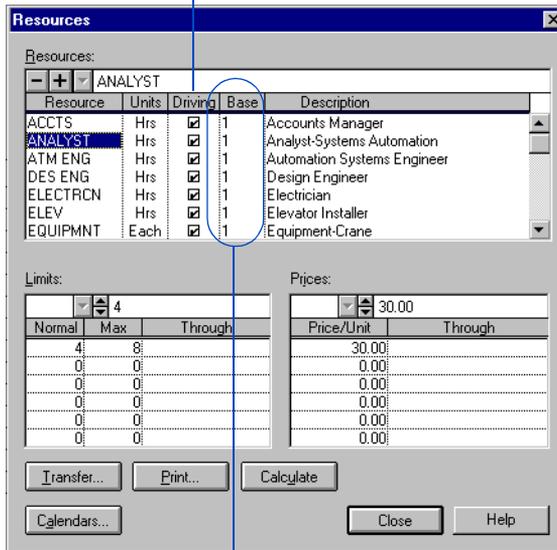
You can also add a resource by clicking the row below the last defined resource.

The Base column identifies the project calendar template for the resource calendar.

Determine a unit of measure   As you are creating the list of resources required for your project, you need to think of how each resource will be allocated; in other words, how will they be measured. Assign days as a unit of measure to allocate resources as whole people (assuming a daily planning unit). For example, when assigning programmers to an activity, specify 2 units to indicate 2 programmers per day. You can also define resource use as person-hours per day. For example, you might specify 16 units to indicate 16 hours of work per day (2 programmers, each working 8 hours a day).

Resources	
Resource	EPG2MEW
Cost Acct/Category	PL1MF2
Driving	☐
Curve	
Units per day	4.00
Budgeted quantity	48.00
Res Lag/Duration	0
Percent complete	
Actual this period	0.00
Actual to date	0.00
To complete	48.00
At completion	48.00
Variance (units)	0.00
Early start	16AUG99
Early finish	13SEP99
Late start	24JAN01
Late finish	20FEB01

Mark E. Wolf's programming time is measured in hours per day; his assignment for this activity is 4 person-hours per day.

The following sections describe how to define resource calendars and limits of availability.

Setting Resource Unit Rate Limits

After you define the list of resources, define availability limits for each resource. You must set limits if you plan to level resources, or if you want to show limits in the resource/cost profiles and tables.

Set resource limits Select a resource from the list, then enter values for the normal and maximum limits. Specify the limits in the same unit used to allocate the resource. The normal limit is the typical availability, while the maximum limit is the highest amount of the resource available at one time.
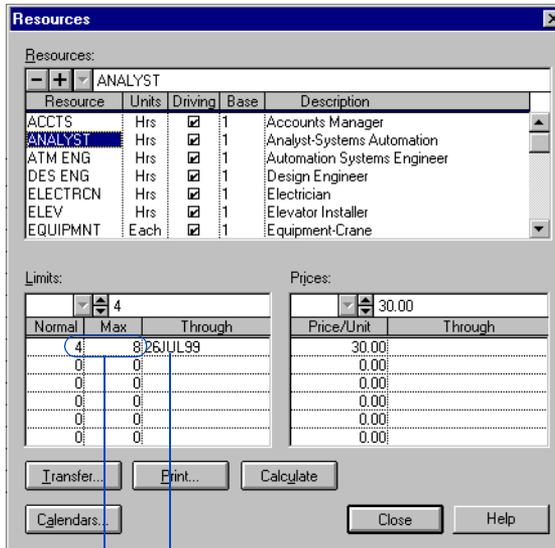
Define a date through which the resource is available. Leave this column blank if the limits apply for the remainder of the project.

The Analyst is usually available 4 hours per day, but can work up to 8.

If you leave resource limits blank, P3 assumes that the resource is available in unlimited amounts through the end of the project.

Defining Resource Calendars

Each resource can have its own unique calendar, so you can accommodate different work schedules for individual people, equipment, and materials. Use resource calendars to indicate personnel information such as vacations, and equipment information such as lease dates.

A resource calendar is a copy of a base (activity) calendar that you modify to indicate a resource's availability. For example, to meet a deadline, the design engineer may have to work Saturdays (normally nonworkdays) for the last month of the project. In this case, associate the Design Engineer resource with an appropriate base calendar, then specify Saturdays in the last month of the project as workday exceptions to that base calendar.

Define resource calendars Choose Data, Resources, then choose Calendars. Select the resource whose calendar you want to define.

1 Click Resource to edit resource calendars.

2 Right-click in the Base Calendar column to change the base calendar for the resource.

3 Specify holidays, vacations, or any other nonworkperiods or exceptions that apply to the selected resource.

Modify the standard workweek The resource calendar inherits the workweek from the base calendar. You should select (or define) the base calendar that most closely matches the standard workweek for the resource. However, if a resource uses a different workweek than specified in the base calendar, click Standard from the Calendars dialog box, then clear the Use Base Calendar Standard Workweek checkbox and mark the appropriate workdays.

Any changes you make to a resource calendar do not affect the base calendar.

Adding Activities and Relationships

After you define the resources for your project and set up the resource calendars, add the necessary activities to your project and designate them as "independent" activities. In an independent activity, resources work according to their own resource calendars and for their own durations. P3 schedules an independent activity according to predecessor logic and the times its resources are scheduled to work.

For details on adding activities, see the *Creating a Basic Task-Driven Schedule* chapter.

Define an independent activity Use the Type field in the Activity form to designate an activity as independent. In PERT, P3 automatically displays the Activity form for each activity you add.

Double-click a blank area or choose Insert, Activity to add an activity in PERT.
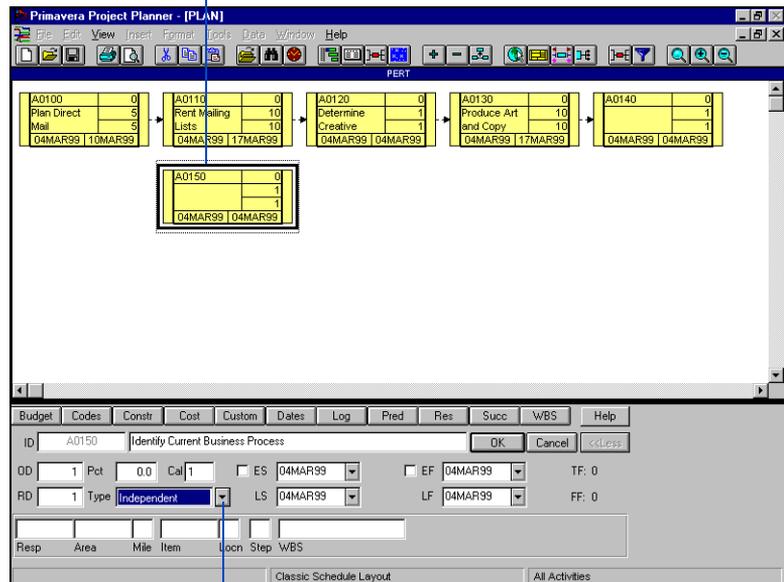
You can automatically display the Activity form as you add activities in the Bar chart. Choose Tools, Options, Activity Inserting, then mark the Use Activity Form checkbox.

Click the Type field, then click ▼ *and choose Independent as the activity type.*

You needn't estimate activity durations, because P3 will automatically calculate them once you allocate the necessary driving resources.

Creating Meeting Activities

In a resource-driven schedule, you can also designate an activity as a "meeting" activity. Meeting activities require that all resources work together simultaneously to complete the work. They are useful to schedule meetings and any activities where resources cannot work independently.

For example, in a factory relocation project, heavy-equipment resources and a crew resource must be onsite at the same time for 1 week. Both the equipment and the crew resources are driving—the activity's duration depends on their work. If you define this activity as a meeting activity, P3 schedules it only when both the equipment and the crew are available for the same 1-week time-period. P3 schedules any nondriving resources, such as an inspector, according to the combined calendars of the crew and equipment—the conglomerate of the driving resources' calendars.

For more details on how to assign relationships, see the Creating a Basic Task-Driven Schedule chapter.

Link activities with relationships You can connect several activities at once in the Bar chart using the Edit, Link Activities command. This command automatically defines finish to start relationships between selected activities. Select the activities you want to connect, then choose Edit, Link Activities. P3 adds a relationship from the finish of each activity to the start of the next activity in the group.

Select the activities you want to connect. If the activities are contiguous, click the first activity, then drag the mouse until you reach the last activity. If the activities you want to connect are not contiguous, press and hold the Ctrl key while you click each activity.

Use the Edit, Unlink Activities command to delete finish to start relationships from a group of activities.
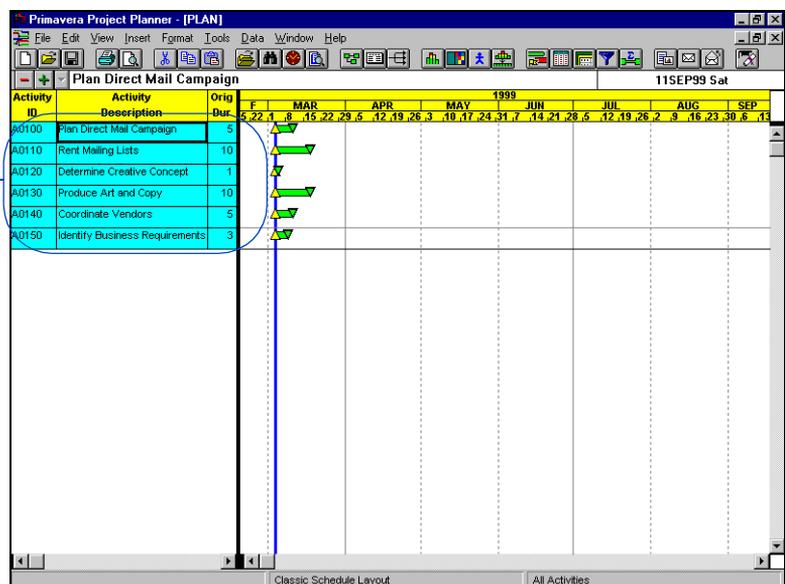
Assigning Resources to Activities

As you add activities, assign the necessary resources. When assigning driving resources, enter the total effort required (budget) and the number of units per timeperiod for the resource. P3 calculates a duration for each resource based on the amounts you enter. For example, if you budget 20 hours of work at 4 hours per day, it will take five days to complete.

Assign resources Select one or more activity(ies) in the Activity columns, then choose Insert, Resource Assignment.

When a resource is defined as driving in the Resource Dictionary, P3 automatically marks this checkbox.

1 Click to select a resource name.

2 Optionally select (or enter a new) cost account and category to track quantities and costs for the resource.

3 Enter the total budget quantity necessary to complete the task and the units per timeperiod the selected resource can devote to the task.

Click Insert to assign the selected resource to the activity(ies). Close the Insert Resource Assignment dialog box.

For details on establishing a Resource Dictionary, see the Planning Resources and Costs chapter in the Reference manual.

When specifying the number of units, make sure you use the same units defined for the resource in the Resource Dictionary. For example, if the dictionary defines programmers in terms of person-hours per day, specify the number of units for programmers in hours per day. You can also express resource units as person-days per day, quantities of material to be installed per day (such as linear feet), or any other type of unit. The sample projects, APEX and SWDV, show units assigned in hours per day.

When you enter both quantity and units per timeperiod, and are assigning a driving resource (mark the This is a Driving Resource checkbox), P3 calculates a resource duration automatically. This is the only case in which P3 calculates the resource duration.

For details on calculating a schedule, see the *Creating a Basic Task-Driven Schedule* chapter.

Calculate the schedule After you establish the project and assign resources, calculate the schedule to determine schedule dates and distribute resources. Press F9 or choose Tools, Schedule.

Review resource data Open the Resources form to review other resource data, including the early and late start and finish dates for each activity. Right-click an activity, then choose Activity Detail, Resources.

When you include a resource column in the layout, all resources assigned to each activity are shown individually in the column cell.
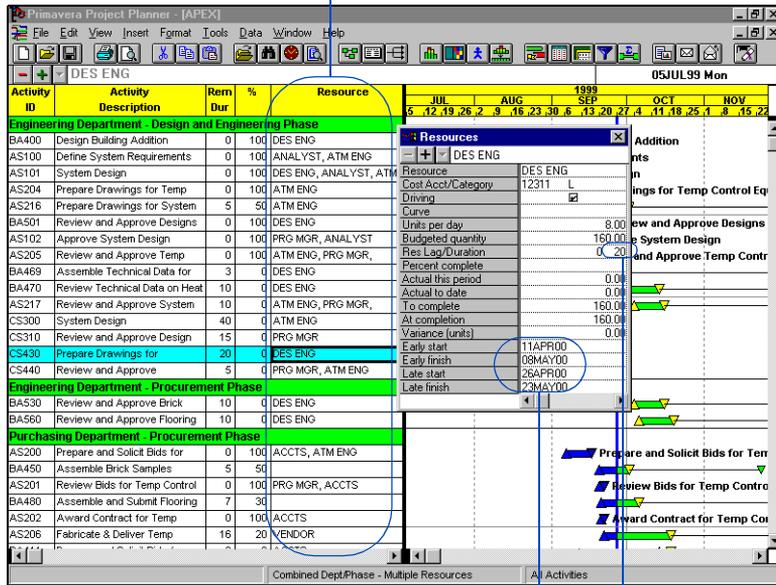
P3 calculates dates and a duration for each resource.

Scheduling with Resource Calendars

When you assign driving resources to an independent activity, P3 only schedules work to occur when the resources are available. P3 calculates dates and a duration for each resource according to its own calendar. P3 then calculates the activity dates as the earliest early start and latest early finish of all assigned resources. The activity original and remaining durations are calculated in workperiods as the difference between the early start and early finish of the resources, based on the assigned activity calendar.

For example, suppose two writers are working on a rough draft. Each writer works according to his or her own calendar; both writers are not always working simultaneously.

The following layout shows the dates and durations for each writer (each a driving resource) and the independent activity to which they are assigned. The technical writer works on a 5-day workweek and is budgeted 10 days. The contractor works on a 3-day workweek with a budget of 7 days. The resource bar indicates when each writer is scheduled to work on the activity. The necking (indenting) of the bar reflects weekends for each resource. The activity starts on June 2, the earliest early start for both writers, and spans the durations of both resources, finishing on June 16—the early finish for the contractor. P3 calculates the duration for the activity as 11 days, the difference in workperiods between these dates based on the base calendar for Activity 100, which is a 5-day workweek.
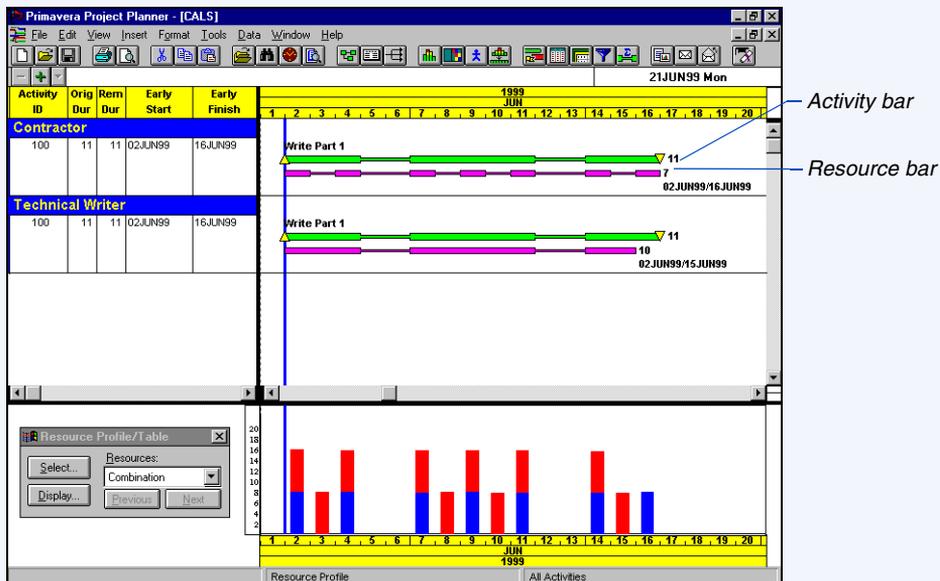
Reviewing Resource Profiles

Quickly check whether the schedule requires more resources than are available by producing resource profiles and viewing them onscreen. If a profile shows that some activities need more resources than are available, you may want to level resources to redistribute them across the schedule.

Display a resource profile Choose View, Resource Profile, to divide the Bar chart into two panes; the top pane shows the activity schedule and the bottom pane enables you to customize a resource profile. P3 displays a profile for the first resource in the Resource Dictionary.
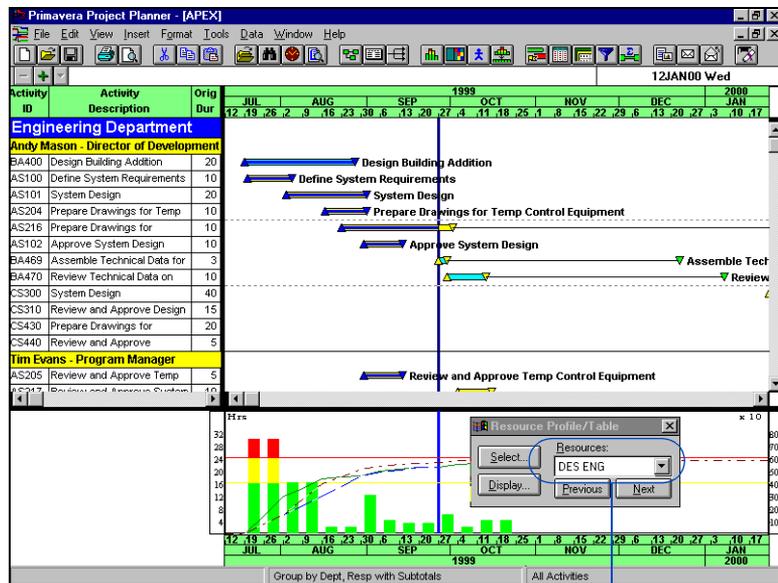
To close the resource profile, click the Resource Profile icon on the toolbar.

To profile use for another resource, select a resource, or click Previous or Next to view a profile for the previous or next resource in the list.

The resource profile uses the same timescale as the Bar chart so you can examine the activity schedule and corresponding usage. Use the horizontal scroll bar for the Bar chart to move both the activity and resource bars (histogram) into future or past timeperiods.

Customize profile options Click Display from the Resource Profile/Table dialog box.

Analyze resource use based on early or late schedule dates.

Show use for all activities or only activities currently selected (highlighted) in the Activity columns.

Resource Profile Display Options

Display

Type:
- ● Units
- ○ Costs

Dates:
- ● Early
- ○ Late

Activities:
- ● All
- ○ Selected

Time interval:
Weeks

☒ Histogram
☒ Curves

☐ Exclude actual to date from current estimate

Histogram

Calculate:
- ○ Total
- ● Peak
- ○ Average

Format:
- ○ Area
- ● Bar

Values:
- ● Current estimate
- ○ Earned value
- ○ Planned value

Calendar:
<Blank>

☒ Draw limits
☒ Emphasize overload with color

Curves

☒ Current estimate   ☒ Earned value   ☒ Planned value

☒ Show curves using different line types

Close   Help

Expand or compress the timescale of a resource by adjusting the timescale on the Bar chart. For example, when you show use per day, you may want to stretch the timescale.

Choose time intervals and values for resource use In the preceding resource profile, the peak usage for each week is shown for the Design Engineer (DES ENG). When the time interval is the same as the planning unit for the project, you can compare the total scheduled resource use per timeperiod to the normal and maximum availability limits, using color or limit lines. When reporting on a time interval that is greater than the project's planning unit, you can compare peak or average use.

Emphasize resource overloads If you mark the Emphasize Overload With Color checkbox, the bar color changes as resource use exceeds the limits.

Resource use is above the maximum limits of availability.

P3 uses the following colors to indicate areas of availability: green for use within availability, yellow for use above the normal limit, but below the maximum, and red for use above the maximum limits. Choose Format, Screen Colors to use a different coloring scheme.

Maximum limit

Normal limit

Resource use is within availability.

Resource use exceeded the normal limit but is still within the maximum.
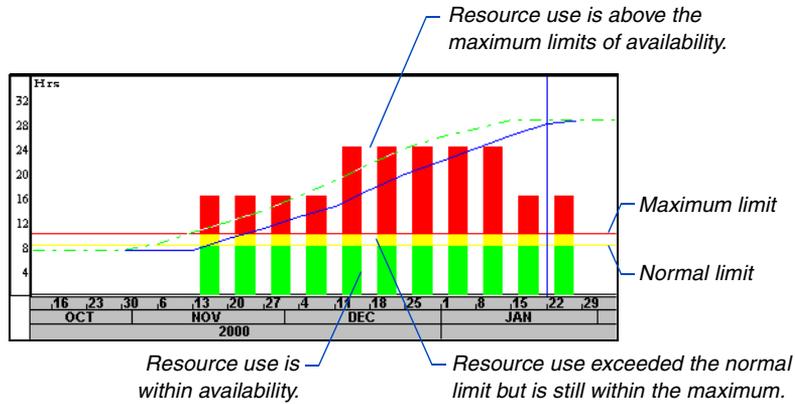
Stack resources You can profile more than one resource at the same time. Different color bars, indicating the use per timeperiod for each resource, appear "stacked" above one another. Display the specific data value for an individual resource bar by clicking anywhere on that bar. P3 displays each resource's name, color, and value for that time interval.

Each resource bar represents use for three different resources.
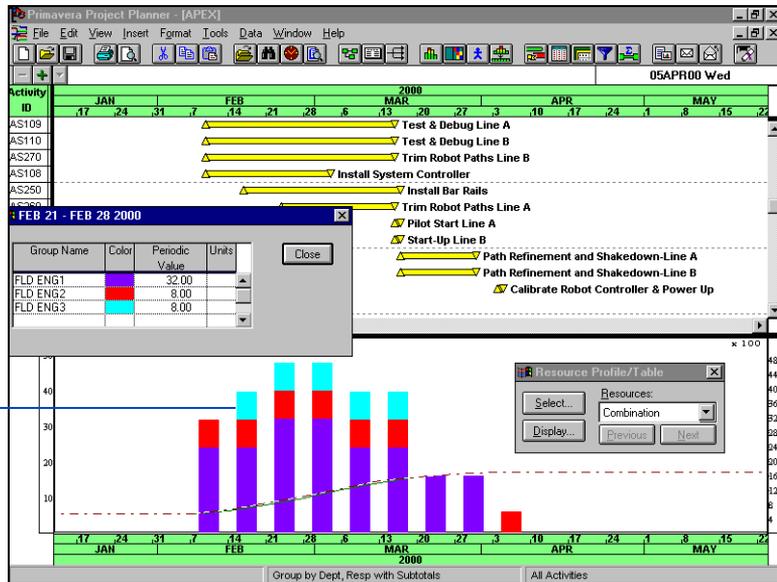
Click the Select button in the Resource Profile/Table options box to choose the resources you want to profile.
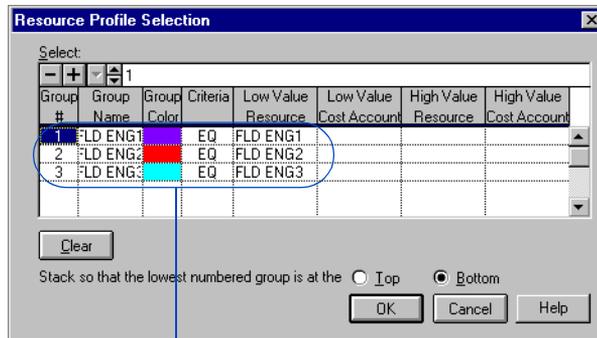
To stack resources, assign a unique group number
and color for each resource selection.

Group resource use into one bar by assigning each line of resource
selection to the same group number and color. Designate a name
for the group using the Group Name column. For example, you may
want to show Programmer 1, Programmer 2, and Programmer 3
grouped into one bar called "Programmers," and Tester 1, Tester 2,
and Tester 3 combined in another bar entitled "Testers."

You can select resources and/or cost accounts to profile. Use the
High Value columns only when you are specifying a range (with the
WR and NR criteria codes.) P3 bases resource selections on all
activities included in the view; however, you can also base the
selections on only activities currently selected (highlighted) in the
Activity columns. Click Display, then choose Selected Activities.

Leveling Resources

If resource profiles show that some activities need more resources than are available, use P3's leveling feature to redistribute critical resources across the schedule. Resource leveling compares the allocation of resources to availability and delays certain activities (and sometimes the project) to remain within these limits. Resource leveling does not change activity durations or resource requirements; it can, however, delay schedule dates.
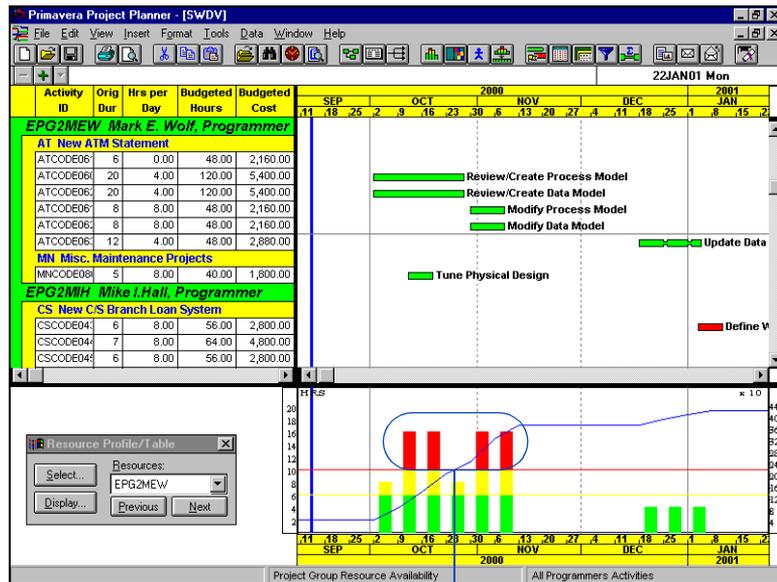
When analyzing resource profiles with the schedule, run a filter that selects only the activities that use the resource you want to examine.

The programmer, Mark Wolf, is overallocated during October and November.
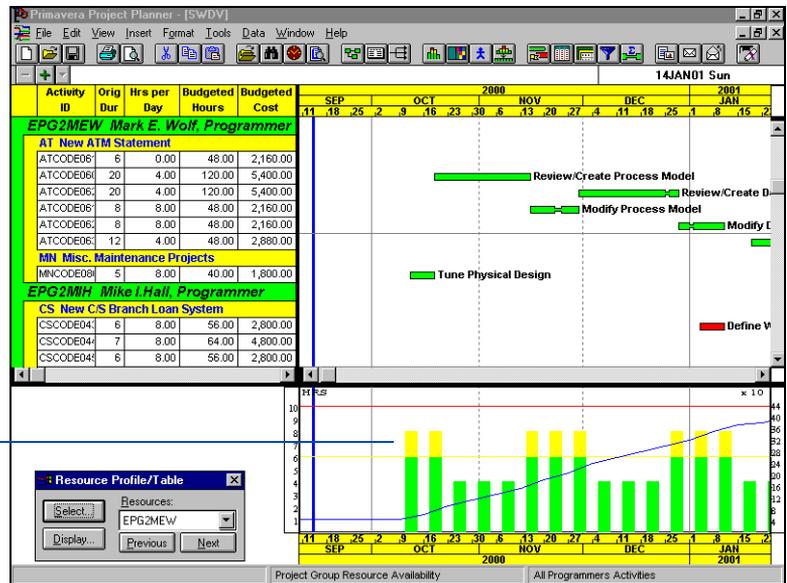
Leveling eliminates the spikes of resource use and brings use below the maximum limit by moving some activities into December and January.

During leveling, P3 reschedules activities whose combined resource needs exceed the availability limits defined in the Resource Dictionary. Before P3 can reschedule an activity, however, all its predecessors must be completed, and all the necessary resources for the activity must be available for the entire duration of the activity. P3 delays the activity until both requirements are satisfied.

Level resources Choose Tools, Level. P3 provides several options for resource leveling.

Specify how you want to prioritize activities for leveling.

Enter a report series code to produce additional reports when leveling.

Level the entire project or specify a cutoff date to level within a particular date range.

Select a filter to level only certain activities in a project.
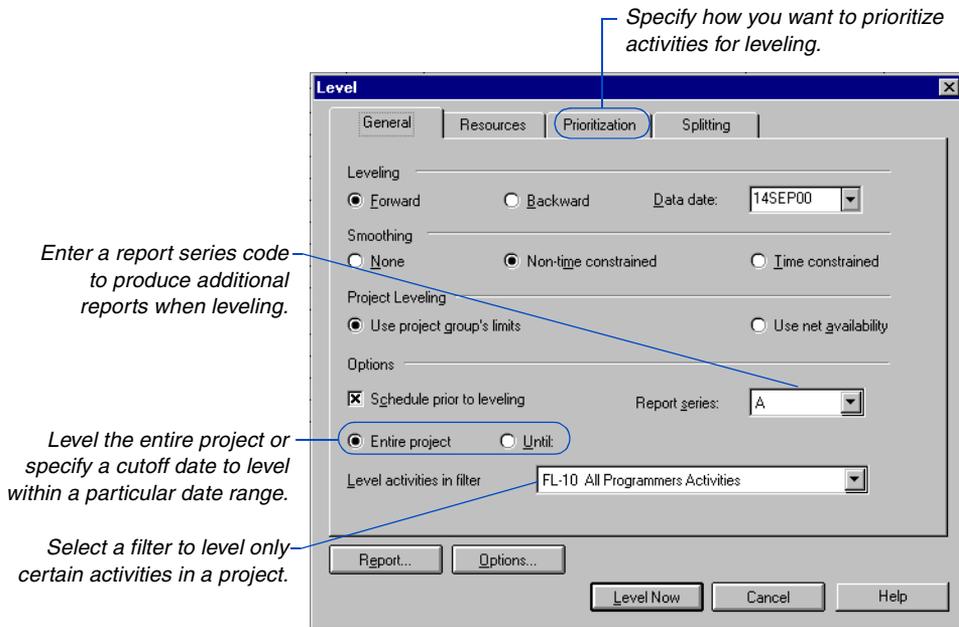
Level automatically If you turn on automatic resource leveling in the Schedule/Level Calculation Options dialog box (click Options in the Level dialog box), P3 levels each time you schedule your project or each time you modify data that affect leveling, such as when you add, change, or delete a resource, calendar, or relationship.
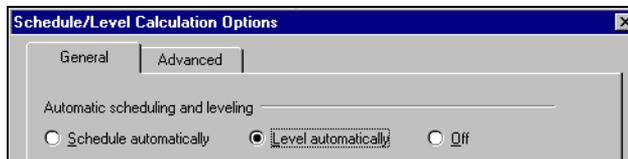
After leveling resources, the leveled dates replace the current schedule dates for the project. If you calculate the schedule and do not level, P3 replaces leveled dates with the schedule dates without the effects of leveling.

Select the resources to level Click the Resources tab to specify the resources you want to level; select the ones that are most critical to your project schedule.

Click to automatically enter the first 500 resources from the Resource Dictionary.

You can only level resources for which normal and maximum availability limits are defined in the Resource Dictionary.

Level dialog box with tabs: General, Resources, Prioritization, Splitting.

Level these resources:

Resource	Description	Units
EPG2MEW	Mark E. Wolf, Programmer	HRS

All Resources
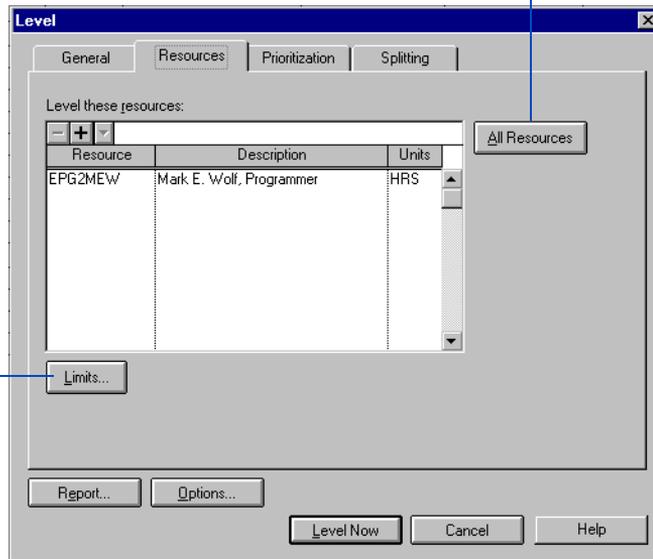
Accesses the Resource Dictionary so you can revise the normal and maximum limits

Limits...

Report... | Options...

Level Now | Cancel | Help

You can specify whether P3 levels forward or backward. P3 normally levels activities according to their early schedule dates, starting with the first activity with no predecessors and continuing to the last activity in the network; this is called forward leveling. P3 can also perform backward leveling, in which activities are leveled using their late schedule dates. In a backward-leveled schedule you can see the latest possible dates for activities without exceeding resource availability. When you backward level, P3 moves activities forward in time instead of delaying them.

Produce a leveling analysis report Click Report to specify whether to produce a leveling analysis report. When you choose to produce this report, you can also specify the activities to include and a date range.

Use the Tools, Tabular Reports, Production command to assign series codes to reports.

When you level a project, you can also produce additional reports, such as a tabular schedule, to examine the effects of leveling on the entire schedule. Specify a report series code in the Reports Series field in the General tab of the Level dialog box.

Smooth resources Choose Nontime Constrained or Time Constrained on the General tab to smooth resources based on time or resource constraints. Nontime constrained, or resource smoothing, uses positive float to minimize sharp changes in resource use. During nontime-constrained smoothing, P3 makes several attempts to schedule an activity within the maximum availability limit of the resource, thereby reducing the possibility of delays. When time is more important than resource availability, time-constrained resource smoothing automatically doubles the maximum resource limit in an attempt to schedule the activity without delays.

Resource leveling helps you evaluate options; it does not produce optimal solutions. Rather than accept the results of any leveling run at face value, you should consider alternatives. For example, repeat the leveling steps using different levels of availability and different priority codes. You may also want to reassign resources to key activities or apply constraints to activities after leveling. Remember, you can always modify network logic and then reschedule and relevel the project to see the impact of other approaches.

Broaden the resource pool Suppose the available amount of a resource is insufficient to perform the assigned activities. One alternative is to use another available resource with comparable qualifications. For example, assume that hardware assembly specialists and hardware testers are equally skilled to perform the same tasks. You can create a structure for resources in P3 that lets you select, organize, level, and report on broad categories, called hierarchical resources.

Use hierarchical resources to combine groups of similar resources and level them as one resource. For example, in the resource-leveling case discussed previously, the programmer was overloaded. Yet, other programmers may be able to perform some of the work, which may reduce the amount of delay to the project.

This resource represents all categories of programmers.
The asterisk, which must be specified as the last character
of the hierarchical resource, is used as a "wildcard."

Level				
General	Resources	Prioritization	Splitting	

Level these resources:

− + ▼ EPG*   All Resources

Resource	Description	Units
EDC2LAH	Linda A. Hayes, Writer	HRS
EDC2ROR	Rob O. Roy, Writer	HRS
EDC3*	Jr. Doc. Writer - Employee	HRS
EDC3ARB	Allen R. Banks, Jr. Writer	HRS
EPG*	All Programmers - Employee	HRS
EPG1*	Sr. Programmer - Employee	HRS
EPG1CTM	Conrad T. Mayer, Sr. Programmer	HRS
EPG1RAW	Rob A. White, Sr. Programmer	HRS
EPG1TOC	Thomas O. Cummins, Sr. Programmer	HRS
EPG2*	Programmer - Employee	HRS

Limits...

Report...   Options...

Level Now   Cancel   Help

When leveling on EPG*,
P3 considers all
programmers inter-
changeably.

Hierarchical resources are also useful for creating and reporting broad categories of resources when preparing proposals or studying the feasibility of a long-term project.

Splitting, Stretching, and Crunching

When you level resources, P3 delays or advances each activity until sufficient resources are available. P3 provides three additional leveling techniques to ensure that resource demand does not exceed resource availability.

Splitting: P3 can split activities into segments that work around periods of low resource availability. P3 can schedule an activity to begin when the required resources are available, suspend work if the resource supply becomes too low, and resume work when sufficient resources are available again.

Stretching: P3 can reduce resource requirements during some workperiods, stretching an activity's duration. This technique is available only for independent activities.

Crunching: P3 can shorten activity durations by taking advantage of abundant resources. For example, suppose the duration of an activity is six eight-hour days. If the programmer assigned to this activity can work 12-hour days, the activity can be crunched to be completed in four 12-hour days. This technique is available only for independent activities.

Specify these leveling techniques on an activity-by-activity basis. Use the Constraints form, the Activity columns, or Global change to specify a leveling technique other than Normal.

To set global options for splitting, stretching, and crunching, choose Tools, Level, then click the Splitting tab.
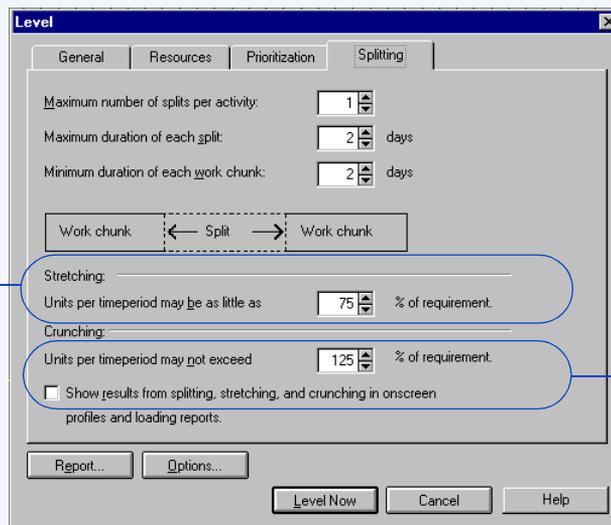
Specify the minimum usable percentage of a resource's units per timeperiod.

Specify the maximum usable percentage of a resource's units per timeperiod. P3 does not exceed the maximum availability limit set in the Resource Dictionary.

Estimating Costs

This chapter describes how to complete the project plan by estimating costs.

Base the budget on detailed estimates of the amounts of labor, materials, and other resources required to complete each activity. Obtain estimates from historical data and/or labor rates and vendor quotes. Assign each budget to a unit of work that has a scheduled start and finish, a measurable goal, and a responsible manager in the organization. Set up a cost account structure and assign codes to activities and/or resources to track costs.

Setting Up a Cost Account Structure

A cost account structure is essential for measuring the amount of work accomplished against the amount of money spent. Each cost account should identify a project component and the person responsible for completing that component. Then, if a cost report shows a variance, you can quickly identify the responsible person.

In the sample project, APEX, a detailed cost account structure is based on the work breakdown structure (WBS) and responsibilities. Each cost account consists of four parts: the project group name, the project name, the project component, and the responsible manager. For example, in cost account 11233, the first 1 identifies the project group name (APEX), the second 1 indicates the Robotics Automation System, 2.3 represents a project component (2 indicates hardware and 2.3 represents the system controller, a subcomponent), and the final 3 indicates the Director of Hardware Engineering, Tom Mills.

Establish a cost account structure Choose Data, Cost Accounts.

Create one-character codes to categorize the type of cost.
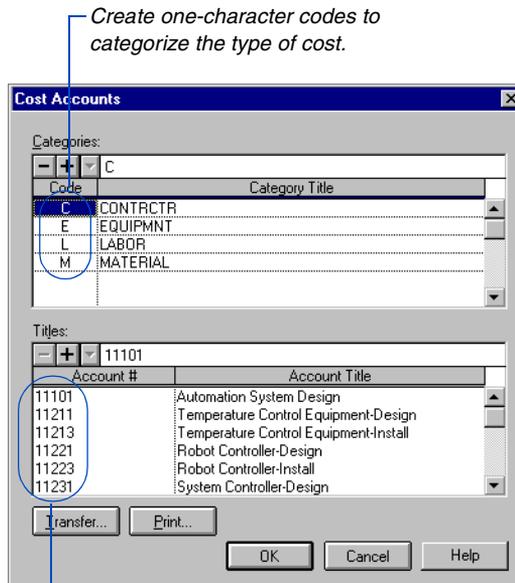
When you create a new project that is similar to an existing one, save time by using the Transfer button to copy the Cost Accounts Dictionary from the existing project.

Cost account numbers can contain up to 12 characters.

Roll up costs Name your cost accounts in a way that will enable you to roll up costs and analyze performance at varying levels of detail. Use wildcards (question marks) in a cost account selection when you want to roll up costs.

Create an onscreen cost table to show the monthly total of all costs for each project.

Click Select in the Resource Profile/Table options box to create a cost table that shows rolled-up costs. The preceding cost table was created by rolling up cost accounts that begin with 11, 12, and 13.

The first 1 indicates the project group APEX and the 1, 2, and 3 in the second position represent each project. Question marks indicate wildcards.

Assigning Cost Accounts

Once you establish a cost account structure, assign cost accounts and their associated budgets to each activity. Use the Budget Summary form to enter and review quantities and costs for each resource/cost account at the same time. The Budget Summary form also provides a total of all units and costs for the selected activity.

Cost account

You must enter the cost category in the last (12th) position of the cost account.

You can also use the Cost form or the Activity columns to assign cost accounts to activities.

You can associate a cost account with each resource to track quantities and costs. To track only cost data, assign cost accounts to activities without resources.

If you enter a cost account that is not defined in the Cost Accounts Dictionary, P3 prompts you to add it to the dictionary and assign a title to it.

Defining Unit Prices

You can let P3 automatically calculate budgeted costs based on resource quantities, provided you entered unit prices in the Resource Dictionary.

Enter unit costs for the selected resource.

When estimating budgets, you may want to experiment with varying rates and dates. You can revise the price per unit and click Calculate to apply the new cost.

For each resource, define a unit cost and indicate increases or changes through six successive time intervals. Leave the Through column blank to apply the adjacent cost for the remainder of the project. For example, in the preceding example, the Automation Systems Analyst costs $30 per hour from the start of the project through 23JUL00. Due to schedule constraints, this resource must work overtime for a 3-day period, during which time wages increase to $45 per hour. P3 automatically adjusts the resource's costs for its assigned activities to reflect the price change during this timeperiod.

For details about automatic costing, see the *Tracking Resources and Costs* chapter in the *Reference* manual.

If you prefer to assign budgets yourself, choose Tools, Options, Autocost Rules and clear the checkboxes for the rules: When Quantities Change, Use Current Unit Prices to Recompute Costs, and Use the Update Percent Complete Against Budget to Estimate.

Reviewing Cash Flow

After you assign budgets to cost accounts, you will probably want to analyze cash flow for the entire project. P3 provides several ways to review the budget. Examine a time-phased spending plan using a cost table or profile.

The profiles show the total estimated costs at completion for each month.
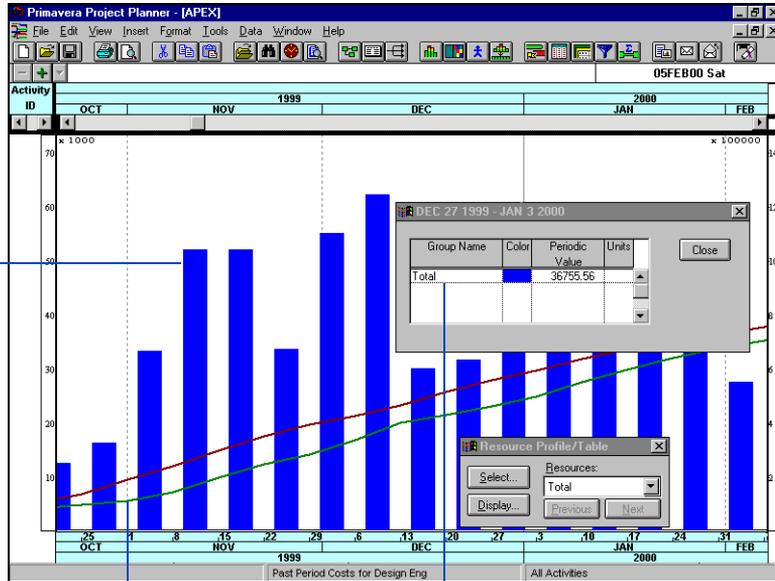
Three different curves show the accumulated current estimate, earned value, and scheduled budget costs.

Click any bar to show detailed values for that timeperiod.

Right-click on any curve to display cumulative values for the corresponding timeperiod.

Expand or compress the timescale by adjusting the Bar chart timescale at the top of the display.
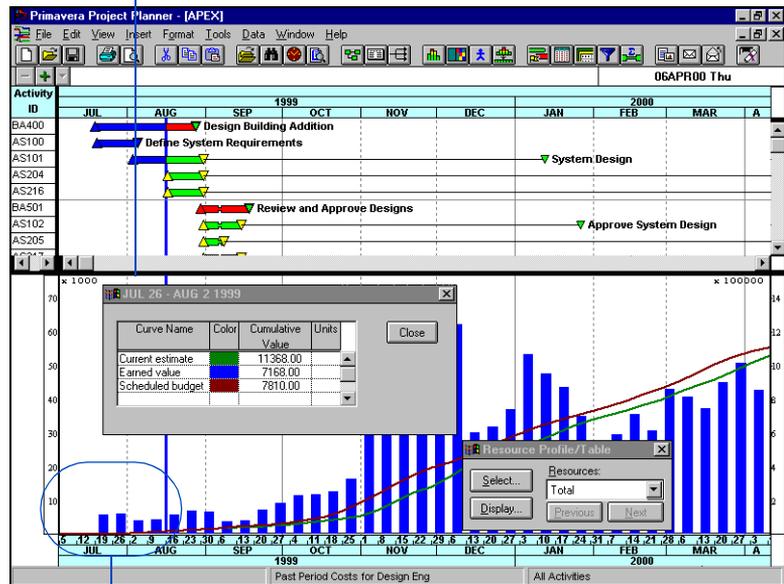
Quantities, costs, and earned values for update periods before the data date can also be analyzed if you store period performance.

When you combine a histogram and curve on the same display, the left Y axis displays the scale of values for the histogram, while the right Y axis applies to the cumulative curve. Follow these steps to create a cost profile and curve of total costs:

1   Choose View, Resource Profile.

Adjust the size of the resource profile pane to the height you want by dragging the horizontal split bar.

2   Click ▾ in the Resource Profile/Table dialog box, scroll to the bottom of the Resources list, and choose Total.

Choosing Total displays costs associated with all resources. To include costs that may not be associated with any resource (that is, assigned only to a cost account), click Select and specify wildcards in every position of the Cost Account field (????????????).

3   Click Display from the Resource Profile/Table dialog box.

Choose Costs.

Choose a monthly time interval.

Configure the profile to show total estimated costs using a bar format.

Show up to three curves to reflect current estimate, earned value, and scheduled budget costs.

Choose different line types to identify each curve; by default, P3 draws the current estimate as a solid line, the earned value as a dashed line, and the scheduled budget as a dash-dotted line.
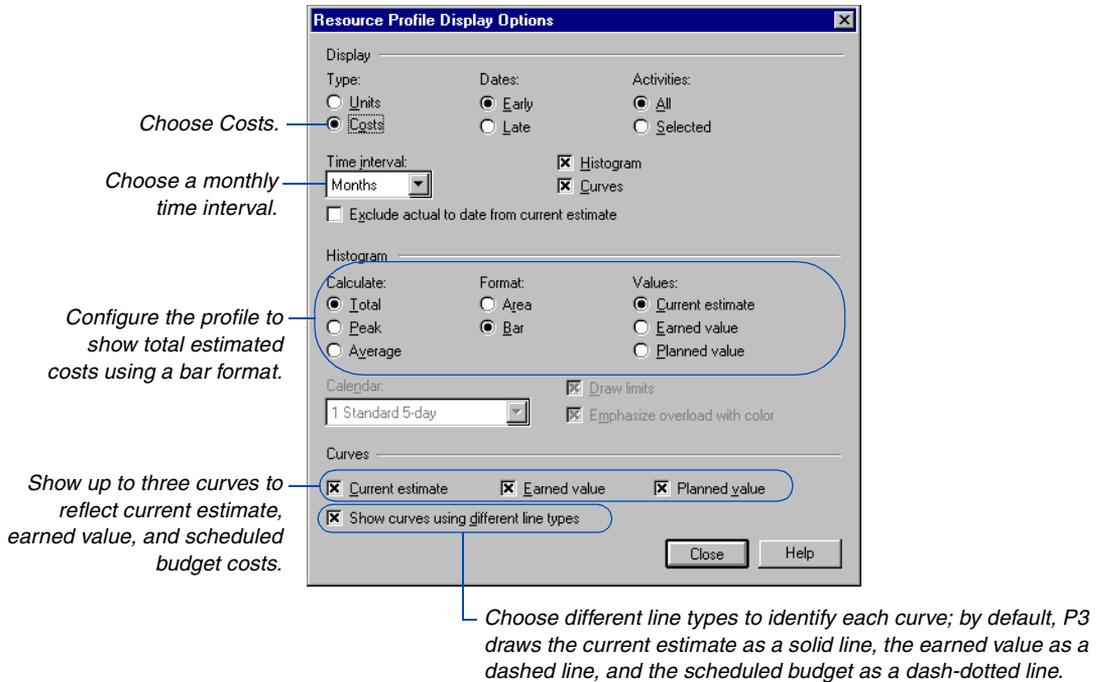
Review rolled-up costs You may also want to break down costs by project component or responsible manager. Use specific cost account selections and wildcards to roll up or detail costs when you create a cost table or histogram.

These selections were used to create the corresponding cost table.
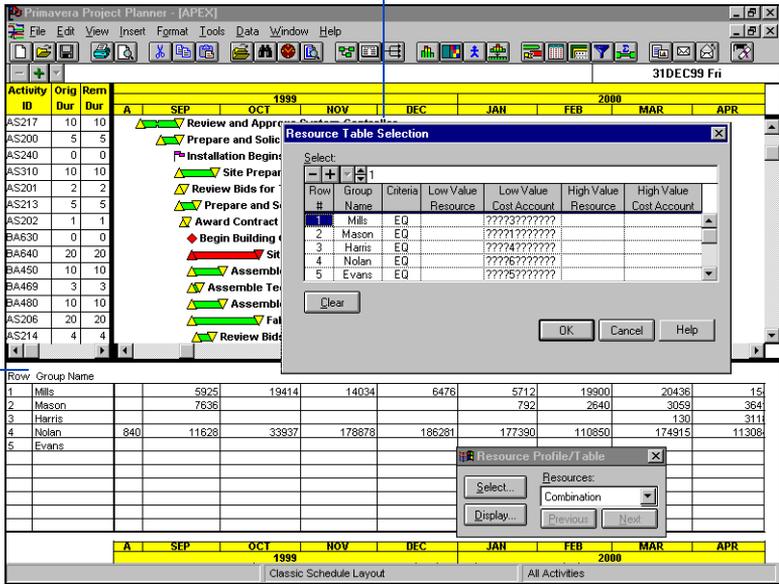
This cost table rolls up costs per month by responsible manager.
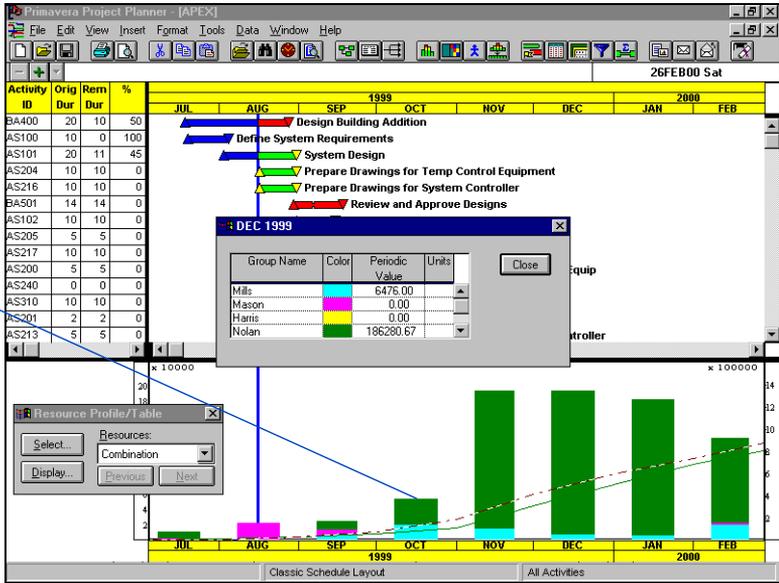
You can quickly display a cost histogram that shows color-coded bars for each manager's monthly costs. You need not respecify the selection criteria—P3 uses the criteria you specified for the resource/cost table.

P3 combines cost graphics with the Bar chart so you can review costs and schedule dates at the same time. Remember, you can print the cost histograms and tables you customize, together with your Bar chart, using the File, Print command.

Group by cost account When you need to monitor spending
more closely, you can detail the costs for each activity by cost
account. Customize the Activity columns to include columns for cost
data, such as budgeted cost, cost to complete, and forecasted
costs. Group the Bar chart by cost account to show an organized,
detailed listing.

*Double-click any group title
band to summarize the
cost data.*

*Show subtotals for
each cost account.*

Adjusting and Refining the Schedule

In this part: **Building Additional Data Structures**

                                      Refining the Schedule

*T*his part of the *Planning and Control Guide* discusses how to structure your project data so you can organize it in different ways. Create a work breakdown structure, add more project and activity codes, set up activity ID codes, and define custom data items. This part also describes how to adjust the schedule by modifying the work calendars, impose constraints to lock activities to specific dates, and rearrange the sequence of activities.

Building Additional Data Structures

P3 provides methods for organizing data in ways that are most meaningful and useful for managing your projects.

Use a work breakdown structure (WBS) to organize data into a hierarchy of work to be accomplished. Use project codes to organize the member projects in a project group according to specific categories, such as location and manager. Use activity codes to categorize work into groups, such as phase and responsibility. Custom data items enable you to expand the project database. Create and track additional items for activities and resources/costs. Use these items as another means for organizing data.

You can define these structures during early project planning or you can create a minimal schedule to get started and later refine the coding for additional analysis and reporting capabilities.

Creating a Work Breakdown Structure

After you define the scope of your project, create a work breakdown structure (WBS) to define and organize the project elements so you can clearly identify the deliverables and report and summarize schedule and cost data at different levels of detail. Graphically portrayed as a tree, a WBS is created by establishing a hierarchy of work to be accomplished, beginning with the end-product at the top and subdividing in successive levels down to individual activity tasks at the bottom. You can collect data from any level to satisfy the needs of management and clients.

For details on creating an outline of your project, see the *Organizing Data* chapter.

Use P3 to create an outline of your project based on its WBS. Using this outline, you can roll up to a higher (more general) level to summarize data, or expand down the tree to show more detail. You can also include columns for target data so you can compare the current schedule to the plan.

WBS level band

Each WBS level is indented.
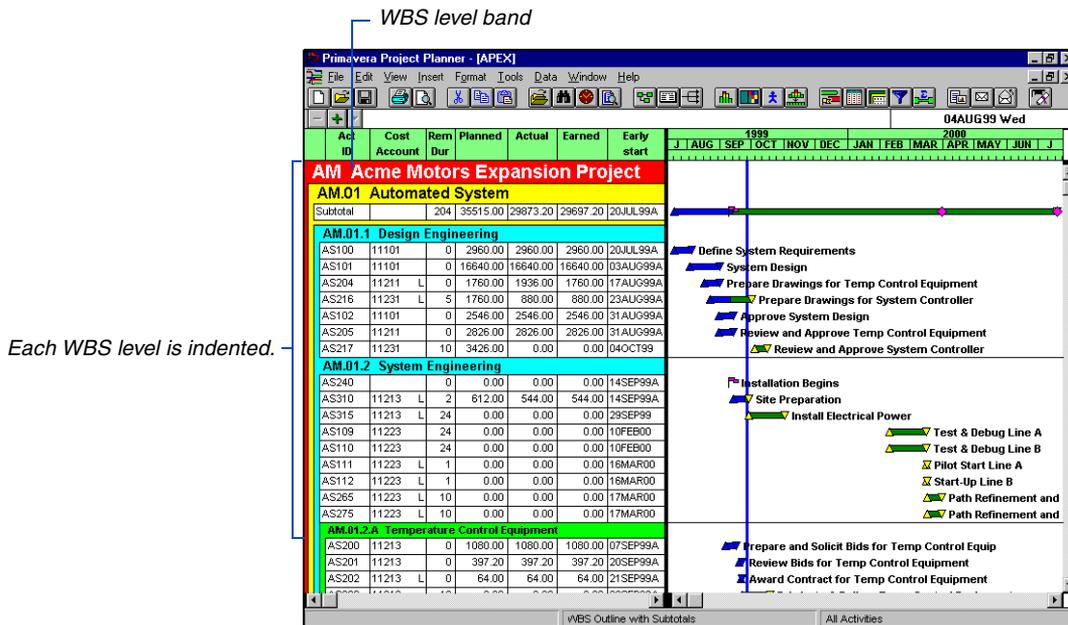
Divide the work To create a WBS for a project, first divide the work into major components. For example, the sample plant expansion project provided with P3, APEX, consists of three major components: a Robotics Automation System, a Conveyor System, and the Office Building Expansion. Once you identify the major elements, list the subcomponents. Continue dividing each subcomponent into succeeding levels of detail until you reach a manageable single-task level.

Next develop a hierarchical coding system that corresponds to each level and component. Assign these WBS codes to activities so you can easily track each component. For example, in the sample project APEX, "AM" represents the highest level—the entire project. At the next level, AM.01, AM.02, and AM.03 identify the three major project components. The periods in these codes act as separators to distinguish between levels; you can also use other characters, such as commas or dashes.
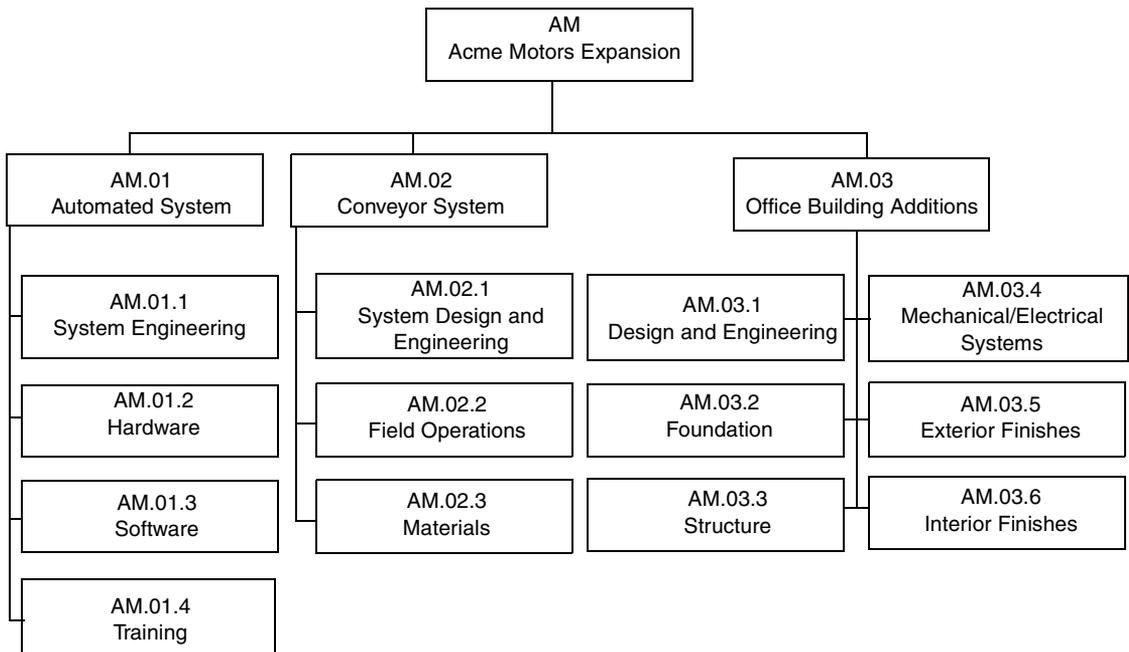
Create a WBS Dictionary Use the WBS Dictionary in P3 to enter the codes and titles for components in your work breakdown structure. Define up to 20 levels, using a total of 48 characters for the codes. Choose Data, WBS.

Each level in the WBS Dictionary is indented to show the work hierarchy.
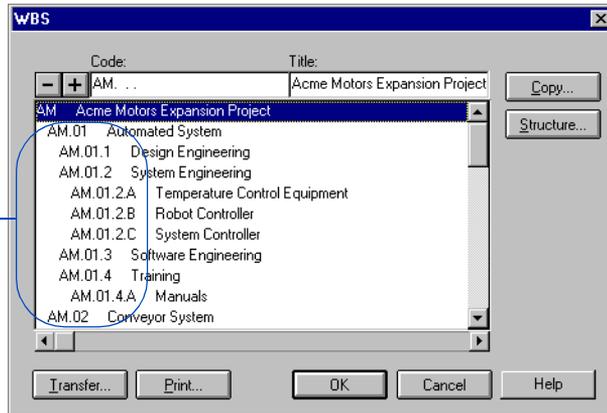
Before you begin entering WBS codes and titles, click Structure to define the number of characters per level and the character to be used as a separator. The total number of characters for all levels cannot exceed 48.

Use the Width field to enter the number of characters you want in that level, where Level 1 is the highest level.
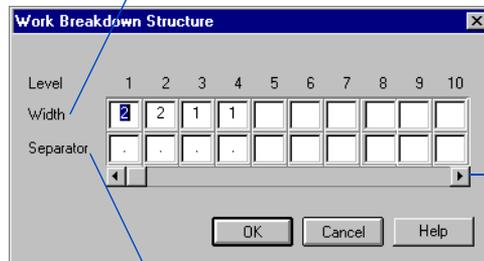
If you need to define more than the 10 levels shown, scroll to Levels 11 through 20.

In each Separator field, enter a character to separate the levels in your WBS codes.

Define WBS codes and titles After you establish a structure, enter the WBS codes and titles that outline your project. Use numbers, letters, or a combination of both.

Click to add a new code and title.
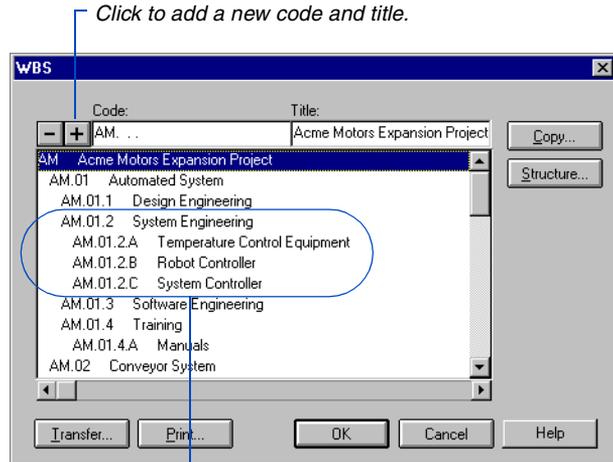
A group of codes that contain the same values for one or more levels makes up a branch.

If you enter the lowest-level WBS code first, P3 automatically adds codes for the higher levels in that branch. For example, entering 1.A.1.1 first also creates the codes 1, 1.A, and 1.A.1.

Continue entering new codes in any order; P3 automatically sorts them after each entry. If your project contains multiple branches, copy them to save time: point to the first code of the branch you want to copy, then click Copy. P3 prompts you to enter a unique code. P3 duplicates and renames each code in the branch so you need only modify titles.

Assign WBS codes to activities Use the Activity or WBS form to assign WBS codes to activities. Choose View, Activity Form to keep the form open for each activity you select.

Click the WBS field, then click ▼ to display a list of codes contained in the WBS Dictionary.

Click Next to automatically select the next activity in the Activity columns, then assign a WBS code to that activity.

Defining Project Codes

In addition to structuring data using activity codes, you can set up codes for tracking items at the project level. Use project codes to categorize member projects into groups, such as division, funding source, manager, team, and type of work. You can then organize member projects, combine multiple member projects in a single band, or summarize, sort, filter, and report using the codes from the project group. Define project codes and values in the project group, then assign the project code values to your member projects.

If you want to use a code that is not currently defined in the supplied list, you will need to change an existing code description to fulfill your coding requirements.

P3 supplies 10 default project codes, which is the maximum number of codes that can be assigned to a project group in the Project Codes Dictionary. You can use these codes as-is and define your own values for each one, or you can change the descriptions to better suit your organization. For example, you may want to replace the default Project Manager code description with Team Leader.

Define project codes and values With a project group open, choose Data, Project Codes. You can also choose File, Project Overview, and then click Project Codes. Define up to 10 project code descriptions; click a project code description and type a new description in the edit bar.

To add values to a project code, type the values and descriptions in the Values section of the Project Code Definition tab.

Supply up to 10 characters per value.

Click to update a target, or other project, with the Project Codes Dictionary.

Use the Order column to specify the order of values by entering the appropriate number for each value in the list. These numbers determine the order of bands when you organize a project by a project code.

Assign project code values Open the member project for which you want to assign project code values. Choose Data, Project Codes, and click the Values for Project tab. You can also choose File, Project Overview, then click Project Codes. The project codes predefined in the project group are displayed in the Code column. Click the Value cell for the applicable code, then select the value from the drop-down list in the edit bar.
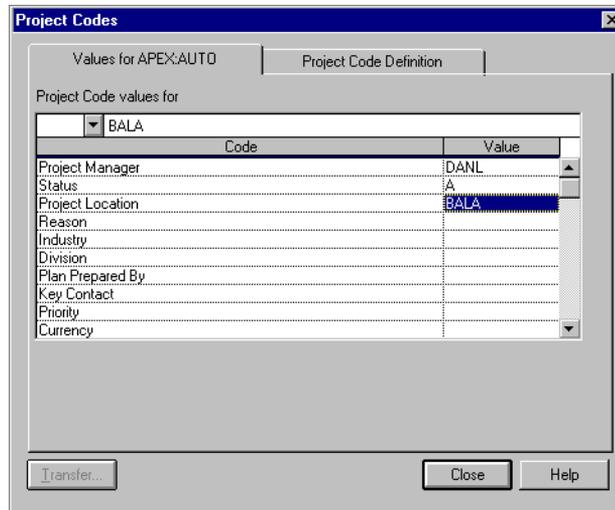
All activities in the project are automatically assigned the project code value.

The project code values you assign in a project need not be defined in the project group; you can add new values from the member project using the Project Code Definition tab. If necessary, you can add, edit, and delete project code values and titles. P3 automatically changes the Project Codes Dictionary in the project group—the codes and values are then available for other projects in the same group.

If you are restricted from modifying the Project Codes Dictionary, any values you add are assigned to the project code, but they are not added to the Project Codes Dictionary.

Defining Additional Activity Codes

P3 provides a set of standard activity codes for every new project, including responsibility, area/department, milestone, item name, location, and step. Activity codes enable you to group, sort, select, and summarize activities. Use the Activity Codes Dictionary to define additional codes for your project, such as manager, priority, and type of work.

Define activity codes. Choose Data, Activity Codes, then click the Activity Codes tab. To add a new activity code to the end of the list, scroll to the first available row and click in the Name column. You can insert a new activity code between existing ones by selecting a code and clicking ⊞. P3 adds the code above the one you selected. Enter a four-character name to define the code, then press Enter.

The length of an activity code cannot exceed 10 characters, and the total number of characters for all 20 codes cannot exceed 64.

Code values are assigned to activities and describe the parts or divisions of an activity code.

Use code descriptions to record full descriptions for values.

Assign an order number (from 1 to 255) to specify the sequence in which code values will appear when grouped; otherwise, P3 sorts code values alphanumerically.

Define code values and descriptions After you establish activity codes and lengths, define specific code values and descriptions. Click the code name you want to define values for. Press ⊞ in the edit bar in the Values list box. Enter a code value, then click ☑ to accept your entry.

Defining Activity ID Coding

You can classify the characters of an activity ID to give different parts of the ID special meaning. For example, the characters in an ID might identify different projects and departments.

For information on coding numeric activity IDs, see the *Activity and Project Codes* chapter in the *Reference* manual.

Define activity ID codes Choose Data, Activity Codes, then click the Activity ID tab. Set up the activity ID codes the same way you define activity codes, described in the previous section. Define up to four ID codes. For each code, set the length of the values for that portion of the ID (the total length of all ID codes cannot exceed 10 characters). Code 1 for activity IDs always starts in the first position of the ID field.

P3 assigns SUBP as the first activity ID code when you add a project to a project group.

The first two ID characters identify the project to which the activities belong.

The following example shows the coding structure for the sample project, SWDV.

ATANSF0210
— Activity ID
— Phase
— Project ID
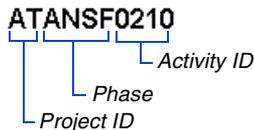
Establishing Custom Data Items

Use custom data items to expand a project database by creating your own data items for activities, resources, and costs. For example, track additional activity data such as planned start and finish dates, fabrication dates, and purchase-order numbers. Track additional data for resources/costs such as original, baseline, and revised budgets, income, and expenditures. These data items can contain characters, numbers (with or without decimal places), or start or finish dates. You can add up to eight custom data items each for activities and resources/costs.

Define custom data items Choose Data, Custom Data Items. P3 displays the Custom Data Items dialog box for Activity items. Click the Resource/Cost tab to view items for resources/cost accounts.

Specify a four-character name.

Define the type as characters (C), numerics (N), precision (P), start date (S), or finish date (F). Numeric items have no decimal places, and precision items have two decimal places.

You can also use custom data items for filtering, sorting, and reporting.
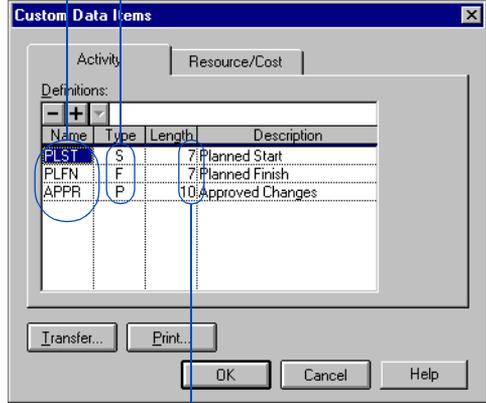
Specify a length for the values, depending on the data type chosen.

You cannot name custom data items using reserved abbreviations such as ACT, DES, ID, OD, and RD, or the activity codes defined in your project.

Assign custom data items After you create custom data items, use the Custom Data Items form to assign values to activities or resources/cost accounts. To display the Custom Data Items form, right-click an activity in the Activity columns, and choose Activity Detail, Custom Data.

Click the appropriate tab to assign custom data item values to the activity, or to the assigned resources/cost accounts.
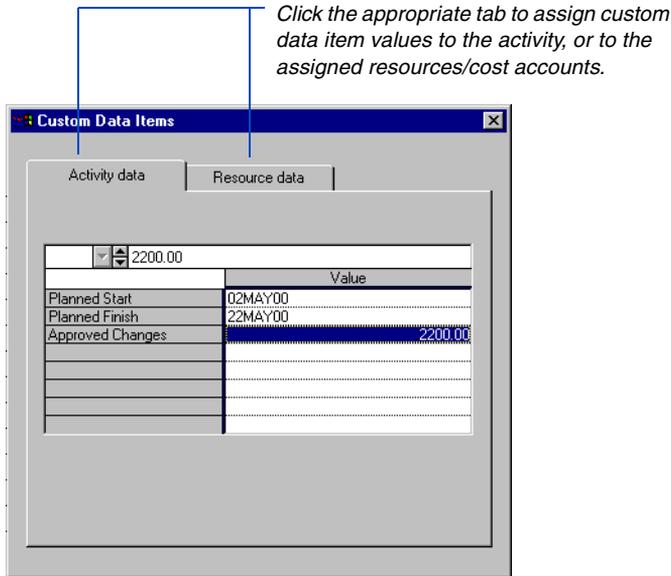
You can also use the Activity columns to assign custom data item values. Click the appropriate custom data item cell, then press F2. Type a value in the edit bar, then press Enter.

Include columns for the custom data items, then use the edit bar to assign values to the appropriate activities.
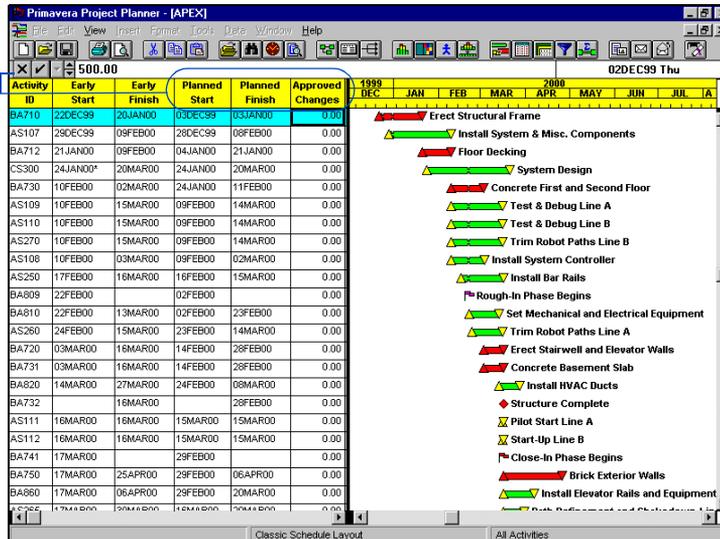
Globally Assigning Custom Data Items

The Global change feature enables you to change or assign values to all or a selected group of activities at one time. For example, before the project starts, you can globally assign the early schedule dates as planned dates using Global change.

Choose Tools, Global Change to display the list of existing specifications. Select a specification and choose Modify to define global changes.

You can create and save specifications for Global changes to use throughout the project or to transfer to other projects.

APEX - Global Change

ID	Title
GL-01	Increase Durations
GL-02	Reassign Resources
GL-03	Enter Approved Changes
GL-04	Store Planned Dates for All Activities
GL-05	Delete All Actual Start Dates
GL-06	Increase Durations for Engineering Department
GL-07	Increase Budgeted Cost For Fld Eng by 10 Percent
GL-08	Store Original Budgeted Cost

Trial Run
Run

Modify...   Add...   Delete
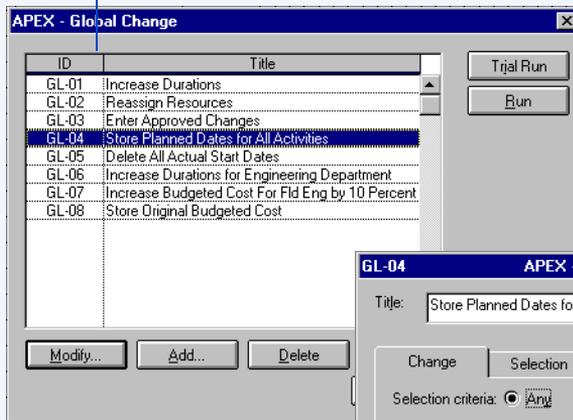
Define Global changes using If:Then:Else: statements. Write an If: statement if the activities to which you are applying the change must first satisfy some condition.

GL-04   APEX - Global Change

Title: Store Planned Dates for All Activities   <<   >>

Trial run
Run

Change   Selection

Selection criteria: ● Any   ○ All

Specifications:

	Data Item	Criteria	Data Item/Value	Operation	Data Item/Value
If:					
or					
or					
or					
Then:	PLST	EQ	T1ES		
	PLFN	EQ	T1EF		
Else:					

Transfer...   OK   Cancel   Help
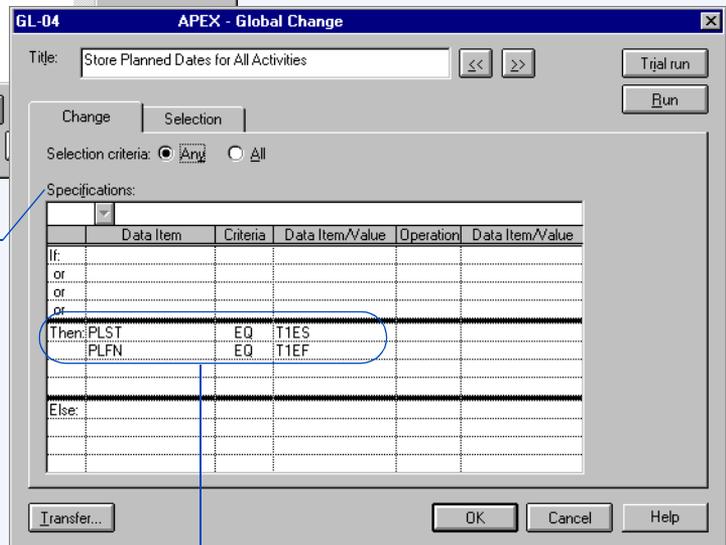
This specification requires only a Then: statement to set the custom data items planned start (PLST) and planned finish (PLFN) equal to the target early start and finish dates.

For more details about using Global change, see the *Global Change* chapter in the *Reference* manual.

Refining the Schedule

After you schedule a project the first time, you will probably need to make adjustments. P3 provides several ways to help you refine and compress the schedule, including modifying or adding calendars to model varying work schedules and imposing constraints to lock activities to specific dates.

You can also use P3's PERT to adjust your project's logic by rearranging activities in the network chain.

Modifying the Standard Workweek

P3 provides one calendar with every new project, called "calendar 1." In a project with a daily planning unit, calendar 1 specifies a standard Monday-through-Friday workweek. To control the times P3 can and cannot schedule work, such as on weekends, you can modify calendar 1 at any time. Choose Data, Calendars, then click Standard.
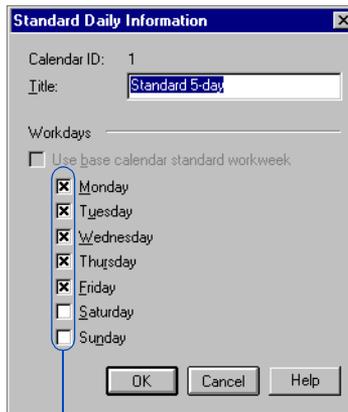
Mark a blank checkbox to designate a workday; clear a marked checkbox to change that day to a standard nonworkday.

You can also define additional calendars or specific days off from work, such as vacations and holidays. The next two sections describe these features.

Adding Calendars

Use more than one calendar when your project contains activities that can occur on different schedules. For example, suppose you are scheduling the pouring of concrete. The concrete must cure after it is poured; curing, however, does not stop on weekends. You can create one calendar that specifies a normal Monday-through-Friday workweek and another that specifies continuous worktime. If you define multiple calendars for the same project, you must assign each activity to the specific calendar that indicates the worktime available for performing that activity. P3 schedules each activity only during the worktimes of the calendar it is assigned to. You can add up to 30 other calendars for each project.

P3 automatically assigns all activities to calendar 1, so you only need to reassign activities that use a different calendar.

You can also use multiple calendars to model other situations, such as overtime or conflicts due to resource availability. For example, to compress the schedule for the installation of the Conveyor System in project APEX, you could assign the critical activities to a separate calendar that specifies a 6-day workweek, instead of the standard 5-day week.

Add a calendar Choose Data, Calendars, then click Add. Enter a description for the calendar in the Title field, then click OK.

Use the ID to assign the calendar to activities.
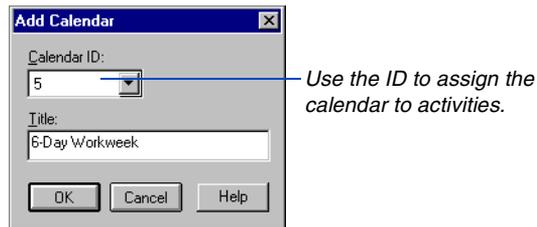
You can also define calendars for individual resources. See the Creating a Resource-Driven Schedule chapter for details.

In a project with a daily planning unit, the new calendar specifies a standard Monday-through-Friday workweek. In hourly, weekly, and monthly projects the default is continuous worktime (24-hour workday and 7-day workweek). Click Standard from the Calendars dialog box to modify the workweek.

Specifying Holidays

Once you add the calendars for your project and specify each calendar's workweek, define nonworkperiods such as holidays, vacations, and other times when work cannot occur.

Define holidays or a range of nonworkdays Choose Data, Calendars, then select the appropriate calendar from the list of defined calendars.

To define a range of nonworktime, drag the mouse from the start day to the last day of the range, then click Nonwork. To select an entire column of days, double-click the name of the day (SAT).
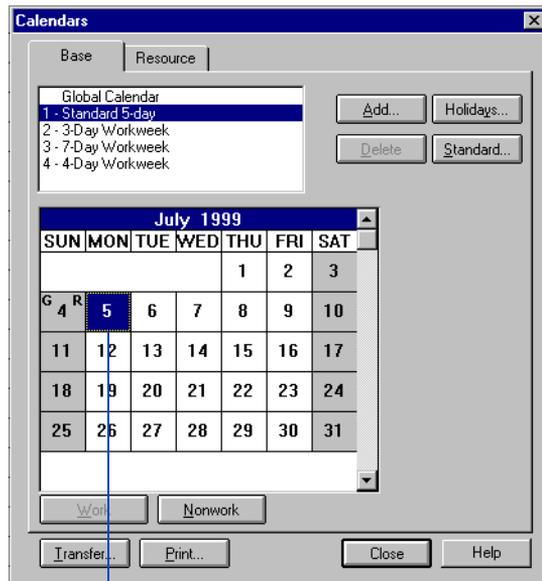
Double-click a workday to set it as a nonworkday, or double-click a nonworkday or holiday to set it back to a workday.

Define holidays or a range of nonworkdays for all calendars If you use multiple calendars, you needn't enter standard holidays such as New Year's Day for each calendar. P3 provides a Global calendar for specifying holidays or other nonworkperiods that apply to all activities in a project, regardless of their assigned calendar.

Select Global Calendar to set holidays and other nonworkdays for all calendars.

Displays additional project information, including the project planning unit, start date, data date, and finish date.

A "G" indicates a global holiday; an "R" indicates a holiday that occurs every year.

Define exceptions When work must be scheduled on days usually designated as nonworktime, specify exceptions. Suppose an unexpected problem delays the project. To recover the lost time, you could specify Saturdays, which are usually nonworkdays, during specific months as exceptions to the standard workweek. To set a single date exception, double-click a standard nonworkday such as a Sunday. To designate a range of exceptions, select a range of standard nonworktime, then click Work. To review a list of all the holidays and exceptions specific to a calendar, select a calendar then click Holidays.

Mark the applicable checkbox(es) in this column to designate a holiday that occurs every year.

Constraining Activity Dates

Use constraints when activities in your schedule have specific deadlines or other restrictions that can't be modeled in the logic for the project. Constraints enable you to restrict or distribute float to critical segments of the network, control stand-alone activities within a network, eliminate resource conflicts, or control subnetwork logic in a multiple-project environment. P3 calculates the schedule to satisfy these external requirements while adhering to the network logic.

Use date constraints when a specific date controls the start or finish of an activity or network rather than the logic. For example, a late-finish constraint could be imposed on the Start-Up & Debug System activity so that it finishes no later than 30JAN01. Other date constraints include early start, late start, early finish, and mandatory finish.

Assign a constraint in the Bar chart Point to the activity bar whose dates you want to constrain. Press and hold down the Ctrl key. Drag the mouse left or right, then release it when you reach the constraint date you want to apply. (The mouse pointer changes to ⊥ when you begin to drag it.) As you drag the mouse, the Datometer displays the precise date for use as a guide.

The mouse pointer looks like this when you are about to set a constraint.

Activity ID	Activity Description	Orig Dur	Rem Dur
AS110	Test & Debug Line B	24	24
AS270	Trim Robot Paths Line B	24	24
AS108	Install System Controller	16	16
AS250	Install Bar Rails	20	20
BA809	Rough-In Phase Begins	0	0
BA810	Set Mechanical and Electrical	15	15

When you release the mouse, P3 displays the Constraints dialog box already set with an early start constraint on the date you selected. (If you are setting a constraint on a late bar, the default constraint shown in the Constraints dialog box is Finish No Later Than.)

To set a different type of constraint, clear the Early Constraint checkbox and choose the constraint type you want.

Once you set the constraint, make sure you press F9 to calculate the schedule. If you have automatic scheduling or leveling turned on, adding or removing a constraint triggers the scheduling or leveling function.

Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
BA710	Erect Structural Frame	20	20	0	22DEC99	20JAN00
AS107	Install System & Misc.	3	3	0	29DEC99	03JAN00
BA712	Floor Decking	14	14	0	21JAN00	09FEB00
CS300	System Design	40	40	0	24JAN00*	20MAR00
BA730	Concrete First and Second	3	3	0	10FEB00	14FEB00

An asterisk next to a date in the Activity columns indicates that a constraint has been assigned.

Modifying the Sequence of Activities

After you build the initial project plan, or as the project progresses, you will probably need to reevaluate the network logic and readjust it to reflect changes in the project scope. Or you may need to find ways to compress the schedule, for example by modifying logic so that some activities are performed in parallel.

P3 provides features in PERT that enable you to modify or rearrange a chain of activities. You can extract an activity from a relationship chain; P3 removes all relationships to and from the extracted activity, then connects the predecessor activity to the successor activity with a finish to start relationship. P3 does not delete the extracted activity.

Extract an activity Select the activity you want to extract, then choose Edit, Extract Activity.

Use the Extract feature as a method when moving an activity to another area of the project. Extracting saves you the step of recreating relationships in the broken chain of activities.

Extracted activity

P3 links the extracted activity's predecessor and successor with a finish to start relationship.
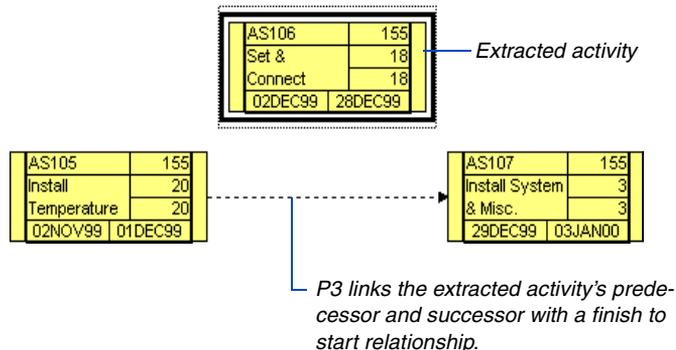
Once you extract an activity, you can drag it to another location.

Dissolve an activity You can also remove an activity from the project, but preserve its predecessor and successor relationships. Select the activity you want to remove, then choose Edit, Dissolve Activity. P3 deletes the activity and joins its predecessor and successor with a finish to start relationship.
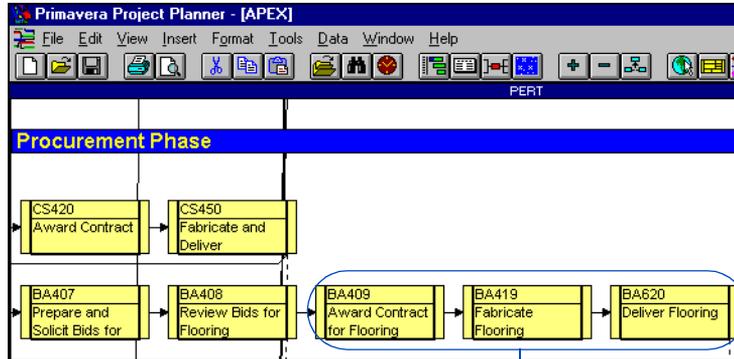
This sequence of activities can be completed with only two activities. Dissolve activity BA419, then revise the activity description for BA620 to reflect both the Fabricate and Deliver tasks.
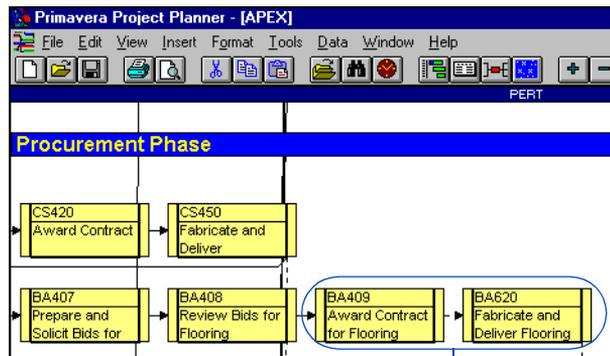
P3 automatically joins activity BA419's predecessor and successor with a finish to start relationship.

Updating and Managing the Schedule

In this part: **Updating the Schedule**

Sharing Project Data Remotely

Monitoring Projects

*S*uccessful project management doesn't end after you develop a project plan. To accomplish the goals of your project, you need to track daily events and update the schedule with accurate data. Controlling the project also means recording and reporting progress, communicating changes as they occur, comparing the current schedule to the plan, and measuring performance.

This part of the *Planning and Control Guide* discusses how to use P3 to update and manage a project schedule. You will learn how to update a project schedule from local and remote locations, update and track resource and cost data, and review progress using layouts, reports and graphics.

Updating the Schedule

A good project schedule can serve as a key management tool for making decisions and predicting whether the project will finish on time and within budget. Update your project regularly so you can record progress and identify potential problems.

This chapter focuses on methods for updating task- and resource-driven activities and describes techniques to mitigate problems and keep the project on track.

Process Overview

Once a project is underway, it is important to keep the schedule up to date. One of the most important reasons to update the schedule is that actual durations will probably vary from your original estimates. In addition, the sequence of activities may change once the work begins, and you may need to add new activities and delete unnecessary ones. Regularly updating schedules and comparing them with baseline schedules ensures that you are using resources effectively, monitoring project costs against budget, and keeping abreast of actual durations and costs so you can initiate your contingency plan if necessary.

Establish company procedures and communicate them to all participants. Ask questions about what data you need to update and how, when, and by whom the data will be updated.

Establish project update procedures Establish a systematic process for updating the project schedule. Usually, several projects at various levels of progress will be ongoing simultaneously. Multi-project management can be further complicated when project managers, key resources, or other employees involved in the process are geographically dispersed. You must consider these factors as you establish updating guidelines.

To help develop procedures, ask questions such as these:

■   What data need to be assembled for the update and what method(s) will be used to collect the data?

■   How often should the project(s) be updated?

■   Are resources local or offsite?

■   On which project team(s) are resources participating?

■   Who on each team will be gathering the information used for the project update?

■   Who needs to see the results of the update and when do they need them?

■   What types of information need to be generated after each update to communicate progress before the next update?

The answers to these questions are important in determining how you will use P3 to update projects.

Identify the types of data to collect The data to collect may depend on whether your activities are task- or resource-driven. You can update task-driven activities by simply recording actual dates and a remaining duration. If activities are resource-driven, you should update by resource: enter the actual hours to date and the hours to complete.

The following example shows a portion of customized Activity columns—part of a layout created for updating activity durations— one method you can use to update task-driven activities.

The duration was updated and an actual start assigned for activity CS310.

Activity ID	Current Dur	Revised Dur	% Comp	Early Start	Early Finish	Actual Start	Actual Finish
Andy Mason - Director of Development							
CS300	40	0	100	24JAN00A	20MAR00A	24JAN00	20MAR00
CS310	15	12	0	21MAR00A	10APR00	21MAR00	
CS430	20	0	0	11APR00	08MAY00		
CS440	5	0	0	09MAY00	15MAY00		
Tom Mills - Director of Hardware Engineering							
CS311	0	0	0	07AUG00			
CS315	15	0	0	07AUG00	25AUG00		

This is a "Start milestone" activity, which signifies a major event in the project; milestones have no duration, but you must assign actual dates to this activity type to update the schedule.

Determine how data will be collected Will you automatically collect timesheet entry data for each employee from Webster for Primavera? Will you collect data from other sites? Do these sites have access to P3 and the project data through a LAN or WAN? If not, do they have access to the Internet?

Determine whether project data will be rolled into a project group Will you import data from other systems supported by your company, such as an accounting system? Or will updates be handwritten on printouts of the schedule distributed to project participants, collected weekly by the project manager or team leader, and entered in P3?

If you answered Yes to one or more of these questions, your update process will probably involve more than one procedure—all equally facilitated by P3.

Once you establish acceptable procedures, communicate the results in a format acceptable to all participants, then begin the update cycle.

Analyze and communicate data Recording progress in P3 is only the beginning of the update process: after you produce an updated schedule, you need to analyze the results.

P3 offers many display and print options to examine updated project schedules. You can first view onscreen displays to see immediate results, then look at project data in more detail by generating reports and graphics. Pinpoint potential problems by comparing the current schedule to the target plan in the Bar chart or by displaying a resource profile for a graphical representation of resource use. If problems are apparent, you may want to perform "what-if" analyses before modifying the network. Use existing report and graphic templates, create new template specifications by modifying existing ones, or add your own template to produce the data you need to see.

Effective communication to all project participants is also essential to the success of every project. Use easily understood reports and graphics to show the project team and management what is happening. Focus on critical activities, resource and cost overloads, and slippages, and identify actual and required future progress.

The *Monitoring Projects* chapter provides many more examples of graphics for analyzing and communicating project information.

Start with a Classic Schedule Bar Chart. Customize your onscreen display to show only the necessary activities and data columns, then print it.

Activity ID	Orig Dur	Rem Dur	%	Early Start	Early Finish	Resource	Budgeted Cost
BA400	20	0	100	19JUL99A	27AUG99A	DES ENG	9,600.00
AS100	10	0	100	20JUL99A	04AUG99A	ANALYST,	2,960.00
AS101	20	0	100	03AUG99A	31AUG99A	DES ENG,	16,640.00
AS204	10	0	100	17AUG99A	31AUG99A	ATM ENG	1,760.00
AS216	10	5	50	23AUG99A	01OCT99	ATM ENG	1,760.00
BA501	14	0	100	30AUG99A	20SEP99A	DES ENG	1,680.00
AS102	10	0	100	31AUG99A	13SEP99A	PRG MGR,	2,546.00
AS205	5	0	100	31AUG99A	13SEP99A	ATM ENG,	2,826.00
AS200	5	0	100	07SEP99A	16SEP99A	ACCTS, ATM	1,080.00
AS310	10	2	80	14SEP99A	28SEP99	FLD ENG3	680.00
AS240	0	0	100	14SEP99A			0.00
BA450	10	5	50	20SEP99A	01OCT99		0.00
AS201	2	0	100	20SEP99A	21SEP99A	PRG MGR,	397.20
BA640	20	18	10	21SEP99A	20OCT99	EXCAVATR	20,640.00
BA480	10	7	30	21SEP99A	05OCT99		0.00
AS202	1	0	100	21SEP99A	21SEP99A	ACCTS	64.00
BA630	0	0	100	21SEP99A			0.00
AS206	20	16	20	22SEP99A	18OCT99	VENDOR	0.00
BA469	3	3	0	27SEP99	29SEP99	DES ENG	540.00
AS315	24	24	0	29SEP99	01NOV99	ELECTRCN	12,288.00
AS103	18	18	0	29SEP99	22OCT99	FLD ENG1,	4,824.00
AS104	13	13	0	29SEP99	15OCT99	PLUMBER	3,432.00
BA470	10	10	0	30SEP99	13OCT99	DES ENG	600.00
BA530	10	10	0	04OCT99	15OCT99	DES ENG	240.00
AS217	10	10	0	04OCT99	15OCT99	ATM ENG,	3,426.00
BA560	10	10	0	06OCT99	19OCT99	DES ENG	240.00
BA411	3	3	0	14OCT99	18OCT99	ACCTS	384.00
BA421	3	3	0	18OCT99	20OCT99	ACCTS	384.00
AS213	5	5	0	18OCT99	22OCT99	ATM ENG,	784.00
BA412	2	2	0	19OCT99	20OCT99	ACCTS	128.00
BA407	5	5	0	20OCT99	26OCT99	ACCTS	640.00
BA650	10	10	0	21OCT99	03NOV99	EXCAVATR	13,760.00
BA422	3	3	0	21OCT99	25OCT99	ACCTS	96.00
BA413	1	1	0	21OCT99	21OCT99	ACCTS	32.00
BA550	90	90	0	22OCT99	02MAR00	VENDOR	2,300.00

Bar labels: Design Building Addition; Define System Requirements; System Design; Prepare Drawings for Temp Control Equipment; Review and Approve Designs; Approve System Design; Review and Approve Temp Control Equipment; Prepare and Solicit Bids for Temp Control Equip; Installation Begins; Assemble Brick Samples; Review Bids for Temp Control Equipment; Site Preparation; Award Contract for Temp Control Equipment; Begin Building Construction; Assemble Technical Data fo; Review Technical D; Review and Approve Brick Samples; Prepare and Soli; Prepare and Solicit Bids for Bric; Review Bids for; Excavation; Review Bids for Brick; Award Contra

Start Date 19JUL99
Finish Date 23FEB01
Data Date 27SEP99
Run Date 04JUN99 10:18
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Legend: Early Bar, Float Bar, Progress Bar, Critical Activity

APEX — Sheet 1A of 4B — Acme Motors — Plant Expansion and Modernization — Classic Schedule Layout

Date	Revision	Checked	Approved

Classic Schedule Bar Chart

This printed layout includes early schedule dates, durations, and the budgeted cost for each activity.

The rest of this chapter discusses specific methods for recording progress in P3 from a local area network or stand-alone computer. For information on updating from remote sites, refer to the *Sharing Project Data Remotely* chapter.

Establishing a Target Plan

Before you update a schedule the first time, Primavera suggests that you create a target plan. The simplest target plan is a complete copy of the original schedule. As the project progresses, use the target as a benchmark or baseline for comparing the target dates, resources, and costs to those for the current schedule. You can also use the target to measure project status as well as performance.

In P3 you can create as many targets as you want, but you can compare only two targets to the current schedule at a time. For example, you might designate the baseline schedule as Target 1 and the current schedule at the end of the last update as Target 2. Comparing the current schedule to each of these targets enables you to see how the project has progressed since its start, as well as since the previous update. As a project progresses and changes occur, you can globally incorporate the changes into the target project so the data you compare are accurate.

For more information about updating target projects, see the *Targets and Progress* chapter in the *Reference* manual.

Create a copy of the current project and designate it as a target With the current project open, choose Tools, Project Utilities, Targets. Type the name of the target project and click OK.

Create a target project to monitor any variance from the original plan.

Click to incorporate specific data from the current project into the target project.
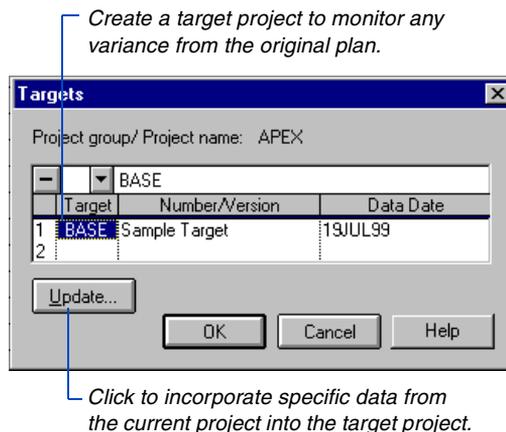
Highlighting Activities for Updating

The Progress Spotlight highlights the activities that should have been worked on during a specified timeperiod. You can turn this option on from the View menu or by dragging the data date line forward or backward in time. Once you spotlight activities, you can automatically status them, manually update them, or cut and copy them.

Use the Progress Spotlight feature Choose View, Progress Spotlight, or click the Progress Spotlight icon to highlight a timeperiod equal to the smallest increment of the displayed timescale from the previous data date.

Drag the data date line Click the data-date line; when it changes to ⧺, drag the line to the right until you reach the new data date. P3 spotlights the activities between the last data date and the new data date.

When you drag the data date line, the new data date is displayed.
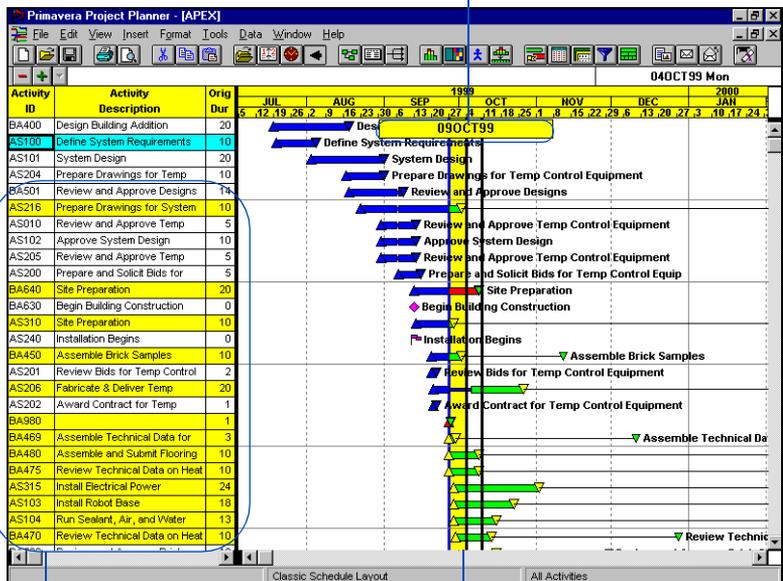
Unlike selected activities, when Progress Spotlight is active, activities remain spotlighted even when you click in another area of the workspace.

P3 spotlights activities that should have started, progressed, or finished between the previous data date and the new data date.

Distinguish spotlighted activities from selected activities by assigning them different colors. Choose Format, Screen Colors.

Change the spotlighted period To increase/decrease the highlighted area between the previous data date and the new date by one or more timescale increments, drag the data date line to the right or the left.

You can update the highlighted activities as described later in this chapter, or reschedule the project immediately according to the new data date by pressing Ctrl+F9.

You may want to set up your timescale so that the smallest increment is equal to your update periods. Then, when you turn Progress Spotlight on, the highlighted curtain will indicate the update period immediately and eliminate the need to adjust the data date. Choose Format, Timescale, to set the minimum time unit.

For more information about the Update Progress dialog box, see *Estimating Activity Progress Automatically* later in this chapter.

Depending on the density of the timescale above the activity bars, you may not be able to position the data date line on the exact date and time you want to use. In this case, enter the data date in the Update Progress dialog box and have P3 estimate progress as of that date before you update individual activities.

When you spotlight activities by dragging the data date line or by using the Progress Spotlight feature, P3 turns off automatic scheduling. Choose Tools, Schedule, or press F9 to reschedule after you finish updating; P3 recalculates the schedule and turns automatic scheduling back on.

Estimating Activity Progress Automatically

If activities are progressing on schedule, you may want P3 to estimate progress for all activities as of the new data date you specify. P3 can quickly determine activity dates, percent complete amounts, and remaining durations when you use the Update Progress dialog box to update a project.

Estimating activity progress is a quick and convenient way to update your project. P3 estimates progress only for those activities that were supposed to take place. Since progress can occur out of sequence, you may need to update additional activities—especially if you select activities by dragging the data date line or by using the Progress Spotlight feature. You should also review all incomplete activities to make sure their remaining durations, actual dates, and percent complete amounts are realistic. Once you spotlight activities, you can quickly update the project as "on time."

In P3, you can either update projects automatically or update each activity manually.

Estimate progress for all spotlighted activities Spotlight the activities for which you want to estimate progress by dragging the data date line or by using the Progress Spotlight feature. Choose Tools, Update Progress. Select a new data date if the one shown is not accurate.

The data date may differ from the date on which you enter the update information. For example, you can enter update information on a Monday for a data date as of the previous Friday; the resulting project shows progress as of that Friday.
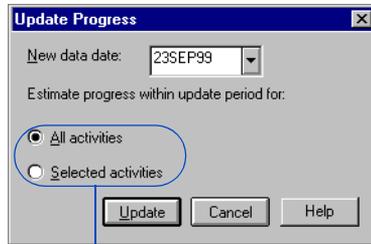
*Choose to update all activities scheduled
to work during the current update period
or only spotlighted activities.*

For details on recom-
mended options settings
before updating, see the
*Calculating and Adjusting
the Schedule* chapter in
the *Reference* manual.

Click Update. For each activity in the update, P3 estimates percent
complete amounts as of the data date, sets dates to actual dates if
they fall before the new data date, and estimates remaining
durations for activities that are not finished as of the data date. P3
also updates resource assignments based on each activity's
revised percent complete and remaining duration while adhering to
Autocost rules. In addition, P3 takes into account only the first price
per unit in the Resource Dictionary, if more than one price per unit
for varying through dates exists, when updating resource assign-
ments.

*If you estimate progress for selected activities that do not
fall within the update period, those activities will show no
progress. When spotlighting activities, you can only
estimate progress—percent complete, remaining
duration, and so on—for activities that are within the
update period. If you manually update a spotlighted
activity, then run Update Progress, P3 bypasses the
activity and your changes are retained.*

Updating Resource/Cost Data Automatically

Autocost, P3's automatic resource and cost statusing feature, is a shortcut to project statusing. With this feature, when you enter a percent complete or revise the remaining duration for an activity, P3 automatically updates resource and cost data for nondriving resources.

For example, suppose you updated an activity to be 70 percent complete. P3 calculates an actual quantity to date as 70 percent of the budgeted quantity for each resource assigned to that activity. This actual to date value is subtracted from the total quantity at completion for the resource to give a new quantity to complete. P3 also updates the costs applied to each resource.

Update activity progress.

P3 updates resource quantities automatically.

If you prefer to update resource and cost data manually, or if you want to change a default Autocost calculation method, you can modify the standard set of Autocost rules P3 uses during updates. To access the Autocost rules, choose Tools, Options, Autocost Rules.
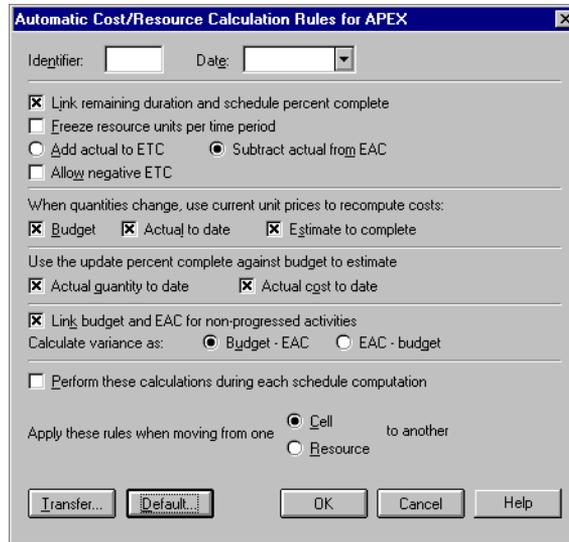
For example, to enter actual to date values manually rather than have P3 estimate them for you, turn off the Use the Update Percent Complete Against Budget to Estimate rule by clearing both check-boxes. As another example, the Subtract Actual From EAC rule is set based on the assumption that you have a finite quantity or fixed budget in which to accomplish a certain amount of work. As your project progresses, the more resources you use or the more money you spend, the less remains. However, you may want to add the actual to date value to the estimate to complete with each update to calculate a new estimate at completion so you can see how much it really costs to complete the activity. In this case, you can change the setting for this rule to Add Actual To ETC.

For detailed information about each Autocost rule, refer to the *Tracking Resources and Costs* chapter in the *Reference* manual.

Set Autocost rules to apply to all projects or set them individually for each project. To define a set of rules to apply to all new projects, choose Tools, Options, Default Autocost Rules before you open a project; to set up rules for a specific project, choose Tools, Options, Autocost Rules from within that project. You should establish a standard set of rules at the beginning of a project and keep them consistent throughout its duration.

Updating Using Timesheet Data

After employee timesheet entries are approved in Webster for Primavera, you can use the timesheet data to update P3 projects. Use Webster for Primavera as another method of posting hours for each resource to the Actual to Date field for all associated activities in P3.

If you use P3's Store Period Performance option to zero out actuals at the end of each update period (before performing the next update), the hours are posted to the Actual This Period field for all associated activities in P3.

After you update projects with timesheet data, create a layout that you can use to evaluate the effect of the update. Include columns for actual this period quantities and costs and for quantity and cost to complete amounts so you can compare them with budgeted amounts for the activ-

ities. Include these columns with early dates and durations to make it easy to gauge progress.

Refer to the Webster for Primavera online documentation for details.

Updating Task Activities Manually

P3 provides different activity types to accommodate your scheduling requirements. For task-driven activities where P3 bases activity durations on a specific completion date instead of resource availability, use the task activity type. Task type activities should be updated as completed or in progress. For activities underway, record the date each activity actually started and its remaining duration or percent complete. When an activity is complete, record its actual finish date.

P3 provides several ways to enter actual data: update activity bars on the Bar chart, edit data in Activity columns, or enter data using the Activity form.

Enter actual dates and progress on a bar Hold down the Shift key at the beginning of the bar (for actual start) or at the end of the bar (for actual finish) until the mouse cursor changes to an actual pin: ✎. Drag the pointer right or left and release the mouse button when you reach the actual start or actual finish date you want, as shown on the Datometer displayed on the top right side of the P3 window.

As you drag the scroll bar, P3 draws progress on the bar.

P3 displays the Progress dialog box so you can update the percent complete or remaining duration for underway activities.
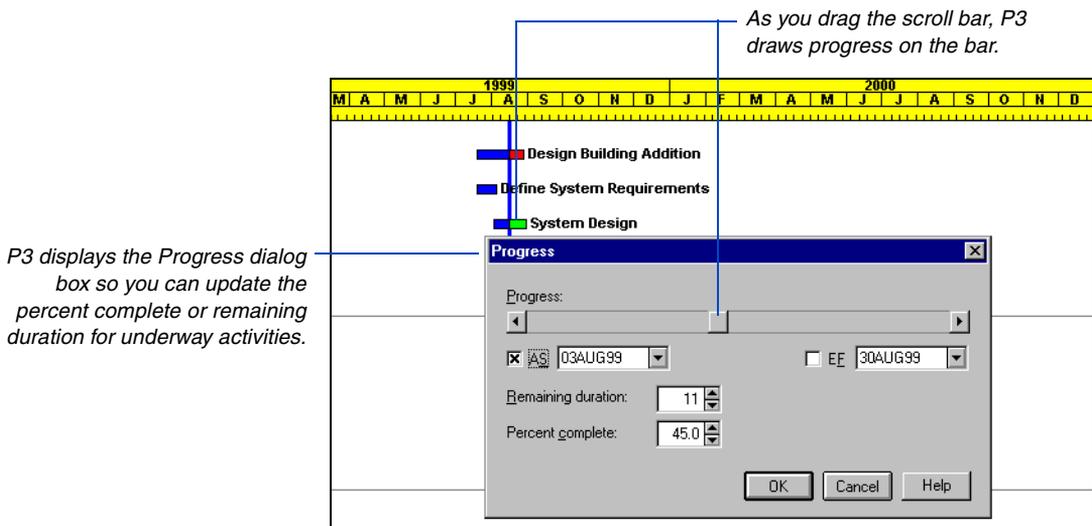
P3 calculates remaining duration based on the percent complete and places an "A" beside an early or late date to indicate that it is an actual date.
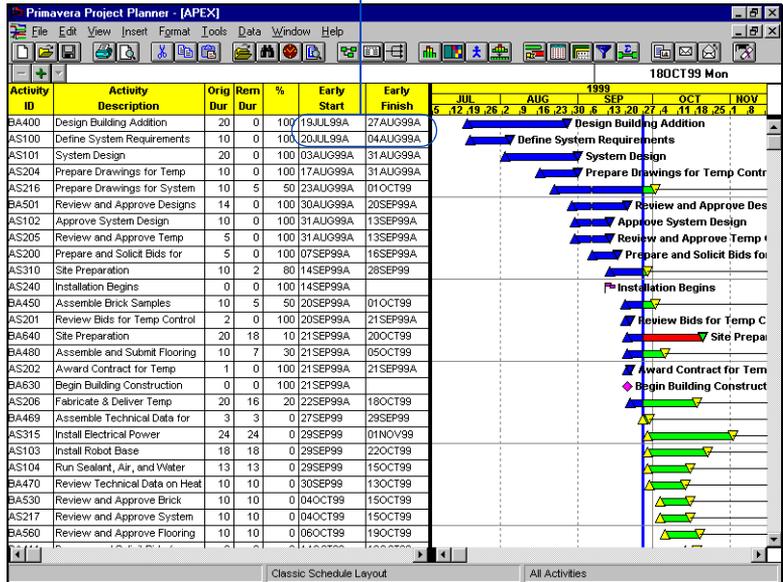
Recalculate the Schedule

After recording progress for the current period, you should always recalculate the schedule by pressing F9 or clicking the Schedule icon. Be sure to update the data date—the date from which P3 begins schedule calculations.
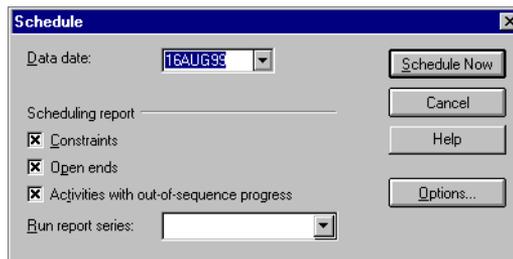
Record progress using columns Choose Format, Columns to select and order the columns you need for updating. For example, select columns for the activity ID, description, original duration, remaining duration, and percent complete. You may also want to add other data columns for reference, such as early dates and total float.

Select the remaining duration or percent complete cell and make the change directly in the Activity column.

Organize and Filter to Save Time
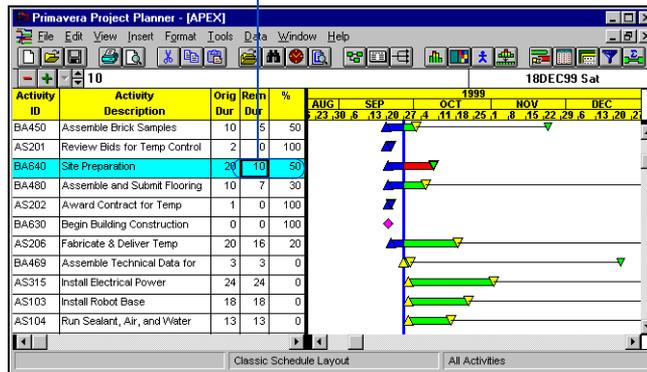
For more information about filtering and organizing activities, refer to the *Organizing Data* chapter.

When you update a schedule to reflect progress for a current week, you probably do not need to see activities that are finished or activities that are not scheduled to start later, such as 3 months from the current date. You can save time by filtering and organizing activities before you update.

Filters select activities based on criteria you specify. For example, specify a filter that selects only those activities that were scheduled to start or finish, or were underway, during the past week. You can then organize your Bar chart so that P3 lists the activities in an order that will speed updating. For example, if you collect actual data from each department, you may want to organize and group the Bar chart by the activity code, Department. You can specify additional sort criteria to order activities within each department group, such as by early start date.

Use the Format, Filter and Format, Organize commands to select and order activities. You can save the layout with the specified organization and associated filter to use each time you update.

Update using expected finish dates When you don't have actual data, but you know when you expect an activity to finish, you can update a project using expected finish constraints. For example, in the sample project, APEX, suppose delivery of the temperature control equipment needed for the Robotics Automation System is confirmed for a specific date. Enter this date as the "expected finish" date for the activity. When you recalculate the schedule, P3 automatically calculates the remaining duration for the activity. To enter an expected finish constraint, click Constr from the Activity form to display the Constraints form.

Mark the Expected Finish checkbox to status an activity based on its current early finish date or any other end date you specify.

Using Expected Finish Constraint in Mail

If you use P3's e-mail feature as a tool for updating project progress, the project manager can send a status sheet of activities to multiple recipients, who can then update the activities and return the status sheet, via e-mail, to the manager.
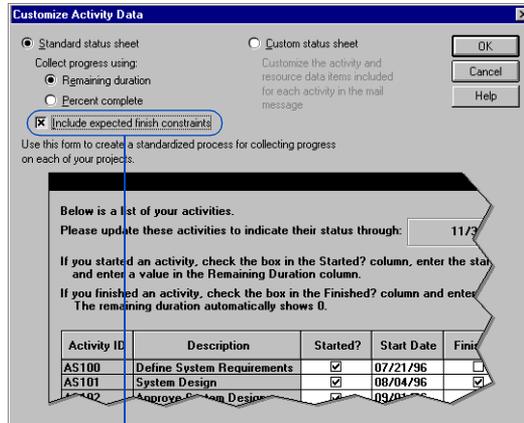
Mark this checkbox to include the expected finish constraint as a column on the status sheet. The recipient can then use this column to enter activity status.
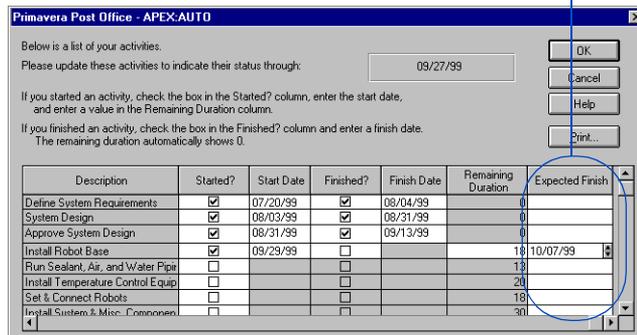
Suspend and resume work Sometimes work must be interrupted. For example, suppose that after system design has begun for the Automation System, technical problems force work to stop. Record the last day of work as the "suspend date." When work begins again, enter the "resume date." Use the Dates form to enter suspend and resume dates for an activity.

To assign suspend/resume dates, the activity must already have an actual start.
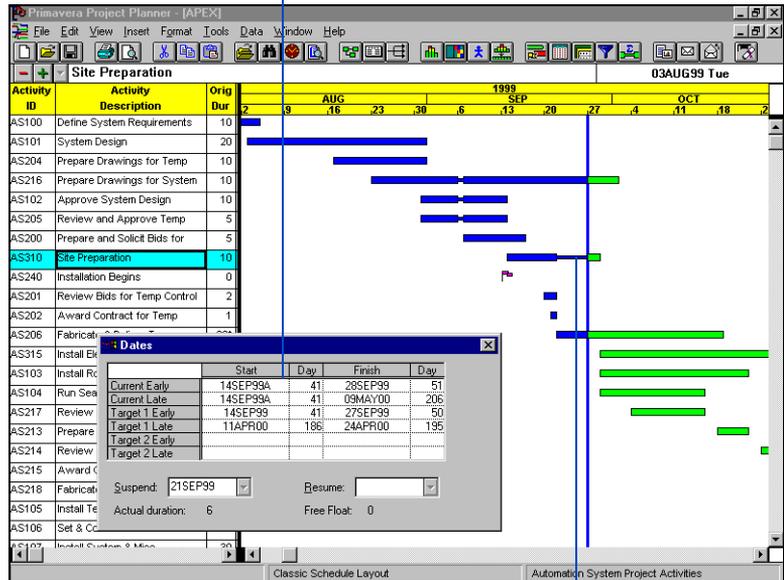
Suspended time is shown necked (indented) on activity bars.

Keeping Activity Logs

Primavera recommends that you record activity progress, special conditions, quality measures, material requirements, safety precautions, and other relevant project information. Use P3's Log form to track this information for each activity. Click Log from the Activity form to access the Log form. You can show as many log lines as you want on the Bar chart view or print all lines on printed schedule reports, Bar chart graphics, and custom reports.

Choose Format, Bars. Select the bar you want to display logs for, click Modify, and then click the Label tab.

Specify the start log and the end log that you want to display.

For instructions on setting up a hot link in the Log form, see *Record log information* in Help.

Create hot links to other documents Sometimes the information you might want to include in a log is available in a letter written in Word or a spreadsheet created in Excel. You can jump directly to these documents from the Log form in P3 by creating hot links, or shortcuts. For example, you can insert a file hot link pointing to a graphic created in Look, or an HTML report created using Primavera's Web Wizard. You or other users can then launch the associated application directly from the shortcut in the Log form.
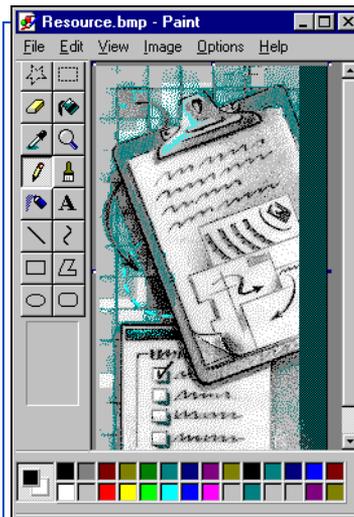
You can include a note identifying the contents of the file, web page, or graphic. Just remember to separate it from the shortcut with a space.

The green text color in the Log form signifies the shortcut reference; click the beginning of it to launch the associated application.

Type the complete address of the Web page you want to jump to, including the HyperText Transfer Protocol (HTTP) designation.

The hot link text color is based on the JumpColor= setting in the [Windows Help] section of the WIN.INI file. If the section/setting are not found, the default color is "0 128 0" (green).

Recording Progress on Resource-Driven Activities

For projects where resource availability drives the schedule rather than activity durations, use the "independent or "meeting" activity type. In an independent activity, resources work according to their own resource calendars, and for their own durations. P3 schedules an independent activity according to predecessor logic and the times its driving resources are scheduled to work. Meeting activities require that all resources work together simultaneously to complete the work; they are useful for scheduling meetings and any activities where resources cannot work independently.

For projects that have driving resources, update independent or meeting activities by entering actual to date (or actual this period) and estimate to complete values for the resources assigned to them. The following example shows a portion of customized Activity columns—part of a layout created for the purpose of updating resource use—one of several methods you can use to update independent or meeting activities. In this example, column data was customized and the layout was organized by resource so each person can easily fill in their hours for the period.

This column format provides the Hours To Date and Hours To Finish recorded thus far, together with blank columns for completion by each person (resource).

Activity ID	Current Hours to Date	Revised Hours to Date	Current Hours to Finish	Revised Hours to Finish	Early Start	Early Finish	Actual Start	Actual Finish
Analyst-Systems Automation								
AS217	0.00	**12.00**	40.00	**28.00**	01OCT99	14OCT99	**01OCT99**	
Design Engineer								
AS101	160.00		0.00		03AUG99A	30SEP99A	03AUG99	30SEP99
Electrician								
AS315	0.00	**18.00**	384.00	**366.00**	22OCT99	24NOV99	**25SEP99**	

You can display the Activity form with the Resources form to update resource data, as shown in the following example.

For independent activities that have driving resources assigned to perform the work, record Actual To Date (or Actual This Period) and To Complete values.
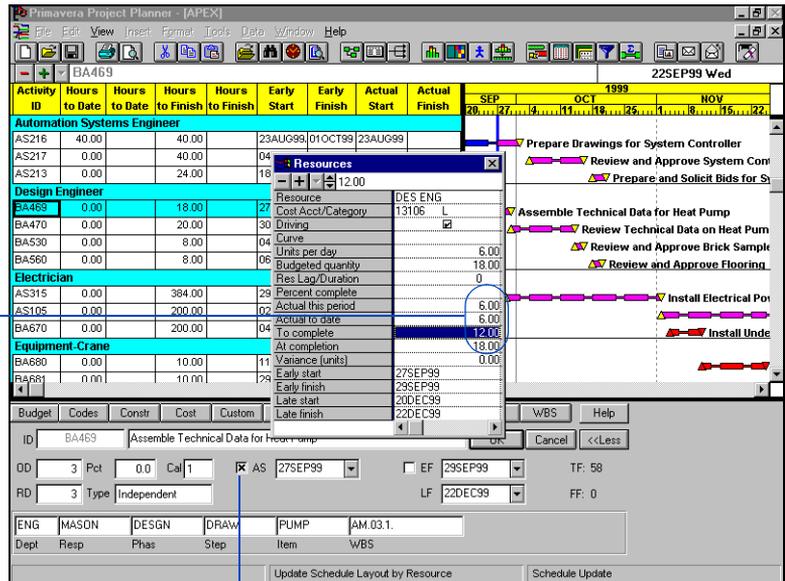
You should also record actual start and finish dates for the activity.
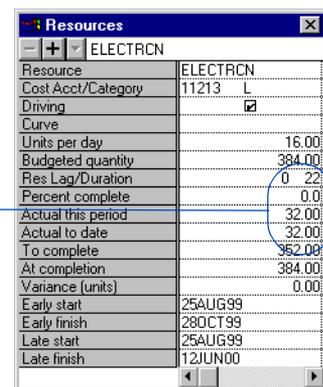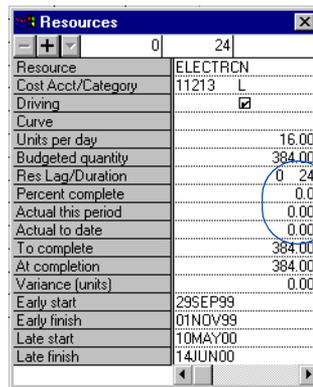
The remaining duration changes for the resource when Actual To Date and To Complete values are recorded.

P3 calculates the remaining duration of each resource by dividing its quantity to complete by its units per timeperiod.

Storing Period Performance

P3 spreads actual data evenly from the recorded actual start date to the data date unless you choose to store period performance at the end of each schedule update period. Each resource assignment's actual and earned value costs and quantities are then spread from the start of the resource assignment to the data date as they actually occurred.

The project controls coordinator should establish a regular time-period for updating the schedule. Period performance data should always be stored at the end of this period, after the update is complete and before the next schedule update period begins. This process ensures that later comparisons of historical period data are based on the same timespan.

Resources must be assigned to the activities in your project before you can store period performance data.

Use the Resource table to view actual costs and quantities in prior periods for each resource.

Since you cannot change period performance data once you store them, you should create a backup copy of the project before storing actuals for the update period.

Store period performance Record progress by entering actual start dates for each activity and updating each activity's resource quantity this period or quantity to date. Then change the data date to a date that is later than all of the recorded actual dates and schedule the project. At this point you can close out the update period and store performance data.

> *Be sure to define prices for resources in the Resource Dictionary before storing period performance. Changing prices after closing out an update period may result in cost variances.*

Choose Tools, Store Period Performance.
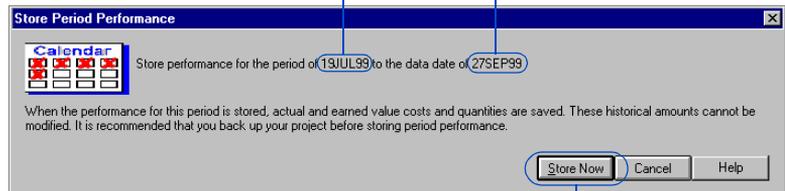
Click to store period performance data for the update period.

P3 saves the actual this period values and earned value as period performance data and then resets the actual this period value to zero in anticipation of the next schedule update period. Resetting the actual this period values does not affect actual to date values, but it enables you to begin tracking progress for the current schedule period and it saves values from the previous period. For example, if you increase the actual this period by 50, P3 increases the actual to date by the same amount. When you store period performance, P3 resets the actual this period to zero, but the actual to date remains increased.

P3 skips any assignments that have an actual start or an actual finish after the data date. If P3 cannot close out all resource assignments, it creates a file called CLOSEOUT.OUT that lists the assignments it could not calculate. P3 also creates an audit file in the PROJECTS folder named <project name>HST.OUT that contains a history of closeout dates for the project.

> *Storing period performance requires Exclusive access to the project. If you are the only user who has the project open and you have Read Write access, P3 changes your access rights to Exclusive when you begin storing period performance and then returns them to Read Write when you finish.*

Tracing Progress Using the Progress Line

For information about showing progress on bars, see the Customizing Bar Chart Layouts chapter in the Reference manual.

Show a progress line in the Bar chart to graphically trace progress on activities to see an overall picture of how a project is performing. You can choose to base the progress line on finish date variance or on actual progress. Click the Progress Line tab in the Sight Lines dialog box (Format, Sight Lines) to select line type and color, and whether you want to base progress on target variance or on actual progress.
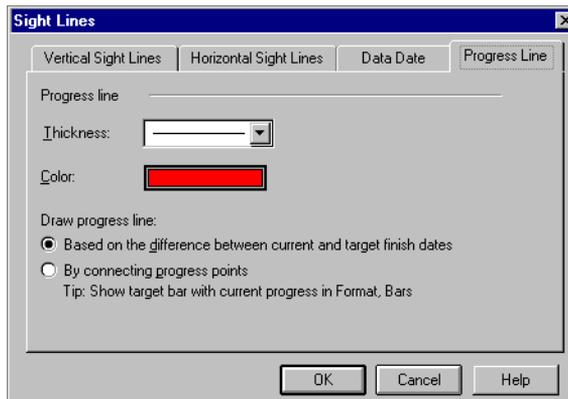
Choose View, Progress Line, to display the progress line.

Draw progress line based on target variance Choose the Difference Between Current and Target Finish Dates option to see the progress line drawn to the left or right of the data date line using the variance value for all activities. For example, if the target finish date is two days before the current finish date (negative variance), the progress line is drawn two days to the left of the data date line. Conversely, if the target finish date is two days after the current finish (positive variance), the progress line is drawn two days to the right of the data date line. If an activity is on schedule (zero variance) the progress line is drawn to the data date.

P3 draws the variance progress line based on a continuous, seven-day calendar.

Using the variance option, you can immediately gauge whether your project is staying on track based on your original estimates. An activity is behind schedule if the progress line is drawn to the left of the data date line on the activity bar, and ahead of schedule if the line is drawn to the right of the data date line on the activity bar.

Draw progress line based on actual progress Choose the Progress Points option to see the progress line zig zag among activities that have started or that should have started, relative to the target start and finish dates. When using this option, you should choose to display target bars with progress based on the current project. (Choose Format, Bars).

Mark the target bar as visible and set as the key bar to trace progress.

Choose Current Project, and base progress on either remaining duration or percent complete.
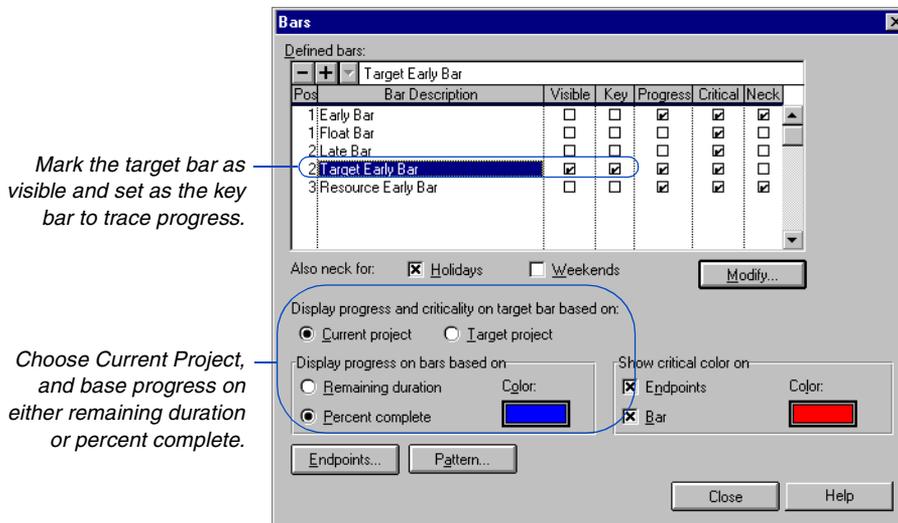
For example, if you choose to show progress based on the current project and percent complete, an activity that should have been 50 percent complete according to its target dates, but is only 25 percent complete, would have its progress line zig to the left of the data date line to the 25 percent complete point as it would appear on the target bar. Conversely, if the activity is 75 percent complete, the line would zag to the right of the data date line to the 75 percent complete point relative to the target bar.

In the following example, the current progress (based on percent complete) is drawn on each target bar. The Percent Complete (%) column indicates that Activity AS216 is 50 percent complete. This current progress is drawn to the 50 percent complete point of the target bar. The progress line then connects each progress point.

If the progress line appears to the left of the data date line, the activity is behind schedule; if it appears to the right, the activity is ahead of schedule.
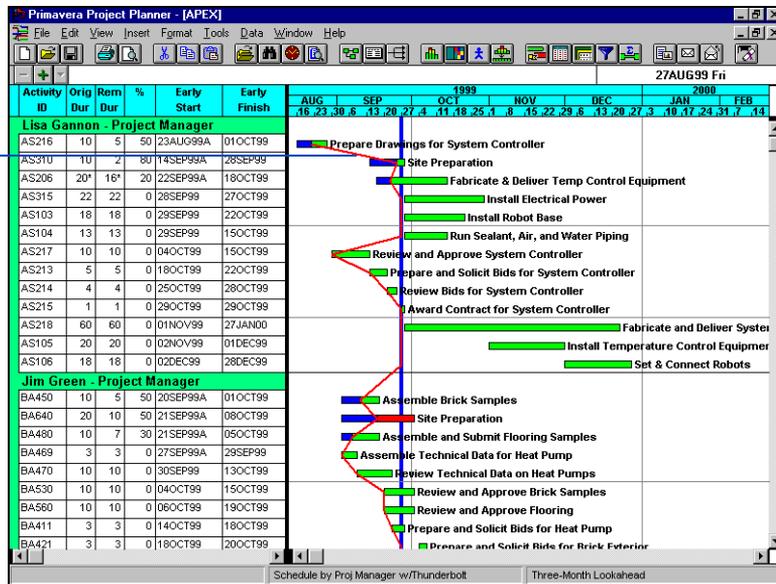
If an activity was scheduled to start before the data date, but has no progress, P3 draws the progress line to the target start point (indicating a delay.)

P3 draws the progress line to the data date line when:

■   the activity is completed,

■   the activity has no progress and is scheduled to start after the data date,

■   the activity is a milestone or a flag,

■   the activity does not exist in the target project, and/or

■   the resource dates do not exist in the target project.

The key bar determines the bar to which the progress line is drawn. For example, if you are displaying the current and the target bar with the target bar designated as the key bar, the progress line connects points on the target bar.

Tracking Additional Cost Data

Although P3 provides several data items for analyzing schedule, resource, and cost data, you may need to track other items. You can use custom data items to expand a project database by creating your own data items for activities, resources, and costs. These data items can contain characters, numbers (with or without decimal places), or start or finish dates.

Custom data items are especially useful for monitoring costs. For example, create a resource/cost data item called "original budget" to store all budgeted costs at the beginning of a project. Define another custom data item for committed budgets to track the amount of money committed for an activity to date. You might also want to track costs according to data items such as revised budget, overhead costs, purchase number, or location.

You can create up to eight custom data items that apply to activities and an additional eight items for each resource. Define standard custom data items for a project in the Custom Data Items Dictionary (choose Data, Custom Data Items). Assign specific values for each activity or resource using the Custom Data Items form or Activity columns.
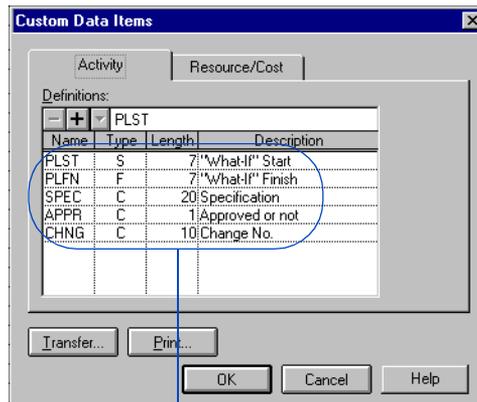
Custom data items help you keep track of and maintain specifics about an activity, such as planned dates and money spent on changes.

Tracking the original budget enables you to monitor variance; in this case, the current budgeted cost is greater than the original budget amount for the selected activity.
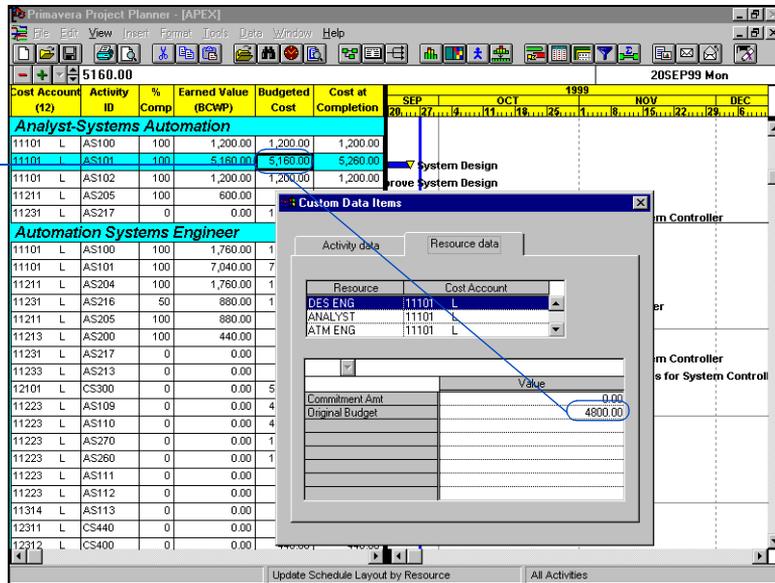
Using custom data items for filtering, sorting, and reporting
Include Activity columns for custom data items to assign or review values. In a Bar chart layout, you can define bars and endpoints that use customized dates. For example, if you have custom data items for planned or committed start and finish dates, you can create bars based on these dates.

Custom data item dates
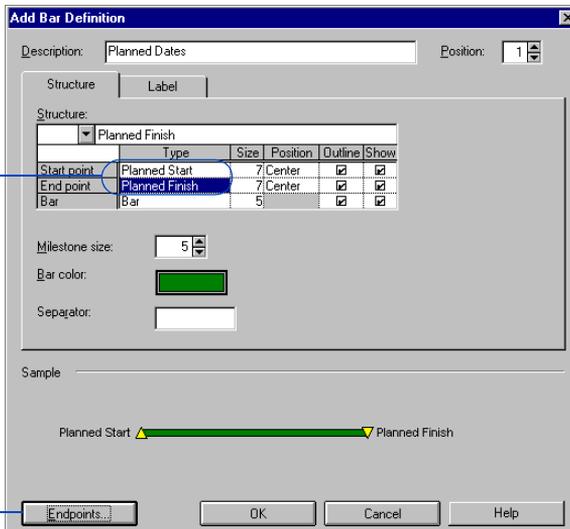
Set start and finish endpoints for custom-data-item bars.

Interim Milestones

In P3, you can designate major events in a project, such as the start or finish of phases, as milestones. Milestones are activities that represent a point in time with zero duration; they are especially useful for management overviews. In addition to milestones, you may sometimes need to track important dates during the course of an activity. For example, suppose you defined an activity for preparing operation manuals for the Conveyor System. Without establishing a list of detailed tasks for this activity, you may want to know significant points in time, such as the finish of writing or the

start of editing and review. You can create custom data items to identify interim milestones for each activity. In this situation, custom data items help you track these milestone dates without adding activities to your network.

Show interim milestones on a Bar chart by defining them as endpoints. Create a high-level management overview by overlaying the interim milestone dates on top of the current schedule bar. You may also want to attach symbols or other data items to the milestone endpoints.
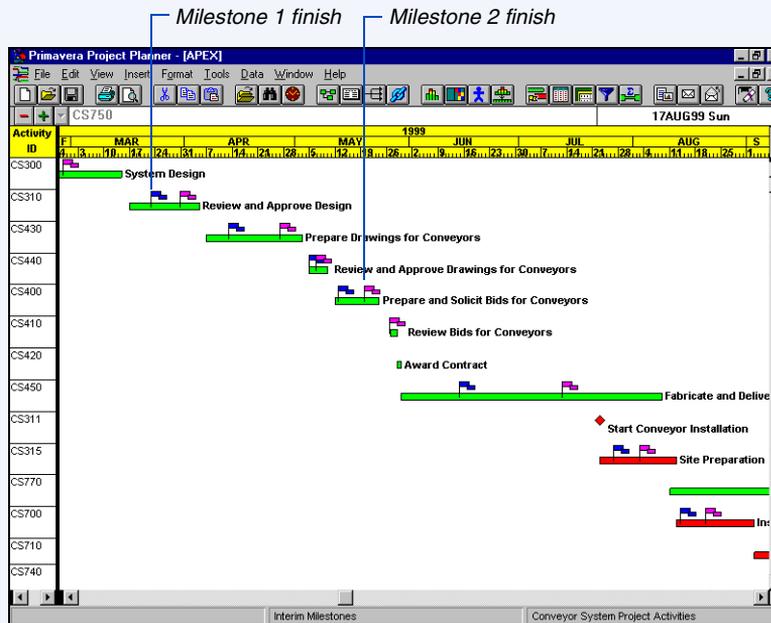
Milestone 1 finish   Milestone 2 finish

Sharing Project Data Remotely

Your update cycle should include collecting project data from all participants, including those located elsewhere or whose project data are not directly accessible. Electronic mail (E-mail) is a convenient way to send backups of projects or to send and receive selected activities for updating. Use the standard status sheet provided to collect updates, or customize it to further define activity selection.

You can also save layouts in HyperText Markup Language (HTML) format in P3, and set up documents that contain projects and reports in HTML format using the Primavera Web Publishing Wizard, then transfer these documents via the World Wide Web or your office intranet. This chapter describes the methods you can use to share project data remotely.

Process Overview

You can communicate project data with participants outside your immediate access area using several methods, depending on whether the participants have access to P3. If you send backup disks manually or send a backup of the project through e-mail, the recipient needs P3 to restore the data you send them. However, if you send an electronic status sheet containing activities to be updated, the recipient does not need access to P3 to view activities and update their status.

Communication Method	Recipient Requires P3	Recipient Does Not Require P3
Send backup disks manually	✔	
Send a backup of the project through e-mail	✔	
Send standard or custom status sheet through e-mail		✔

The following flow chart illustrates the basic steps for communicating project data via e-mail.
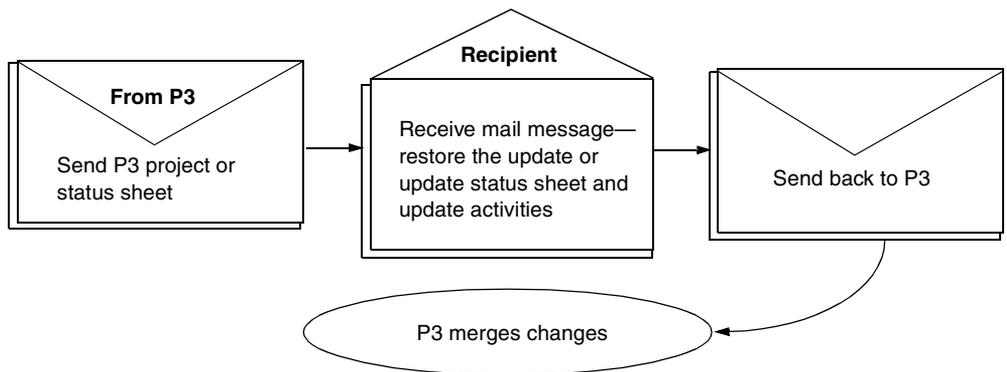
Regardless of how you communicate remotely, you should update projects at regular intervals so all project participants can be kept current on progress. When you are planning your update cycle, make sure you account for all factors and make appropriate allowances for the selected communication method.

Sending E-Mail to Update Projects

When you need to update projects with data that is located remotely, you can use e-mail to communicate project information and update the project status through P3's Send Mail and Receive Mail features. Send an entire project through e-mail or simplify the update process by sending an electronic status sheet to multiple recipients, who can then update their activities and send the sheet back to you for project scheduling. Open the project group or project you want to send, then choose File, Send Mail to launch the Send Mail Wizard. Select the option that applies to your process, then click Next to quickly move through the steps shown below.

1 Choose this option to send a status sheet.
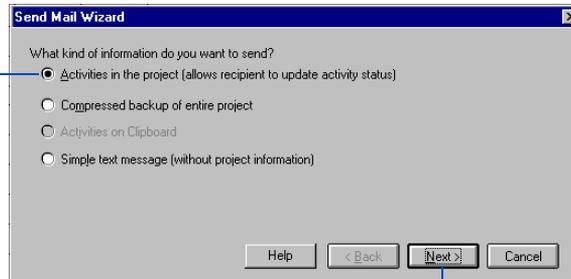
2 Select activities to send. Set up a filter that you can use each time for a specific project to expedite selecting activities for the status sheet.
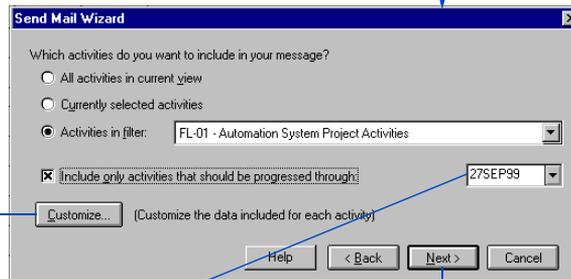
3 Send the standard remaining duration/percent complete status sheet provided, or customize activity data prior to sending.

4 Specify the data date for updating activities.

5 Send the status sheet to a team or department working on the same project. Use an existing activity code or create one for this purpose.

Since P3 supports both MAPI (Messaging Application Programming Interface) and VIM (Vendor Independent Mail) formats, P3's e-mail feature is compatible with most major mail systems.
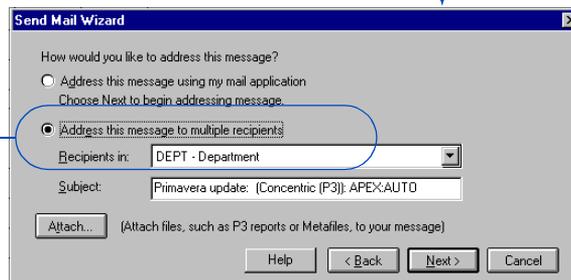
P3 uses your e-mail system to address the P3 message you create. If you choose Address This Message Using My Mail Application, you can send multiple copies of a single message so each recipient receives the same mail message. This is helpful when you need to address several offsite team members who have activities in the same project.

You can also assign an activity code representing an e-mail address to each activity; when you send e-mail, P3 automatically sends all coded activities to the mail addresses assigned to them. To expedite this process, filter activities based on resource (or responsible person) so only the applicable activities to be sent to a particular address can be assigned the e-mail address code.

Add the code you will use to store the e-mail addresses.

Type the e-mail address for each person.

Define activity codes for the people to whom you want to send activities to update.

When you choose to address your message to multiple recipients, P3 sends a mail message to each recipient containing only the activities coded as pertaining to him or her.

Receiving E-Mail in P3

The Mail Inbox displays the messages you receive that contain P3 data items. To access your inbox from P3, choose File, Receive Mail and log into your e-mail system.

Select a mail message to view or restore.   *View the text message and status sheet containing the activities to update.*
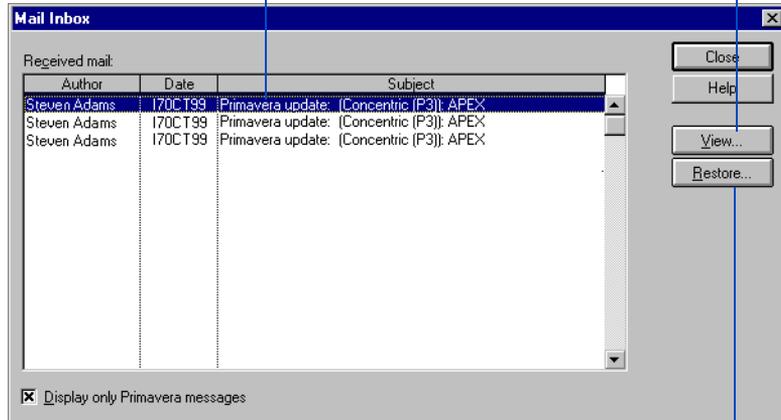
Restore a project backup.

View the status sheet and update activities using Primavera Post Office, an application that is automatically launched when you click View for a selected Primavera message. Once these activities have been modified to reflect progress in the project, return the status sheet to the project manager so progress can be rolled into the P3 project.

You can send activity information to participants who do not have P3 if they have the Primavera Post Office application. Contact Primavera Systems for information on obtaining this application.

You cannot edit columns that appear gray in the status sheet.

Update using the standard status sheet Use the standard status sheet to update activity information and merge it into your project or return it to the sender. After an activity starts, you can edit the Start Date and Finished? columns for that activity; when an activity is marked finished, you can edit the Finish Date column. If an activity is marked finished, P3 automatically enters a value of 0 for the activity's remaining duration, or 100 for percent complete. You can also manually change the percent complete to update activities. Choose to update percent complete or remaining duration on the standard status sheet by clicking Customize from the Send Mail Wizard.

Mark to indicate that an activity has started.

Enter the date the activity started.

Indicates the date through which activities should be updated

Primavera Post Office - APEX:AUTO

Below is a list of your activities.
Please update these activities to indicate their status through: 09/27/99

If you started an activity, check the box in the Started? column, enter the start date, and enter a value in the Remaining Duration column.

If you finished an activity, check the box in the Finished? column and enter a finish date. The remaining duration automatically shows 0.

OK
Cancel
Help
Print...

Description	Started?	Start Date	Finished?	Finish Date	Remaining Duration	Expected Finish
Define System Requirements	☑	07/20/99	☑	08/04/99	0	
System Design	☑	08/03/99	☑	08/31/99	0	
Approve System Design	☑	08/31/99	☑	09/13/99	0	
Install Robot Base	☑	09/29/99	☐		18	10/07/99
Run Sealant, Air, and Water Pipir	☐		☐		13	
Install Temperature Control Equip	☐		☐		20	
Set & Connect Robots	☐		☐		18	
Install System & Misc. Componen	☐		☐		30	

You can also status by indicating an expected finish date for an activity; this adds the expected finish (XF) constraint to the activity in P3.

Mark to indicate an activity has finished.

Enter the date an activity finishes.

Update using the custom status sheet The custom status sheet gives you more viewing and editing options than the standard status sheet. You can view the information contained in the custom status sheet as either activity or resource data. The person who composes the mail message specifies the data items presented in the custom status sheet and indicates whether or not these items can be edited.

This column is grayed out because the originator of the message made it uneditable.

You can update information in these columns.

If you want to add an activity from your project to the custom status sheet, choose Insert, Activity, and type the activity ID for the activity you want to include. Fill in the appropriate activity information, then exit the custom status sheet. You can then forward the information in a new mail message to be merged into the project.

Choose View, Resource Data, to view resource data contained in the custom status sheet. When viewing resource data, organize the activities in the custom status sheet by activity ID, resource, or cost account. To sort the activities, choose View, Organize, and select the option you want to use. If the person who sent the mail message also chose to include relationship or log information for the activities, you can view that information in separate dialog boxes.

Merge changes in P3 You can update your project using activities received via e-mail and then merge the changes into your project. Choose File, Receive Mail, and log on to your mail system. From the list of messages, select the one you want to merge into the current project, then click View. Review the activities using the vertical scroll bar; use the horizontal scroll bar to review the data items. You can select any cell that is not grayed out and edit the information it contains before merging.

If the activities were sent using the custom status sheet, choose View, Resource Data, and repeat the preceding instructions to edit resource information. If you are viewing resource data, you can specify in which order the activities are viewed by choosing View, Organize. You can sort the activities by activity ID, resource, or cost account.

Choose File, Save, to save any changes you make, then choose File, Exit. When prompted, choose Merge Into Project to update the project using the changes you just made.

P3 matches activities by activity ID. If an activity in the mail message has the same ID as an activity in the current project, the information in the mail message will replace that activity's existing information. If an activity in the mail message has an ID that does not exist in the current project, you can add the activity to the project. If an activity exists in the project but not in the mail message, it will be unaffected by the mail merge.

If cost accounts or resources in the mail message do not exist in the current project, these items are added to the appropriate dictionary; however, cost accounts that are 12 characters in length are not added if the first 11 characters match identically, since it is assumed the 12th character is used as a cost category.

Updates are tracked and displayed in Primavera Look after merging is complete. When new activities are added, the current filter is rerun.

Publishing HTML Reports and Layouts on an Intranet or on the World Wide Web

Use the Primavera Web Publishing Wizard to guide you through the process of creating Web pages that contain the project information you specify. Once the pages are complete, you can transfer them to the Internet or place them on your intranet server. You can also save P3 layouts in HTML format and publish them on the Internet or office intranet. You can then access this information using any Web browser, such as Netscape Navigator.

By publishing information on a central server, you can maintain a single copy of project reports that administrators, management, or individual project managers can access at any time. Using the World Wide Web to disseminate information also supplies the most current project information to remote managers.

Creating a structure of HTML documents Primavera's Web Publishing Wizard creates a hierarchical structure of HyperText Markup Language (HTML) pages based on the projects and reports you specify. These pages contain hypertext links (jumps) to the other pages in the structure, enabling you to move between projects and reports and from page to page within a report.

You need only set up the structure once. Then, as projects progress, use the Wizard to add new reports, remove outdated reports, or update existing ones with the latest data.

The first HTML page lists the project categories that have been defined, such as Development Projects, Construction Projects, Information System Projects, and so forth. Categories are desig-nators used to organize projects into logical or related groups. Select a category to display the list of projects, and examine overview information about each project it contains. Select a project from this list to see the reports that are available, then select a report to display an HTML page containing that information.

Viewing an HTML structure HTML is a platform-independent language, which means that users can view pages using a different type of computer than the one on which they were created. Once a P3 manager creates an HTML structure, anyone can use an Internet browser to review HTML documents, whether they are downloaded from the World Wide Web or from an office intranet. Following is an example of a cost report viewed using a Web browser.

Use the Primavera Web Publishing Wizard The Wizard helps you designate document categories, choose projects from which to create Web documents, and choose reports to apply to the projects. Choose Tools, Web Publishing Wizard, from P3 to start the Wizard.

If you did not install the Primavera Web Publishing Wizard when you installed P3, the Web Publishing Wizard command on the Tools menu is unavailable. You can install the Primavera Web Publishing Wizard at any time by running the Setup program and selecting the Primavera Web Wizard option.

Choose to define categories for your HTML structure.

Choose to add projects and reports to the HTML structure, or to remove existing projects and reports from the structure.

Choose to update existing reports with current project information.
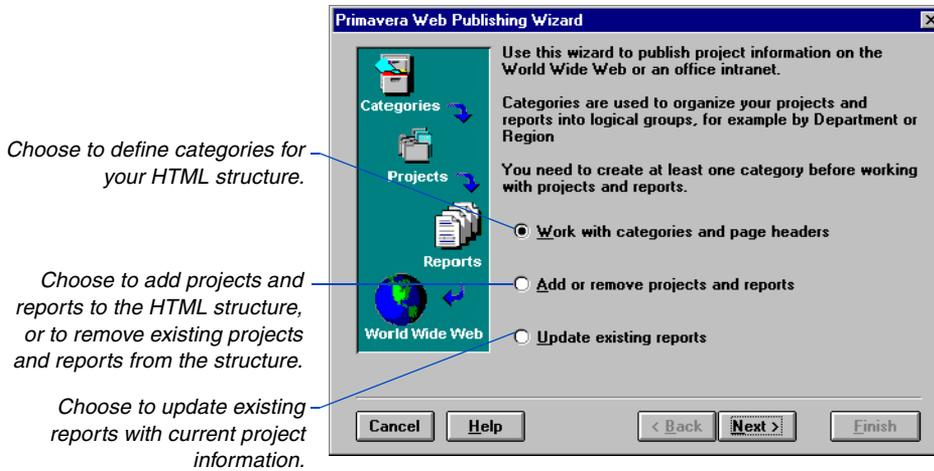
Create and maintain HTML reports using the Primavera Web Publishing Wizard Define the structure of the projects by estab-lishing categories for your projects, then add projects to the categories. Add reports for each project; define the reports based on a template or RTF report to disseminate the information for that project. Transfer the HTML documents to a central server. Update the data contained in the reports at regular intervals. Add new reports to projects as they are needed and remove old reports. Transfer the updated HTML structure to the central server.

If more than one person will be working with the HTML documents, place these files on a network server to facil-itate access to the documents.

Define reports for projects After you add a project to the HTML structure, define reports to present the project information. Define a set of reports and add them to the existing list. The Primavera Web Publishing Wizard includes five report templates:

For descriptions of report contents, see Part 5: Reports and Graphics in the Reference manual.

- Cost Report

- Predecessor/Successor Report

- Resource Assignment Report

- Classic Schedule Report

- Target Comparison Report

You can create a report in a selected project by applying a filter from the project to modify one of the five report templates. You can also use one of P3's tabular reports, such as a resource loading report, and the Wizard will convert it to HTML. Choose the Add Or Remove Projects And Reports option from the Wizard to perform either function.

Type the name of the new report.

Choose to base a report on a combination of a report template and filter.

Choose to add one of P3's tabular reports to the document structure.

Choose to base a report on another file.

Define a Report For Project: CLIN - Clinical Research and D . . .

Enter a title for the report:

System Cost

OK

Cancel

Help

Choose a report type.

● Create a report using a template and a filter:

Report Template: Filter:

Cost   ALL   All Activities

○ Add a P3 Tabular report:

AM-01   Early Dates by Responsible Dept. & Phase

○ Create a report using an existing file of any type:

Browse...

Basing a Report on Another File

In addition to using the reports provided with the Primavera Web Publishing Wizard, you can base a report on any other type of file. For example, a report can be a picture of a construction site in .GIF format, or the schematic diagrams for a new circuit board. To base a report on another file type, choose Create A Report Using An Existing File Of Any Type and type the file name or browse to it.

If you choose to base the report on a file type that is not supported by HTML, specify a file association (helper application) on your Web browser to view the file. For example, if you add a Portable Document Format (.PDF) file for viewing the layout of a project, define Acrobat Reader as your helper application.

Once you create a structure of HTML documents, you can update the reports in those documents to reflect the changing status of your project to keep all participants "on the same page." Use the Update Existing Reports option in the Wizard to be guided through

the steps for updating selected reports with the latest data from your project. You can only update template reports. If you want to examine the updated document structure before transferring it to a central server, mark the Open The Reports And Other Documents In Your Web Browser checkbox before you click Finish. The Primavera Web Publishing Wizard opens the PRMINDEX.HTM file with your browser, enabling you to inspect the document structure.

Once the reports are updated, transfer the latest structure to your server, replacing any existing structure.

Save layouts in HTML format In P3, open the layout you want to convert to HTML, then choose File, Save As Web Page. Type a maximum of five characters for the filename (the name of the currently open project is the default) with no extension; P3 automatically supplies JPG or PNG (port network graphics) format for the layout image, based on your File Format for Image selection. Select the drive and folder location for the layout file, then click Save. P3 saves the HTML file in the location you specify, where you can retrieve it for publishing on the Internet or company intranet.

Preview the layout in HTML format immediately.

Save as Web Page	
Enter first 5 characters of file name:	APEX
Note: Page numbers are appended to the file name.	
e:\p330\p3out	
Target image size:	Folder
600x800	e:\
	P330
File format for image:	P3OUT
JPG	
☒ View in browser	
Drives:	
e:	

Buttons: Save, Cancel, Help, Network...
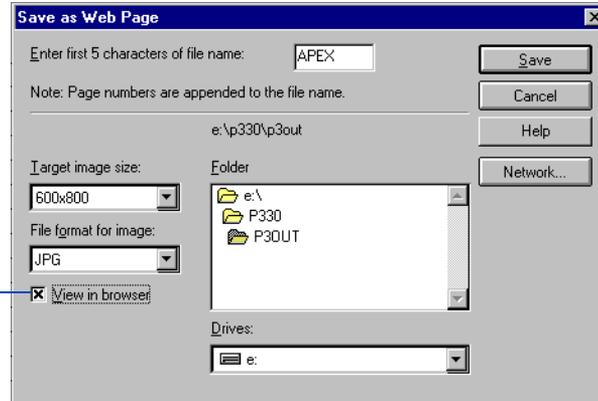
Transferring pages to the World Wide Web If you intend to place your HTML documents on the World Wide Web, you will need to transfer them to your server using FTP (File Transfer Protocol). You can transfer files to the Internet server using a Windows-based FTP program, such as WS_FTP Professional. These programs are usually available from your Internet provider, or you can download them from their companies' Web sites.

Monitoring Projects

You've established the schedule, created the baseline, and now the project is underway. As the project progresses, you'll need to monitor what is happening and when. Use P3 to identify completed activities and to focus on the remaining work.

As a project manager, you'll also need to guide the project, recognize problems, make decisions, motivate the project team, and communicate information about the current status and required actions. This chapter presents some useful P3 reports and graphics that can help you manage projects successfully.

Managing Change

Few projects proceed exactly as planned. The scope of the project changes, some activities fall behind schedule or occur out of sequence, and resource requirements are revised. During the life of a project, you must continually evaluate each project element— schedule dates, resources, and costs.

As the project manager, you should also look at the project as a whole, since a change in one area can greatly affect other areas. Consider the following situations:

■   During the development of a point-of-sale and delivery software application, a change of scope requires that the current design specification changes to meet the client's requirements—even though coding is well underway. How can the project team finish by the deadline, which has a contractual finish no later than constraint?

■   During a historical restoration, workers discover that floors scheduled for repair actually need to be replaced. Do you have enough resources available to perform this work? Is this activity on the critical path?

■   A weather emergency cancels work for three days on a project that is already running behind schedule. Can you designate Saturday as a workday?

Scenarios such as these require immediate action from you, the project manager. P3 helps you with solutions in response to your action items.

The remainder of this chapter presents key questions about determining project status. Following each question is a P3 layout, report, or graphic that contains the data you will need to make informed decisions.

Is the Project Progressing According to Plan?

Comparing progress to the original plan is the best way to know whether your project is staying on track. You need to be able to pinpoint trouble areas early—while enough time remains for you to make revisions and avoid extending the scheduled end date. P3 provides several onscreen displays, along with printed reports and graphics, to help you compare the current schedule to the target plan. A Bar chart enables you to see at a glance whether you are ahead of or behind schedule. Choose Format, Bars, to create a Bar chart like the following sample; it includes a progress line that traces progress on underway activities, relative to the target start and finish dates. The variance between the current and target plans is shown to the right of each target bar so you can quickly assess how long the activities will be delayed and adjust the schedule accordingly. This project is behind schedule.
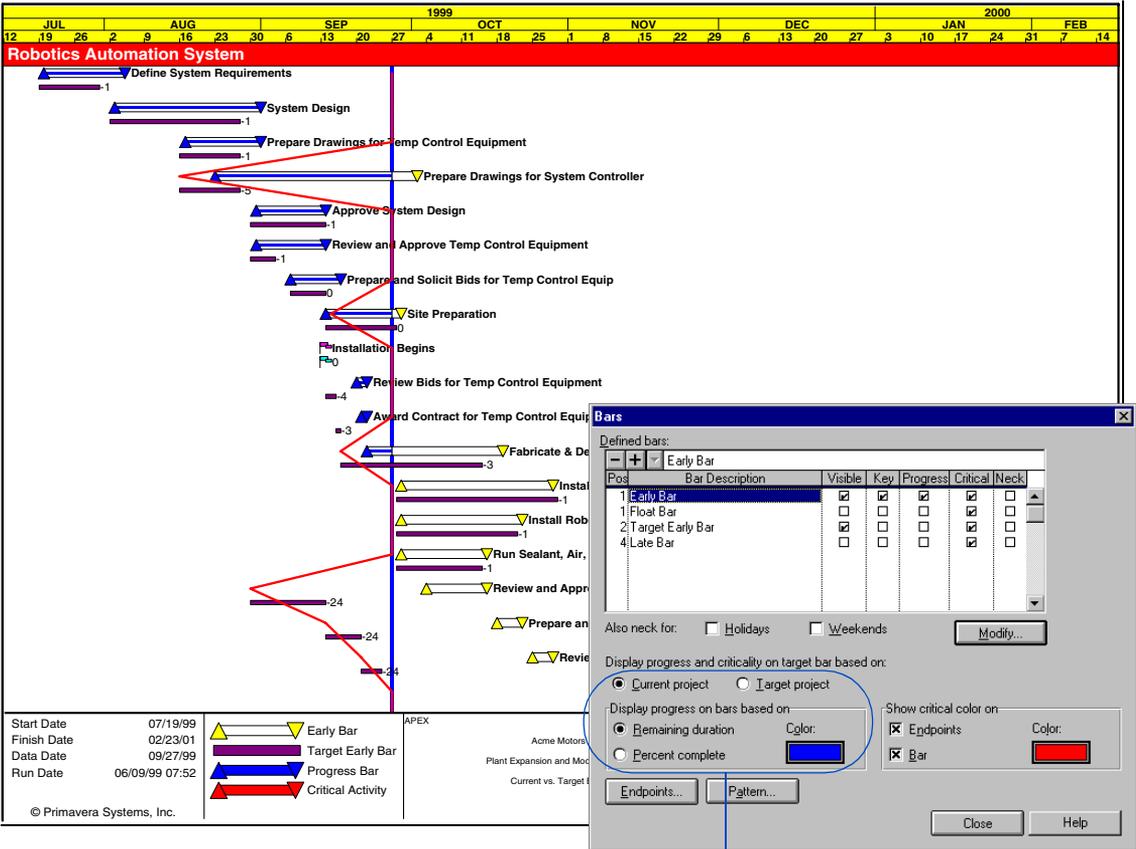
These settings determine how P3 draws the progress line and how progress is indicated on bars in the layout.

Which Activities Have Slipped?

In addition to comparing the most recent schedule to the original plan, you may also want to compare progress from week to week. In this case, in addition to retaining a target baseline plan (Target 1), you should retain the schedule at the end of each update period (Target 2). You can then compare Target 2 to the current schedule to see progress since the last update. You can customize the Activity columns to include a column showing variance between the dates or produce a schedule report to compare the current and target schedules. To simplify your analysis, concentrate on the exceptions—for example, activities that slipped during the past week—rather than review all activities.

Indicates slippage between this week's schedule and last week's schedule

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Acme Motors   PRIMAVERA PROJECT PLANNER   Plant Expansion & Modernization

REPORT DATE 9JUN99   RUN NO. 39   -----Project Schedule-----   START DATE 19JUL99 FIN DATE 23FEB01
                8:21
Current vs. Target Since Last Update   DATA DATE 27SEP99 PAGE NO. 2

ACTIVITY ID	TAR DUR	CUR DUR	CAL	%	CODE	ACTIVITY DESCRIPTION	CURRENT START	EARLY FINISH	TARGET START	EARLY FINISH	VAR.
BA530	10	10	1	0	ENG	Review and Approve Brick Samples	4OCT99	15OCT99	20SEP99	1OCT99	-10
BA560	10	10	1	0	ENG	Review and Approve Flooring	6OCT99	19OCT99	20SEP99	1OCT99	-12
AS200	5	8	1	100	PCH	Prepare and Solicit Bids for Temp Control Equip Refer to Design specification #01270.	7SEP99A	16SEP99A	7SEP99	13SEP99	-3
AS201	2	2	1	100	PCH	Review Bids for Temp Control Equipment	20SEP99A	21SEP99A	14SEP99	15SEP99	-4
BA450	10	5	1	50	PCH	Assemble Brick Samples Architect requires a sample face brick wall be Constructed for review.	20SEP99A	1OCT99	3SEP99	17SEP99	-10
AS202	1	1	1	100	PCH	Award Contract for Temp Control Equipment	21SEP99A	21SEP99A	16SEP99	16SEP99	-3
BA480	10	7	1	30	PCH	Assemble and Submit Flooring Samples Samples of carpet and ceramic and vinyl flooring Must be submitted and approved before ordering.	21SEP99A	5OCT99	3SEP99	17SEP99	-12
AS206	20*	16	*1	20	PCH	Fabricate & Deliver Tem					
BA411	3	3	1	0	PCH	Prepare and Solicit Bids Determine the necessar System drawings. Send specs to top three					
BA421	3	3	1	0	PCH	Prepare and Solicit Bids Face brick outer wall wil					
AS213	5	5	1	0	PCH	Prepare and Solicit Bids Refer to Design Spec #0 Specs for system contro					
BA412	2	2	1	0	PCH	Review Bids for Heat Pu					

SR-12 — APEX - Schedule Reports

Title: Current vs. Target Since Last Update   [<<] [>>] [Run]

Tabs: Content | Format | Selection

Level [1 ▼] must meet ○ All   ● Any   of the following criteria:

Selection criteria:

[-][+][▼]

Select if	Is	Low Value	High Value
Variance target 2 early finish	LT	0	

[Transfer...]   [OK] [Cancel] [Help]

Fine-tune your analysis by including only those activities with variance since the last update.

What Is the Status of Critical Activities?

Critical activities set the schedule for the project because they must start and finish on time or else delay the project end date. Watch critical activities when reviewing project status.

Critical activities have zero or negative float.

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Acme Motors                                    PRIMAVERA PROJECT PLANNER      Plant Expansion & Modernization

REPORT DATE 9JUN99 RUN NO. 45                    -----Project Schedule-----     START DATE 19JUL99 FIN DATE 23FEB01
         8:55
Schedule Report  -  Sort by TF, ES                                             DATA DATE 27SEP99 PAGE NO. 3
```

ACTIVITY ID	ORIG DUR	REM DUR	CAL	%	CODE	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	LEVELED LS	LEVELED LF	TOTAL FLOAT
CS315	15	15	1	0	ISD	Site Preparation	10AUG00	30AUG00	10AUG00	30AUG00	0
CS700	14	14	1	0	ISD	Install Conveyor 211	31AUG00	20SEP00	31AUG00	20SEP00	0
CS710	50	50	1	0	ISD	Install Conveyor 212	21SEP00	29NOV00	21SEP00	29NOV00	0
CS740	50	50	1	0	ISD	Field Piping	16NOV00	26JAN01	16NOV00	26JAN01	0
CS750	50	50	1	0	ISD	Field Wiring	16NOV00	26JAN01	16NOV00	26JAN01	0
CS720	10	10	1	0	ISD	Install Conveyor 213	30NOV00	13DEC00	30NOV00	13DEC00	0
CS730	30	30	1	0	ISD	Install Conveyor 214	14DEC00	26JAN01	14DEC00	26JAN01	0
CS305	20	20	1	0	ISD	Start-Up & Debug System	29JAN01	23FEB01	29JAN01	23FEB01	0
CS800	0	0	1	0	ISD	Conveyor System Complete		23FEB01		23FEB01	0
BA902	5	5	1	0	CON	Install AC Grills and Registers	12JUL00	18JUL00	14JUL00	20JUL00	2
BA770	5	5	1	0	CON	Install Door and Window Frames	24MAR00	30MAR00	29MAR00	4APR00	3
BA790	10	10	1	0	CON	Install Exterior Doors and Windows	31MAR00	13APR00	5APR00	18APR00	3
BA912	2	2	1	0	CON	Install Plumbing Fixtures	28JUL00	31JUL00	2AUG00	3AUG00	3
BA901	3	3	1	0	CON	Install Lighting Fixtures	12JUL00	14JUL00	18JUL00	20JUL00	4
BA800			1	0	CON	Insulate Ducts	10MAY00	11MAY00	22MAY00	23MAY00	8
BA8							12MAY00	18MAY00	24MAY00	1JUN00	8
CS7							14DEC00	12JAN01	29DEC00	26JAN01	10
CS3							24JAN00*	20MAR00	8FEB00	4APR00	11
CS3							21MAR00	10APR00	5APR00	25APR00	11
CS4							11APR00	8MAY00	26APR00	23MAY00	11
CS4							9MAY00	15MAY00	24MAY00	1JUN00	11
CS4							16MAY00	31MAY00	2JUN00	15JUN00	11
CS4							1JUN00	2JUN00	16JUN00	19JUN00	11
CS4							5JUN00	5JUN00	20JUN00	20JUN00	11

SR-02   APEX - Schedule Reports

Title: [Schedule Report - Sort by TF, ES]   [<<] [>>] [Run]

Tabs: Content | Format | Selection

Display
Skip line on: [<none>]   Skip page on: [<none>]   Summarize on: [<none>]

Target comparison
Use: ● None   Display: ○ Early dates
○ Target 1   ○ Late dates
○ Target 2   ○ Full range

Sort by:
Sort on	Order
Total float	Ascend
Early start	Ascend

Display
☒ Early start ☒ Early finish ☒ Late start ☒ Late finish
☒ Calendar ☒ Activity codes ☒ Total float ☐ Hours

[Transfer...]   [OK] [Cancel] [Help]

Sort the report by total float so that P3 orders activities according to their criticality.

Which Activities Are Critical or Nearly Critical?

Remember to watch near-critical activities, since they can quickly become critical as the project progresses. The following timescaled PERT layout highlights the critical path. For this analysis, activities with a total float of five or fewer days were selected for the layout.
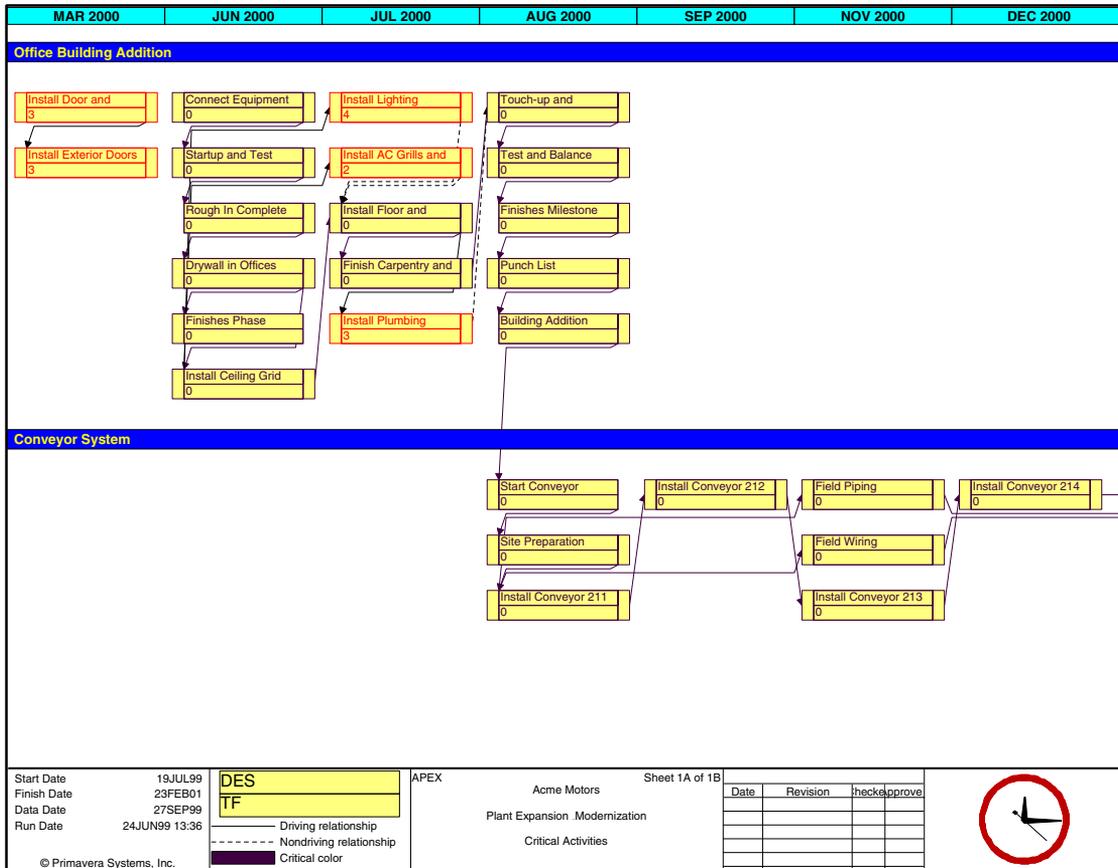
This example focuses on progress and critical-path activities in the network for each project for a monthly timeframe. Activities are arranged by early start date.

When you are evaluating which activities are critical, you should also note their relationship to other scheduled activities: a delay to one activity delays other activities and the project end date. Review activities in PERT to see how activities are interrelated.
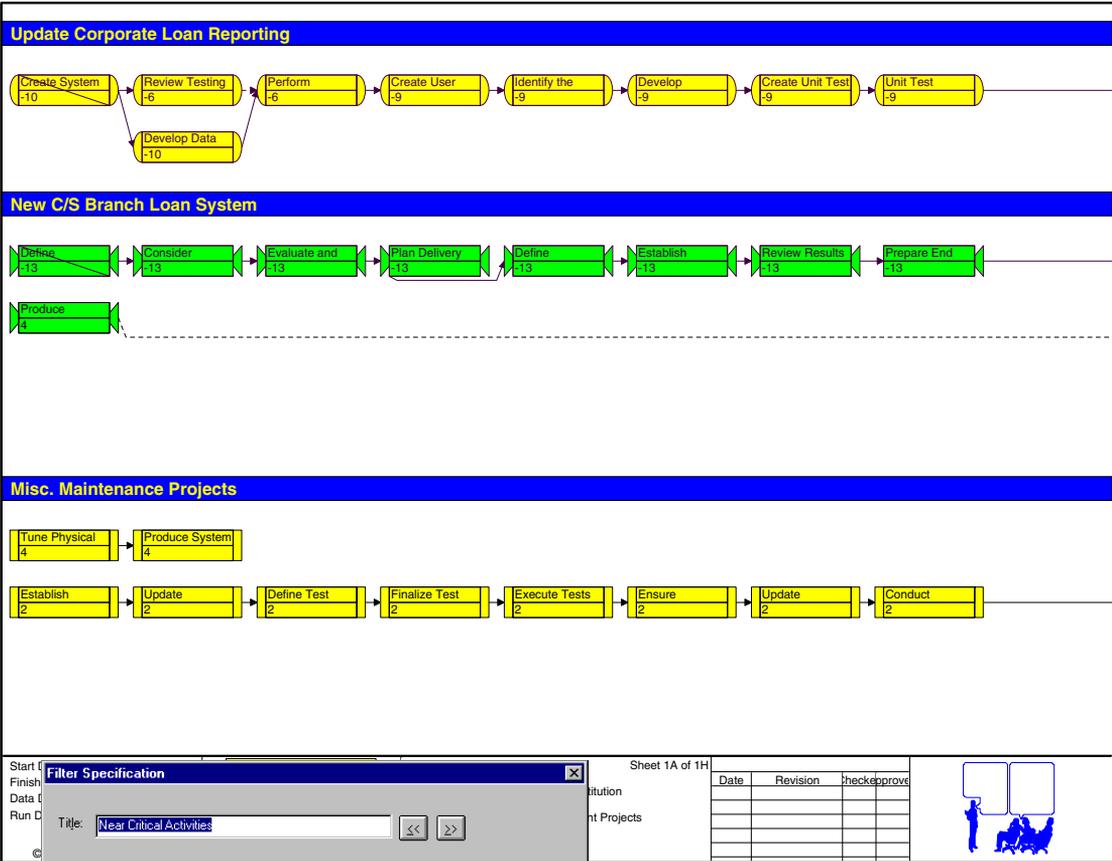
Filter the layout to concentrate on activities with a total float value of zero or less, then watch them as the project moves forward so you can anticipate problems before they occur.

How Are Groups of Activities Related?

When you are evaluating the logic of a specific group of activities, showing the external relationships of those activities often is useful; however, you may not want to clutter the graphic with too many details. You can balance these requirements in PERT by showing connectors to external activities not included in the current filter. Connectors are represented as ovals and contain the activity ID.

Customize header/footer information easily in P3.
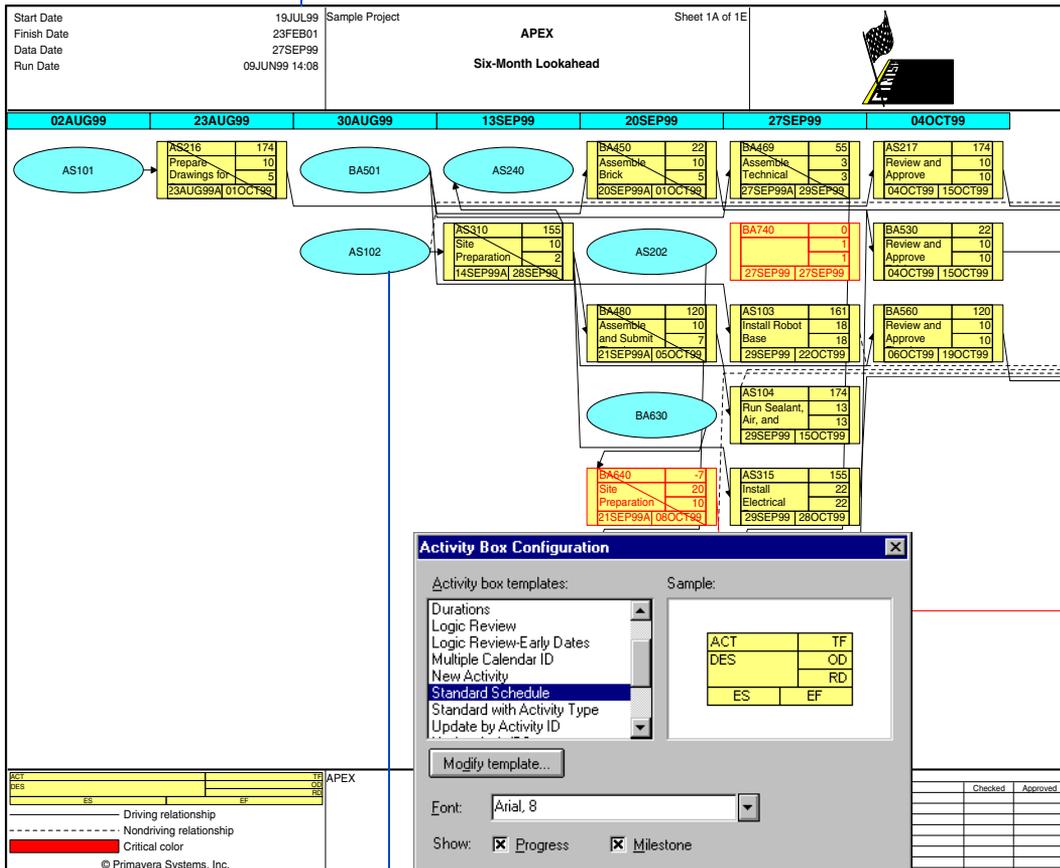
Choose to show connectors when you are viewing a portion of the network.

What Is Scheduled to Begin in the Next Three Months?

Looking ahead to the future project plan prepares you for upcoming events, resource requirements, and cost requirements. You can easily produce lookahead data in a report or Bar chart based on the project start date or the current data date. For example, the following Bar chart shows only those activities scheduled to start in the next three months. This example is organized by responsible manager and includes the primary resource (listed first in the Primary Resource column, along with other assigned resources) so you can see who is responsible for what activities in the near future.

You can specify different patterns on bars to represent various data. In this example, a diagonal crosshatch pattern is used, color-coded by project.
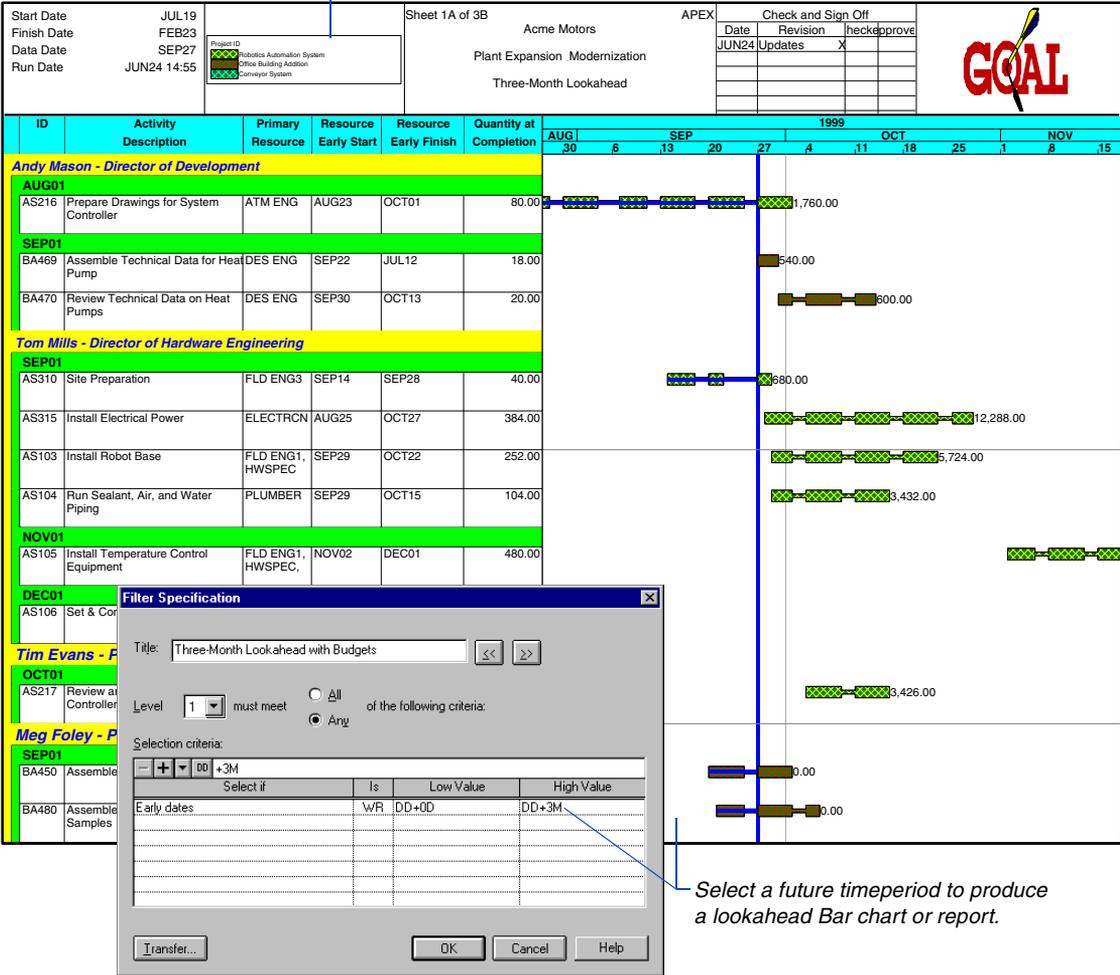
Select a future timeperiod to produce a lookahead Bar chart or report.

What Is Happening in Each Project?

Management or clients may want to see an overall picture of project progress. Create a summary Bar chart by rolling up data to any group level. The following Bar chart graphic shows activities grouped by project and summarized by phase within each project.
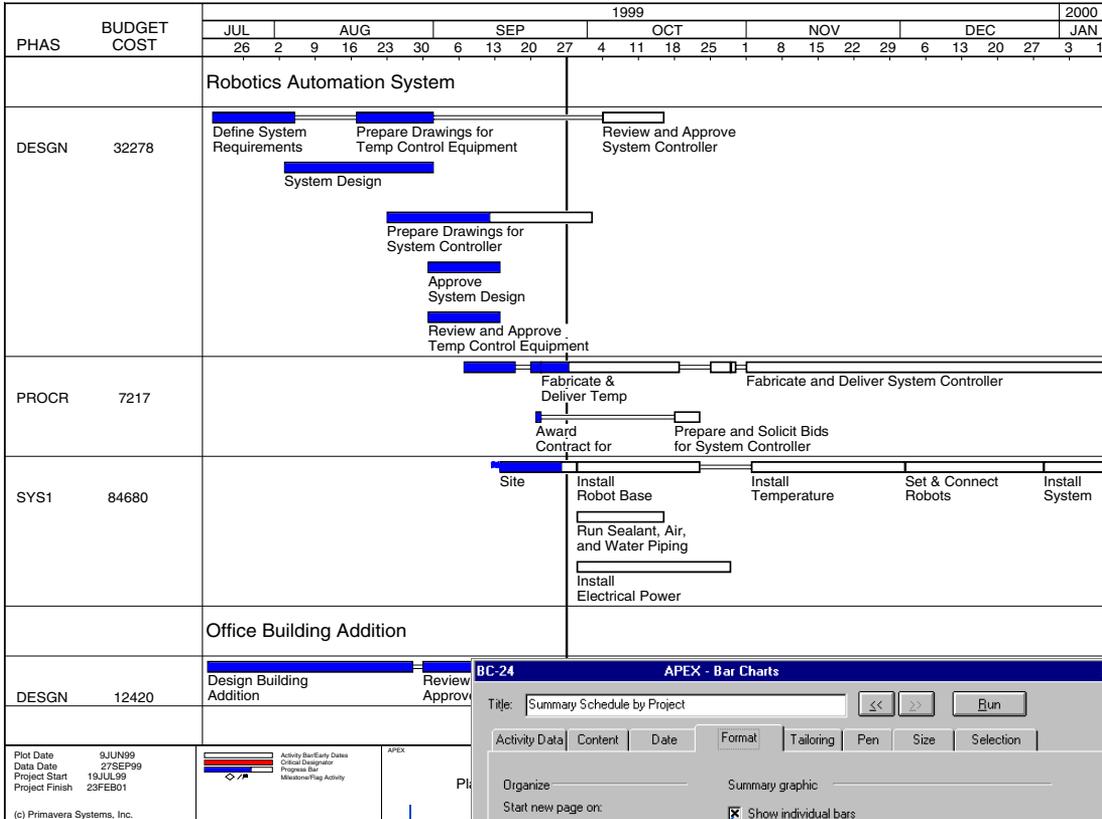
Print a Bar chart graphic such as this one to evaluate progress by phase, then distribute it to participants for their assessment of activities for which they're responsible in each project.

This example shows discrete bars rather than one summary bar.

When Will the Project(s) Be Finished?

When customers or management request end dates for ongoing projects, you can quickly find out when projects will finish by setting up a summary Bar chart layout. The following example shows the current projects in a financial institution; each phase within each project is summarized. Choose Format, Summarize All to summarize data within each group. From either an onscreen or printed layout, you can report when work started and when it will finish, how much progress has been made to date, and how much everything will cost.

This example includes a subtotal line by project so you can see the tabular and graphical data below it rolled up for a quick overview.

When Will Major Milestones Be Achieved?

You can also summarize the major events in a project using a Bar chart that shows only milestones and flags. Use this chart to quickly evaluate overall progress while eliminating the detail.

In a Bar chart graphic, milestones appear as diamonds, and flags are oriented forward or backward, depending on whether they represent a start or a finish.

What's Involved in the Procurement Process?

Activity matrix reports are useful to identify the scheduled date of each step in the procurement process. The following report lists the items to be procured for each project, showing the current early finish date for each step. Use matrix reports for any type of process that involves repetitive steps.

Acme Motors		PRIMAVERA PROJECT PLANNER		Plant Expansion & Modernization	

REPORT DATE 24JUN99   RUN NO. 61   -----Project Schedule-----   START DATE 19JUL99   FIN DATE 23FEB01
                        15:15
Procurement: Early Finish by Step   DATA DATE 27SEP99   PAGE NO. 1

Procurement

Project Item DESCRIPTION	Drawings/ Samples	Review and Approve	Prepare & Solicit Bids	Review/Approve Bids	Award Contract	Fabricate/ Deliver
Robotics Automation System						
TEMPC Temperature Control Equip	31AUG99A	13SEP99A	16SEP99A	21SEP99A	21SEP99A	18OCT99
SYSTC System Controller	01OCT99	15OCT99	22OCT99	28OCT99	29OCT99	27JAN00
	01OCT99	**15OCT99**	**22OCT99**	**28OCT99**	**29OCT99**	**27JAN00**
Office Building Addition						
BRICK Brick	01OCT99	15OCT99	20OCT99	25OCT99	26OCT99	24JAN00
PUMP Heat Pump	29SEP99	13OCT99	18OCT99	20OCT99	21OCT99	02MAR00
FLOOR Flooring	05OCT99	19OCT99	26OCT99	29OCT99	01NOV99	28JAN00
	05OCT99	**19OCT99**	**26OCT99**	**29OCT99**	**01NOV99**	**02MAR00**
Conveyor System						
CNVYS Conveyors	08MAY00	15MAY00	31MAY00	02JUN00	05JUN00	15AUG00
	08MAY00	**15MAY00**	**31MAY00**	**02JUN00**	**05JUN00**	**15AUG00**
	08MAY00	**15MAY00**	**31MAY00**	**02JUN00**	**05JUN00**	**15AUG00**

Are Enough People Available to Do the Work?

You should examine the resource plan to determine whether available resources are sufficient to do the required work. To efficiently manage resources, avoid overloads as well as idle time. The following layout shows the requirements for one resource in relation to the overall project schedule.

% Comp	Early Start	Early Finish	RESP	Budgeted Cost	Task
GANNON					**Lisa Gannon - Project Manager**
100	20JUL99A	04AUG99A	MASON	2,960.00	Define System Requirements
100	03AUG99A	31AUG99A	MASON	17,000.00	System Design
100	17AUG99A	31AUG99A	MASON	1,760.00	Prepare Drawings for Temp Control Equipment
50	23AUG99A	01OCT99	MASON	1,760.00	Prepare Drawings for System Controller
100	31AUG99A	13SEP99A	EVANS	2,826.00	Review and Approve Temp Control Equipment
100	07SEP99A	16SEP99A	FOLEY	1,080.00	Prepare and Solicit Bids for Temp Control Equip
0	04OCT99	15OCT99	EVANS	3,426.00	Review and Approve System Controller
0	18OCT99	22OCT99	FOLEY	784.00	Prepare and Solicit Bids for System Controller
0	10FEB00	15MAR00	MILLS	9,024.00	Test & Debug Line A
0	10FEB00	15MAR00	MILLS	9,024.00	Test & Debug Line B
0	10FEB00	15MAR00	MILLS	5,424.00	Trim Robot Paths Line B
0	24FEB00	15MAR00	MILLS	4,320.00	Trim Robot Paths Line A
0	16MAR00	16MAR00	MILLS	88.00	Pilot Start Line A
0	16MAR00	16MAR00	MILLS	88.00	Start-Up Line B
0	31MAR00	03APR00	HARIS	352.00	Install Processor/Software/Data Tapes
0	30JUN00	05JUL00	EVANS	528.00	Startup Pr
0	06JUL00	18JUL00	EVANS	1,987.80	Train
MOYER					**John Moyer - Project Manager**
0	24JAN00*	20MAR00	MASON	5,280.00	System Design
0	09MAY00	15MAY00	MASON	1,113.00	Review and Approve Drawings
0	16MAY00	31MAY00	FOLEY	440.00	Prepare and Solicit Bids
0	29JAN01	23FEB01	MILLS	4,528.00	

This profile shows that requirements exceed resource availability during February and March.

Is Any Leeway Possible in Allocating Resources?

You can compare early and late date use for critical resources using resource profiles. Although finishing a project early may seem best, working according to late dates can even out the resource load and save money in the end. You need to decide whether it is more important for your project to save time or money. Examine resource profiles to determine when resource use is high and low for both the early and late schedule dates.

In this example, solid bars indicate early date use and crosshatched bars represent the late date use for each resource profiled.

How Are Resources Allocated?

A resource loading report forecasts the quantity of resources needed during each timeperiod. You can organize the report by activity code, project code, activity, resource, or cost account, and produce a summary or a detailed report. The following report shows detailed use for key resources during a two-month period.

Acme Motors		PRIMAVERA PROJECT PLANNER				Plant Expansion & Modernization		
REPORT DATE 10JUN99 RUN NO. 51 07:38		RESOURCE LOADING REPORT				START DATE 19JUL99 FIN DATE 23FEB01		
Resource Loading - Weekly Detailed Total		TOTAL USE FOR WEEK				DATA DATE 27SEP99 PAGE NO. 1		

ACT ID	DESC	7FEB 2000	14FEB 2000	21FEB 2000	28FEB 2000	6MAR 2000	13MAR 2000	20MAR 2000	27MAR 2000
FLD ENG1 - Field Eng-Senior (Hrs)									
AS103	Install Robot Base								
AS105	Install Temperature								
AS108	Install System Contr	16	40	32	40				
AS109	Test & Debug Line A	16	40	32	40	40	24		
AS110	Test & Debug Line B	16	40	32	40	40	24		
AS260	Trim Robot Paths Lin			16	40	40	24		
AS265	Path Refinement and						8	40	32
AS275	Path Refinement and						8	40	32
CS305	Start-Up & Debug Sys								
CS700	Install Conveyor 211								
CS710	Install Conveyor 212								
CS720	Install Conveyor 213								
CS730	Install Conveyor 214								
TOTAL	**FLD ENG1**	48	120	112	160	120	88	80	64
FLD ENG2 - Field Engineer (Hrs)									
AS106	Set & Connect Robots								
AS114	Calibrate Robot Cont								
AS270	Trim Robot Paths Lin	16	40	32	40	40	24		
CS740	Field Piping								
CS750	Field Wiring								
CS760	Field Painting								
TOTAL	**FLD ENG2**	16	40	32	40	40	24		
FLD ENG3 - Field Eng-Assistant (Hrs)									
AS107	Install System & Mis	24							
AS250	Install Bar Rails		16	32	40	40	32		
AS310	Site Preparation								
CS315	Site Preparation								
CS740	Field Piping								
CS750	Field Wiring								
TOTAL	**FLD ENG3**	24	16	32	40	40	32		
	REPORT TOTAL	88	176	176	240	200	144	80	64

When you produce a loading report, specify the resources or cost accounts you want to review, together with the timeframe.

Are Resources Overloaded?

Resource histograms can show you if, when, and why resource use exceeds availability. The following chart profiles the daily demand for several resources in a product development project.
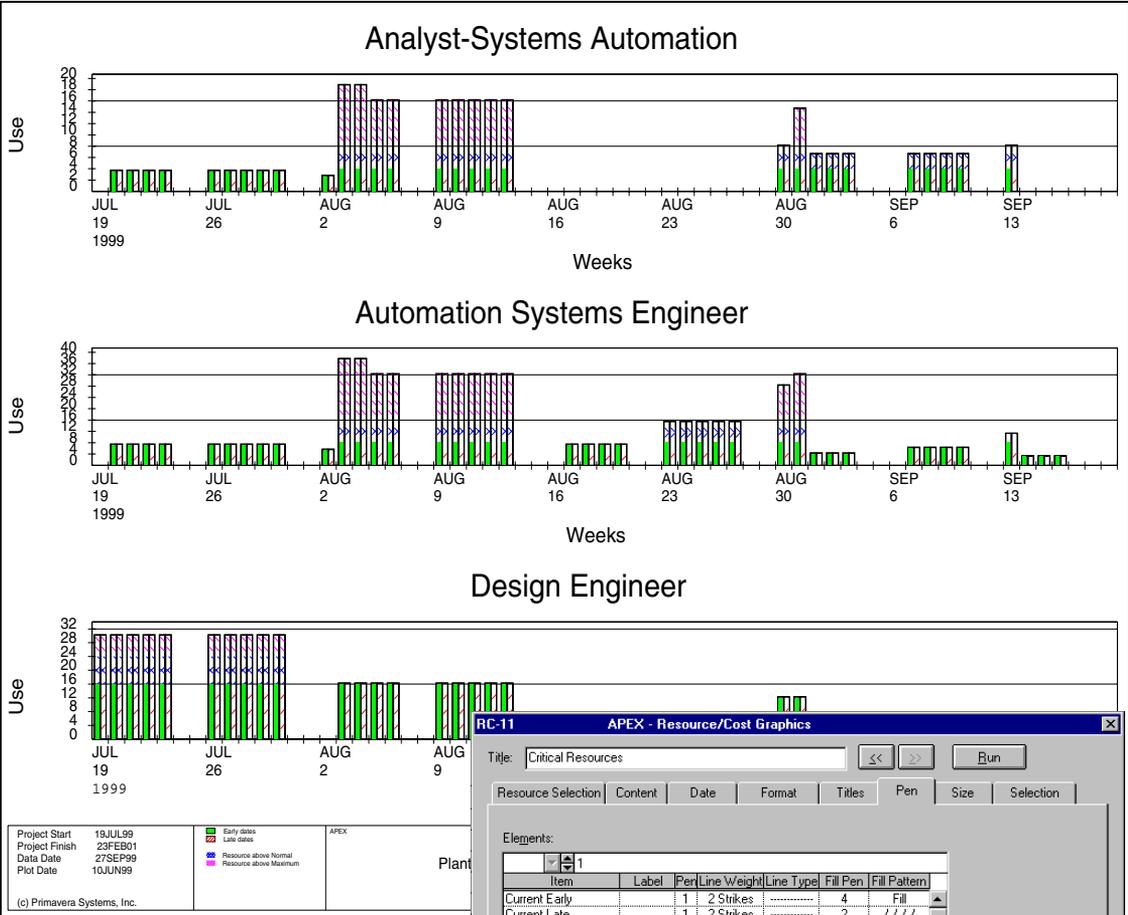
When you set up this type of graphic specification, make sure you specify a different color/pattern to indicate where normal and maximum resource limits are exceeded.

Splitting, Stretching, and Crunching Resources

If you want to use resources fully, you can specify whether P3 can split an activity, scheduling work when sufficient resources are available and suspending work when they are unavailable. When P3 splits an activity, the stretching and crunching parameters (choose Tools, Level, Splitting) for the resource units per timeperiod define the amount of the required resource that is used. Use the Constraints form to specify whether P3 should split the activity during resource leveling. You can see the results of splitting, stretching, and crunching in onscreen profiles and loading reports. Make a backup of your project to perform "what-if" analysis using this function. Determine the impact of better resource use on your project costs and/or end date. Review the "before" and "after" profiles below to see the effect on allocation of one resource in the sample project APEX.
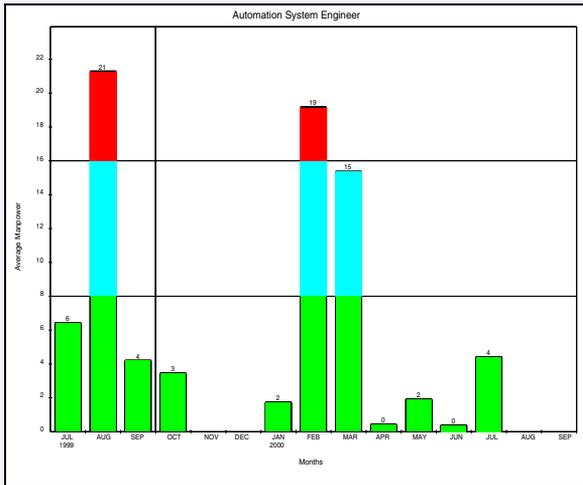
Before splitting, stretching, and crunching, resource availability is insufficient for requirements.

After splitting, stretching, and crunching, requirements are met in the workperiods when sufficient resources are available.
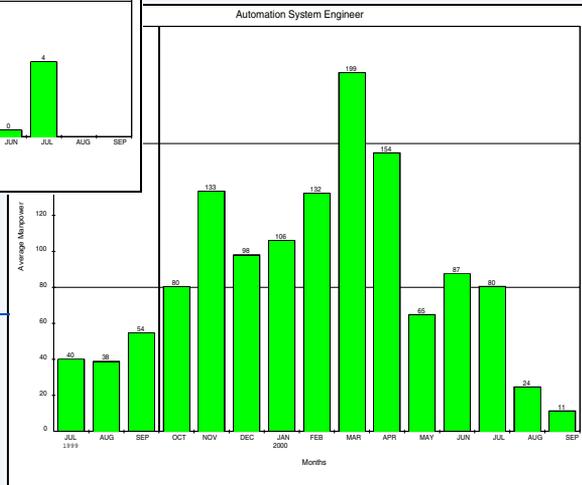
What Are the Projected Costs?

Use cost curves, histograms, and cost control reports to monitor spending. For example, the following cost graphic forecasts spending for the next three months of a project relative to early and late dates. Bars indicate the weekly expenditures, and curves show the accumulated costs for the three-month period.
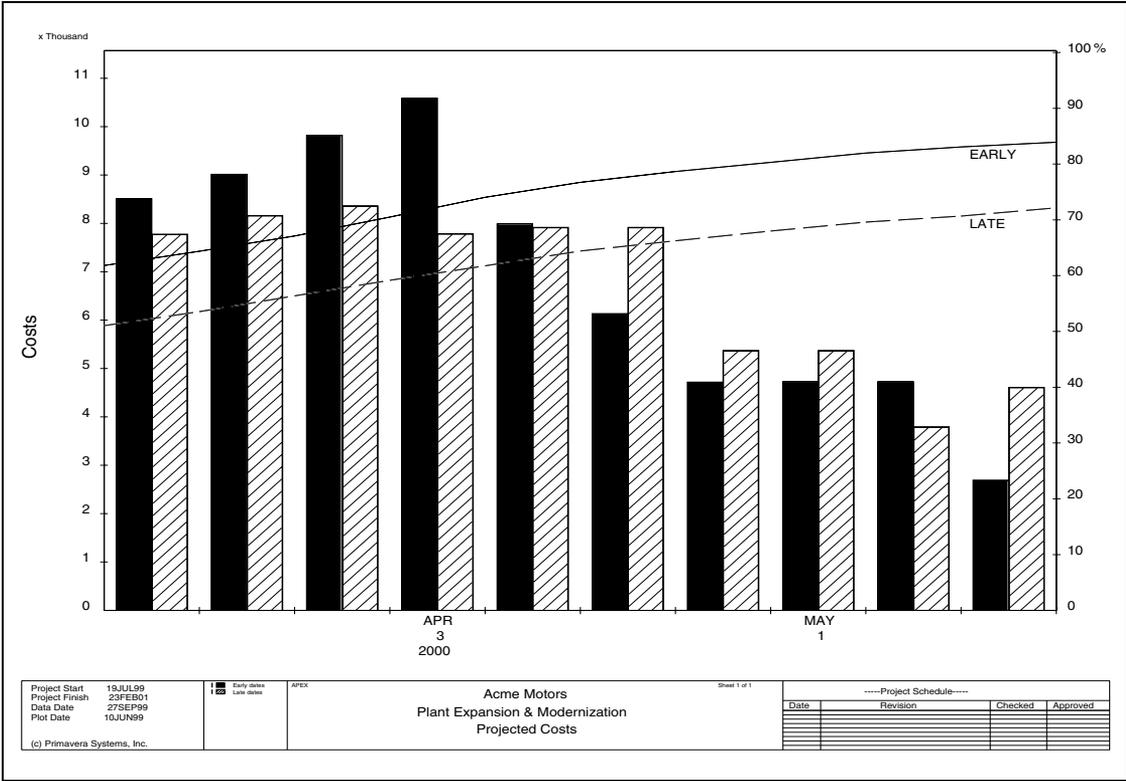
Produce this type of graphic to see forecasted expenditures in relation to early and late dates.

Will Spending Stay within Plan?

Find out how much and how fast money is being spent each month by reviewing a cash flow report. You can compare the expenditure rate based on early, late, and Target 1 schedule dates. Perform a cost comparison to see which schedule is the most feasible. If you store period performance, P3 spreads costs evenly for each update period and spreads costs for the current period from the last storage date to the data date. If you do not store period performance, P3 spreads actual to date values from the actual start dates to the data date, and spreads estimate to complete values from the data date to the finish date.

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Acme Motors                            PRIMAVERA PROJECT PLANNER              Plant Expansion & Modernization

REPORT DATE 10JUN99 RUN NO. 54         TABULAR COST REPORT - MONTHLY          START DATE 19JUL99 FIN DATE 23FEB01
            15:28
Tabular Cost - Monthly Project Cash Flow                                      DATA DATE 27SEP99 PAGE NO. 1

-----------------------------------------------------------------------------------------------------------------------
    PERIOD      -----EARLY SCHEDULE----        -----LATE SCHEDULE-----        ---TARGET 1 SCHEDULE---
    BEGINNING   USAGE        CUMULATIVE        USAGE        CUMULATIVE        USAGE        CUMULATIVE
    ----------  ----------   -----------       ----------   -----------       ----------   -----------
                COST ACCOUNT = ????????????? -                                TARGET = EARLY

    1JUL99      11908.00     11908.00          11368.00     11368.00          2960.00      2960.00
    1AUG99      21457.03     33365.02          21457.03     32825.02          29760.00     32720.00
    1SEP99      19788.18     53153.20          39648.18     72473.20          15174.70     47894.70
***DATA DATE***
    1OCT99      50717.80     103871.00         26760.00     99233.20          73204.00     121098.70
    1NOV99      90032.00     193903.00         172516.00    271749.20         182380.00    303478.70
    1DEC99      125388.00    319291.00         112140.00    383889.20         10448.00     313926.70
    1JAN00      315800.00    635091.00         71984.00     455873.20         382440.00    696366.70
    1FEB00      79000.00     714091.00         215600.00    671473.20         160360.00    856726.70
    1MAR00      202312.00    916403.00         680.00       672153.20         109579.00    966305.70
    1APR00      201736.00    1118139.00        242251.00    914404.20         184869.00    1151174.70
    1MAY00      56873.00     1175012.00        62439.00     976843.20         38273.00     1189447.70
    1JUN00      59154.60     1234166.60        70953.60     1047796.80        85506.60     1274954.30
    1JUL00      59027.80     1293194.40        166419.80    1214216.60        24675.80     1299630.10
    1AUG00      49020.00     1342214.40        81084.00     1295300.60        33020.00     1332650.10
    1SEP00      2800.00      1345014.40        11824.00     1307124.60        2800.00      1335450.10
    1OCT00      .00          1345014.40        17864.00     1324988.60        .00          1335450.10
    1NOV00      10000.00     1355014.40        19306.00     1344294.60        12000.00     1347450.10
    1DEC00      11085.50     1366099.90        2816.00      1347110.60        12285.50     1359735.60
    1JAN01      39328.00     1405427.90        44896.00     1392006.60        36128.00     1395863.60
    1FEB01      4000.00      1409427.90        17421.30     1409427.90        4000.00      1399863.60
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For a graphical representation of cost data, you can use a cash flow graphic and include cumulative curves that represent early, late, and target date spending.

Where Is Money Being Spent?

When you need to monitor spending in a project, a detailed cost control report by cost account can show where the dollars are going. The following cost control report focuses on only the Design phase of the Automation System in project APEX. The variance in this report indicates a difference between budgeted and forecasted costs.

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Acme Motors                          PRIMAVERA PROJECT PLANNER              Plant Expansion & Modernization

REPORT DATE 10JUN99 RUN NO. 57       COST CONTROL ACCOUNT REPORT            START DATE 19JUL99 FIN DATE 23FEB01
              16:00
Cost Control Detailed by Cost Account                                       DATA DATE 27SEP99 PAGE NO. 1

---------------------------------------------------------------------------------------------------------------------------------------------
                     COST      ACCOUNT   UNIT              PCT    ACTUAL      ACTUAL       ESTIMATE TO
ACTIVITY ID RESOURCE ACCOUNT   CATEGORY  MEAS BUDGET       CMP    TO DATE     THIS PERIOD   COMPLETE    FORECAST   VARIANCE
----------- -------- --------  --------  ---- -----------  ----   ----------  ------------  ----------  ----------  ---------

                     11??????????

AS100       ANALYST  11101     L  LABOR  Hrs  1200.00     100.0   1200.00        .00          .00       1200.00        .00
AS101       ANALYST  11101     L  LABOR  Hrs  5160.00     100.0   5160.00      360.00       100.00       5260.00     -100.00
AS102       ANALYST  11101     L  LABOR  Hrs  1200.00     100.0   1200.00        .00          .00       1200.00        .00
AS100       ATM ENG  11101     L  LABOR  Hrs  1760.00     100.0   1760.00        .00          .00       1760.00        .00
AS101       ATM ENG  11101     L  LABOR  Hrs  7040.00     100.0   7040.00        .00          .00       7040.00        .00
AS101       DES ENG  11101     L  LABOR  Hrs  4800.00     100.0   4800.00        .00          .00       4800.00        .00
AS102       PRG MGR  11101     L  LABOR  Hrs  1346.00     100.0   1346.00        .00          .00       1346.00        .00
AS205       ANALYST  11211     L  LABOR  Hrs   600.00     100.0    600.00        .00          .00        600.00        .00
AS204       ATM ENG  11211     L  LABOR  Hrs  1760.00     100.0   1936.00        .00          .00       1936.00     -176.00
AS205       ATM ENG  11211     L  LABOR  Hrs   880.00     100.0    880.00        .00          .00        880.00        .00
AS205       PRG MGR  11211     L  LABOR  Hrs  1346.00     100.0   1346.00        .00          .00       1346.00        .00
AS217       ANALYST  11231     L  LABOR  Hrs  1200.00       .0       .00        .00        1200.00       1200.00        .00
AS216       ATM ENG  11231     L  LABOR  Hrs  1760.00      50.0    880.00        .00         880.00       1760.00        .00
AS217       ATM ENG  11231     L  LABOR  Hrs   880.00       .0       .00        .00         880.00        880.00        .00
AS217       PRG MGR  11231     L  LABOR  Hrs  1346.00       .0       .00        .00        1346.00       1346.00        .00
                                               ------------  -------  --------   -----     -----------  -----------   ----
            ACCOUNT TOTAL      11??????????   32278.00     87.2   28148.00    360.00      4406.00      32554.00     -276.00
===========================================================================================================================================
```

Measuring Earned Value

You can determine performance using earned value—the calculated value of work satisfactorily completed based on a complete target plan. Activities often are not performed as planned: the work completed is insufficient and/or the cost per unit of work is different than anticipated. For example, suppose you plan to finish an activity by June 1 with a budget of $3,000. It is now June 1 and you have spent $3,000, but only 70 percent of the work is complete. You are not only behind schedule, but over budget.

Measuring earned value involves three key indicators: planned value (or budgeted cost for work scheduled—BCWS), earned value (or budgeted cost for work performed—BCWP), and actual cost for work performed (ACWP). If you track these values over time, you can see the past spending and schedule trends for the project, together with a forecast of future costs.

The variance between the planned budget and earned value amounts indicates an unfavorable schedule variance.

You can create Activity columns to report earned value in a tabular format.

Is the Project Being Performed as Planned?

Comparing actual costs to budgets is a simplistic approach to cost control. Measuring performance using earned value is more effective. You can print a tabular earned value report to see the value of work performed as well as the actual costs for work performed.

Measure performance by comparing progress from the current schedule to the Target 1 baseline schedule.

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Acme Motors                            PRIMAVERA PROJECT PLANNER           Plant Expansion & Modernization

REPORT DATE 10JUN99 RUN NO. 58         EARNED VALUE REPORT - COST          START DATE 19JUL99 FIN DATE 23FEB01
            16:42
Earned Value Report - Cost                                                 DATA DATE 27SEP99 PAGE NO. 1
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COST ACCOUNT		RESOURCE	ACTIVITY ID	PCT CMP	ACWP	BCWP	BCWS	COST	SCHEDULE	BUDGET	ESTIMATE
					.......CUMULATIVE TO DATE.......			........VARIANCE.........		...AT COMPLETION....	
11213	L	ACCTS	AS200	100.0	640.00	640.00	640.00	.00	.00	640.00	640.00
11213	L	ACCTS	AS201	100.0	128.00	128.00	128.00	.00	.00	128.00	128.00
11213	L	ACCTS	AS202	100.0	64.00	64.00	64.00	.00	.00	64.00	64.00
11233	L	ACCTS	AS213	.0	.00	.00	256.00	.00	-256.00	256.00	256.00
11233	L	ACCTS	AS214	.0	.00	.00	256.00	.00	-256.00	256.00	256.00
11233	L	ACCTS	AS215	.0	.00	.00	.00	.00	.00	32.00	32.00
12312	L	ACCTS	CS420	.0	.00	.00	.00	.00	.00	32.00	32.00
13426	L	ACCTS	BA411	.0	.00	.00	256.00	.00	-256.00	384.00	384.00
13426	L	ACCTS	BA412	.0	.00	.00	.00	.00	.00	128.00	128.00
13426	L	ACCTS	BA413	.0	.00	.00	.00	.00	.00	32.00	32.00
13516	L	ACCTS	BA421	.0	.00	.00	.00	.00	.00	384.00	384.00
13516	L	ACCTS	BA422	.0	.00	.00	.00	.00	.00	96.00	96.00
13516	L	ACCTS	BA423	.0	.00	.00	.00	.00	.00	32.00	32.00
13616	L	ACCTS	BA407	.0	.00	.00	.00	.00	.00	640.00	640.00
13616	L	ACCTS	BA408	.0	.00	.00	.00	.00	.00	96.00	96.00
13616	L	ACCTS	BA409	.0	.00	.00	.00	.00	.00	32.00	32.00
		ACCTS	TOTAL	25.7	832.00	832.00	1600.00	.00	-768.00	3232.00	3232.00
11101	L	ANALYST	AS100	100.0	1200.00	1200.00	1200.00	.00	.00	1200.00	1200.00
11101	L	ANALYST	AS101	100.0	5160.00	5160.00	5160.00	.00	.00	5160.00	5260.00
11101	L	ANALYST	AS102	100.0	1200.00	1200.00	1200.00	.00	.00	1200.00	1200.00
11211	L	ANALYST	AS205	100.0	600.00	600.00	600.00	.00	.00	600.00	600.00
11231	L	ANALYST	AS217	.0	.00	.00	1200.00	.00	-1200.00	1200.00	1200.00
		ANALYST	TOTAL	87.2	8160.00	8160.00	9360.00	.00	-1200.00	9360.00	9460.00
11101	L	ATM ENG	AS100	100.0	1760.00	1760.00	1760.00	.00	.00	1760.00	1760.00
11101	L	ATM ENG	AS101	100.0	7040.00	7040.00	7040.00	.00	.00	7040.00	7040.00
11211	L	ATM ENG	AS204	100.0	1936.00	1760.00	1760.00	-176.00	.00	1760.00	1936.00
11211	L	ATM ENG	AS205	100.0	880.00	880.00	880.00	.00	.00	880.00	880.00
11213	L	ATM ENG	AS200	100.0	440.00	440.00	440.00	.00	.00	440.00	440.00
11223	L	ATM ENG	AS109	.0	.00	.00	.00	.00	.00	4224.00	4224.00
11223	L	ATM ENG	AS110	.0	.00	.00	.00	.00	.00	4224.00	4224.00
11223	L	ATM ENG	AS111	.0	.00	.00	.00	.00	.00	88.00	88.00
11223	L	ATM ENG	AS112	.0	.00	.00	.00	.00	.00	88.00	88.00
11223	L	ATM ENG	AS260	.0	.00	.00	.00	.00	.00	1320.00	1320.00
11223	L	ATM ENG	AS270	.0	.00	.00	.00	.00	.00	1584.00	1584.00
11231	L	ATM ENG	AS216	50.0	880.00	880.00	1760.00	.00	-880.00	1760.00	1760.00
11231	L	ATM ENG	AS217	.0	.00	.00	880.00	.00	-880.00	880.00	880.00
11233	L	ATM ENG	AS213	.0	.00	.00	528.00	.00	-528.00	528.00	528.0

What to Do Next?

After you report progress and distribute the necessary reports, schedule a meeting with team members and supervisors to review project status. Meetings should be short and to the point, focusing on problem areas and discussing solutions.

When a schedule falls behind, you can take several courses of action:

■   *Identify activities on the critical path that have long durations.* Assign additional resources to these activities to reduce their durations and therefore reduce the length of the critical path.

Adding resources is not always a positive solution; sometimes it may actually hamper progress and lengthen the duration, especially if the additional resources are less experienced than the original ones.

■   *Rearrange activity sequences,* perhaps by performing some sequentially scheduled activities in parallel.

■   *Avoid focusing on one activity that has fallen behind schedule.* Instead, examine the paths leading to the activity, since the delay may be caused by a predecessor. Then look at successors to determine whether you can make any changes to counteract the delay.

Activities that are behind schedule should not be viewed as discrete items because they may affect similar activities later in the project. For example, you can compensate for a delay in installing ceiling grids by shortening the duration. However, if the delay was really caused by poor productivity or an underestimate of duration, the same delay may occur during future construction activities.

When the resource plan exceeds the maximum quantity available, several solutions are possible:

■   Use P3's hierarchical resource feature to assign similar qualified resources to overloaded activities.

■   Revise the availability limits or increase the number of workdays in the week for critical resources.

■   Assign or reassign resource/cost distribution curves.

■   Level resources to minimize overtime and unproductive time, and to overcome any shortages.

The solution you choose depends on whether time, money, or resources are more important for your project. You'll probably want to spend more money for additional resources rather than allow the project deadline to slip.

One advantage of using P3 to control your projects is that it enables you to easily examine and evaluate the effect of different approaches to modifying schedules before you actually change the schedule. For example, you can make a complete duplicate of a project for "what-if" analyses (choose Tools, Project Utilities, Copy), and then implement the changes in the current schedule.

When the project is complete, examine what went right and what went wrong. Instead of sifting through large stacks of reports, use P3 to analyze data efficiently. For example, use activity codes to focus on specific groups of activities, or store period performance to analyze and track quantities and costs before the data date so you can make informed decisions about allocation and budgets in the future. After you evaluate the results, apply what you learned to improve future projects. For example, schedule variances—whether positive or negative—can indicate that you should revise activity durations in future projects. While P3 is an excellent tool for successfully managing projects, the ultimate responsibility lies with you. You still do the thinking and make the decisions. The real success of the project depends on your skill and judgment as a project manager.

Customizing Presentations

In this part: **Customizing the Bar Chart**

Organizing Data

Customizing PERT

Printing Layouts, Reports, and Graphics

*T*o communicate the schedule to other members of the project team, management, or clients, you need to present it in a way that is clear and understandable. P3 makes it easy to create effective presentations because you can change the visual aspects of a project onscreen, preview it, and print it with no surprises—what you see onscreen is what prints on paper.

This part of the *Planning and Control Guide* describes the different ways you can customize layouts in P3 to sharpen the content and appearance of your project presentations, and it explains how to customize and print the predefined reports and graphics supplied with P3.

Customizing the Bar Chart

Customize a Bar chart layout by defining and formatting the data you want in the Activity columns. You can also control nearly every aspect of the Bar area, including the schedule dates all or individual bars represent; their size, color, and endpoint designations; and other timescale elements. Create summary presentations based on project codes, activity codes, resources, cost accounts, or the work breakdown structure (WBS) for the project.

You can also use P3's Attachment tools and object linking and embedding (OLE) to enhance your Bar chart presentation.

Customizing Activity Columns

The default Bar chart layout contains columns for schedule data. You can, however, customize both the content and the appearance of the Activity columns. Specify the data that appear in each column. Modify font type and size, background colors, and other elements.

Format a single Activity column   Double-click the column title for the column you want to modify.

Click to change the data item displayed in the column.
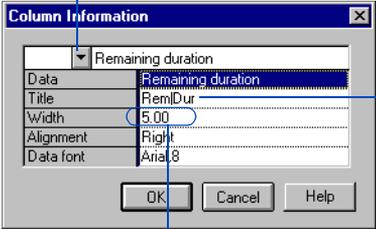
The pipe (I) character indicates a line break for the column title.

P3 automatically adjusts the width of the column to best fit the data; however, you can manually change it by entering a number in the Width field.

You can also adjust the width of individual columns by dragging the border to the right of the column whose width you want to change.

When the mouse pointer changes to ⊹ , drag the column border to the right to increase the column width or to the left to decrease it.

To change the background and text colors of Activity columns and titles, choose Format, Screen Colors.
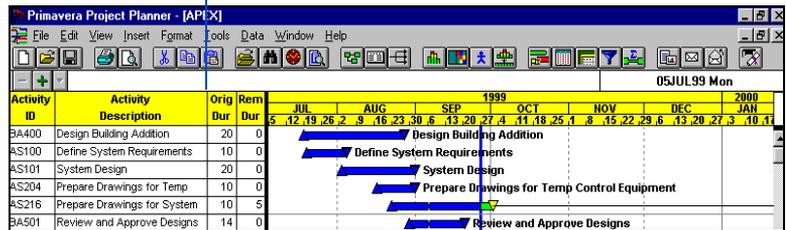
If you include a column for resources, predecessors, successors, or cost accounts, all assignments appear in the column cell for the activity. Make sure you adjust the column width in any of these cases so you can see all values for each activity in the Activity columns.

Add columns Choose Format, Columns. To add a new column to the end, scroll to the bottom of the data items list and click the next blank row. Click ▾ to display a list of data items available, then select the item you want. To insert a new column between existing columns, select a data item in the Data column, then click ⊞. P3 inserts a new column above the one you selected.

The sequence of columns onscreen is the same as their order in this list.

Use to add or delete columns.

Specify the font P3 uses for all column titles.
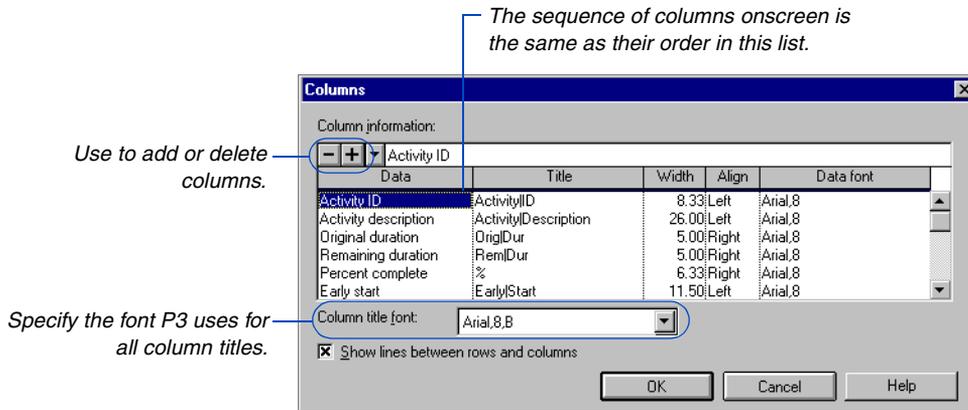
P3 redisplays the Activity columns with any modifications you made. To view any columns that may not be visible, drag the vertical split bar to the right, or use the horizontal scroll bar below the Activity columns to view additional columns.

Adjusting the Timescale

P3 displays the timescale at the top of the Bar area, beginning just before the project start date and extending beyond the project finish date. You can change the timescale to span a specific timeframe and control the size of the activity bars by compressing or expanding the timescale.

Adjust the timescale Double-click anywhere in the timescale.
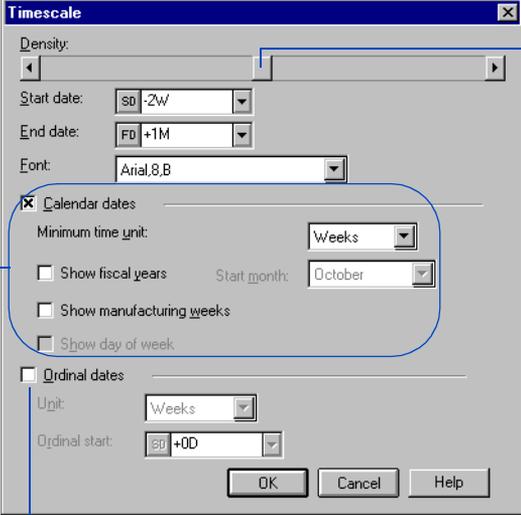
Drag the scroll bar to the right to expand the spacing of the timescale or to the left to compress it.

When showing calendar dates, you can choose to show fiscal years, manufacturing weeks, the days of the week, or a combination of these choices, depending on the minimum time unit.

Mark the Ordinal Dates checkbox to show sequential numbers for each time unit instead of specific dates. This feature is useful during initial project bidding.

Compressed timescale

Expanded timescale
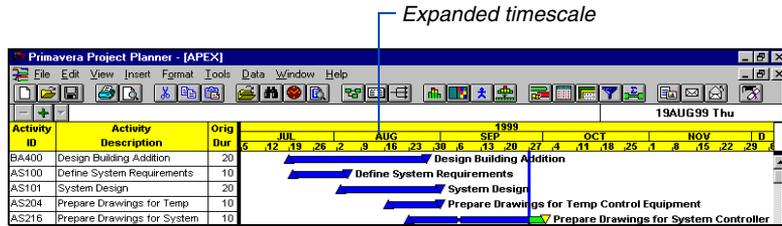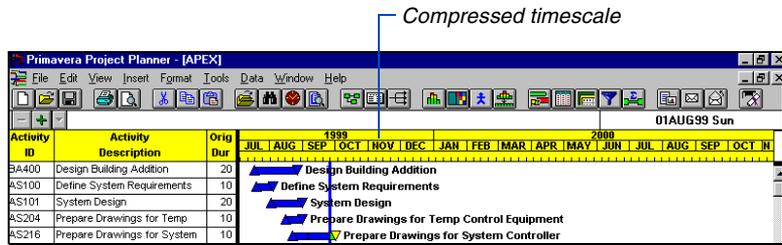
P3 labels the timescale using a combination of three increments of time, such as weeks, months, or years. You can specify the minimum time unit displayed using the Timescale dialog box. For example, if you specify days as the minimum time unit, P3 labels every day of the month, depending on the available space. If space is insufficient to show every day, P3 uses hash marks instead of numbers.

Use rolling dates   Use rolling dates to set the start and end dates for the timescale. A rolling date format is based on a date type, such as the project start (SD), data date (DD), or project finish (FD). Customize the rolling date by adding or subtracting a time unit (such as hours, days, or weeks) to the date type you select.

Click to choose a rolling date format.

Choose Calendar Date to base the timescale on specific dates.

This rolling date is based on the project start and finish dates. The Start Date is set to two weeks before the project start; the End Date is set to one month after the project finish.

When you use rolling dates you set the date range only once. As the project moves forward in time, P3 automatically adjusts the rolling date.

Horizontal minor sight lines set at every activity are useful when you show more than one bar per activity.

Format sight lines, data date line, and progress line Use sight lines in the Bar area to help you trace bars to their position along the timescale (vertically) or to Activity column data (horizontally). Specify the location and style of major and minor horizontal and vertical sight lines. By default, major sight lines appear as solid gray lines, while minor sight lines are dotted gray lines that are positioned between major sight lines.

You can also change the density and color of the data date line and progress lines. P3 uses the data date, or "as-of" date, when calculating the schedule. The data date line is always visible in the Bar area. The progress line graphically traces progress to see an overall picture of project performance. Choose View, Progress Line, to display the progress line. By default, the data date line is a thick blue line, and the progress line is a thick red line. Choose Format, Sight Lines to specify how you want sight lines, the data date line, and the progress line to appear in the Bar area.

Space horizontal sight lines according to a specific number of activities.

Change the line thickness and color of the data date line and progress line, and the method used to draw the progress line.

Space vertical sight lines based on a specific number of time intervals in the timescale.
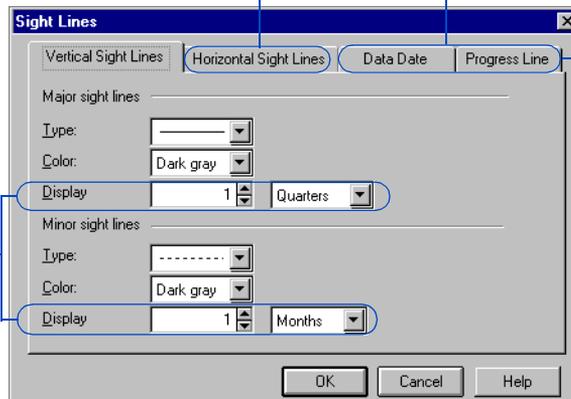
Formatting Bars

A bar represents the schedule dates for an activity. You can display multiple bars for each activity, for example, show an early date bar, a late date bar, and a target bar. Distinguish the bars by varying their color, shape, size, and endpoint designators. You can modify the attributes of individual bars, for example, to distinguish a particular group of bars using different endpoints or colors, or to call out individual bars using a different pattern.

Format all activity bars Choose Format, Bars. The default layout provides a bar for early dates, float, late dates, and resource dates, as shown in the following example.

The key bar is used for summarizing, showing patterns, and showing relationship lines. Only one bar is assigned as the key bar.

Double-click the checkbox in this column to show or hide a bar.

Assign position numbers to place each bar. Bars with the same position number appear on the same line. Assign consecutive numbers to align the bars close together or skip numbers (Pos 1, 3, 5, and so on) to spread them out.

Define how to show progress and critical activities.

In the default layout, the early bar and float bar appear on the same line (position 1).

Modify an existing bar or add a new bar Choose Format, Bars. In the Bars dialog box, choose an existing bar to modify, then click Modify, or add a new bar by clicking ⊞.

Type a number from 1 to 99 to indicate relative placement of the bar when multiple bars are displayed.

Type a description to identify the bar.

Define a bar by specifying when it should start and end. Right-click to choose from a list of start and finish schedule dates for the current or the target schedule.

Format the length of time between the start and endpoints as a solid, dashed, or dotted line, or as a thick bar.

Click to select a bar color.

Use these fields to define endpoints.

Click OK, then click Close in the Bars dialog box to apply your changes.

Show nonworktime on activity bars P3 indents, or "necks," activity bars to indicate nonworktime. Mark the Neck checkbox in the Bars dialog box for bars representing current or target schedule dates. P3 indents bars when an activity has defined suspend and resume dates or when an activity has out of sequence progress.

Nonworktime

You can also choose to show necking for holidays and/or weekends, based on the activity's calendar. Mark the appropriate checkbox(es) in the Bars dialog box.

Resource bars only display necking when you group the Bar chart by resource.

Modify endpoints and milestones/flags Specify the start and end point size, position (above, below, or centered on the bar), and style (outlined or displayed), and the milestone point size in the Bars or Bar Definition dialog box. Click Endpoints to select endpoint, milestone, and flag shapes and colors.

1 *Click the endpoint you want to modify. To choose more than one endpoint at once, press and hold the Ctrl key as you click on shapes, or drag the mouse over consecutive shapes.*

2 *Select a shape for the selected endpoints.*

3 *Select a color.*

You can also customize endpoints for custom data items that represent dates.

You can change or add to the standard set of shapes P3 uses for endpoints with the Endpoint Manager application (installed during P3 Setup). Refer to the Reference *manual for more information.*

Set attributes for individual bars   Select activities in columns for the bar(s) you want to modify, and choose Format, Selected Bars, Modify Bar Format. Change bar style, pattern, or shape by selecting new values from the drop-down lists, then click any of the Color blocks to select a different color from the color palette.

You can change only the bar types previously defined in the Bars dialog box for the entire layout.
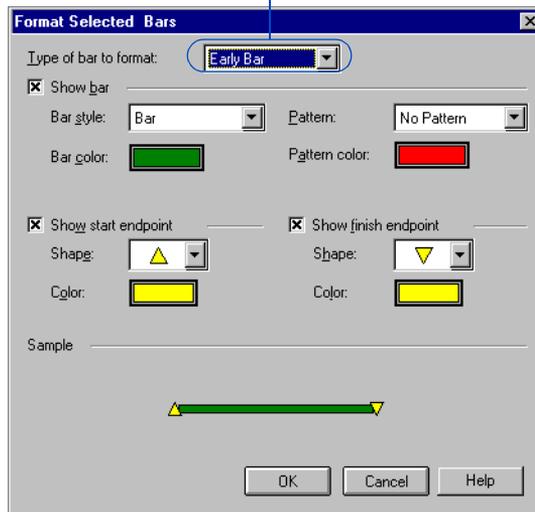
The bar you are copying must have the same bar type as the bars to which you are pasting the bar format. For example, if you select the early bar as the bar type to copy, you can only paste that bar format to other early bars in the layout.

Apply a bar format to other bars You may want to set up attributes for one bar to be used as a template for other bars in a layout. The following example uses a specific bar format for design-related activities. Right-click the bar and choose Format Selected Bars, Copy Bar Format. In the Activity columns, select the activities to which you want to apply the copied attributes, then right-click and choose Format Selected Bars, Paste Bar Format. Select a bar type to paste for the selected bars (if you copied more than one bar type), then click Paste.

This early bar was modified and copied...

...then pasted to these other early bars.
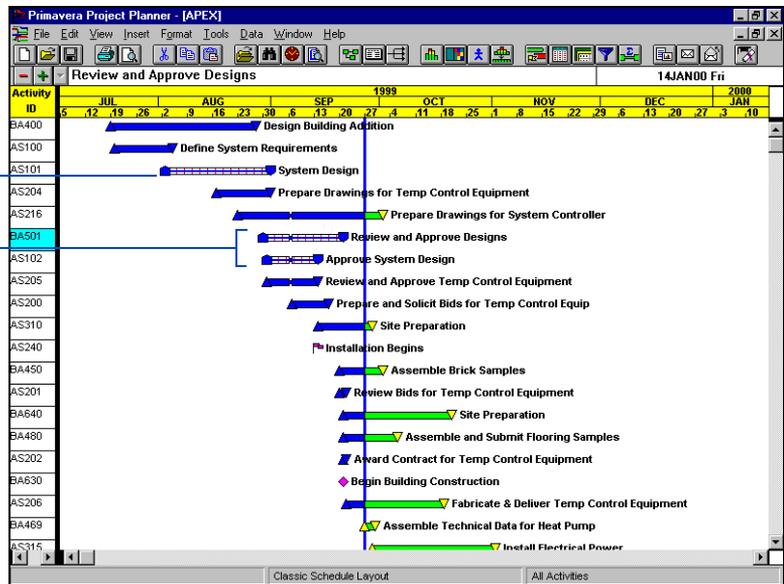
Revert to the original formatting If you want to use the original settings for the bar types in a layout, select the bars you want to change, then choose Format, Selected Bars, Use Default Bar Format. If you selected more than one bar, from the drop-down list in the Default Bar Format dialog box, select the bar type or All Bars to which to apply the default bar format, then click OK.

If the bar formats of the selected activities are already set to the defaults, the Use Default Bar Format menu command is inactive.

Showing Data on Bars

Some data items can be shown directly on bars for reference, including the activity ID, description, cost data, schedule dates, durations, float values, and logs.

The bars on this layout show each activity's ID and the budgeted cost.
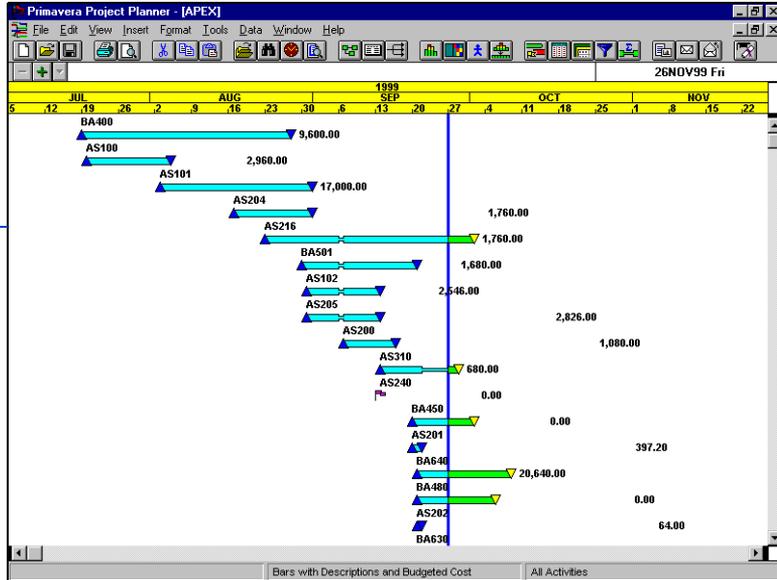
Show data on bars Use the Label tab of the Modify Bar Definition dialog box (choose Format, Bars, select a bar, click Modify, then click the Label tab) to specify the data items you want to show on activity bars. You can also set the position of the data item relative to the bar using the picture of the bar at the bottom of the dialog box as a guide. The preceding example shows the activity ID above the bar (top position), the description below the bar (bottom position), and the budgeted cost at the end of the bar (right-most position).

1 Click to specify a new data item on the activity bar.

2 Right-click and select a position for the data item.

3 Select a data item.

4 Select a font.

If you choose to show logs, enter the log number you want to display in the Start and End Log columns. You can also show two or more data items in the same position. Separate the items by entering a character such as a slash or hyphen in the Separator field of the Structure tab.

Adjust row height When you add data above or below activity bars, P3 automatically increases the row height. P3 sets the height of a row based on the size and data in the Activity columns as well as on the size and number of bars for each activity in the Bar area. You can also manually adjust the row height of an individual activity or of all activities.

The row-height indicator shows the current row height (in points).

Point to the bottom left grid line for the activity whose height you want to change, then drag the grid line up or down to change the height.

You can also adjust the row height for multiple activities manually by choosing Format, Row Height.

Crosshatching Bars by Activity Code

Use colors and patterns on activity bars to distinguish activities by specific groups. For example, assign a dark blue crosshatch pattern to identify activities that are the responsibility of a specific manager.

When you use patterns, you can still show progress and identify critical activities; P3 displays progress like a "thermometer" bar.
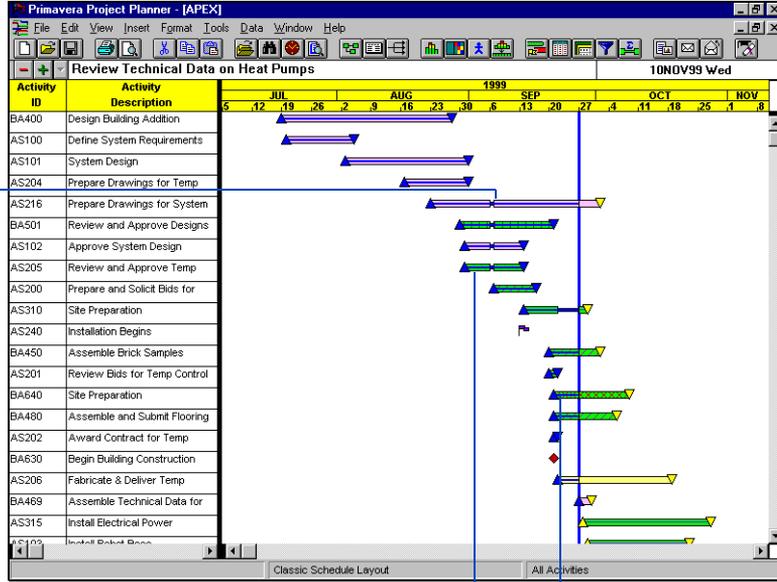
Responsibility of Evans.　*Responsibility of Nolan.*

Assign patterns and colors to activity bars Choose Format, Bars, then click Pattern. Show patterns on bars based on the selected activity code; or choose another existing activity code.

Click to assign a pattern and color to one code value at a time. Click ▼ to select a code value.

Choose a pattern and color for each code value.

Pattern

Pattern bars based on activity code: RESP - Responsibility ▼

Patterns for code values:

Code Value	Pattern	Pattern Color
ACME	Crosshatch	
EVANS	Down diagonal	
FOLEY	Up diagonal	
HARIS	Vertical	
MASON	Solid fill	
MILLS	Horizontal	
NOLAN	Diagonal crosshatch	
VENDR	Solid fill	

Fills in default settings for all code values

Assign patterns for all code values

Clear all patterns for code values

Legend   OK   Cancel   Help

Save the current pattern specification to a file so you can paste it on the layout.

Patterns appear only on the bar designated as the "key" bar in the Bars dialog box.

Summarizing Data

A summary display condenses large amounts of data into an easily read form. Summary presentations are especially convenient for management and client overviews because they suppress activity-level details. P3 enables you to quickly summarize activity data based on project codes, activity codes, WBS codes, resources, or cost accounts. For example, summarize the procurement of individual items, the work in each phase, or the funding for each member project.

This layout shows summary data for each project division by location.
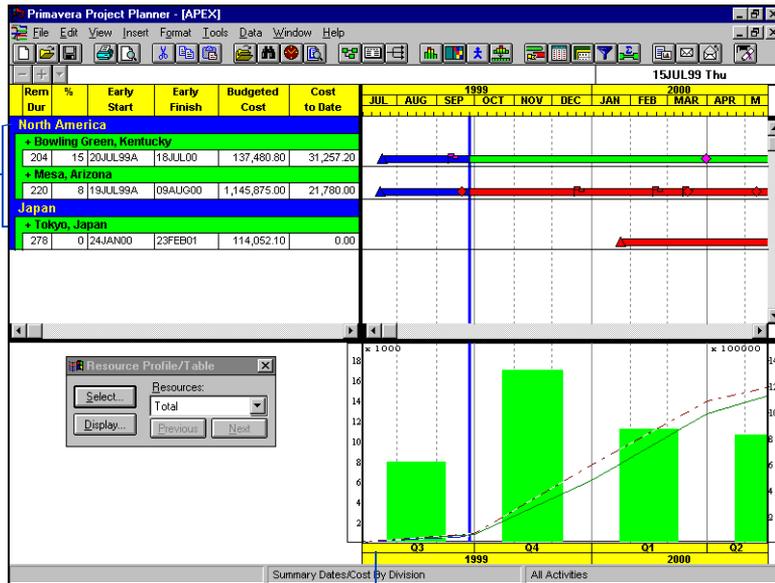
The cost profile shows the total summarized costs per quarter.

Summarize data in the Bar chart Choose Format, Organize, to organize the Bar chart so that it is grouped by an activity code, project code, resource, cost account, or work breakdown structure (WBS) codes. Double-click the group title band for the activities you want to summarize.

Rem Dur	%	Early Start	Early Finish	Budgeted Cost	Cost to Date	JUL	AUG
North America							
+ Bowling Green, Kentucky							
204	15	20JUL99A	18JUL00	137,480.80	31,257.20		
+ Mesa, Arizona							
220	8	19JUL99A	09AUG00	1,145,875.00	21,780.00		
Japan							
+ Tokyo, Japan							
278	0	24JAN00	23FEB01	114,052.10	0.00		

When a group has been summarized, a plus sign (+) appears in the group title. Double-click the title again to redisplay the activity details.

P3 summarizes schedule data into one bar. The dates summarized depend on how you define the bar. If the activity bars represent early dates, the summary bar begins at the earliest early start date of all activities in the group and extends to the latest early finish date of the same activities. P3 also summarizes data in the Activity columns; for example, durations are totaled and an average percent complete is calculated.

If you define multiple bars, P3 can summarize only one bar type at a time, such as early date bars or late date bars. Use the Key column in the Bars dialog box (choose Format, Bars) to indicate which schedule dates to summarize by.

Summarize all groups in a layout   Instead of double-clicking each group title, choose Format, Summarize All, to summarize all groups in a specific level at one time.

To unsummarize all bands at the same time, choose None in the Summarize To field.

Summarize All

Apply to

⦿ All bands

Summarize to: Project Location ▼ ── *Select the item you want to summarize by.*

○ Highlighted bands

[Summarize] [Cancel] [Help]

Indent bars for inactive (nonwork) time When you summarize, P3 shows one continuous bar for each summary group. Since the summarized activity may contain periods when no work takes place, the continuous bar may not always represent total duration accurately. You can show scheduled worktime more accurately by choosing to neck (indent) summary bars during inactive periods. For example, if activity A ends in June and activity B doesn't begin until August, the summary bar would be indented during the month of July to indicate that no work is being performed. To apply this feature, choose Format, Summary Bars.
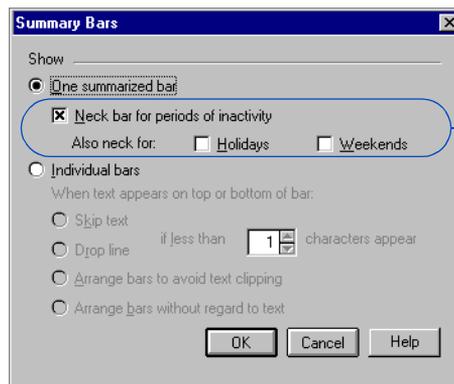
Mark these checkboxes to indent the bar for periods of nonworktime, including holidays and weekends.

Divide the summary bar You can also divide the summary bar into discrete segments that represent each component activity bar. P3 places as many individual bars as will fit in each row. Using discrete bars, you can summarize activity data into one line in the Activity columns, but still see the start and end dates for each activity in the Bar area.

This layout shows individual bars for each step in the procurement process.

To neck individual bars when showing summaries, use the Bars dialog box (choose Format, Bars).
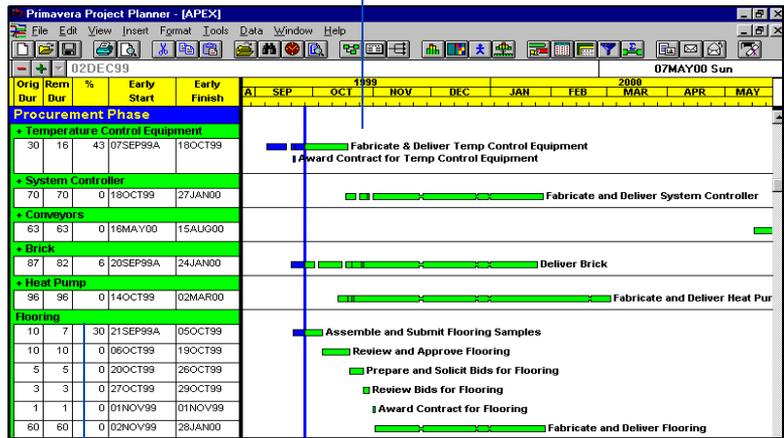
Unsummarized group

Choose this option to show discrete bars.

Additional bar placement options are available. For example, if you are showing text on the activity bars, such as descriptions, the space on the bars may be too small to show the entire text string when the bars are placed end-to-end. Specify a cutoff value for the minimum number of characters you want P3 to show; if at least that number of characters does not fit in the available space, P3 masks the entire text string. You can also specify that the bar drop down to the next line to show the complete activity description.

Showing Summaries with Detailed Activities

You can show summary data together with a list of detailed activities by grouping activities and showing totals.

Summary bar

P3 shows a subtotal row and summary bar for each department group.

Place subtotal rows at the top or bottom of the appropriate group band in the Organize dialog box.

Using OLE to Enhance the Presentation

P3 provides additional tools for enhancing your Bar chart presentation. Use the Attachment Tools to link images and add text to a layout. You can also insert lines or shaded areas in the Bar area to highlight a specific date or timeperiod. P3 provides a Tools palette which includes tools for customizing a layout.

Display the Tools palette   Choose View, Attachment Tools. The Tools palette appears in the upper-left corner of your screen, but you can move it to any other convenient area.

Primavera Symbol Selection tool

Arrow tool

Attachment tool

Line tool

Curtain tool

Activity ID field

Text tool
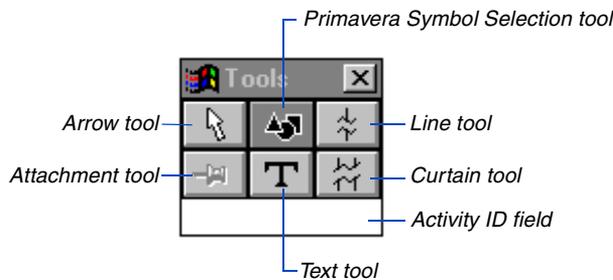
Attach a symbol to your layout   Click the Symbol Selection tool, then point to a space in the Bar area where you want to insert a symbol and drag the mouse. P3 displays the Primavera Symbol Selection dialog box.

Select the symbol to appear in your layout.

P3 provides a clip-art library containing many images already in Primavera's file format (.PMT).

Create a new symbol using the Primavera Draw program.
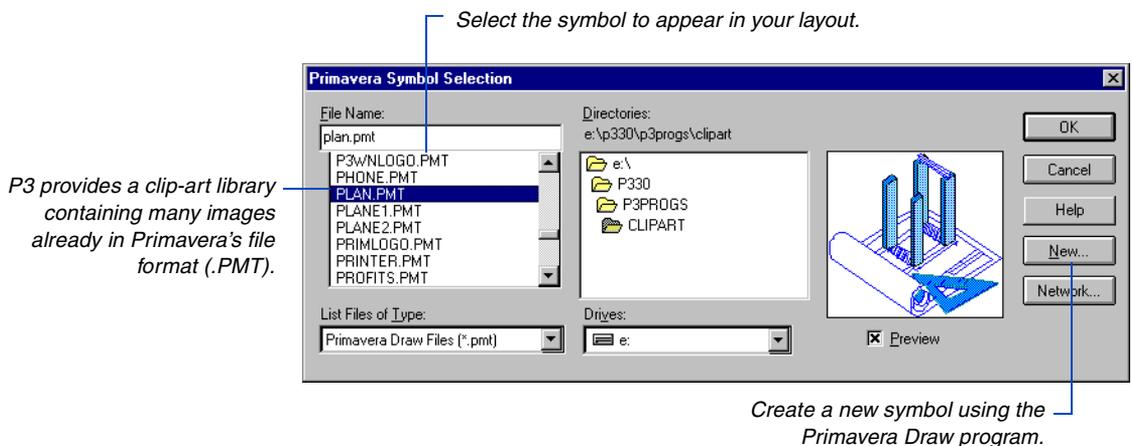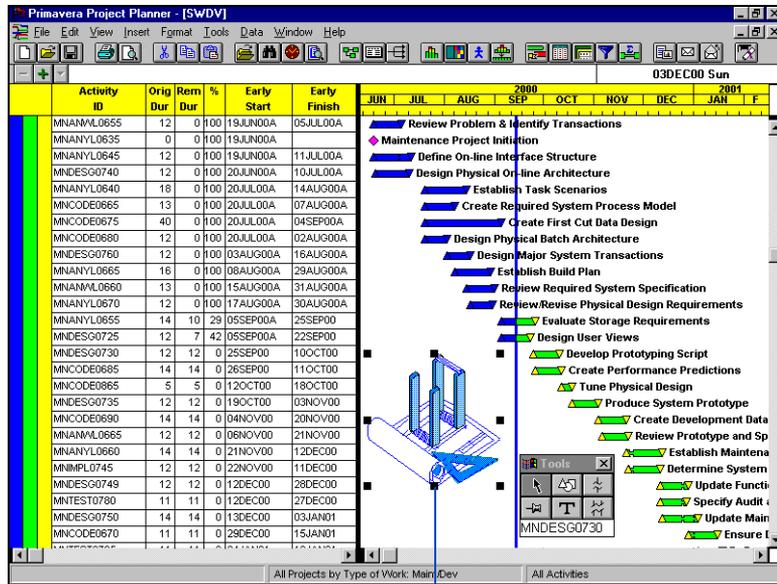
Click the image to select it; use the
mouse to move or resize it.

Add text to a layout Click the Text tool, then point to a space in the Bar area where you want to place the text and drag the mouse. P3 displays the Text toolbar.

Closes the Text application

Opens the Font dialog box

Displays the color palette

Opens Help

Aligns text to the right

Centers text

Aligns text to the left
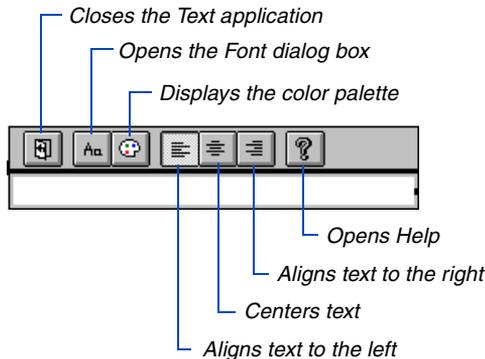
Highlight a range of dates Click the Curtain tool, then drag the mouse over the Bar area you want to shade.
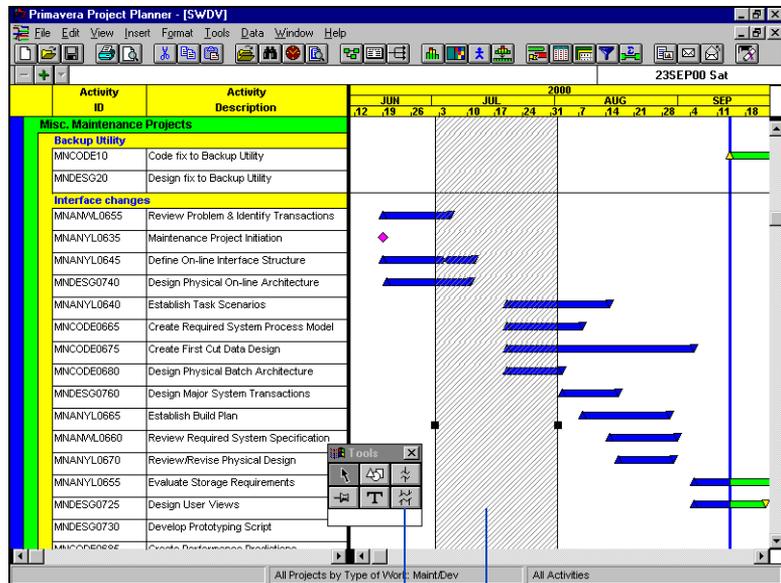
Use the Curtain tool to highlight a critical time in the schedule.

Object linking and embedding In addition to using the Primavera Attachment tools, you can further enhance the meaning and content of a Bar chart presentation by integrating data from other applications. For example, include as part of a Bar chart a spreadsheet with costing information, a pie graph illustrating year-end cost figures, or a text document, such as a proposal or monthly status report. Windows makes exchanging information from one application to another easy through object linking and embedding (OLE).

OLE is a standard Windows program for sharing data between applications. Use it to create a file that combines data from several applications with links to their original sources. This means that if something in the linked file changes, your file can be quickly updated without exiting P3, opening the application from which the data originated, making the necessary changes, and reimporting it back to your P3 file. You link and embed using a process similar to copy and paste.

For example, suppose you use Microsoft Excel to track subcon-tractors and their addresses, telephone numbers, and current account information. You could link this spreadsheet to your Bar chart layout. Then, whenever this information changes in Excel, P3 updates your Bar chart to reflect the change. You can also open Excel directly from the Bar chart in P3 by double-clicking on the spreadsheet object and making the necessary changes to it. If this same spreadsheet is linked to other layouts, they will also be updated.

The preceding paragraph described an example of *linking*. Linking an object, such as a chart, graph, or text file, retains a connection to the source application; in the previous example, Microsoft Excel is the source application. When you edit a linked object, you are actually working in the source application. If you need to keep an object that is included in one or more layouts up to date, you should use linking.

Embedding an object makes a copy of the data and inserts it directly in the layout. The inserted data contains no reference to the source application. You can still open the application from your Bar chart and change it, but these changes will not be reflected in the original data file or in any other layout that contains this object.

For additional information about Attachment Tools, Primavera Text, and OLE, see *Integrating Infor-mation with OLE* in the *Reference* manual.

You can link and embed objects from any application that supports OLE, such as Microsoft's Word and Access; Corel's Quatro Pro and Paradox; and Lotus 1-2-3.

Organizing Data

P3's organizational features enable you to view a project from different perspectives. For example, arrange activities into groups based on a common attribute such as an activity code, or sort activities by total float to see the most critical activities first. You can also organize activities based on the project work breakdown structure (WBS) and on project code values assigned to the member projects in a project group.

Use filters to focus on specific groups of projects or activities for analyzing, reporting, and updating. Filters display only the member project or activities you want to see.

Grouping Activities into Bands

P3 enables you to organize activities into groups based on a common attribute, such as an activity or project code, WBS code, date, float value, resource, or cost account.

Group title bands

Activities are grouped by project, department, and responsibility.

Display subtotals and a summary bar for any group.
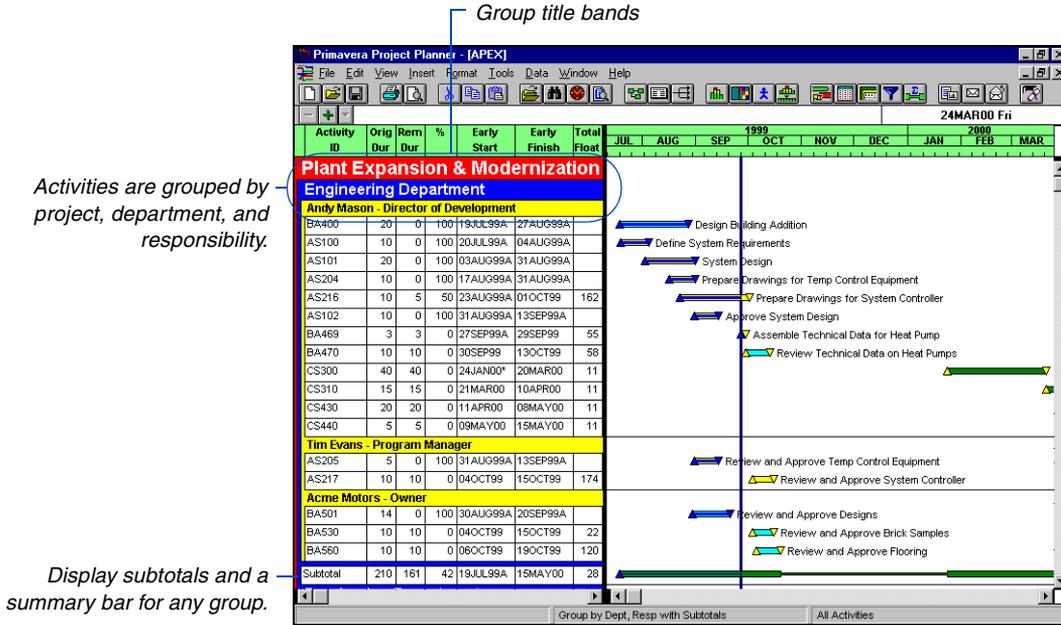
Group activities in the Bar chart Choose Format, Organize. Click the Activity data item option to group activities according to an activity data item.

*1 Click to add an item for
   grouping; click ▼ to
   select the data item.*

*2 Enhance the presentation by
   modifying the font and colors
   for the group title bands.*

*4 Optionally mark to combine
   the selected data items
   together in one group band.*

*3 Choose Top or Bottom to show a subtotal
   above or below each group.*

Combine group bands You can organize by multiple data items
and then combine those items into one band to consolidate a
layout. For example, combine the phase, responsibility, and area
codes into one band. Choose Format, Organize, select the data
items you want to group, then mark the Display All Values in One
Band checkbox.

Combining data items enables you to focus simultaneously on activities with several classifications.

Activity ID	Orig Dur	Rem Dur	%	Early Start	Early Finish	Total Float	Resource	Budgeted Cost	Budgeted Quantity
Procurement Phase - Acme Motors - Owner									
BA530	10	10	0	04OCT99	15OCT99	29	DES ENG	240.00	8.00
BA560	10	10	0	11OCT99	22OCT99	109	DES ENG	240.00	8.00
Procurement Phase - Vendor									
AS206	20	15	25	21SEP99A	26OCT99	151	VENDOR	3,500.00	0.00
AS218	60	60	0	01NOV99	27JAN00	166	VENDOR	4,200.00	0.00
System Integration Phase I - Tom Mills - Director of Hardware									
AS310	10	2	80	14SEP99A	28SEP99	147	FLD ENG3	680.00	40.00
AS240	0	0	100	14SEP99A				0.00	0.00
AS315	24	24	0	29SEP99	01NOV99	147	ELECTRCN	12,288.00	384.00
AS103	18	18	0	29SEP99	22OCT99	153	FLD ENG1,	4,824.00	216.00
AS104	13	13	0	29SEP99	15OCT99	166	PLUMBER	3,432.00	104.00
AS105	20	20	0	02NOV99	01DEC99	147	FLD ENG1,	12,760.00	480.00
AS106	18	18	0	02DEC99	28DEC99	147	FLD ENG2,	4,104.00	216.00
AS107	30	30	0	29DEC99	09FEB00	147	HWSPEC,	8,160.00	480.00
AS109	24	24	0	10FEB00	15MAR00	147	FLD ENG1,	9,024.00	384.00

To navigate between combined bands, press the Ctrl+up/down arrow keys.

Place group title bands   You can place group title bands in the Activity columns, Bar area, or both. Click Options from the Organize dialog box to place group title bands.
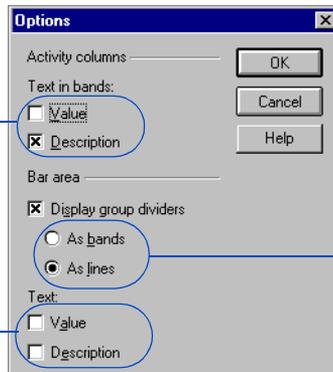
Show values and/or descriptions in the group title bands for the items by which you are grouping.

Format the appearance of group dividers in the Bar area as colored bands or solid black lines.

P3 displays page breaks onscreen as thick horizontal lines.

Skip pages   You can create page breaks for printed output; specify Yes in the New Page column for the appropriate group. P3 starts a new page when the value for each group changes.

Group by dates   Group activities by early or late schedule dates to track activities that start or finish about the same time.

When grouping by week, the group title band shows the start date for every week. You can quickly see activities scheduled to start in the upcoming weeks.
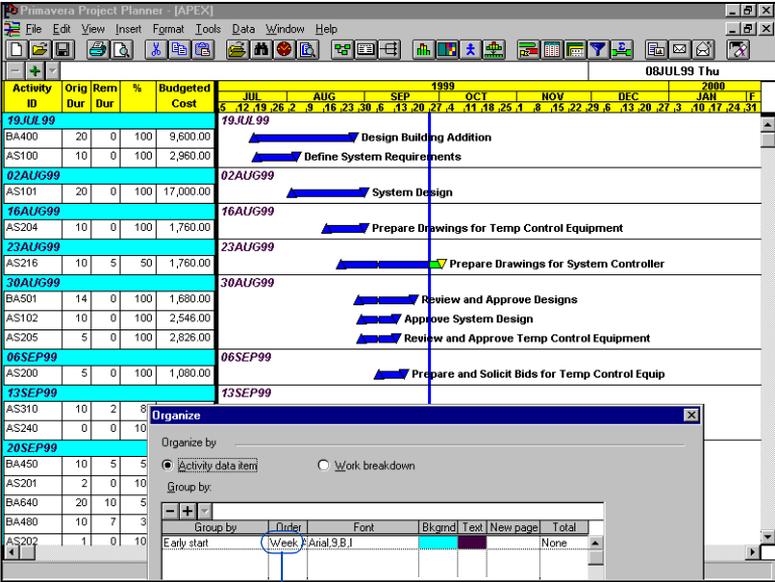
Choose the time increment to group by, such as every hour (hourly projects), day, week, month, or year, in ascending or descending order.

Grouping PERT by Start Date

Timescaled PERT is another way to organize activities by date. You may prefer this graphical representation in which P3 vertically positions all activities scheduled to start below the applicable daily, weekly, or monthly time intervals. From the Bar chart, choose View, PERT; then from PERT, choose Format, Organize, click the Arrangement tab, and choose the PERT Layout with Timescale option. P3 displays activities with the horizontal axis arranged by early/actual start date, ascending only. You can choose the colors for the timescale band and text, and the text font, and you can indicate whether to reorganize the layout automatically after scheduling or leveling.
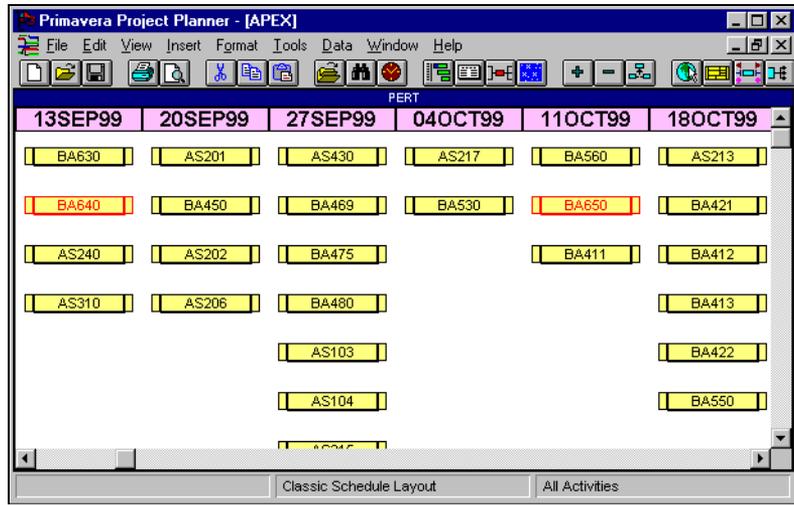
Group by resource/cost account Group activities by their assigned resources or cost accounts to review or modify resource and cost assignments.

Detailed activities are shown for each resource.

If an activity has more than one resource assigned, the activity appears for each resource group.
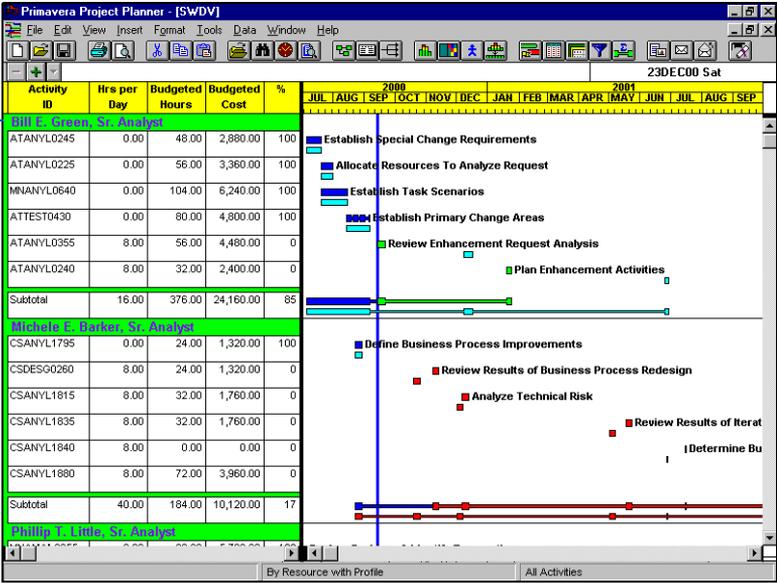
Sorting Activities

You can sort activities into any sequence in the Bar chart—alphabetically, numerically, or chronologically, depending on the data item you choose. Choose Format, Organize.
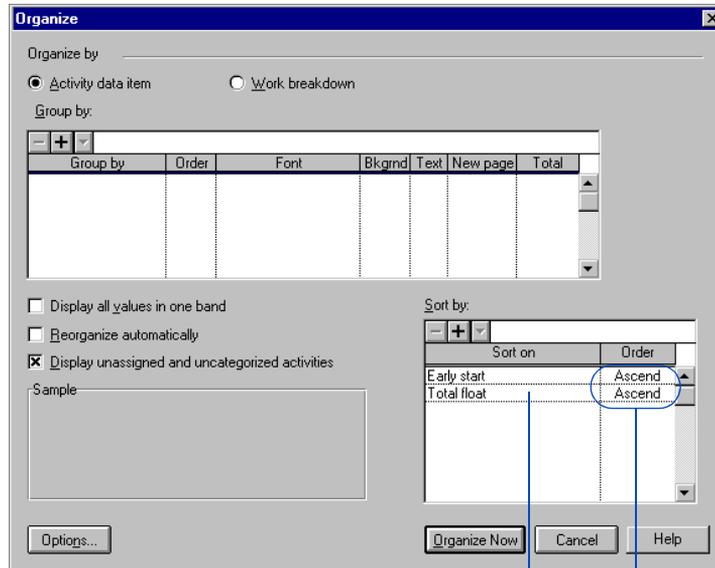
Select up to 20 data items for sorting.

Sort data in ascending or descending order.

P3 automatically orders activities you are sorting from least to greatest value (ascending order). You can also sort any numeric parameter in descending order.
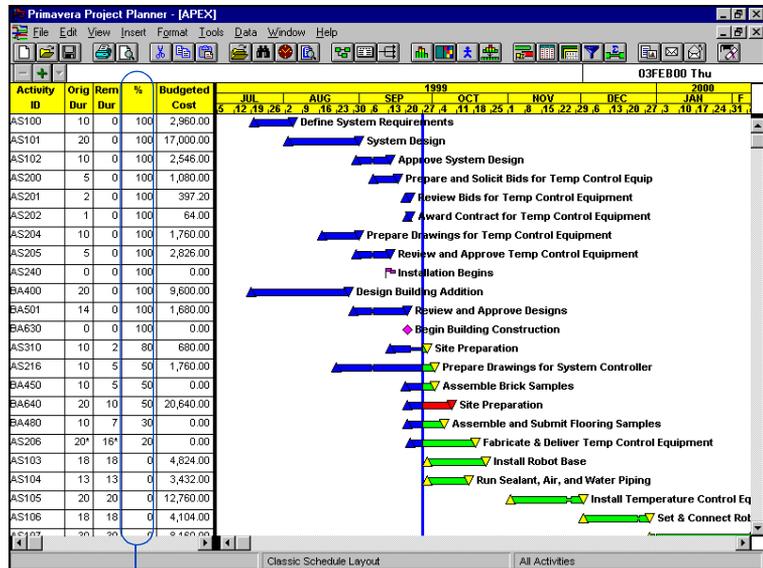
Because activities are sorted by percent complete in descending order, P3 lists completed or in-progress activities at the top of the list.

Outlining Activities

Create a hierarchical view of your project by outlining activities according to their work breakdown structure (WBS) codes. Before you display an outline of your project, you should first create WBS codes and titles in the WBS Dictionary and assign them to activities.

Each WBS level is indented.

For details on creating a WBS structure, see the *Building Additional Data Structures* chapter earlier in this book.
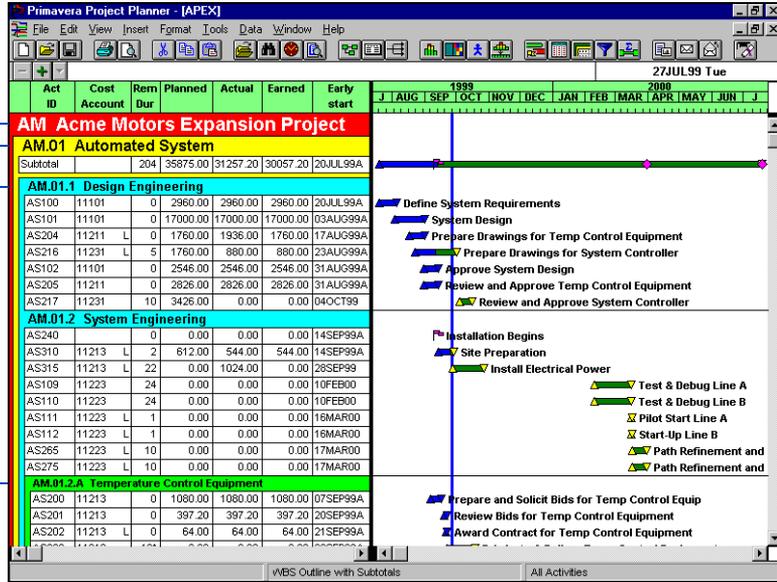
Outline a project Choose Format, Organize, then choose Work Breakdown.

To hide a level, click ▼ in this column and choose Blank.

P3 automatically enters all WBS levels defined in the WBS Dictionary.

Customize the WBS group title bands.

Show or hide WBS levels with no activity assignments.
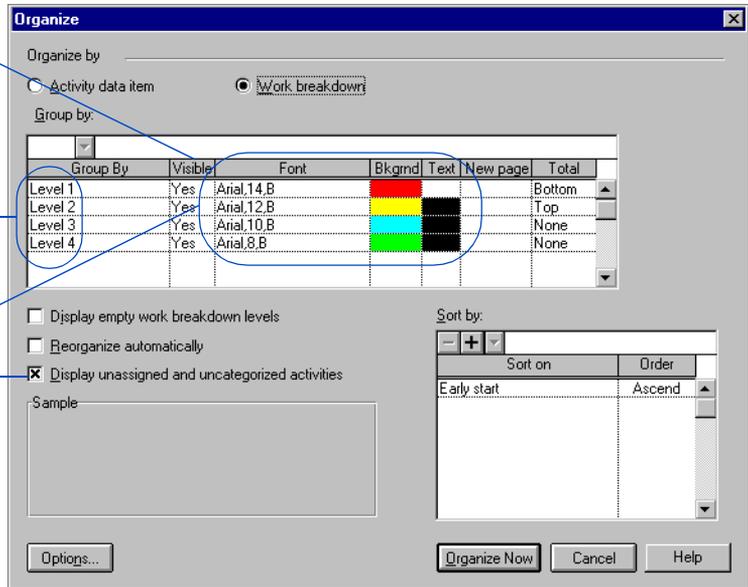
Add activities in outline mode You can build a project by adding detailed activities under the appropriate WBS bands. P3 automatically assigns the WBS codes to activities as you add them. You can also reassign WBS codes by dragging activities from other levels. Make sure you choose to display empty work breakdown levels in the Organize dialog box.

Select the empty WBS band, then click ➕ to add an activity to that WBS level; P3 automatically assigns the WBS code to the new activity.
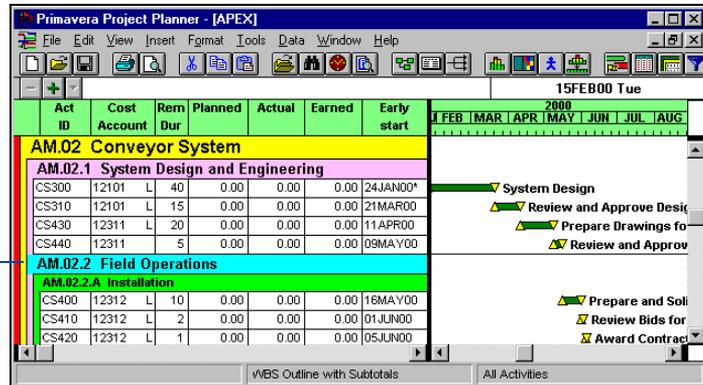
Filtering Activities and Projects

Although organizing data for effective communication and analysis is important, you also need to limit the activities shown to those that are pertinent. Filters enable you to focus on specific activities, groups of activities, or member projects for analyzing, reporting, and updating. Select activities according to common attributes; for example, to analyze the schedule, list only activities that have zero total float. To review only the projects managed by one person in a project group, select the project manager project code.

Apply a filter   Choose Format, Filter.
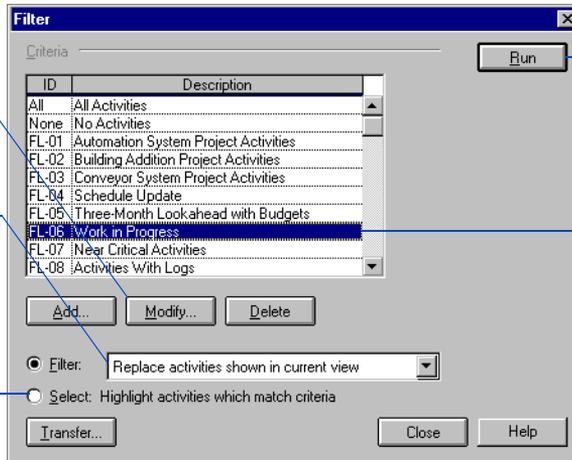
Click to view or change the filter specification.

When you apply the filter, you can either replace the current set of activities or append the selected activities to the existing list.

You can highlight those activities in the current layout that meet the filter criteria.

Select a filter, then click Run to apply it.
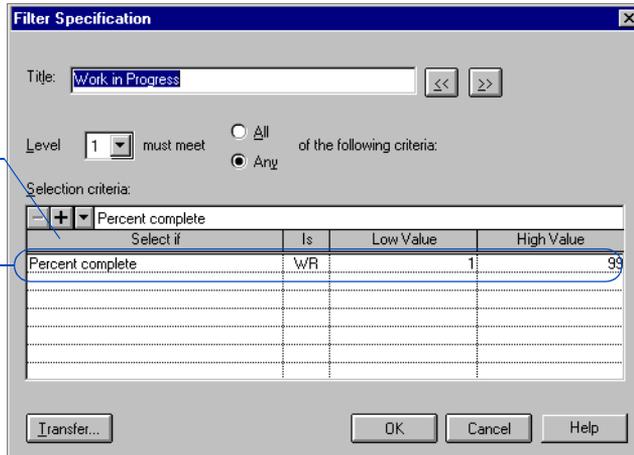
Use data items and schedule parameters to filter activities and projects.

This filter chooses activities with progress; the percent complete must be greater than 0, but less than 100.

To select activities at a more specific level, you can add lines of selection criteria. For example, in the previous example, you can further limit the activities to only those that are assigned to the Engineering department by including the following statement:

Select If	Is	Low Value
DEPARTMENT	EQ	ENG

If you include two or more selection statements, specify whether an activity can satisfy Any of the criteria, or whether All lines of criteria must be met to be selected. In addition, P3 provides four levels of selection criteria. Each level selects from only those activities chosen in previous levels.

For more information about these options, see the Using Filters to Select Activities and Projects *chapter in the* Reference *manual.*

Valid criteria codes are equal to (EQ), not equal to (NE), greater than (GT), less than (LT), within range (WR), not within range (NR), text string contains (CN), and text string does not contain (SN).

Add a new filter Choose Format, Filter, then click Add and type a two-character reference number for the new specification. Click OK to display the Filter Specification dialog box. Type a title that identifies the filter in the Title field. Click the first cell in the Select If column, then click ▾ to select a data item. Enter a criteria code in the Is: column to expand the selection statement. Enter specific activity data in the Low Value and High Value columns that correspond to the data item you selected. Click ▾ to show valid data. For example, if you enter Department, P3 displays a list of values defined for the Department activity code. Use the High Value column only in conjunction with the WR and NR criteria codes.

Enter more lines of selection criteria if necessary. (You can enter up to seven lines of selection criteria per level.) If you want the selected activities to meet every condition, choose the All option at the top of the Filter Specification dialog box, then click OK.

When you apply a filter, it changes the set of activities P3 displays in both the Bar chart and PERT.
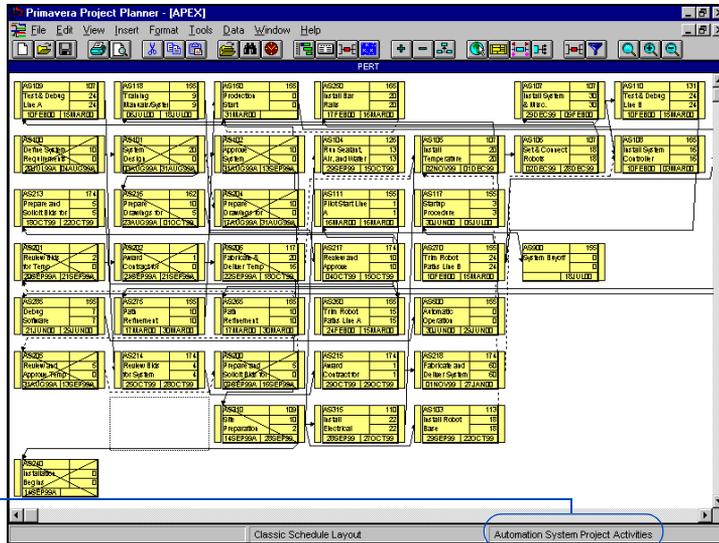
P3 identifies the current filter in the status bar.

Using Special Selections

Suppose you need to update the schedule every Friday based on the previous week's progress. To simplify your job, you want to see only those activities scheduled to start or finish during that week. You can use two of the special selection criteria available in P3: "rolling dates" and the "window-of-time" parameter, early dates.

Rolling dates select activities based on their relation to the project data date rather than by specific calendar dates. The early dates schedule parameter enables you to select activities whose early start, early finish, or work underway is scheduled to occur at a specific time.

This selection statement selects any activity whose early dates range from the data date (DD+0D) to 1 week beyond the data date (DD+1W).

P3 selects activities based on the previous week's data date, choosing only those activities that should have started or finished, or that were worked on during the previous period. Using rolling dates eliminates the need to revise the date specification at each update period, since P3 always uses the current data date. You can also select by any number of hours, days, weeks, months, or years—based on calendar time rather than worktime.

Save filters with layouts P3 attaches the most recently processed filter to the current layout when you save the layout. Each time you open the layout, P3 runs this filter so that the activities displayed meet the specified criteria. If you or another user subsequently add activities to the layout that do not satisfy the selection criteria, P3 does not include these activities in the layout when you re-open it. However, P3 enables you to specify the activities to display the next time and each subsequent time you open the current layout. Choose View, Layout, Options.

Use this option to display large projects (containing 1,000 activities or more) much faster.

When you open the layout, P3 displays the activity list as it was last saved.

Choose to have P3 prompt you with these options when you open the layout.

Customizing PERT

Customize PERT layouts by controlling the amount and type of data P3 displays for activities. You can also distinguish specific activities using different shapes and colors, format the appearance of relationships lines, and arrange activities into groups based on common attributes.

Formatting Activity Boxes

Each activity box in PERT contains information about the activity. You can customize PERT to show only the information you want for each activity. P3 provides predefined templates that show a different range of activity data. For example, use a template that shows just the activity ID and description, or one that includes activity codes or custom data items.

By default, P3 displays the following data:

Choose Format, Activity Box Configuration to change the format for activities.

Modifying and Creating Templates

You can change an existing template or add new ones. From the Activity Box Configuration dialog box, select the template you want to modify, then click Modify Template. If you are creating a new template, select the template that most closely resembles the one you want to create.

Type a new name if you are creating a new template.

Click a button to select the adjacent row.

Adds a row above a selected row

Adds a row to the bottom of the template

To create a new cell, click the cell next to the one where you want to place the new cell, then click Split Cell.

To change the data P3 displays in a cell, right-click the cell and select another data item.

For details on creating your own activity template, see the *Customizing PERT Layouts* chapter in the *Reference* manual.

Change the alignment and type style for individual cells.

Modify an existing template. Choose Format, Activity Box Configuration. Select the template from the displayed list that you need to modify, then click Modify Template and make changes, as described previously. Click Change Template when you finish making changes.

You can transfer templates across layouts by copying and pasting them. See the Reference *manual for more information.*

Add a new template. Choose Format, Activity Box Configuration. Select the template that most closely resembles the new template you want to create, then click Modify Template. Type a new name in the Name field, make changes to the template, then click Add Template. Choose View, Layout Save to save the new template as part of the layout.

P3 does not save changes you make to a template unless you save the layout.

Changing the Color and Shape of Activities

You can change the end shapes and colors for specific activities so they stand out from the rest of the project. For example, instead of using the standard box shape for all activities, format certain activities as ovals. Select the activities you want to change, then choose Format, Activity Box Ends and Colors.

Change the shape and fill patterns for activity ends.

Select a background color for the selected activities.

Select a color for the data items and activity border.
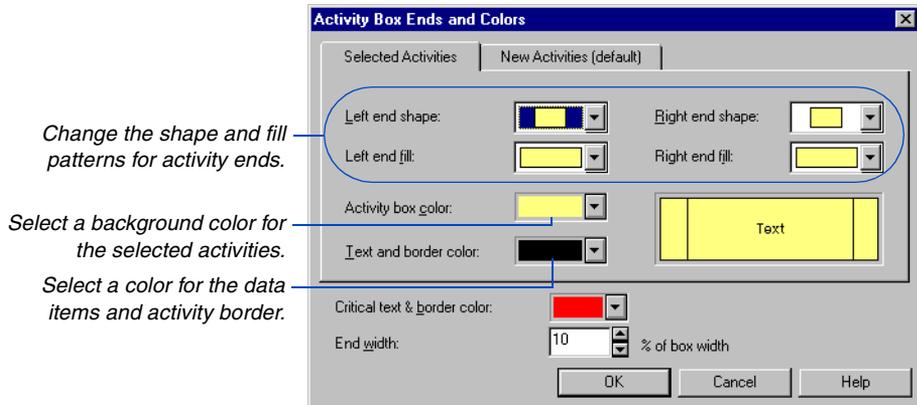
Use different end shapes and colors to distinguish certain activities.

You can select activities based on a common attribute, such as all activities in the design phase. Choose Format Filter, then choose the Select option.
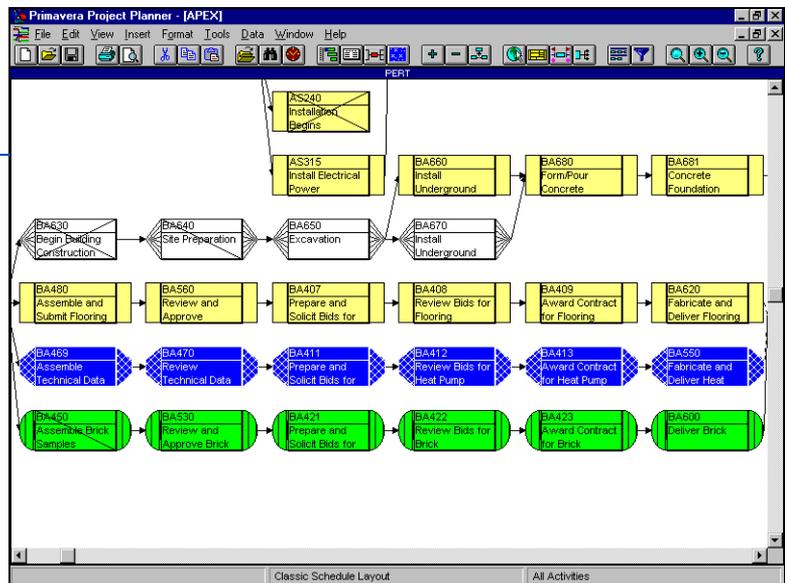
You can also customize the appearance of activities by controlling the width of activity ends. P3 sizes the activity ends based on the length of the activity. To change the end width, specify a percentage in the End Width field in the Activity Box Ends and Colors dialog box. For example, enter 25 to size the ends as 25 percent of the activity length.

Change the appearance of new activities You can change the shapes and colors of activities that are new to the project or view. Click the New Activities tab in the Activity Box Ends and Colors dialog box (choose Format, Activity Box Ends and Colors), then select the appropriate shapes and colors. For example, if your layout contains Programming activities and you run a filter to also show Marketing activities, the Marketing activities will use the settings defined for new activities.

Formatting Relationship Lines

Customize your PERT presentation by changing the line types and colors to distinguish driving and nondriving relationships lines. You can also hide either type of relationship lines; for example, you may want to show only driving relationships so you can examine the critical path of your project.

Modify relationship lines Choose Format, Relationships.
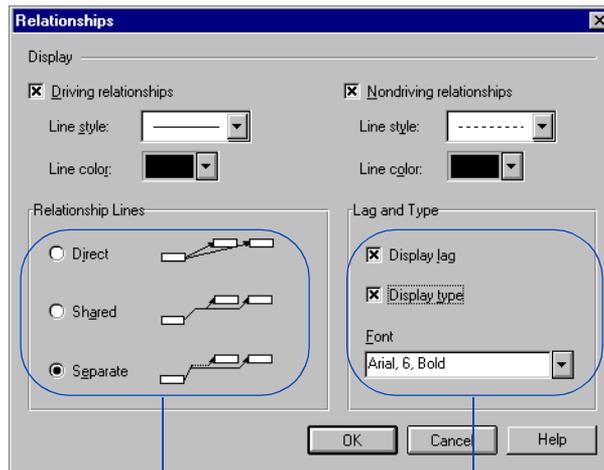
Change the way P3 angles relationships onscreen.

Choose to show the relationship abbreviation and lag amount next to the relationship lines.
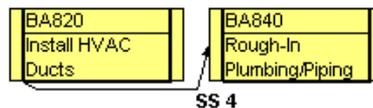
SS4 indicates a start to start relationship with a 4-day lag. (P3 identifies relationships and lag values other than FS with a 0 lag.)

Arranging Activities

P3 arranges activities in PERT based on schedule logic by default. You can also group activities based on relationships or early/actual start date along a daily, weekly, or monthly timescale, and arrange activities into groups based on a common activity or project code, calendar ID, or total float value.

Activities are grouped by the project category project code and arranged by early start date along a weekly timescale. Group title bands identify each project category.
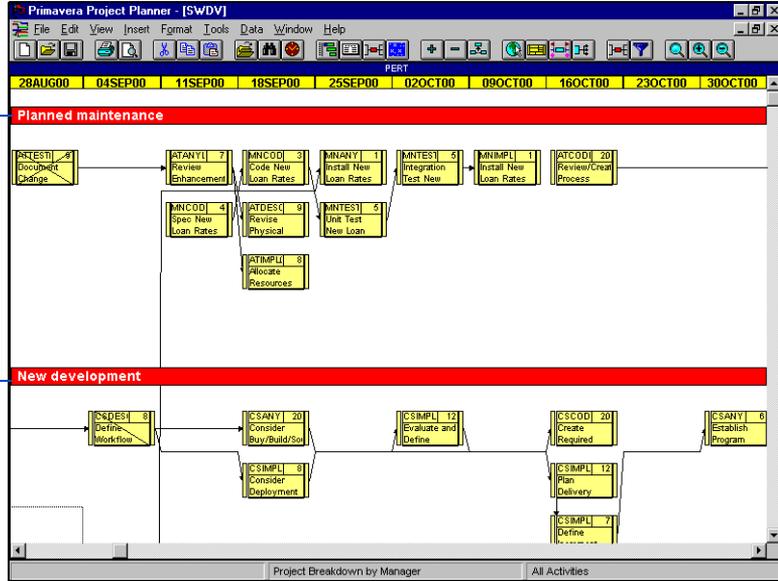
Group activities Choose Format, Organize, then click the Grouping tab.

Select the item by which to group activities.
To turn off grouping, select <None>.

Create page breaks for printed output.

Customize the appearance of group title bands.

Use these options to control where P3 positions new activities when moving from the Bar chart to PERT.

You can drag an uncategorized activity to a group band to have P3 assign the appropriate activity code.

Show uncategorized activities When grouping by an activity code, some activities may not have an assigned value for the code. P3 places these activities below a blank group band placed at the bottom of the network. This setup enables you to quickly see which activities are missing code assignments. If you do not want your presentation to include these activities, you can hide this band by clearing the Display Uncategorized Activities checkbox.

Configure timescaled PERT Choose Format, Organize, click the Arrangement tab, and choose the PERT Layout with Timescale option.

P3 adjusts the column width and height according to the number of activities you specify if you choose the Early Start Dates option; the width is also affected by the activity box configuration.

By default, P3 arranges activities by predecessor/successor logic and then places the activity boxes according to early/actual start.

Mark to reorganize activities automatically each time you perform a scheduling or leveling run.
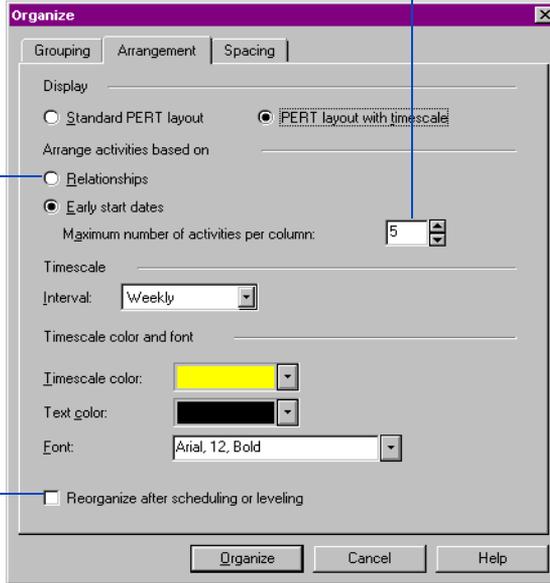
You can show relationships, include Trace Logic that shows the relationship logic for a selected activity in the timescaled layout, and modify activity boxes. You can also insert and delete rows and columns to adjust spacing in the layout.

This timescaled PERT layout specifies a maximum of three activities per column. P3 automatically creates additional columns under the time interval to hold all the applicable activities.
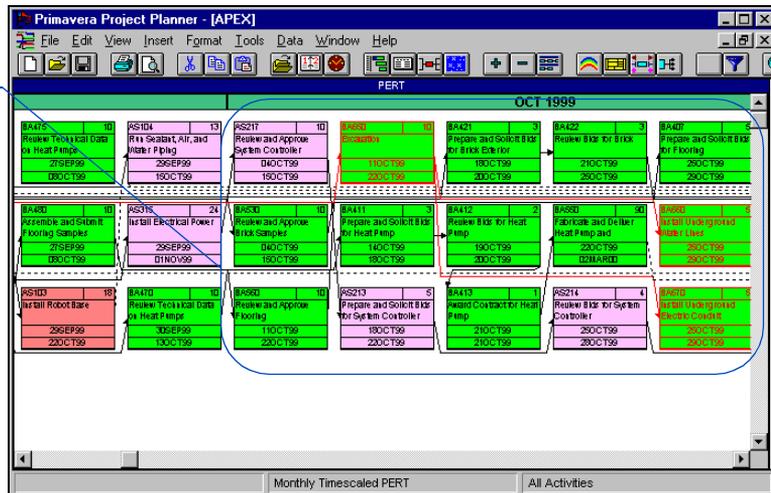
Control the space between activities You can adjust the amount of vertical and horizontal space between activities in PERT. Choose Format, Organize, and click the Spacing tab.

Add more space to widen the network, or reduce space to show more activities per page.
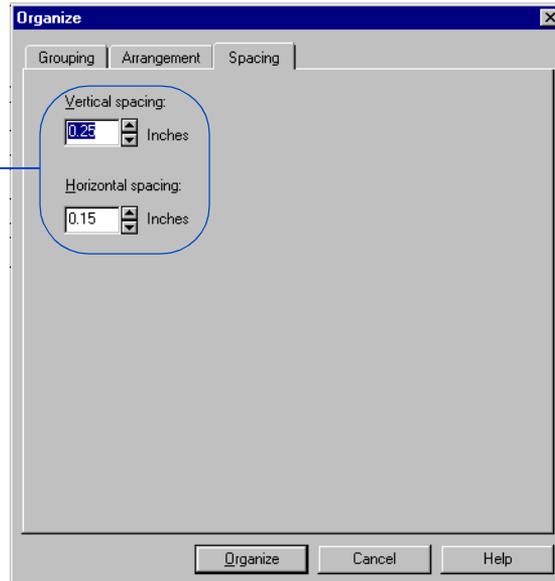
Insert and remove rows and columns You can expand or decrease your network of activities by inserting or deleting columns or rows in PERT. For example, you may want to add a row and then copy a group of activities to it, or you might want to remove an empty column so you can see more activities in the layout. You can insert and remove rows and columns in both PERT and timescaled PERT; these options are not available for Trace Logic or Cosmic View.

You can also right-click and use the Cut, Copy, and Paste commands to move activity boxes from one place to another.

To insert or delete a row, select the activity box or area of the layout above which you want to insert a row and choose Insert, Row. To delete a row, select an empty row and choose Insert, Remove Row.

To insert or delete a column, select the activity box or area of the layout to the left of which you want to insert a column and choose Insert, Column. To delete a column, select an empty column and choose Insert, Remove Column.

To move an activity box from one row or column to another in PERT, select the box and drag it to the location you want.

Printing Layouts, Reports, and Graphics

In this chapter:

Using Print Preview

Defining Page Settings

Printing Reports and Graphics

After you select and format the information in your Bar chart and PERT layouts, you will probably want to print them. P3 produces presentation-quality graphics that you can send to a printer or plotter. Before you print or plot, however, you may want to preview onscreen exactly how your output will look on paper. If you're not satisfied with the number of pages or the layout, you can adjust them, preview the display again, and then print when you are satisfied.

P3 also provides predefined reports and graphics that show a variety of data using different formats.

Using Print Preview

Print preview shows you the basic layout and size of your Bar chart or PERT schedule before you actually print it. View one page at a time or all pages, or zoom in for a closeup on part of a page.

Preview the layout Choose File, Print Preview. P3 displays the first page of the layout.

Modify header or footer information that appears on the report.

Use these buttons to scroll through additional pages one at a time.
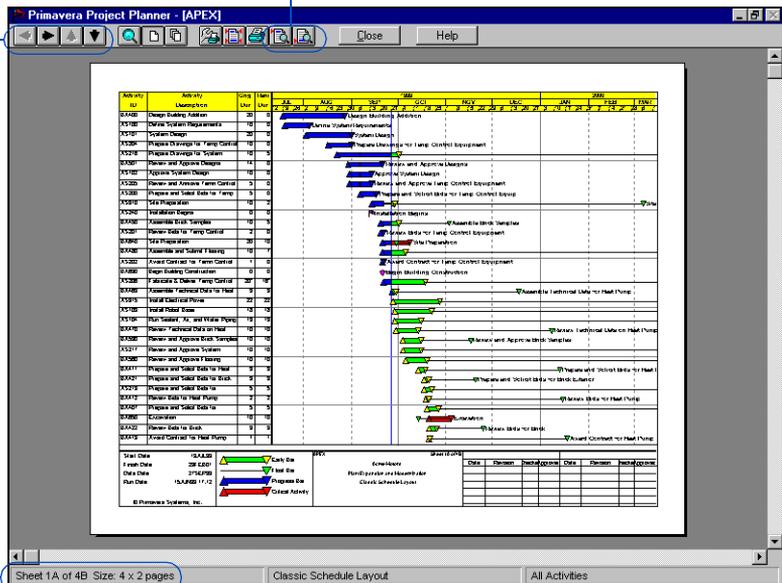
P3 displays the number of vertical and horizontal pages.

Two-page PERT layout
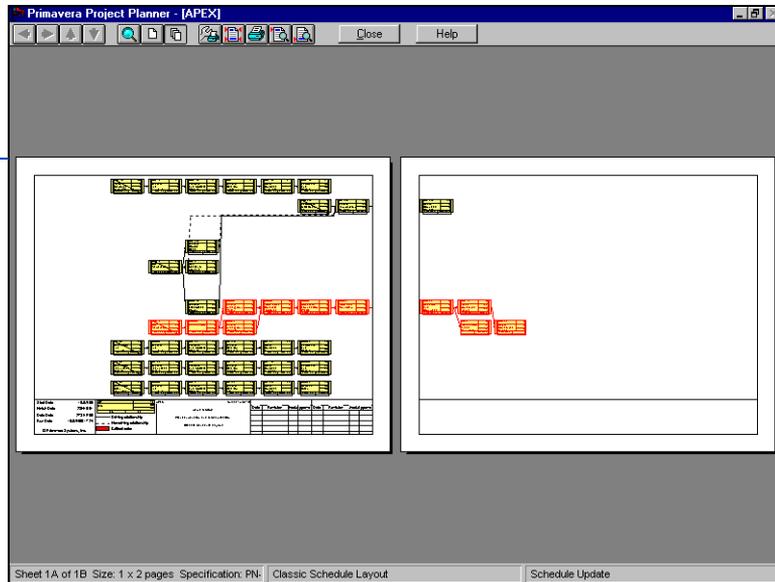
To view a single page when you are in the multipage view, click anywhere on that page.

When you click the mouse over an area of the displayed page, the mouse pointer changes to a $\mathbb{Q}$ so you can zoom in on details. To return to the original view, click the mouse again.

P3 numbers pages horizontally with letters and vertically with numbers. For example, a two-by-two graphic consists of four pages: 1A and 1B make up the first row and 2A and 2B are the second row, as follows:

1A	1B
2A	2B

Defining Page Settings

P3 provides many options for customizing the printed output. For example, you can limit the timeframe shown in a printed Bar chart, customize header and footer settings, and change margins for the printed page.

Define page settings for the Bar chart You can print any combination of the Bar chart elements: Activity columns, Bar area, or resource/cost profile/table. For example, print only the Activity columns so the printed output looks like a spreadsheet. Choose File, Page Setup, or click the Page Setup icon on the Print Preview toolbar.

Change the start and end dates for the printed timescale.

Mask or show the Activity columns and Bar area. The Resource/Cost Display option is enabled if the layout shows a resource/cost profile or table.

The maximum number of horizontal pages is eight.

Compress or expand the printed layout You can stretch or compress a graphic horizontally using the Fit To Pages Wide field. When you first display the layout in print preview, P3 enters the exact number of horizontal pages. To compress the printed output, reduce this number; P3 compresses the timescale so the range of dates fit in the specified number of pages. Enter 0 to have P3 determine the best fit of data.

To eliminate a header/ footer from the printed layout, select No Pages in the Include On field.

Format a header or footer Click the Header or Footer button. (You can also click the Header or Footer icon in the Print Preview toolbar.) In the Include On field, specify on which pages to print the header/footer. Indicate the header/footer height in inches or centimeters. (The Margin Units setting in the Page Setup dialog box determines the unit of measure.)

Choose to divide the header/footer into three or five sections. If you choose five sections, P3 automatically adjusts the spacing of the two sections before and after the center section if you leave one of these sections empty. For example, if you select a data element for the first section, and leave the second section blank, P3 expands the first section into the second section.

For more information about setting up the different types of data items in the header/footer, see the *Printing Layouts* chapter in the *Reference* manual.

Select the element you want to place in the header or footer in each section. You can include the same data item with the same or different properties in more than one section. For example, you may want to include two revision boxes—one for the project manager and one for team leaders—in the footer. Set up as many header and footer elements as you want, then click OK.

Choose Logo to include a bitmap in a header/footer.

Select the item you want to include.
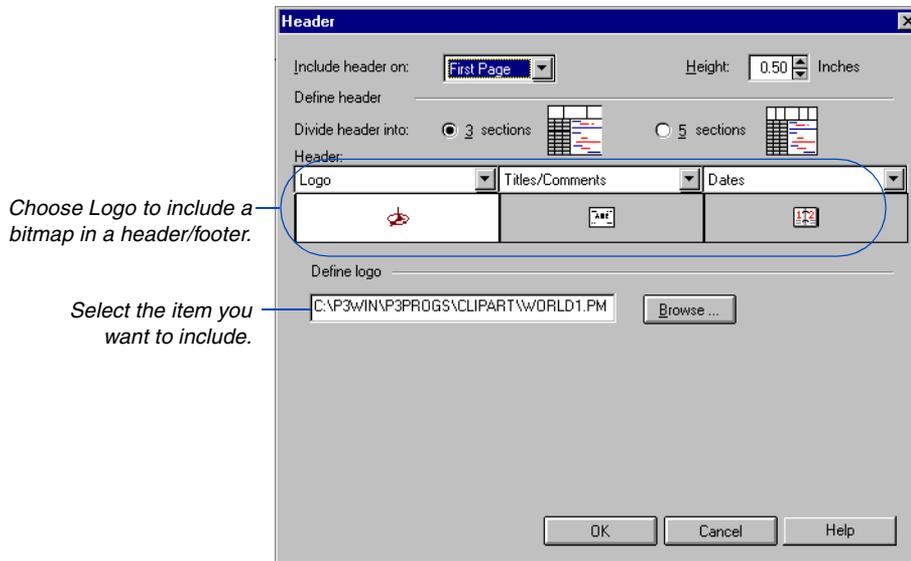
Define page settings for PERT layouts P3 provides different page options when you are printing a PERT layout. For example, print only the activities that appear in the Trace Logic view.

This option is only available when Trace Logic is displayed.

Print all activities in the PERT layout.

Specify the number of horizontal and/or vertical pages.

Page Setup

Print

○ PERT view   ○ Trace logic view

Page Settings

Fit to ☐ 0 ☐ pages wide, and ☐ 1 ☐ pages tall.

Top: ☐ 0.50 ☐   Bottom: ☐ 0.50 ☐   Margin units: ☐ Inches ▼

Left: ☐ 0.50 ☐   Right: ☐ 0.50 ☐   ☐ Allow page breaks to split an activity box

☒ Mask interior page borders

[Header...]   [Footer...]   [Grayscale...]

[OK]   [Cancel]   [Help]

Place activities and page breaks Some activities might straddle page breaks when printing the PERT layout. Clear the Allow Page Breaks To Split An Activity Box checkbox to have P3 automatically move activities away from page breaks. P3 moves these activities either to the right or down, so the entire activity is within the bounds of only one page.

Printing Reports and Graphics

In addition to printing layouts, P3 provides reports and graphics that you can produce by specifying options about their content, format, order, and selection. P3 saves your specifications for each report or graphic type so you can reuse them whenever you need, such as for weekly meetings. Define as many different specifications as you want and run a series of reports or graphics to save time.

Available reports include tabular schedule, activity matrix, resource/cost loading, resource matrix, cash flow, and many more. Presentation-quality graphics include Bar charts, timescaled and pure logic diagrams, and resource and cost graphics.

Produce a report or graphic Choose Tools, Tabular Reports, to produce reports or Tools, Graphic Reports, to produce graphics.

Choose Tools, Tabular Reports/Graphic Reports, Options to specify the output method for the report (print, view onscreen, or save to a file).

Select the type of report to produce.
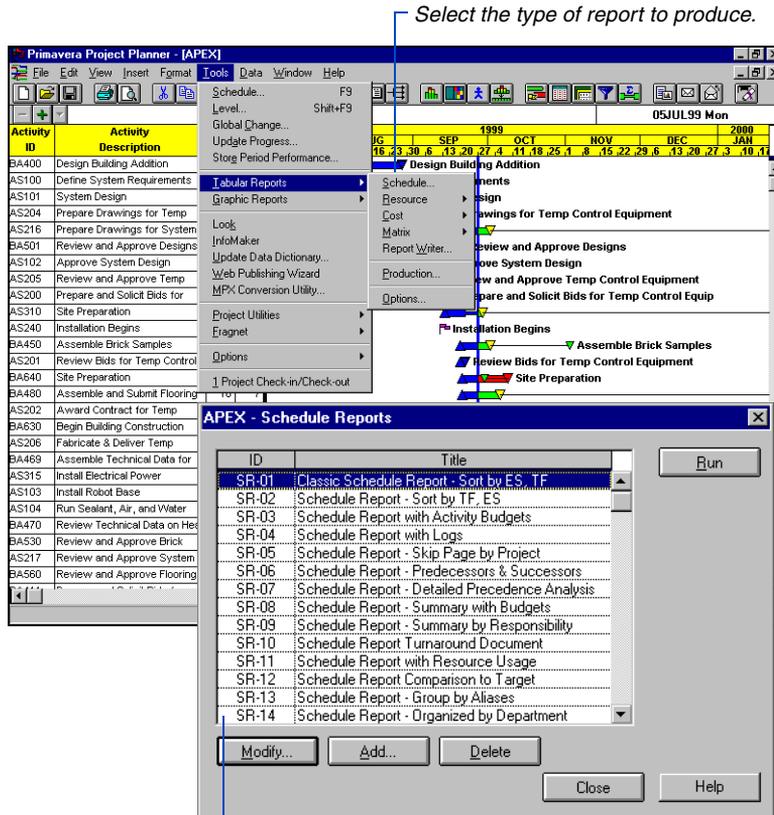
Choose from a list of predefined specifications. You can also modify a specification or create a new one.

Preview reports and graphics Preview a report or graphic before printing it by viewing it onscreen in Primavera Look. Choose View On Screen in the Tabular or Graphic Reports Options dialog box. You can also start Look by choosing Tools, Look.

Click the Print Preview icon to see how the report will look when it is printed, based on the selected printer.

Opening Loading Reports in Microsoft Excel

To save resource/cost loading reports (such as the preceding example) to a CSV (comma-separated values) file that you can open in another application, such as Excel or Word, choose the Export Report in CSV Format to the File option on the Format tab of the Resource/Cost Loading Reports dialog box. You can automatically view a .CSV formatted file in Excel by setting your report options to view files. Choose Tools, Tabular Reports, Options. Under Output, choose View On Screen.

Create a report series To produce multiple reports or graphics at the same time, choose Tools, Tabular Reports/Graphic Reports, Production.

Click to select the code you want. P3 produces any report with the assigned code.

Assign a series code (letters A through Z) to the reports you want to produce; click the right mouse button in the Series column, then select a code.

P3 lists all specifications for every report type.
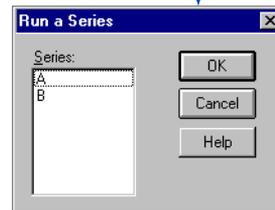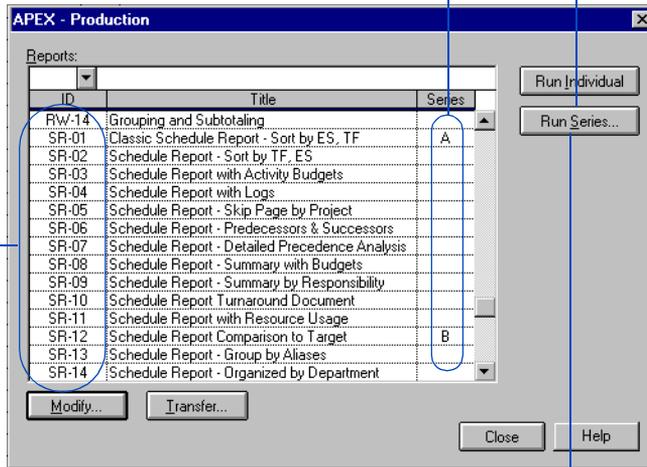
For report and graphic samples, see the *Monitoring Projects* chapter.

For information about the InfoMaker report writer, see the *Creating P3 Reports with InfoMaker* chapter in the *Reference* manual.

Using P3 with Different Languages

P3 makes working in a multilingual, international environment easier by enabling you to display certain layout information in languages other than English. Use the Set Language feature to choose a language for the following information: default activity column titles, header and footer information that appears on layouts (titles/comments, revision block titles, dates, and legends), report column headings, and month names on the timescale. Choose Tools, Options, Set Language, then select the language you want.

If you are sharing project information with organizations of different nationalities, you can use the activity logs to store translations for activity descriptions. Choose Format, Bars and add a bar for the translated descriptions. Modify the bar so the log record(s) containing the translated text appears on or next to the bar. As you create presentations in different languages, make sure the appropriate bar appears in the Bar area.

*Column titles and month names
are displayed in German.*

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