

PROJECT PLANNER MANUAL

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GUIDE TO TECHNICAL DOCUMENTATION

This manual is one of a set that documents the Convergent™ Family of Information Processing Systems. The set can be grouped as follows:

Introductory

- Installation Guide
- Operator's Guide
- Executive Manual
- Context Manager Manual
- Status Codes Manual
- Installation Guide (NGEN)
- Operator's Guide (NGEN)
- MagTape: Half-Inch Magnetic Tape for IWS

Hardware

NGEN

- Processor Manual: Model CP-001
- Dual Floppy Disk Manual
- Floppy/Hard Disk Manual
- Diagnostics Manual
- Keyboard Manual
- Power System Manual
- Monochrome Monitor Manual: Model VM-001
- Color Monitor Manual
- Graphics Controller Manual: Model GC-001

IWS

- Workstation Hardware Manual
- Peripherals Hardware Manual
- IWS Peripherals Hardware Manual (SMD Version)

AWS

- AWS-210 Hardware Manual
- AWS-220, -230, -240 Hardware Manual
- AWS Color Workstation Hardware Manual

Operating System

- CTOS™ Operating System Manual
- System Programmer's Guide

Guest Operating Systems

- CP/M-86™
- MS™-DOS (and GW™-BASIC)
- XENIX™

Programming Languages

- COBOL Manual
- FORTRAN Manual
- FORTRAN-86 Manual
- BASIC Manual
- BASIC Compiler Manual
- Pascal Manual
- Assembly Language Manual

Program Development Tools

- COBOL Animator
- Editor Manual
- Debugger Manual
- Linker/Librarian Manual

Data Management Facilities

- CT-DBMS™ Manual
- ISAM Manual
- Forms Manual
- Sort/Merge Manual
- Query Manual

Text Management Facilities

- Word Processing User's Guide
- Word Processing Reference Manual
- Word Processing Quick Reference

Applications Facilities

- Project Planner Manual
- CT-MAIL™ User's Reference Manual
- CT-MAIL™ Administrator's Reference Manual
- Multiplan
- Business Graphics User's Guide
- Business Graphics Reference Manual
- Graphics Programmer's Guide
- Font Designer Manual

Communications

- Asynchronous Terminal Emulator Manual
- 3270 Terminal Emulator Manual
- Enhanced BSC 3270 Emulator Manual
- 2780/3780 RJE Terminal Emulator Manual
- SNA Network Gateway Manual
- SNA 3270 Emulator Manual
- SNA RJE Manual
- X.25 Network Gateway Manual
- Multimode Terminal Emulator User's Guide
- Multimode Terminal Emulator Reference Manual

This section outlines the contents of these manuals.

INTRODUCTORY

The Installation Guide describes the procedure for unpacking, cabling, and powering up a system.

The Operator's Guide addresses the needs of the average user for operating instructions. It describes the workstation switches and controls, keyboard function, and floppy disk handling.

The Executive Manual describes the command interpreter, the program that first interacts with the user when the system is turned on. It describes available commands and discusses command execution, file management, program invocation, and system management. It also addresses status inquiry, volume management, the printer spooler, and execution of batch jobs. This manual now incorporates the System Utilities and Batch Manuals.

The Context Manager Manual describes and teaches the use of the Context Manager, which allows the user to run applications concurrently and interchange them on the screen almost instantly.

The Status Codes Manual contains complete listings of all status codes, bootstrap ROM error codes, and CTOS initialization codes. The codes are listed numerically along with any message and an explanation.

The NGEN Installation Guide describes the procedure for unpacking, assembling, cabling, and powering up an NGEN workstation.

The NGEN Operator's Guide is a link between the operator, the NGEN workstation, and the workstation's documentation. The Operator's Guide describes the operator controls and the use of the floppy disk drives, as well as how to verify that the workstation is operational and how to use software release notices.

The MagTape Manual: Half-Inch Magnetic Tape for IWS explains the use of two MagTape utilities, Tape Backup and Tape Copy. It describes the Tape Bytestreams and Tape Server software, as well as the MagTape diagnostics.

HARDWARE

NGEN

The Processor Manual: Model CP-001 describes the Processor Module, which houses the Processor board, Memory board, I/O board, Video/Keyboard board, and Motherboard. It details the architecture and theory of operation of the printed circuit boards, external interfaces, and the Memory Expansion Cartridge, as well as the X-Bus specifications.

The Dual Floppy Disk Manual and the Floppy/Hard Disk Manual describe the architecture and theory of operation for the NGEN modules. They discuss the applicable disk drives and controllers, and contain the applicable OEM disk drive manuals.

The Diagnostics Manual describes the diagnostics available for the NGEN workstation. It discusses the Processor Module's bootstrap ROM program and error codes, and individual software diagnostics for modules in the workstation.

The Keyboard Manual describes the architecture, theory of operation, and external interfaces for the NGEN keyboard.

The Power System Manual describes the operation and connections for the 36-Volt Power Supply and the dc/dc converters used with the NGEN workstation.

The Monochrome Monitor Manual: Model VM-001 describes the operation and connections of the 12-inch Monochrome Monitor used with the NGEN workstation.

The Color Monitor Manual describes the operation and connections of the 15-inch Color Monitor used with the NGEN workstation.

The Graphics Controller Manual: Model GC-001 describes the architecture, theory of operation, and external interfaces for the Graphics Controller Module, which accommodates either a monochrome or color monitor.

IWS

The Workstation Hardware Manual describes the mainframe, keyboard, and video display for the IWS family of workstations. It specifies system architecture, printed circuit boards (Motherboard, Processor, I/O Memory, Multiline Communications Processor, Video Control, Graphics Control Board, ROM and RAM Expansions), keyboard, video monitor, Multibus interface, communications interfaces, power supply, and environmental characteristics of the workstation.

The Peripherals Hardware Manual describes the non-SMD single-board Mass Storage Subsystem (MSS) and Mass Storage Expansion (MSX) disk subsystems for the IWS family of workstations. It contains descriptions of the disk controller Motherboard, the two controller boards for floppy and Winchester disks, power supplies, disk drives, and environmental characteristics.

The IWS Peripherals Hardware Manual (SMD Version) describes the SMD MSS and MSX disk subsystems having one controller board.

AWS

The AWS-210 Hardware Manual describes the mainframe, keyboard, and video display of the AWS-210 workstation. It specifies architecture, theory of operation of the printed circuit boards (Motherboard, Deflection, and CPU), keyboard, video monitor, expansion interface, cluster communications interface, power supply, and environmental characteristics of the workstation.

The AWS-220, -230, -240 Hardware Manual describes the mainframe, keyboard, disk controllers, and video display of the AWS-220, -230, and -240 workstations. It specifies architecture, theory of operation of the printed circuit boards (Motherboard, Deflection, 8088 CPU, 8086 CPU, Floppy Disk Controller, and Hard Disk Controller), keyboard, video monitor, cluster communications interface, external interfaces, power supply, and environmental characteristics of the workstation.

The AWS Color Workstation Hardware Manual describes the mainframe, keyboard, and color video display of the AWS Color Workstation. This manual reports the architecture and theory of operation of the printed circuit boards (Motherboard, Graphics Control Board, Hard Disk Controller, Color Video, Color Deflection, and CPU), keyboard, color monitor, peripheral interfaces, cluster communications interface, power supply, and environmental characteristics of the workstation. This manual also contains four OEM disk drive manuals and a summary of adjustments for the color monitor.

OPERATING SYSTEM

The CTOS™ Operating System Manual describes the operating system. It specifies services for managing processes, messages, memory, exchanges, tasks, video, disk, keyboard, printer, timer, communications, and files. In particular, it specifies the standard file access methods: SAM, the sequential access method; RSAM, the record sequential access method; and DAM, the direct access method.

The System Programmer's Guide addresses the needs of the system programmer or system manager for detailed information on operating system structure and system operation. It describes (1) cluster architecture and operation, (2) procedures for building a customized operating system, and (3) diagnostics.

GUEST OPERATING SYSTEMS

The CP/M-86™ and MS™-DOS Manuals describe the single-user operating systems originally designed for the 8086-based personal computer systems.

The GW™-BASIC Manuals describe the version of BASIC that runs on the MS™-DOS operating system.

The XENIX™ Manuals describe the 16-bit adaptation of the UNIX system, including the XENIX environment for software development and text processing.

PROGRAMMING LANGUAGES

The COBOL, FORTRAN, FORTRAN-86, BASIC (Interpreter), BASIC Compiler, PASCAL, and Assembly Language Manuals describe the system's programming languages. Each manual specifies both the language itself and also operating instructions for that language.

The Pascal Manual is supplemented by a popular text, Pascal User Manual and Report.

The Assembly Language Manual is supplemented by a text, the Central Processing Unit, which describes the main processor, the 8086. It specifies the machine architecture, instruction set, and programming at the symbolic instruction level.

PROGRAM DEVELOPMENT TOOLS

The COBOL Animator describes the COBOL Animator, a debugger that allows the user to interact directly with the COBOL source code during program execution.

The Editor Manual describes the text editor.

The Debugger Manual describes the Debugger, which is designed for use at the symbolic instruction level. It can be used in debugging FORTRAN, Pascal, and assembly-language programs. (COBOL and BASIC, in contrast, are more conveniently debugged using special facilities described in their respective manuals.)

The Linker/Librarian Manual describes the Linker, which links together separately compiled object files, and the Librarian, which builds and manages libraries of object modules.

DATA MANAGEMENT FACILITIES

The CT-DBMS[™] Manual describes Convergent's data base management system (CT-DBMS), which consists of (1) a data manipulation language for accessing and manipulating the data base and (2) utilities for administering the data base activities such as maintenance, backup and recovery, and status reporting.

The ISAM Manual describes both the single- and the multiuser indexed sequential access method. It specifies the procedural interfaces (and how to call them from various languages) and the utilities.

The Forms Manual describes the Forms facility that includes (1) the Forms Editor, which is used to interactively design and edit forms, and (2) the Forms run time, which is called from an application program to display forms and accept user input.

The Sort/Merge Manual describes (1) the Sort and Merge utilities that run as a subsystem invoked at the Executive command level, and (2) the Sort/Merge object modules that can be called from an application program.

The Query Manual describes the Query application, which is used to interactively query and update a CT-DBMS data base from a workstation. The manual explains Query's screen layouts, forms, menus, and point-and-type user interface, and provides information for data base administrators and programmers who use CT-DBMS.

TEXT MANAGEMENT FACILITIES

The Word Processing User's Guide introduces the Word Processor to the first-time user. It provides step-by-step lessons that describe basic word processing operations. The lessons show how to execute operations and apply them to sample text.

The Word Processing Reference Manual is a reference tool for users already familiar with the Word Processor. Efficient use of the various facilities of the Word Processor is discussed and each Word Processing command is described in detail. Information is included on list processing, programmer specific operations, and printer and print wheel configurations.

The Word Processing Quick Reference provides a concise summary of all word processing operations and briefly describes the keyboard and commands.

APPLICATIONS FACILITIES

The Project Planner schedules and analyzes tasks, milestones, and the allocation of resources in a project. By means of diagrams and several kinds of bar charts, Project Planner presents time and resource allocation results and shows the occurrence of project milestones. The Project Planner Manual explains the use of the program and also serves as a reference once the user is familiar with it.

The CT-MAIL™ User's Reference Manual introduces the first-time user to the CT-MAIL electronic mail

system. It provides step-by-step instructions for using the basic CT-MAIL operations to create, send, and receive mail.

The CT-MAIL™ Administrator's Reference Manual provides the System Administrator with instructions for installing, configuring, and maintaining the CT-MAIL electronic mail system; setting up communication lines; creating and maintaining mail centers; adding mail users; creating distribution lists; and troubleshooting.

Multiplan is a financial modeling package designed for business planning, analysis, budgeting, and forecasting.

The Business Graphics User's Guide introduces Business Graphics to the first-time user. It provides step-by-step lessons that describe basic Business Graphics operations. The lessons show how to execute operations and apply them to sample charts.

The Business Graphics Reference Manual is a reference tool for users already familiar with Business Graphics. It describes the Business Graphics keyboard and screen; box and arrow cursor movement; obtaining information from Multiplan; operations; and plotter configurations.

The Graphics Programmer's Guide is a reference for applications and systems programmers. It describes the graphics library procedures that can be called from application systems to generate graphic representations of data, and it includes a section on accessing Business Graphics from an application system.

The Font Designer Manual describes the interactive utility for designing new fonts (character sets) for the video display.

COMMUNICATIONS

The Asynchronous Terminal Emulator Manual describes the asynchronous terminal emulator.

The 3270 Terminal Emulator Manual describes the 3270 emulator package.

The Enhanced BSC 3270 Emulator Manual describes the installation and operation of the CRT and Printer subsystems and the Control Unit Emulator that are provided by this emulator package.

The 2780/3780 RJE Terminal Emulator Manual describes the 2780/3780 emulator package.

The SNA Network Gateway Manual describes the SNA Network Gateway, which supports data communications over an SNA network. The SNA Network Gateway comprises the Transport Service and Status Monitor. The SNA Network Gateway emulates an IBM SNA cluster controller and forms the foundation for Convergent SNA products.

The SNA 3270 Emulator Manual describes the SNA 3270 emulator package. The SNA 3270 emulator provides CRT and printer subsystems in addition to a Virtual Terminal Interface for use in interactive application programs.

The SNA RJE Manual describes the SNA RJE subsystem. Built on the SNA Network Gateway, SNA RJE allows multiple, concurrent Logical Unit sessions with remote IBM-compatible hosts. The manual describes user interface features, installation, and a procedural interface for user-defined RJE application systems.

The X.25 Network Gateway Manual describes the X.25 Network Gateway, which supports CCITT Recommendation X.25 communications over a public data network. There are three levels of access to the network: packet, X.25 sequential access method, and the Multimode Terminal Emulator X.25 communications option.

The Multimode Terminal Emulator User's Guide introduces the Multimode Terminal Emulator to the first-time user. It describes the MTE video display, keyboard, display memory, and advanced operations for the X.25 communications option.

The Multimode Terminal Emulator Reference Manual is a reference tool for sophisticated users of the Multimode Terminal Emulator. It describes the MTE escape sequences and field verification program.

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MS, GW and XENIX are trademarks of Microsoft Corp.

UNIX is a trademark of Bell Laboratories.

1 INTRODUCTION

1.1 CRISIS PREVENTION: PROJECT PLANNER

It has to be done by the end of next month because two important customers will go elsewhere if they don't have it. Your right-hand person got promoted, and you have three people to work on this project. One will be on vacation the first week of next month. Another works weekends and Monday through Wednesday on flextime.

At an important meeting in three weeks, you'll be expected to show a firm grasp of the project and explain how you're going to make the deadline. You suspect you are going to need another person, but you must sort out these factors and make a strong presentation that will convince your boss of that need. Fortunately, Project Planner can give you a firmer basis for planning and justifying your needs than you can get from the old conjecture-and-doodles method.

Project Planner is a simple-to-use computer implementation of a tested approach to systematized planning, the critical path method. Project Planner takes the facts you know or can estimate and

- o calculates starting and ending dates for tasks
- o tells you what must start on time and what can wait
- o lets you know when one of your people, machines, or other resources is going to be overloaded under your plan
- o allows you to try out various approaches to project management ahead of time, rather than troubleshooting crisis after crisis

Project Planner gives you the hard evidence to justify your requests and sell your ideas. You can use a plotter to draw

- o a network diagram that shows all the tasks, milestones, dependencies, and important dates in a project
- o easy-to-read, flexibly organized charts that summarize information by task or by resource

Because of Project Planner's unique ability to condense almost any entire network or chart onto one screen, you can see your entire project or chart without making a hard copy of it.

1.2 PLANNING BASICS

It's easy to apply Project Planner to your project management tasks. Before you do that, however, step through a brief learning example using this manual. This exercise builds a project planning network using a familiar group of tasks--those involved in selling a house. You will see that the mechanics of using Project Planner are simple.

Then gather the facts you need to apply Project Planner to your own work:

- o What is the overall goal or substance of your project?
- o Into what separate tasks can you divide it?
- o What important deadlines, meetings, or other intermediate milestones, as they are called, will occur during the project?
- o What resources or groups of resources (people, machines, vendors) must work on each task?
- o How many days must each resource commit to the project?

For a small project, you probably already have generalizations about most of these points in your head. For a large one, you may need to make a few lists. But don't bother trying to estimate whether you have overloaded one of your people or have demanded too much from a certain vendor within a week: Project Planner does that for you.

1.3 HOW TO USE THIS MANUAL

This manual is designed to be both a quick way for you to learn about Project Planner and a reference for later use. (See also Project Planner Release Notice for installation and technical information.)

The running text of the manual provides an overview of what Project Planner can do by leading you through steps to build a project planning network. At first, the text gives you detailed instructions, but later you have a chance to try some manipulations by yourself. The text refers you to Appendix D, "Hints and Answers," for help in those places where you might have difficulties.

Wherever a series of commands or processes occurs that you might want for quick reference later, a reference box like the one in Figure 1-1 occurs on a right-hand page.

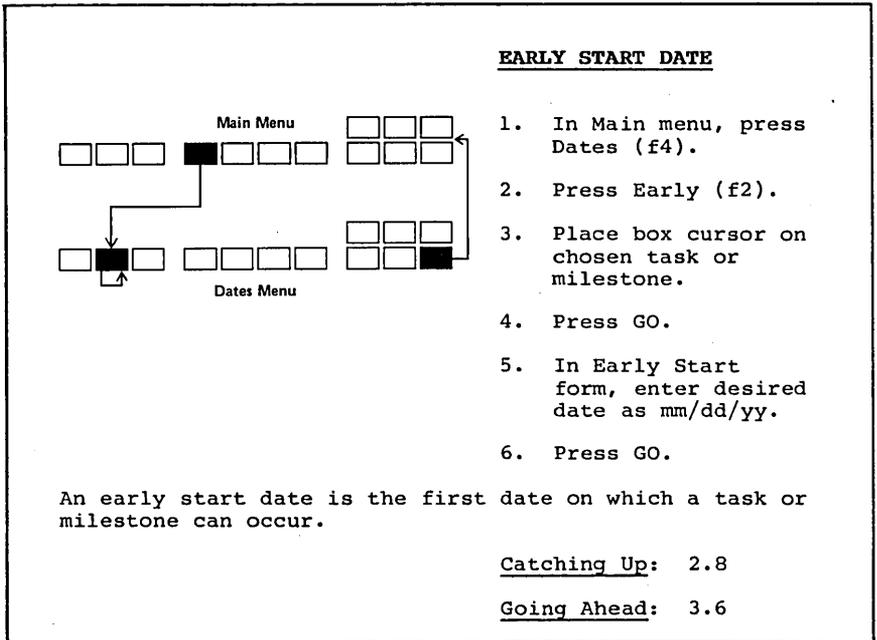


Figure 1-1. Example of a Reference Box.

To use this manual as a reference after you have finished reading it and building the example network, simply look up what you want to know in the index. It directs you to the reference box that summarizes the steps involved in doing that particular operation. You do not have to read extensive text to sift out what you want to know.

Either of two cross references, Catching Up or Going Ahead, may appear below the information summary in the reference box. Catching Up refers you to the number of a previous section that contains prerequisite material to the reference box you are reading. Going Ahead refers you to more advanced material on the same subject.

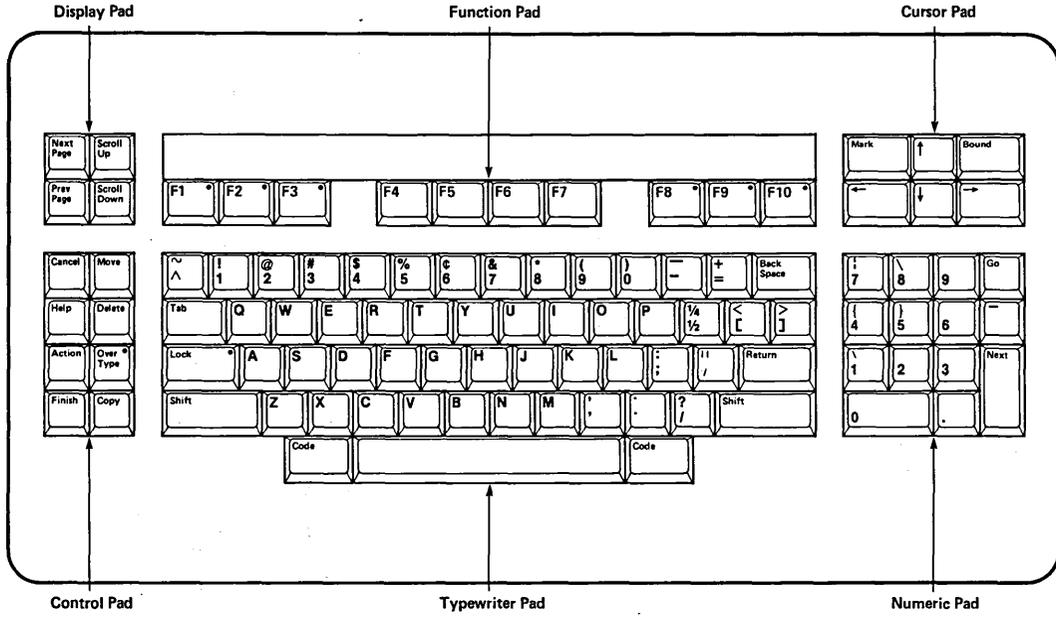


Figure 1-2. Keyboard.

1.4 KEYBOARD AND COMMAND MAP

Most reference boxes, like the one in Figure 1-1, have small, simplified maps inset to serve as visual aids. When you use the index and turn to the needed box, a glance at this small map may be all you need to remind yourself of the correct sequence of commands.

What do these maps represent? To answer that question, we need to take a look at the workstation keyboard in Figure 1-2.

In Project Planner, aside from the standard typewriter pad and the numeric pad on the right, you use the cursor pad in the upper right hand corner extensively. On the control pad, on the left, you use CANCEL, DELETE, FINISH, and OVERTYPE. You use all four keys in the display pad at upper left.

Across the top of the keyboard are 10 function keys, f1 through f10. These keys are redefined to do different things at different times. At any given time when you are working in Project Planner, the video display tells you the current meanings of the function keys by showing a highlighted strip or menu across the bottom of the screen. Here is one such menu:

Task	Milstn	Delete	Modify	AddDep	DelDep	Move	Expand	HrdCpy	
							Shrink	Recalc	GoBack

(The "double decker" structure of this menu is described further in Section 2.1.)

The small map in the reference box in Figure 1-1 shows two such menus and how to get from one to the other and back to execute a command.

For the entire Project Planner, we can draw a more general map based on menus to show changes in the definitions of the function keys and how to get from one function to another to do what you want to do.

This map is the Command Map shown on foldout pages in Appendix E. It will be a useful reference later, even though it means little to you now. Look at it while you are using Project Planner. Between the Command Map and the displayed messages that Project Planner uses to remind you of what to do, you may need to refer to this manual very seldom.

Now let us get on with our example!

2 THE BASICS

2.1 STARTING OUT

NOTE

If another person has been using this manual and building its learning example, it is best to reset the calendar and the classification assignments before you start using Project Planner. See the "Resetting the Calendar" subsection in Section 3.3, "Calendar and Overcommitted Resources," and the "Resetting Classes" subsection in Section 3.5, "Resource Classifications."

Entering Project Planner

When you begin a session, the system's sign-on form should be displayed:

```
User name: (e.g., Allen) _____
Password
Date/Time (e.g., Mon Jun 1, 1981 8:00 pm)
```

A form on a video display, like one on paper, is a simplified and ordered way of providing information. The bright highlight in the form indicates the line on which your next typed entry will appear, and the cursor (small blinking underline) shows the position that will be affected by the next character that you enter.

Enter your user name and password in the appropriate spaces. Check to make sure the Date/Time entry is correct: Project Planner uses the date. Press GO. (See "Starting the Executive" in the Executive Manual for details. If the sign-on form is not present or if the remaining steps in this section do not progress normally, consult your system administrator or Project Planner Release Notice.)

A highlighted command form appears. Enter the words "Project Planner", or any abbreviation that is unique among your allowed commands. ("P P" or "Pro" may work; and the system recognizes either uppercase or lowercase letters.)

```
Command Project Planner
```

Press RETURN, not GO. (GO results in an error message and offers you the command form: simply start over.) A File Name form appears:

Command Project Planner
Project Planner
Project File _____

The learning example you are about to begin builds a network to plan the steps in selling a house. The system accepts names composed of letters, numbers, and spaces. A project name can have up to 30 characters.

Name this project "House" and type in that name as shown in the form below. Then press GO.

```
Command Project Planner      RETURN
Project Planner
Project File House          GO
```

Project Planner now becomes available to you, and its first display appears. (See Figure 2-1.)



Figure 2-1. First Display.

On the display, midway down the screen, are two hexagons, one marked "Project Start", and the other, "Project Completion". They are the beginning and ending points of the project network. You will build the rest of the project network as you go on through this example. First, however, because this is a new project, you must choose a start date for it. At the bottom of the screen is the Start Date form. (Later on, when you reenter the same project, you will not be asked for a start date.)

NOTE

If you make errors in typing information into a form, use the keyboard BACKSPACE key to move the cursor to the position of the error, and then type the correct information over what is there. (This kind of replacement is called overtyping. Other ways to edit are discussed in Appendix C, "Editing in Forms.")

**ENTERING
PROJECT PLANNER**

1. Sign on to system.
 2. Enter "Project Planner" in Command form.
 3. Press RETURN.
 4. Enter project name in Project file field.
 5. Press GO.
 6. If project is new, enter start date as mm/dd/yy
- Any unique abbreviation may be used for "Project Planner".
- Filenames may contain letters, numbers, and spaces.
- You can edit in forms by overtyping.

Carry out the instructions on the Start Date form, typing in the date of the day on which the project should start in the form mm/dd/yy. (The form m/d/yy also is accepted.) In this example, use July 1, 1983.

Enter the project start date below. Press GO to execute.
07/01/83

Press GO. The form disappears. Although the start date is not displayed at this point, it has been filed for later use.

After you pressed GO, a menu appeared across the bottom of the display. (See Figure 2-2.)

The blocks in the lower line of this menu correspond to the function keys f1 through f10 at the top of your keyboard. The menu name for each key represents the function of that key while that menu is present on the screen.

The three blocks in the partial upper line on the right end of the menu represent combinations of keys. To carry out a command in one of these upper blocks, you press the keyboard SHIFT key and the appropriate function key at the same time.

Expand	HrdCpy	
Shrink	Recalc	

Edit	Save	Charts	Dates	Calndr	Class	
------	------	--------	-------	--------	-------	--

Figure 2-2. Main Menu.

For example, to give the Expand command, you would press SHIFT and function key f8 simultaneously. (Such a combination is symbolized in this text as SHIFT-f8.)

This particular menu, the first one that appears whenever you enter or reenter Project Planner, is the Main menu.

2.2 GETTING OUT

You can save your work and get out of Project Planner at any time, as long as a menu is present at the bottom of the screen. Press the keyboard FINISH key, at the lower left corner of the control pad. The Finish form appears:

```
Finish
Save? Y
```

If you want to save your work, allow the "Y" that already appears to stand and press GO. (Such a value that appears and will be used if you do not change it is called a default value or simply a default.) If you want to finish but do not want to save this work, type an uppercase or lowercase "N" and press GO. If you decide that you do not want to finish the session after all, press CANCEL to return to the Main menu.

If you choose to finish and save, a message appears:

```
Saving . . .
```

During this time, your project, including all the work you have done in this session, is saved in place of any previous version of the same project that you already had. (We named our project "House," but the file is saved under the name "House.pj", where "pj" stands for "project.") However, the system keeps your immediately previous version under the same filename with the suffix -Old (for example, House.pj-Old).

When you reenter this particular project, you can use the name "House" just as you did before: you do not need to use the suffix ".pj". (If you want to enter House.pj-Old, rename it with a name ending in ".pj". See the Executive Manual for details on renaming.)

GETTING OUT

Cancel	Move
Help	Delete
Action	Over * Type
Finish	Copy

1. Make sure a menu is present on screen.
2. Press FINISH to exit Project Planner.
3. Choose Y to save or N to discard session's work.
4. Press GO to complete finish or CANCEL to return to Main menu.

Then the system's command form returns to the display, and you may log out or choose another system command. (See the Executive Manual.)

When you reenter a project that you have saved, the screen displays the same portion of the project network that you were working on when you pressed FINISH. (If you finished from a Charts menu, however, you do not reenter into Charts.)

2.3 TASKS, MILESTONES, AND DEPENDENCIES

In any project, there are tasks and milestones. A task is a piece of work that involves the use of resources over time. A resource may be anything, but usually is a person or a machine. A task may require one or several resources. A milestone is an important event in the life of a project: the beginning (Project Start) or end (Project Completion) or perhaps an important meeting or deadline that occurs in between. Unlike a task, a milestone does not require the use of resources over time: it is considered an instant occurrence.

Adding a Task

Reenter Project Planner if you have exited. (If you saved the "House" project, the start date information is still recorded in it.) In the first display (Figure 2-3), Project Start and Project Completion are milestones. All milestones are shown as hexagons in the network. No tasks are shown yet: you are about to create one.

Project Start

Project Completion

Expand	HrdCpy	
Shrink	Recalc	

Edit	Save	Charts
Dates	Calndr	Class

Figure 2-3. First Display with Main Menu.

In the Main menu, press Edit (fl). The Edit menu appears at the bottom of the display. (See Figure 2-4.) (To avoid later confusion, note that the Edit (fl) command is not in the Edit menu, but in the Main menu.)

Expand	HrdCpy	
Shrink	Recalc	GoBack

Task	Milstn	Delete
Modify	AddDep	DelDep
	Move	

Figure 2-4. Edit Menu.

Another new element appears: a large box cursor, made up of dotted lines. Like the blinking underline cursor (also called the edit cursor), the box cursor shows the location that will be affected by your next action. While you are in this menu, you can move the box cursor around the display using the four arrow keys at the upper right corner of the keyboard. Experiment with them to see how they work. If you hold an arrow key down, it repeats and the box cursor skips along rapidly. (Should you run the box cursor to the edge of the screen and cause the display to shift, just do the same in the opposite direction to correct the situation.)

Now place the box cursor immediately to the right of Project Start. (See Figure 2-5.) You will place your first task here. (It can be moved later if necessary.)

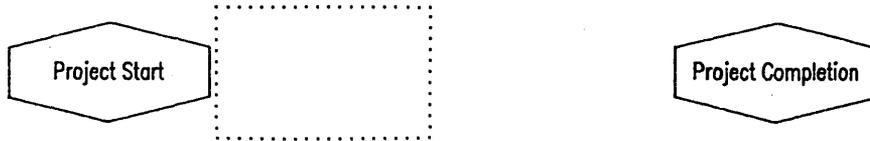
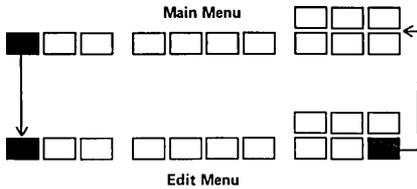


Figure 2-5. Box Cursor to Right of Project Start.



ADDING A TASK

1. In Main menu, press Edit (f1).
2. Move box cursor to desired position for task.
3. In Edit menu, press Task (f1).
4. In Task form, enter task title, resource title, and time committed by resource.
5. Repeat resource and time entries for up to five resources.
6. Press GO to place task in network; CANCEL to discard task.

A task is rectangular on the display. A task title can include up to 40 characters in two lines. Resource and Classification titles can include up to 20 characters. Three digits are allowed for time, in full days.

Going Ahead: 3.1, 3.3, 3.5

The first task in selling a house is to find a good realtor with whom to list it. This house has two owners, both of whom intend to participate in interviewing several realtors. They estimate that this task will take 10 working days from one owner and three from the other, running concurrently.

Press Task (f1). The display is cleared (but not forgotten) and the Task form appears.

The bright highlight is initially on the first line, or field, of "Task title". Type in "find realtor" (not including the quotation marks). You can use any combination of uppercase and lowercase, and you can include spaces, as we have here. The first field can contain up to 20 characters. If the title is longer, a second field is available.

In this form, any of the keys NEXT, RETURN, TAB, or down arrow moves the bright highlight to the next field. Up arrow moves it back one field at a time. In this case, our title requires only

one field. Press NEXT twice to move the bright highlight to the first field under "Resource".

You could give these first resources, the owners, whatever names (of up to 20 characters, including spaces) you like: call them "owner1" and "owner2" here, partly because later it will turn out to be helpful that they have short names that begin with the same characters. (In fact, you could call them o1 and o2 most conveniently; but for now, stay with the more readable forms.)

In the first field of "Resource", type "owner1". Press NEXT. The bright highlight skips the "Classification" fields (which are discussed in Section 3.5) and goes on to the first "Time" field. Type "10" (for 10 days) in this field. Up to three digits are allowed, and the units are working days. Project Planner's default calendar assumes that resources work full days, Monday through Friday. (This calendar can be adjusted for each resource: you will see how to do so in Section 3.3.)

Even if only part of a resource's time each day is devoted to this particular task, you must enter the total number of days during which the resource has some commitment to the task, because Project Planner uses elapsed time to figure out starting and ending dates. So even though owner1 may do other things between realtor interviews, it still takes 10 working days to find a good realtor. (For a further discussion of working days and calendar days, see Section 2.7.)

After typing "10", press NEXT. The bright highlight goes back to the second field of "Resource". Following the same pattern as for "owner1", enter resource "owner2" with a time of three days.

Five fields are available under "Resource": a total of five resources may be assigned to a task. (If you have more resources, break the task into two.)

Here is the completed Task form:

Task title
find realtor

Resource
owner1
owner2

ClassificationTime
10
3

Enter text above. Press GO to execute, CANCEL to dismiss.

Now press GO. (If you decided that you did not want this task after all, you could press CANCEL rather than GO.) The information you have entered appears in a task box at the position of the box cursor. Task boxes are always rectangular. (See Figure 2-6.)

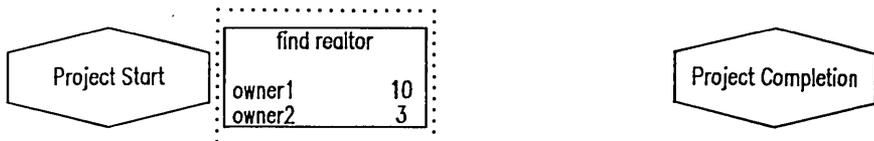


Figure 2-6. Task "Find Realtor".

Now add a second task: press the right arrow key twice to move the box cursor to the right just enough to be clear of "find realtor".

Press Task (f1). Enter the task title, "find buyer".

Press NEXT twice. Enter the resource for this task, "realtor".

Press NEXT. It will take the realtor a time of about eight five-day weeks (40 working days) to complete the task.

Press GO to place the task box in the network. The result should look like Figure 2-7.

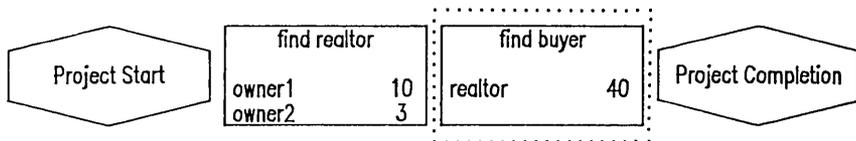


Figure 2-7. Adding Task "Find Buyer".

NOTE

Do not attempt to add a task before the Project Start hexagon or after the Project Completion hexagon. Additional tasks can be inserted only between Project Start and Project Completion.

Getting Around

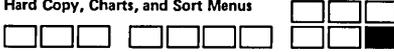
You can now look at the Command Map (Appendix E) to see the path of the command excursion you have just finished. You started in the Main menu, went to the Edit menu, and chose Task (f1) to carry out the goal of adding a task.

All the steps you do in Project Planner are carried out by such excursions from the Main menu. By looking at the Command Map at any time, you can tell where you are and what path to follow to get to the next step you want to do.

Other important ways of getting around include the following: In general, GoBack is f10 in all menus except Main and always takes you back to the previous menu. The GO and CANCEL keys that you press to execute or discard a command place you back in the menu from which you have just made a choice (in this case, the Edit menu).

In Project Planner, RETURN and NEXT keys move the bright highlight from one line to another in a form.

Edit, Dates, Classification,
Hard Copy, Charts, and Sort Menus



GETTING AROUND

- o GoBack (f10) goes back to previous menu.
- o GO or CANCEL in forms returns to same menu from which you entered the form.
- o RETURN and NEXT move bright highlight within forms.
- o Arrow keys move edit cursor, box cursor, or arrow cursor. CODE-arrow moves cursor to edge of display.

Catching Up: 1.0

Adding a Dependency

Within a project, any particular task or milestone cannot occur until some other task is complete or some milestone has been reached: that is, one task or milestone is dependent on another. Project Planner shows these dependencies with lines that connect the task and milestone boxes. In Project Planner, all dependencies are directional: imagine that the connecting line proceeds from the task or milestone that must occur first to the one that must occur second. (In Project Planner, this directionality is also from left to right.)

In our example, task "find realtor" is dependent on Project Start and task "find buyer" is dependent on task "find realtor". To add these dependencies, check to see that you are in the Edit menu and press AddDep (f5). A message replaces the menu at the bottom of the display.

Because you must add the dependency starting from the task depended upon, move the box cursor to enclose Project Start. (Ignore the dashed box that the box cursor leaves behind.) Press MARK (in the keyboard cursor pad). A new dashed box is defined at the new location of the box cursor. The dashed box now shows the task or milestone on which another one will depend. (The first dashed box that you ignored was a default: the assumption was that you had already moved the cursor where you wanted it.)

Now that you have used MARK to define the starting point for this dependency line, the box cursor is free again. Move it to enclose "find realtor". Press BOUND. A dependency line appears between the milestone and the task: the task depends on the milestone; the milestone subtends the task.

At this point, you could return to the Edit menu by pressing CANCEL; but you will add another dependency first, because it is always more efficient to make several dependency changes at one time.

The box cursor is still on "find realtor". Move it to "find buyer" and press BOUND again. (Note that you did not have to press MARK because you were continuing a chain of dependencies.) A dependency line appears between "find realtor" and "find buyer".

Now continue on to make Project Completion dependent on "find buyer". This is the end of this chain of dependencies. (If you wanted to go on and make another chain in a larger project, you would now move the box cursor to the beginning of the new chain and press MARK to define this new starting point.)

Press CANCEL to get back to the Edit menu. The results of all these added dependencies are shown in Figure 2-8.

ADDING A DEPENDENCY

1. In Main menu, press Edit (f1).
2. In Edit menu, press AddDep (f5).
3. Move box cursor to task or milestone depended upon.
4. Press MARK.
5. Move box cursor to dependent task or milestone.
6. Press BOUND.
7. Repeat steps 5 and 6 to continue a chain of dependencies.
8. Press CANCEL.

Adding a dependency is directional, from the task or milestone depended upon to the dependent task or milestone.

You can make up to five dependencies on either side of a task or milestone.

Going Ahead: 3.1

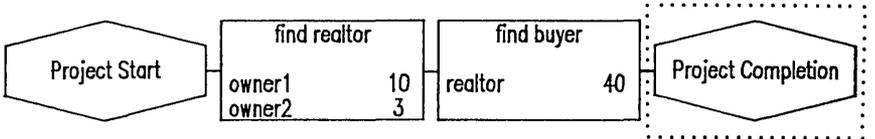


Figure 2-8. Adding Dependencies.

Deleting a Dependency

Suppose you now want to insert something between "find buyer" and Project Completion. First you must delete the dependency between these two.

In the Edit menu, move the box cursor to "find buyer". Press DelDep (f6). A message again replaces the displayed menu.

This time, you positioned the box cursor before pressing DelDep. The dashed box default is an acceptable starting point for the deletion, so even though the screen message tells you to press MARK, you do not have to do so. Move the box cursor to Project Completion and press BOUND. The dependency line disappears.

You are still under the Delete Dependency command and could do further deletions, much as you did additions, but this deletion was the only necessary one, so press CANCEL to go back to the Edit menu.

Deleting a dependency, unlike adding one, is not directional: you can MARK the task or milestone at either end of the dependency line and move the box cursor to the other end to press BOUND.

The result of your deletion is shown in Figure 2-9.

DELETING A DEPENDENCY

1. In Main menu, press Edit (f1).
2. In Edit menu, press DelDep (f6).
3. Move box cursor to task or milestone at either end of dependency line.
4. Press MARK.
5. Move box cursor to task or milestone at other end of dependency line.
6. Press BOUND.
7. Repeat steps 5 and 6 to delete a chain of dependencies.
8. Press CANCEL.

Deleting a dependency is not directional.

Going Ahead: 3.1

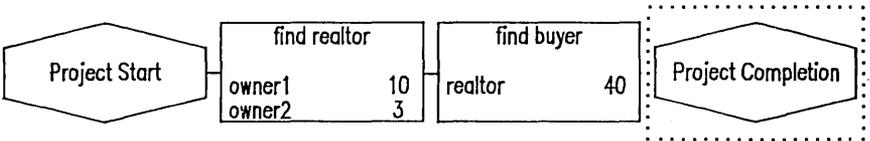


Figure 2-9. Deleting a Dependency.

2.4 HANDLING LARGER PROJECT NETWORKS

Scrolling

When you were first experimenting with the box cursor, you may have tried moving it beyond one edge of the display. When you do so, the entire project moves over on the display to allow the cursor to be where you want it and still to remain visible.

Imagine that the project network is being drawn in the middle of a very large invisible grid, and you are looking at it through a limited rectangular window that you can move about. You move this window by using the arrow keys to "push" the edge of the window in the direction you want.

This effect is called scrolling, because another way to think of it is that Project Planner is rolling and unrolling the ends of a scroll behind your screen to allow you to see the parts you need.

In the Edit menu, experiment with placing the box cursor at the right edge of the display and then pressing the right arrow key again. Also try scrolling at the other edges of the display, using the other arrow keys. You can make any of the arrow keys repeat by holding it down.

If you press SHIFT and an arrow key at the same time (called SHIFT-arrow hereafter), the box cursor moves faster by skipping five cursor positions at a time. SHIFT-arrow allows you to scroll more quickly than does an arrow key alone.

CODE-arrow moves the box cursor from wherever it is to the edge of the screen, but does not scroll.

CODE-b scrolls and moves the box cursor to the project start milestone.

CODE-e scrolls and moves the box cursor to the project completion milestone.

The SCROLL UP and SCROLL DOWN keys do exactly what their titles say. SCROLL UP moves the display upward on the screen by two cursor positions; SCROLL DOWN moves it down by the same amount.

SHIFT-SCROLL UP moves the display to the right by two cursor positions; SHIFT-SCROLL DOWN moves it to the left by the same amount.

The NEXT PAGE and PREV PAGE keys work similarly to the SCROLL UP and SCROLL DOWN keys, except that they shift the display by six cursor positions at a time. The same is true of SHIFT-NEXT PAGE and SHIFT-PREV PAGE.

The four keys in the display pad have the advantage that you can use them to scroll whether you are in the Main, Edit, Dates, or Classification menus. You do not have to have a box cursor available to do scrolling. Also, the box cursor remains in the same relative position within the network while you scroll with these keys.

SCROLLING

- o In Edit menu, place box cursor at edge of display and press arrow key to scroll display.
- o SHIFT-arrow key scrolls display more rapidly (five positions at a time).
- o CODE-arrow key moves box cursor to edge of screen, does not scroll.
- o CODE-b and CODE-e move the box cursor to the project start and project completion milestones.
- o SCROLL UP, SCROLL DOWN, SHIFT-SCROLL UP, SHIFT-SCROLL DOWN move display two cursor positions up, down, right, left, respectively.
- o NEXT PAGE, PREV PAGE, SHIFT-NEXT PAGE, SHIFT-PREV PAGE move display six cursor positions up, down, right, left, respectively.
- o Display pad keys operate in Main, Edit, Dates, and Classification menus.

Try out all the scrolling options. When you have seen how scrolling is done, restore the project network to its former position on the display.

Shrink and Expand

In the work you have done so far, you have seen that the display shows four horizontal or vertical elements of a project network at a time. You can, however, see more of your project at once, even if it is larger than the display area.

In the Edit menu, place the box cursor at the middle of the left edge of the display (on or near Project Start). Press Shrink (f8). You can press Shrink again up to a total of five times. Because labels in a condensed network would be too small to read, they do not appear.

All the editing commands work on shrunken versions of the network: the box cursor simply shrinks in proportion to the size of the network. It is often most efficient to work on shrunken versions, and by the time you have built a network, you usually know it well enough so that you do not need labels to do the kind of formatting moves that you are about to begin here.

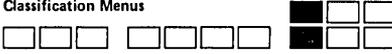
To return your network to its original size, press Expand (SHIFT-f8) as many times as you need to.

You can use CODE-MARK to shrink the network to its smallest size and CODE-BOUND to return it to normal size.

Shrink (f8) and Expand (SHIFT-f8) also appear in the Main, Dates, and Classification menus.

The screen accommodates in one display of a project network only four elements with labels in each direction. For explanatory purposes, many figures in the rest of this manual show labeled project networks that are larger than could appear on a single display.

Main, Dates, Edit, and
Classification Menus



SHRINK AND EXPAND

- In Main, Edit, Dates, or Classification menu, press Shrink (f8) to reduce scale of network on display.
- Press Expand (SHIFT-f8) to increase scale of network.
- Press CODE-MARK to reduce network to smallest size in one step.
- Press CODE-BOUND to expand network to normal size in one step.

Shrink can be pressed up to five times for progressively reduced versions of the network. All editing commands work on reduced versions.

2.5 THE MOVE OPERATION

Between "find buyer" and Project Completion, you must insert a vital milestone: the owners and the buyer must sign a sales agreement or contract specifying the terms of the sale. There is, however, no room left between the two, so you must move Project Completion to the right to make room.

In the Edit menu, place the box cursor on Project Completion.

Press Move (f7). A message appears in place of the menu. (This message contains some information that you do not yet need, so disregard it for the moment.)

In this simple case, the box cursor already surrounds exactly what you want to move. (Section 3.1 discusses manipulating the box cursor to take in larger areas.) Press BOUND. A dashed box appears, showing exactly what will be moved.

The box cursor is now free again. Move the box cursor to the right, scrolling as you go, to make enough room for insertion of the new task. (See Figure 2-10.)

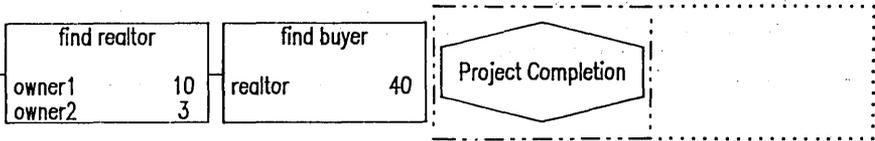


Figure 2-10. The Move Operation after BOUND and Scrolling.

When you have the box cursor where you want Project Completion to be, press GO. The Edit menu returns, and Project Completion appears in its new location. The result should look approximately like Figure 2-11.

(Now that you have started using Move, the format of your results from here on may not look exactly like that of the example. However, the relationships among tasks and milestones should be the same.)

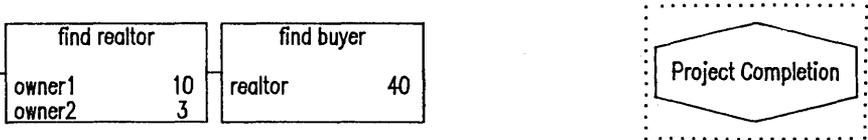


Figure 2-11. Result of Moving Project Completion.

Main Menu

Edit Menu

BASIC MOVE OPERATION

1. In Main menu, press Edit (f1)
2. In Edit menu, place box cursor on task or milestone to be moved.
3. Press Move (f7).
4. Press BOUND.
5. Move box cursor to desired location of task or milestone.
6. Press GO.

Dependencies are unaffected by the Move operation.

Going Ahead: 3.1

Adding a Milestone

You now have room to insert the signing of the sales agreement. An outline of this exercise follows, in which you will be given fewer step-by-step instructions than in previous exercises. If you need help with this or later procedures, see Appendix D, "Hints and Answers."

Move the box cursor to the space between "find buyer" and Project Completion.

Press Milstn (f2). The Milestone form appears.

The Milestone form is similar in function to the Task form, although simpler. Milestones do not have resources or times: they only have titles. Enter the title "sign sales agreement" in the first field of the Milestone form:

Enter text below. Press GO to execute, CANCEL to dismiss.
sign sales agreement

Press GO. A milestone (hexagon) bearing the title appears, and the Edit menu returns. (As before, you could press CANCEL instead of GO to discard the milestone.)

Now make this new milestone dependent on "find buyer". (Remember to start the dependency line at "find buyer".)

Make Project Completion dependent on "sign sales agreement".

The results of adding the milestone and creating the dependencies should look like Figure 2-12.

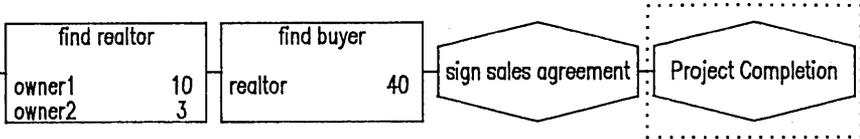


Figure 2-12. Adding a Milestone and Its Dependencies.

Inserting Another Task

One of the terms of the sales agreement in our example is that the buyer must secure financing within a certain time, or the contract is invalid. Thus you need to add another task, "secure financing", between "sign sales agreement" and Project Completion.

Move Project Completion to the right, following the same steps you used before inserting "sign sales agreement". (See Appendix D, "Hints and Answers," for help.)

Note the elongated dependency line between the two. The Move operation does not affect dependencies. Delete this dependency of Project Completion on "sign sales agreement".

Insert the new task, "secure financing", in the space thus created. The resource is "buyer"; the time needed is five work weeks.

Make "secure financing" dependent on "sign sales agreement"; make Project Completion dependent on "secure financing".

The result should resemble Figure 2-13. Look at the new task carefully. If you have entered different information from what is in the figure, see Appendix D, "Hints and Answers," for help in correcting it.

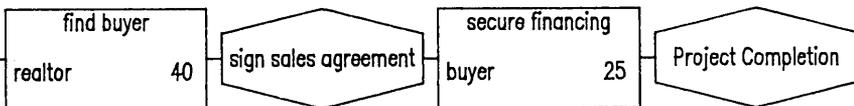
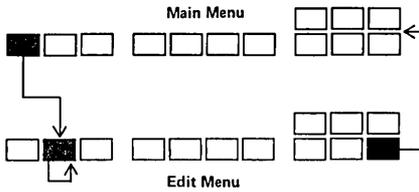


Figure 2-13. Addition of Task "Secure Financing".

ADDING A MILESTONE



1. In Main menu, press Edit (f1).
2. In Edit menu, place box cursor where you want milestone to be.
3. Press Milstn (f2).
4. In Milestone form, enter milestone title.
5. Press GO.

A milestone title may include up to 40 characters in two lines. A milestone is hexagonal on the network display.

Going Ahead: 3.1

2.6 ADDING PARALLEL TASKS

Project Planner reflects a real world in which you often have to do more than one thing at a time. In our example, while the buyer is looking into getting some money, the title company also is at work producing the title report on the property. Both tasks start after the signing of the sales agreement, and both must be complete before Project Completion.

Project Planner allows you to make up to five dependencies on each side of a single task or milestone: that is, one task or milestone may depend on five other tasks or milestones and may subtend five additional tasks or milestones. The exercise we are about to do is the simplest example of such a parallel arrangement.

A summary of the addition of the task "secure final title report" follows. Refer to Appendix D, "Hints and Answers," for help.

To maintain an elegant format, move "secure financing" upward slightly. (The steps are similar to those in Section 2.5.) Note that if you were to try to move a task or milestone to a new position that overlapped another task or milestone, a message would inform you that such a move is not allowed.

Directly below "secure financing", add the task: task title is "secure final title report". (Use NEXT once to create the two-line title.) The resource is "title company"; the time required is three normal work weeks.

Add dependencies: "secure final title report" depends on "sign sales agreement" and subtends Project Completion. The result should resemble Figure 2-14.

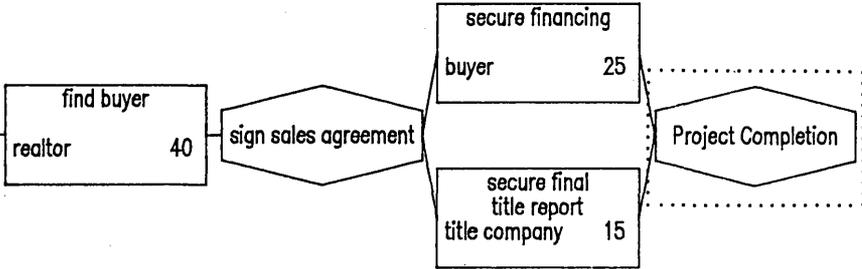


Figure 2-14. Adding a Parallel Task.

As another exercise in adding parallel tasks, suppose that owner1 succeeds in persuading owner2 that the running toilet, leaking faucets, and other piping problems need attention before any decent realtor will list the house. The toilet and faucets are a quick matter; but unfortunately the plumber called in to investigate the pipes determines that to correct the problems will take five working days.

Add the parallel task "repair plumbing", which must happen after Project Start and before "find buyer". The resource is the plumber; the time is one work week. (See Appendix D, "Hints and Answers," for help.) The result is shown in Figure 2-15.

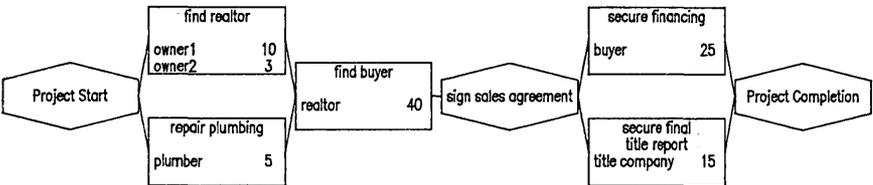


Figure 2-15. Adding the Parallel Task "Repair Plumbing".

2.7 RECALCULATING: THE CRITICAL PATH

Our project network so far is simple, but it has all the basic features that we need to create a plan. By comparing the lengths of the various tasks and knowing their order, Project Planner can now do three things:

- o calculate the critical path, or the string of tasks that must start and end on time if the project is to end in the minimum time
- o calculate intermediate starting and ending dates for tasks and milestones and the ending date for the project
- o display on the screen the project network, with the calculated dates and the critical path

All these actions are triggered by one command: Recalc (f9), which can be invoked in the Main, Edit, Dates, and Classification menus and has the same result in all of them.

To continue the example, press Recalc (f9) in one of the menus in which it is available. A result similar to Figure 2-16 appears. (You can scroll to check all the dates.)

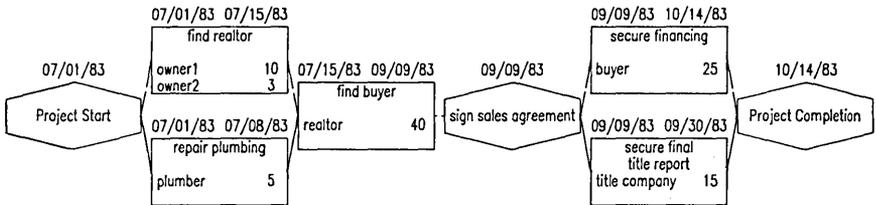


Figure 2-16. Project Network After Recalculation.

The critical path appears as a blue line (on color workstations) or as a dashed line (on monochrome workstations) passing from one critical task to another through the network. Dates appear at the upper left and upper right corners of each task box; a single date appears above each milestone.

(If the dates on your screen do not match those in Figure 2-16, it may be that someone else has used this example before you on your system. See the subsection "Resetting the Calendar," in Section 3.3, "Calendar and overcommitted Resources," to reset the calendar. Also see Appendix D, "Hints and Answers," or consult your system administrator.)

For a task, the upper left date is the early start date, the first date on which the task can start, given the finish date of the last critical task before it. The upper right date is the early finish date, the first date on which the task can finish.

For a task on the critical path, these dates are not so much the early dates as the only dates: these tasks must start and end on time. Noncritical tasks, those not on the critical path, have what is called slack time associated with them. In our example, "repair plumbing" has an early finish on July 8, and "find buyer", which is dependent on it, has an early start on July 15. The time between these dates is slack time, during which "repair plumbing" could be finished up if it had not begun on time or took longer than was expected. (Note that "find buyer" could not be moved up to meet the early finish of "repair plumbing": "find buyer" also depends on "find realtor", which is critical and does not end until July 15.)

To understand start and finish dates correctly, you must know how they are related to the calendar of available working days for each resource.

The finish date of a task is the date on which its dependent tasks can begin, but they will begin on that date only if their resources are available then. As an example, suppose Task A starts on Wednesday, August 10, and takes three days. Task A then occupies Wednesday, Thursday, and Friday. Task B, which depends on Task A, then conceivably could start on Saturday, August 13, so this is the date shown on the project network as the finish date for Task A. But suppose the resources for Task B do not work on weekends. They are available on Monday, August 15. Project Planner knows this, so it reports August 15 as the start date for Task B.

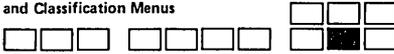
Why does Project Planner not simply report the finish date for Task A as Monday, August 15? Because, as you will see in Section 3.3, you can change a resource's calendar to reflect available work days other than the default work week of Monday through Friday. You can have resources that work on Saturday, holidays, and so on. Task B might have begun on Saturday, so Project Planner allows for that during recalculation.

Go over the the example project network carefully. So far, you have assumed that all resources devote five-day, Monday-through-Friday work weeks to selling the house and are not available Saturday and Sunday. Comparing the project network with a 1983 calendar, make sure you can justify each date on the project network. If you make the effort to understand the concepts of start and finish dates, work days, and calendar days at this point, you will avoid errors when you start building project networks of your own.

You can shrink the network to see the whole picture on one display. (To continue the example, restore the network to normal size.)

Note that if you have set up an illegal situation such as a loop or a discontinuity, you may discover it only when recalculation gives you a message. Thus, it pays to recalculate after every change in the project network.

Main, Edit, Dates,
and Classification Menus



RECALCULATION

- o In either Main or Edit menu, press Recalc (f9).
- o Dates on tasks and milestones are
 - Early start, upper left
 - Early finish, upper right
 - Late start, lower left
 - Late finish, lower right
- o Critical path appears

The critical path appears as a blue line on color workstations or as a dotted line on monochrome workstations.

The start date is the first date on which a task can start, given resource availability for that task.

The finish date for a task is the first date on which its dependent tasks can start, not considering the dependent tasks' resource calendars.

Going Ahead: 3.6

A loop is a situation in which, for example, Task A subtends Task B, which subtends Task C; but Task C subtends Task A. A discontinuity is a case in which a task or milestone (other than Project Start or Project Completion) does not have at least one dependency on each side.

2.8 CHARTS: AN INTRODUCTION

The information in the project network can be presented in chart form in more than one way.

If you happened to finish and save your work after the last exercise, reenter Project Planner and the "House" example and immediately press Recalc (f9). Project Planner does not allow charts to be created if a recalculation has not been done since the last edit or reentry.

In the Main menu, press Charts (f3). The Charts menu appears. (See Figure 2-17.)

Task	Resrce		Subset	Zoom	Sort		HrdCpy	GoBack
------	--------	--	--------	------	------	--	--------	--------

Press TASK or RESOURCE to see charts.

Figure 2-17. Charts Menu.

Here, the focus is on the basic charts only. More detailed information about charts appears in Section 3.6, "More About Charts." [At that point we shall also discuss the bright highlight that you see on Zoom (f5).]

Task Chart

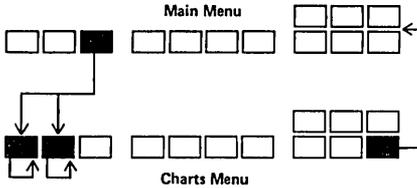
First let us look at a chart organized by task. In the Charts menu, press Task (f1). A chart containing information about the whole project appears. (See Figure 2-18.)

In the left-hand column, all the project's tasks appear in chronological order from top to bottom. Bars representing critical tasks (those on the critical path) have blue edges on the color workstation and dashed edges on the monochrome workstation. Noncritical tasks have solid edges, and the amount of slack time included in the bar is cross hatched. The bar ends at the late finish date, or the last possible date on which the task can end without delaying the project.

On the left end of each bar is a label (or as many letters of a label as will fit) that shows the names of the resources involved in that task. Because some task bars are very short, it can be helpful to choose short resource names that differ in their first letters.

Across the top of the chart is a headline showing dates and milestones. In this example, the total time required for the project is divided into four equal parts, and each of the five vertical lines in the chart shows the beginning or ending date of one of these time divisions. In our example, four-week intervals are shown. The start date of July 1, 1983 falls on a Friday, and so does the date of each division thereafter.

CHARTS: INTRODUCTION



1. In Main menu, press Charts (f3).
2. In Charts menu, press either Task (f1) or Resrcce (f2) to display chart listing tasks or resources in chronological order.

Critical task bars have dotted edges (monochrome workstation) or blue edges (color workstation). In noncritical task bars, the amount of slack time is shown by cross hatching. In a task chart, bar labels indicate the resources involved. In a resource chart, the bar label describes the task. The message line fully describes the bar on which the arrow cursor is placed.

Going Ahead: 3.6

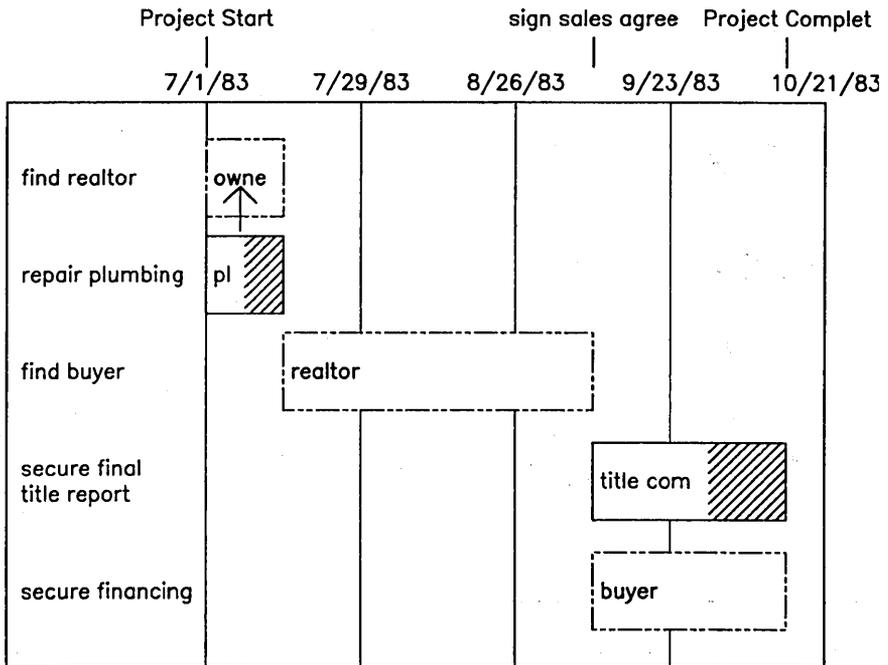
Milestones are indicated by short vertical lines along this time axis, with a label at each one. Note that if you choose to create a milestone label as two short lines rather than one long one, more of it is shown in the headline.

A new kind of cursor appears in this chart: an arrow cursor that points to the bar that is being described in the message line, located between the bottom of the chart and the menu.

Move the arrow cursor using the arrow keys. In this chart, either down arrow or right arrow moves the arrow cursor to the next bar down. Either up arrow or left arrow moves the arrow cursor to the next bar up. In all charts, the right and left arrow keys make the arrow cursor visit each bar sequentially.

Experiment with the arrow keys and watch the message line. On the left, it shows the resources involved in a given task, spelled out completely. On the right, it shows the duration of the task and its number of slack days. (The duration is from early start to late finish, including slack days.)

If you move the arrow cursor up past the top bar of the chart, it can enter the headline, at which point the message line shows the spelled-out name of the milestone on which the arrow cursor is located and the duration of that milestone, including the slack days that may occur if the milestone is not critical. You can move the arrow cursor to the different milestones in the headline by using the left and right arrow keys.



owner1, owner2

7/1/83 - 7/15/83 (0 Slack Days)

Task	Resrce		Subset	Zoom	Sort		HrdCpy	GoBack
------	--------	--	--------	------	------	--	--------	--------

Use cursor keys to see text detail.

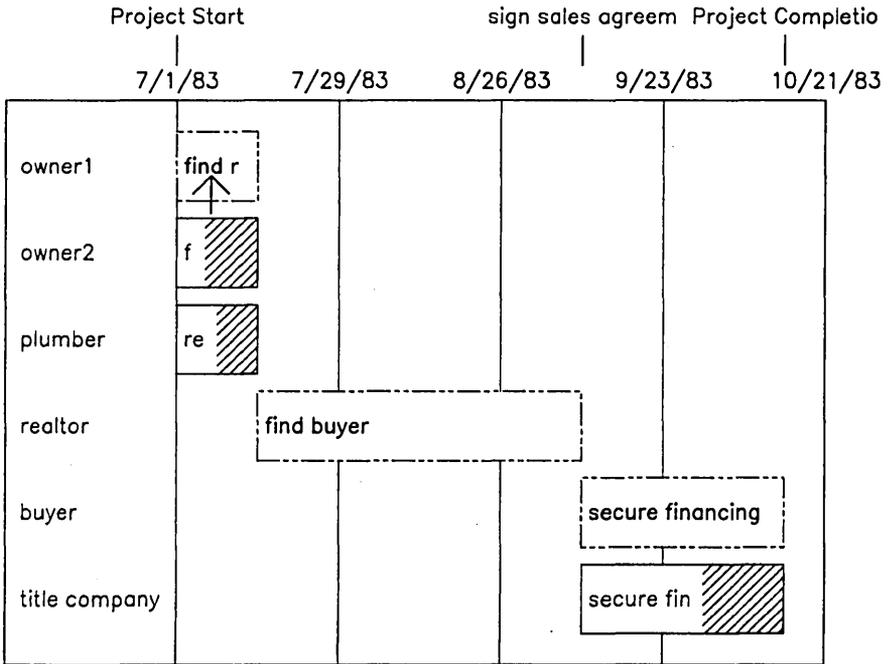
Figure 2-18. Task Chart.

Resource Chart

It is also possible to organize a chart by resources rather than by tasks.

The Charts menu still is shown at the bottom of the task chart display. Press Resrce (f2). A new chart replaces the old one. (See Figure 2-19.)

The layout of the resource chart is similar to that of the task chart, except that resources appear in the left column from top to bottom in order of the first time they are needed during the project. For each resource, all task bars are shown sequentially from left to right, each with a label that shows the first few letters of the task, if there is room.



find realtor 7/1/83 – 7/15/83 (0 Slack Days)

Task	Resrc		Subset	Zoom	Sort		HrdCpy	GoBack
------	-------	--	--------	------	------	--	--------	--------

Use cursor keys to see text detail.

Figure 2-19. Resource Chart.

In the resource chart, the down arrow key moves the arrow cursor to the first task bar of the next resource on the list. The up arrow key moves the arrow cursor to the first task bar of the previous resource. The right and left arrow keys move sequentially through the tasks within a resource as well as moving between resources.

Using the resource chart, you can see how tight the plan is for each resource used and whether you could take work from a person with a heavy schedule and transfer it to someone who has a schedule gap.

3 FILLING IN THE PICTURE

You are ready now to use Project Planner for more complicated planning and projections. Continue to build the project planning network for the learning example at your own pace.

You will see that with Project Planner it is easy to try out several different resource utilization possibilities, to see trouble spots and adjust your planning to eliminate them--in short, to use Project Planner to help you perfect your planning process.

3.1 EDITING, MODIFYING, AND FORMATTING

More About Move

The actual process of selling a house is, of course, much more complicated than the network we have created so far. To add to it, you need to do some more sophisticated moves.

Suppose the exterior of the house needs to be painted, and that this work should go on concurrently with finding the realtor and repairing the plumbing.

Add this task parallel to "find realtor" and "repair plumbing". The format of the result will be more esthetically pleasing if you move the two existing tasks down the display first.

You could move them one at a time, but you can more easily expand the box cursor to cover both so that they can be moved together.

From the Main menu, press Edit (f1) to enter the Edit menu. Place the box cursor on "repair plumbing".

Press Move (f7). In doing so, you define the current box cursor position as the starting point for each edge of the expandable box cursor.

After Move (f7) has been pressed, each of the arrow keys moves a side of the box cursor out from or back to the original location. Experiment with the arrow keys to understand their effect. Then return the box cursor to its original size. It should still be on "repair plumbing".

Now press the up arrow key repeatedly until "repair plumbing" and "find realtor" are both just barely contained. (See Figure 3-1.)

Press BOUND. A dashed box appears that shows exactly what will be moved as one selection.

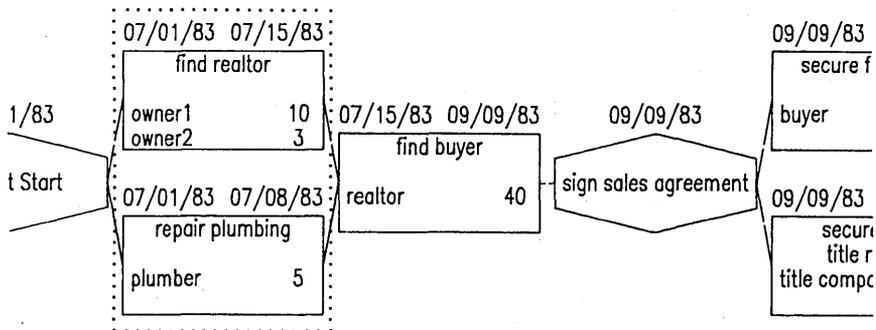


Figure 3-1. Expanding the Box Cursor Upward.

Press the down arrow key twice. The dashed box remains stationary, and the expanded box cursor moves down to show the new location to which the selection will be moved. (See Figure 3-2.) The fact that the box cursor now overlaps the dashed box does not prevent the move. (Remember, though, that you cannot move a selection to a new location where it will overlap a part of the network that is not being moved.)

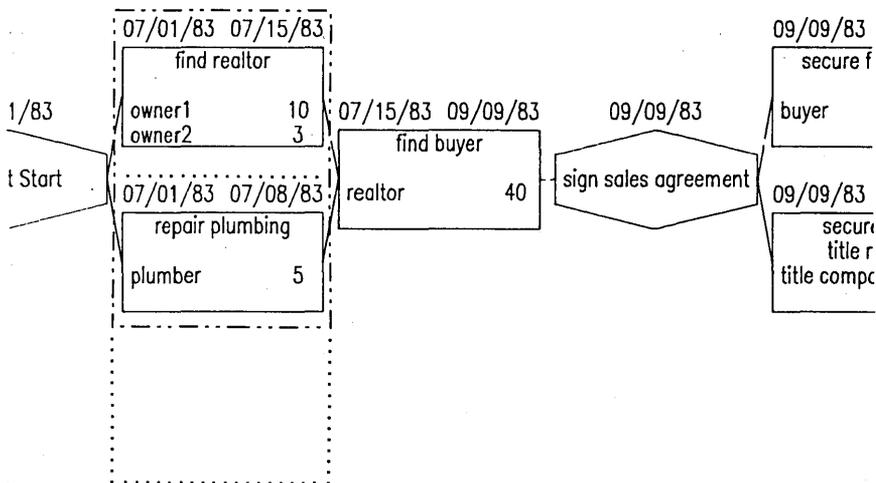


Figure 3-2. Moving Expanded Box Cursor to Final Location.

Press GO. Both tasks and their dependency lines move down together, and the Edit menu returns. (See Figure 3-3.)

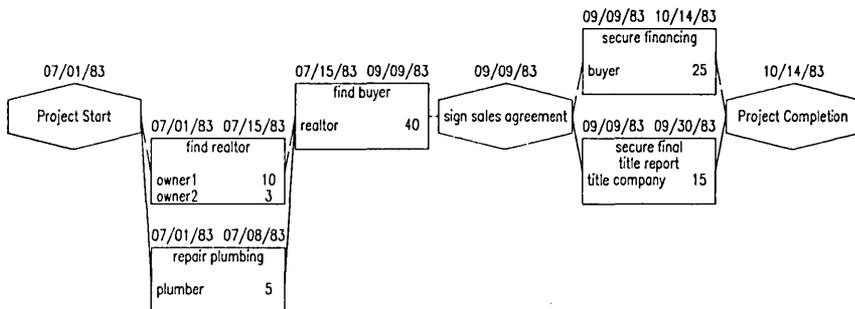


Figure 3-3. Network After Two Tasks Are Moved.

Now you can add the task "paint exterior" above and parallel to "find realtor". This task has two resources: owner2, who will spend three days working, and painter, who will spend 12 days. (Owner2 hopes to speed up the process by participating, even though owner1 thinks this result is highly unlikely.)

The new task depends on Project Start and subtends "find buyer".

If you need help with this task, see Appendix D, "Hints and Answers." One possible result is shown in Figure 3-4.

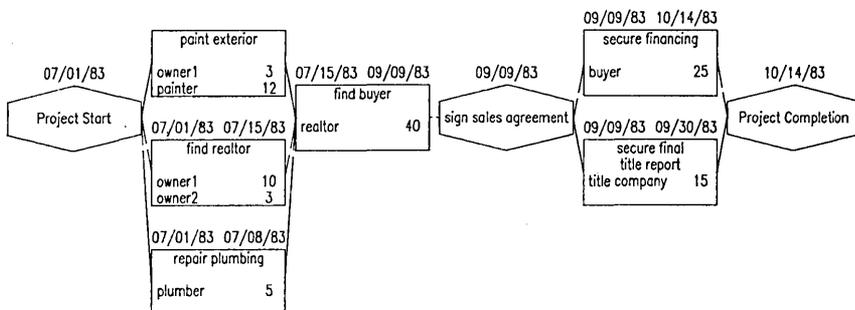


Figure 3-4. Addition of Task "Paint Exterior".

Recalculate at this point, watching the display. What is the result?

Another Expanded Move

The expandable box cursor is more versatile than we have yet seen. Addition of another task will show more of its capabilities.

Between "find buyer" and "sign sales agreement" lies the very human process of negotiating the sales agreement. To insert this task, first place the box cursor on "sign sales agreement". You are about to move everything in the project that occurs at or after this point further to the right.

Press Move (f7). Now press the right arrow key as many times as you need to so that the box cursor just includes the right edge of Project Completion. (Note that the display scrolls to allow you to do so.)

You can see that the expanded box cursor does not include portions of "secure financing" and "secure final title report". (See Figure 3-5.) If you were to try to expand downward and upward, the box cursor would not cooperate. (If you experiment on your own now, the rest of this example may not work, because it depends on the order in which you move the sides of the box cursor.)

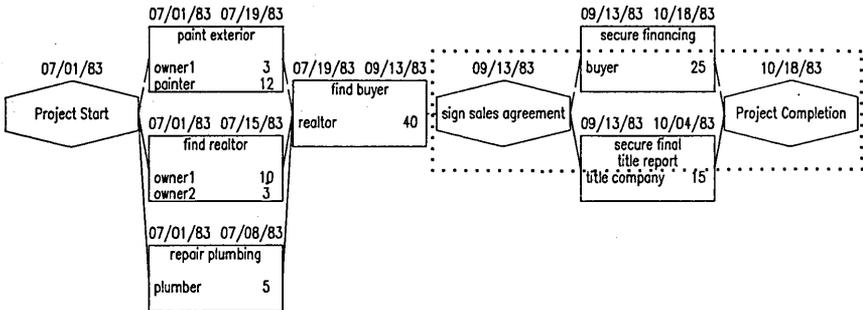


Figure 3-5. Incomplete Coverage by Expanded Box Cursor.

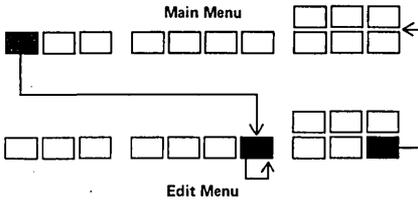
You need to redefine the basic position of the box cursor to remedy this problem.

Press the down arrow key until the lower edge of the box cursor is just below the bottom of "secure final title report".

Press MARK. MARK defines the new basic position of the cursor as the corner formed by the last two sides that you moved: in this case, the right and lower sides, so that the box cursor overlaps the lower half of Project Completion.

Press the left arrow key repeatedly until the left edge of the box cursor is once again just to the left of "sign sales agreement".

MORE ABOUT MOVE



To use the expandable box cursor,

1. In Main menu, press Edit (f1).
2. Press Move (f7).
3. Use arrow keys to enlarge box cursor to contain selection to be moved.
4. If basic position of box cursor does not allow step 3 to encompass selection, press MARK to redefine box cursor's basic position as corner formed by last two sides moved.
5. Press BOUND to define selection.
6. Move expanded box cursor to desired selection location.
7. Press GO.

When Move (f7) is pressed, the rules governing the box cursor change. The arrow keys move the sides of the box cursor out from or back to their original location.

Overlap between the position of the original selection and the position to which it will be moved is acceptable. Other overlap is not acceptable.

Catching Up: 2.5

Press the up arrow key as many times as you need to to bring the upper edge of the box cursor just above the top of "secure financing". The expanded box cursor should now contain all of the project to the right of "find buyer". (See Figure 3-6.)

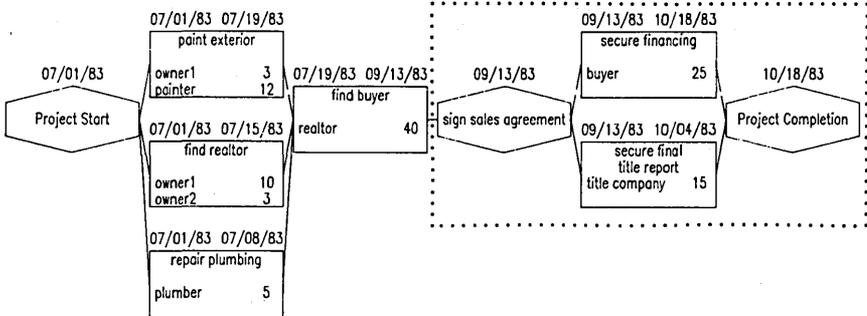


Figure 3-6. Expanding the Box Cursor After Using MARK.

Now the move progresses as we have seen before. Press BOUND to define the selection to be moved. (See Figure 3-7.)

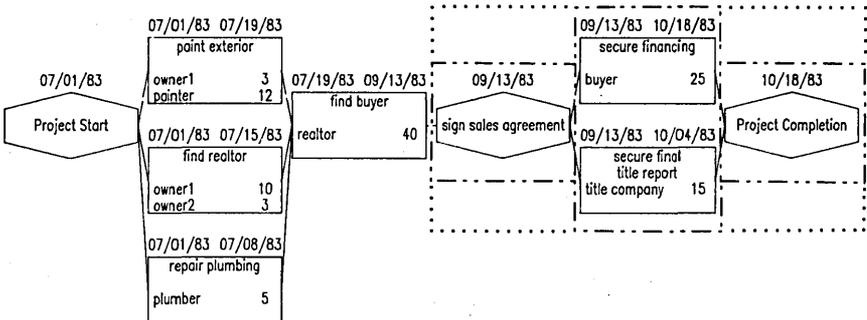


Figure 3-7. Dashed Boxes Define Selection to Be Moved.

Move the expanded box cursor to the right far enough to allow room for insertion of a task. Press GO. (Pressing GO removes the special qualities of the box cursor.) The result of the move is shown in Figure 3-8.

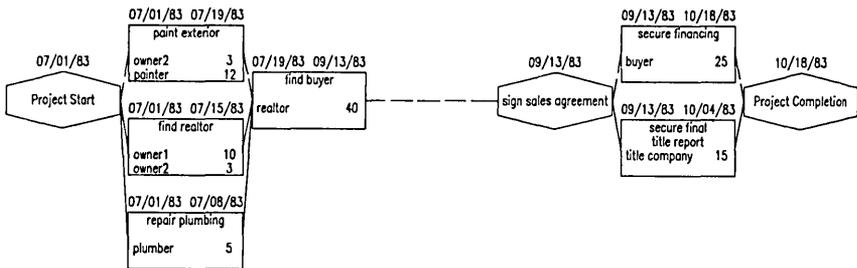


Figure 3-8. Result of Move.

Delete the old dependency and add the new task in the space you have created. Its title is "negotiate sales agreement", and resources owner1, owner2, realtor, and buyer spend two days on it. The task depends on "find buyer" and subends "sign sales agreement". (See Appendix D, "Hints and Answers," if you have trouble.) The result is shown in Figure 3-9.

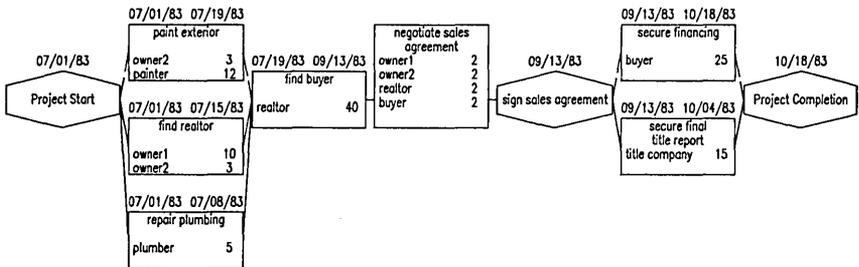


Figure 3-9. Addition of Task "Negotiate Sales Agreement".

This new task turned out to be a taller single box than any we have created. The normal box cursor does not cover the entire enlarged task box, but that fact does not interfere with normal operations. Whether the normal box cursor is positioned on the upper or the lower part of a single large task box, it still designates the whole task box. (Note that the expanded box cursor is used not to cover a single tall task box, but to encompass more than one task or milestone.)

Do a recalculation.

Deleting a Task or a Milestone

The process of securing financing for the purchase of a house probably should be broken down into two tasks: the search for financing, which is done by the buyer; and the processing of the loan application, which is done by the lender.

There is more than one way to use Project Planner's editing capabilities to divide "secure financing" into two tasks. One method is to delete the old task, do some moves, and put in the two replacement tasks, as follows.

In the Edit menu, place the box cursor on "secure financing".

Press Delete (f3, not the keyboard DELETE key). A message appears, asking you to confirm that you want this deletion. (This protects you from losses caused by hitting f3 accidentally.) When you confirm the deletion by pressing GO, the unwanted task is gone, and its dependencies with it.

Now add two tasks in sequence in place of secure financing: first move Project Completion to the right enough to allow room for two task boxes instead of one. (See Appendix D, "Hints and Answers," for help throughout this exercise.)

In the space vacated by the old task, add the new task "search for financing". The resource is the buyer, and the task should take four days.

To the right of "search for financing", add the new task "process loan application". The resource is the lender; the time is four work weeks.

Now add the necessary dependencies: "search for financing" depends on "sign sales agreement". "Process loan application" depends on "search for financing" and subtends Project Completion.

Now do a recalculation. Has the critical path changed? (See Figure 3-10.)

You can delete a milestone in the same way as you deleted a task.

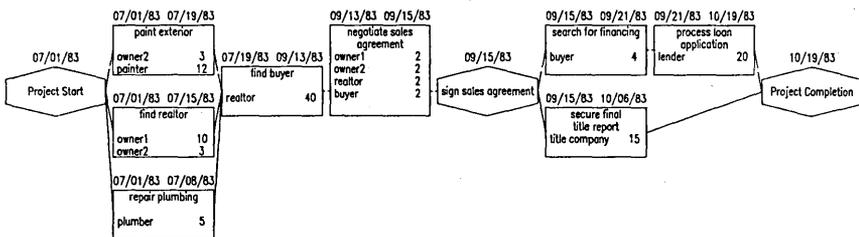
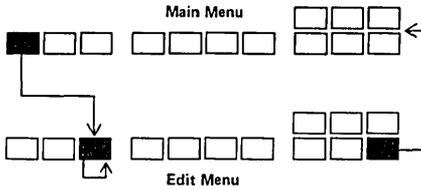


Figure 3-10. Deleting and Adding Tasks.

**DELETING A TASK
OR MILESTONE**



1. In Main menu, press Edit (f1).
2. In Edit menu, move box cursor to task or milestone to be deleted.
3. Press Delete (f3).
4. Press GO to confirm deletion.

Dependencies are deleted along with the task or milestone.

Changing a Task with the Modify Command

A second way to change our network is by editing the content of tasks and milestones.

The task "secure final title report" is oversimplified. It should be broken down into two steps: the preliminary title search, without which the lender will not start processing the loan application; and the final title report, which must be complete before close of escrow (Project Completion) can occur.

Instead of deleting "secure final title report", you will edit it. (Throughout this exercise, see Appendix D, "Hints and Answers," if you need help.)

In the Edit menu, place the box cursor on "secure final title report" and press Modify (f4). (Always position the box cursor before pressing Modify.) The filled-in Task form appears, showing you what information is already entered in this task and allowing changes.

Task Title
secure final
title report

Resource
title company

ClassificationTime
15

Enter text above. Press GO to execute, CANCEL to dismiss.

As before, NEXT or RETURN moves the bright highlight from field to field. Fill in the form with the correct information, overtyping what is incorrect. (Use the space bar to eliminate characters where space should occur.)

The task title should be "preliminary title search". The resource is still "title company", so use NEXT to pass over it. The time required is one work week.

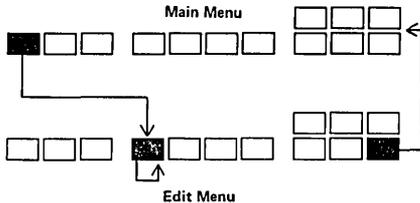
Task Title
preliminary
title search

Resource
title company

ClassificationTime
5

Enter text above. Press GO to execute, CANCEL to dismiss.

MODIFYING A TASK OR MILESTONE



1. In Main menu, press Edit (f1).
2. In Edit menu, place box cursor on task or milestone to be modified.
3. Press Modify (f4).
4. Overtyp e entries shown in Task or Milestone form with desired entries.
5. Press GO.

Use NEXT or RETURN to pass fields that are acceptable in original form.

You can use Modify to edit Project Start and Project Completion.

Catching Up: 2.3, 2.4

Press GO to implement your changes. The new information appears in the task box. (The old dates that still appear are incorrect until recalculation.)

The Modify command does not affect dependencies. The dependencies that already exist for this task box are correct; but in addition, you need to specify that "process loan application" depends on "preliminary title search". Add this dependency.

Now delete the dependency of Project Completion on "preliminary title search".

Add a new task, "final title report", dependent on "preliminary title search" and subtending Project Completion. The resource is the title company, which takes two weeks to produce this report.

Your edit of this task is complete. (You can edit milestones in the same manner.) Do a recalculation and notice the results. (See Figure 3-11.)

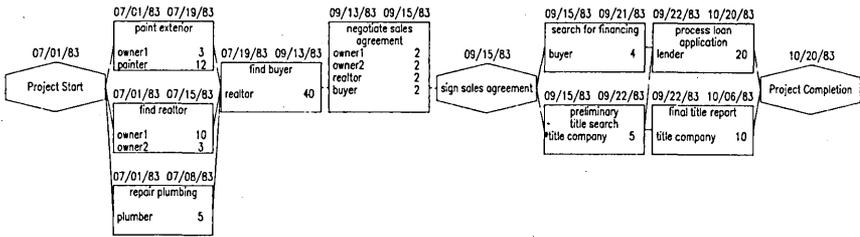


Figure 3-11. Editing and Adding Tasks.

Making Project Start and Project Completion More Specific

You have used the Modify command to edit a task. You can also use it to give more individualized labels to the Project Start and Project Completion milestones. (You cannot, however, delete Project Start or Project Completion.)

In the Edit menu, place the box cursor on Project Start.

Press Modify (F4): the filled-in Milestone form appears, showing the title "Project Start".

Enter text below. Press GO to execute, CANCEL to dismiss.
Project Start

You can change this milestone title to "decision to sell" by overtyping as you have done before. Editing within forms is faster, however, if you know a few more skills. If you would like to learn them, see Appendix C, "Editing in Forms." If you do not want to go through Appendix C at present, continue the example by overtyping Project Start with "decision to sell" and pressing GO. Then use the Modify command to change Project Completion to "close of escrow".

Moving a Selection That Is Larger than the Screen

You would not actually find a realtor and send him or her out to find a buyer without making a formal agreement to list your house with that realtor. Thus you need to add a milestone between "find realtor" and "find buyer": "sign brokerage agreement". (Why is this a milestone and not a task?)

It would be easy to move everything in the project before "find buyer" to the left; but just to be difficult (and illustrative), try moving everything after "find realtor" to the right instead. (This sort of situation can come up in a large project network.)

The portion of the diagram to be moved is larger than the screen. If you try to move it, you see that the expandable box cursor does not go off-screen to include the whole selection. What you see is what you can move.

**MOVE: SELECTION
LARGER THAN SCREEN**

It is easiest to carry out a large-scale move in a shrunken version of the project network.

If a large-scale move is necessary in an expanded version of the network, note that the box cursor cannot expand beyond the displayed area. Move the outermost portion of your selection to its final position; then move the remainder of the selection out to be adjacent to it.

Catching Up: 2.5

There are two ways around this restriction. The faster method is to shrink the network, do the move, and reexpand the network. You can do this because all the edit rules stay the same in shrunken versions of the network: the only difference is that the basic box cursor becomes smaller. (See Appendix D, "Hints and Answers," if you want help in doing this move on a shrunken version.)

If you are working in an unfamiliar project and need to read the labels to know where you are, you must do the move in sections.

In our example, enter the Edit menu and scroll until you have just brought Project Completion, now called "close of escrow", onto the display at the right side.

Place the box cursor in one corner of the display.

Press Move (F7), and use the arrow keys to expand the box cursor to encompass the entire displayed portion of the network from "sign sales agreement" to "close of escrow."

Press BOUND to define the selection to be moved. (See Figure 3-12 for the result.)

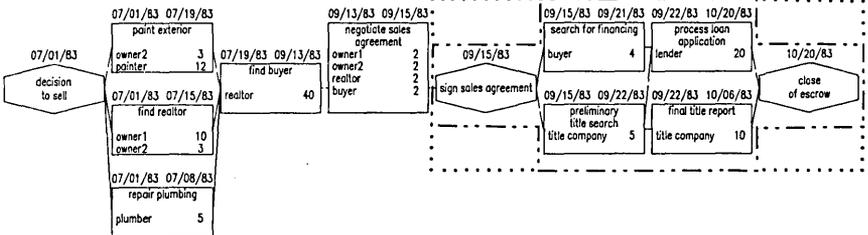


Figure 3-12. Complex Move After BOUND Is Pressed.

Now use the right arrow key to move the expanded box cursor to the right, scrolling as you go.

Press GO to complete the move.

Now, if you scroll back to see what has happened, you have left a space between "negotiate sales agreement" and "sign sales agreement", with an elongated dependency line between them.

By scrolling, position the network on the display as shown in Figure 3-13.

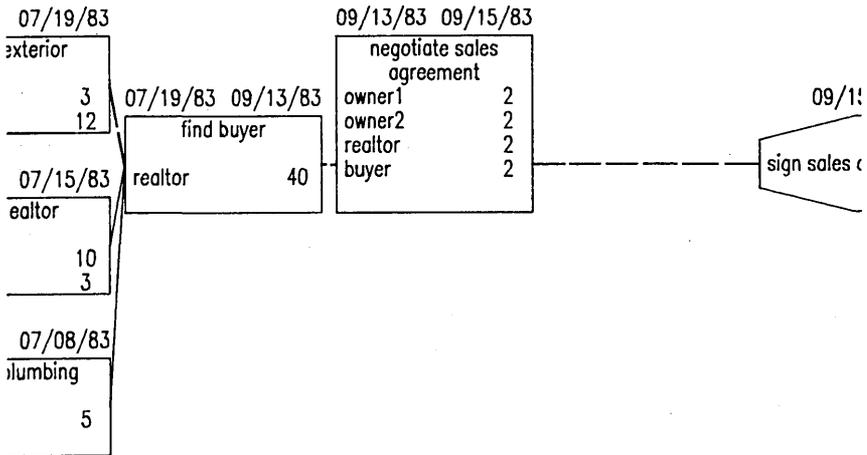


Figure 3-13. Network After First Move.

Now you will move "find buyer" and "negotiate sales agreement" to the right to "catch up" with the portion you already moved.

Position the box cursor on "find buyer".

Press Move (F7) and expand the box cursor to include "negotiate sales agreement".

Press BOUND to define the selection, and move the expanded box cursor to the right so that it is adjacent to "sign sales agreement".

Press GO to complete the move. The displayed result is shown in Figure 3-14.

If you have become absorbed by the intricacies of moving, remember that the purpose of doing the move was to allow insertion of the new milestone "sign brokerage agreement" between "find realtor" and "find buyer". (See Appendix D, "Hints and Answers," for help during this exercise.)

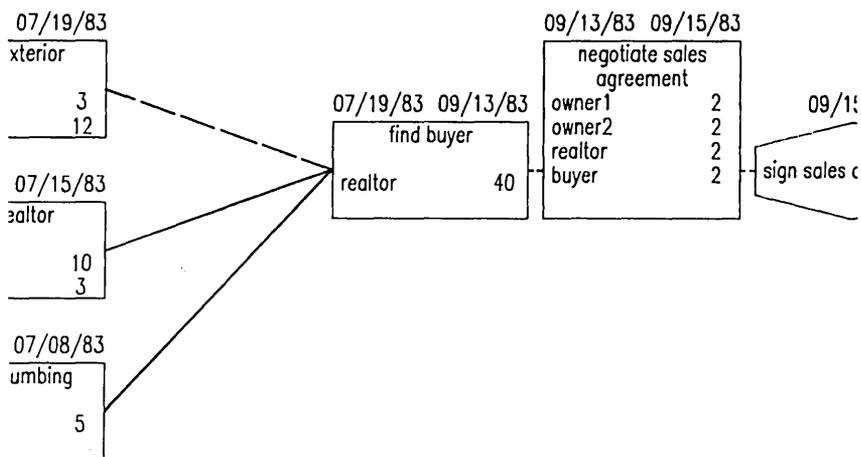


Figure 3-14. Visible Result of Complex Move.

Delete the dependencies of "find buyer" on "paint exterior", "find realtor", and "repair plumbing".

Add the new milestone.

Add dependencies: "sign brokerage agreement" depends on "paint exterior", "find realtor", and "repair plumbing". "Find buyer" depends on "sign brokerage agreement".

Do a recalculation. The network should look similar to Figure 3-15.

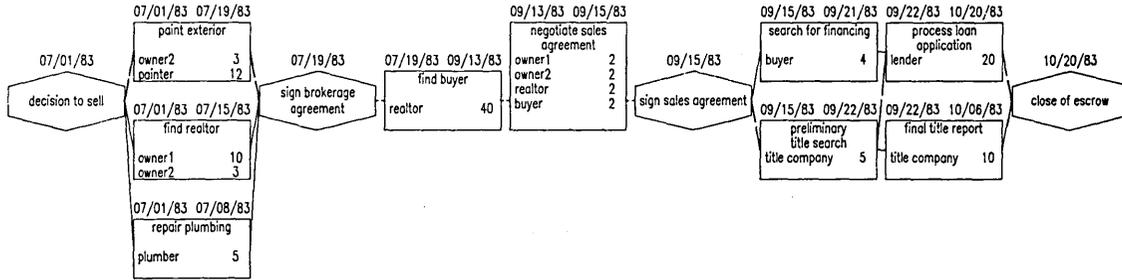


Figure 3-15. Network After Insertion of "Sign Brokerage Agreement" Milestone.

Making More than Five Dependencies

Suppose you need to add three more repair tasks to prepare for the sale, and they all have to be parallel to "find realtor". Project Planner allows five dependencies on either side of a task or milestone. This situation creates a total of six dependencies to the right of "decision to sell" and six to the left of "sign brokerage agreement".

You can, in fact, make more than five dependencies to a given task or milestone simply by creating intermediate "connector" milestones to which the extra tasks are attached.

In our example, first add the new task "interior painting" above and parallel to "paint exterior". The resource is owner2 and the time is one day. The new task depends on "decision to sell" and subtends "sign brokerage agreement".

Now, instead of adding another task, add a new milestone directly above and parallel to "interior painting". Call the milestone "connector milestone" or any other name you like. (Often, such milestones can in fact be true milestones with significant names.) Make this connector milestone dependent on "decision to sell" only.

Move the entire network portion before "sign brokerage agreement" to the left to allow room for two more task spaces and several dependency lines. Try to do this move in a shrunken version of the network. A first approximation at this point might look like Figure 3-16. (See Appendix D, "Hints and Answers," if you need help.)

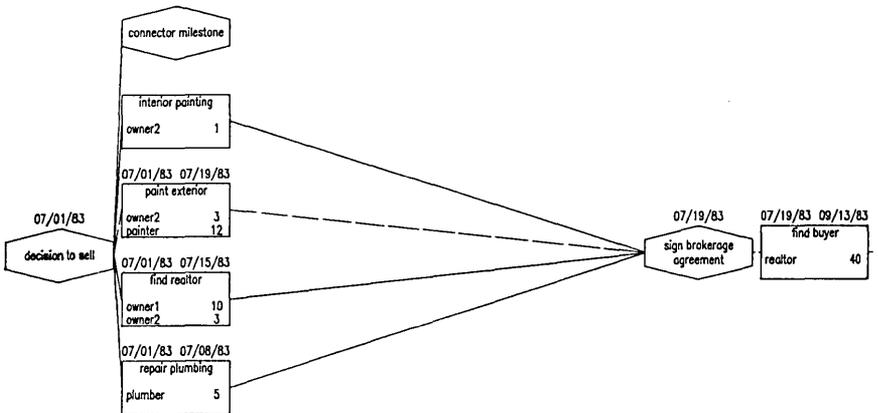


Figure 3-16. Move to Make Room for More Tasks.

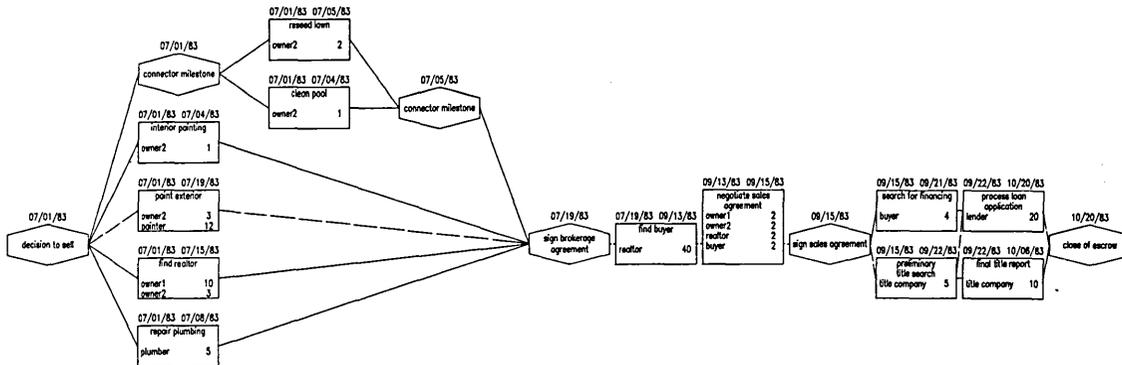
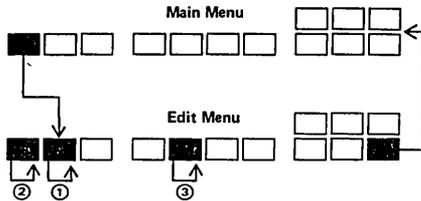


Figure 3-17. Use of Connector Milestones to Add Six Dependencies.

MAKING MORE THAN FIVE DEPENDENCIES



1. Create a connector milestone.
2. Create a dependency between the connector milestone and the task or milestone that would have become "overloaded" by further additions.
3. Create any further tasks or milestones needed.
4. Create dependencies between these tasks or milestones and the connector task or milestone.

Catching Up: 2.3, 2.4

Add two tasks, "reseed lawn" (which takes owner2 two days to do) and "clean pool" (which takes owner2 one day). These tasks are parallel to each other and depend on the connector milestone.

To the right of these two new tasks, add another connector milestone that is dependent on them. This new connector milestone subtends "sign brokerage agreement". (Notice that Project Planner tolerates two tasks or milestones of the same name.)

By this time, even though you did a move to make room for all these items, you may have something that is beginning to resemble a plate of spaghetti. Note that if you have done the dependencies correctly, Project Planner does not become confused and does recalculate correctly.

The brain of the human observer, however, is another matter. Do whatever Moves you need to do to make the format clear.

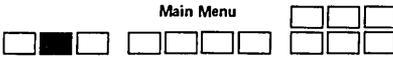
Do a recalculation. The result should have the same logic as Figure 3-17.

3.2 SECURITY MEASURES: SAVING

If some unfortunate incident such as a power outage should occur, you would not like to lose the fruits of all your efforts thus far. Whenever you have completed a complex task, it is a good idea to save your work, which you can do without finishing a session.

Enter the Main menu and press Save (f2). The message "Saving..." appears on the screen. As soon as the message disappears, your work up to that point has been saved and you can resume working.

The value of saving often is always being emphasized and usually ignored. You are not really expected to take this warning seriously until after you have had the experience of losing a day's work in a few seconds.



SAVE

1. In Main menu, press Save (f2).
2. When "Saving..." message disappears, continue work.

Catching Up: 2.1

3.3 CALENDAR AND OVERCOMMITTED RESOURCES

Resetting the Calendar

Under certain conditions you might want to reset the calendar. For example, if someone else has used Project Planner before you begin the learning example, the calendar still pertains to that user's project. To clear all calendar settings, use the Reset Calendars command in the Executive before you begin your project.

Type "Reset Calendars" in the Executive command form and then press GO.

Command Reset Calendars

All previous calendar settings are removed and you start your session with a clean calendar.

You can also use Reset Calendars after a Project Planner session to remove the customized calendar you make. Subsequent users then have a standard calendar to use in their work.

Note that Reset Calendars removes all the customized calendars made in Project Planner. All Project Planner networks on the system can be affected, so be careful to use Reset Calendars only when all existing calendars can be cleared.

Changing the Calendar for an Individual

Throughout this example, you have been making the somewhat unrealistic assumption that Project Planner's default calendar applied to your cast of characters. This calendar assumes a five-day work week available to the project, with Saturday and Sunday off.

Actually, owner1 and owner2 both work full time at other jobs. They do the tasks involved in selling the house on their days off from their jobs. In addition, the Independence Day holiday falls within the scope of the project, making further schedule complications.

To create a more realistic working calendar for owner2, first enter the Main menu.

Press Calndr (f5). A Resource Name form appears: fill it in with "owner2". (It does not matter whether you use uppercase or lowercase.)

Press GO.

Enter resource name below. Press GO to execute, CANCEL to dismiss.

owner2 GO

A calendar appears. You have just specified that this calendar pertains only to owner2's time.

The month that appears is the month in which you are now working, not the month and year chosen for this example.

Use NEXT PAGE to go to the next month, or PREV PAGE to go to the previous month. The keystroke combinations SHIFT-NEXT PAGE and SHIFT-PREV PAGE take the calendar forward or back three months, respectively.

On the calendar form, the unmarked days are days available to the project. A day marked with a diagonal line (which is yellow on color workstations) is a day not available to the project.

When the calendar first appears, an arrow cursor points to the date of the day on which you are working. The arrow cursor is controlled by the four arrow keys. Experiment with them to see their effect. If you move the arrow cursor past the end or beginning of a month, the calendar scrolls to the next or previous month.

To change an available day to an unavailable day or vice versa, move the arrow cursor to that day and press MARK.

To change a range of days, place the arrow cursor on the first day, press MARK, move the arrow cursor to the last day in the series, and press BOUND. You can change a series of up to 15 days in this way.

Whether or not you make changes in the calendar, you can use GO to record the calendar for that individual and return to the Main menu. (Use CANCEL to return to the Main menu without recording any calendar changes.)

In the example, owner2 has a rotating schedule at work. In July 1983, owner2 works Tuesday through Saturday and is available to the project of selling the house only on Sundays, Mondays, and holidays.

Use PREV PAGE and SHIFT-PREV PAGE as necessary to reach July 1983.

(The calendar for July 1983 should show a regular five-day week, Monday through Friday, as available time for the project. If it does not, someone else may already have used this example on your system. See the subsection, "Resetting the Calendar" above, Appendix D, "Hints and Answers," or your system administrator.)

Use the arrow keys to move the arrow cursor to Friday, July 1. The calendar now allows this day as available, when in fact it is not.

Press MARK to mark this day as unavailable.

Use the arrow keys and MARK to unmark Sunday, July 3, which is available to the project.

Now move the arrow cursor to Tuesday, July 5, and use MARK, the arrow keys, and BOUND to mark owner2's normal work week of Tuesday through Friday (July 8) as unavailable to the project.

Continue to adjust owner2's calendar in the same way throughout the month.

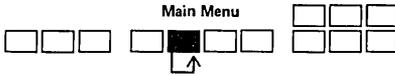
Suppose also that owner2 gets Tuesday, July 5 off because owner2's normal day off fell on July 4, Independence Day. Go back and make the appropriate change.

Note that Project Planner uses this same calendar for this resource if anyone on your system creates another project and uses this resource name. To create a different calendar, you must assign another resource name.

The calendar should look like Figure 3-18.

1983 JULY						owner2	
Sun	Mon	Tue	Wed	Thu	Fri	Sat	
						1	2
3	4	5	6	7	8	9	
10	11	12	13	14	15	16	
17	18	19	20	21	22	23	
24	25	26	27	28	29	30	
31							

Figure 3-18. Calendar for Owner2 After Adjustments.



CHANGING A CALENDAR

1. In Main menu, press Calndr (f5).
2. In Resource form, type in resource name.
3. Press GO.
4. Move arrow cursor to desired date.
5. In calendar, use MARK to mark a day (make it unavailable) or to unmark it (make it available).
6. If marking a range of days, mark first day, use arrow keys to go to end of series, press BOUND.
7. Press GO to record changes or CANCEL to discard.

Use NEXT PAGE or PREV PAGE to choose the next month or the previous month. Use SHIFT-NEXT PAGE or SHIFT-PREV PAGE to scroll the calendar three months. The arrow keys scroll the calendar if repeated past the ends of the month.

Catching Up: 2.1

Going Ahead: 3.5

Now press GO to record the calendar and return to the Main menu. So as not to bore ourselves, let us continue to assume that everyone else works a normal schedule. (If you wish to be a perfectionist, you can enter each person's calendar and give July 4 as a holiday, but remember that your results will then differ from those given here.)

An Overcommitted Resource

Now do a recalculation. A message appears:

```
Resource owner2 is overcommitted
```

```
Press CANCEL to dismiss
```

As you (and owner1) suspected, owner2 has been optimistic in becoming involved in all the preparations for the sale of the house. The sum of the time owner2 has committed to these parallel tasks is 10 days, which is less than the longest amount of time spent by any one other resource during these tasks: 12 days by the painter in "exterior painting".

Why, then, is owner2 overcommitted? Because owner2's calendar does not show as many available days as does the painter's. The painter, working five days a week starting on July 1, will finish up on July 19. Project Planner takes the painter's schedule, the longest of any single resource in any single task of this parallel set, as the time required for all these parallel tasks to be completed. Owner2 cannot get through by July 19, given the calendar we have set up.

Suppose owner2 is not only optimistic, but masochistic. If you do now follow the displayed message and press CANCEL, you allow a recalculation to proceed and permit owner2 to come home from work and put in another full day's effort working on the house whenever necessary to meet that July 19 date. Some task dates change to reflect owner2's actual dates available, but the start date for "sign brokerage agreement" does not.

Project Planner does not forget that this state of affairs is abnormal, even if you press CANCEL. If you do not adjust owner2's schedule, every time you press Recalc, forever more, Project Planner will remind you that owner2 is overcommitted.

If you must have a resource work overtime, there is a way around Project Planner's scruples. Simply define your resource twice--as John and again as JohnOT, perhaps--thereby giving Project Planner the impression that it is dealing with two separate resources. You are then spared constant moralizing on the part of a computer and you still know who is doing what.

This division of resources into subnames also can give you the ability to have a single resource work part time on two or more tasks. Suppose you want John to spend half his time on Task A and the other half on Task B, with the two tasks running concurrently. If you were to set up parallel tasks A and B, each with John as the resource, Project Planner would assume that John was working full time on each one and would report him as an overcommitted resource. Here again, you simply assign John1 as the resource for Task A and John2 as the resource for Task B. For each of the two tasks, allow the number of working days John needs while working half time, not the number of days he would need if working full time.

OVERCOMMITTED RESOURCE

If Recalc (f9) produces a message showing a resource is overcommitted,

- o Pressing CANCEL allows a recalculation with overcommitment of resource
- o You can
 - modify that resource's tasks to move work to other resources
 - change that resource's calendar
 - adjust other dates to force slack time in the parallel structure in which the resource's overcommitment occurs

Catching Up: 3.1

Going Ahead: 3.4

Returning to our example, let us agree with owner1 that it is foolish for owner2 to undertake such a traumatic schedule, especially with heavy negotiations coming up. You have a choice of reentering owner2's calendar to create a few days off from work (that is, more days available for the house project) or using the Modify command to move some of owner2's house project work to other resources such as contractors. (Owner1 is not offering to help out!)

Let us take the former option. Owner2 decides to add to the Independence Day holiday to make up a total of 10 available project working days between July 1 and July 19.

Press CANCEL to get rid of the overcommitment message and allow the recalculation to proceed for the time being.

In the Main menu, press Calndr (f5) to reenter the calendar. Type owner2's name into the Resource Name form and press GO.

Use PREV PAGE to reach July 1983.

At present, owner2 has seven available days between July 1 and July 19, and needs three more to make 10. Owner2 decides to take off July 6 through July 9. (This is one more day than necessary, but owner1 persuades owner2 that it will round out the holiday.)

Use MARK and BOUND to change the calendar. It should look like Figure 3-19.

1983 JULY

owner2

Sun Mon Tue Wed Thu Fri Sat

						1	2
3	4	5	6	7	8	9	
10	11	12	13	14	15	16	
17	18	19	20	21	22	23	
24	25	26	27	28	29	30	
31							

Figure 3-19. Final Adjustments on Owner2's Calendar.

Now press GO to return to the Main menu.

Press Recalc (f9). Recalculation proceeds without an over-commitment message. In this example, the parallel task dates remain the same, but in other examples, they might change to reflect a resource's changed availability.

3.4 DATES

In Section 2.1, when you were starting the example, you specified a start date for the project; but aside from that, you have accepted Project Planner's defaults where dates are concerned.

Actually, it is possible to specify certain start dates for individual tasks and milestones. Also, the network can display different dates from the ones we have been seeing.

In the Main menu, press Dates (f4). The Dates menu appears. (See Figure 3-20.)

Start	Early	Late	Option				Expand	HrdCpy	
							Shrink	Recalc	GoBack

Figure 3-20. Dates Menu.

Start (f1) is the command used to set the project start date. You can change the start date at any time by pressing Start, overtyping the old date to modify it, and pressing GO.

Early (f2) refers to setting an early start date: that is, a date before which a task or milestone cannot start.

Late (f3) refers to setting a late start date: that is, a date after which a task or milestone cannot start.

Option (f4) allows you to choose the start and end dates to be displayed on the network.

Setting a late start date for a milestone is the way to specify a deadline for all or part of a project.

Early Start

To illustrate specifying an early start date, let us suppose that the buyer has to go out of town on a business trip and cannot start "search for financing" until September 20.

In Edit menu, scroll until "search for financing" is on the screen.

In Dates menu, press Early (f2). A message appears. Place the box cursor on "search for financing".

Press GO. The Early Start form appears. Fill it in with the September 20 date, and press GO.

Enter the earliest starting date. Press GO to execute.
09/20/83 GO

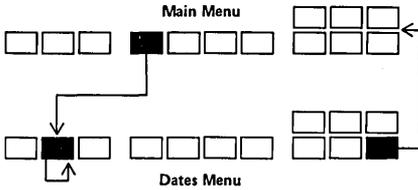
Now the Dates menu returns. At this point, you could make further date edits if you wanted to.

Press GoBack (f10) to return to the Main menu.

Do a recalculation. Note that the critical path changes, as do the dates for "process loan application" and "close of escrow".

At any time, you can reenter either an Early Start or a Late Start form and edit or delete the date shown. Deleting the date and leaving the form blank removes the restriction on the affected task or milestone.

EARLY START DATE



1. In Main menu, press Dates (f4).
2. Press Early (f2).
3. Place box cursor on chosen task or milestone.
4. Press GO.
5. In Early Start form, enter desired date as mm/dd/yy.
6. Press GO.

An early start date is the first date on which a task or milestone can occur.

You can edit the date in this form, or delete it to remove the restriction.

Catching Up: 2.8

Going Ahead: 3.6

Late Start

Suppose now that owner1 also has to go on a business trip that starts on July 14, but wants to sign the brokerage agreement before leaving. You can use Late Start to force "sign brokerage agreement" to happen on July 13.

In the Main menu, press Dates (f4). The Dates menu appears.

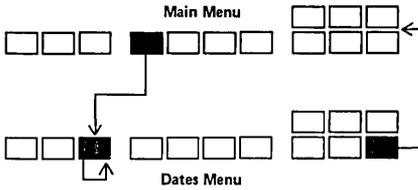
Press Late (f3).

Place the box cursor on "sign brokerage agreement".

Press GO. The Late Start form appears. As with the Early Start form, fill it out with the last date on which this milestone can occur, July 13, and press GO.

Enter the latest starting date. Press GO to execute.
07/13/83 GO

LATE START DATE



1. In Main menu, press Dates (f4).
2. Press Late (f3).
3. Place box cursor on chosen task or milestone.
4. Press GO.
5. In Late Start form, enter desired date as mm/dd/yy.
6. Press GO.

A late start date is the latest date on which a task or milestone can begin.

You can specify a deadline by creating a milestone having a late start date.

You can edit the date in this form, or delete it to remove the restriction.

Going Ahead: 3.6

Do a recalculation. Unfortunately, we have run into another scheduling problem, as indicated by the message:

The date constraint for sign brokerage agreement is impossible to meet.
Press CANCEL to dismiss.

If you press CANCEL at this point, the message is dismissed and the recalculation proceeds but ignores the late start restriction that cannot be met. (Project Planner does not, however, forget that you asked for this restriction, and it can pop up again later if you do not do something about it when it first occurs.)

You could now go back into the Dates menu and remove this restriction on "sign brokerage agreement"; but owner1 is adamant about not leaving town without signing it.

To make "sign brokerage agreement" on July 13 possible, you can either move the project start date back four working days, or shorten an intermediate critical task (here, "paint exterior").

Suppose that the painter is inflexible. You must redefine the project start date as June 27 to allow four more working days. Press CANCEL to dismiss the message.

Press Start (f1). Fill in the Start Date form as shown, overtyping the previously entered date of 07/01/83 with 06/27/83 and pressing GO.

Enter project start date below. Press GO to execute.
06/27/83 GO

Now do a recalculation. It should sail through with July 13 as the date for "sign brokerage agreement".

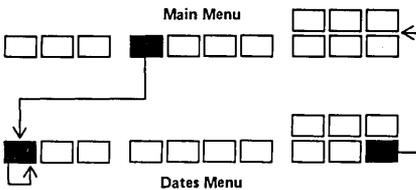
You can specify a late start on a task or milestone without causing a situation in which a date cannot be met. The task or milestone must be noncritical, and the amount by which you change the date must not exceed the slack time in the task or milestone.

**IMPOSSIBLE
DATE CONSTRAINT**

If, after you have specified start dates, recalculation produces a "date constraint is impossible to meet" message, you can

- o ignore the message each time by pressing CANCEL
- o eliminate a date constraint
- o change project start date
- o shorten an intermediate critical task between specified dates

CHOOSING START DATE



1. In Main menu, press Dates (f4).
2. Press Start (f1).
3. Enter project start date in Start Date form as mm/dd/yy.
4. Press GO.
5. GoBack (f10) goes to Main menu.

Dates in the format m/d/yy are also accepted.
The start date can be reentered and modified.

Options: Displaying Dates

When we have done recalculations up to now, the dates displayed on the project network have been the early start and early finish dates. (See Section 2.7.)

It is also possible to display late start and late finish dates, or any combination of the four dates.

Let us summarize here what the four dates mean.

- o An early start date is the first date on which a task or milestone can start, given the finish date of the last critical task before it.
- o An early finish date is the first date on which a task could be finished. Slack time (for noncritical tasks) occurs after the early finish.
- o A late start date is the last date on which a task or milestone can start without delaying the project. Slack time (for a noncritical project) occurs before the late start date.
- o A late finish date is the latest date on which a task can end without delaying the project.

In the Dates menu, press Option (f4). The Options form appears:

Early Start	Early Finish	Late Start	Late Finish
<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No

In the Options form, the large highlight indicates the type of date currently being considered. Under each date type, a small box indicator highlight shows which choice is currently in force.

Project Planner's default values for the display of dates are "yes" for early start and early finish and "no" for late start and late finish. We have always used these defaults up to now.

Suppose you want to display all four dates for each task on the network. As before, NEXT or RETURN moves the large highlight; the up and down arrow keys move the small box indicator highlights.

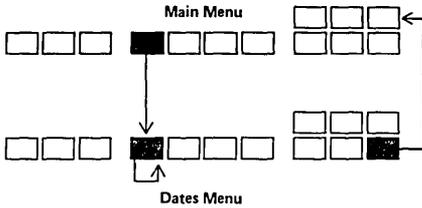
Since "Early Start" and "Early Finish" already have the values that we want, use NEXT or RETURN to move the large highlight to "Late Start".

Use either the up arrow key or the down arrow key to move the box indicator highlight to "yes".

Move the large highlight to "Late Finish" and choose "yes" again

Press GO. The Dates menu returns.

OPTIONS: DISPLAYING DATES



To choose the dates to be displayed on the project network after each recalculation:

1. In Main menu, press Dates (f4).
2. In Dates menu, press Option (f4).
3. Use NEXT or RETURN to move large highlight to choose desired date type: early start or finish; late start or finish.
4. Use up and down arrow keys to move box indicator highlight to choose "yes" or "no" for that date type.
5. Press GO.

Early finish is the earliest date on which a task can end: slack occurs afterward.

Late finish is the latest date on which a task can end: slack occurs before.

Catching Up: 2.7

Do a recalculation. Notice that both early and late dates now appear, with the late start at the lower left of each task and the late finish at the lower right.

If you like, you can experiment with the Option command to show some, all, or none of the calculated dates. (Recalculation always calculates all of them, whether you choose to display them or not.)

3.5 RESOURCE CLASSIFICATIONS

Resetting Classes

Under certain conditions you might want to reset classifications (classes). For example, if someone else has used Project Planner before you begin the learning example, the classes still pertain to that user's project. To clear all classes, use the Reset Classes command in the Executive before you begin your project.

To do so, type "Reset Classes" in the Executive command form and then press GO. All previous classes are removed.

Command Reset Classes

You can also use Reset Classes after a Project Planner session to remove the classes you have made so that the next user cannot possibly inadvertently use the ones you have created.

Note that Reset Classes removes all classes created and all class assignments made in Project Planner. All project networks on the system can be affected, so be careful to use Reset Classes only when all existing class assignments can be cleared.

Creating a Classification

Until now, you have treated resources as individuals. You also can assign resources to classifications, or groups of individuals, according to whatever criteria you wish. You might, for example, want to classify people by department or by the unions to which they belong, or you might want to group certain vendors or differentiate people from machines.

Suppose you decide to create a classification for people who are called in to work on the house. It is called "contractors", and you want to assign the painter and the plumber to this classification.

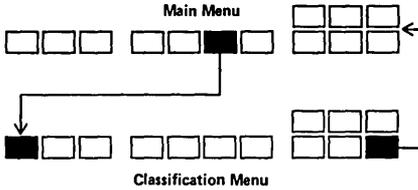
In the Main menu, press Class (f6). The Classification menu appears. (See Figure 3-21.)

Create	Assign	List					Expand	HrdCpy	
							Shrink	Recalc	GoBack

Figure 3-21. Classification Menu.

Press Create (f1). The Create Classification form appears. Fill it in as shown, and press GO. (Pressing CANCEL would return you the Classification menu without executing your choice.)

CREATING A CLASSIFICATION



1. In Main menu, press Class (f6).
2. In Classification menu, press Create (f1).
3. In Create Classification form, type desired name of classification, up to 20 characters.
4. Press GO.

Going Ahead: 3.6

Enter classification name below. Press GO to execute, CANCEL to dismiss.

contractors GO

The Classification menu returns.

The classification "contractors" has now been created, and you can assign resources to it.

Assigning Resources to a Classification

In the Classification menu, press Assign (f2). The Assignment form appears. In it, enter the title of the resource, "painter", exactly as you spelled it when you created the resource in a task form long ago. (You may use uppercase and lowercase as you wish.)

Press NEXT to move the bright highlight to the next field.

Type in the classification to which you are assigning "painter". It is "contractors", spelled just as you did in creating the classification. (Note that you must create a classification before you can assign resources to it. You cannot create the classification in the Assignment form.)

Press GO to implement your assignment. (CANCEL would take you back to the Classification menu without executing the assignment.)

Enter resource and classification below. Press GO to execute, CANCEL to dismiss.

Resource: painter
Classification: contractors GO

As an exercise, assign the plumber to the same classification. (You do not have to create the classification again.)

Now create another classification, called "inspectors". (See Appendix D, "Hints and Answers," for help if you need it.)

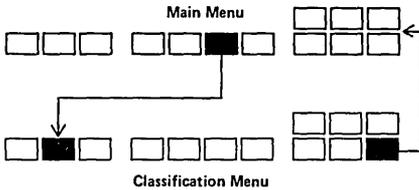
If you were now to use the Modify command to examine the "paint exterior" task, you would not see the classification "contractors" in the task form, even though the painter belongs to this classification. The classification field of the task form contains an entry only when no individual resource is specified.

One reason for this arrangement is that you can assign resources to a classification only through the classification menu. You cannot assign a resource to a classification by making both entries in a Task form.

Listing Classifications

In the Classification menu, press List (f3). A list of the classifications you have created and the resources assigned to them appears.

ASSIGNING RESOURCES TO CLASSIFICATIONS



1. In Main menu, press Class (f6).
2. In Classification menu, press Assign (f2).
3. Fill in Assignment form with resource name to be assigned and name of classification to which resource is being assigned.
4. Press GO.

You can examine a list of classifications and resources within them by pressing List (f3).

Going Ahead: 3.6

Classification:
Contractors

Resource:
painter
plumber

Classification
inspectors

Press any key to exit command.

This list is an easy way to remind yourself of what you have done in a complex project. In fact, it shows all classifications and assigned resources that have been created on your system.

Press any key to return to the classification menu.

Using a Classification in a Task Form

In creating a task, you can specify that a class of resources, rather than an individual resource, is going to do the work. If you do not know how many individual resources you will have, but you do know how long the task has to take, this feature is useful.

Within this example, create a task called "inspections". Because the example is getting large, this edit is easiest to do on a shrunken version of the network. (See Appendix D, "Hints and Answers," for help in this exercise.)

Enter the Edit menu and move the box cursor to a vacant area above the network.

Add a new task: the title is "inspections".

After you have typed the title into the Task form, press NEXT three times. If you pass the Resource field in this way without entering a resource name, Project Planner assumes that you are going to enter a classification instead, and the bright highlight goes to the Classification field instead of skipping to the Time field.

In the Classification field, enter "inspectors". Press NEXT to go on to the Time field.

Enter the time, three days.

```
Task title
inspections
_____
ResourceClassification   Time
                        inspectors   3
_____
_____
_____
```

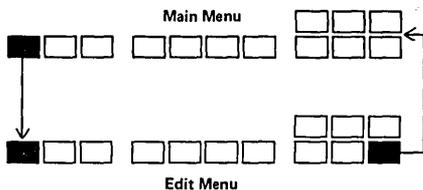
Enter text above. Press GO to execute, CANCEL to dismiss.

Press GO.

Add dependencies: "inspections" depends on "decision to sell and subtends "close of escrow". (Note that you cannot make "inspections" directly dependent on "decision to sell".)

Now do whatever moves you need to make the format readable. The result should have the same logic as Figure 3-22.

**CLASSIFICATION
IN A TASK FORM**



1. Enter Edit menu and press Task (f1).
2. In Task form, type task title.
3. Use NEXT or RETURN to pass Resource field.
4. In Classification field, enter name of classification to be committed to task.
5. In Time field, enter time required for Classification's work.
6. Press GO.

Do not use the Task form to assign resources to a classification. Only the Assign form can do so.

Catching Up: 2.3

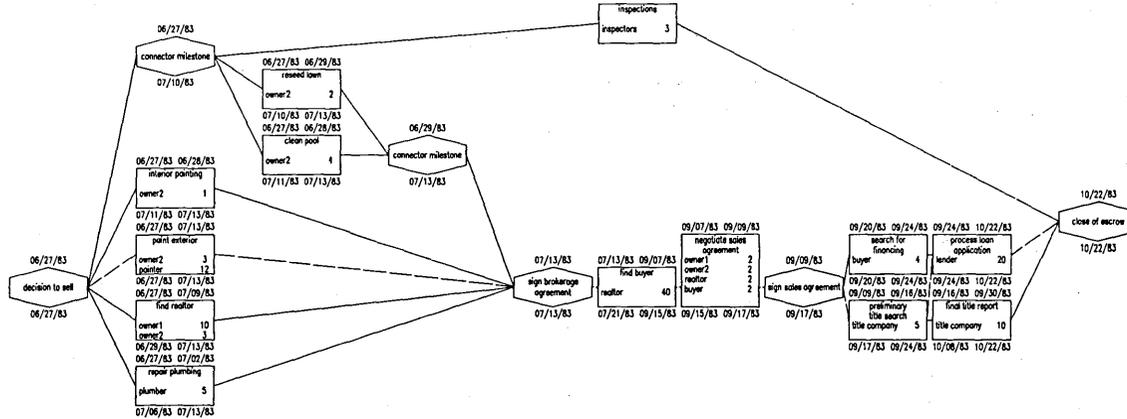


Figure 3-22. Addition of Task "Inspections".

**CALENDAR FOR
A CLASSIFICATION**

You can create a calendar for an entire classification by typing the classification name instead of a resource name in the Resource Name form during Calendar creation.

Catching Up: 3.3

Calendar for a Classification

A calendar for a given classification can be created once and then apply to all members of that classification. This feature would be useful for union members with certain holidays.

In the Main menu, press Calndr (f5). The Resource Name form appears.

In the Resource Name form, enter the classification title "contractors". Press GO.

Enter resource name below. Press GO to execute, CANCEL to dismiss.
contractors GO

When the calendar is displayed, use NEXT PAGE or PREV PAGE to reach July 1983. Use MARK to give all the contractors July 4 (Independence Day) off.

Press GO to implement your calendar change.

In the Main menu, do a recalculation. Why do you get a date constraint message? What should you do about it? (See Appendix D, "Hints and Answers," for help.)

3.6 MORE ABOUT CHARTS

To see some of the more advanced features of the Charts command, you need a slightly more complex network. Delete the task "inspections" and replace it with four better defined tasks:

- o "termite inspection", which takes inspector1 one day
- o "pool inspection", which takes inspector2 one day
- o "roof inspection", which takes inspector3 one day
- o "geological inspection", which takes inspector4 one day

Add dependencies (and milestones, if necessary) for these tasks: they all depend on "decision to sell" (directly?) and subtend "close of escrow".

(Note that if your screen does not look exactly like the examples below, you should not be concerned. Some workstations display a slightly different number of items in a chart at any one time, for example. Also, the order in which you enter the above four tasks, or any other parallel group of tasks of the same duration, determines the order in which they appear on charts, and this may result in some variations. Dates and relationships should be the same as in this manual's examples, however.)

Do any needed moves to make the network format clear.

Do a recalculation.

Your completed network (yes, this really is the end) should have the same logic as Figure 3-23.

Is There Always a Critical Path?

You may have noticed as soon as you set a late start date for "sign brokerage agreement" and did a recalculation that the line representing the critical path in the network (dotted in monochrome workstations or blue in color workstations) became incomplete. There is no such line between "sign brokerage agreement" and "search for financing".

You might at first think that an error has occurred, but this situation is normal. We set an overall time between these two tasks that exceeded the sum of the times required by the tasks between them. Thus all the intermediate tasks contain slack time, and there is no critical path during that period.

Let us look at some charts under these conditions, and then change them to look at charts where a complete critical path exists.

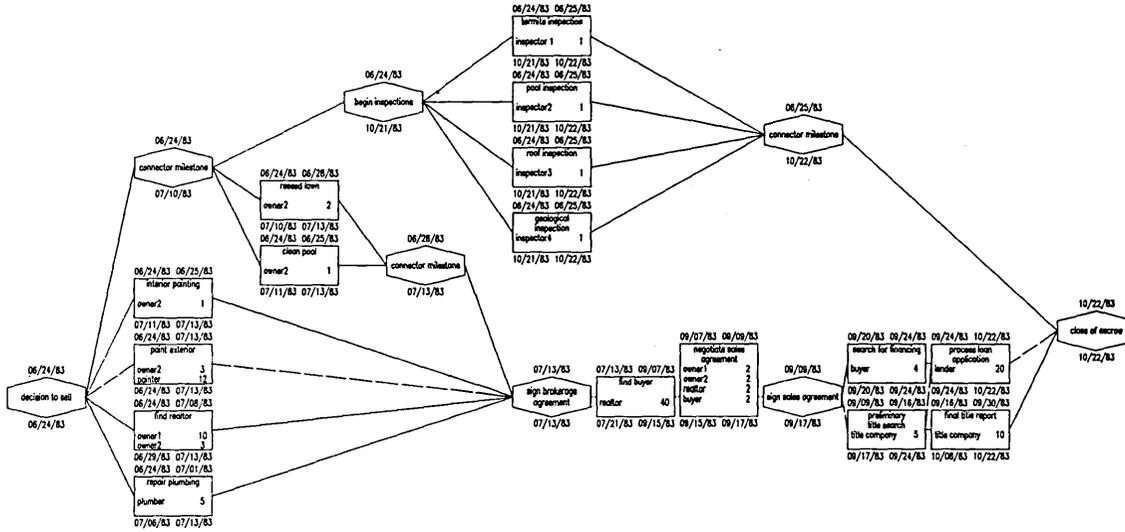


Figure 3-23. Adding Four Inspection Tasks.

Charts of More than One Page

In the Main menu, press Charts (f3). The Charts menu appears.

Task	Resrce		Subset	Zoom	Sort			HrdCpy	GoBack
------	--------	--	--------	------	------	--	--	--------	--------

Press TASK or RESOURCE to see charts.

Figure 3-24. Charts Menu.

Choose Task (f1). A task chart is displayed, much as it was when we looked at charts originally. The Charts menu remains at the bottom of the display. (See Figure 3-25.)

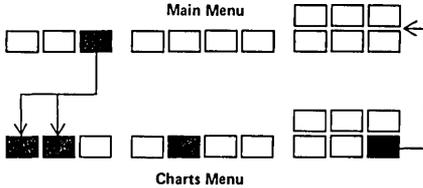
Use the arrow keys to examine the milestone titles at the top of this chart. Note that noncritical milestones have early and late start dates and have slack time. (The message line describes all milestones in succession, including those not shown on the chart because of overlap.)

On closer inspection, you can see that the left column contains 13 tasks in chronological order; but there are 16 tasks in the network now.

Press NEXT PAGE to see the second page of the chart. (Note that the time scale along the top of the chart has been adjusted to accommodate those tasks that appear on this page.)

To go back to the first page of the chart, press PREV PAGE. (Where a chart has several pages, CODE-PREV PAGE goes back to the first page.)

CHARTS WITH MORE THAN ONE PAGE

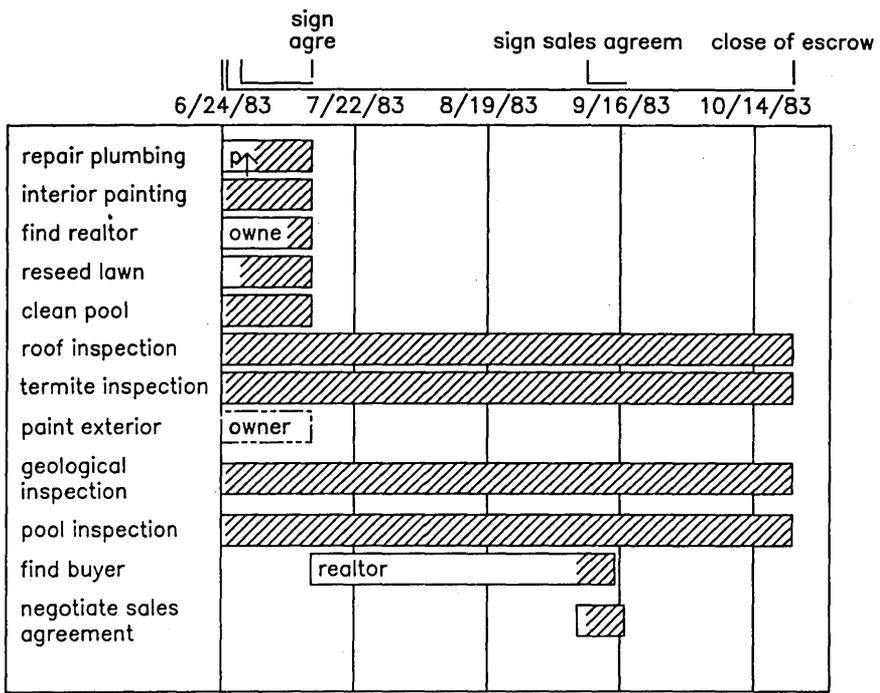


In either task or resource chart:

- o To see continuation of chart, press NEXT PAGE. To advance 3 pages, press SHIFT-NEXT PAGE.
- o To see previous page of chart, press PREV PAGE. To back up 3 pages, press SHIFT-PREV PAGE. To return to first page, press CODE-PREV PAGE.
- o To condense entire chart, press Zoom (f5) in Charts menu.
- o To return from condensed chart to normal chart, press Zoom (f5) again.

In a condensed chart, the message line spells out the task and resource names for the bar on which the arrow cursor is located.

Catching Up: 2.8



plumber 6/24/83 - 7/13/83 (12 Slack Days)

Task Resrce Subset Zoom Sort HrdCpy GoBack

Use NEXT PAGE & PREV PAGE to see more. Use cursor keys to see text detail.

Figure 3-25. Task Chart with Incomplete Critical Path.

Thus, no matter how large your chart is, you can examine all its information on one display.

To return to the expanded and detailed version of the chart, press Zoom (f5) again. The bright highlight on Zoom (f5) reappears.

Sorting a Chart

We have always looked at charts with items (whether by task or by resource) sorted by their early start dates from top to bottom. It is also possible, and sometimes more helpful, to look at items sorted by the amount of slack time they contain, from least to most.

In the Charts menu, with the expanded version of the task chart on the display, press Sort (f6). The Sort menu appears. (See Figure 3-27.)



Figure 3-27. Sort Menu.

The bright highlight on Start (f1) shows that the chart is currently sorted by early start date.

Press Slack (f2). The Charts menu reappears, and the task chart is redrawn, now sorted so that those tasks with the least amount of slack time appear at the top of the chart. (See Figure 3-28.) As before, you can use NEXT PAGE, PREV PAGE, SHIFT-NEXT PAGE, SHIFT-PREV PAGE, and CODE-PREV PAGE to examine the chart.

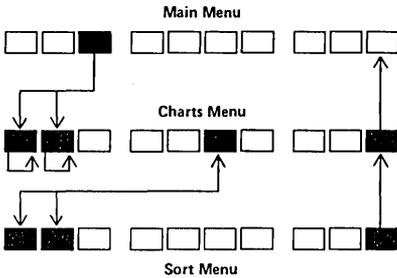
The main purpose of this sort is to place the critical tasks at the top of the chart where you can examine them all together. Notice how the interrupted critical path looks on this sorted chart so that you can compare it to the version you will do later.

After you have entered the Charts menu from the Main menu, the Charts menu remains on the display throughout your manipulation of charts except when a Sort menu or a form is on the display or a plot is in progress. Thus you can change from a task chart to a resource chart (still sorted by slack time) without making any other changes.

Press Resrce (f2). The resources chart appears, sorted so that the resources involved in those tasks that have the least slack time occur first. Again, resources involved in critical tasks appear at the top. (Whatever other tasks those resources are involved in are also shown in that resource's task group.)

You can use Zoom (f5) to condense these sorted charts at any time.

SORTING A CHART

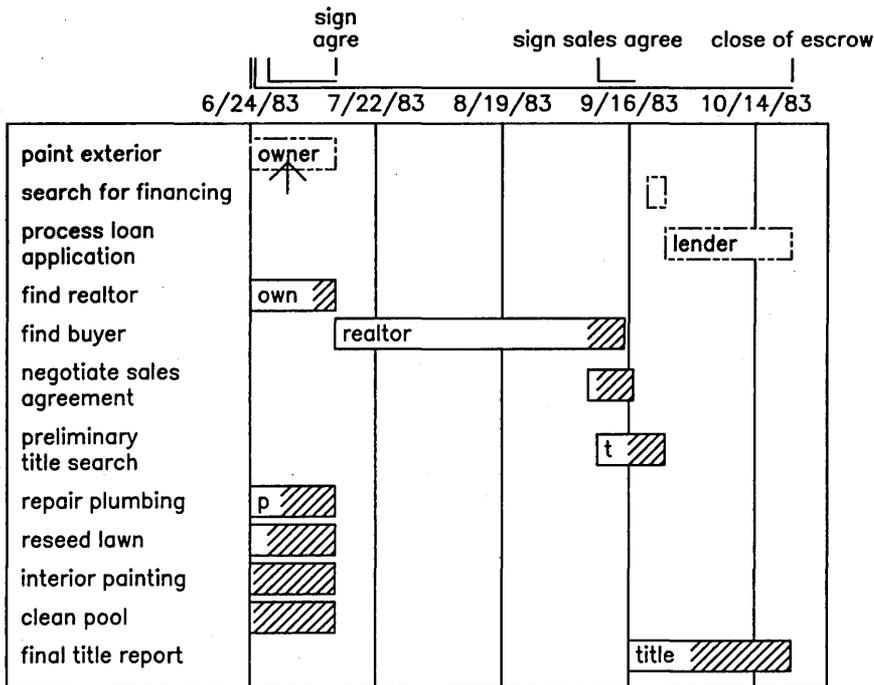


1. In Main menu, press Charts (f3).
2. In Charts menu, choose Task (f1) or Resource (f2) chart.
3. Press Sort (f5).
4. In Sort menu, press Start (f1) or Slack (f2) to change sort criterion.

When you first enter either a task or a resource chart, items are sorted by early start dates as a default.

Sorting items by their amount of slack time places critical tasks at the top of the chart.

Catching Up: 2.8



owner2, painter 6/24/83 - 7/13/83 (0 Slack Days)

Task	Resrce	Subset	Zoom	Sort	HrdCpy	GoBack
------	--------	--------	------	------	--------	--------

Use NEXT PAGE & PREV PAGE to see more. Use cursor keys to see text detail.

Figure 3-28. Task Chart Sorted by Slack.

Chart with a Complete Critical Path

So that we can see a complete critical path in our sorted charts, let us remove from our example the restrictions that created so much slack time.

From the Charts menu, GoBack (f10) to the Main menu.

Through the Dates menu, you can use the box cursor and Early Start to change your restriction on "search for financing". As with the Modify command, you can overwrite, insert, or delete whatever you want from the Early Start form. (See Appendix C, "Editing in Forms.")

Deleting the date shown in the Early Start form for "search for financing" effectively removes the restriction you had placed on that task. (See Appendix D, "Hints and Answers," if you need step-by-step help to do this series of edits.)

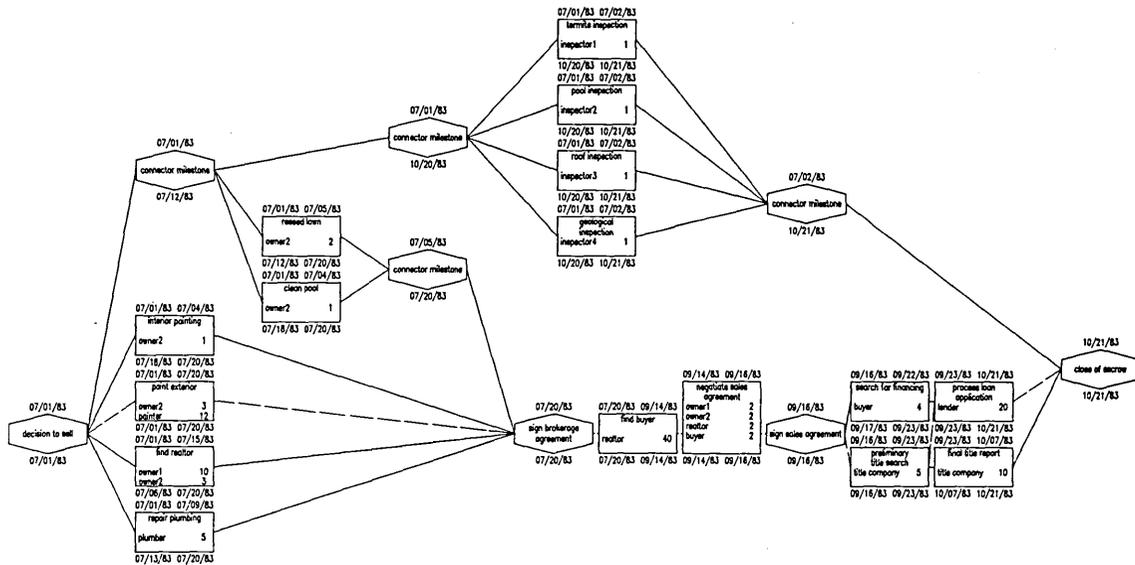
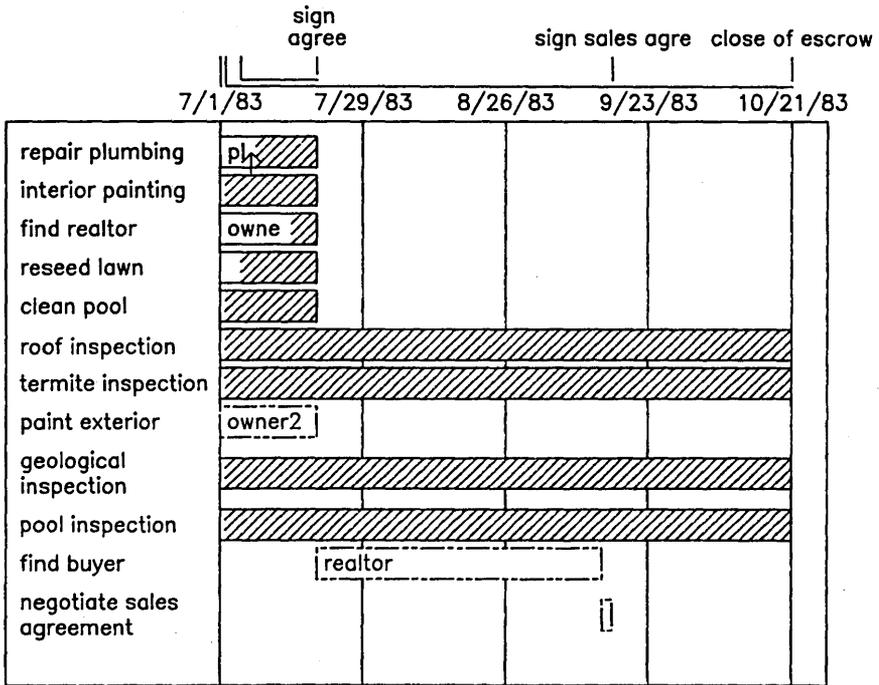


Figure 3-29. Network with Continuous Critical Path.



plumber 7/1/83 - 7/20/83 (11 Slack Days)

Task Resrce Subset Zoom Sort HrdCpy GoBack

Use NEXT PAGE & PREV PAGE to see more. Use cursor keys to see text detail.

Figure 3-30. Task Chart with Continuous Critical Path.

Now use Late (f3) to edit out the date restriction you had placed on "sign brokerage agreement".

Remember that we changed the "decision to sell" (Project Start) date to accommodate the July 13 "sign brokerage agreement" date. Use Start (f1) to change the project start date back to July 1.

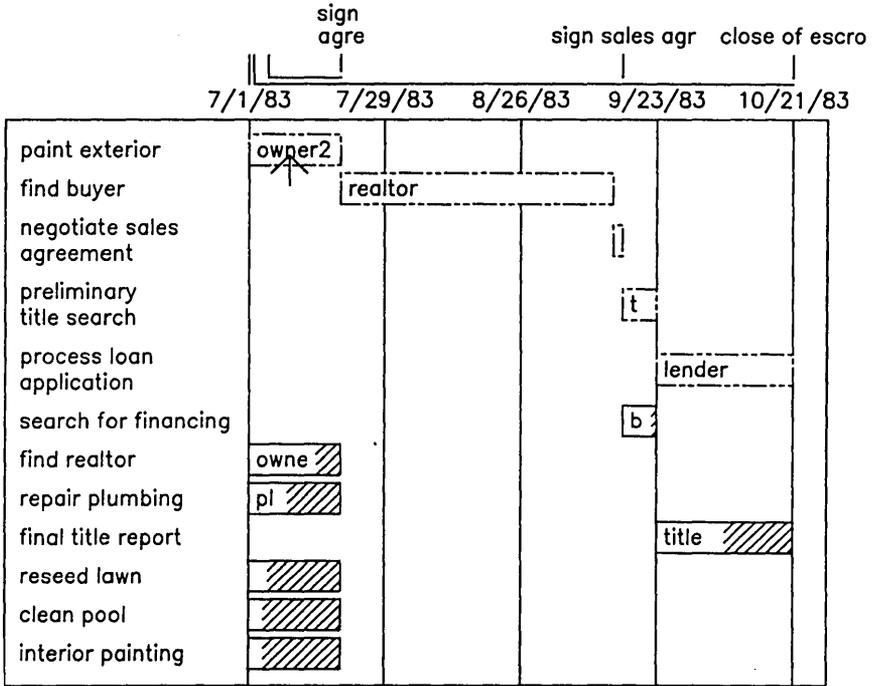
Do a recalculation. Several dates change, and the critical path should now be continuous. (See Figure 3-29.)

To see charts of this network, press Charts (f3) in the Main menu.

Press Task (f1) to create a task chart. Even though we exited from charts that were sorted by slack, this new task chart is sorted by start, which is the default. (See Figure 3-30.)

You can use NEXT PAGE, PREV PAGE, and Zoom (f5) to examine this task chart as before.

Now press Sort (f6) and then Slack (f2) to sort this task chart by slack. The entire critical path of tasks appears at the top of the chart. (See Figure 3-31.)



owner2, painter 7/1/83 - 7/20/83 (0 Slack Days)

Task	Resrce		Subset	Zoom	Sort		HrdCpy	GoBack
------	--------	--	--------	------	------	--	--------	--------

Use NEXT PAGE & PREV PAGE to see more. Use cursor keys to see text detail.

Figure 3-31. Task Chart Sorted by Slack.

Subsets of Charts

In a complex project, it is often helpful to be able to look at what certain individuals or groups of resources are going to be doing. You can do this in either task or resource charts.

Using the same task chart that we have just developed, press Subset (f4) in the Charts menu. The Resource/Classification form appears.

Let us say that you would like to see all tasks in which the realtor is involved. Fill out the Resource/Classification form as follows, and press GO.

Enter the resource or class specifications and press GO.
realtor GO

	sign brokerage agreement				sign sales agreer
	7/20/83	8/3/83	8/17/83	8/31/83	9/14/83
find buyer		realtor			
negotiate sales agreement					

owner1, owner2, realtor, buyer 9/14/83 - 9/16/83 (0 Slack Days)

Task	Resrce		Subset	Zoom	Sort		HrdCpy	GoBack
------	--------	--	--------	------	------	--	--------	--------

Use cursor keys to see text detail.

Figure 3-32. Chart Subset for Realtor.

A new chart (Figure 3-32) appears that shows only the realtor's tasks. Press the down arrow key to move the arrow cursor to the "negotiate sales agreement" bar. You can see that the bar labels and the message line still describe other resources who are involved in the same tasks.

To look at what someone else is going to do, press Subset (f4) again. The Resource/Classification form reappears, still showing "realtor", because that was your most recent choice.

Suppose you want to look at the commitments of both owner1 and owner2. Conveniently enough, their names start with the same few letters, and you can use what is called a "wild card character" to choose both of them with one name.

In the Resource/Classification form, overtype "realtor" with "owner*".

The asterisk (which is the wild card character) stands for any character that may appear in that position or those that follow. Project Planner interprets this name to mean that you want to select all resources whose names begin with the letters "owner". If we had defined other resources named "owner3", "ownerandmaster", or "ownerJones", these resources would also be included in this subset. (Note that you can use the wild card character only at the end of a name, not embedded within one.)

Delete any extra letters from "realtor" that you did not overtype. Press GO.

```
Enter the resource or class specifications and press GO.  
owner*                                GO
```

The resulting task chart shows all tasks in which either owner is involved.

When a task has multiple resources, if the resource description is long in the message line, the dates and slack time are not shown on the right side.

It is easy to change the chart subset from a task chart to a resource chart. The Charts menu is still available to you at the bottom of the display.

Press Resrce (f2). The tasks of owner1 and owner2 are now organized by resource.

As you experiment with the arrow cursor in resource charts and chart subsets, remember that the up and down arrow keys move the arrow cursor from resource to resource, while the left and right arrow keys visit all bars sequentially.

It is also possible to look at a chart subset containing an entire classification of resources.

Press Subset (f4) again, and overtype "owner*" with "contractors".

Press GO. The resulting resource chart shows the work of both the painter and the plumber.

Your chart subset at this point still is sorted by slack if you have not changed the sorting method.

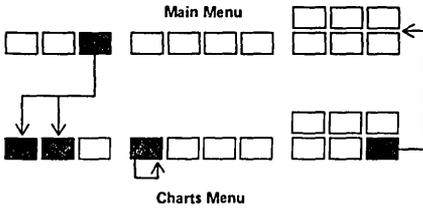
You can sort a chart while you are in a subset. Press Sort (f6) and then Start (f1) to place the tasks for these two resources in order of their start dates.

Press Subset (f4) and overtype "contractors" with the names of two resources in series: "title company,lender". Press GO.

Notice that you use a comma and no space after it to separate the two resource names. The comma tells Project Planner that the string of characters immediately following the comma is another resource name. Project Planner is literal-minded. It does not have any names on the roster that begin with a space. If you were to type "title company, lender", you would get a chart subset that dealt with the title company only. Project Planner, like many of us, chooses to ignore what it does not understand.

When you have seen as many subsets as you need, you can return to the complete chart by pressing Subset once more, deleting any name or names from the Resource/Classification form, and pressing GO.

SUBSETS OF CHARTS



1. In Main menu, press Charts (f3).
2. In Charts menu, press Task (f1) or Resrce (f2) to choose task or resource chart.
3. Press Subset (f4).
4. In Resource/Classification form, enter name of resource(s) or classifications of interest.
5. Press GO.
6. To see another subset, press Subset (f4) again and overtype previous entry with new one.

In Resource/Classification form, you can use * as a wild card character at the end of a name. To enter more than one name, use a comma and no space between names.

You can sort a chart within a subset.

You can change a task chart to a resource chart within a subset.

You can use Zoom (f5) on a chart within a subset.

Catching Up: 2.8, 3.5

3.7 PLOTTING A HARD COPY

Both the project network and the charts can be plotted on either paper or transparencies suitable for overhead projection. To do so, use the Hrdcpy (SHIFT-f9) command in the Main menu for a copy of the project network, or HrdCpy (f9) in the Charts menu for a copy of a chart.

Before using either Hard Copy command, it is wise to press Save (f2) in the Main menu.

Plotting a Project Network

In the Main menu, press HrdCpy (SHIFT-f9). The Hard Copy menu appears. (See Figure 3-33.)

Plot	Option								GoBack
------	--------	--	--	--	--	--	--	--	--------

Figure 3-33. Hard Copy Menu.

Press Option (f2). Four forms appear, three on the right side of the display and one on the left. They allow you to choose the type of plotter to use, the medium (paper or transparency) on which to plot, the number of copies to make, and the title to be inscribed on the plot. (See Figure 3-34.)

<u>Title</u>	<u>Plotter Name</u> (List depends on installation)
	<u>Hardcopy</u>
	<input type="checkbox"/> Paper
	<input type="checkbox"/> Transparency
	<u># of Copies</u>
	1

Press ↑ or ↓ to move within a parameter
Press NEXT to select the next parameter, GO to execute.

Figure 3-34. Hard Copy Forms for Network Plot.

The top form is the Plotter Name form. A large bright highlight on the form name shows that whatever you do next will affect this form. A list of possible printers and plotters is given, with a small box to the left of each. (The names of the printers or plotters on this list depends on your installation. See Appendix B, "Printers and Plotters," for further information.) A small bright highlight functions as an electronic "checkmark" to select

the hard-copy device to be used. The first device on the list is selected by default. To choose a different one, use the up and down arrow keys to move the small bright highlight to the one you want to use.

RETURN or NEXT moves the large bright highlight to the next form, the Hardcopy form. Again using the up and down arrow keys, choose paper or transparency as the medium on which to plot.

Use RETURN or NEXT to choose the next form, # of Copies. The default value is 1: to change it, overtype the correct integer (2 for two copies, and so on).

Finally, use NEXT or RETURN to move the large bright highlight across to the Title field. You can leave it blank or choose a title of up to 30 characters to be inscribed by the plotter on the plotted network.

Press GO (or CANCEL to go back to the Hard Copy menu without implementing your choices). You have now set defaults for your own use. Project Planner uses these values during this session unless you use Option (f2) to change them.

Press Plot (f1). The Plot form appears:

Enter the plotter name or a filename and press GO to execute.

Even now you can change the type of plotter you wish to use by overtyping the default shown in this form with the correct plotter name. (You can disregard the words "or a filename" in this screen message.)

When you are satisfied with the plotter name, press GO.

Some installations provide direct plotting and some provide spooled plotting. If you have direct plotting, you now remain in the Hard Copy command while the plot takes place. If you have spooled plotting, this plotting job is spooled, or placed in a queue--stored and made to wait in line for the plotter to finish other jobs before plotting your current job. Once your job is spooled, you are returned to the Main menu, and you can continue to work in Project Planner while the plot takes place.

What happens after you press GO to start the plot depends on what kind of plotting you have. In spooled plotting, you receive the following message:

Spooling to file--press GO to confirm, CANCEL to deny.

In direct plotting, once you have started the plotting job, the message "Plotting . . ." appears until you are asked to load another piece of paper or the plot is complete. In spooled plotting, an extended Hard Copy menu appears if you press HrdCpy (f9) in the Main menu. (See Figure 3-35.)

Plot	Option	Cancel	Replot	Halt	Resume				GoBack
------	--------	--------	--------	------	--------	--	--	--	--------

Figure 3-35. Extended Hard Copy Menu.

Resume (f6) appears only on certain occasions. It appears when you are requested by a screen message to use it to continue the plot after loading a new piece of paper or transparency.

Once spooling is complete, you can cancel the plot entirely by pressing Cancel (f3, not the keyboard CANCEL key) in the Hard Copy menu. A form appears in which you can specify the name of the project you wish to cancel. Follow the screen directions to fill in the form and implement the command.

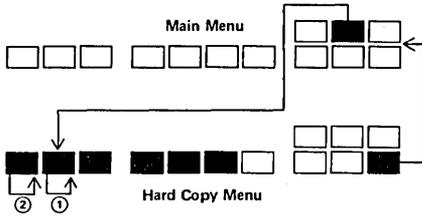
If you do not wish to cancel the plot but do want to restart it, press Replot (f4) in the Hard Copy menu. A screen message informs you that the plot is restarting. Then Resume (f6) is added to the menu, with a message directing you to load the plotter and press f6.

If you wish to halt a plot and then resume it at the same point, first press Halt (f5). A screen message informs you that the plot is being halted. Then Resume (f6) is added to the menu, and a screen message asks you to press f6 to resume the plot.

When the plot is complete, a direct-plotting system returns you to the Main menu.

A complete plotted network for the House project is shown in Figure 3-23. In fact, plotted networks have been used throughout this manual as the basis for network figures. You can see that these rapidly generated drawings can be suitable for inclusion in camera-ready copy for your own reports.

**PLOTTING A
NETWORK HARD COPY**



1. In Main menu, press HrdCpy (SHIFT-f9).
2. To change default parameters, press Option (f2). Use NEXT or RETURN and arrow keys to choose parameter values. Press GO to implement choices, CANCEL to discard.
3. Press Plot (f1) to start plot. Follow screen messages to load paper or change pens as needed.

In spooled plotting, if necessary:

press HrdCpy (f9) in the Main menu

press Cancel (f4) and fill in the Cancel form to cancel the plot

press Replot (f4) and Resume (f6) to restart the plot

press Halt (f5) to halt the plot and then Resume (f6) to resume the plot at the same point

In direct plotting, press CANCEL to stop the plot.

Plotting a Chart

In the Charts menu, with the resource chart still on the display, press HrdCpy (f9). The Hard Copy menu appears. (See Figure 3-36.) As before, Cancel (f3), Replot (f4), Halt (f5), and Resume (f6) appear only when they are appropriate during spooled plotting.

Plot	Option	Cancel	Replot	Halt	Resume			GoBack
------	--------	--------	--------	------	--------	--	--	--------

Figure 3-36. Charts Hard Copy menu.

Press Option (f2). The result is analogous to that in the network plot from the Main menu, except that five forms appear, one at the left side of the video display and four on the right side. The fifth form allows you to choose how many pages wide the chart should be. (See Figure 3-37.)

<u>Title</u> Resource Utilization Chart	<u>Plotter Name</u> (List depends on installation)
	<u>Hardcopy</u> <input type="checkbox"/> Paper <input type="checkbox"/> Transparency
	<u># of Copies</u> 1
	<u># Pages Wide</u> 2

Press ↑ or ↓ to move within a parameter
Press NEXT to select the next parameter, GO to execute.

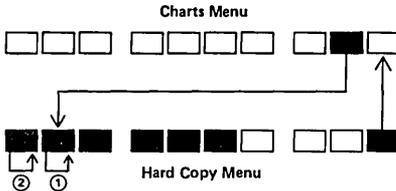
Figure 3-37. Hard Copy Forms for Charts Plot.

Fill out the forms in the same way as for the network plot. The last form is # Pages Wide. On a plotter, the chart is plotted on two lengthwise sheets of 8 1/2 by 11 inch paper, unless you specify otherwise here. To change the number of pages, overtype with the desired number.

In the Title field, overtype the default title with your chosen title of up to 30 characters.

Press GO (or CANCEL to go back to the Hard Copy menu without implementing your choices). As before, you have set defaults for plotting charts in this session.

**PLOTTING A
CHARTS HARD COPY**



1. In Charts menu, press HrdCpy (f9).
2. To change default parameters, press Option (f2). Use NEXT or RETURN and arrow keys to choose parameter values. Press GO to implement choices, CANCEL to discard.
3. Press Plot (f1) to start plot. Follow screen messages to load paper and pens as needed.

In spooled plotting, if necessary:

press HrdCpy (f9) in the Charts menu

press Cancel (f4) and fill in the Cancel form to cancel the plot

press Replot (f4) and Resume (f6) to restart the plot

press Halt (f5) to halt the plot and then Resume (f6) to resume the plot at the same point

Press Plot (f1). The Plot form appears:

Enter the plotter name or a filename and press GO to execute.

(enter name here)

Overtyping the plotter name if you did not specify it under the Option command. Press GO.

Make sure your plotter is turned on and its pens are in place. On a two-pen plotter, the main chart is drawn with the left pen and the critical-path tasks with the right pen. On a plotter with four or more pens, the main pen should be pen 1, and critical path pen should be pen 4.

After you have followed the screen message instructions, the plot begins. During the plot, when the time comes to change pens, a message is displayed, the exact wording of which depends on your installation.

When the first page of the plot is complete, and if another page is necessary, the message concerning loading paper reappears. After all pages have been plotted, the chart you were plotting and the Charts menu return to the display.

If you have finished plotting, turn off the plotter and remove and cap the pens.

Figure 3-38 shows a hard copy of your resource chart.

Resource Utilization Chart

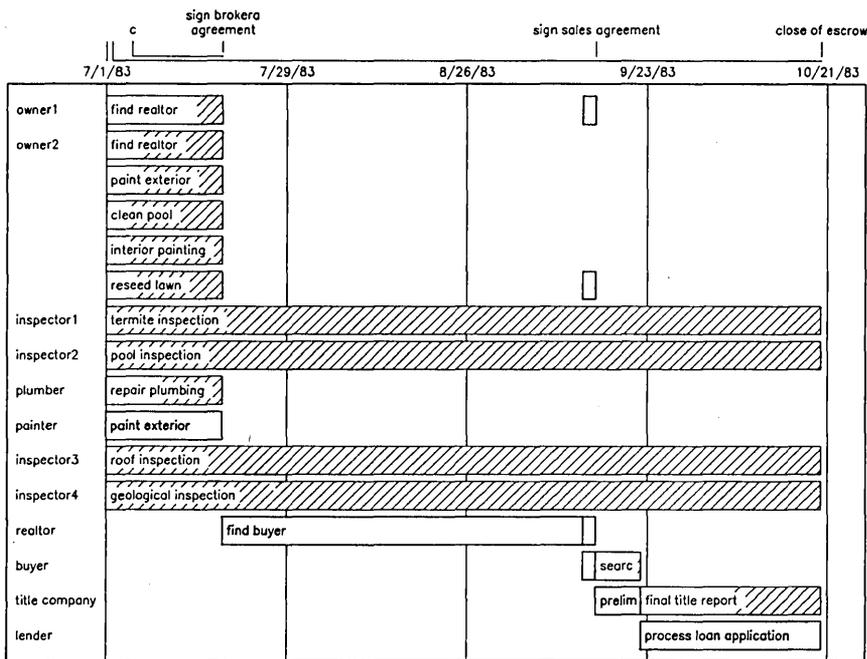


Figure 3-38. Plotter Copy of Resource Chart (Number Pages Wide = 1).

3.7 EPILOGUE

You can experiment further with the House project, creating a larger project network with more resources and seeing what happens when you make various changes. When you have finished the House project to your own satisfaction, you can help the next person who does this example on your system by changing the calendars for owner2 and contractors back to their default values.

Now your learning process with Project Planner in the "real world" begins. Its implications and usefulness in your own work will grow as you use it. Whether you are an owner1 or an owner2 in temperament, Project Planner can give you a more realistic picture of your undertakings before you find yourself in a crisis. With a little practice, you can use it to try out various scenarios quickly and to convince others that your plans are well grounded.

In a figurative sense, press GO!

APPENDIX A: STATUS MESSAGES

A discontinuity exists in the project

A task or milestone in the project has no connection on one side. Find it and create a dependency.

A loop exists in the project

Tasks or milestones are connected with circular logic. Find the loop and reassign dependencies.

Bad date specification

You entered a date in incorrect format. Reenter it in the format mm/dd/yy.

Bad syntax. Please reenter.

You entered a time incorrectly in a task form. Overtyping your entry with the correct number of days.

Calendar has been modified. Press GO to overwrite, CANCEL to deny.

A calendar that you had been using has been modified by someone on your system. Press GO if you want to accept this modification.

Cannot connect a node to itself

You tried to make a task or milestone dependent on itself.

Classification does not exist. Press GO to create, CANCEL to reenter.

When adding or modifying a task, you specified a classification that has never been created. If you want to create the classification, press GO.

Computed date out of calendar range

Your project start date is within calendar range, but later dates computed during recalculation fall after the last date on the available calendar.

Date out of calendar range

You tried to specify a date earlier than the first date or later than the last date on the available calendar.

Milestone or task already exists at this location

Move the box cursor to an unoccupied location and create task or milestone again.

Modified task no longer fits. MOVE it then make modifications.

The task you tried to change with the Modify command was so close to other tasks that the enlarged task box you have now created no longer fits in the original space. Move the portion of the project network that is directly above the original task box.

No classes have been created

You pressed List (f3) in the Classification menu, but there are no classifications to list.

No milestones or tasks exist at that location

You tried to delete, edit, or assign a date with the box cursor at an unoccupied location. Move the box cursor to enclose a task or milestone and start over.

No plotters or printers were specified in the configuration file

See Appendix B or your system administrator.

No project start date was specified

Project Planner will not recalculate without a start date for the project. Use the Start (f1) command in the Dates menu to enter a project start date.

No resource name was specified where a time was specified

You entered a time in a Task form, but no resource name for that time. Move the bright highlight to the first field and reenter the entire task.

No resources were specified

You tried to create a task without entering the names of any resources. Move the bright highlight to the first field and reenter the entire task.

No such classification

You have tried to assign a resource to a classification that does not exist. Enter the Classification menu and press Create (f1) (hereafter denoted as Classification: Create) to create the needed classification.

No task or milestone has been MARKed

You tried to complete a move without making a selection to be moved. Use MARK (if necessary), the arrow keys, and BOUND to make a selection.

Nothing selected

You tried to complete an editing command by pressing GO without having made a selection.

No time was specified for resource

You tried to create a task without specifying the amount of time a resource needs for that task. Move the bright highlight to the first field and reenter the entire task.

Plotter configuration file not found

See your system administrator or Appendix B.

Plotter offline or Printer offline

Check to see that the plotter or printer is turned on and is correctly connected to your system.

Recalc must be done first

You cannot enter the Charts menu if you have not recalculated since you last edited the project network. Press Recalc (f9).

(Resource Name) is already classified as (Classification Name)
Press GO to use new classification, CANCEL to dismiss.

The resource you are trying to assign has already been assigned to another classification.

Resource (Resource Name) is overcommitted

The resource named in the message has been committed to work that it cannot fulfill given its current calendar. This message usually results from a parallel task structure in which this resource is involved in more than one task. You can alter date constraints or reassign work to eliminate overcommitment.

Task does not fit there. Using cursor keys, move it to an acceptable place and press GO.

The task you are trying to enter has an enlarged task box that will not fit where you want it to be. You can move either this task or part of the project network to make room.

Tasks or milestones would overlap

You tried to move a portion of the network to a location where another portion already exists. Choose another location.

That milestone cannot be deleted

You tried to delete Project Start or Project Completion, neither of which can be deleted.

The date constraint for (task or milestone name) is impossible to meet

You have specified a certain start date for the named task or milestone, but the preceding tasks cannot be completed by that time because they take longer than the time available. If you cannot remove the start date restriction, move the project start date back to allow time.

There are no tasks to show

You requested a display of charts for a project network that contains no tasks, or for nonexistent classifications or resources.

The spooler is currently not serving that plotter

You requested a plotter that is not available. See your system administrator.

Those two boxes are already connected

You tried to add a dependency where one already existed.

Those two boxes are not connected

You tried to delete a dependency where none existed.

Too many dependencies

You tried to make more than five dependencies on one side of one task or milestone. Replace one of the five allowed connections with a connector milestone and make further dependencies to it instead.

APPENDIX B: PRINTERS AND PLOTTERS

The values for the Plotter Name parameter shown in Figures 3-34 and 3-37 can vary from one installation to another, depending on the output devices supported. The listed values are familiar names for the output devices and are the result of entries made in the printer configuration file.

The printer configuration file may already be customized to provide the output devices available for Project Planner at your installation. If you need a selection that is not listed, see your system administrator or modify the printer configuration file using the information below.

PRINTER CONFIGURATION FILE

The printer configuration file can have any filename, but is frequently called "Sys.Printers". If the file is named something other than "Sys.Printers", it must be referenced in the ".user" file for your directory in order to execute HrdCpy.

Each output device has the following entries in the printer configuration file, in order, separated by colons:

1. The user-defined name that appears as the Plotter Name value. For example,

MVP

2. A queue name or device-dependent configuration file, or both, each enclosed in square brackets. If both are present, they must be separated by commas. For example,

[LPT],[PRINTRONIX]

3. The type of printer to be used for printing typewritten text (not graphics labels), such as that used by a word processor. For example,

Diablo630

When the entry is for a plotter, this field must be left blank.

4. The type of printer or plotter to be used for plotting graphics output. The plotter choices are

HP7470A
HP7475A
HP7220C
HP7220T
Gould DS10
Strobe 100

Each line of the printer configuration file is terminated by a linefeed (↵). The name in the first entry for each output device suitable for graphics plotting is listed as a value in the Plotter Name parameter in the hard copy Option forms. (See Project Planner Release Notice.)

PLOTTER CONFIGURATION

Project Planner software supports six plotters:

- o Hewlett-Packard Model HP7470A
- o Hewlett-Packard Model HP7475A
- o Hewlett-Packard Model HP7220C
- o Hewlett-Packard Model HP7220T
- o Gould DS10
- o Strobe Model 100

For information on operating the plotter, see the instruction guide for the appropriate model.

The information in this appendix includes the connections and switch settings required to run each of these plotters with a graphics workstation.

Connections

All six of the supported plotters require a crossed cable for RS-232-C communications.

Switch Settings

Hewlett-Packard HP7470A

The requirements for running a Hewlett-Packard HP7470A plotter with a graphics workstation are the following:

- o RS-232-C interface
- o 2400 baud
- o D/Y switch set to Y (programmed ON/OFF switch)
- o no parity
- o US--U.S. standard paper size, 8 1/2 by 11 inch

Hewlett-Packard HP7475A

The requirements for running a Hewlett-Packard HP7475A plotter with a graphics workstation are the following:

- o RS-232-C interface
- o 2400 baud
- o D/Y switch set to Y (programmed ON/OFF switch)

- o no parity
- o switch A3/A4 set to A4
- o US--U.S. standard paper size, 8 1/2 by 11 inch

Hewlett-Packard HP7220C and HP7220T

The requirements for running a Hewlett-Packard HP7220C plotter or a Hewlett-Packard HP7220T plotter with a graphics workstation are as follows:

- o RS-232-C interface
- o crossed cable to MODEM connector on plotter
- o 2400 baud
- o half-duplex
- o CONF. TEST set to Off
- o DTR BYPASS/NORM set to NORM
- o Parity set to Off
- o Hard Wire/MODEM set to MODEM

Gould DS10

The requirements for running a Gould DS10 plotter with a graphics workstation are as outlined below. Unscrew the RS-232-C interface module for access to the switches.

- o 8 data bits and 1 stop bit (no parity) set with interface selection switch as follows:
 - switch 1 OFF
 - switch 2 ON
 - switch 3 OFF
- o RS-232-C interface (switch 4 OFF)
- o baud rate jumper position set to 2400

Strobe 100

The requirements for running a Strobe 100 plotter with a graphics workstation are as follows:

- o RS-232-C interface
- o 2400 baud
- o no parity

APPENDIX C: EDITING IN FORMS

In a form that has a small blinking underline cursor (the edit cursor), this cursor is controlled by the right and left arrow keys. The up and down arrow keys, as well as NEXT and RETURN, control the large bright highlight.

Experiment with all four arrow keys in this form.

Now place the bright highlight on "Project Start" in the first line of the title.

Place the edit cursor on "P" if it is not already there.

Press the keyboard DELETE key (not f3).

Press this key again. Now you should be left with "oject Start".

If you press the keyboard CODE key and DELETE at the same time, the entire remaining line is deleted. (You can also delete a series of characters by holding down the DELETE key so that it repeats.)

In the empty line, type in "decision to sell" to replace "Project Start". Press GO to implement your edit. Project Start is now replaced in the network by "decision to sell", and the Edit menu returns.

Now turn your attention to Project Completion. It really should be a milestone called "close of escrow".

Move the box cursor to Project Completion and press Modify (f4). The Modify form appears, bearing the title Project Completion.

Enter text below. Press GO to execute, CANCEL to dismiss.
Project Completion

You can move the edit cursor to an incorrectly typed letter and overwrite it. Suppose you merely wanted to make Project Completion all lowercase to go with the rest of your network. The edit cursor should be on "P": overwrite it with "p". Now move the edit cursor to "C" and overwrite it with "c".

Enter text below. Press GO to execute, CANCEL to dismiss.
project completion

This title is not the one you want, however. Move the edit cursor back to the beginning of the line and overwrite the line with the title "close escrow". Delete the rest of "project completion". Now we see that in our haste, we left out the word "of".

Enter text below. Press GO to execute, CANCEL to dismiss.
close escrow

Your editing in forms may be easier if you experiment with two different modes for typing in changes. You may have noticed that the small light on the keyboard OVERTYPE key is on whenever a form is on the screen. This overtyping mode is the default in Project Planner forms. You can enter a different mode, the insert mode, by pressing the OVERTYPE key (which you should now do if your curiosity has not already overwhelmed you).

When you go into insert mode, the light on the OVERTYPE key goes off. Thus you can tell which mode you are in by looking at the key.

Move the edit cursor to the "e" of "escrow". In insert mode, the next character you type is placed before the position of the edit cursor.

Type "of " (including the space, because a space is a character). The word is inserted into the title.

Press the OVERTYPE key again to return to overtype mode.

Press GO to implement your edit of the milestone title.

Enter text below. Press GO to execute, CANCEL to dismiss.
close of escrow GO

Your changed milestone title appears on the display, and the Edit menu returns.

EDITING IN FORMS

The left and right arrow keys control the position of the edit cursor.

The up and down arrow keys control the position of the bright highlight.

The keyboard DELETE key deletes the character at the current edit cursor position.

CODE-DELETE deletes the entire line at the bright highlight position.

Pressing OVERTYPE enters insert mode: characters typed are inserted before the edit cursor position; the OVERTYPE key light is off.

Pressing OVERTYPE again returns to overtype mode; the OVERTYPE key light is on.

Catching Up: 2.1

APPENDIX D: HINTS AND ANSWERS

NOTE

In the answers below, exact numbers of keystrokes are given in order to offer specific solutions. As the network example grows more complex, the likelihood increases that your network might differ slightly from the example in this manual. Therefore, although the steps will be accurate, the exact numbers of keystrokes given in some of the hints and answers below might not apply to your network.

Adding a Milestone (2.5)

To move the box cursor, press left arrow twice. In general, you press an arrow key twice to move it just clear of a task or milestone that it previously contained.

To make the milestone dependent on "find buyer":

Press left arrow twice; press AddDep (f5); press right arrow twice; press BOUND.

To make Project Completion dependent on milestone:

Press right arrow twice; press BOUND.

To return to Edit menu, press CANCEL.

Inserting Another Task (2.5)

To move Project Completion to the right:

In Edit menu, with box cursor on Project Completion, press Move (f7); BOUND; right arrow twice; GO.

To delete dependency:

With box cursor still on Project Completion, press DelDep (f5); left arrow 4 times; BOUND; CANCEL.

To add task:

Press right arrow twice; Task (f1); type "secure financing"; NEXT twice; type "buyer"; NEXT; type "25" (5 weeks = 25 days); GO.

To add dependencies:

Press left arrow twice; AddDep (f5); right arrow twice; BOUND; right arrow twice; BOUND; CANCEL.

Adding Parallel Tasks (2.6)

To move "secure financing":

Press left arrow twice; Move (f7); BOUND; up arrow once; GO.

To add task:

Press down arrow twice; Task (f1); type "secure final"; NEXT; type "title report"; NEXT; type "title company"; NEXT; type "15" (3 work weeks = 15 work days); GO.

To add dependencies:

Press up arrow once; left arrow twice; AddDep (f5); right arrow twice; down arrow once; BOUND; right arrow twice; up arrow once; BOUND; CANCEL.

Adding Another Parallel Task (2.6)

To move "find realtor":

Press left arrow 10 times (or scroll until Project Start is on screen); place box cursor on "find realtor"; press Move (f7); BOUND; up arrow once; GO.

To add parallel task:

Press down arrow twice; Task (f1); type "repair plumbing"; NEXT twice; type "plumber"; NEXT; type "5" (1 week = 5 days); GO.

To add dependencies:

Press left arrow twice; up arrow once; AddDep (f5); down arrow once; right arrow twice; BOUND; right arrow twice; up arrow; BOUND; CANCEL.

Different Results from a Recalculation (2.7)

If your first recalculation works, but the dates that appear on your screen are not the same as those in the figure, either you have made an error in entering the project start date, or someone has used this example before you and altered the calendar.

First, from the Main menu, press Dates (f4) and Start (f1) and check to see that you entered 07/01/83. If you did not, overwrite your entry with that date. If your date is correct, do the following:

See Section 3.3 in this manual and read it to understand how calendars are manipulated. Note that the subsection "Resetting the Calendar" tells you how to use the Reset Calendar command in the Executive to be sure that the calendar is standard. You can use this command at this point and be sure that the calendar is standard.

You can also press Calndr (f5) in the Main menu and type "owner2" in the form that appears; press GO. The calendar for owner2 appears; it should be marked with diagonal bars across the days that are not available to the project as work days. Normal five-day weeks should show as available. If, instead, the calendar looks like Figure 3-18 or 3-19, it has been changed by a user. Use the Reset Calendar command or adjust the calendar for owner2. (See the subsections "Resetting the Calendar" or "Changing the Calendar for an Individual" in Section 3.3.)

Do a recalculation and you should get the correct dates. If you do not, check with your system administrator or try the correction below.

Check to see if a classification, "contractors," has been created. This could be the case if someone created this example on your system before you. Call up the calendar for that classification and change it if necessary. You can also use an Executive command "Reset Classes" to clear any classifications on the system that might cause your example not to work like the one in this book. (See the subsection, "Resetting Classes" in Section 3.5.)

Again, do a recalculation, and if you do not get the correct dates, see your system administrator.

More About Move (3.1)

To add task "paint exterior" after move:

With box cursor on "repair plumbing", press up arrow key 4 times; Task (f1); type "paint exterior"; NEXT twice; type "owner2"; NEXT; type "3"; NEXT; type "painter"; NEXT; type "12"; GO.

To add dependencies:

Press left arrow twice; down arrow once; AddDep (f5); right arrow twice; up arrow once; BOUND; right arrow twice; down arrow once; BOUND; CANCEL.

Another Expanded Move (3.1)

If you did experiment with the expandable box cursor before you read on, you can start over by pressing CANCEL to go back to the Edit menu, placing the box cursor on "sign sales agreement", and beginning again.

Another Expanded Move (3.1)

Deleting the old dependency:

After move, box cursor overlaps "sign sales agreement". Press up arrow once; DelDep (f6); left arrow 4 times; BOUND; CANCEL. (Remember, adding dependency is directional; deleting dependency is not.)

Adding new task:

Press right arrow twice; Task (f1); type "negotiate sales"; NEXT; type "agreement"; NEXT; type "owner1"; NEXT; type "2"; NEXT; complete resource and time entries similarly. Remember that if you see an error in a field you have already passed, you can use up arrow to move the bright highlight back to it and overtype it. When complete, press GO.

To add dependencies:

Press left arrow twice; AddDep (f5); right arrow twice; BOUND; right arrow twice; BOUND; CANCEL.

Deleting a Task or Milestone (3.1)

Moving Project Completion:

Place box cursor on Project Completion; press Move (f7); BOUND; right arrow twice (display scrolls); GO.

Adding new tasks:

Place box cursor above "secure final title report"; press Task (f1); enter "search for financing"; NEXT twice; type "buyer"; NEXT; type "4"; GO.

Press right arrow twice; Task (f1); type "process loan"; NEXT; type "application"; NEXT; type "lender"; NEXT; type "20" (4 weeks of 5 days); GO.

Adding dependencies:

Place box cursor on "sign sales agreement"; press AddDep (f5); move box cursor to "search for financing"; BOUND; repeat last 2 steps with "process loan application" and Project Completion; press CANCEL.

Changing a Task with the Modify Command (3.1)

To change filled-in Task form:

Bright highlight is on first field. Overtyping "preliminary", press space bar once; press NEXT 3 times; type "5"; press space bar once; press GO.

To add dependency:

With box cursor on "preliminary title report", press AddDep (f5); move box cursor to "process loan application"; press BOUND; CANCEL.

To delete dependency:

Place box cursor on Project Completion; press DelDep (f6); move box cursor to "preliminary title report"; press BOUND; CANCEL.

To add task:

Box cursor is on "preliminary title report": press right arrow twice; Task (f1); type "final title report"; NEXT twice; type "title company"; NEXT; type "l0"; GO.

To add dependencies:

Place box cursor on "preliminary title report"; press AddDep (f5); right arrow twice; BOUND; move box cursor to Project Completion; BOUND; CANCEL.

Press Recalc (f9).

Moving a Selection Larger than Screen (3.1)

Moving in a shrunken version:

First note positions in network of "find realtor" and "find buyer". Press Shrink (f8) twice and scroll to place entire network at left on display.

Place box cursor on "find buyer"; press down arrow once; press Move (f7); press right arrow 10 times; up arrow twice; BOUND; right arrow twice; GO; Expand (SHIFT-f8) twice.

Inserting milestone "sign brokerage agreement":

Scroll to place parallel tasks including "find realtor" on display. Place box cursor on "paint exterior"; press DelDep (f6); move box cursor to "find buyer"; BOUND; move box cursor to "find realtor"; BOUND; move box cursor to "repair plumbing"; MARK (to define new starting point); move box cursor to "find buyer"; BOUND; CANCEL.

Adding milestone:

Press left arrow twice; Milstn (f2); type "sign brokerage"; NEXT; type "agreement"; GO.

Adding dependencies:

Place box cursor on "paint exterior"; press AddDep (f5); move box cursor to "sign brokerage agreement"; press BOUND; place box cursor on "find realtor"; press MARK; move box cursor to "sign brokerage agreement"; press BOUND; repeat last 4 steps with "repair plumbing"; move box cursor to "find buyer"; BOUND; CANCEL.

To recalculate, press Recalc (f9).

Making More than Five Dependencies (3.1)

Moving leftmost portion of network:

Press Shrink (f8) twice. Place box cursor on "connector milestone". Press Move (f7); down arrow 8 times; left arrow twice; BOUND; left arrow 7 times; GO; Expand (SHIFT-f8) twice.

Assigning Resources to a Classification (3.5)

To create classification "inspectors":

In Classification menu, press Create (f1); type "inspectors"; GO.

Using a Classification in a Task Form (3.5)

To add task:

From Classification menu, press GoBack (f10); Edit (f1); Shrink (f8) 3 times; move box cursor to a point above network.

Press Task (f1); type "inspections"; continue as described in text through "Press GO."

To add dependencies:

Task "inspections" must depend on first connector milestone, not directly on "decision to sell", which already has 5 dependencies.

In text example, first "connector milestone" and Project Completion ("close of escrow") have been moved to prevent overlapping lines. Note that line overlap does not interfere with logic or recalculation, however.

Calendar for a Classification (3.5)

Impossible date constraint message appears because painter (one of contractors) now has one less working day as a result of contractors' calendar change you just made. Painter cannot finish 12-day job in time for July 13 date for "sign brokerage agreement".

Press CANCEL to dismiss message. Enter Dates menu and change project start date ("decision to sell") to 06/24/83 to give painter the needed extra day. Press GO; Recalc (f9). Recalculation should now place "sign brokerage agreement" on 7/13/83.

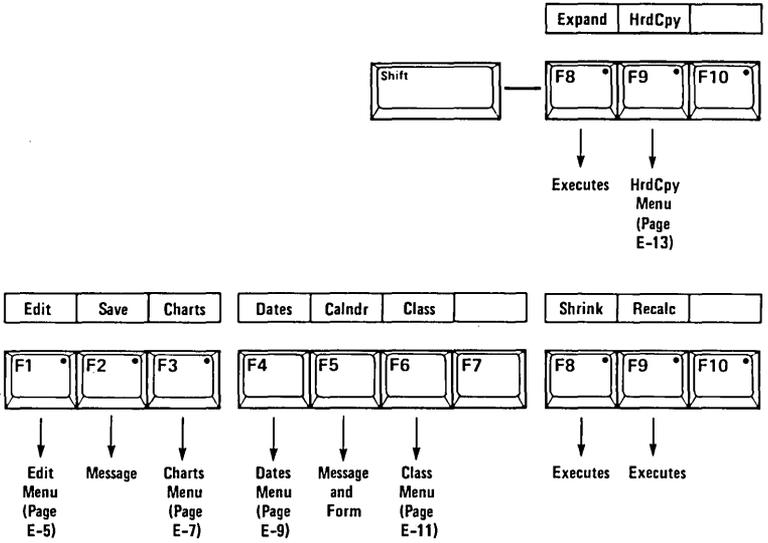
Chart with a Complete Critical Path (3.6)

In Dates menu, press Early (f2); place box cursor on "search for financing"; press GO; use ovrtype and space bar or CODE-DELETE to delete date; press GO.

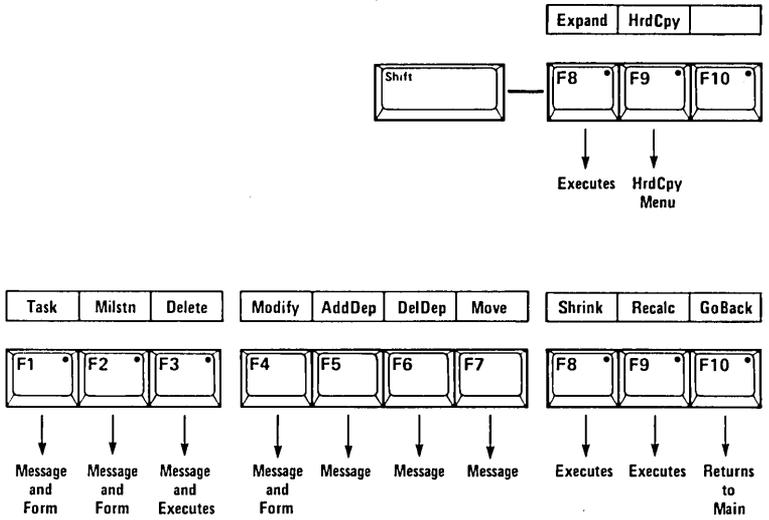
Use similar steps with Late (f3) to delete date from "sign brokerage agreement".

APPENDIX E: COMMAND MAPS

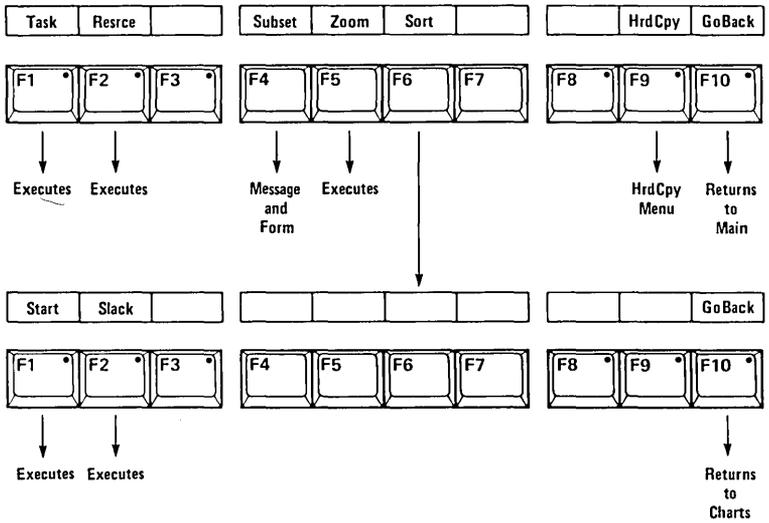
MAIN MENU COMMAND MAP



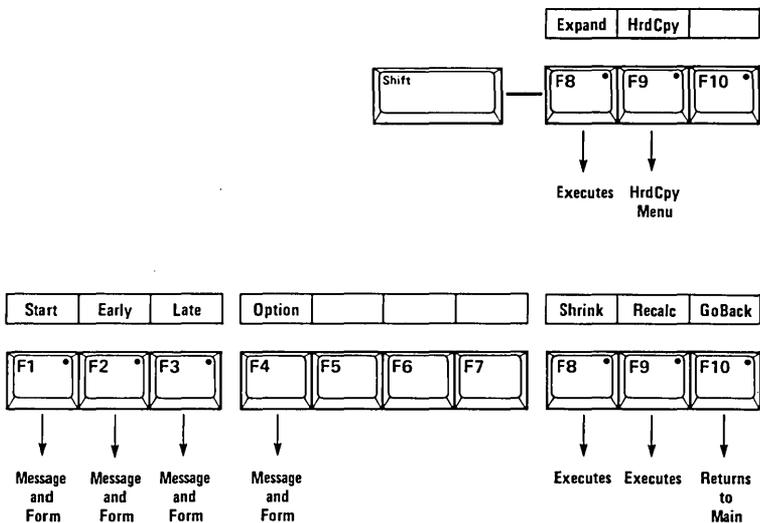
EDIT MENU COMMAND MAP



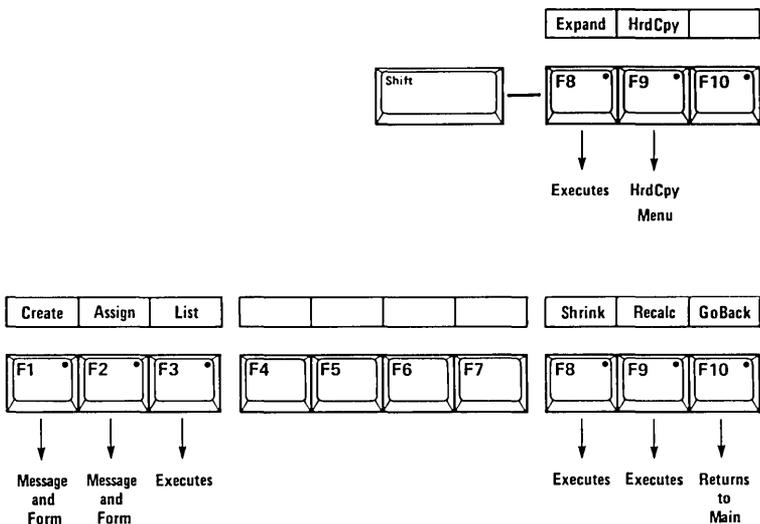
CHARTS MENU COMMAND MAP WITH SORT



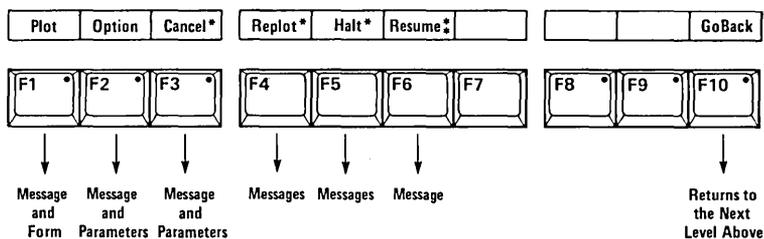
DATES MENU COMMAND MAP



CLASSIFICATION MENU COMMAND MAP



HARD COPY MENU COMMAND MAP



*Appear only during HrdCpy execution.

**Appears only when output device has been halted.

GLOSSARY

arrow cursor. An arrow cursor is a movable arrow that appears on a bar within a chart or on a date box within a calendar. In a chart, the arrow cursor indicates the bar currently described by the message line. In a calendar, it indicates the date position that will be affected if you press MARK.

box cursor. A box cursor is a rectangle of dotted lines that indicates the network position to be affected by your next entry.

bright highlight. A bright highlight is a rectangular lighted bar that shows what part of the form your next entry will affect.

classification. A classification is a group of resources, established according to whatever criteria you want. In a Task form, you can specify a classification instead of a resource.

Command Map. The Command Map is a diagram of several pages that shows the relationships of the Project Planner commands and how to move from one to another. It appears in Appendix E.

connector milestone. A connector milestone, used between a node (task or milestone) and other dependent nodes, enables the formation of more than five dependencies to a single node.

critical path. The critical path is the string of tasks that must start and end on time if the project is to end in the minimum time.

critical task or milestone. A task or milestone that is part of the critical path is said to be critical.

cursor. A cursor is any one of several types of displayed indicators that show the position that will be affected by your next action.

dependency. Dependency is a relationship between tasks or milestones in which one (the dependent one) cannot occur before another is complete.

default value. A default value is a value or choice that is used automatically if you do not change it.

discontinuity. A discontinuity occurs when a task or milestone does not have at least one dependency connection on each side, or when Project Start subtends nothing or Project Completion depends on nothing.

early finish date. The early finish date of a task or milestone is the first date on which a task dependent on it could begin.

early start date. The early start date of a task or milestone is the first date on which it can start, given the finish date of the last critical task before it.

edit cursor. The edit cursor is a small blinking underline that shows the position within a form that will be affected by the next character you enter.

field. A field is a space within a form in which you enter one or more values for a variable.

form. A form is a displayed guide to entering needed information, analogous to a paper form.

function keys. The function keys are keys f1 through f10 across the top of the keyboard. They can have different effects at different times.

insert mode. In insert mode, the next character you type is inserted before the current position of the edit cursor. This condition is brought about when a form is on the display and you press the OVERTYPE key. (The key light goes off.)

late finish date. The late finish date of a task or milestone is the last date on which a task dependent on it could begin.

late start date. The late start date of a task or milestone is the last date upon which it can begin.

loop. A loop is a circular logic pattern within a project network in which, for example, Task A subtends Task B, which subtends Task C; but Task C subtends Task A. A loop prevents successful recalculation.

menu. A menu displays the command choices currently available to you and identifies them with the appropriate function keys.

message line. In a chart, the message line appears between the body of the chart and the menu. It describes the chart bar on which the arrow cursor is located.

milestone. A milestone is an event in the life of a project, considered an instant occurrence and requiring no resources. In a project network, a milestone is shown as a hexagon.

node. A node is either a task or a milestone.

noncritical task or milestone. Any task or milestone not on the critical path is said to be noncritical and can have slack time associated with it.

overtyping. Overtyping is replacing one character by another by positioning the cursor at the desired location and typing the desired character.

parallel tasks. Parallel tasks or series of tasks either directly or indirectly depend on the same task or milestone and subtend the same task or milestone.

project network. A diagram in which rectangles (symbolizing tasks) and hexagons (symbolizing milestones) are interconnected so as to represent their dependency relationships.

queue. In spooled plotting, the queue is the series of files, in order of entry, waiting for an available plotter.

resource. A resource, usually an individual person or machine, spends time carrying out a task.

scrolling. To scroll is to change the position of the screen "window" continuously to see an adjacent portion of the larger project network.

slack time. Slack time is time available in excess of the time required for completion of a noncritical task or milestone.

spooled plotting. In spooled plotting, a file to be plotted is placed in a queue to wait for the plotter to become available. Once the file is spooled, you can continue to work in Project Planner.

subtend. Task A subtends Task B if Task B depends on Task A.

task. A task is a piece of work that requires the use of a resource or resources over time. In a project network, a task is shown as a rectangle.

wild card character. The wild card character, an asterisk (*), represents any character or string of characters occurring at and after a given position in a name used in a chart Resource/Classification form.

work week. The default work week in Project Planner consists of five full days, Monday through Friday. You can alter this work week by adjusting the calendar for a resource or classification.

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NOTE

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