

MANUAL FOR EXPDD250-V3

**TOSHIBA PLC PROGRAMMING
SOFTWARE**

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INTRODUCTION

The help screens in the PDD software are completely based on this manual. There are designations in the manual such as [Help250.000] which indicate the help file in the software that corresponds to a section in the manual.

Please read the QUICK START GUIDE below before using the software.

The information contained in this document describes how to use the EXPDD software. This document describes the EXPDD250 menu structure, how to move through the menu, and setup information. It lists the instruction set, but does not describe it in detail. It does not describe any hardware items. It does not provide any program examples. For specific information please consult one of the following:

M20/40 User's Manual UM-EXM2040-E002

EX100 User's Manual UM-EX100-E001

Combination M20/M40 & EX100 Manual on Diskette EX10Manual (Incl. with PDD250 Software)

Medium PLC Primer, good program examples (Contact Country Squire Ph. 903-364-2365)

Handy Programmer (HP) Operation Manual UM-EX25UB-E022

EX100 Computer Link User's Manual UM-EX100-E004

EX100 Position Control Module User's Manual

EX100 ASCII/Basic Module Operation Manual UM-EX100-E016

QUICK START GUIDE AND IMPORTANT NOTES FOR EXPDD

INSTALLATION USING THE INSTALL UTILITY:

1. Put the disk into drive A:
2. Type "INSTALL A: *.*" and follow the instructions on the screen.
3. Type "PDD" to start EXPDD.

INSTALLING WITHOUT THE INSTALL UTILITY:

1. Put the disk into drive A:
2. Type "MD EXPDD"
3. Type "CD EXPDD"
4. Type "XCOPY A: *.* /S"

OPERATION FROM THE HARD DRIVE:

1. Change your config.sys file so that it has the lines:

```
FILES=30  
BUFFERS=30
```

The program will NOT run properly if your files and buffers are not set to at least 30.

2. Load your mouse driver if available. Operate your mouse using a dedicated bus mouse port. See Appendix C for information on using the mouse.
3. Type "PDD" and press enter.
4. If you do not have the minimum amount of free base memory required by PDD, an error will appear now, informing you of this.

OPERATION FROM THE DISK DRIVE (NOT RECOMMENDED)

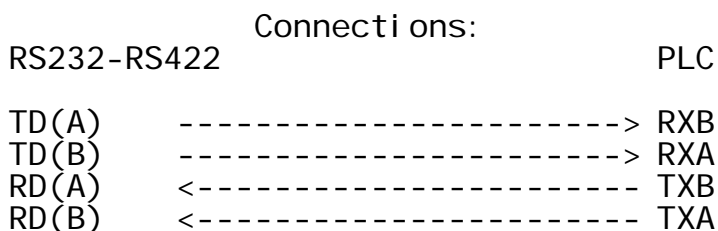
1. Put the disk into drive A:
2. Type "A:PDD" and press enter

HARDWARE CONNECTIONS:

1. Locate the RS232 to Current Loop Converter (For EX100/200/250/500 or M20/40 only). Part #EX25GP232A-TIC2
2. Attach one end of the converter into COM1 or COM2.
3. Attach the other end of the converter to the programming port on your PLC.
4. If you have an EX100 with an enhanced CPU, make sure the PROGRM/LINK switch on the front of the CPU is in the PROGRM position.
5. A hardware key is included with your software package. The key is necessary to activate certain program features. Plug the key into the appropriate port. As this is being written, we are in the process of switching from a parallel port key to a serial port key. If the key is an off-white color, and says "Rainbow Technologies" on it, then it plugs into the printer port. The serial port key will have "serial port" on the label. Also note that the software protection has changed in this version. See the "What's New in Version 3.0" section to find out about this.

RS232 to RS422 CONVERTER (COM 1 to Computer Link Port)

This converter does not require an external power supply. It gets its power from the serial port for short distances. The unit has been tested by the manufacturer at 19.2 Kbaud up to 4000 feet without a power supply.



MISCELLANEOUS:

This version of the software requires a 3.5" high density disk drive. If you do not have access to one, then contact your distributor to obtain a copy on 5.25" HD, or 3.5" DSDD disks.

WHAT' S NEW I N PDD250 VERSION 3.0

NO KEY REQUIRED FOR ON-LINE PROGRAMMING: The key protection has been reversed for version 3.0. A program can now be written online without a key, and saved to the hard drive. The key is only needed for documentation and offline programming. See the following table:

Mode	Feature	Keyed
Online	Programming and Saving a Program	No
Online	Up / Down Load a Program	No
Online	Compare Program in PLC to Program on Computer	Yes
Online	Monitor a Program (in Ladder and with Block Monitor)	No
Offline	From Main Menu, "F6 - Online"	No
Offline	Programming (Demo Mode)	No
Offline	Saving a Program	Yes
Offline	Commentary (Device, Line, Circuit, Page)	Yes
Offline	Printing	Yes
Both	Synonyms	Yes
Both	Mouse Support	No

PDD250 version 3.0 will read programs saved to a computer's hard drive with earlier versions. However, when a program is saved to a computer's hard drive using version 3.0, earlier versions are NOT able to read the file. So, PDD250 is upward compatible, but not downward compatible. Programs saved to a PLC can be read by any version of PDD, no matter which version the program was written with.

MOUSE SUPPORT ADDED: Simply start your mouse driver in DOS, and when you start PDD, you will be able to use your mouse. Clicking with the mouse will execute the EXPDD keyboard commands.

NEW COLOR SETUP: By selecting "F5 - User Settings" from the main menu, and then "F1 - Color", you can change the default color scheme on the programming screen to any color scheme of your choice.

FREE EX100, M20 & M40 MANUAL ON DISKETTE INCLUDED WITH THE PDD250 SOFTWARE: Always have a copy of the programming manual with the programming software. View or print out any portion of the programming manual at any time. Add notes, special explanations, etc., to the programming manual. This manual is available in both MS WORD for Windows Version 2.0b, and Word Perfect for DOS Version 5.1. Wiring diagrams are in a DXF (CAD) format.

REVISED EXPDD250 USERS MANUAL AND ONLINE HELP: Both included with the PDD250 software and available for immediate reference.

[Help250.000]

HELP ON HELP

The HELP facility can be called from ANY EX-PDD MENU by pressing [Ctrl] [F10]. The 'Top Menu' is the first screen displayed when the EX-PDD program is started. To select a function, press one of the function keys (F1 - F10). These keys are labeled on the last 2 lines of the screen. A status line on the 3rd line from the bottom of the screen gives the current Online/Offline status of the system. Status info given is:

File Name: Default	- Named program on disk (8 characters max.)
Unit: S	- Station number of Online PLC (S or 0 - F).
Halt/Run/Error	- Halt/Run/Error status of PLC
M20/M40/EX100	- PLC model number
Memory: 4K	- Program memory capacity of PLC.
ID: DEFAULT	- ID. of program in PLC memory (10 characters max.)
Pages: 15	- No. of pages used by program in PLC memory(0-999).
Steps: 591	- No. of steps used by program in PLC memory(0-8192).

The EX-PDD program operates in two different "environments". These are Online and Offline. Select one by pressing F6 from the Top Menu.

- When Offline: The ladder, block monitor, system information, I/O allocation, and commentary are taken from the named program on disk.

- When Online: The ladder, block monitor, system information, and I/O allocation are taken from the program in PLC memory. The commentary is taken from the named program on disk (disk programs are named by selecting F7 from the Top Menu).

The EX-PDD program can be Temporarily or Permanently exited from the Top Menu to MS-DOS by selecting F10. When Temporarily exiting to MS-DOS, the EX-PDD program will remain resident in memory. To return from MS-DOS to EX-PDD, type EXIT.

[Help250. 100]

SYSTEM AND CONTROL MENU

The System And Control Menu allows selection of the following functions:

- * System Information (F1)
- * I/O Allocation (F2)
- * Load/Save/Compare (F3)

For a more detailed description of these functions, use the following HELP function keys:

F3 for help on System Information.
F4 for help on I/O Allocation.
F5 for help on Load/Save/Compare.

[Help250. 110]

SYSTEM INFORMATION MENU

When Offline, system information is displayed from the program on disk. This information can be edited by positioning the cursor with the arrow keys and entering the desired information. The information is saved to disk by pressing [F10], or canceled by pressing [Esc].

When Online, system information is displayed from the program in the PLC. This information can be edited by pressing [F9], positioning the cursor with the arrow keys, and entering the desired information. The information is saved to the PLC by pressing [F10], or canceled by pressing [Esc].

The information that can be displayed and edited are:

- Program ID (edit online or offline)
- Keep Area TOP (edit online or offline)
- Memory Capacity (determined by PLC type chosen)
- PLC type (edit Offline only - use space bar to choose PLC type)
- System ID (Firmware version in PLC)

All other system information displayed cannot be edited.

SYSTEM INFORMATION MENU

The System Information Menu displays the following information:

- Program ID: A PLC program identification is displayed/entered here. A program ID can be up to 10 characters long.
- Keep Area Top: The RW, D, C, and T registers are partitioned into non-retentive and retentive areas. The bracketed number defines the beginning of the retentive range. For example, an 86 in the brackets for the T registers will make T000-T085 non-retentive and T086-T127 retentive. Entering all blanks (spaces) in the numeric area for the T registers will make all T registers, T000-T127, non-retentive.
- Memory Capacity: This is the program memory capacity of the PLC. Valid values are 2K, 4K, and 8K words of memory. Memory capacities for each PLC type are 2K or 4K for the EX250, 8K for the EX500, and 4K for the M20, M40, EX100 and EX200B.
- Used Page: Number of pages used in PLC program. The Used Page information is updated in the ladder logic program on disk when the program is loaded into the PLC. It is also updated offline following a [Shift][F7](Valid Ladder), while viewing ladder logic.
- Used Step: Number of steps (words) of memory used in PLC program. The Used Step information is updated in the ladder logic program on disk when the program is loaded into the PLC. It is also updated offline after executing a [Shift][F7](Valid Ladder).
- PLC type: When Offline; this is the PLC type that the program is intended to run on. The PLC type can be selected by positioning the cursor into this field and pressing [Space]. When Online, this information is read from the Online PLC.
- System ID: Firmware version number of Online PLC. When Offline, entering a 2 enables you to program special functions for the model EX25-1A and EX50-1A PLCs.
- PDD Version: EX-PDD version number.
- Scan Time(msec): The amount of time required by the Online PLC to process the entire program once (including any overhead time such as I/O processing, diagnostics, etc.). The number displayed is rounded to the nearest whole millisecond. This number does not include the 2ms required at the end of each scan for communication processing.
- Error Status: If an error occurs in the PLC, the short description of the cause is displayed here. This information is retained until the [Error Table Clear] function is executed.

-Diagnostics: User defined diagnostic numbers and messages generated by the DDSP and DDSM instructions in the PLC program are displayed here. Up to 4 numbers/messages can be displayed simultaneously.

SYSTEM INFORMATION MENU

-Control Commands - These commands allow control of the PLC operation through the computer keyboard and are only available while Online with a PLC. The control commands are described below:

-Write EEPROM: This command is available for the EX100, M20/40, EX200B, and the enhanced EX250 (model EX25-1A) and EX500 (model EX50-1A). The contents of RAM is transferred to EEPROM. The PLC must be in HALT.

-RUN: The Run command puts the PLC into the run mode. The halt/run switch on the PLC must be in the run position for this command to work.

-RUN-F: The Run Forced command puts the PLC into the run forced mode. The halt/run switch on the PLC must be in the run position for this command to work

-HALT: The Halt command puts the PLC into the halt mode.

Reset Commands - These commands allow resetting and testing of several parameters in the PLC. These commands are available for an Online PLC only.

-Pgm. Check: The program in PLC memory is tested for correct format, valid instruction op-codes, and memory content. Any errors are displayed in the Error Table.

-Memory Clear: The PLC RAM is cleared (the program and all data is erased). This command will not work if an EPROM module is installed in an EX250/500 or if the ROM/RAM switch is in the ROM position on the EX200B.

-Err/T Clear: The Error Status table (which is displayed in item 9 of the System Information menu) is cleared. The Error Reset command must be sent before this command will work.

-Error Reset: All error conditions in the PLC are cleared.

-Force Clear: All forced devices in the PLC are reset to the normal non-forced condition.

[Help250. 120]

I/O ALLOCATION TABLE

The I/O register allocation for each I/O module mounted in the PLC is displayed in this table. The table layout depends on the PLC type (EX100, EX250, EX500, or EX200B) specified in the System Information Table.

-The table can be edited by moving the cursor to the desired unit/slot number and pressing the appropriate softkey to select the type and quantity of I/O registers required by each module.

-The table can be automatically defined if the PLC is ONLINE and the I/O modules are installed. Pressing the Auto Setup key [F8] initiates this feature. (The PLC must be in the halt mode.)

-The I/O allocation information is saved to disk when OFFLINE, or to PLC (in the halt mode) when ONLINE by pressing the [F10] key.

The cursor control keys are used to move the cursor to the desired slot number. The function softkeys are labeled with the register type that can be used. Pressing the space bar will assign the quantity of registers to the I/O slot. The following table shows the quantity of registers that can be assigned to each slot according to register type:

Reg type	Number of Registers Possible
X, iX, Y, iY	1, 2, 4, or 8
X Y, iX Y	2, 4, or 8
Z	8, 16, or 32
SP	1, 2, 4, 8, 16, or 32
OPT	Intelligent I/O Modules

[Help250. 130]

The Load/Save/Compare menu allows selection of the following functions:

- * Load a program from a disk file to PLC memory (F1).
- * Save a program from PLC memory to a disk file (F2).
- * Compare a program in PLC memory to a disk file (F3).
- * Compare a disk file to another disk file (F4).

LOAD MENU

You can load a program to any one of 16 different PLC units by selecting a Station Number (S or 0-F). Default number is the PLC unit currently ONLINE.

The Filename on disk, which you specify with 1 to 8 characters, is loaded to the PLC. Default filename is the currently named program.

You can Select ([F7]) or De-select ([F8]) specific PLC information to be loaded from disk by positioning the cursor over:

- Ladder Logic: Load the Ladder program to the PLC.
- TOP of Keep Area: Load the Keep Area status to the PLC.
- I/O Allocation Tables: Load the I/O Allocation Table information.
- Force Inputs: Load the force status of all X and Z input devices.
- Register Values: Load all of the register values to the PLC.

SAVE MENU

You can save a program from any one of 16 different PLC units by selecting a Station Number (S or 0-F). Default number is the PLC unit currently ONLINE.

The PLC program is saved to the Filename on disk, which you specify with 1 to 8 characters. Default filename is the currently named program.

You can Select ([F7]) or De-select ([F8]) specific PLC information to be saved by positioning the cursor over:

- Ladder Logic: Save the PLC Ladder program to disk.
- TOP of Keep Area: Save the PLC Keep Area status to disk.
- I/O Allocation Tables: Save the I/O Allocation Table information.
- Force Inputs: Save the force status of all X and Z input devices.
- Register Values: Save all PLC register values to disk.

COMPARE PLC MENU

You can Compare a program on disk to any one of 16 different PLC units by selecting a PLC Station Number (S or 0-F). Default is the PLC ONLINE. The Filename on disk, which you specify with 1 to 8 characters, is compared to the PLC. Default filename is the currently named program. You can Select ([F7]) or De-select ([F8]) specific PLC information to be compared to the disk program by positioning the cursor over:

- Ladder Logic: Compare the Ladder program to the PLC.
- TOP of Keep Area: Compare the Keep Area status to the PLC.
- I/O Allocation Tables: Compare the I/O Allocation Table.
- Force Inputs: Compare the force status of all X and Z devices.
- Register Values: Compare all of the register values to the PLC.
(RW62 and RW63 cannot be compared)

You can specify the compare results to be directed to a printer port (such as LPT1) or to a filename on disk (such as COMPARE.PRN etc.), or to the screen. The compare results default to LPT1.

COMPARE DISK MENU

A Filename on disk, which you specify with 1 to 8 characters, is compared to another Filename on disk. The defaults for both filenames are the currently named program. To change the filenames, simply move the cursor to the Filename fields and enter the new filenames.

You can Select ([F7]) or De-select ([F8]) specific information to be compared in the two disk programs by positioning the cursor over:

- Ladder Logic: Compare the Ladder Logic in both programs.
- TOP of Keep Area: Compare the Keep Area status in both programs.
- I/O Allocation Tables: Compare the I/O Allocation Table.
- Force Inputs: Compare the force status of all X and Z devices.
- Register Values: Compare register values (except RW62, RW63).

You can specify the compare results to be directed to a printer port (such as LPT1) or to a filename on disk (such as COMPARE.PRN etc.), or to the screen.

LADDER LOGIC DISPLAY

Ladder logic programs are divided into pages which are numbered from 001 to 999. Each page can contain up to 14 lines. The screen will display 7 lines of ladder logic at a time. When the ladder logic display mode is entered from the Top Menu (by pressing [F2]) the source of the program to be displayed depends on Online or Offline status.

-When Offline, page 001 of the named program on disk (selected by [F7] in the Top Menu) is displayed on the screen. If the filename cannot be found on the disk, then it is created and a blank page 001 is displayed.

-When Online, page 001 of the program in PLC memory is displayed.

-Pressing [F7] (Valid Ladder) in the Ladder Logic softkey menu initiates a test for correct ladder logic grammar, instruction grammar, and reference number ranges. Valid Ladder should be done after editing.

-Pressing [Shift] [F7] (Valid Ladder) while viewing Ladder Logic OFFLINE, will validate every page of ladder logic sequentially, starting with page one, and ending with the last page. This validation will check for correct ladder logic grammar, instruction grammar, number ranges, and logic combination. As a habit, this should always be executed before attempting to load a program to the PLC. When the entire program validation check has been completed, EX-PDD will calculate the number of steps and pages used, and then display the number of steps used as a message on the screen. The system information page will also be updated.

LADDER LOGIC DISPLAY

The following is a brief description of how lines, circuits, and pages are identified:

```
001 | PB1
    01+---| |---|^|-----
        1 |X001 |R001
          |START2|
    02+---| |---+
        1 |X002
          |PB3   |LS3
    03+---| |---| |-----
        2 |X005 |X021
```

001: The page number is displayed at the top left corner of the screen.

01, 02, & 03: The line number is displayed next to the line of the logic.

1, 2: The circuit number is displayed below the line number.

Other pages in the program can be displayed by pressing the Display Page softkey ([F1]), entering the desired page number, and then pressing [Enter].

To move "between" pages of Ladder Logic, these keys can be used:

- [Home]: Display the first page of the program (Page 001).
- [End]: Display the last page of the program.
- [PgUp]: Display the page preceding the page currently displayed.
- [PgDn] - Display the page following the page currently displayed.
- [F1]: Enter page number (000 - 999) - then press [Enter] key.

To move "within" pages of Ladder Logic, these keys can be used:

- [Ctrl] [Home]: Display lines 1 - 7 of the page
- [Ctrl] [End]: Display lines 8 - 14 of the page
- [Ctrl] [PgUp]: Move up the page by one line
- [Ctrl] [PgDn]: Move down the page by one line

Pressing [F2] (New Page) will insert a new blank page following the page currently displayed. Edit Page mode is automatically entered.

Pressing ESC (or the right mouse button) will cancel the current action.

[Help250. 230]

GLOBAL PAGE MOVE/COPY

Pressing [F3] (Global Page) selects the Move/Copy Ladder Logic menu. The pages to be moved/copied are taken from the filename displayed in the menu (default filename = the program currently displayed on the screen). Another filename can be entered if the pages are to be COPIED (not moved) from another disk file. This makes it possible to select pages from a library of other programs on disk and insert them into the program you are working on. All moved/copied pages are inserted AFTER the page displayed on the screen.

- Pressing [F1]: Initiates the Move page function.
- Pressing [F2]: Initiates the Copy page function.
- Pressing [Esc]: Cancels the Move/Copy function.

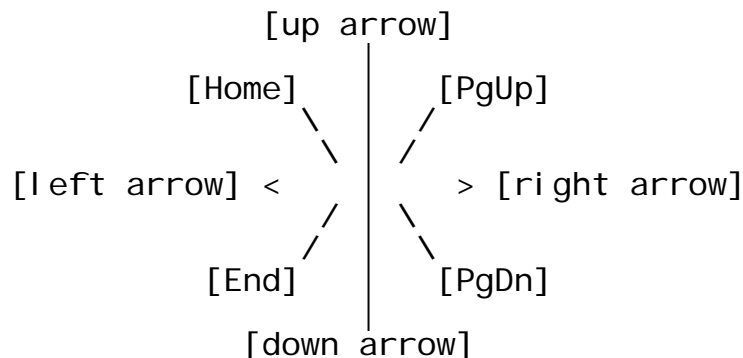
CAUTION: The Move/Copy Page function will work on pages of Ladder Logic ONLY. Move/Copy Page does NOT delete any Page, Circuit, or Line commentary. This caution does not apply to Device comments. Device comments are moved/copied along with the Ladder Logic.

Pages cannot be moved between programs; only copied.

[Help250. 240]

EDIT PAGE

Pressing [F4] in the Ladder Logic softkey menu allows you to enter the Edit Page mode. An element cursor is displayed in the upper left corner of the screen. The following keys are used to move the cursor to the desired direction:



TO MOVE WITHIN THE 14-LINE PAGE OF LADDER LOGIC, THESE KEYS CAN BE USED:

- [Ctrl] [Home]: Display lines 1 - 7 of the page.
- [Ctrl] [End]: Display lines 8 - 14 of the page.
- [Ctrl] [PgUp]: Move up the page by one line.

-[Ctrl] [PgDn]: Move down the page by one line.

The [F1] through [F6] keys select sub-menus containing the complete instruction set. The [F7] and [F8] keys select powerful editing commands which allow you to manipulate existing ladder logic. [F9] is a toggle which allows you to switch between programming with PLC device reference numbers (such as X001) or synonyms (such as PB1). [Shift][F9] will open a window and allow you to edit the ref/syn table. This window is equivalent to the device commentary menu under comment ladder. Escape out of this menu by pressing [F10]. [Shift][F10] is used to save the page of ladder logic to disk when you are Offline, or to the PLC when you are Online.

To enter a ladder logic instruction

1. Move the element cursor to the location on the screen where the instruction is to be entered.
2. Select the sub-menu where the instruction is located by pressing one of the first 6 function keys ([F1] - [F6]).
3. Find the instruction in the sub-menu display and press the appropriate function key. (Note that some of the instructions must be entered by holding down the [Shift] key while pressing the function key.)
4. The instruction will be displayed on the screen at the cursor location. You can now enter the reference number(s) or synonym(s) from the keyboard, and then press [Enter].
5. You may return to the Ladder Logic softkey menu by pressing [F10].

NOTE: By holding down the [Alt] key and pressing the desired function key, you can go directly from one instruction sub-menu to another sub-menu without having to return to the Ladder Logic softkey menu.

NOTE: The mouse can also be used to enter ladder logic instructions.

EDIT PAGE

[F1] - Sequence Instructions:
Instructions:

-] [- NO Contact
 -]/[- NC Contact
 -]^[- Leading edge trans contact
 -]v[- Trailing edge trans contact
 OPEN No vertical connection
 CLOSE Vertical connection
 _ Horizontal connection
 -x x- No horizontal connection
 -()- Coil
 -*-()- Forced coil
 TON On-delay timer
 TOF Off-delay timer
 SS Single-shot timer
 CNT Counter
 END End of program

[F2] - Extra Sequence

MCS Master control set
 MCR Master control reset
 JCS Jump control set
 JCR Jump control reset
 STIZ Step sequence initialize
 STIN Step sequence input
 STOT Step sequence output
 SET Set bit
 RST Reset bit
 SR Shift register
 F/F Flip-flop
 U/D Up/down counter

[F3] - Move and Compare Instructions:

W -> W register to register move
 K -> W constant to register move
 TINZ table initialize
 register
 T -> W table to register move
 register
 W -> T register to table move
 register
 T -> T table to table move
 constant
 DDSP diagnostic display
 register
 DDSM diagnostic display w/ message
 constant
 R > R compare register > register
 R > K compare register > constant
 sub.
 R = R compare register = register
 R = K compare register = constant
 R < R compare register < register
 R < K compare register < constant

[F4] - Arithmetic Instructions:

R + R add register to register
 R + K add register to constant
 R - R subtract register-
 R - K subtract constant-
 R x R multiply register x
 R x K multiply register x
 R / R divide register by
 R / K divide register by
 R ++ R double length register add
 R -- R double length register
 RT square root
 SIN sine
 ASIN arc-sine
 COS cosine

[F5] - Logical Operation Instructions: [F6] - Convert & Limit Inst.:

R AND R	register AND register	BIN	BCD to binary conversion
R AND K	register AND constant	BITC	bit count of bits = 1
R OR R	register OR register	BCD1	binary to BCD conversion
R OR K	register OR constant	BCD2	binary to double length BCD
R EOR R	register Excl. OR register	ENC	encode position of bit = 1
R EOR K	register Excl. OR constant	DEC	decode position and set
bit=1			
NOT	invert register bits	UL	set upper limit value
LL	set lower limit value	MAX	find maximum value in table
NEG	2's complement of register	MIN	find minimum value in table
RTR	rotate register bits right	AVE	find average value in table
RTL	rotate register bits left	FG	function generator
TEST	register bit test for 1	IN	read the input values now
		OUT	write the output values now
		READ	block read from OPT module
		WRITE	block write to OPT module

Pressing [F7] in the Ladder Logic softkey menu will re-define the softkeys for insert and delete operations. The new softkey definitions are:

-[F1] Clear Element: Erases the instruction at the location of the element cursor.

-[F2] Delete Line: Deletes the entire line in which the element cursor is located. Lines below the deleted line are moved up to fill the gap.

-[F3] Delete Column: Deletes a column of instructions at and below the element cursor in a circuit (not the entire page). Columns to the right are pulled over to fill the gap.

-[F4] Insert Line: Inserts a new blank line at the location of the element cursor. Lines at and below the cursor are pushed down the page.

-[F5] Insert Column: Inserts a new blank column at and below the element cursor in a circuit. Columns to the right are pushed over to make room.

-[F6], [F7] Verticals: Allows you to enter/erase vertical and horizontal shorts.

-[F8] Recover: Cancels the effect of the most recent command used in the insert/delete submenu by restoring the ladder to its prior state.

Pressing [F8] in the Ladder Logic softkey menu will re-define the softkeys for move and copy line operations. The new softkey definitions are:

-[F2] Copy Lines: Allows you to copy existing lines of logic which are already programmed into another location in the ladder program. You can specify the page number and range of lines on the page from which the lines are copied. The lines are inserted into the location of the element cursor on the displayed page. Any previous lines at or below the element cursor location are moved down the page to make room for the copied lines.

-[F1] Move Lines: Functions the same way as Copy Lines, except that the specified page MUST be the displayed page. Also, the specified range of lines are deleted from their old location and any following lines on the displayed page are moved up to fill the gap.

[Help250. 250]

DELETE PAGE

Pressing [F5] (Delete Page) in the Ladder Logic softkey menu allows you to remove a page, or range of pages from the ladder logic program. Subsequent pages beyond the deletion are renumbered to eliminate gap. To remove page(s) of ladder logic, enter the numbers of the page(s) to be deleted and press [Enter] to delete or [Esc] to cancel.

CAUTION: The Delete Page function will delete pages of Ladder Logic ONLY. Delete Page does NOT move/copy any Page, Circuit, or Line commentary. This caution does not apply to Device comments. Device comments are moved/copied along with the ladder logic.

[Help250. 260]

SEARCH LADDER

The SEARCH Function ([F6] in the Ladder Logic menu) is used to locate and display a device of a particular reference number in the program both ONLINE and OFFLINE. To begin search, enter an address, either a full device number address or a partial address. (i.e. X018 for an exact match, or X001 to find all devices from X010 to X01F). The page range defaults from the present page to the end page. To change this page range, place cursor over number, by using [tab] or [arrow keys], and edit. To begin search press: [F3] Search First.

NOTE: Both upper and lower case letters can be entered, even though forced devices are represented by lower case letters. PDD checks the force table and determines the state of the device before it implements the search.

The following page explains the operation of each search softkey.

SEARCH LADDER

The following are Search functions under [F6] in the Ladder Logic menu:

- [F1] Ref Only/Ref & Syn.: Toggles between choices of searching for reference numbers or ref. number and synonyms. When Ref & Syn is shown, synonyms may be typed in and searched. Remember, synonyms can be up to 6 characters and are always capital letters. [F2]
- Forward/Backup - Selects search direction to be forward from the beginning of the specified page range, or backward from the end of the specified page range in the program.
- [F3] Search First: Finds first occurrence of the searched device for a forward or backup search.
- [F4] Search Next: Finds the next occurrence of the searched device for a forward or backup search
- [F5] Any Instruction/Coil Only: Toggles between coil only or any instruction. Use Coil Only to find device numbers that correspond to only coils, and Any Inst. to find all occurrences of the device number.
- [F6] Edit Page: Allows you to enter Edit Page Mode from the search menu so a searched device can be edited and saved.

COMMENT LADDER

There are several levels of ladder logic commentary available. All of these are available only with a hardware key.

- Page Comments: Describe a full 14-line page of ladder logic (10 lines by 76 characters).
- Circuit Comments: Describe a circuit of one or more ladder logic lines (5 lines by 76 characters).
- Line Comments: Describe a single line of ladder logic (3 lines by 50 characters).
- Device Comments: Describe a device such as a contact, coil, or register (3 lines by 6 characters).

NOTE: It is recommended that PAGE, CIRCUIT, and LINE comments be entered into your program AFTER you have completed developing your program logic. This is because PAGE, CIRCUIT and LINE comments are assigned to page numbers, and inserting or deleting ladder logic will cause the existing comments to be off. However, the comments can be re-located by the MOVE, COPY, INSERT, or DELETE functions under [F9](move comment).

COMMENT LADDER

Pressing [F1](Display Page) allows you to select a page of Ladder Logic.

Pressing [F2](Remove/Display Synonym) allows you to Display or Remove the synonym portion of the device commentary on the screen display.

Pressing [F3] allows you to Display or Remove the description portion of the device commentary on the screen display.

Pressing [F5] allows you to enter page comments

Pressing [F6] allows you to enter circuit comments.

Pressing [F7] allows you to enter line comments.

Pressing [F8] allows you to enter device comments.

Pressing [F9] allows you to change Locations(move/copy) page comments

The following are available under [F9](Move Comment

-[F1](Insert Page): This inserts blank page(s) beginning at the page range specified.

-[F2](Delete Page): This deletes page(s) of commentary beginning at the page range specified.

-[F3](Move Page): This allows comments to be moved from the current ladder program or from another ladder program stored on disk.

-[F4](Copy Page)- Same as above but comments will be copied.

[Help250.285]

PAGE COMMENT

Pressing [F5] from the Comment Ladder softkey menu allows you to display/edit the Page commentary for the Ladder Logic page currently displayed on the screen. A page comment consists of a block of text up to 10 lines high by 76 characters wide. A text cursor marks where text will be displayed when you enter it from the keyboard. Up to 3 lines of text are visible on the screen at a time. To see any other hidden text you may use the cursor up and down keys to scroll the commentary. Other useful keys are:

-[Home]: Move the cursor to line 1 of the text block.

- [End]: Move the cursor to line 10 of the text block.
- [PgUp]: Move up the text block 3 lines at a time.
- [PgDn]: Move down the block of text 3 lines at a time.
- [Enter]: Move the text cursor to the first column in the next line.
- [F1]: Save the page commentary to disk.
- [Esc]: or [F10]: Cancel any commentary changes.

CIRCUIT COMMENT

Pressing [F6] from the Comment Ladder softkey menu allows you to display/edit the Circuit commentary for the ladder logic page currently displayed on the screen. A circuit comment consists of a block of text up to 5 lines high by 76 characters wide. After pressing [F6] you will be asked to enter the circuit number you wish to display on the screen. Circuit numbers are entered in decimal. (i.e., enter 10 for circuit A, 11 for circuit B, etc.) A text cursor marks where text will be displayed when you enter it from the keyboard. Up to 3 lines of text are visible on the screen at a time. To see any other hidden text you may use the cursor up and down keys to scroll the commentary. Other useful keys are:

- [Home]: Move the cursor to line 1 of the text block.
- [End]: Move the cursor to line 5 of the text block.
- [PgUp]: Display the first 3 lines of text.
- [PgDn]: Display the last 3 lines of text.
- [Enter]: Move the text cursor to the first column in the next line.
- [F1]: Save the circuit commentary to disk.
- [Esc] or [F10]: Cancel any commentary changes.

LINE COMMENT

Pressing [F7] from the Comment Ladder softkey menu allows you to display/edit the Line commentary for the ladder logic page currently displayed on the screen. Line commentary consists of a block of text up to 42 lines high by 50 characters wide. Out of the 42 text lines in the block, 3 text lines are dedicated to each of the 14 ladder logic lines on the page. A text cursor marks where text will be displayed

when you enter it from the keyboard. Up to 3 lines of text are visible on the screen at a time. To see any other hidden text you may use the cursor up and down keys to scroll the commentary. Other useful keys are:

- [Home]: Move the cursor to comment 1, text line 1 of the text block.
- [End]: Move the cursor to comment 14, text line 3 of the text block.
- [PgUp] Move up the text block 3 lines at a time.
- [PgDn]: Move down the block of text 3 lines at a time.
- [Enter]: Move the text cursor to the first column in the next line.
- [F1]: Save the line commentary to disk.
- [Esc] or [F10]: Cancel any commentary changes.

DEVICE COMMENT

Pressing [F8] from the Comment Ladder softkey menu allows you to display/edit the Device commentary for the entire ladder logic program. Device commentary text consists of a 1 line by 6 character synonym and a 3 line by 6 character description. A screen display color can also be assigned. A text cursor marks where text will be displayed when you enter it from the keyboard. The synonym is always required when assigning device comments. The description and color are optional. Either the device reference number or the synonym can be entered first by toggling the REF and SYN display with the [F9] key. Reference numbers and synonyms are entered by OVERWRITING the new ref/syn text on top of any previous text at the cursor location. Then, when tabbing over to the next column with the [Tab] key, a space is opened for the rest of the new ref/syn and description text to be entered.

A ref/syn assignment can be DELETED by blanking out the synonym. When in the reference display mode, press the [Space] bar key and then press [Enter]. To exit the device commentary menu display, press [F10].

DEVICE COMMENT

These are the color codes for CONTINUOUS color display of device comments.

Background Colors	Foreground Colors														
WHT	BLK	BLU	GRN	CYN	RED	MAG	BRN	DRK GRY	LT GRY	LT BLU	LT GRN	LT CYN	LT RED	LT MAG	YEL
BLACK 015		001	002	003	004	005	006	007	008	009	010	011	012	013	014
BLUE 031	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030
GREEN 047	032	033	034	035	036	037	038	039	040	041	042	043	044	045	046
CYAN 063	048	049	050	051	052	053	054	055	056	057	058	059	060	061	062
RED 079	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078
MAGENTA 095	080	081	082	083	084	085	086	087	088	089	090	091	092	093	094
BROWN 111	096	097	098	099	100	101	102	103	104	105	106	107	108	109	110
LT GREY 127	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126

These are the color codes for BLINKING color display of device comments.

Background Colors	Foreground Colors														
	BLK	BLU	GRN	CYN	RED	MAG	BRN	DRK GRY	LT GRY	LT BLU	LT GRN	LT CYN	LT RED	LT MAG	LT YEL
WHT															
DARK GREY	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142
143															
LT BLUE	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158
159															
LT GREEN	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174
175															
LT CYAN	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190
191															
LT RED	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206
207															
LT MAGENTA	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222
223															
YELLOW	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238
239															
WHITE	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254
255															

DEVICE COMMENT

Repacking the Device Commentary Index Table:

Device reference numbers, synonyms, and comments are saved in two index tables on the disk. This is done by using a binary tree algorithm. Thus, as the table grows larger, the retrieval time of syn/ref data will take longer. Therefore it is necessary to repack the indexes. A test[F2] is provided to see if the indexes need repacking. Remember, there are two index tables, Syn. and Ref. The Ref table is tested and repacked by pressing [F2] or [F1], respectfully, when the word REF in the ref. column is in high-intensity (bold). Likewise, the SYN table is tested and repacked the same way (when SYN in the syn. column is in bold print.) Remember, if one index needs to be repacked (test fails and repacking is indicated), then the other index probably needs repacking also. To do this only takes a few moments to complete.

NOTE: The primary key is set by pressing [F9] toggle REF/SYN. They are alphabetized by either references, or by synonyms.

[Help250. 290]

MONITOR/FORCE

Pressing [F9] from the Ladder Logic softkey menu selects the Monitor and Force functions. This is only available while Online with a

running PLC. The Monitor function allows the current status of all devices on the screen to be observed while the PLC program is running. The status of each device is shown on the screen as follows:

- Contacts: Displayed in a high intensity color when true, and in the normal (low intensity grey) mode when false.
- Coils: Displayed in a high intensity color when energized, and in the normal (low intensity grey) mode when non-energized.
- Connecting Lines: Displayed in high intensity color when power-flow can be traced through the ladder logic circuit between the left and right power rails.
- Registers: Values are continuously updated and displayed below the register reference number.

MONITOR/FORCE

The Force function allows contacts and coils to be turned on or off from the computer keyboard, rather than from the I/O status in the PLC program. To Force or Release a device, press [F3](FORCE/RELEASE) and enter the device number. Use [F7] to turn On, or [F8] to turn Off a forced device.

- [F1] T/C Preset: This allows the preset value of the counter or timer to be changed while monitoring the PLC in the run mode.
- [F2] DEC/HEX/ASCII: Display reg values in Decimal, Hexadecimal, or ASCII.
- [F5] Set Value - allows register values (i.e. D or RW) to be changed while monitoring the PLC in the run mode.
- [F6] toggles between Data Hold and Data Active. Data Hold will freeze the screen display, holding the latest device status. Data Active allows the screen to be updated continuously with device status.

[Help250.300]

BLOCK MONITOR

Pressing [F3] from the Top Menu selects the Block Monitor. The block monitor allows you to display the values of up to 32 consecutive registers on the screen. To select a group of registers for display, press [F1] (Start Number) and enter the desired starting register type and number. The following keys will also aid in selecting registers for display.

- [Home]: Display the first 32 registers of the register type currently selected.

- [PgUp]: Rotate the previous 16 registers into the 32 register display of the type currently selected.
- [PgDn]: Rotate the next 16 registers into the 32 register display of the type currently selected.
- [End]: Display the last 32 registers of the register type currently selected.

Pressing [F6] toggles between Data Hold and Data Active. Data Hold will freeze the screen display, holding the register status. Data Active allows the screen to be updated continuously with register status.

The [F2] key works as a display mode selector. This softkey label indicates the currently selected display mode. The 3 modes are:

- DEC: Display register values in decimal from 00000 to 65535.
- HEX: Display register values in hexadecimal from H0000 to HFFFF.
- ASCII: Display 2 characters to represent the high byte and low byte of the stored value. If a byte has no "printable" characters, then display a blank.

Pressing [F5] allows you to set register values. Values are entered in decimal unless prefixed by an H or O. Press [Esc] to cancel the set value function.

- An H0200 is a Hex value equal to 512 in decimal.
- An 00017 is an Octal value equal to 15 in decimal.

This is a partial list of the ASCII character codes (used in IBM PC).

Hex Code	Char.	Hex Code	Char.	Hex Code	Char.	Hex Code	Char.	Hex Code	Char.	Hex Code
20	(space)	30	0	40	@	50	P	60	`	70
p										
21	!	31	1	41	A	51	Q	61	a	71
q										
22	"	32	2	42	B	52	R	62	b	72
r										
23	#	33	3	43	C	53	S	63	c	73
s										
24	\$	34	4	44	D	54	T	64	d	74
t										
25	%	35	5	45	E	55	U	65	e	75
u										
26	&	36	6	46	F	56	V	66	f	76
v										

27	'	37	7	47	G	57	W	67	g	77
W										
28	(	38	8	48	H	58	X	68	h	78
X										
29	)	39	9	49	I	59	Y	69	i	79
y										
2A	*	3A	:	4A	J	5A	Z	6A	j	7A
Z										
2B		3B	;	4B	K	5B	[	6B	k	7B
{										
2C	,	3C	<	4C	L	5C	\	6C	l	7C
2D	-	3D	=	4D	M	5D	]	6D	m	7D
}										
2E	.	3E	>	4E	N	5E	^	6E	n	7E
~										
2F	/	3F	?	4F	O	5F	_	6F	o	
7F(del)										

[Help250. 400]

DOCUMENT PRINT

Documentation Print commands are available Offline by pressing the [F4] key in the Top Menu. The name of the program you wish to print must already be entered (using [F7] in the Top Menu) before you press [F4] to display the Documentation Menu. Printing is only available in the offline mode, and when the hardware key is connected.

Press [F6] to select a different printer driver. Printer drivers available include Hewlett Packard Laserjet III, IBM Graphics, IBM Graphics with Epson control codes, and plain ASCII.

The Ladder program printout can be directed to one of several output devices. These devices may be selected either by softkeys or named from the keyboard. Valid output devices are:

Parallel Ports: LPT1	Serial Ports: COM1	A disk file: Any valid
DOS		filename.
LPT2	COM2	
LPT3		

Your printer will typically be connected to LPT1, which is the default setting. If you direct the printout to a disk file, you can examine the contents of the file on the screen in MS-DOS by using the TYPE command. You can also print the file on a printer using the PRINT command in MS-DOS.

Each page of your printout will have a Title and a Sub-Title centered at the top. To enter/change these titles, move the cursor to these fields in the menu. The Title and Sub-Title are limited to 50 characters each. Other data automatically added to the page title includes:

-PAGE number: The Ladder Logic page number (000 - 999), printed only on sheets containing Ladder Logic.

-SHEET number: The printout page number, printed on all sheets of paper involved in the printout of the program.

-DATE/TIME: This is the taken from the MS-DOS system clock.

Printout options are selected/de-selected by moving the cursor to the desired field and pressing [F7] to select, or [F8] to de-select. Selected options are indicated in reverse-video. De-selected options are indicated in normal video.

Options that are printed with the Ladder Logic diagram include:

-Ladder Logic Diagram Pages 001-001: Print the range of Ladder Logic pages specified. You can change the range of pages to be printed from the keyboard.

-Circuit Numbers in Ladder: Print the circuit number below each Ladder Logic line number in the printout.

-In-Ladder Coil Cross Reference: Print the cross reference for all coils in a page of logic immediately following the logic for each page. The format is: Page-Line-Circuit-Type where:

--Page: A 3-digit Ladder Logic page number.

--Line: A 2-digit Ladder Logic line number (decimal).

--Circuit: A 1-digit logic circuit number (hexadecimal).

--Type: A 2, 3, or 4-char. mnemonic for the instruction opcode.

Print Compressed Ladder & Comments - Print 132 characters on standard 8.5" wide paper.

Page and Circuit Commentary - For each page of Ladder Logic, print the page comment first and then the logic. Also print the circuit comments ahead of each circuit.

Line Commentary (132 column only) - Print the line comment to the right of each line of logic. This will print up to 132 characters per line.

Device Description - Print the 3-line description above each device in the logic.

Device Synonym - Print the synonym above the device (between the device and the description when Device Description is also selected).

Options that are printed on separate sheets after the logic diagram:

-System Information: Print the system information table.

-I/O Allocation Table: Print the I/O allocation table.

Device Usage - Print the device usage of the Ladder program. The notation used for each device (Bit) in the register and also for the register as a whole.

Force Usage - Print a list of the Forced devices. This list includes Inputs (X contacts), Link Relays (Z contacts), and Disabled Coils (R, Y, Z coils).

Instruction Usage - Print a list of all instruction types found to be used in the ladder logic program, and the number of times each type is used.

Register Values XY Z R T C D0000-D1535 - Print the register values. You can select a group of registers to print by placing the cursor over the register type and using [F7] to select and [F8] to de-select. The D register type is range-editable.

Page/Circuit/Line Commentary Pages: 000-999 - Print page, circuit, and line comments from the range of pages specified.

Device Commentary - Print a list of all device comments.

Cross Reference - Print a complete cross reference of all reference numbers. The cross reference format is: PAGE-LINE-CIRCUIT-TYPE where:

-PAGE: A 3-digit ladder logic page number.

-LINE: A 2-digit ladder logic line number (decimal).

-CIRCUIT: A 1-digit logic circuit number (hexadecimal).

-TYPE: A 2, 3, or 4-char. mnemonic for the instruction opcode.

[Help250. 500]

USER SETTINGS

Pressing [F5] from the main menu brings up the user settings menu. Currently, the only option on this screen is {[F1] COLOR SETTINGS}. Pressing [F1] at this point brings up the color setting menu. Here, the colors which appear on the ladder logic programming screen ([F2] from the main menu) can be set.

[Help250. 600]

ONLINE / OFFLINE

Pressing [F6] from the main menu toggles the software between the online and the offline mode. While online, the program being viewed is the program in the PLC. While offline, the program being viewed is in the hard disk drive of the computer.

The hardware key must be installed in order to write and save a program in the offline mode. It is also needed to use the COMPARE function, synonyms, device comments, line comments, page comments, and circuit comments. Without the key, you can write a program online, monitor the program, and save it to your hard disk drive. A key is not needed for these basic features.

When [F2] is pressed from the main menu in the offline mode and without a key installed, the "demo" mode of the offline programming software is entered. A program can be entered, but it cannot be saved.

The key is not needed to use a mouse.

PDD250 version 3.0 will read programs saved to a computer's hard drive with earlier versions. However, when a program is saved to a computer's hard drive using version 3.0 or later, versions earlier than 3.0 are NOT able to read the file. So, PDD250-V3 is upward compatible, but not downward compatible. Programs saved to a PLC's RAM can be read by any version of PDD, no matter how the program was loaded (any version of PDD, a hand-held programmer, or a graphic programmer).

[Help250.700]

PROGRAM NAME

A program name is entered as a standard MS-DOS file name WITHOUT a 3 character extension. (Extensions are reserved by EX-PDD.)

Program names are limited to 8 characters maximum. The program name may be prefixed with any valid disk drive letter and/or sub-directory name. Some examples are as follows:

-PROGRAMNAME: PROGRAMNAME is found on the default disk drive and sub-directory (i.e. where EX-PDD was loaded from).

-B: PROGRAMNAME: PROGRAMNAME is found on disk drive B.

-C: PROGRAMNAME: PROGRAMNAME is found on disk drive C.

-C:\LADDERS\PROGRAMNAME: PROGRAMNAME is found on disk drive C in a sub-directory called LADDERS.

-LADDERS\PROGRAMNAME: PROGRAMNAME is found on the default disk drive and sub-directory in another sub-directory called LADDERS.

It is not recommended that ladder programs be stored in the same directory as the PDD program. Also, do not work out of the program on a floppy disk if you intend to use the move or copy functions. These operations can take a very long time if the program is on a floppy disk.

[Help250. 800]

COMMUNICATION PARAMETERS

The communication parameters menu allows you to select either COM1: or COM2: to communicate to a PLC. The PLC Station Number will be S (single) for connection to the PLC Programmer Port, or 0 - F for connection to the PLC RS-422/485 Port. When S is the station number, the communication format is 4800 baud, 8 data bits, even parity bit, one stop bit. When 0 - F is the station number, EX-PDD searches to find the PLC baud rate when going Online (9600 - 300 baud). 8 data bits, no parity, and one stop bit is used. The baud rate search feature can be bypassed by entering the baud rate after COM1: or COM2: as shown in the following example:

COM1:4800 This will set the baud rate at 4800. When you press [F6] from the Top Menu to go Online, EX-PDD will start communicating to the PLC at 4800 baud rather than search for the PLCs baud rate.

The RS-485 computer link switch settings on the EX100 are as follows:

off	on		
+-----+			+-----+-----+-----+
4 |---|	BR2 - Baud rate	(off)	| BR2 | BR1 | Baud Rate
3 |---|	BR1 - Baud rate	(off)	|---|---|---|
2 |---|	PEN - Parity disable	(off)	| off | off | 9,600
1 |---+|	PR - Parity odd/even	(off)	+-----+-----+-----+
+-----+			| off | on | 4,800
EX100			+-----+-----+-----+
DIP switch			| on | off | 2,400
			+-----+-----+-----+
			| on | on | 1,200
			+-----+-----+-----+

* Toggle switch (on EX100) must be set for link position for the RS485 port on the EX100 to be selected.

* Rotary switch = station number (0-F)

The RS-422 computer link switch on the EX250/500 is as follows:
 off on

```

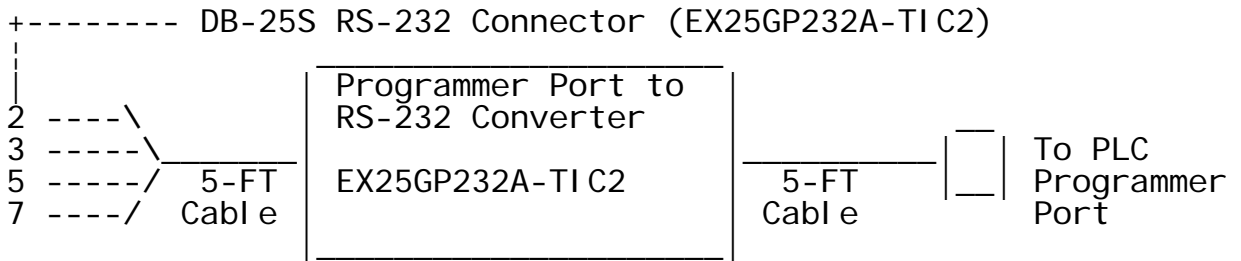
+-----+
+----+
8 +-+ SP0-Cntrl cmd enable (off)
7 +-+ SP1-Prog blk wrt enable (off)
6 +-- SP2-Binary mode (off)
5 +-- BR0- (on)
4 +-+ BR1- Baud rate = 9600 (off)
3 +-- BR2- (off)
2 +-+ PEN-Pari ty di sabled (on)
1 +--+ EVN-Pari ty odd (off)
+-----+
Switch Positi on
-OFF = Left
-ON = Right
  
```

BR2	BR1	BR0	Baud Rate
off	off	off	Di sabled
off	off	on	9,600
off	on	off	4,800
off	on	on	2,400
on	off	off	1,200
on	off	on	600
on	on	off	300
on	on	on	1,200

EX250/500 DIP switches: Toggle switch = up (on). Rotary switch = station number (0 -7).

- * Slide switch = Link position
- * Rotary switch = station number (0-9, A-F)

Programmi ng Cable: RS232 (Computer) to Current Loop Converter (PLC programmi ng port).



Other Programmi ng Cable: RS232 (Computer) to RS422/485 (PLC computer link port)

EXCNAV422-232C cable

Connections:

RS232-RS422		PLC
TD(A)	----->	RXB
TD(B)	----->	RXA
RD(A)	<-----	TXB
RD(B)	<-----	TXA

Note that "A" s connect with "B" s, and "R" s connect with "T" s.

Modem Connection: Computer-to-PLC connection can be made through Hayes compatible telephone modems. Modem initialize, dial, and hangup are handled in the Communication Parameters menu (selected by pressing F8 in Top Menu).

Computer-to-PLC connection can be made through Hayes compatible telephone modems. Modem initialize, dial, and hangup are handled in the Communication Parameters menu (selected by pressing F8 in Top Menu).

```

+-----+ RS232 +-----+ TELEPHONE LINE +-----+ x-----x +-----+
+
|CMPTER+-----| MODEM |-----| MODEM +-|Null | |RS232/
|RUNNING|          +-----+          +-----+ |Modem|-----|RS422
|EX-PDD |          * ORIGINATE MODE          x-----x |CONV.
+-----+          * 8-DATA, NO PARITY,          +-----+
+
SETUP BAUD RATE      1-STOP BIT          * 8-DATA, NO PARITY,          |R
AND DATA PARAMETERS          1-STOP BIT          |S
COMPATIBLE WITH PLC AND MODEMS          |4
SELECT PLC STATION NUMBER          +-----+          |2
          | Toshiba PLC +-----+          |2
          +-----+
          * BAUD RATE COMPATIBLE WITH MODEMS

```

This is a typical method used to connect a Hayes compatible modem to the PLCs computer link port via a Toshiba converter.

USING A MODEM

Selecting Modem Baud Rate

Selecting a modem baud rate is only required if you are going to communicate via modem to the PLC. The following example shows the modem communication parameters USING A MODEM.

Selecting Modem Baud Rate

Selecting a modem baud rate is only required if you are going to communicate via modem to the PLC. The following example shows the modem communication parameters for 2400 baud:

Modem Baud Rate: 2400: N, 8, 1, CSD, DSO, CDO

This example sets the modem communications for 2400 baud, 8 data bits, no parity, and one stop bit. The CTS (Clear To Send), DSR (Data Set

Ready), and CD (Carrier Detect) hardware handshake signals are disabled.

Pressing [F6] (Modem Init), [F7] (Modem Dial), or [F8] (Modem Hangup) will append the information stored in the "Modem Baud Rate" field to the "Port" field after the COM1: or COM2: display. Pressing [F10] will save this field to the named program on disk.

Modem Initialization

This field is used to store the modem initialization commands for the modem attached to the computer. Multiple Hayes "AT" commands can be stored in this field, separated by commas. For example: ATZ, ATL1.

The ATZ command resets the modem and restores all of the factory default settings. ATL1 lowers the modem's speaker volume to a lower level. Pressing [F6] sends the initialization commands to the modem. Pressing [F10] will save this field to the named program file on disk.

Modem Phone Number

The phone number of the remote modem is stored here. This field can store multiple Hayes "AT" commands separated by commas. The Hayes "ATD" command tells the computer's modem to dial the phone number for the remote modem attached to the PLC. The remote modem answers the call to establish modem-to-modem connection. For example: ATDP 1-800-555-5555

Pressing [F7] will pulse dial a remote telephone modem at the number 1-800-555-5555. Another example: ATDT 9W555-1212 Pressing [F7] will Touch-Tone dial a "9" to get outside line access, wait for a second dial tone, and then Touch-Tone dial 555-1212. Pressing [F10] will save this field to the named program file on disk.

Modem Hangup

[F8] (Modem Hangup) is used to disconnect the modem-to-modem communication on the phone line. Pressing [F8] will return the computer modem from the online state back to the command state and then send the Hayes hang-up command "ATH" to hangup.

Saving Your Selections

To save your selections, press [F10] to return to the Top Menu. Or press ESC to restore the previous communication parameters, and return you to the Top Menu.

Establishing a Communication Link

Using the [F8] COMM Port command does not open a channel to the PLC. It only determines which of the two serial channels will be used, what station number to use for the PLC, and establishes modem-to-modem communication.

To cause a channel to be opened, and a communications link to be established between the computer and the PLC, use the [F6] Online Ladder command. If the link is successfully established, the screen status line report will change to say "Online." If the link cannot be established, an error message will appear: "(002) Not connected, check cables / Computer Link Card for proper installation."

The most common causes of communication failures are:

1. Proper cable not connected between computer and PLC.
2. Wrong COMM Port specified.
3. The PLC internal DIP switch settings may be incorrect.
4. Computer installation of serial card may be incorrect. The serial port(s) must be configured to work as COM1 or COM2.
5. Modem setup may be incorrect.

[Help250. 999]

EXIT TO DOS

Pressing [F10] at the Top Menu allows you to exit from EX-PDD and go back to the MS-DOS operating system. Three choices appear at the bottom of the screen.

-Temporary exit to DOS: Press [T] if you want to run a DOS utility, and then return to EX-PDD without having to reload the software from disk. To return back to EX-PDD, type EXIT and then press [Enter]

-Permanent exit to DOS - Press [P] if you want exit from EX-PDD with no intention of returning. This will release all of the memory which was reserved for running the EX-PDD software.

-Press [Esc] if you change your mind about exiting from EX-PDD.

NOTE: When Temporarily exiting EX-PDD to DOS, be sure that the default EX-PDD drive and directory are selected when EXITing back to EX-PDD.

Appendix A

List of Reserved Files

This section is provided as a guide to disk backup and maintenance operations. The following reserved files are components of the EX-PDD software:

PDD.BAT - Batch file to start EX-PDD Software.
PDDINS.COM - Marker for PDD RAM resident software.
PODREL.COM - Removes PDD RAM resident software.
PDD250.COM - PDD RAM resident software (Toolkit routines).
PDD250A.EXE - PDD RAM resident software (FOS routines).
PDD250B.EXE - PDD software (Main routines).
PDD250.OVL - Template or Menu overlays.
PDD250.CUR - Cursor movement tables.
PDD250.SK - Softkey menu overlays.
PDD250.EM - Error and informational messages.
PDD250.BMW - Block Monitor work area.
PDD250.ORG - Default system information file.
PDD250.PAR - Default parameters and other definitions.
PDD250.OPD - Opcode definition.
PDD250.BTP - Binary to Pcode table.
PDD250.TMP - Temporary Scratch file.
FOSCRITCH. \$\$\$ - Scratch file for index table rebuild.

The following reserved filenames are used to save user program and related files, where PROGNAME is up to 8 characters entered by the user to refer to a PLC program. Archival storage of your file should include:

PROGNAME.P\$ - Ladder Logic used by EXPDD250-V2 software (Pcode format).
PROGNAME.%% - Ladder Logic used by EXPDD250-V3 software (Pcode format).
PROGNAME.BIN - System information and Ladder Logic used by PLC.
PROGNAME.RDT - Register Table Storage.
PROGNAME.NDX - Node comment index file (FOS dependent).
PROGNAME.NDA - Node comment data file (FOS dependent).
PROGNAME.CDX - Cross reference index file (FOS dependent).
PROGNAME.CDA - Cross reference data file (FOS dependent).
PROGNAME.CLI - Cross reference list file.
PROGNAME.MDM - Modem baud rate, initialization, phone number.
PROGNAME.000 - Contains Active/Inactive status for comments per page.

PROGNAME.001 - These files contain the Page, Line, and Circuit comments. PROGNAME.999 -The numeric extension is the page number.

The following filenames are HELP and UTILITY files which are used to modify EX-PDD printout configuration and support the HELP facility.

PDD250-L.PAR - Default parameters for HP Laserjet III printout.
PDD250-A.PAR - Default parameters for ASCII printout.
PDD250-G.PAR - Default parameters for Graphics printout.

PDD250-E.PAR - Default parameters for Graphics printout with Epson control codes.

HELP\HELP250.XXX - EX-PDD HELP facility support files.
xxx = Access code number for help file.

MOUSEKEY\MOUSEKEY.XXX - EXPDD mouse control files
xxx = safety selection code

APPENDIX B

Summary of all EX-PDD Commands

EX-PDD Command Tree

Note: "S" preceding a function key designates that (Shift) is held down while the function key is pressed.

Top Menu

(F1) System and Control Menu

(F1) System Information Menu

(OFFLINE mode)

(F10) System Menu
(Esc) Abandon edit

(ONLINE) mode

(F1) Reset Commands

(F1) Control Commands
(F2) Program Check
(F3) Memory Clear
(F4) Error/Table Clear
(F5) Error Reset
(F6) Force Clear
(F9) Edit Table
(F10) System Menu
(Esc) Abandon edit

(F2) I/O Allocation Table

(F1) Input register(s) XW
S(F2) Direct Input register(s) iXW
(F2) Direct Output register(s) iYW
(F3) Output register(s) YW
(F4) Direct I/O registers iX + Y
(F5) I/O X + Y Input/Output registers XW & YW
S(F6) Option Module I/O OPT
(F6) Reserved Space SP
(F7) Link registers ZW
(F8) Auto Setup (Online Only)
(F9) Blank Slot
(F10) System Menu
(Esc) Abandon edit

(F3) Load/Save/Compare Menu

- (F1) Load Ladder
- (F2) Save Ladder
- (F3) Compare PLC
- (F4) Compare Disk
- (F10) System Menu

From Top Menu:

(F2) Ladder Logic

- (F1) Display Page
- (F2) New Page
- (F3) Global Page (Offline only)
- (F4) Edit Page

Main Editing Softkey Menu:

(F1) Sequence Instructions

- (F1) - | | - normally open contact
- S(F1) - | ^ | - Transitional Contact-leading edge
- (F2) - | / | - normally closed contact
- S(F2) - | v | - Transitional Contact-trailing edge
- (F3) CLOSE vertical connection
- S(F3) OPEN vertical open
- (F4) _____ horizontal connection
- S(F4) + + horizontal open

- (F5) - () - | coil
- S(F5) FORCE forced coil
- (F6) TON On delay timer
- (F7) CNT counter
- S(F7) SS single shot timer
- (F8) END end of program
- (F9) Enter Device/Synonym on Ladder
- S(F9) Assign Device/Synonym together
- (F10) Main Editing Menu
- S(F10) Accept

(F2) Extra Sequence Instructions

- S(F1) MCS Master control set
- S(F1) MCR Master control reset
- (F2) JCS Jump control set
- S(F3) STIZ Step Sequence initialize
- (F4) STIN Step Sequence input
- (F5) STOT Step Sequence output
- (F6) F/F Flip flop

(F7) SET Set bit
S(F7) RST Reset bit
(F8) SR Shift register
S(F8) U/D Up down counter
(F9) Enter Device/Synonym on Ladder
S(F10) Main Editing Menu
S(F10) Accept (Save) program page to PLC/disk

(F3) Move and Compare Instructions

(F1) W->W Register to Register move
S(F1) K->W Constant to register move
(F2) TINZ Table initialize
(F3) T->W Table to register move
S(F4) T->T Table to table move
(F5) DDSP Diagnostic display
S(F5) DDSM Diagnostic display with message
(F6) R>R Register greater than register compare
S(F6) R>K Register greater than constant compare
(F7) R=R Register equal to register compare
S(F7) R=K Register equal to constant compare
(F8) R<R Register less than register compare
S(F8) R<K Register less than constant compare
(F9) Assign Device/Synonym together
(F10) Main Editing Menu
S(F10) Accept (Save) program page to PLC/disk

(F5) Logic Operations

(F1) R and R
S(F1) R and K
(F2) R or R
S(F2) R or K
(F3) R eor R
S(F3) R eor K
(F4) NOT invert
(F5) RTR Rotate register bits right
(F6) RTL Rotate register bits left
(F7) TEST
(F8) NEG 2's complement
(F9) Enter Device/Synonym on Ladder
S(F9) Assign Device/Synonym together
(F10) Main Editing Menu
S(F10) Accept (Save) program page to PLC/disk

(F6) Conversion and Limit Instructions

- (F1) BIN BCD to binary
- S(F1) BITC Bit count
- (F2) BCD1 Binary to 4-digit BCD
- S(F2) BCD2 Binary to 10-digit BCD
- (F3) ENC Encode
- S(F4) UL Upper limit
- S(F4) LL Lower limit
- (F5) MAX Maximum value in table
- S(F5) MIN Minimum value in table
- (F6) AVE Average of table
- S(F6) FG Function generator
- (F7) IN Direct Output
- (F8) OUT Direct Output
- S(F8) READ ASCII Read
- S(F9) Assign Device/Synonym together
- (F10) Accept (Save) program page to PLC/disk

(F7) Insert and Delete Command

- (F1) Clear element
- (F2) Delete Line
- (F3) Delete Column
- (F4) Insert Line
- (F5) Insert Column
- (F6) CLOSE vertical connection
- S(F6) OPEN vertical open
- (F7) _____ horizontal connection
- S(F7) + + horizontal open
- (F8) Recover
- (F9) Enter Device/Synonym on Ladder
- S(F9) Assign Device/Synonym together
- (F10) Main Editing Menu
- S(F10) Accept (Save) program page to PLC/disk

(F7) Insert and Delete Commands

- (F1) Clear element
- (F2) Delete Line
- (F3) Delete Column
- (F4) Insert Line
- (F5) Insert Column
- (F6) CLOSE vertical connection
- S(F6) OPEN vertical open
- (F7) _____ horizontal connection
- S(F7) + + horizontal open
- (F8) Recover
- (F9) Enter Device/Synonym on Ladder
- S(F9) Enter Device/Synonym together
- (F10) Main Editing Menu

S(F10) Accept (Save) program page to PLC/disk
(F8) Move and Copy Commands
 (F1) Move Line
 (F2) Copy Lines
 (F9) Enter Device/Synonym on Ladder
S(F9) Assign Device/Synonym together
 (F10) Main Editing Menu
S(F10) Accept (Save) program page to PLC/disk

(F9) Enter Device/Synonym on Ladder
S(F9) Assign Device/Synonym together
S(F10) Accept (Save) program page to PLC/disk
(Esc) Abandon Edit Page mode

From Top Menu \ [F2] Ladder Logic Functions:

(F5) Delete Page
(F6) Search Ladder
(F7) Valid Ladder (Page displayed on screen)
S(F7) Valid Ladder (All pages)
(F8) Comment Ladder (Offline only)
 (F1) Display Page
 (F2) Display/Remove Synonyms
 (F3) Display/Remove Descriptions
 (F5) Page Commentary Edit
 (F6) Circuit Commentary Edit
 (F7) Line Commentary Edit
 (F8) Device Commentary Edit
 (F9) Move Comment
 (F1) Insert Page
 (F2) Delete Page
 (F3) Move Page
 (F4) Copy Page
 (F10) Ladder Menu
 (Esc) Abandon selection
(F9) Monitor Force (Online only)
(F10) Top Menu

From Top Menu:

(F3) Block Monitor

(F1) Start Number

(F2) Decimal/Hexadecimal/ASCII display

(F4) Increment and Set

(F5) Set Value

(F6) Data Active/Data Hold toggle (Online only)

(F10) Top Menu

From Top Menu:

(F4) Documentation Print (Offline only)

Documentation-Print Ladder Logic and Maps]

(F1) LPT1

(F2) COM1

(F3) LPT2

(F4) COM2

(F5) LPT3

(F7) Select Option

(F8) De-select Option

(F9) Start Print/Pause Print/Resume Print

(F10) Top Menu

From Top Menu

(F6) Offline Ladder/Online Ladder

From Top Menu

(F7) Program Name

From Top Menu

(F8) Communication Parameters

(F2) COM1

(F4) COM2

(F6) Modem Initialize

(F7) Modem Dial

(F8) Modem Hangup

(F10) Top Menu

(Esc) Abandon Selection

From Top Menu

(F10) Exit DOS

T Temporary exit to DOS

P Permanent exit to DOS

(Esc) Return to Top Menu

APPENDIX C

USING THE MOUSE

To use the mouse, the following must be done:

Setup:

While in DOS, run the mouse driver. This is a program that came with the mouse, typically with a filename such as "mouse.exe". If you are running PDD in a DOS shell under Windows, this mouse driver must still be running, even though Windows does not need it.

Operation:

Instead of pressing function keys, you can click on them with the mouse. You can also use it to put instructions into the ladder logic edit screen. Just click where you want the instruction to appear, then click on the instruction that you want.

The right mouse button, when clicked, is identical to pressing the "ESC" key.

Cautions:

WE RECOMMEND USING A DEDICATED BUS MOUSE PORT TO OPERATE THE MOUSE. The reason for this is that PDD is already using the serial ports for two things: the serial key, and PLC communications. If you do not have a bus mouse port, you can still use the mouse. Just make sure that you do not try to connect with a PLC on the port that the mouse is connected to.

If your mouse is connected to COM1, and the software is told to go "ONLINE" with a PLC on COM1, the software will produce indeterminate results.