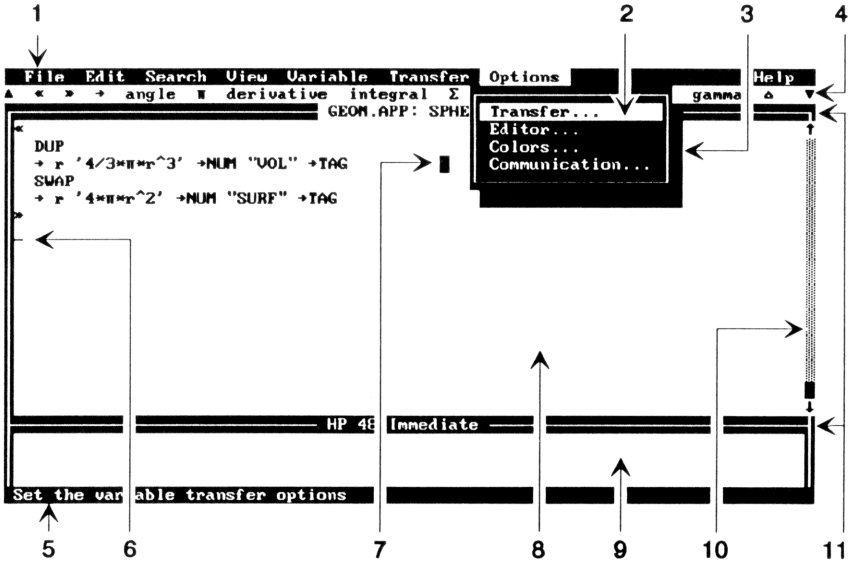
HEWLETT PACKARD

Getting Started with the Program Development Link

for the HP 48



1 Menu bar
2 Menu command
3 Menu
4 HP 48 character bar
5 Message bar
6 Cursor
7 Mouse pointer
8 Variable window
9 HP 48 Immediate window
10 Scroll bar
11 Title bars

Comments on the Program Development Link Documentation

We welcome your evaluation of this documentation. Your comments and suggestions help us improve our products.

Program Development Link Documentation

Please circle a response for each of the statements below. You can use the **Comments** space to provide additional opinions.

1 = Strongly Agree 3 = Neutral 4 = Disagree
2 = Agree 5 = Strongly Disagree

	Printed	On-Line
■ I am satisfied with *Getting Started*.	1 2 3 4 5	
■ I am satisfied with the on-line Help.		1 2 3 4 5
■ The information is well organized.	1 2 3 4 5	1 2 3 4 5
■ I can find the information I want.	1 2 3 4 5	1 2 3 4 5
■ The information is accurate.	1 2 3 4 5	1 2 3 4 5
■ I can easily understand the instructions.	1 2 3 4 5	1 2 3 4 5
■ There are enough examples.	1 2 3 4 5	1 2 3 4 5
■ The examples are appropriate and helpful.	1 2 3 4 5	1 2 3 4 5
■ The illustrations are clear and helpful.	1 2 3 4 5	1 2 3 4 5

■ The amount of printed information is: too much appropriate too little
■ The amount of on-line information is: too much appropriate too little
■ The parts I refer to most frequently are:

Printed: *Getting Started*
On-Line: Environment Information Menu Descriptions Customizing
HP 48 Command Dictionary Other HP 48 Reference Information

Comments: _____
_____
_____
_____
_____

Name: _____
Address: _____
City/State/Zip: _____
Occupation: _____
Phone: (_____) _____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 38 CORVALLIS, OR

POSTAGE WILL BE PAID BY ADDRESSEE

HEWLETT-PACKARD COMPANY
DOCUMENTATION DEPARTMENT
CORVALLIS DIVISION
1000 NE CIRCLE BLVD
CORVALLIS OR 97330-9973

Getting Started with the Program Development Link

for the HP 48

The contents of this manual are printed on recycled paper.

HP Part No. 82208-90003
Printed in U.S.A. December 1990

Edition 1

Notice

This manual and any examples contained herein are provided "**as is**" and are subject to change without notice. **Hewlett-Packard Company makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.** Hewlett-Packard Co. shall not be liable for any errors or for incidental or consequential damages in connection with the furnishing, performance, or use of this manual or the examples herein.

© Copyright Hewlett-Packard Company 1990. All rights reserved. Reproduction, adaptation, or translation of this manual is prohibited without prior written permission of Hewlett-Packard Company, except as allowed under the copyright laws.

© Copyright Trustees of Columbia University in the City of New York 1989. Permission is granted to any individual or institution to use, copy, or redistribute Kermit software so long as it is not sold for profit, provided this copyright notice is retained.

MS-DOS is a U.S. registered trademark of Microsoft Corporation.

Hewlett-Packard Company
Corvallis Division
1000 N.E. Circle Blvd.
Corvallis, OR 97330, U.S.A.

Printing History

Edition 1 ..... December 1990

Getting Started

Contents

Software License Agreement 3
Setting Up Your System 5
  Installing the Software 6
  Connecting the HP 48 and Computer 6
What the Program Development Link Does 7
Using the System 8
  To Use the Keyboard or the Mouse 8
  To Try Out the System 9
  To Back Up and Restore HP 48 Memory 12
  To Get On-Line Information 13
Getting More Information 14
Fixing Problems 14
Limited Warranty 15

Software License Agreement

Important: Please carefully read this License Agreement before opening the media package or operating the equipment. Rights in the software are offered only on the condition that the Customer agrees to all terms and conditions of the License Agreement. **Opening the media package or operating the equipment indicates your acceptance of these terms and conditions.** If you do not agree to the License Agreement, you may return the unopened package for a full refund.

In return for payment of the applicable fee, HP grants the Customer a license in the software, until terminated, subject to the following:

Use:

- Customer may use the software on any one computer.
- Customer may not reverse assemble or decompile the software.

Copies and Adaptations:

- Customer may make copies or adaptations of the software:
  - For archival purposes, or
  - When copying or adaptation is an essential step in the use of the software with a computer so long as the copies and adaptations are used in no other manner.
- Customer has no other rights to copy unless they acquire an appropriate license to reproduce which is available from HP for some software.
- Customer agrees that no warranty, free installation, or free training is provided by HP for any copies or adaptations made by Customer.
- All copies and adaptations of the software must bear the copyright notice(s) contained in or on the original.

Ownership:

- Customer agrees that they do not have any title or ownership of the software, other than ownership of the physical media.
- Customer acknowledges and agrees that the software is copyrighted and protected under the copyright laws.
- Customer acknowledges and agrees that the software may have been developed by a third party software supplier named in the copyright notice(s) included with the software, who shall be authorized to hold the Customer responsible for any copyright infringement or violation of this License Agreement.

Transfer of Rights in Software:

- Customer may transfer rights in the software to a third party only as part of the transfer of all their rights and only if Customer obtains the prior agreement of the third party to be bound by the terms of this License Agreement.
- Upon such a transfer, Customer agrees that their rights in the software are terminated and that they will either destroy their copies and adaptations or deliver them to the third party.
- Transfer to a U.S. government department or agency or to a prime or lower tier contractor in connection with a U.S. government contract shall be made only upon their prior written agreement to terms required by HP.

Sublicensing and Distribution: Customer may not sublicense the software or distribute copies or adaptations of the software to the public in physical media or by telecommunication without the prior written consent of HP.

Termination: HP may terminate this software license for failure to comply with any of these terms provided HP has requested Customer to cure the failure and Customer has failed to do so within thirty (30) days of such notice.

Updates and Upgrades: Customer agrees that the software does not include updates and upgrades which may be available from HP under a separate support agreement.

Export Clause: Customer agrees not to export or re-export the software or any copy or adaptation in violation of the U.S. Export Administration regulations or other applicable regulations.

Setting Up Your System

This section shows you how to set up the computer and HP 48 so you can use the Program Development Link.

To write applications with the Program Development Link, you'll need an IBM PC or compatible computer containing:

- A 5.25-inch (360 KB or 1.2 MB) flexible disk drive, or a 3.5-inch (720 KB or 1.44 MB) flexible disk drive.
- A hard disk drive.
- MS-DOS® operating system, version 3.00 or later.
- A Microsoft-compatible mouse (optional).

You'll need these additional items to connect an HP 48 to the computer:

- Serial port on the computer.
- HP 48 serial cable and adapter (included with the Program Development Link).

Installing the Software

Follow these steps to install the Program Development Link software onto your hard disk. If you have problems, see "Fixing Problems" at the end of this chapter.

1. Make sure the computer is turned on, and the MS-DOS operating system is active.
2. Find Disk 1 for the Program Development Link and insert it into flexible disk drive A (usually the upper drive). Choose the disk size that fits your drive.
3. Type

   ```
   a: ↵
   install ↵
   ```

   This makes drive A the active drive and starts the installation process. Follow the instructions on the screen. *The predefined answers are usually the ones you want.*
4. When the installation is finished, remove the last disk from drive A.
5. Hold Ctrl and Alt and press Del to restart the computer (or turn it off and on). This activates the changes that were made.

Connecting the HP 48 and Computer

Follow these steps to connect your HP 48 to your computer's serial port:

1. Find the serial port on your computer—it's either a 9-pin or 25-pin connector. If your computer has *more than one serial port*, it's simplest to use the *primary* one, called COM1—or you can use COM2.
2. If you're using a 25-pin serial port, attach the 25-pin adapter to the HP 48 serial cable. (If you're using a 9-pin port, don't use the adapter.)
3. Plug the cable into the computer's serial port.
4. Plug the cable into the HP 48 serial port—the 4-pin connector at the top of the case.

The HP 48 doesn't need to be connected unless you're transferring data. You can unplug it whenever you want. Leave the cable attached to the computer for convenient hookup.

What the Program Development Link Does

The Program Development Link enables you to develop *applications* for the HP 48 using your computer. An HP 48 application is a collection of one or more HP 48 objects that work *together* to perform a task. The simplest application is a program—one program object. A more complicated application might include subprograms, list objects that contain custom menus or other data, or other types of HP 48 objects. When you start using your system, you can look at the LOOKUP.APP sample application that's installed on your computer.

The Program Development Link gives you an on-screen work environment for developing applications, complete with a specialized editor. As you develop an application, you can send part or all of it to the HP 48. There each object in the application is stored in an HP 48 variable. You can then run the application on the HP 48—or you can operate the HP 48 from your computer.

The following sections help you try out some Program Development Link features. For more information, start the system as described next, then read the on-line Help information about the Program Development Link. (See "To Get On-Line Information" later in this manual.)

Using the System

This section helps you get started using your system.

To Use the Keyboard or the Mouse

Before you start the Program Development Link, you'll want to understand how to do tasks. Instead of typing commands, you use *menus* to specify the tasks you want to do. Each menu contains a group of *commands*. If a command needs input from you, it displays a *dialog box* for your input. Follow the simplified directions below.

Using the keyboard:

1. To get a menu, press Alt, then use ◄ and ► to highlight the menu you want, and press ↵. (To get out of the menu bar, press Esc.)
2. To pick a command in a menu, use ▲ and ▼ to highlight the command you want, and press ↵. (To get out of a menu, press Esc.)
3. To enter information in a dialog box, press Tab or Shift-Tab to move from one field to another. Type the information needed. For some tasks, you can choose options from a list—just move to the list and use ▲ and ▼ to highlight the item you want. After you've entered *all* the information, press ↵ to do the task. (To *not* do the task, press Esc instead.)

Using a mouse:

1. To get a menu, click the mouse on the menu label—that is, move the mouse until the pointer is on the label, then press and release the left mouse button.
2. To pick a command in a menu, click the mouse on the command you want. (To get out of a menu, click the mouse *outside* the menu.)
3. To enter information in a dialog box, click the mouse on the field and type the information needed. For some tasks, you can choose options from a list—just click on the item you want. After you've entered *all* the information, click the mouse on "OK." (To *not* do the task, click the mouse on "Cancel" instead.)

To Try Out the System

You can try this sample session on your system. It gives you a chance to see how you can create HP 48 applications on your computer.

The GEOM application in this example finds the volume and surface area of a sphere for a specified radius. It uses a typical HP 48 application structure—the HOME directory contains a variable that sets up the application, and the application subdirectory contains two variables:

- **HOME directory:**

GEOM	Program that sets up the GEOM application.

- **DGEOM directory:**

SPHERE	Main program of the GEOM application.
CST	Custom menu for GEOM application.

Each of the numbered headings below shows a main step in the process of creating the application.

1. Start the Program Development Link.

On your computer, run the PDL program to start the Program Development Link environment:

pdl ⏎

2. Open a new application (if necessary).

In this example, there's no current application open, so *you don't have to open a new one.* (If you *had* an application open, you could open a new one by getting the "File" menu and picking the "New Application" command.)

3. Set the installation directory.

You can specify where most variables go on the HP 48.

1. Get the "Options" menu and pick the "Transfer" command. (See "To Use the Keyboard or the Mouse" earlier.)
2. Next to "HP 48 Installation Directory," type :HOME:DGEOM, then press ⏎ or pick "OK."

4. Create the first variable.

1. Get the "Variable" menu and pick the "New Variable" command.
2. Next to "Variable Name," type SPHERE. Then press ↵ or pick "Edit in Active."

5. Enter the HP 48 program.

1. Type the following program lines on the computer. Type the characters shown. *Certain combinations that represent HP 48 characters or commands change automatically when you move to the next line*—for example, << changes to «, \pi changes to π, and dup changes to DUP.

```
<< ↵
Tab
dup ↵
-> r '4/3*\pi*r^3' ->num "VOL" ->tag ↵
swap ↵
-> r '4*\pi*r^2' ->num "SURF" ->tag ↵
Home
>> ↵
```

When you finish, your program should look like the one below. If it doesn't, use the cursor keys, Delete, and ← to fix any mistakes.

```
«
  DUP
  → r '4/3*π*r^3' →NUM "VOL" →TAG
  SWAP
  → r '4*π*r^2' →NUM "SURF" →TAG
»
```

6. Create other variables as needed.

Use similar steps to create the other variables for the application:

1. Create the variable CST. (Use the "Variable" menu, "New Variable" command.) Then enter the following list:

```
{ SPHERE { "EXIT" home } } ↵
```

2. Create the variable GEOM—but because it needs to go in the HOME directory, enter its name as {HOME GEOM}—*with* curly braces. (Use the "Variable" menu, "New Variable" command.) Then enter the following program:

```
<< DGEOM 1 menu >>
```

7. Save the application in a file.

All variables in the application are saved in the same file—GEOM.APP for this example.

1. Get the "File" menu and pick the "Save As" command.
2. Next to "File Name," type GEOM, then press ENTER or pick "OK."

8. Send the application to the HP 48.

1. If you're using the computer's COM2 serial port (instead of the default COM1 port), get the "Options" menu and pick the "Communications" command—then under "Serial Port" choose COM2. (You can also check other communications parameters.) Then press ENTER or pick "OK."
2. Make sure the HP 48 and computer are connected. (See "Connecting the HP 48 and Computer" earlier.)
3. *On the HP 48*, press → I/O to put the calculator in Kermit Server mode. This means it can be controlled by the computer.
4. *On the computer*, get the "Transfer" menu and pick the "Send All" command. Wait for the "Send All" message to disappear—the transfer may take half a minute or more. If you get an error message, the application may have a syntax error, or the communication parameters may not be set properly. To reset the HP 48 I/O parameters, purge variable IOPAR.

9. Run the program from the computer.

1. Make the HP 48 Immediate window *active*—you can press F6 (a shortcut for the "View" menu, "Next Window" command)—or you can click the mouse anywhere in the "HP 48 Immediate" title bar.

2. *On the computer*, type commands to run the program. Each time you press ENTER, the calculator responds as though you entered the commands there—and the HP 48 Immediate window shows the contents of the stack.

`GEOM` ENTER	*Runs the GEOM setup program and shows its menu on the calculator.*
`14 SPHERE` ENTER	*Enters a radius and runs the SPHERE program.*
`home` ENTER	*Returns to the HOME directory.*

10. Run the program from the HP 48.

On the HP 48, press ATTN to end Kermit Server mode. Then press the following keys:

VAR `GEOM`	*Runs the GEOM setup program and shows its menu.*
`8.5 SPHER`	*Enters a radius and runs the SPHERE program.*
`EXIT`	*Returns to the HOME directory.*

11. Exit the Program Development Link.

On the computer, get the "File" menu and pick the "Exit" command.

To Back Up and Restore HP 48 Memory

You can back up and restore HP 48 memory using the "Transfer" menu. But you can also do this at the MS-DOS prompt—without using the programming environment:

1. Make sure the HP 48 and computer are connected. (See "Connecting the HP 48 and Computer" earlier.)
2. If you're *not* using the computer's COM1 serial port, you *must* run the Program Development Link software and change the specified serial port. (See "To Try Out the System" earlier.)
3. *On the HP 48*, press → I/O to put the calculator in Kermit Server mode. This means it can be controlled by the computer.
4. *On the computer*, run the PDL program in one of the following ways, then follow the instructions on the screen:

- To back up memory (into a computer file named BAK2.MEM)

  ```
  pdl /b bak2 ↵
  ```

- To restore memory (from a computer file named BAK2.MEM)

  ```
  pdl /r bak2 ↵
  ```

To Get On-Line Information

The main documentation about the Program Development Link is contained in the on-line Help system, which is available in the programming environment. To get Help information:

1. Select a topic:

   - **Program Development Link and HP 48 information.** Get the "Help" menu and choose one of the commands, such as "Contents" or "HP 48 Command Dictionary."

   - **HP 48 command information.** Move the cursor to a command that's in the window, such as one you've just typed, and press F1. Or click the *right* mouse button on a command. (The "Help" menu, "Context-Sensitive Help" command, also does this.)

   - **Menu and dialog box information.** If the menu label or menu command is highlighted, press F1. If a dialog box is displayed, press F1 or pick "Help." (Steps 2 and 3 below don't apply to information about a menu operation that's in progress.)

2. Review the information. You can also copy and paste from the Help window.

   - To make the Help window active, press F6 until its title bar is highlighted, or click the mouse on the "Help" title bar.

   - To move through the current topic, press Page Down and Page Up or use ▼ and ▲ to move the cursor. Or you can click the mouse pointer on the scroll bar at the right edge of the display.

   - To move ahead to a new topic, move the cursor to any word (such as a command) or tab to a phrase marked by ◀ ▶ (called a *link*), then press F1. Or click the *right* mouse button on a word or marked phrase. (◀Contents▶ goes to the main Help screen.)

- To trace your steps back to previous topics, press Ctrl-F1. Or click the *right* mouse button on ◀Back▶ at the top of the topic.

3. To close the Help window, press Esc or get the "View" menu and pick "Help Window."

Getting More Information

You can get information from these sources:

- The on-line Help system, which provides the main Program Development Link information. See "To Get On-Line Information" above.
- The README.TXT file, which is included and installed on your hard disk with the Program Development Link. To read this file, change to your installation directory (such as C:\PDL), then view it with a text editor or with the MS-DOS command TYPE README.TXT | MORE.
- The *HP 48 Owner's Manual*, which comes with the HP 48.
- The *HP 48 Programmer's Reference Manual.*

Fixing Problems

If you have problems installing or starting the Program Development Link, look for the description below that matches your problem. (For problems that occur *while* you're using the Program Development Link, you'll get a message—plus an option for getting more information.)

Installation program doesn't work properly

- Make sure you're using Disk 1 for the Program Development Link.
- Make sure you've set the current drive to the drive containing Disk 1. For example, if Disk 1 is in drive A, type a: ↵ to make it the current drive.
- Don't use / in the directory name. Use \ instead.

Program Development Link won't start up

- Make sure you installed the Program Development Link on a hard disk.
- Make sure you allowed the installation process to finish—and you restarted the computer afterward.
- Type path ↵ and check that your MS-DOS PATH variable includes the directory where you installed the Program Development Link, such as C:\PDL. You can edit AUTOEXEC.BAT to add the directory to PATH. Otherwise, you must change to that drive and directory to start up the Program Development Link.
- Make sure you're using MS-DOS version 3.00 or later.

Mouse doesn't work right

- Make sure the mouse-driver software that came with the mouse or computer is installed.
- Make sure the mouse driver is activated. For example, your CONFIG.SYS file might contain DEVICE=C:\MOUSE.SYS—your AUTOEXEC.BAT file might contain C:\MOUSE.COM.

Cursor doesn't work right

- If you're using movement keys on the *numeric keypad*, make sure "Num Lock" is off.
- Check your keyboard. Certain shifted-key combinations aren't supported on the early HP Vectra PC with only f1 ... f8 across the top of the keyboard.

Limited Warranty

Software: HP warrants for a period of **1 year** from the date of purchase that the software product will execute its programming instructions when properly installed on the personal computer or workstation indicated on this package. HP does not warrant that the operation of the software will be uninterrupted or error free. In the event that this software product fails to execute its programming instructions during the warranty period, Customer's remedy shall be to return the diskette(s) or tape cartridge(s) ("media") to HP for replacement. Should HP be unable to replace the media within a

reasonable amount of time, Customer's alternate remedy shall be a refund of the purchase price upon return of the product and all copies.

Media: HP warrants the media upon which this product is recorded to be free from defects in materials and workmanship under normal use for a period of **1 year** from the date of purchase. In the event any media prove to be defective during the warranty period, Customer's remedy shall be to return the media to HP for replacement. Should HP be unable to replace the media within a reasonable amount of time, Customer's alternate remedy shall be a refund of the purchase price upon return of the product and all copies.

Notice of Warranty Claims: Customer must notify HP in writing of any warranty claim not later than thirty (30) days after the expiration of the warranty period.

Limitation of Warranty: HP makes no other express warranty, whether written or oral, with respect to this product. Any implied warranty of merchantability or fitness is limited to the 1-year duration of this written warranty. Some states or provinces do not allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you. (In the UK only: If you are a "consumer" as defined by statutes, parts of this statement may not apply to you.)

This warranty gives specific legal rights, and you may also have other rights which vary from state to state, or province to province.

Exclusive Remedies: The remedies provided above are Customer's sole and exclusive remedies. In no event shall HP be liable for any direct, indirect, special, incidental, or consequential damages (including lost profit) whether based on warranty, contract, tort, or any other legal theory. Some states or provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Warranty Service: Warranty service may be obtained from the nearest HP sales office or other location indicated inside the back cover.

Program Development Link

	F1	F2	F3	F4
	Context Help	Open Variable	Find Next	Enlarge Window
Shift	Help on Help	Next Variable	Find Selected	Reduce Window
Ctrl	Last Help	Last Viewed Var	Find	
Alt		New Variable		

	F5	F6	F7	F8
	Send Changed	Next Window	Character Bar	Save As
Shift	Send All	Split Window	Immediate Window	Save
Ctrl	Send Current	Custom Editor		Exit
Alt				

	Del	Ins	Backspace	Enter
	Delete	Insert/Replace	Backspace	New Line
Shift	Cut	Paste		Break Line
Ctrl	Cut Line	Copy		
Alt		Paste HP 48 Char	Undo	

	Up/Down	Left/Right	Home	End
	Prev/Next Line	Prev/Next Char	Start of Line	End of Line
Shift	Highlight	Highlight	Highlight	Highlight
Ctrl	Scroll Up/Down	Prev/Next Word	Top of Window	Bottom of Window
Alt				

Contacting Hewlett-Packard

For Information about Using the Product. If you have questions about how to use the Program Development Link, first check the built-in on-line Help system and "Fixing Problems" in this manual. (Also check the *HP 48 Owner's Manual,* appendix A.) If you can't find an answer in those places, you can contact the Calculator Support department:

Hewlett-Packard
Calculator Support
1000 N.E. Circle Blvd.
Corvallis, OR 97330, U.S.A.

(503) 757-2004
8:00 a.m. to 3:00 p.m. Pacific time
Monday through Friday

For Service. If your product doesn't seem to work properly, refer to the built-in on-line Help system for diagnostic instructions. If you are in the United States and your product requires service, mail it to the Corvallis Service Center:

Hewlett-Packard
Corvallis Service Center
1030 N.E. Circle Blvd.
Corvallis, OR 97330, U.S.A.
(503) 757-2002

If you are outside the United States, refer to the *HP 48 Owner's Manual,* appendix A, for information on locating the nearest service center — or write to the address above.

HP Calculator Bulletin Board System. The Bulletin Board provides for the exchange of software and information between HP calculator users, developers, and distributors. It operates at 300/1200/2400 baud, full duplex, no parity, 8 bits, 1 stop bit. The telephone number is (503) 750-4448. The Bulletin Board is a free service — you pay for only the long-distance telephone charge.

Part Number 82208-90003
Edition 1
English
Printed in U.S.A. 12/90