Divelbiss
CORPORATION

DOC
DIVELBISS ADVANCED DOCUMENTATION MANUAL
USERS MANUAL ICM-UM-06
REVISION "D"

USERS MANUAL

DIVELBISS CORPORATION
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FREEERICKTOWN, OHIO 43019

DOC

DIVELBISS ADVANCED DOCUMENTATION MANUAL

USER MANUAL ICM-UM-06

REVISION "D"

To be used with your personal computer and MS-DOS operating system. You must also have the ICM-DOC-01 software and the ICM-PR-05 INTELLIGENT PROGRAMMER.

DIVELBISS CORPORATION
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1. INTRODUCTION

The Divelbiss family of Programmable Logic Controllers, while simple to use even for the first time programmer, are made easier to use with the Advanced Documentation Program.

Good documentation is very critical to designing, installing and maintaining every control system. Older relay systems usually left the plant well documented. Time and changes tended to catch up with the drawings and the result was a system that was not properly maintained. This documentation package helps to make updating easier by putting control directly in your hands.

Most PLC manufacturers have their own CRT programmer. This means that you have to dedicate those precious capital funds to a one function product. Our approach is just a little different. We help you make better use of an existing piece of capital goods by offering software for your MS-DOS based computer. Most computers will work fine with this software. Unfortunately, we cannot make any guarantee that all computers will work.

This manual is intended to supplement the ICM-UM-05 User Manual and the Divelbiss Training Seminar. These documents should be reviewed to gain insight in the programming instructions of the Bear Bones product line.

The Advanced Programming format will provide you with options that will make record keeping easier and simpler than it used to be. You will find ladder diagrams easier to do and easier to support with this package. The diagram is only the beginning of the task of documentation. The job of making it easy for someone else to understand your logic is far more difficult.

This package makes that explanation easier with the ability to label each Input, Output, all Functions, and CR's. Now add the ability to provide text to each rung up to 3,600 characters per rung. Now add the ability to furnish external wiring diagrams and wire labels. The Advanced Documentation Package is more than a software support achievement, it is a personal drafting aid.

We have tried to make your introduction to our product line as easy as possible. Included on your DOC disk are some sample programs. Use the DOS command DIR to review these filenames. They all begin with DEMO. Once you have these files displayed, make a record of what is available for future reference.

2. BASICS

2.01 REQUIRED HARDWARE

384K minimum MS-DOS computer system, 640K recommended
25 line by 80 column monitor
2 disk drives (2 floppies or 1 floppy and 1 hard)
RS-232 communication port(s)
ICM-PR-05 Intelligent Programmer
ICM-CA-17 Serial Port Cable (ICM-CA-16 optional)

2.02 OPTIONAL HARDWARE

A Divelbiss PLC (Bear Bones or Baby Bear Bones)
An interface ICM-IF-BB
80 column printer

2.03 KEYBOARD

A sheet of self adhesive keyboard labels are included with the Advanced Documentation Manual. Please place these on the top or front of your Keys. These labels are a valuable guide to you while programming. Also included is a quick reference card with the keyboard legend printed on it. This is a handy reference for you so keep it in a safe place. Section 5 of this manual also contains some useful keyboard information.

2.04 DISKS

Protect your disk by keeping it in its protective jacket when not in use. Never touch the exposed surface of the disk. Keep the disk out of dirty environments. Insert the disk carefully in the disk drive. Avoid magnetic fields and static charges. Do not store your disk in a hot environment.

Your DOC disk is not copy protected, so you can make copies. The labeled and serial numbered disk is the only one that can be returned for free upgrades. Just follow the instructions in your computer manual for making disk copies and then store your MASTER in a safe place. Call the copy WORKING DOC. Use this disk in your daily work.If you have a hard disk in your computer you may find it convenient to put DOC in its own directory on the hard disk.

Boot your computer using your DOS diskette

FLOPPY DISK EXAMPLE

Your DOC disk should be in drive A and your WORKING DOC disk in drive B.

```
A> DISKCOPY A: B:
```

This would copy all the files on the disk in drive A onto the disk in drive B.

Boot your system from the hard drive.

HARD DISK EXAMPLE

```
C> MD \DOC

C> CD \DOC

C> DOC COPY A:*.*
```

This would create a directory called DOC, change to that sub-directory. It would then copy all files from drive A to drive C directory DOC.

In the rush to get started it is easy to forget to mail in your registration card. This is an important procedure if you wish to be notified of future upgrades.

2.05 SCREEN CHARACTER VALUES

The character values listed below are suitable for use with most systems. Monochrome monitors are set to the below configuration. If you have a color monitor, you may change these values to suit your needs.

	MONOCHROME	COLOR
FOREGROUND	7	2
BACKGROUND	0	0
HIGHLIGHT	15	15
REVERSE	7	2

The foreground is the normal text color. The background is the background color on which the text is displayed. The highlight is the menu highlight and power flow color. Reverse is the cursor color in ladder and wire modes.

2.06 PROGRAMMING PROMPTS

Almost all of the programming prompts used in DOC are displayed with a default response. If this is the selection you want, just press <ENTER>. Where the prompt takes the form of a menu item, we have included a highlighted character. You may select an item by typing the highlighted key. When a letter is highlighted, you may use upper or lower case. Prompts requiring a specific entry will ignore invalid keys.

You may move the cursor with the arrow keys to change the default response and then press <ENTER>.

All entries are checked for errors. An invalid entry will cause an error message to be displayed and a tone will be heard. The message will stay on the screen until a key is pressed. The cursor will return to its' previous position.

ADDITIONAL GUIDELINES

STARTUP

When the DOC program starts it looks for the DOC.DAT file in the current directory. If the file is not found in the current directory the DOS PATH environment is searched. If the file is located the configuration is loaded. If the file is not found the default configuration values are used.

This allows you to set the PATH to include the DOC directory. Then you may start DOC from a user directory.

To set the PATH environment type the following command:

```
SET PATH=C:\DOC;
```

This assumes there is a DOC directory on drive C which contains DOC.EXE and DOC.DAT files. The above command may be placed in the AUTOEXEC.BAT or DOCSTART.BAT batch file.

TEMPORARY FILES

DOC stores the text and wire changes in temporary disk files, the I/O descriptions are in memory. The PR-05 contains the ladder diagram. The amount of memory for the text (TXT) and wire (WIR) files may be estimated by adding the bytes used and multiplying by two. Usually this is under 40K bytes. The work files are normally placed in the default drive and directory.

You may relocate the temporary files to a RAM disk to increase the program speed. To create a RAM disk place the following command in the CONFIG.SYS file.

```
DEVICE=VDISK.SYS 64
```

Both CONFIG.SYS and VDISK.SYS must be in the root directory. You must reboot the computer after creating this command. Refer to your DOS manual for further information.

DOC will search the DOS environment for a DOCTEMP variable, designating the location of the work files. You may specify the drive and/or directory. The drive and path must be valid and complete, ready to have a filename added to it.

```
SET DOCTEMP=D:\  or  SET DOCTEMP=C:\DOC\WORKFILE\
```

The first example uses the root directory of RAM disk installed as drive D. The second example tells DOC to use a specific directory to store the work files. This command may be placed in the AUTOEXEC.BAT or DOCSTART.BAT batch file.

Several major programs use the environment variable "TEMP" to designate a work directory, which is also compatible with DOC.

3. SETTING UP

3.01 THE INTELLIGENT PROGRAMMER

Your ICM-UM-05 and DATA SHEET 7809-46 contain important and useful information about setup. Please refer to the appendices and review these documents now.

Once you are ready and have completed the hardware setup you only need to configure the PR-05 INTELLIGENT PROGRAMMER port baud rate to be 4800. Now place the PR-05 in the COMMUNICATING TO PERSONAL COMPUTER mode (PC). Note that the PR-05 displays the selected baud rate. Make sure it is 4800.

The PR-05 is used in conjunction with DOC for program, print, run, and EPROM modes. The ladder diagram always exists in the PR-05. DOC talks to the PR-05 through the COM port.

WARNING ! ! Memory resident device drivers, such as printer spoolers, can interfere with communications between DOC and the PR-05. You may have to disable the driver.

3.02 THE PERSONAL COMPUTER

Connect your PR-05 to the computer with the serial port cable furnished with your documentation package. You must make this connection to COM 1 or COM 2 of your computer (see section 4-11). Most computers require a female termination on the cable. This is what we furnish under our part number ICM-CA-17. Should you need a male end, we will exchange your cable for you. The male part number is ICM-CA-16.

Before you proceed to the DOC program please take a minute and enter <TYPE READ.ME>. This file contains current information that may not be in this manual.

3.03 FLOPPY DISK

Insert your WORKING DOC disk in your floppy drive; usually this is drive A. If you have two floppy drives (A & B) you may use either. Use drive A: for DOC, drive B: for ladder diagrams. Now default to the drive your disk is in by typing in A: for drive A or B: for drive B. Now type in <DOCSTART> and the necessary files will be loaded and you will receive a few prompts to remind you to check to insure you have done the few things required. Now just press any key and the DOC program will be loaded. If all the work has been done correctly the main menu will appear.

3.04 HARD DISK

Default to the DOC directory by typing <CD\DOC>. Now type <DOCSTART> and the necessary files will be loaded and you will receive a few prompts to remind you to check to insure you have done the few things required. Now just press any key and the DOC program will be loaded. If all the work has been done correctly the main menu will appear.

3.05 INITIAL DISPLAYS

This is your first display.

```
DIVELBISS ADVANCED DOCUMENTATION
STARTUP INSTRUCTIONS

   1. Connect the Intelligent Programmer RS-232
      cable to COM1.

   2. Set the Intelligent Programmer RS-232 port
      to 4800 baud.

   3. Place the Intelligent Programmer in PC
      communications mode.

   4. Printer option: Connect the parallel printer
      to LPT1 or the serial printer to COM2 at 300
      baud.

      NOTE: Parallel ports, serial ports, and baud rates
      specified are default values and may be changed.

Strike a key when ready . . .
```

Comply with the instructions and then press the <ENTER> key to get this display.

```
DIVELBISS ADVANCED DOCUMENTATION
STARTUP INSTRUCTIONS

   1. Connect the Intelligent Programmer RS-232
      cable to COM1.

   2. Set the Intelligent Programmer RS-232 port
      to 4800 baud.

   3. Place the Intelligent Programmer in PC
      communications mode.

   4. Printer option: Connect the parallel printer
      to LPT1 or the serial printer to COM2 at 300
      baud.

      NOTE: Parallel ports, serial ports, and baud rates
      specified are default values and may be changed.

Strike a key when ready . . .

Loading program . .
```

3.05 INITIAL DISPLAYS

It will take a brief period of time to load DOC. This is your next screen.

```
Divelbiss Corporation Intelligent Programmer
DIVELBISS ADVANCED DOCUMENTATION SOFTWARE
Version X.XX IBM PC-DOS

Place Intelligent Programmer in PC communication mode.

Communication port COM1 configured for 4800 baud.
```

If the baud rates of the PR-05 Intelligent Programmer and DOC do not agree you will get this display.

```
Divelbiss Corporation Intelligent Programmer
DIVELBISS ADVANCED DOCUMENTATION SOFTWARE
Version 1.51, IBM PC-DOS

Place Intelligent Programmer in PC communication mode.

WARNING! Communications error. Check connections & baud rate
```

If the connections are good and the baud rates agree you could get this display if a program exists in the PR-05.

```
Divelbiss Corporation Intelligent Programmer
DIVELBISS ADVANCED DOCUMENTATION SOFTWARE
Version 1.51, IBM PC-DOS

Ladder program exists in Intelligent Programmer memory.

Proceed? No Yes
```

The most common display is the Main Menu. Please go to section 4.

4. MAIN MENU

Once you have the MAIN MENU you will see a display like this.

```
        Divelbiss Advanced Documentation Software

                        MAIN MENU

     Program filename:

  R - Read Program from Disk      U - Run Program

  L - Edit Ladder Diagram         E - EPROM / Memory Menu

  T - Edit Text Documentation     C - Title Configuration

  I - Edit Wire Diagram           S - Change Function Setpoint

  W - Write Program to Disk       D - DOC Configuration Menu

  P - Print Menu                  Q - Quit, Exit to DOS

            Press SPACE to select, or ENTER to accept.
```

This menu allows you to select any of the listed functions. The selection of any menu item can be done in two ways. First you may move the highlight bar to any of the menu items with the space bar or the arrow keys. Once you have the bar over the item you want just press <ENTER>. The other option available to you is to press the letter that is highlighted and to the left of the item you want. As an example if you want the Print Menu you would press <P>. All sub-menus follow this format.

Each section of the main menu will contain a brief overview of that item to help you recall quickly what it can do.

It will help you to go to section 4-11 now to review the preset values of the DOC Configuration Menu.

CAUTION ! While you are programming and/or editing, the computer is storing what you do in a TEMPORARY file. Review the features contained in section 4-05 Write Program to Disk to PERMANENTLY save your data.

NOTE ! Each Main Menu item contains sub-menus. You can toggle in and out with the <ESC> key. Some sub-menus have an Exit command which will return you to the previous menu.

NOTE ! Prompts may be edited with the edit commands listed in the appendix.

4.01 Read Program from Disk

You can recall a program from your floppy or hard disk. Should you attempt to recall a non existent program, you will be allowed to create that file.

Place the highlight bar over the Read Program from Disk menu item and press <ENTER>. The other method is to press <R>. You will see the following display.

```
Divelbiss Advanced Documentation Software

R E A D   P R O G R A M


Enter program filename:
```

Should you neglect to enter a filename this is your display.

```
Divelbiss Advanced Documentation Software

R E A D   P R O G R A M


Directory of C:\DOC\1.5\*

No files found
```

This display shows where we have stored the DOC program. It is on drive C: directory \DOC\1.5\ with a wildcard as the program name. We got to this display because when we started the DOC program we were on drive C and in the listed directories. The display is telling us there are no DOC programs listed here.

The file directory will be displayed when a wildcard character "*" or "?" is used as part of the filename.

In the next display we are going to change the filename to our basic filename we will use throughout this manual. The example filename is A:\ABC\PRG#1. If you should specify a directory that has not been created you will get an error message. For our next display we will use filename A:\ABC\PRG#1 and assume that the directory \ABC\ was not created on the disk in drive A. This is the display you will get.

4.01 Read Program from Disk (con't)

```
Divelbiss Advanced Documentation Software

R E A D   P R O G R A M


Path not found
```

At this point you must return to DOS and create the directories & subdirectories listed in the filename.

After creating the directory \ABC\ return to DOC and try again to read A:\ABC\PRG#1. You will get this display.

```
Divelbiss Advanced Documentation Software

R E A D   P R O G R A M

Enter program filename:  A:\ABC\PRG#1

File not available. Do you wish to create it?  No Yes
```

If you choose No you will be prompted for a different filename. You can return to the Main Menu by pressing <ESC> should you wish to leave this mode without creating a filename. Choose Yes and the program PRG#1 will be written to the disk in drive A under directory \ABC\.

After you have used DOC for a while you will begin to accumulate many programs. It may be difficult to remember all of them. You will find that the directory is an asset in displaying programs.

Up to 60 files can be displayed on the screen. If more than 60 files exist you can narrow the selection by specifying the first few characters of the program name.

Let us assume that you are developing a program. We will call this program PRG#1. This program will be stored under directory \ABC\. This program will be stored on a floppy disk in drive A. Our filename is A:\ABC\PRG#1. While developing this program we used a few test programs. These test programs are also stored on drive A, but we keep them under a directory named \DEF\. The test programs are TEST, BEST, TEST1, BEST1, & TAST.

4.01 Read Program from Disk (con't)

The final program PRG#1 works fine but now some months later you have another project. It is just like PRG#1 "except". Enter the filename A:\DEF* as shown.

```
Divelbiss Advanced Documentation Software

R E A D   P R O G R A M

Enter program filename:  A:\DEF\*
```

Our filename specifies a disk, directory, & a wildcard which will allow all the programs under the directory \DEF\ on drive A: to be displayed. Note that bytes free are also displayed.

```
Divelbiss Advanced Documentation Software

R E A D   P R O G R A M

Directory of A:\DEF\*
5 files 280K free

TEST  BEST  TEST1  BEST1  TAST

Press SPACE to select, or ENTER to accept
```

Now you can select any of the displayed programs. Just move the highlight with <SPACE>. When the program you want is highlighted press <ENTER>. The arrow keys will also move the highlighter so when your display gets bigger you may find this feature handy.

If you have a long list of programs you may not want to display everything. Let's suppose that the desired program began with "BE". Now type A:\DEF\BE*. You will get this.

```
Divelbiss Advanced Documentation Software

R E A D   P R O G R A M

Directory of A:\DEF\*
5 files 280K free

BEST  BEST1

Press SPACE to select, or ENTER to accept
```

4.01 Read Program from Disk (con't)

Now all you have to do is to choose from the programs that start with "BE". These are "BEST" & "BEST1". You can recall any of your programs in the same manner.

Some of the DOC users will have some computer experience. Some may not have any. Each of you will find that the value added features we have included makes your job easier by offering some items you can choose to use or not. You can grow just as fast as you want to.

4-02 Edit Ladder Diagram

You can create &/or modify a ladder diagram. You may also assign labels to inputs, control relays, functions & outputs.

Place the highlight bar over the Edit Ladder Diagram menu item and press <ENTER>. The other method is to press <L>. If you have not established a disk filename, you will be required to do so. Please see section 4-01. Once you have a disk filename entered you will see a display similar to this. The display depends on your version of software. This display is for version 1.74.

```
Divelbiss Advanced Documentation Software

          T I T L E   C O N F I G U R A T I O N
Program Title:
Revision:
Date:  mm/dd/yy
PLC model:  2  1.BB-2k  2.BB-4k  3.320A  4.PIC-8k  5.PIC-16k

Programmer:
Company name:
Company data:
Company data:

Operator password:
User password:
OEM password:

User view OEM rungs:  Yes
User print OEM rungs:  Yes
```

Here is your chance to add your personal touch to the program. The PLC model is important. You must select the model you will be inserting your EPROM into later. See section 4-09 for a more complete description of how this mode may be utilized.

Once the Title is configured you will be taken to rung one. If no cursor is evident below the word <EDIT> refer to page 2-02 and section 4-11 to establish a cursor for your computer.

```
Edit>  Rung 1   Row .0   Col 1   A:\ABC\PRG#1
```

4-02 Edit Ladder Diagram (con't)

Now press the <Q> key which represents a -] [- contact. Your display will look like this.

NOTE! Section 5-00 lists all special key assignments.

```
Enter input address:


----] [-
```

Enter the input address 1/08 to get this display.

```
Enter input address:  1/08


----] [-
```

Now press the <ENTER> key to get this display.

```
Enter description lines.   1:          2:          3:


   1/08
----] [-
```

The description is comprised of three lines of seven characters each. You use the keys of your computer just like a typewriter. Upper and lower case are both allowed. The arrow keys will let you move the cursor around. To change a description simply type over it. Use the space bar to remove letters. Here is a finished example of what you can do.

```
Enter description lines.  1:LIMIT   2:SWITCH  3:NO. 1


   1/08
----] [-
```

4-02 Edit Ladder Diagram (con't)

Now press <ENTER> and your screen will display.

```
Edit>   Rung 1   Row .0   Col 3   A:\ABC\PRG#1
LIMIT
SWITCH
NO. 1
   1/08
----] [-
```

Now press the <E> key which represents a -( )- coil and type in the address 1/10; then press <ENTER>. Your display will look like this.

```
Enter description lines.  1:        2:        3:
LIMIT
SWITCH
NO. 1
   1/08                                    1/10
----] [-----------------------------------(   )-
```

Now type in the description 1: L.S. 2: No 1 3: MADE; then press <ENTER>. Your display will look like this.

```
Edit>   Rung 1   Row .1   Col 1   A:\ABC\PRG#1
                                              L. S.
LIMIT                                         NO 1
SWITCH                                        MADE
NO. 1                                          1/10
   1/08
----] [-----------------------------------(   )-
```

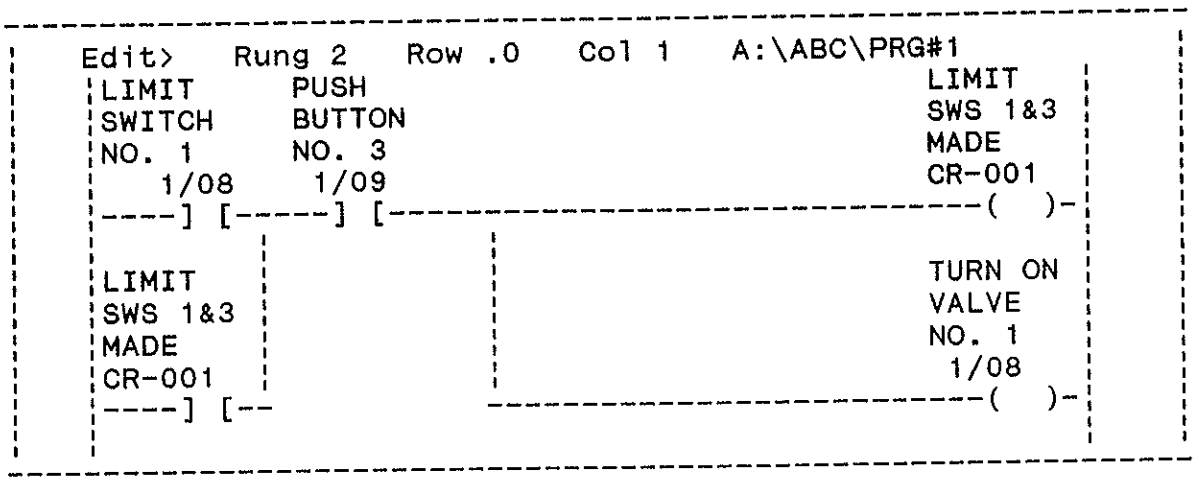
You could program this or any other rung with up to 7 contacts and 1 output per line. You could have up to 8 lines in one rung. All the connections would be drawn in with the connection keys. The key symbol card furnished with your manual shows the symbols associated with each letter. A listing is also shown in section 5-00 of this manual.

When you are done with rung 1 and you want rung 2, press <PgDn> or <ENTER>.

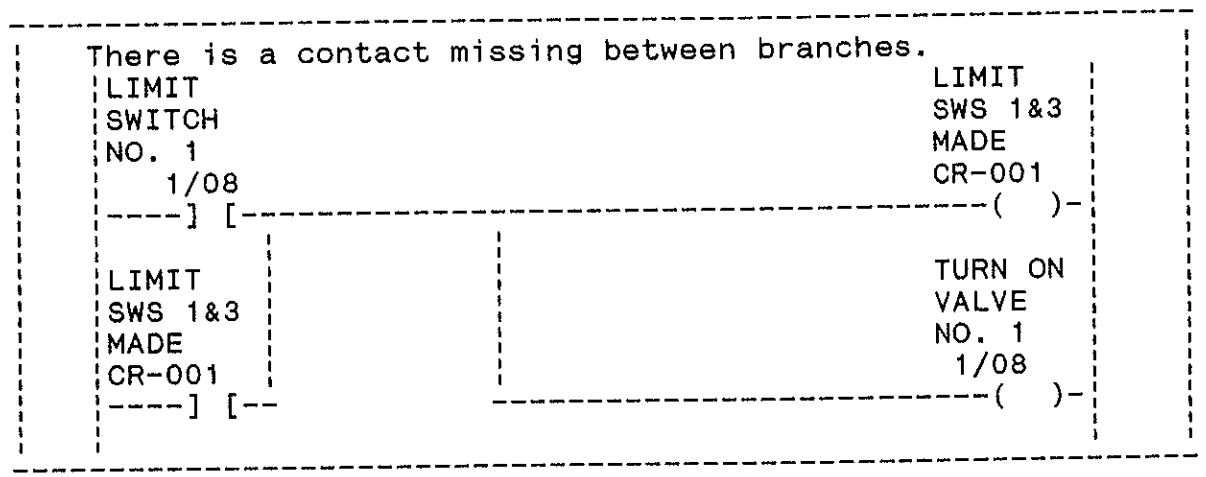
4-02 Edit Ladder Diagram (con't)

Each of the following examples illustrates one or more of the programming capabilities of the DOC package. Please take time to enter each program. This will help you gain familiarity with the necessary keystrokes.

Rung 2 shows how contacts can be connected in series, parallel, and in combination. Close input 1/09 and then close 1/08. Outputs 1/08 and CR-001 are both energized. CR-001 is used as a "seal in" and it can also be used later to show that output 1/08 is on.



Rung 3 is almost the same as rung 2 but the series contact is missing. This logic is not allowed and if attempted will give you this message.



Here is rung 3 as it should be programmed.

4-02 Edit Ladder Diagram (con't)

```
Edit>   Rung 3   Row .0   Col 1   A:\ABC\PRG#1
 LIMIT                                          LIMIT
 SWITCH                                         SWS 1&3
 NO. 1                                          MADE
   1/08                                         CR-001
 ----] [-----------------------------------------(   )-
       |
 LIMIT |                                        TURN ON
 SWS 1&3                                        VALVE
 MADE  |                                        NO. 1
 CR-001                                          1/08
 ----] [-----------------------------------------(   )-
```

Here is rung 3 again but this time the last output has been deleted. Note that the line to the output is started but is not finished. When you attempt this logic you will receive this error message.

```
Incomplete ladder logic.
 LIMIT                                          LIMIT
 SWITCH                                         SWS 1&3
 NO. 1                                          MADE
   1/08                                         CR-001
 ----] [-----------------------------------------(   )-
       |
 LIMIT |
 SWS 1&3
 MADE  |
 CR-001
 ----] [------
```

Here is the program from rung 1 but modified slightly. There is a contact added but it is not next to 1/08. If you enter a program like this don't worry. When you store it DOC will help. Just check the next display and see how we compress the line for you.

```
Edit>   Rung 1   Row .1   Col 1   A:\ABC\PRG#1
 LIMIT                PUSH                      L. S.
 SWITCH               BUTTON                    NO 1
 NO. 1                NO. 3                     MADE
   1/08                1/09                      1/10
 ----] [--------------] [--------------------(   )-
```

4-02 Edit Ladder Diagram (con't)

```
Edit>   Rung 1   Row .1   Col 1   A:\ABC\PRG#1
LIMIT       PUSH                                  L. S.
SWITCH      BUTTON                                NO 1
NO. 1       NO. 3                                 MADE
   1/08      1/09                                  1/10
----] [-------] [-----------------------------(   )-
```

Now let's explore some of our more advanced programs; timers, counters, drums, & shift registers. We won't forget the Access Bear.

Our first example will be for a TDPU timer. TDPU stands for Time Delay on Pick Up. TDPU functions just like an On Delay timer. Our example starts with input 1/08 already programmed.

```
Edit>   Rung 4   Row .0   Col 1   A:\ABC\PRG#1
LIMIT
SWITCH
NO. 1
 1/08
--] [---
```

Now press the <V> key to display the function command sub-menu.

```
Function type: TDPU TDDO RET PGEN CNTR DR SR ABR
LIMIT
SWITCH
NO. 1
 1/08
--] [-----------------------------------
```

4-02 Edit Ladder Diagram (con't)

Since TDPU is highlighted just press <ENTER> & get this display.

```
Enter TDPU number: 1
LIMIT
SWITCH
NO. 1
 1/08
--] [-----------------------------------
```

The program always defaults to the lowest number not currently in use. In this case TDPU 1. It is usually best to press <ENTER> accepting the default. Here is the next screen.

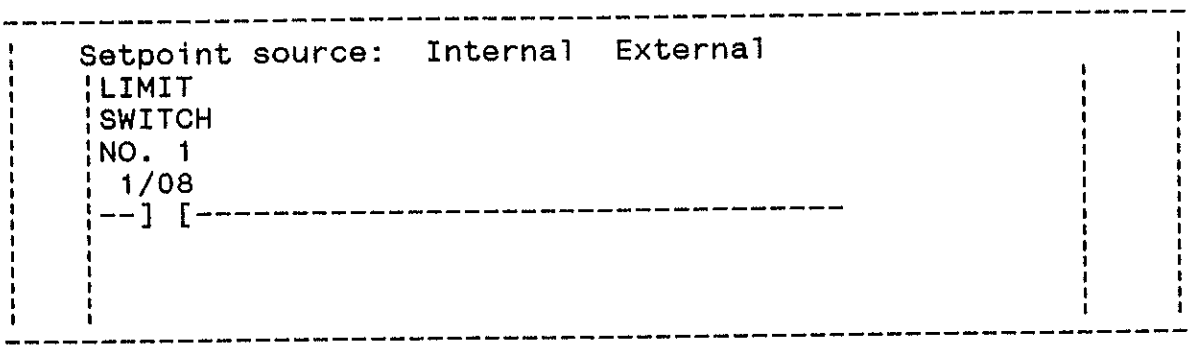
```
Function group number: 1
LIMIT
SWITCH
NO. 1
 1/08
--] [-----------------------------------
```

The function group is where we store setpoints. All functions require one function group unless otherwise stated. To enter a function just press <ENTER>. Here is the next screen.

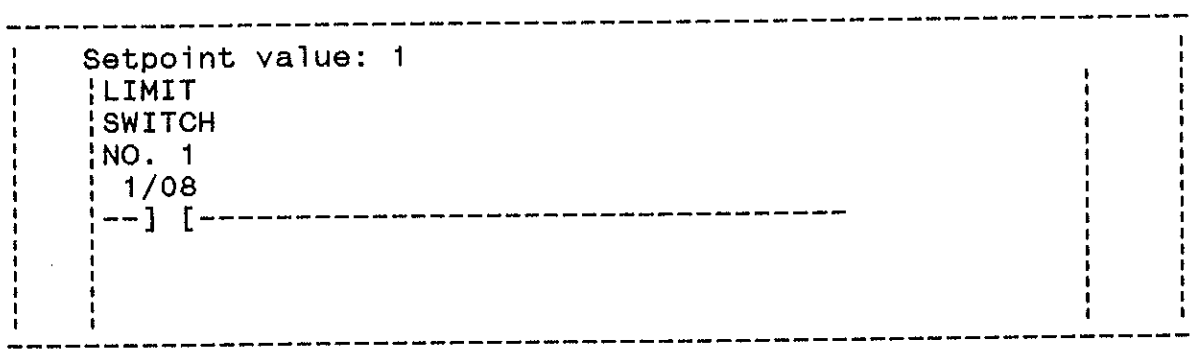
```
Timer base: 0.1 sec  1 sec  0.1 min  1 min
LIMIT
SWITCH
NO. 1
 1/08
--] [-----------------------------------
```

4-02 Edit Ladder Diagram (con't)

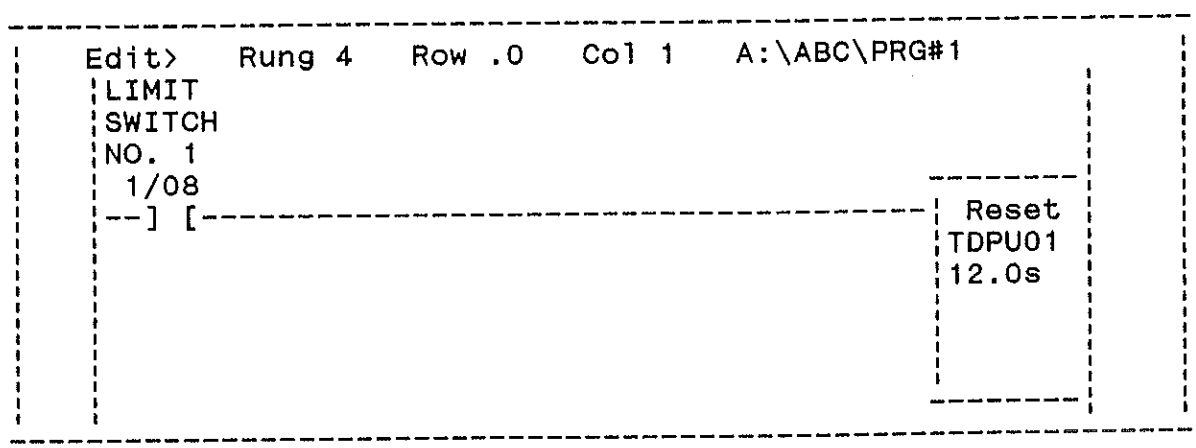
It is best to select the lowest time base you can. Our example will be for a setpoint of 12 seconds. Select a time base of 0.1 seconds not 1 second. This insures the greatest accuracy.



Now you can choose between a programmed setpoint (internal) or a setpoint that can be changed, without reprogramming (external). First we will select Internal and get this screen.



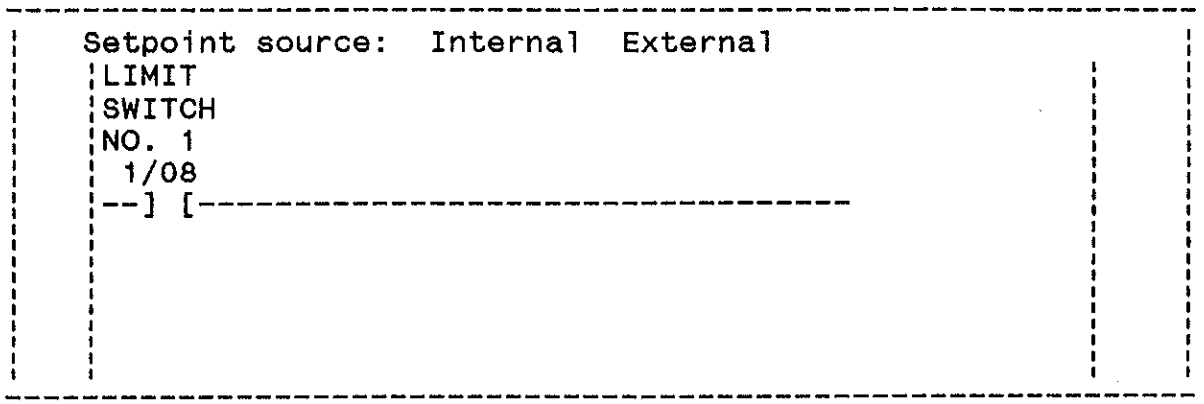
An internal setpoint may be any number from 1 to 255. Our setpoint is 12 seconds with a time base of 0.1 seconds. The number we enter must be 120. This is our final display.



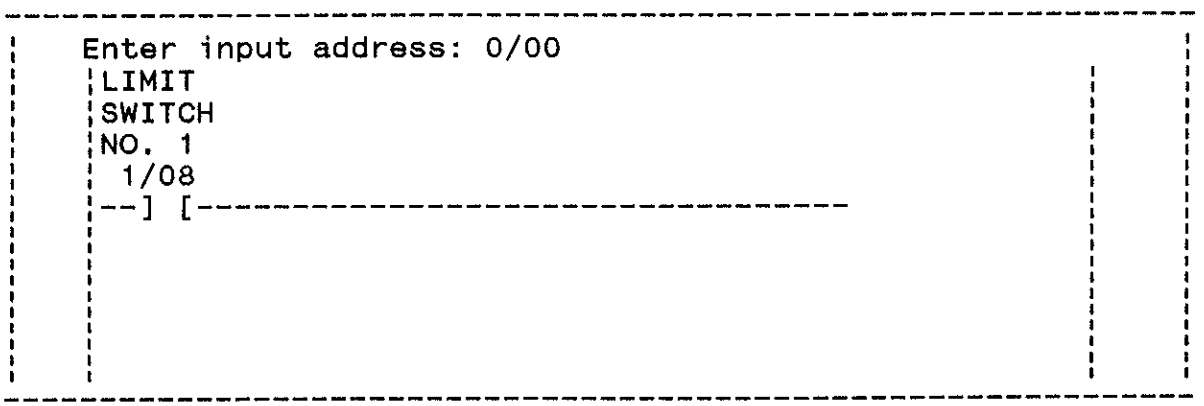
NOTE ! Versions 1.69 and lower do not allow descriptions for function coils. Descriptions for function contacts are allowed. Versions 1.70 and higher allow descriptions for function coils as well as contacts.

4-02 Edit Ladder Diagram (con't)

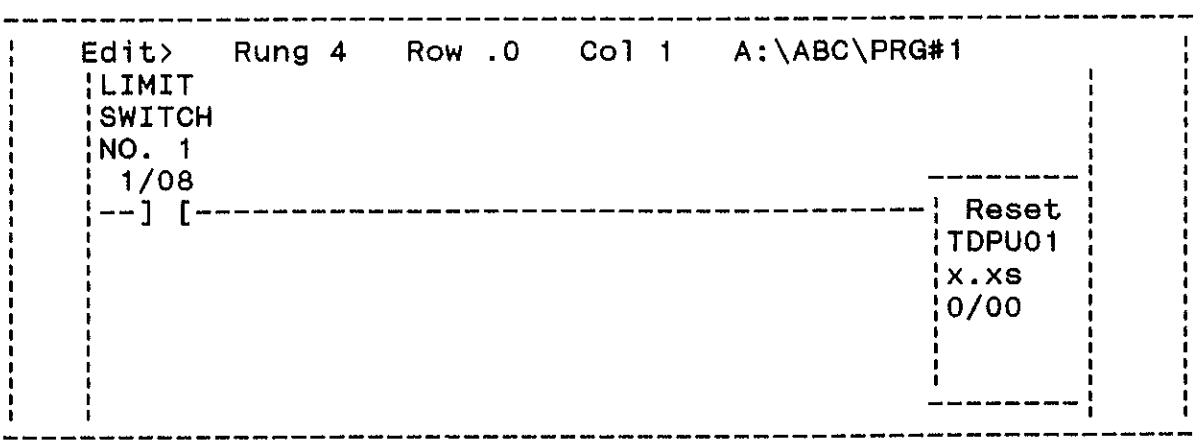
Now let's return to the display where we had to choose between internal and external setpoints.



When you select external you will be choosing 8 inputs or CR addresses that will be used as a BCD setpoint for the function. Here is the next display.

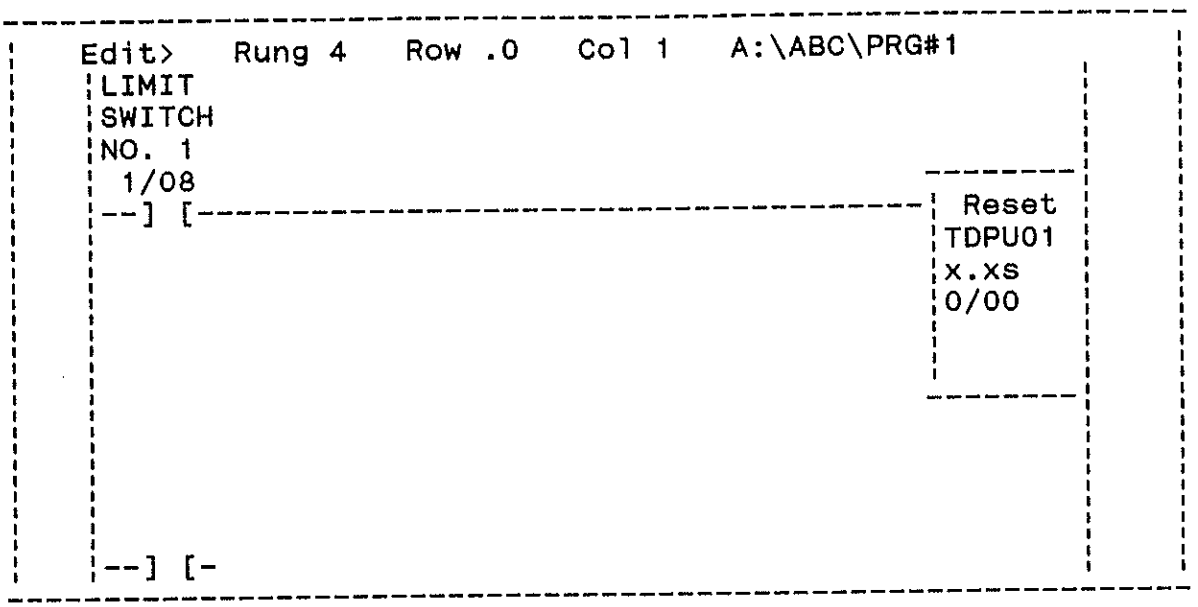


We have elected to use an expander with addresses 0/00 through 0/07 as our variable setpoint. You only select the first of 8 addresses. The program fills in the rest.

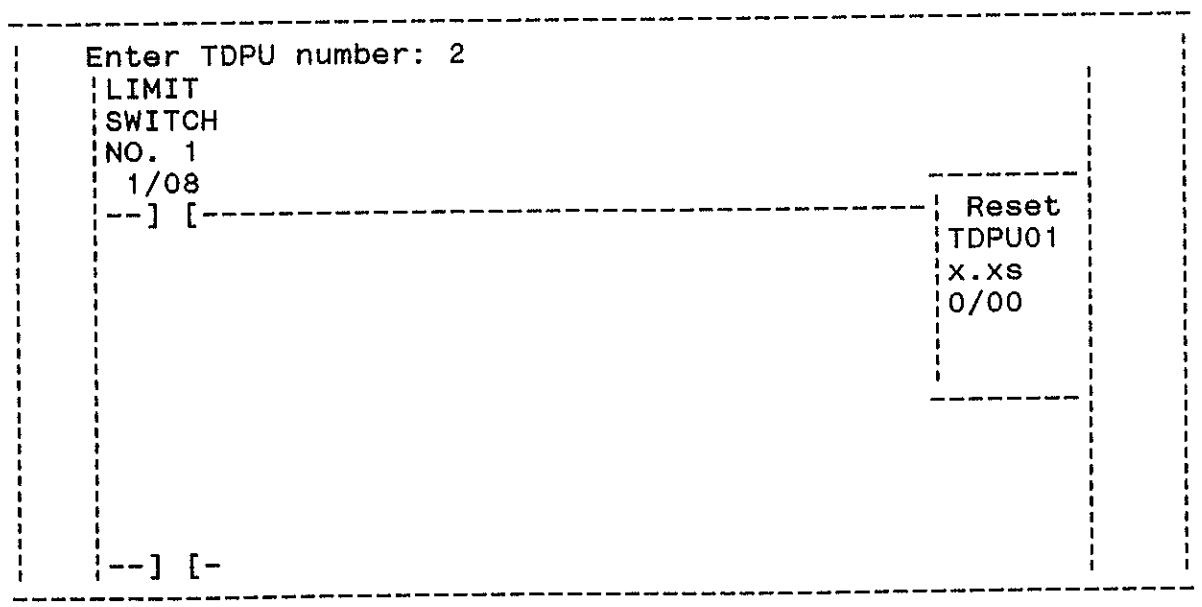


4-02 Edit Ladder Diagram (con't)

Now that you have a timer you will want to use its contact in your control logic. Start with the last screen and program a contact like this:

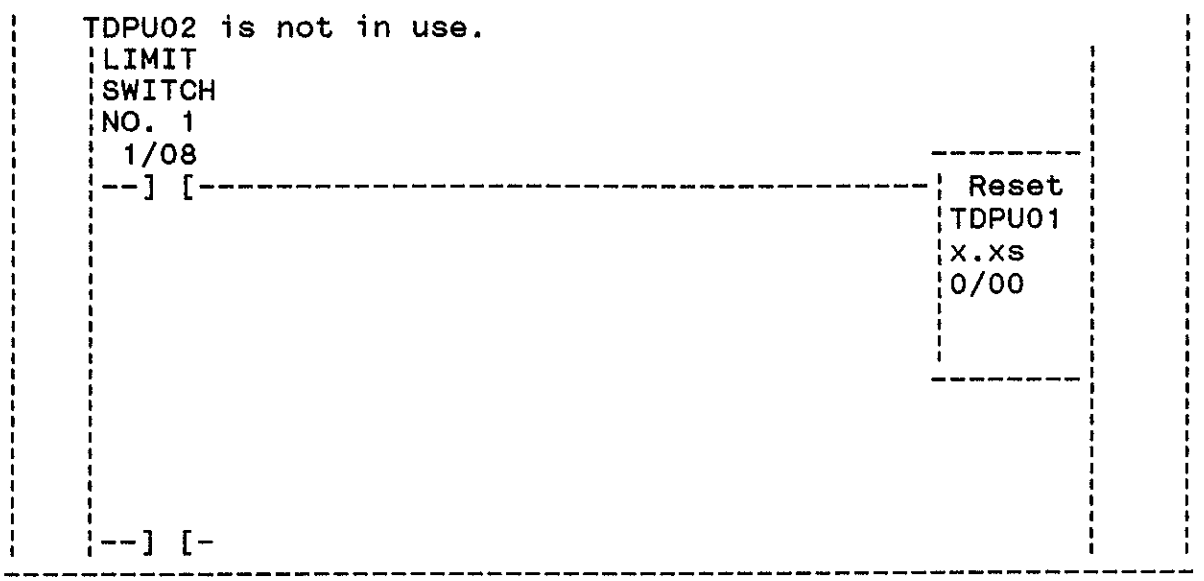


Now press <V> to display the function group command sub-menu & select TDPU. This is the next display.

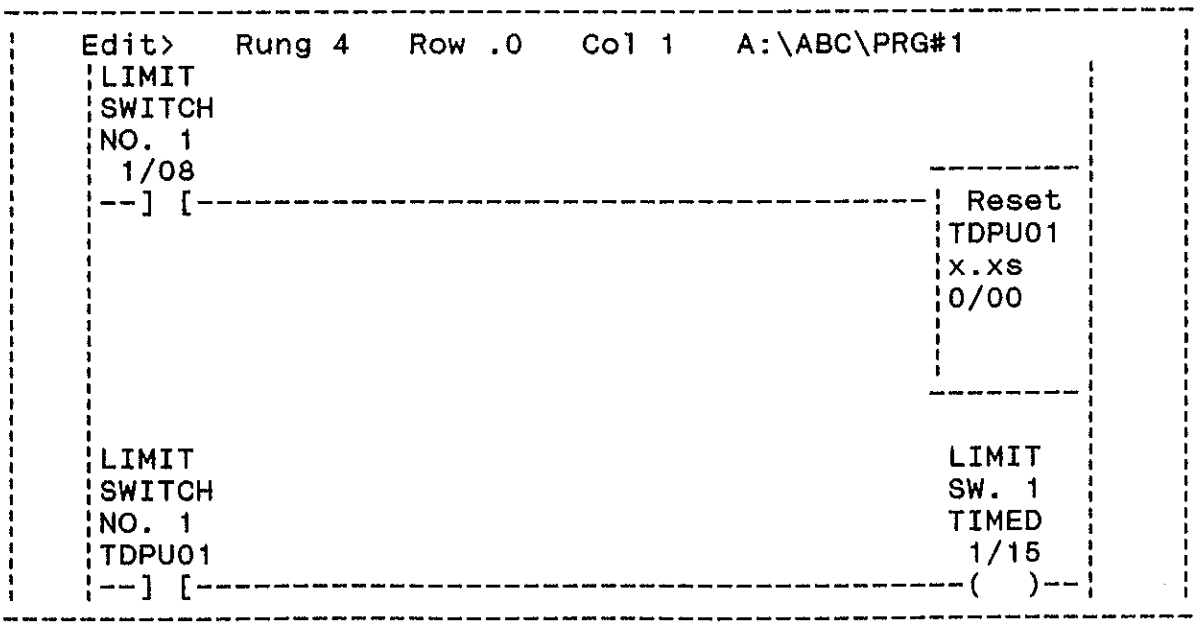


The program defaults to the next highest TDPU number, in this case 2. If you had entered TDPU's up to 6, the default would have been 7. Change the default number to the number you want. Here we want number 1. Should you enter a function number that the coil has not been programmed, in our example 2, you will get this display.

4-02 Edit Ladder Diagram (con't)



Press the <ESC> key and try again. This time enter the number 1 & replace the default 2. Once you press <ENTER> you will have a chance to enter 3 description lines. We have entered "LIMIT SWITCH NO. 1 to indicate what the contact does. We have also entered an output and added a label for it.



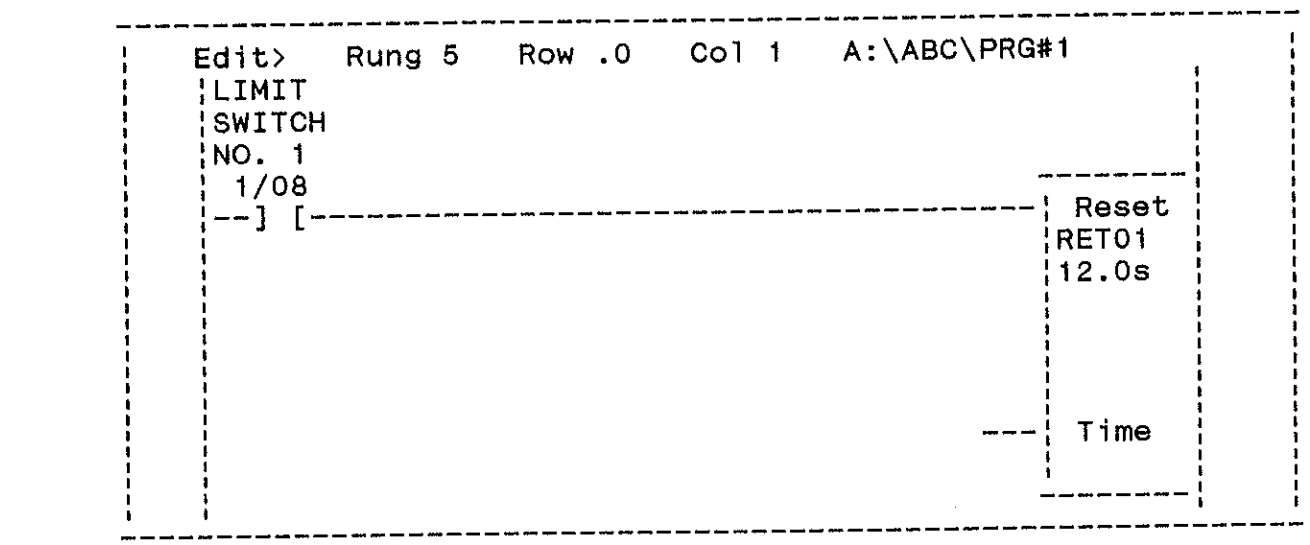
It is not necessary to relay the timer contact. This contact is a relay contact and can be used anywhere in the program.

4-02 Edit Ladder Diagram (con't)

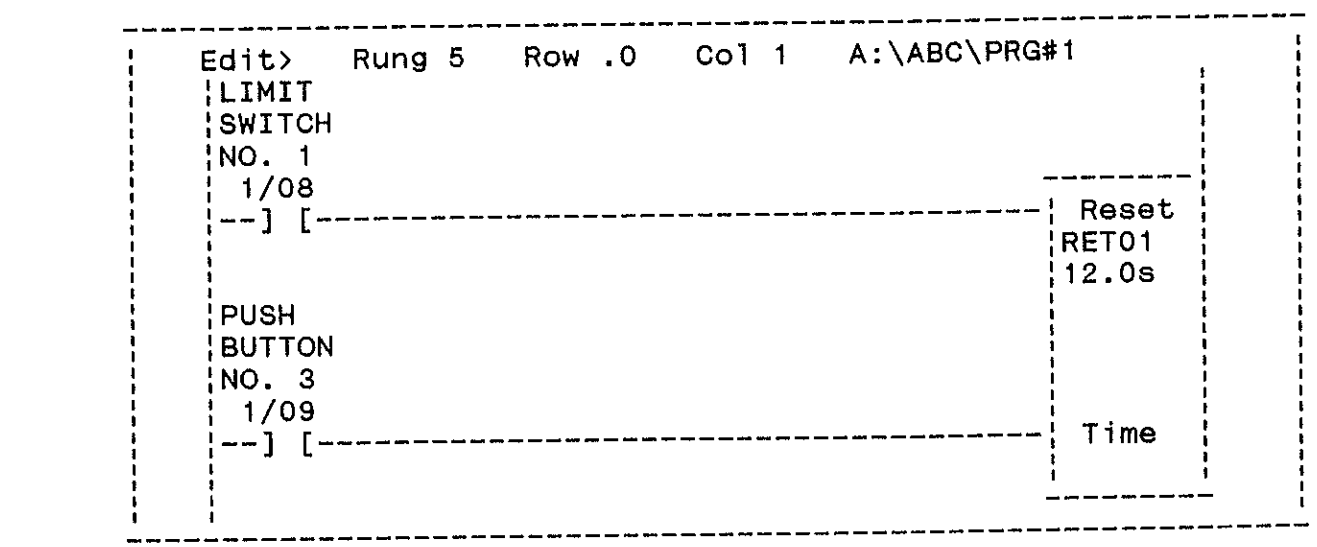
All the TDPU'S would be programmed just like these examples. The TDDO, PGEN functions would be programmed in the same way with the exception of the function title. TDDO means Time Delay on Drop Out or Off Delay. PGEN means Pulse Generator.

These functions are similar because they have only one line going from left to right. They are single function in their control logic.

Now we will program the RET function. RET means Retentive Timer. It requires two lines of control logic.



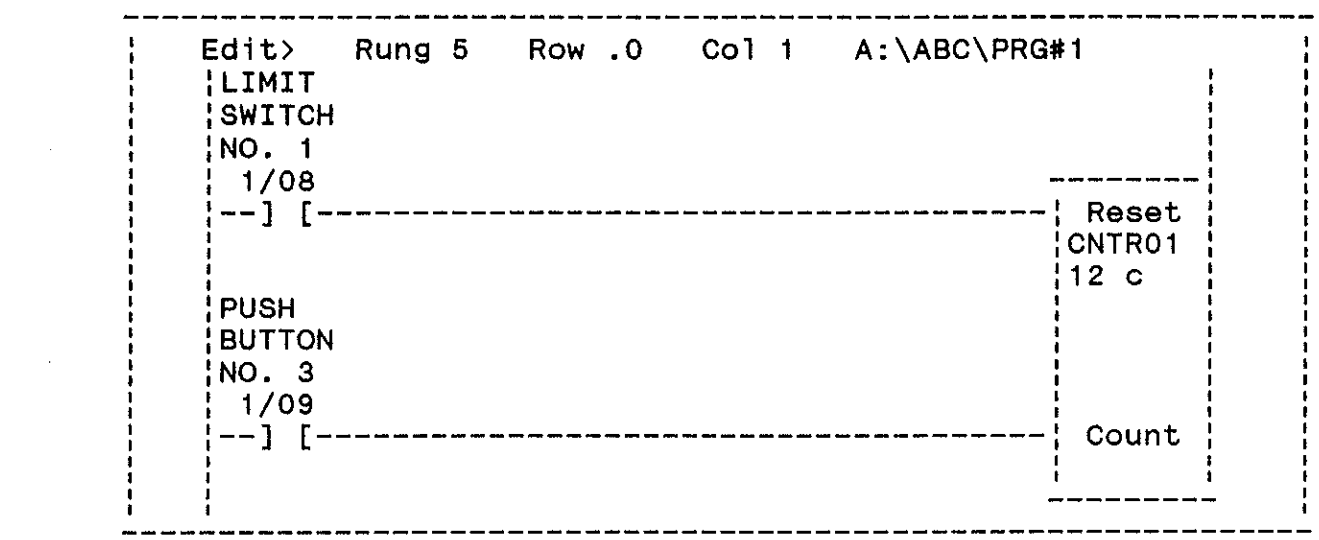
This display shows how the RET function looks when you follow all the steps used in programming the TDPU function. The big difference is that the cursor is now positioned across from the function block. You must now program that second contact.



4-02 Edit Ladder Diagram (con't)

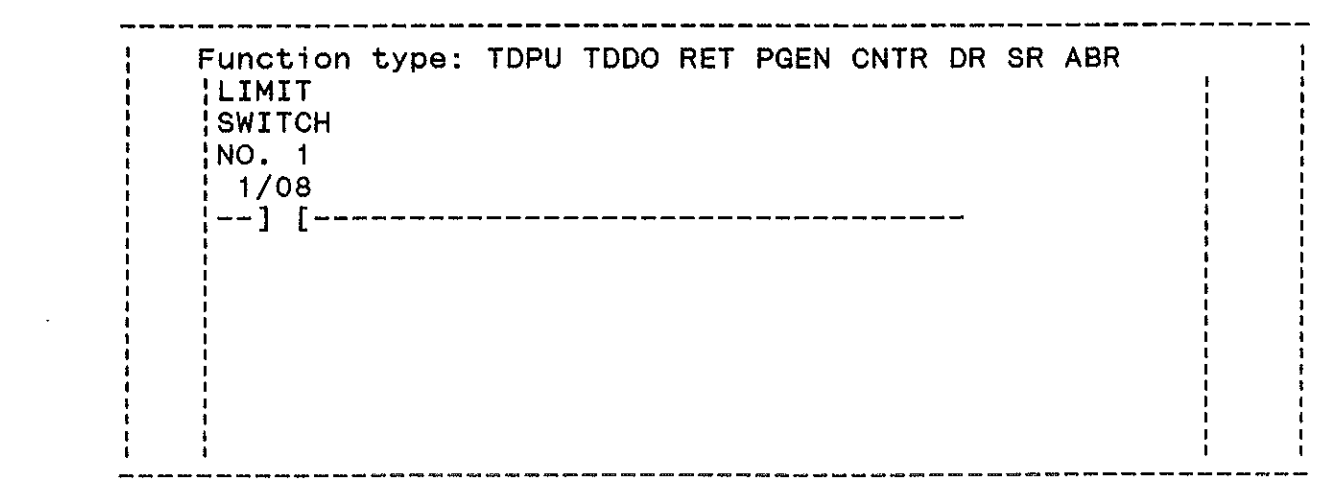
Here we have entered input 1/09 and used the <U> key to connect it to the function.

Here is a program for a CNTR or counter. It is finished but it is done just like the RET.



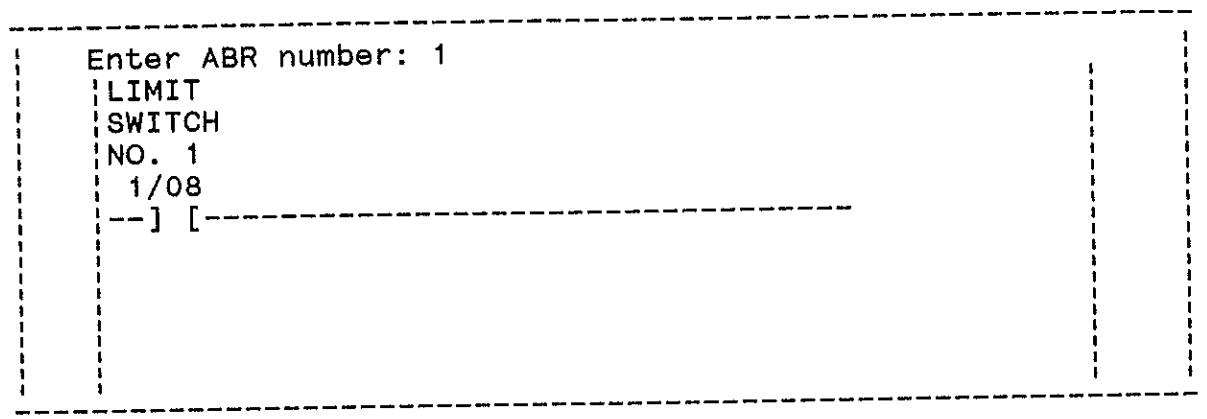
The added feature is the second line. The RET & CNTR both have a reset line that must be on for the function to be enabled. The second line allows RET to accumulate time without resetting. The second line allows CNTR to add counts without resetting. Our next function ABR is a little different. You can program it to function as a TDPU function or a two line RET or CNTR.

We will begin with the two line function. Start with one input and press <V> to get this screen.

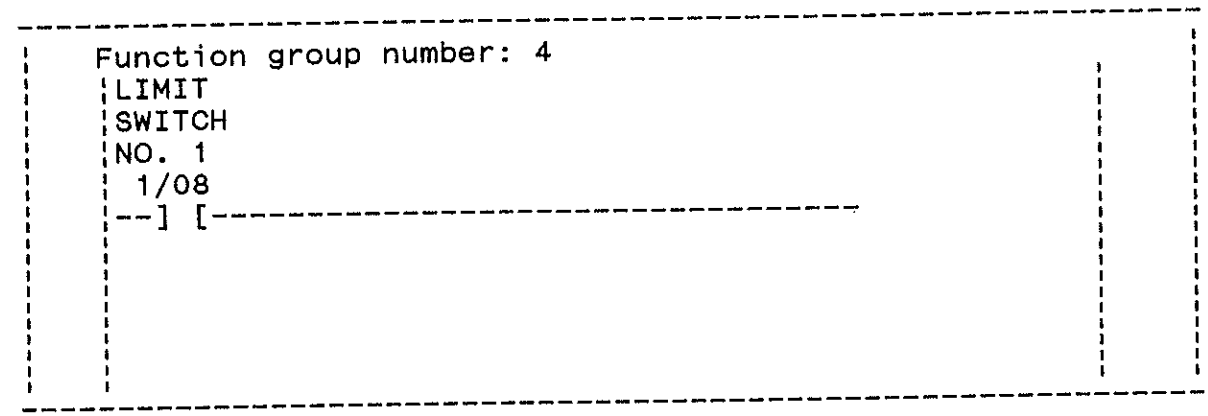


Now select ABR by highlighting it and pressing <ENTER> or press <A>.

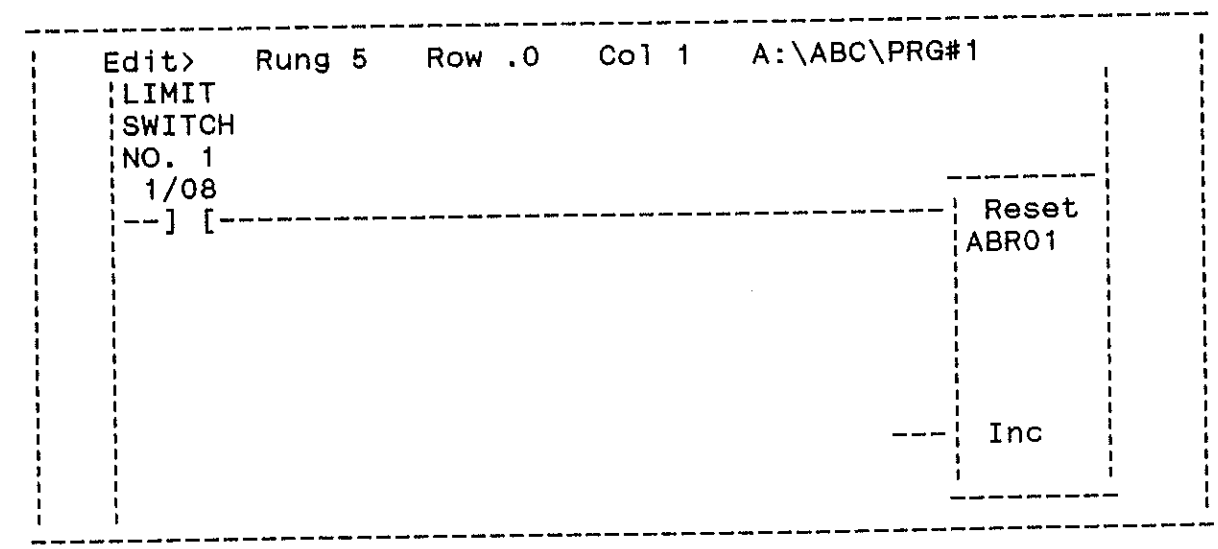
4-02 Edit Ladder Diagram (con't)



The program always defaults to the lowest ABR number not in use. It is usually best to press <ENTER> accepting the default. Here is the next screen.

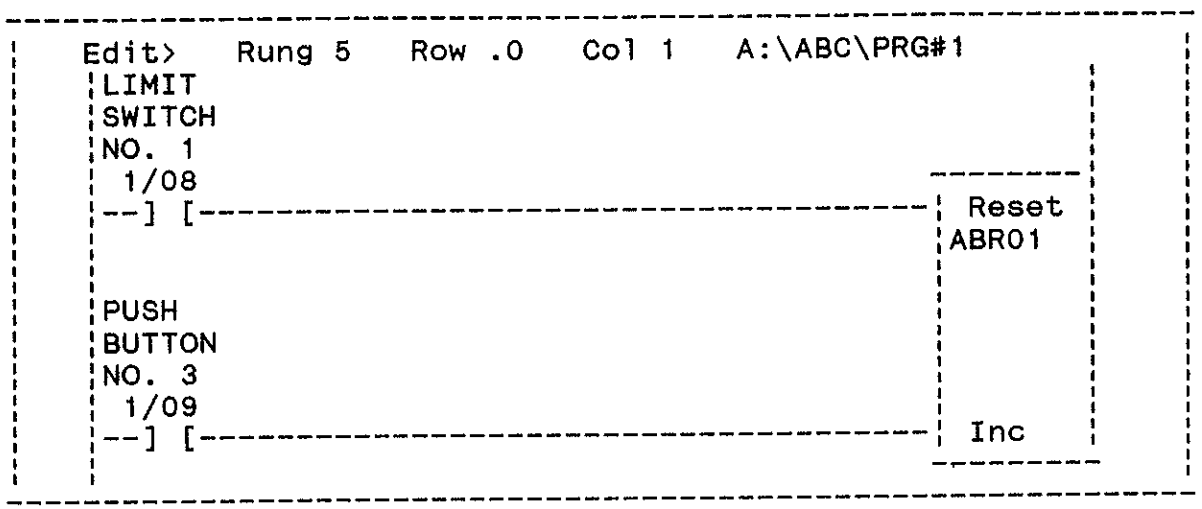


Again it is best to accept the default. The group is 4 because we have already used 3. There is a difference when you program an ABR. This function group will handle four ABR channels. So all 32 ABR channels will require 8 functions. Press <ENTER> to get this display.

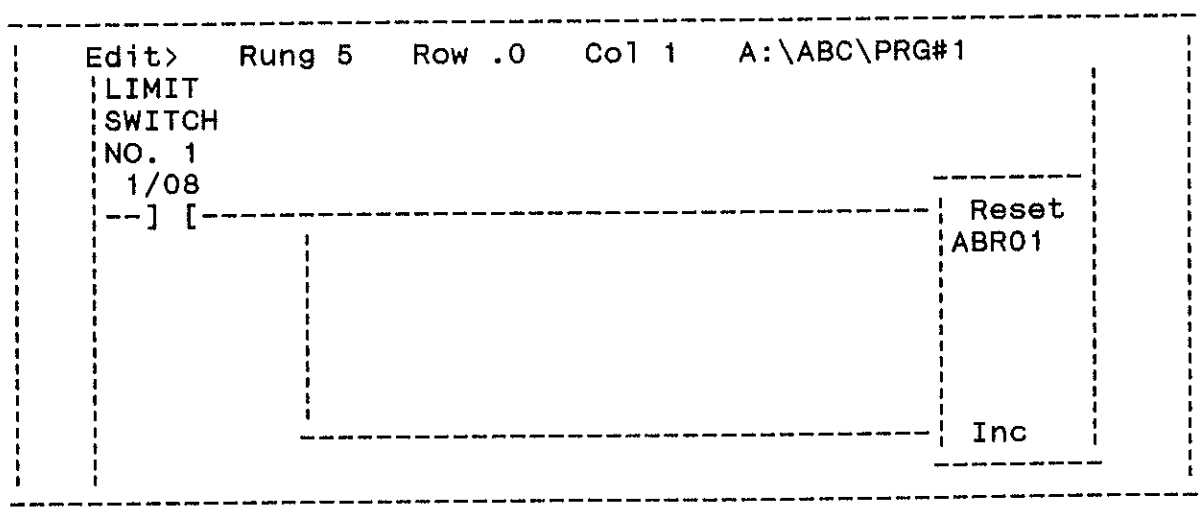


4-02 Edit Ladder Diagram (con't)

This is a change from other functions. You did not program a setpoint. The setpoint is programmed in the ABR. The appendix contains a copy of the data sheet. The next display shows the ABR finished.



This ABR program will allow you to program the ABR module as a RET or CNTR. The next display shows how the ABR program would look for a TDPU function.



As you can see, we have only one switch controlling the function so it becomes a TDPU.

Our next exercise covers the DR or drum. We will begin with one input programmed and the function menu displayed.

4-02 Edit Ladder Diagram (con't)

```
Function type: TDPU TDDO RET PGEN CNTR DR SR ABR
 LIMIT
 SWITCH
 NO. 1
  1/08
 --] [-----------------------------------
```

Now select DR by highlighting it and pressing <ENTER> or press <D> to get this display.

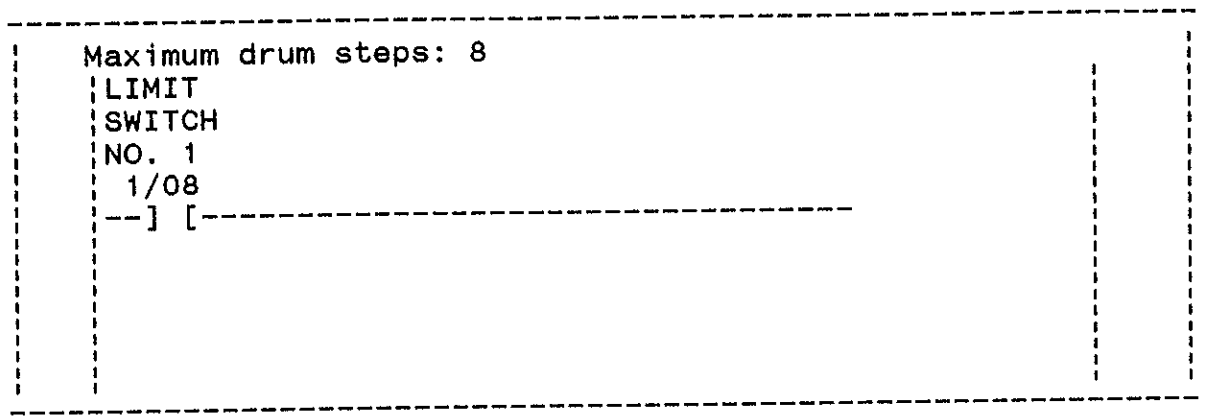
```
Enter DR number: 1
 LIMIT
 SWITCH
 NO. 1
  1/08
 --] [-----------------------------------
```

The program always defaults to the lowest DR number not currently in use. It is usually best to press <ENTER> & accept the default. Here is the next screen.

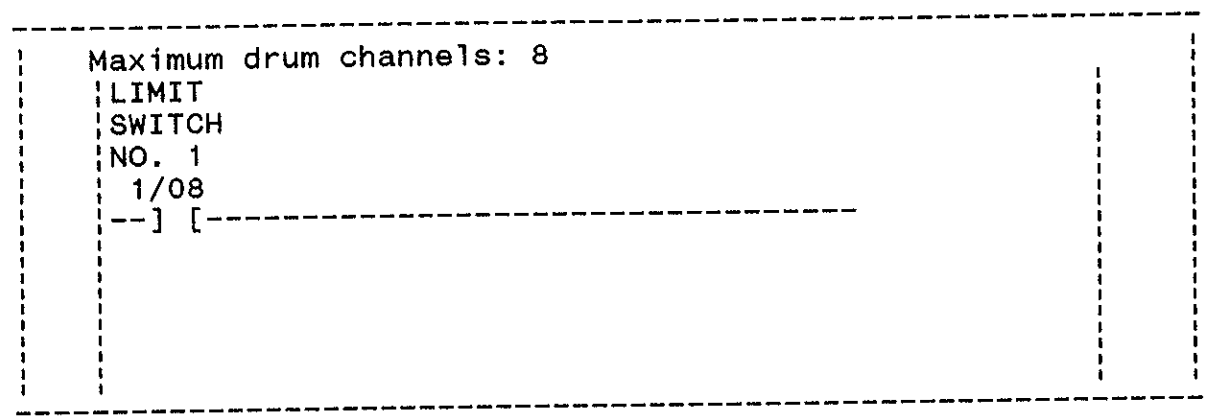
```
Function group number: 5
 LIMIT
 SWITCH
 NO. 1
  1/08
 --] [-----------------------------------
```

4-02 Edit Ladder Diagram (con't)

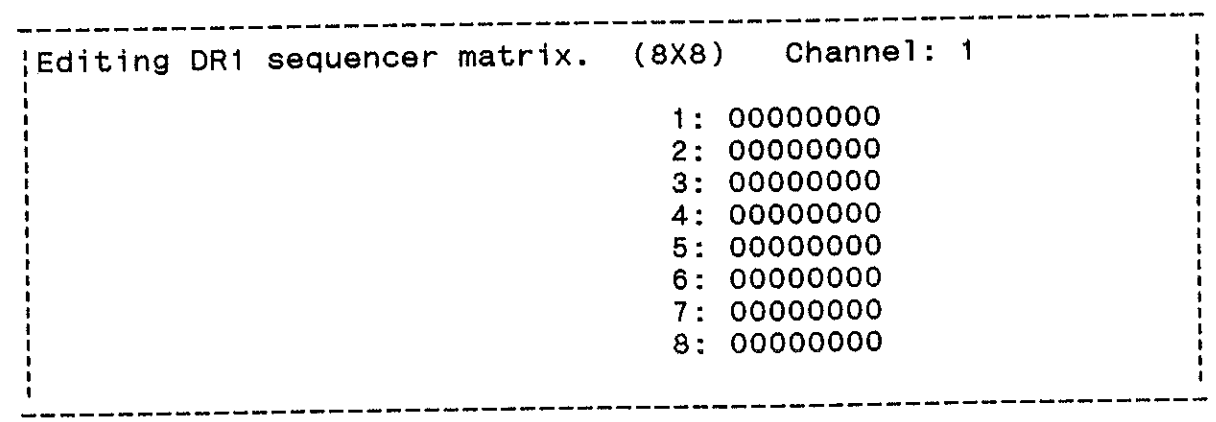
Again accept the default and press <ENTER>. While the drum is very powerful it is also a little more expensive. Each drum will take TWO function groups. If you elect to program thirteen or more channels it will take THREE functions.



You must specify the number of steps you want. You may enter from 1 to 256. We have elected to enter 8. Press <ENTER>.



You may enter any number from 1 to 16. Select 8 & press <ENTER>.



4-02 Edit Ladder Diagram (con't)

The step numbers are displayed in a vertical column to the left of the matrix. The channel number is displayed above the matrix. The arrow keys will move the cursor through the matrix. At the step and channel number you elect to turn on, just enter a one. Any channel with a 0 will be off in that step. We have entered a sample matrix in the next display.

```
Editing DR1 sequencer matrix.  (8X8)   Channel: 1

                                    1: 10000000
                                    2: 01000000
                                    3: 00100000
                                    4: 00010000
                                    5: 00001000
                                    6: 00000100
                                    7: 00000010
                                    8: 00000001
```

The matrix is a staircase arrangement. Channel one will be on in step one. Channel 2 will be on in step 2 etc... You may enter a 1 for any channel in any step. A word of caution about step 1. It is the home position for the drum. This is a good place to program a "ready" light or "home" light so that the operator can see they are in a "ready" or "home" position.

When you are finished with the drum matrix press <ESC> and display the Drum Command sub-menu.

```
Commands: Step Insert Delete Exit

                                    1: 10000000
                                    2: 01000000
                                    3: 00100000
                                    4: 00010000
                                    5: 00001000
                                    6: 00000100
                                    7: 00000010
                                    8: 00000001
```

Select Step to go to any step in the drum. For this example go to step 7. Use the right arrow key to move the cursor to channel 6.

Insert allows you to insert steps in the drum before the cursor position. Select Insert and enter the digit 2.

4-02 Edit Ladder Diagram (con't)

If you attempt to insert steps that exceed the maximum of 256, DOC will insert as many as possible and display the message "xxx lines inserted".

```
Number of steps to insert: 2

                                  1: 10000000
                                  2: 01000000
                                  3: 00100000
                                  4: 00010000
                                  5: 00001000
                                  6: 00000100
                                  7: 00000010
                                  8: 00000001
```

Now press <ENTER>

```
Editing DR1 sequencer matrix.  (10X8)   Channel: 6

                                  1: 10000000
                                  2: 01000000
                                  3: 00100000
                                  4: 00010000
                                  5: 00001000
                                  6: 00000100
                                  7: 00000000
                                  8: 00000000
                                  9: 00000010
                                 10: 00000001
```

There are now two additional steps available to program. Note the cursor is on step nine.

To delete the steps, select Delete.

```
Number of steps to delete:

                                  1: 10000000
                                  2: 01000000
                                  3: 00100000
                                  4: 00010000
                                  5: 00001000
                                  6: 00000100
                                  7: 00000000
                                  8: 00000000
                                  9: 00000010
                                 10: 00000001
```

4-02 Edit Ladder Diagram (con't)

Now enter the number of steps to be deleted. Assuming the cursor is still in step 7. If you attempt to delete more steps than are programmed, DOC will delete as many steps as possible and display "xxx lines delete". The last step may not be deleted.

```
Enter step number:  2

                                    1: 10000000
                                    2: 01000000
                                    3: 00100000
                                    4: 00010000
                                    5: 00001000
                                    6: 00000100
                                    7: 00000000
                                    8: 00000000
                                    9: 00000010
                                   10: 00000001
```

Now press <ENTER>. Delete will delete steps beginning at the cursor position.

```
Editing DR1 sequencer matrix.  (8X8)   Channel: 6

                                    1: 10000000
                                    2: 01000000
                                    3: 00100000
                                    4: 00010000
                                    5: 00001000
                                    6: 00000100
                                    7: 00000010
                                    8: 00000001
```

Now select Exit and return to the Edit mode.

```
Edit>   Rung 5   Row .0   Col 1   A:\ABC\PRG#1
 LIMIT
 SWITCH
 NO. 1
  1/08
 --] [-------------------------------------- Reset
                                             DR1
                                             8X8

 PUSH
 BUTTON
 NO. 3
  1/09
 --] [-------------------------------------- Step
```

4-02 Edit Ladder Diagram (con't)

This display shows input 1/09 already programmed, labeled and connected to the Step terminal of the drum.

You may program any contact as a step function. This includes digital or timed contacts. You may also mix them to gain the advantage of a drum timer combined with a stepping drum.

Our last function is SR or Shift Register. It is the only one that requires three inputs. Let's start at our function menu and select SR. The SR requires one function group.

```
Function type: TDPU TDDO RET PGEN CNTR DR SR ABR
LIMIT
SWITCH
NO. 1
 1/08
--] [-----------------------------------
```

Here is the next display.

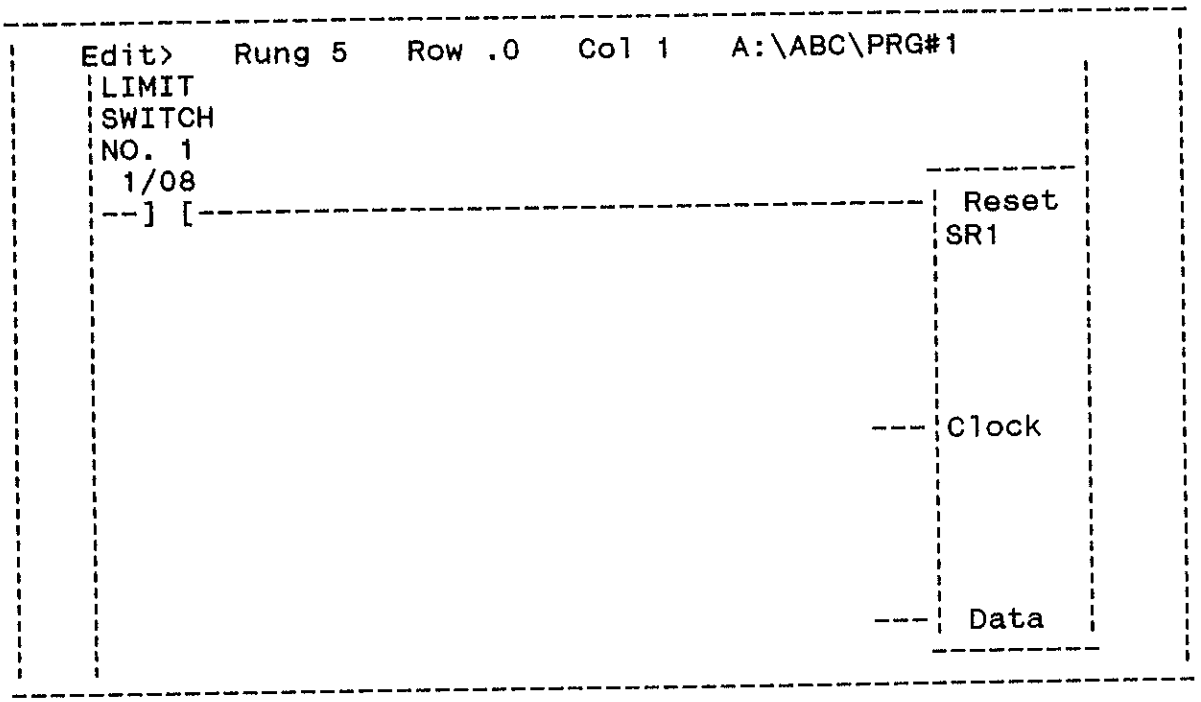
```
Enter SR number: 1
LIMIT
SWITCH
NO. 1
 1/08
--] [-----------------------------------
```

The program always defaults to the lowest SR number available. It is usually best to press <ENTER> accepting the default. Here is the next screen.

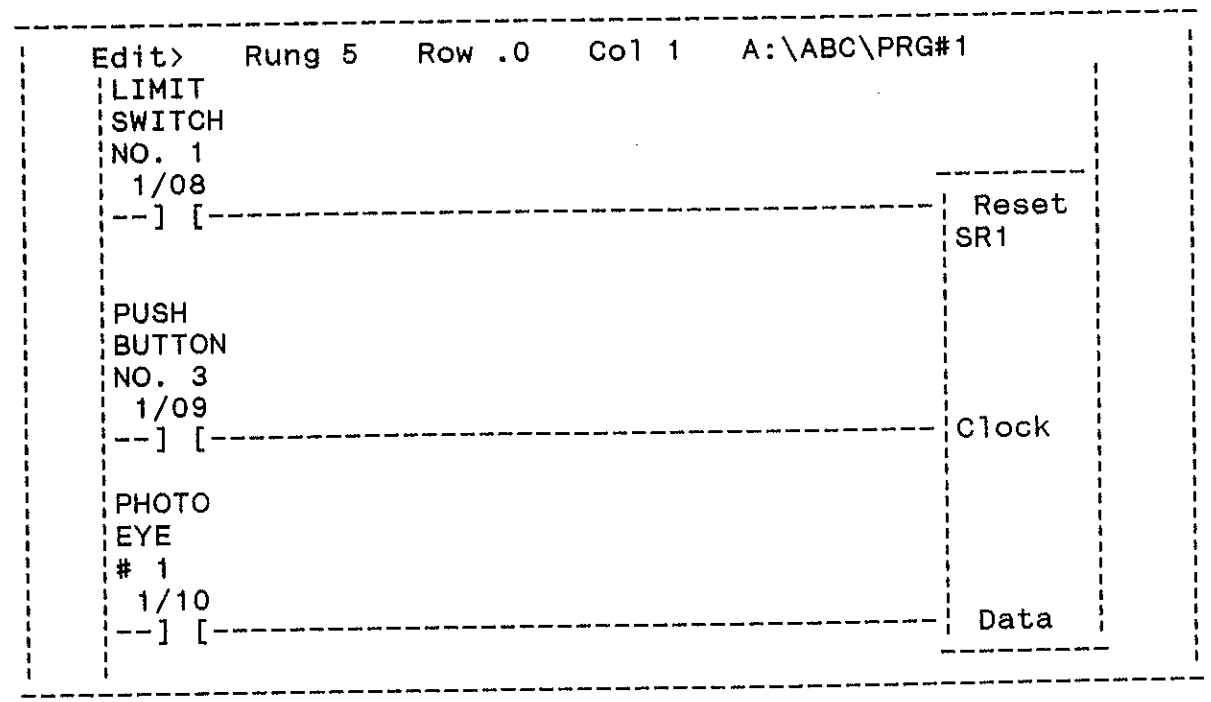
```
Function group number: 1
LIMIT
SWITCH
NO. 1
 1/08
--] [-----------------------------------
```

4-02 Edit Ladder Diagram (con't)

After you select the function, here is the next screen.



Now program input 1/09 and connect it to "Clock". Program input 1/10 and connect it to "Data". The following display shows the shift register programmed as asynchronous. The Clock & Data are separate from each other.



4-02 Edit Ladder Diagram (con't)

You could connect the Clock and Data terminals to the same input and make the SR synchronous.

We have not entered any setpoint for the Shift Register. The setpoint is a variable and depends on the on/off status of the data channel when the clock channel goes high. If data is high and you clock the SR, you turn on the first channel. If the data channel is low and you clock the SR, you turn off the first channel. Each time the clock channel goes high all the data in the 8 channels are shifted one position.

You may wish to program a blank rung. Make sure there is no logic in the rung; then press <ENTER>. This is a handy way to open a rung to enter an index for your Text.

When you are in the edit mode the <Esc> key allows you to enter and exit the COMMAND sub-menu. An Exit command is provided to exit the sub-menu and return to the Main Menu.

Items are selected from the Command Menu just as they are from the Main Menu. Use the arrow keys to move the highlight bar. If the item you want is highlighted press <ENTER>. You also can select an item by pressing the highlighted key.

Now press <Esc> to display the Command Menu.

```
Commands: Rung Ins Del Search Setp Compr Mem Text Mem Exit
```

We have shortened Insert to Ins., Delete to Del., Setpoint to Setp., Compress to Comp. This allows us to display the Menu in one line.

RUNG

Now highlight Rung and press <ENTER> or press <R> to display.

```
Rung:  Number  Copy  Move
```

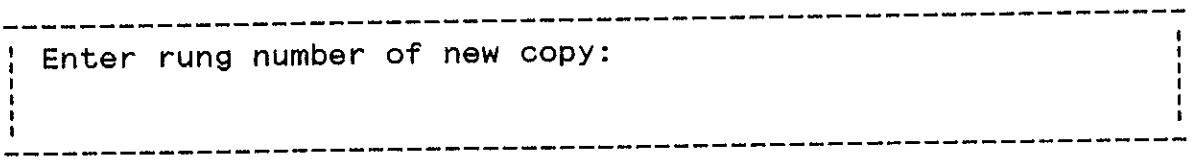
Number

```
Enter rung number:
```

4-02 Edit Ladder Diagram (con't)

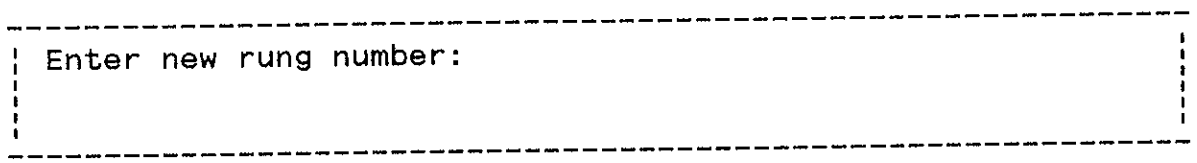
You may now enter any rung number in your program. If you enter a number larger than the last unprogrammed rung, the cursor will be positioned on the first blank rung after the last rung you have programmed.

Copy



You may copy the current rung to any other rung number. The current rung remains unchanged. If you enter no number, you will be returned to your initial rung.

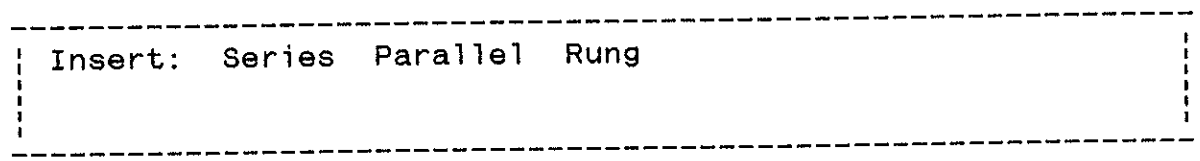
Move



You may move the current rung to any other rung. The current rung will be deleted. If you enter no number, you will be returned to your initial rung.

INSERT

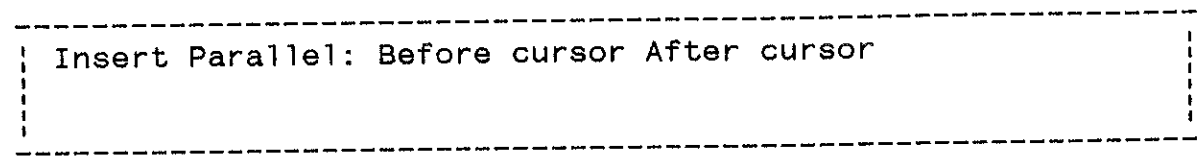
Now go to the command sub-menu and highlight Insert; press <ENTER> or press <I>.



Series

When you select Series Insert, the contacts will be spread so you can insert in between them. If there is not a contact on either side of the cursor, you will be returned to your initial rung.

Parallel



4-02 Edit Ladder Diagram (con't)

Here you can put in contacts before or after existing logic. Do be sure to check your connection symbols in section 5-00 and avoid trying to draw something that is not permitted.

Rung

With this feature you can add rung(s) of logic anywhere. DOC will insert a blank rung for you.

DELETE

Now go to the command sub-menu and highlight Delete. Press <ENTER> or press <D>.

```
Delete:  Function  Rung
```

Function

Delete Function allows you to remove a function from your logic. Be careful to remove all contacts for that function first. Place the cursor over the function to be deleted and delete the function. You must exit the rung to complete the deletion. If you have other logic in your rung you will have to install a temporary output where the function was to complete the line of logic.

Rung

When you select this option the entire rung will be removed from the program. Deleting a rung containing a function also deletes the function if the function coils do not exist in another rung.

SEARCH

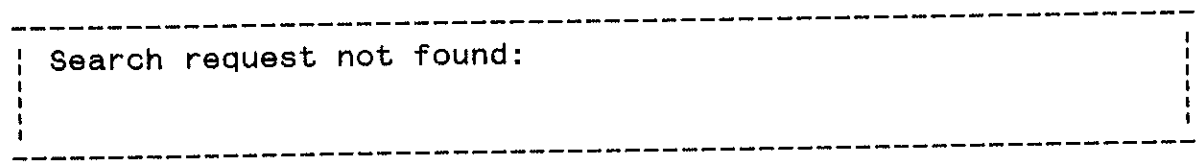
Return to the command sub-menu and highlight Search. Press <ENTER> or press <S>.

```
Search:  Input  Output  CR  Function  Instruction  Next
```

4-02 Edit Ladder Diagram (con't)

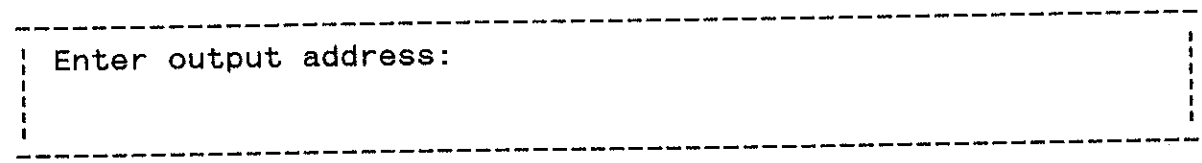
Input

All you have to do is enter the address of the input you wish to find. No matter where that address is, this feature will find it. If you search for a non existing address, your display will appear as.



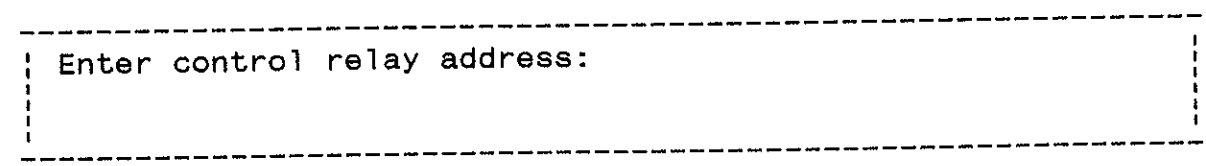
See Next for repeat searches.

Output



All you have to do is enter the address of the input you wish to find. No matter where that address is this feature will find it. See input for non existing address searches. See Next for repeat searches.

CR



Once you enter a control relay address this feature will find the coil(s) and contact(s). You do not have to specify a coil or contact. The program will find them all. See input for non existing address searches. See Next for repeat searches.

4-02 Edit Ladder Diagram (con't)

Function

```
Function type: TDPU TDDO RET PGEN CNTR DR SR ABR
```

After making your selection, you will get this display for the function selected.

```
Enter TDPU number:
```

If you select a function that is not programmed, you will get this display.

```
Enter TDPU number:    Function is not in use.
```

Once you make a valid choice, you will be taken to the function selected. See Next for repeat searches.

Instruction

```
Instruction: Latch Unlatch MCR OEN SKP CMP END
```

Once you select Latch you will get this display.

```
Finding address:
```

The program will find the first (L) coil in the ladder diagram. Contacts do not carry the latch information, so only coils can be found searching for (L) or (U). The contacts can be searched for by using their CR address. See input for non existing address searches. See Next for repeat searches.

The search routines for MCR, OEN, SKP, CMP, & END all work just like Latch and Unlatch. Since there are no contacts associated with these items, you cannot search routine for them by address.

4-02 Edit Ladder Diagram (con't)

Next

Many times you will want to search for the same item through the entire program. Next allows you to do just that. Display the command sub-menu and select Search. Now identify the item to be searched for. The DOC program will find the first occurrence of the item being searched. Then select Next. The DOC program will find the next occurrence for you. You can repeat this next until the program cannot find another occurrence of the item searched for. You would see this display.

```
Search request not found.
 LIMIT                                                  L. S.
 SWITCH                                                 NO 1
 NO. 1                                                  MADE
    1/08                                                 1/10
 ----] [-----------------------------------------------(   )-
```

SETPOINT

This mode allows you to change anything programmed in a function setpoint. This mode supports the Operator password. The setpoint can be changed without getting into the program. You must place the cursor over the any coil of the function to be changed; then select the setpoint.

If you want to change TDPU, TDDO, RET, PGEN, or CNTR you would be taken through the following screens. Note that they are just like programming.

```
Time base:  0.1 sec  1 sec  0.1 min  1 min
```

```
Setpoint source:  Internal  External
```

For a function with an Internal setpoint you would get this display.

```
Setpoint value: xxx
```

4-02 Edit Ladder Diagram (con't)

For a function with an External setpoint you would get this display.

```
+-----------------------------------------------------------+
| Enter input address:                                      |
|                                                           |
+-----------------------------------------------------------+
```

If you try to change the setpoint of a SR or ABR the program will return you to the function coil. Remember that the SR and ABR setpoints cannot be programmed with the PR-05.

If you want to reprogram the DR please review the drum starting on page 17.

COMPRESS

This is a toggle. You can compress the display which shows the ladder diagram but eliminates the I/O labels. If you are in the compress mode and select compress again you will allow the I/O labels to be seen again. Without compress you can view 3 lines of ladder without having to scroll. With compress you can view 6 lines of ladder without having to scroll.

MEM

Selecting Mem allows you to display the memory used, memory available, and the minimum prom size required.

```
+-----------------------------------------------------------+
|Program mem.:417 bytes used,10653 bytes free               |
|                                                           |
+-----------------------------------------------------------+
```

NOTE ! Doc 1.60 and above also displays the minimum EPROM size required for your program.

TEXT

Selecting Text will take you to the text mode. Section 4-03 has a detailed description of using this mode.

EXIT

Selecting Exit allows you to return to the Main Menu.

4-02 Edit Ladder Diagram (con't)

CAUTION ! You must save the information entered. What you have done to this point is only in a temporary file. We have a built in safe guard that reminds you of this when you try to exit to DOS or load the next program.

The ladder program is always in the PR-05. The text and wire files might be recovered if you exit without saving as they are on disk in temporary files. The I/O descriptions are lost if you exit without saving as they are stored in memory.

If your program is an original you risk losing some of your work if you exit without saving. If you are changing a program that is already on disk only the changes will be lost.

Your program will not be saved if you select "NO" at the save prompt. This choice is made if you elect to exit to DOS or load another program. Your program will not be saved if you turn off your computer or if there is a power failure.

Remember to save your program periodically to prevent changes from being lost. You can always reload a saved program from disk in the event of a power loss. Keep copies of your program(s) on several disk in separate locations. Use a different filename for each revision.

4-03 Edit Text Documentation

You can create and/or modify the English text that is so valuable in supporting your ladder diagram.

NOTE ! Text may be edited with the edit commands listed in the appendix.

Place the highlight bar over the Edit Text Documentation menu item and press <ENTER>. The other method is to press <E>. If you have not established a program filename, you will be required to do so (see section 4-01). You may enter text only for rungs which have been programmed. The rung may contain ladder logic or it may be blank. A blank rung would allow you to create text that may not be directly related to ladder logic. A possible use of this ability would be an index of all the rungs.

If there is no ladder logic here is your display:

```
Divelbiss Advanced Documentation Software

No Ladder logic programmed.
```

With ladder logic in your program this is your display.

```
Text>   Rung 1   Line 1   Col 1      A:\ABC\PRG#1
     [EOB]
```

The EOB stands for End Of Buffer. It means that this is the end of the Text for this rung.

Items are selected from the Command Menu just as they are from the Main Menu. Use the arrow keys to move the highlight bar. If the item you want is highlighted, press <ENTER>. You also can select an item by pressing the highlighted key.

Now press <Esc> to display the Command Menu.

```
Commands:  Rung Insert Delete Split Gather Center Exit
     [EOB]
```

4-03 Edit Text Documentation (con't)

Rung

Rung allows you to select any rung to add Text to. You must have programmed ladder logic in a rung to be able to provide Text for that rung. Once selected you will see this display.

```
Enter rung number:
     [EOB]
```

Enter the rung number that you wish to add text to and you will be taken to that rung if the ladder logic has been entered for that rung.

Insert

Insert moves the [EOB] that marks the limit of the text for this rung. You may enter up to 60 lines with 60 characters per line.

Once selected you will see this display.

```
Number of lines to insert: 1
   [EOB]
```

Enter the number of lines you wish to add and press <ENTER>. The [EOB] will be positioned to its new limit location. The next example shows what your display would look like if we were going to insert 4 lines of text.

```
Text>   Rung 1   Line 1   Col 1      A:\ABC\PRG#1



   [EOB]
```

In the following display we have entered text describing the program from rung one. Please note that there is a space left at the head of the text and at the end. You may wish to leave spaces, as it helps to separate the text from the ladder logic when printing. There are two lines in the space between Input and [EOB]. We will use the Delete feature to remove one.

4-03 Edit Text Documentation (con't)

```
Text>   Rung 1   Line 1   Col 1      A:\ABC\PRG#1

   Input 1/08 is used to energize output 1/10.


   [EOB]
```

Delete

This command allows you to delete lines either blank or with text in them. The deletion occurs beginning with the line the cursor is on to the number of lines specified. Once selected you will see this display.

```
Number of lines to delete: 4

   Input 1/08 is used to energize output 1/10.

   []
   [EOB]
```

The symbol [] is used here to represent the cursor. The cursor could be placed anywhere in the two lines between Input and the [EOB]. We have entered a request to delete 4 lines. Press <ENTER> and your display will read.

```
Number of lines to delete: 4   1 line deleted. []

   Input 1/08 is used to energize output 1/10

   [EOB]
```

This is a very handy bit of protection. You cannot delete too many lines. You can delete the wrong information, so be careful.

Split line: No sub menu required.

This command causes the text line to be split into two lines beginning at the cursor position. This makes it easy to add text to any line. You don't have to remember to add a line at the end of your text by moving [EOB], we do that for you. This example uses our previous program and places the cursor in the line we are going to add text to.

4-03 Edit Text Documentation (con't)

```
Split line..

   Input 1/08[]is used to energize output 1/10

   [EOB]
```

After placing the cursor and pressing enter, this is our display.

```
Split line..

   Input 1/08[]
   is used to energize output 1/10

   [EOB]
```

Now add the text (N.O.).

```
Split line..

   Input 1/08 N.O.[]
   is used to energize output 1/10

   [EOB]
```

To finish this exercise, we will use Gather to close the line.

Gather

The first line gathered starts at the cursor and extends to the end of the first line. All other lines gathered start at the beginning of the line and continue for the number of lines specified.

Once selected, you will see this display.

```
Number of lines to gather: 1

   Input 1/08 N.O.[]
   is used to energize output 1/10

   [EOB]
```

4-03 Edit Text Documentation (con't)

Just enter the number of lines you want to gather. If you enter a number that is greater than the space available, the program will only gather what is available. After pressing <ENTER>, here is the new display.

```
Text>   Rung 1   Line 3   Col 1      A:\ABC\PRG#1

   Input 1/08 N.O. is used to energize output 1/10.

   [EOB]
```

Center: No sub menu required.

The line where the cursor is will be centered. The cursor has been placed on line one of our original program. Now call the Command sub menu and select Center.

```
Text>   Rung 1   Line 1   Col 1      A:\ABC\PRG#1

[]Input 1/08 is used to energize output 1/10.

   [EOB]
```

After pressing <ENTER> here is our new display.

```
Text>   Rung 1   Line 1   Col 1      A:\ABC\PRG#1

       Input 1/08 is used to energize output 1/10.

   [EOB]
```

There are two abilities in the Text mode that are not part of the menu system.

The first is the .PAGE command. This gives you the ability to generate a form feed when printing. This is very valuable since it separates rungs. Here is an example of a .PAGE command at the beginning of rung two. The <.> must be in column one.

4-03 Edit Text Documentation (con't)

```
Text>   Rung 2   Line 1   Col 1      A:\ABC\PRG#1
   .PAGE
```

Here is rung 1 with the .PAGE command in rung 2.

```
{                                                                    }
{  Input 1/08 N.O. is used to energize output 1/10                   }
{                                                                    }
LIMIT
SWITCH
NO. 1
 1/08
--] [-----------------------------------------------(   )--
{ .PAGE                                                              }
```

There would be a form feed generated at this point when the rung is printed. Rung 2 would begin on the next sheet of paper.

The second is the .SUBTL command. This command gives you the ability to add a subtitle to page(s) of your ladder diagram printout. This is very valuable since it allows you to partition your program into groups of rungs. Here is an example of a .SUBTL command at the beginning of rung two. The <.> must be in column one.

```
Text>   Rung 2   Line 1   Col 1      A:\ABC\PRG#1
   .SUBTL Divelbiss
```

Divelbiss will be printed on every page until you enter a new .SUBTL command.The new subtitle will have priority in the following rungs. Each subtitle will appear in the table of contents when printed.

Exit: No sub menu required.

Exit takes you out of the Edit Text Documentation mode and returns you to the Edit Mode and the same rung.

4-03 Edit Text Documentation (con't)

CAUTION ! !

You must save the information entered. What you have done to this point is only on a temporary file. We have a built in safe guard that reminds of this when you try to exit to DOS. Remember the text file may also be edited with any editor that can read and write ASCII files. To separate rung text, DOC uses "[RUNG]" as a symbol. Do not add or delete these lines.

4-04 Edit Wire Diagram

In this mode you can identify your remote devices and enter the wire number(s) for each. Once printed just hand the drawing and labels to your assembly crew.

Place the highlight bar over Edit Wire Diagram and press <ENTER>. The other method is to press <I>.If you have not established a program filename, you will be required to do so. If you enter a new filename at this point, you will go to Title Configuration (see section 4-09). Once you exit Title Configuration, you will get the Edit Wire Diagram main menu. Before we go to that, here are a few comments about editing wire labels.

This mode allows 6 contacts in a line. You are allowed up to 20 lines per screen. For a Bear Bones with 8 Inputs or Outputs and 2 Commons, this means 2 parallel branches per terminal. You can divide this capability to suit your needs. If you choose to you could parallel 10 circuits on one terminal. That would leave you with 10 lines for 7 Inputs or Outputs and 2 Commons.

Since the purpose of a programmable controller is to eliminate as much physical wiring as possible, the 6 by 20 capability will be more than enough for any system. Keep in mind that this limit applies to each and every screen. One Bear and three expanders means a 6 by 20 capacity per board.

We have included a menu system for the Wire Label program to make it as easy as possible to use. When you choose the Bear you are going to use, we help by displaying the correct Inputs & Outputs for that product. The only area where you must make a choice is the Bear Bones expanders.

```
Board type: 1.Bear 2.Bear Exp 3.Baby 4.Baby Exp 5.Bear Cub
```

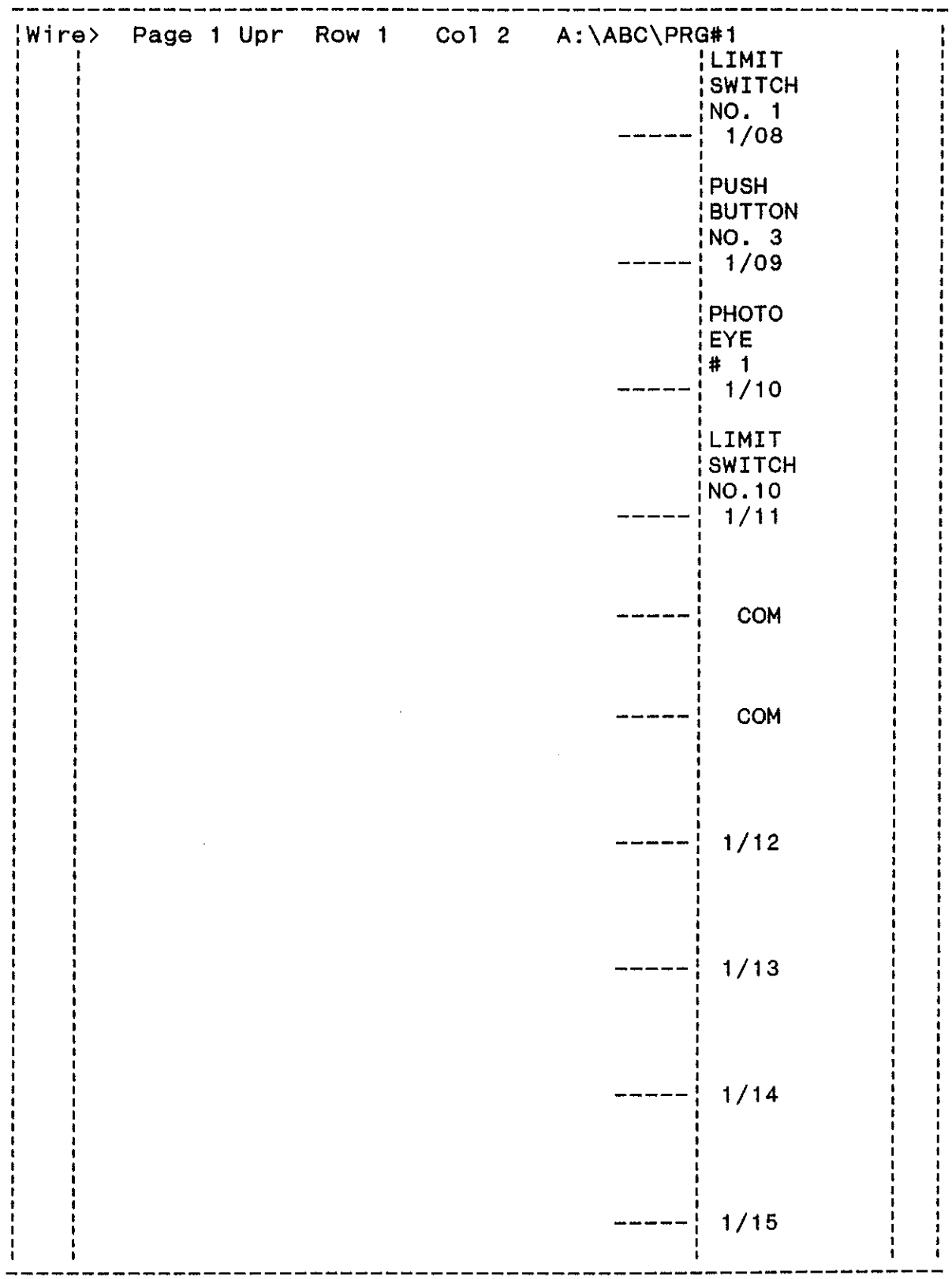
Select the Bear you are working with and get this display.

```
Wire Diagram:  Input  Output
```

Selecting Input gives us this screen. The full screen display is limited to four terminals. Use the arrow keys to scroll around the screen as in the ladder mode.

4-04 Edit Wire Diagram (con't)

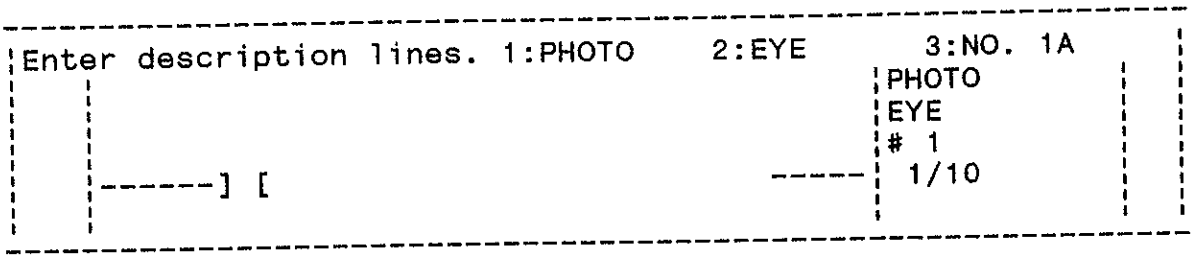
Bear Bones



4-04 Edit Wire Diagram (con't)

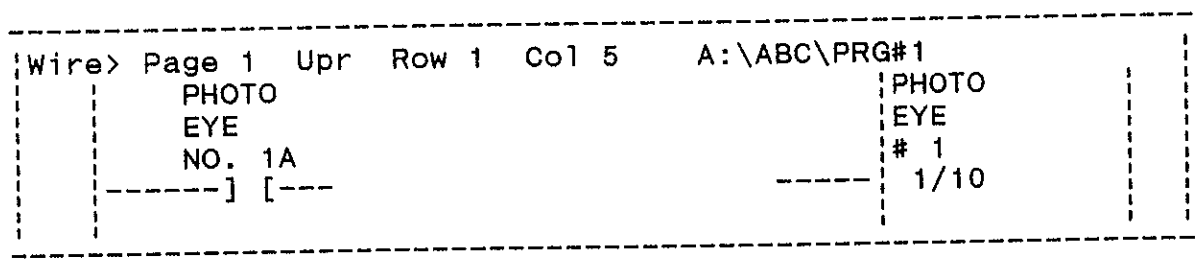
You may have noted that our program calls up the I/O labels used in the ladder diagram and puts them in the terminal blocks. This will help you to identify your I/O without having to print your ladder. Our sub-menu also selects the proper addresses for you.

Now we will wire some of the inputs. In this example we will wire Inputs 1/10, 1/11 and the Commons. We have deleted some of the display until it is required.

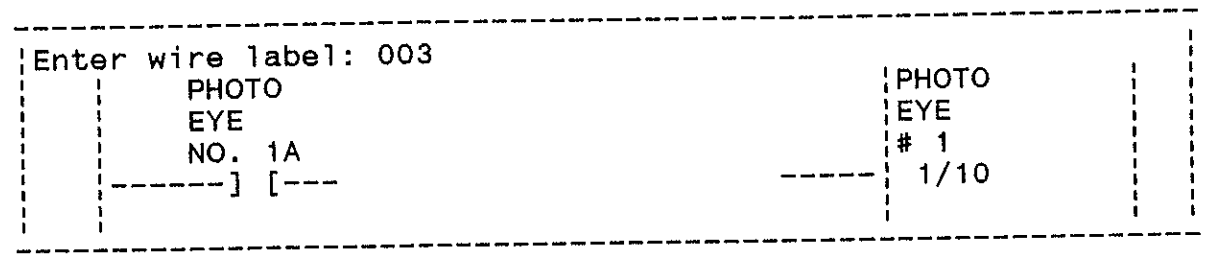


The contact is put on the screen just like it is in Edit Ladder with the <Q> key. Note there is some space to the left of the contact. This was reserved by us with horizontal lines to give room for the "hot" wire number. We have also added the I/O label for this contact.

After pressing <ENTER> here is our next display.



Now press <B> to add the wire label. This dual capability of the <B> key will make adding descriptions and wire labels fast and easy. You may also use the menu selection "Label".



The default is 0. We have entered the wire number 003. You are allowed up to 5 alpha or numeric characters for your wire number. After you press <ENTER>, this is the next screen.

4-04 Edit Wire Diagram (con't)

```
Enter total labels: 2
     PHOTO                                    PHOTO
     EYE                                      EYE
     NO. 1A                                   # 1
------] [---                            -----  1/10
```

The default here is also 0. We have elected to print 2 labels with the number 003. You are allowed up to 99 labels at each point. Now press <ENTER>.

```
Wire> Page 1  Upr  Row 1  Col 5    A:\ABC\PRG#1
     PHOTO                                    PHOTO
     EYE                                      EYE
     NO. 1A                                   # 1
------] [---                            -----  1/10
          003
           2
```

The wire number and the number of labels to be printed are both displayed.

Now we will add another contact.

```
Wire> Page 1  Upr  Row 1  Col 16   A:\ABC\PRG#1
     PHOTO                                    PHOTO
     EYE                                      EYE
     NO. 1A                                   # 1
------] [----------] [---               -----  1/10
          003
           2
```

We will name this device PHOTO EYE NO. 1B. We will label the wire 004 and specify 2 labels. Here is the result.

```
Wire> Page 1  Upr  Row 1  Col 16   A:\ABC\PRG#1
     PHOTO       PHOTO                        PHOTO
     EYE         EYE                          EYE
     NO. 1A      NO. 1B                       # 1
------] [----------] [---               -----  1/10
          003          004
           2            2
```

Now connect to the terminal 1/10 and place the cursor over the first contact.

4-04 Edit Wire Diagram (con't)

```
------------------------------------------------------------------
|Wire> Page 1  Upr  Row 1  Col 5    A:\ABC\PRG#1                 |
|    |     PHOTO        PHOTO                  |PHOTO        |   |
|    |     EYE          EYE                    |EYE          |   |
|    |     NO. 1A       NO. 1B                 |# 1          |   |
|    |------] [---------] [--------------------|  1/10       |   |
|    |         003          004                |             |   |
|    |          2            2                 |             |   |
------------------------------------------------------------------
```

Now we are going to put a contact in parallel with the two we have just entered. Press <ESC> to call the command sub-menu and select Insert. Parallel is the default, so press <ENTER>. This is your display.

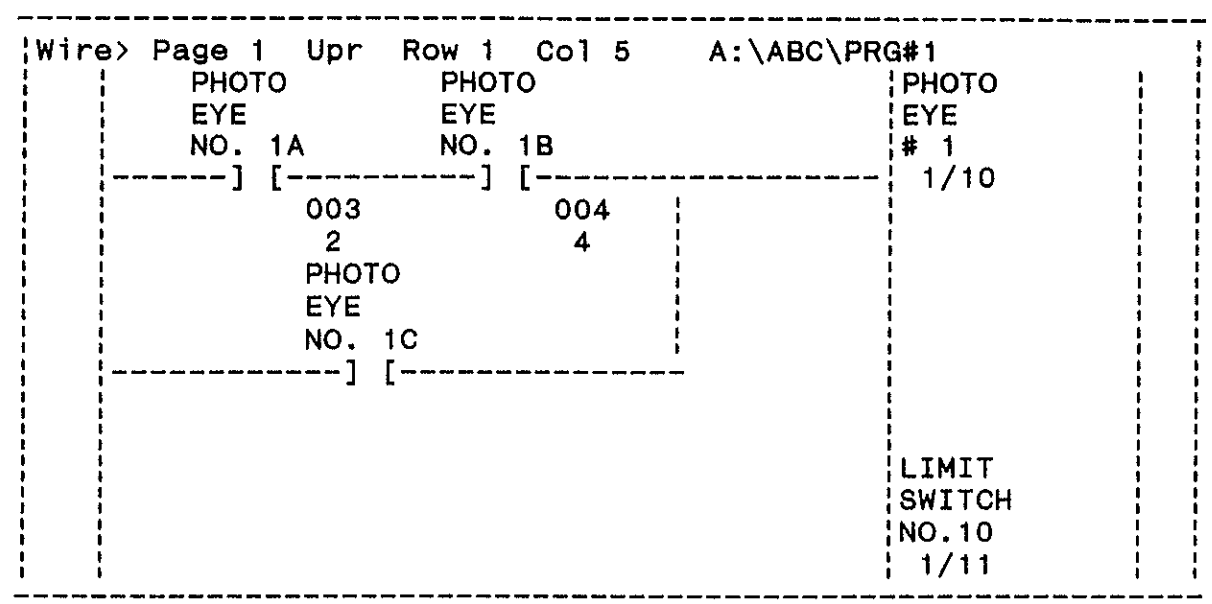
```
------------------------------------------------------------------
|Insert parallel:  Before cursor  After cursor                   |
|    |     PHOTO        PHOTO                  |PHOTO        |   |
|    |     EYE          EYE                    |EYE          |   |
|    |     NO. 1A       NO. 1B                 |# 1          |   |
|    |------] [---------] [--------------------|  1/10       |   |
|    |         003          004                |             |   |
|    |          2            2                 |             |   |
------------------------------------------------------------------
```

Select After Cursor to spread the terminal block. In the next screen we have added Input 1/11 to offer a perspective of your actual display.

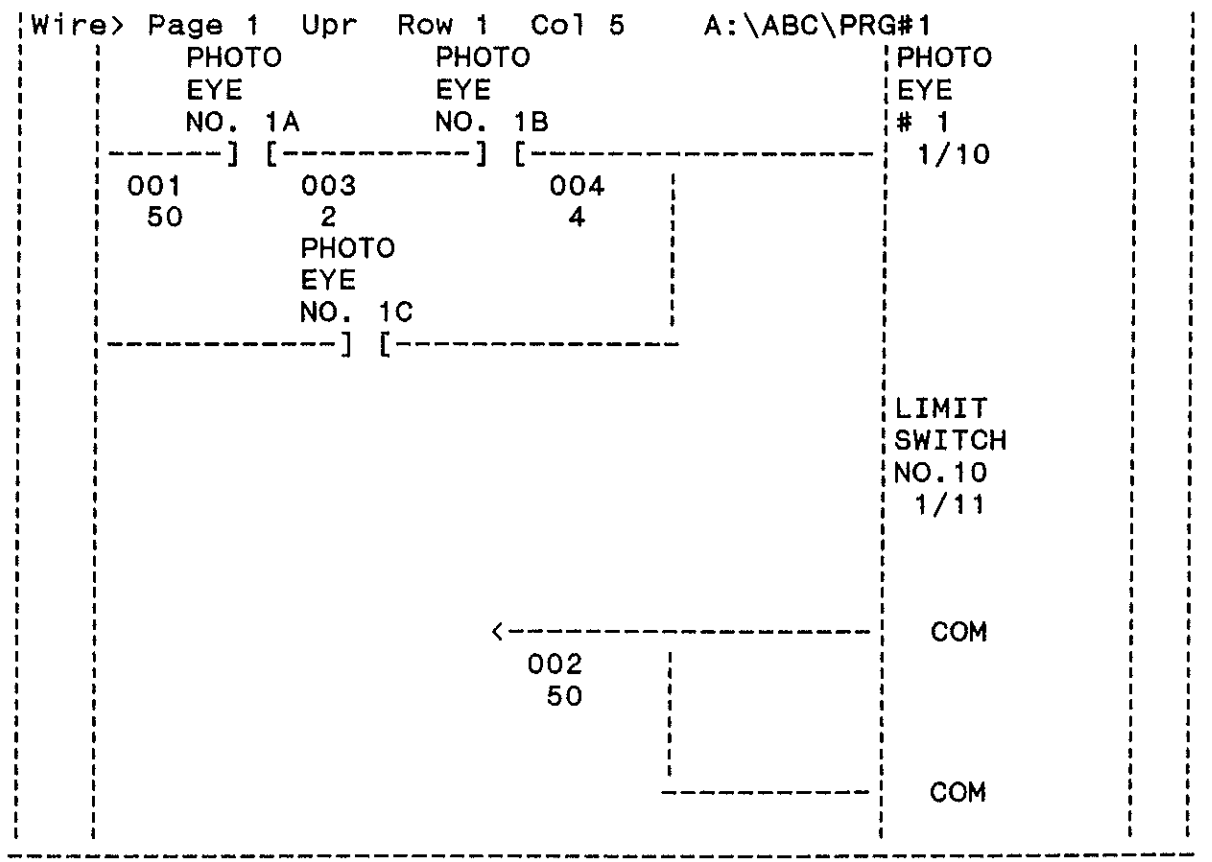
```
------------------------------------------------------------------
|Wire> Page 1  Upr  Row 1  Col 5    A:\ABC\PRG#1                 |
|    |     PHOTO        PHOTO                  |PHOTO        |   |
|    |     EYE          EYE                    |EYE          |   |
|    |     NO. 1A       NO. 1B                 |# 1          |   |
|    |------] [---------] [--------------------|  1/10       |   |
|    |         003          004                |             |   |
|    |          2            2                 |             |   |
|    |                                         |             |   |
|    |                                         |             |   |
|    |                                         |             |   |
|    |                                         |             |   |
|    |                                         |             |   |
|    |                                         |LIMIT        |   |
|    |                                         |SWITCH       |   |
|    |                                         |NO.10        |   |
|    |                                         |  1/11       |   |
------------------------------------------------------------------
```

Now we will enter another contact. Label it PHOTO EYE 1C. Also change the number of wires with the number 004 to 4. Do this by placing the cursor over the wire number 004 and press <B>. Then change the number from 2 to 4. Don't forget to add the wiring.

4-04 Edit Wire Diagram (con't)

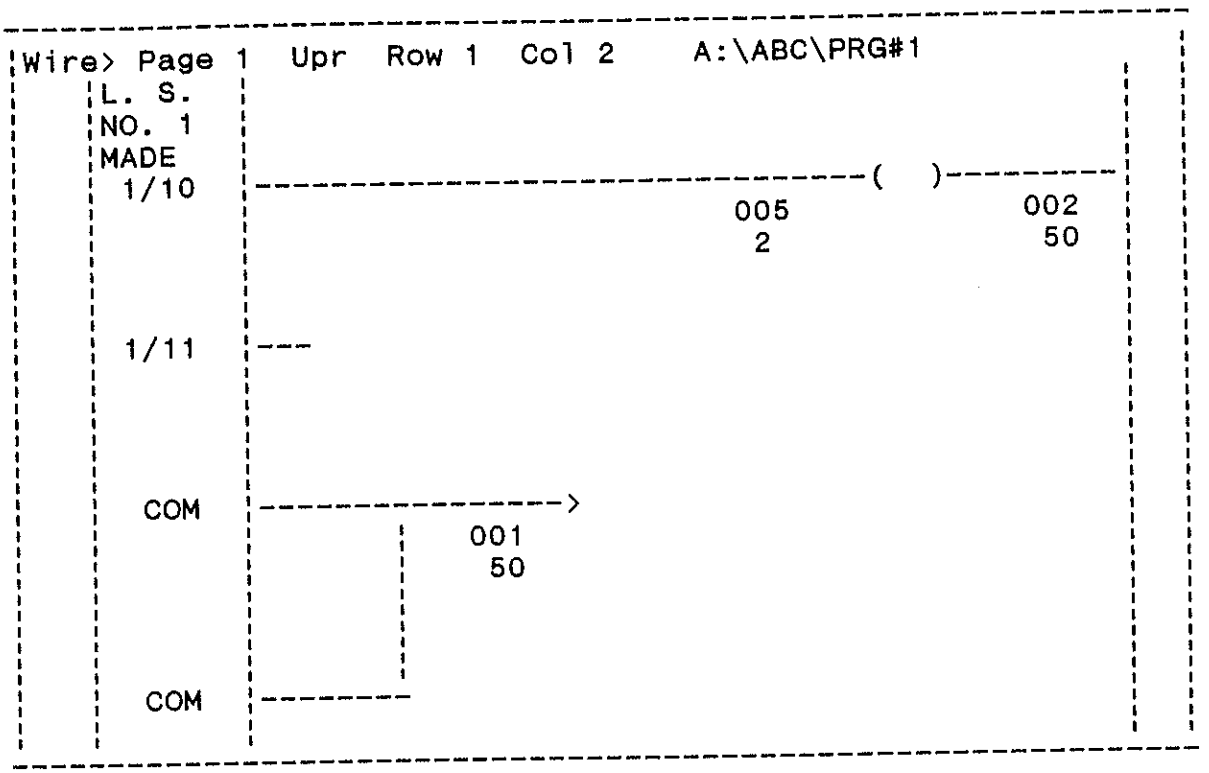


The next display shows that we have labeled the "hot" wire with number 001 and asked for 50 labels. We have also connected the commons, labeled them 002, and asked for 50 labels.



4-04 Edit Wire Diagram (con't)

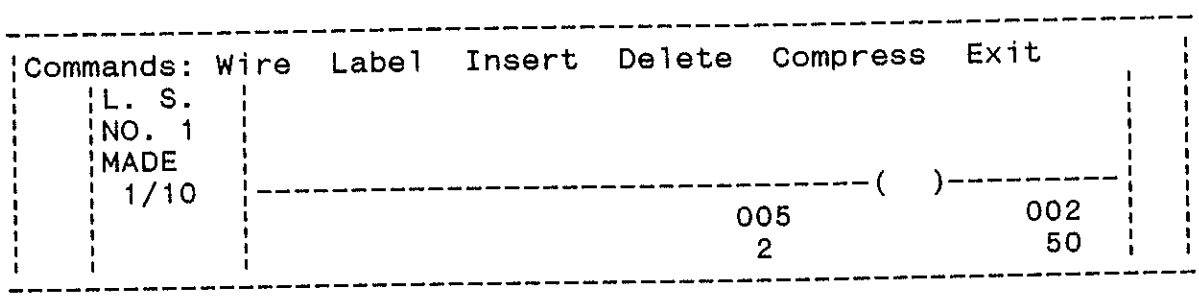
This example shows how easy it is to use our wire label program and how much it resembles a true diagram. Of course you will not always be working with inputs. Here is how the output side of the Bear Bones looks.



Note that the description from the ladder program appears in the terminal strip as in the inputs. Output 1/10 has already been wired to the load with wire 005. The load has been connected to the "neutral" wire 002. It is always a good practice to keep the load at ground potential if possible. The "hot" wire then goes to the common terminal.

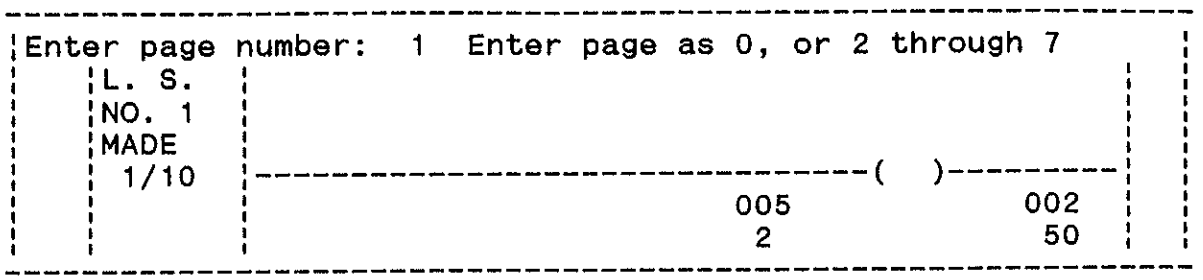
Bear Bones Expanders

Bear Bones expanders are just as easy to do. And we build in a little extra protection for you. Press <ESC> to get the command sub-menu; here is your display.



4-04 Edit Wire Diagram (con't)

Now select Wire to get this display which allows you to go to any expander.

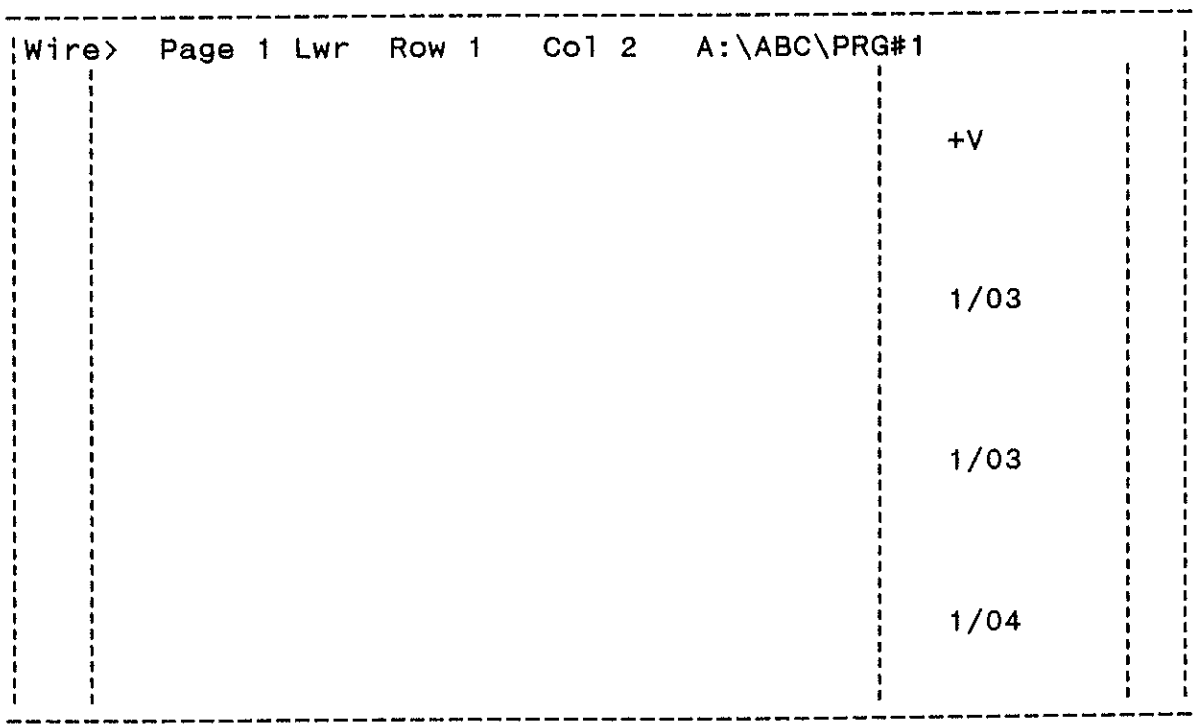


We have tried to select page 1; but since this is the page of the Bear Bones you cannot select it for an expander. Note the prompt at the top of the display reminds you of the legal pages you may choose for an expander.Once you make a choice that is legal you will have to choose Upper or Lower. This only means that Upper is for addresses X/08 through X/15 and Lower is for addresses X/00 through X/07. Once you have chosen the expander you want, all other work is just like the Bear Bones.

Baby Bear Bones

The Baby Bear Bones introduces some new possibilities. All the I/O are two wire. The inputs can be wired sourcing or sinking and the outputs are relay contacts. We will start with the inputs.

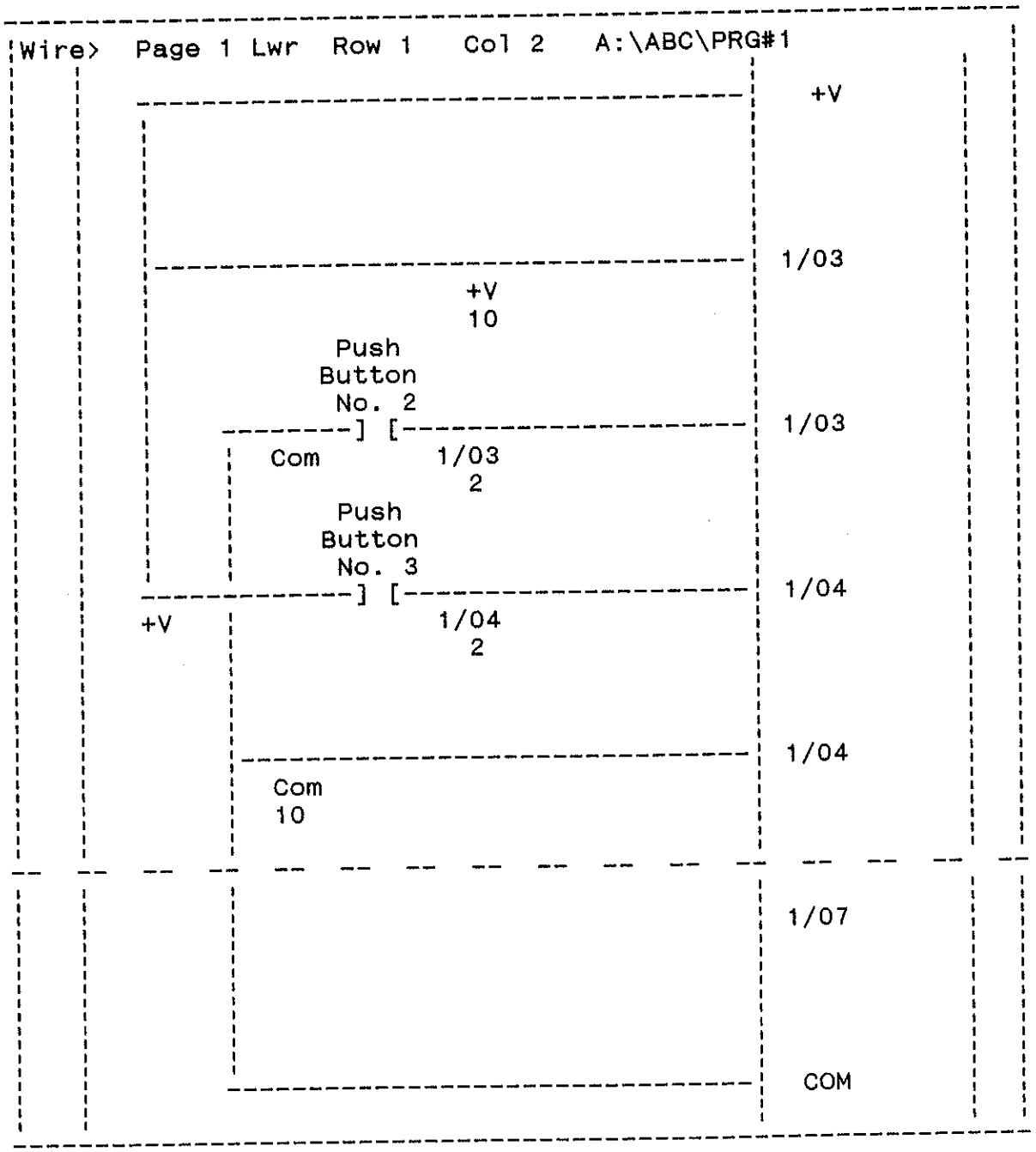
From the Main Menu select Wire, then Baby Bear, then Input.



4-04 Edit Wire Diagram (con't)

If you wish, you may scroll down through the display and note the terminal positions. The purpose of this exercise is to show by example how to wire one input sourcing and one input sinking.

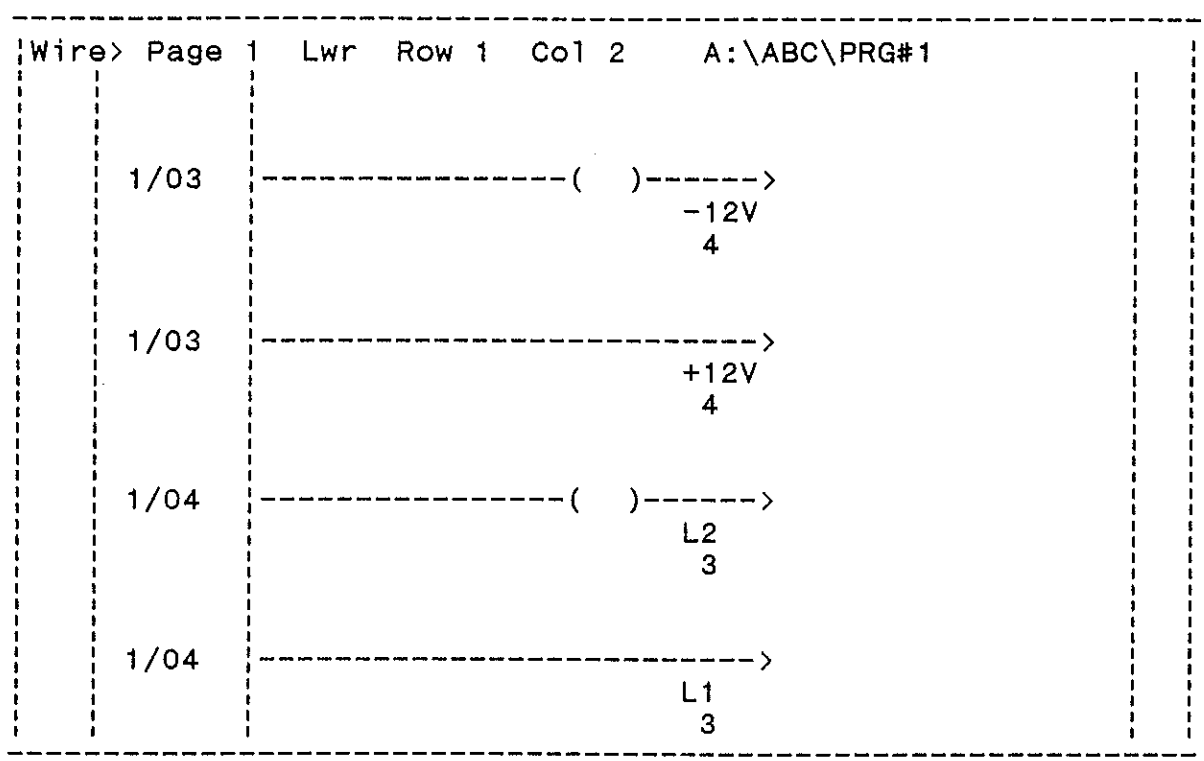
We are going to wire input 1/04 as sourcing. The field contact will source the input. Input 1/03 will be connected as sinking. The field contact will sink the input. All wire numbers will be the same as the terminal connected to. This may help later.



4-04 Edit Wire Diagram (con't)

We have entered a broken line so that you can have an example of how the inputs could be wired sourcing or sinking. Another advantage of this display is that we show you how to cross over wires without connecting them. It helps to clarify the display if you put the +V and Com. comments where wires cross.

Our next example is the Baby Bear Bones outputs.



Since the outputs are relay contacts you have the added ability to mix output voltages. We are illustrating output 1/03 with a 12 VDC load and output 1/04 with a 120 VAC load and output. As always, keep the loads at ground potential where possible.

Don't forget that these outputs can be solid state drivers. We allow you to bypass the relay socket with zero ohm resistors. The purpose of this feature is to allow you to add your relay and delete ours. This will be necessary if your load requires more amperage than our relays are capable of. Please refer to the data sheets in section 5-00.

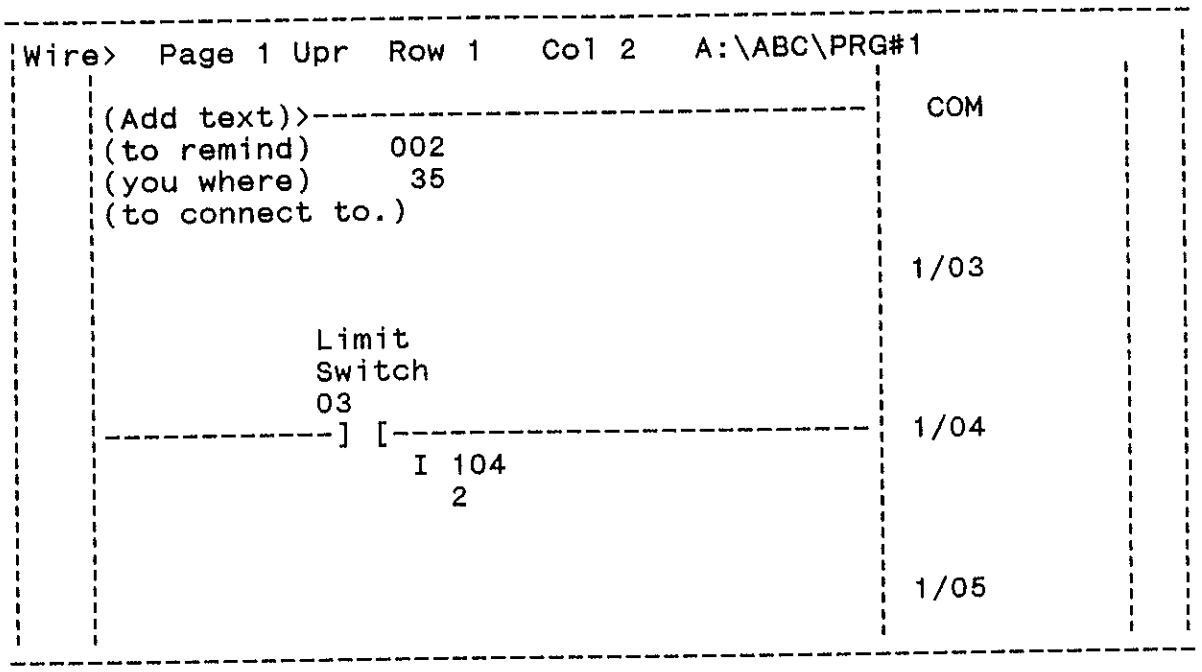
Baby Bear Bones Expanders

These expanders offer all the same features and capabilities of the Baby Bear Bones. The only difference is the addresses used. The examples given for the Baby Bear will work for the expander. The expander uses addresses 1/08 through 1/15.

4-04 Edit Wire Diagram (con't)

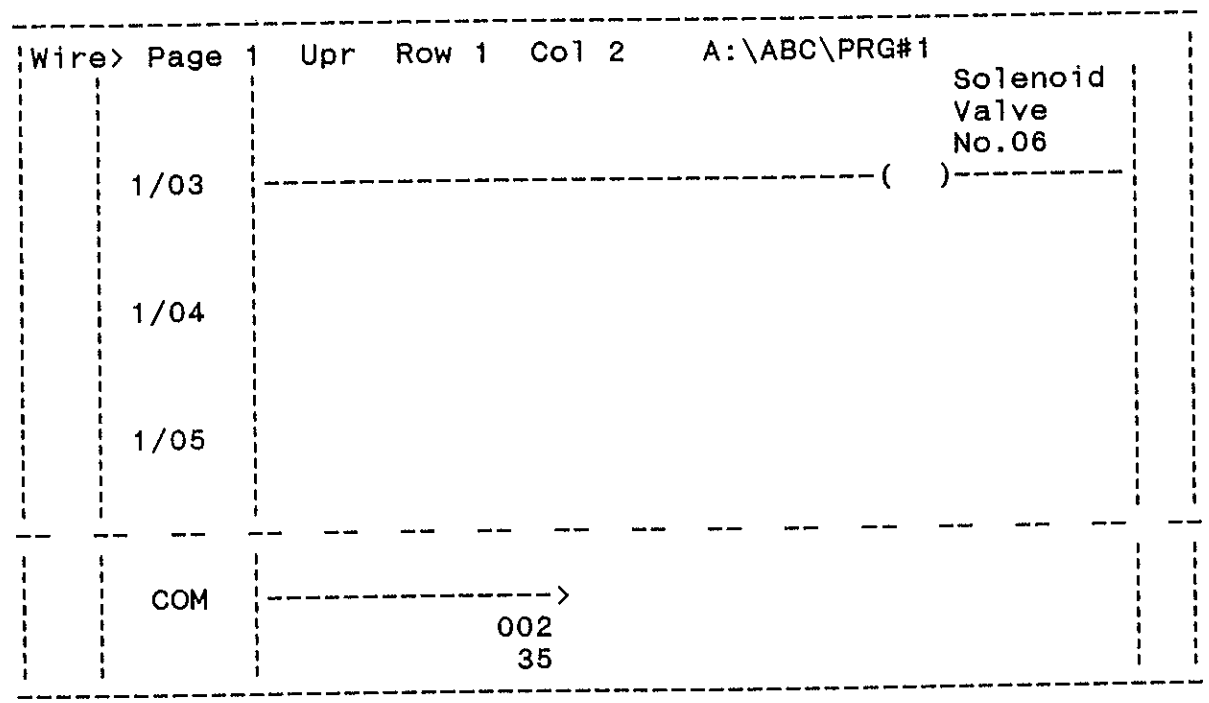
Cub Expander

Here are the Cub Expander inputs already wired.



As you can see, the Cub is very much like the Bear.

Now lets take a look at the Cub outputs.



4-04 Edit Wire Diagram (con't)

The Cub Expander requires some caution. If you are using the Bear Bones Plus or PIC Bear, output 1/03 is not available unless you make a trace change. See the data sheet 7809-26 or 49.

4-05 Write Program to Disk

Allows you to establish the drive, directories, subdirectories, and program names for your ICM programs.

Place the highlight bar over the Write Program to Disk menu item and press <ENTER>. The other method is to press <W>. You will see the following display.

```
Divelbiss Advanced Documentation Software

W R I T E   P R O G R A M

Enter new program filename:
```

This is the mode that you will need to use to save all the files you have generated. These files include Ladder Diagrams, Text Wire Diagrams, Title Configuration, & I/O labels.

In the next screen we have entered a filename. In the following paragraph we will define each part of the filename. You may enter a filename that suits your application better. You may not exceed 40 alpha numeric characters including punctuation.

```
Divelbiss Advanced Documentation Software

W R I T E   P R O G R A M

Enter new program filename:  A:\ABC\PRG#1
```

A: is the drive on which the files will be stored. Be sure you have a formatted disk there. The directory \ABC\ is where the program will be stored. Make sure you have created this directory on the disk. PRG#1 is the program name. This is the same information used in section 4-01.

After you have entered a program and used the Text and Wire label options you will have created five files that are displayed when you scan the directory of your disk. The extensions of your files are:

PRG#1.OPC	This is the code for your ladder diagram.
PRG#1.DES	This is where the I/O descriptions are stored.
PRG#1.TXT	This is the extension for you text.
PRG#1.WIR	This is where your wire diagrams are kept.
PRG#1.LST	This is where your program is stored if you print to disk

4-05 Write Program to Disk (con't)

If you specify a filename that is already on the disk we give you a valuable option; you can replace it or not. This is the display you will see.

```
Divelbiss Advanced Documentation Software

W R I T E   P R O G R A M

Enter new program filename: A:\ABC\PRG#1

File exists. Do you wish to replace it? No Yes
```

If you select Yes, the changes you have made in the program will be written into this filename. If you choose Yes and no changes have been made, this is your display.

```
Divelbiss Advanced Documentation Software

W R I T E   P R O G R A M

No changes made in current program.
```

Just press <ENTER> to return to DOS.

If you selected No at the filename prompt, you will be prompted for a new filename. If storage space permits, it is a good idea to save revisions to different filenames. This makes it easy to maintain good records of your projects.

Should you neglect to create the correct filename, this is the display you will get. You can program an EPROM but you will lose your changes to the text & I/O labels & wire labels.

```
Divelbiss Advanced Documentation Software

W R I T E   P R O G R A M

Path not found
```

The best thing to do is to change the filename to eliminate all directories. You may have neglected to create them on your disk when you were in DOS. Just store the program on the default disk; then go to DOS and create your directories. You can return to DOC, then reload the program and restore it.

4-06 Print Menu

Here you can select from a host of printing options that make supporting you ICM program so much easier.

Place the highlight bar over the Print Menu menu item and press <ENTER>. The other method is to press <P>. If you have not established a program filename, you will be required to do so, see section 4-01. You will also have to entered one rung of ladder logic or a blank rung, or you will see this screen.

```
Divelbiss Advanced Documentation Software

No ladder logic programmed.
```

Once you have at least one rung in your program, with or without ladder logic, you will get this display.

```
Divelbiss Advanced Documentation Software

                P R I N T   M E N U

T - Title Page                                  Yes
K - Ladder Diagram Symbol Key                   Yes
A - Ladder Diagram                              Yes
I - Input / Output Cross Reference              Yes
F - CR / Function Cross Reference               Yes
X - Cross Reference Warnings                    Yes
D - Drum Sequencer Tables                       Yes
W - Input / Output Wire Diagram                 Yes
C - Table of Contents                           Yes
R - Proprietary Information                     Yes
P - Print Selected Options
L - Print Wire Labels

Press SPACE to Select, or ENTER to Accept
```

All the items followed by a YES allow you to decide to print or not to print. You just need to press the <T> key to change the YES to NO for the Title Page. If NO is displayed, then that item will not be printed. Another method of selection is to move the highlight bar down the items one item at a time and press <ENTER> to toggle the YES / NO response. If NO is displayed the display can be changed to YES with the same toggle.

LADDER

Once you have selected the items you want, press the <P> key. You will see the following displays.

4-06 Print Menu (con't)

```
Divelbiss Advanced Documentation Software

P R O G R A M  L I S T I N G

Enter starting rung number: 1
```

You can print only the rungs you want. We default to 1 but you could start at 2 or 3 or 40 if you wish. After selecting your starting rung, press <ENTER> to get this display.

```
Divelbiss Advanced Documentation Software

P R O G R A M  L I S T I N G

Enter starting rung number: 1

Enter ending rung number:  7
```

You can select any ending rung number higher than the starting rung number but not larger than your last rung number. The default is your last rung number. After making your selections, press <ENTER> to get this display.

```
Divelbiss Advanced Documentation Software

P R O G R A M  L I S T I N G

Select diagram format:  Expanded  Compressed
```

If you select compressed the I/O labels & text will not be printed. They will be printed in expanded mode. Once your choice is made press <ENTER> to get this display.

```
Divelbiss Advanced Documentation Software

P R O G R A M  L I S T I N G

Listing destination:  Printer  Screen  Disk  Serial
```

4-06 Print Menu (con't)

Selecting Printer will print the program to the parallel printer port selected in DOC configuration (default LPT1). If you select Screen your selections are displayed on the screen with prompts to give you time to examine your work. Selecting Disk will print the program to a disk file in ASCII format (default "filename".LST). The disk file may be printed using the DOS print command. Selecting Serial will print the program to the serial port selected in DOC configuration (default COM2). The serial printer port must be different from the PR-05 serial port.

If you print to the printer here is your next screen.

```
Divelbiss Advanced Documentation Software

P R O G R A M  L I S T I N G

Printing Ladder Diagram Rung  1..

Ready Printer.  Press any key to continue:
```

Your program will now be printed to the printer port selected.

INPUT / OUTPUT

Printing your Input / Output Diagrams is just as easy as the Ladder Diagram printout. Select <W> and get this display.

```
Divelbiss Advanced Documentation Software

P R O G R A M  L I S T I N G

Select diagram format:  Expanded  Compressed
```

If you select compressed the I/O labels are not printed. They are printed in expanded mode. Once your choice is made, press <ENTER> to get this display.

```
Divelbiss Advanced Documentation Software

P R O G R A M  L I S T I N G

Listing destination:  Printer  Screen  Disk  Serial
```

4-06 Print Menu (con't)

Selecting Printer will print the program to the parallel printer port selected in DOC configuration (default LPT1). If you select Screen, your selections will displayed on the screen with prompts to give you time to examine your work. Selecting Disk will print the program to a disk file in ASCII format (default "filename".LST). The program may be printed using the DOS print command. Selecting Serial will print the program to the serial port selected in DOC configuration (default COM2). The serial printer port must be different from the PR-05 serial port. If you print to the printer and have not selected or programmed any wire diagrams you will get this display.

```
Divelbiss Advanced Documentation Software

P R O G R A M  L I S T I N G

Nothing selected to print.
```

If you print to the printer & have selected or programmed any wire diagrams, this is your next screen.

```
Divelbiss Advanced Documentation Software

P R O G R A M  L I S T I N G

Printing Input Wire Diagram ..

Ready Printer.  Press any key to continue:
```

All the Inputs and Output terminals you have wired will be then be printed to the printer port selected.

LABELS

The ability to print wire labels is just as flexible as the wire diagram program.

Once you select <L> here is your first screen.

```
Divelbiss Advanced Documentation Software

P R I N T  W I R E  L A B E L S

Listing destination:  Printer  Screen  Disk  Serial
```

4-06 Print Menu (con't)

Selecting Printer will print the program to the parallel printer port selected in DOC configuration (default LPT1). If you select Screen your selections are displayed on the screen with prompts to give you time to examine your work. Selecting Disk will print the program to a disk file in ASCII format (default "filename".LST). The disk file may be printed using the DOS print command. If you have a serial printer, only one port is required. Serial will print the program to the serial port selected in DOC configuration (default COM2). The serial printer port must be different from the PR-05 serial port. After making your selection you will see this screen.

```
Divelbiss Advanced Documentation Software

P R I N T  W I R E  L A B E L S


Characters per label:    10
```

This selection depends on the labels you buy for your printer. After pressing <ENTER> here is your next display.

```
Divelbiss Advanced Documentation Software

P R I N T  W I R E  L A B E L S


Characters per label:    10

Lines per label:         2
```

This allows you to choose the number of lines from top to bottom of each label. Now press <ENTER> for your next screen.

```
Divelbiss Advanced Documentation Software

P R I N T  W I R E  L A B E L S


Characters per label:    10

Lines per label:         2

Labels across page:      4
```

This allows you to choose how many labels will be printed from left to right.

4-06 Print Menu (con't)

If you have not selected or programmed any wire labels, you will get this display.

```
-------------------------------------------------------------
|          Divelbiss Advanced Documentation Software        |
|                                                           |
|                P R I N T  W I R E  L A B E L S            |
|                                                           |
|                  Nothing selected to print.               |
-------------------------------------------------------------
```

Here is your last screen when printing to the printer with wire labels in your program.

```
-------------------------------------------------------------
|          Divelbiss Advanced Documentation Software        |
|                                                           |
|                P R O G R A M  L I S T I N G               |
|                                                           |
|                  Printing Wire Labels..                   |
|                                                           |
|                                                           |
|           Ready Printer.  Press any key to continue:      |
-------------------------------------------------------------
```

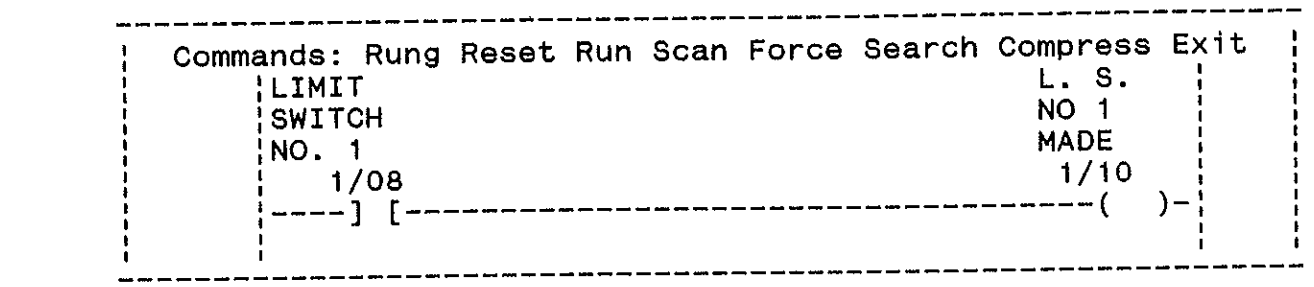
All the wire labels will be printed in the quantity specified. It might be a good idea to try your first print out on paper as it is much lower in cost than labels.

All of our default prompts represent average selections which you are free to change.

4-07 Run Program

Once you have created your control program it is important to run it in real time. Proving your program is just as important as creating it.

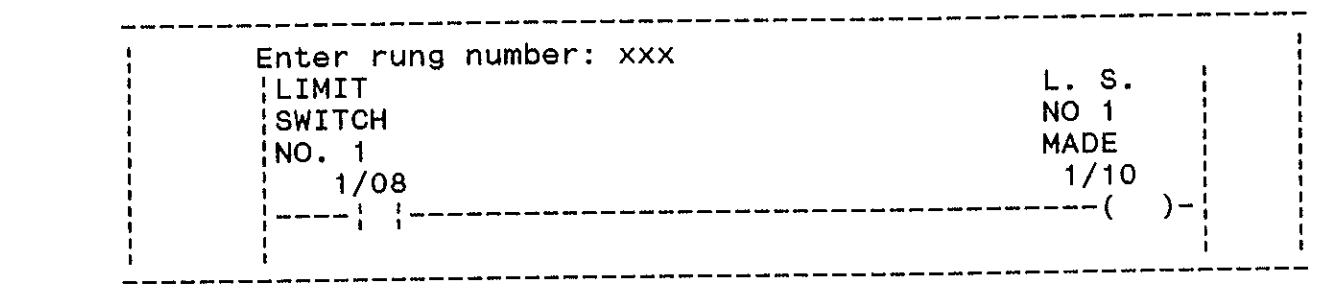
Place the highlight bar over the Run Program menu item and press <ENTER>. The other method is to press <U>. You will then see the run mode Command menu.



Items are selected from the Command Menu just as they are from the Main Menu. Use the arrow keys to move the highlight bar. If the item you want is highlighted, press <ENTER>. You can select an item by pressing the character representing the highlighted key.

RUNG

The rung command allows you to go to any rung in your program.



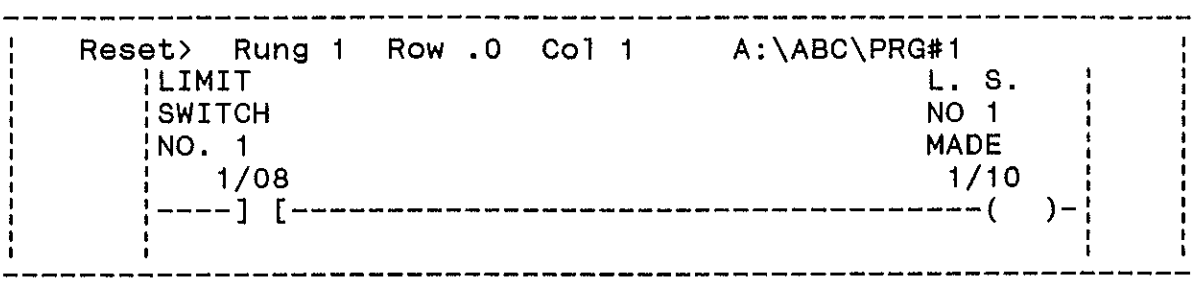
Just enter the rung number you want to go to and press <ENTER>. You will be taken to the specified rung. If you see that you want to make a change in your program, return to the Main Menu to select Edit Ladder Diagram mode. When toggling from Ladder to Run and back we keep you on the same rung number until you choose to go to another rung.

RESET

This mode allows you to reset the Outputs and CR's without having to return to the Main Menu. This menu item used with RUN or SCAN can help you to find a control problem that is haunting you.

4-07 Run Program (con't)

Here is your display after selecting Reset.



The current status is displayed (Reset). Also the Rung number, Row number and Column number. We also show the program filename so you have all the information you need.

RUN

Once you have selected Run, the watchdog timer will be blinking. If it does not blink, make sure that the Bear Bones type selected in Title Configuration agrees with the Bear Bones you are using. The factory default is 4K, but you can change this to suit your needs. Your new choice will be saved when you Write Program to Disk.

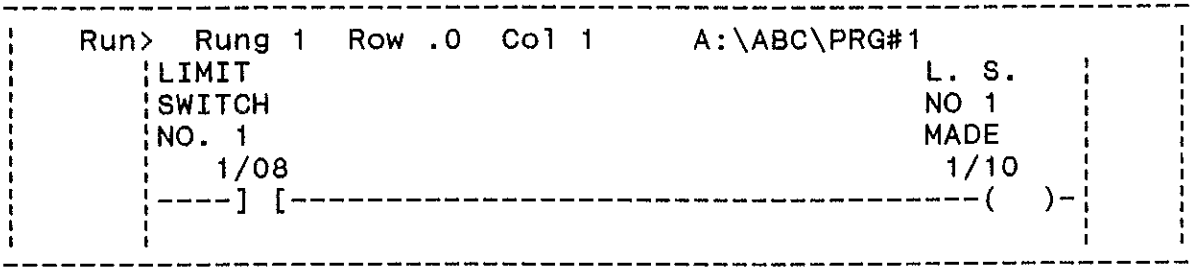
In this mode you can watch your logic go to work. Power flow is a must when trouble shooting. You can observe your contacts open and close. You can observe the setpoints and actual date of your timers, counters, drums, and all the other functions available in the PR-05 programmer.

Version 1.70 and higher

The ICM-DOC-01 version 1.74 or higher when used with the PIC-EM-02 Emulator will highlight the vertical bars for any logic being scanned. If the logic is not being scanned the vertical bars will not highlight. This added feature is valuable when End instructions are inside the program. If an End instruction is enabled or true the following logic will not be scanned because the program counter has been reset to memory location 0000.

All versions

The status of the run mode is always displayed.



4-07 Run Program (con't)

When you close input 1/08, the contact will change color if you have a color monitor. If your display is monochrome, the contact will intensify. You can change the factory set defaults in the DOC Configuration Menu. In version 1.70 or higher the color change or intensification will override the cursor.

If you note that a change in logic is required, leave the Run Menu and return to Edit Ladder Diagram. After making the change you can return to Run.

Remember that the changes you make are temporary until you make them permanent by programming an EPROM or writing the changes to disk.

SCAN

This option allows you to clock through your program for one scan. The scan starts at the cursor and ends at the same point in the program, but one scan later. With this powerful option you can check the action of one input by monitoring its effect for one scan with the input on. Then turn the input off and check the circuit again. The watchdog LED will not blink. It may be ON or OFF after completing the scan.

CAUTION ! !

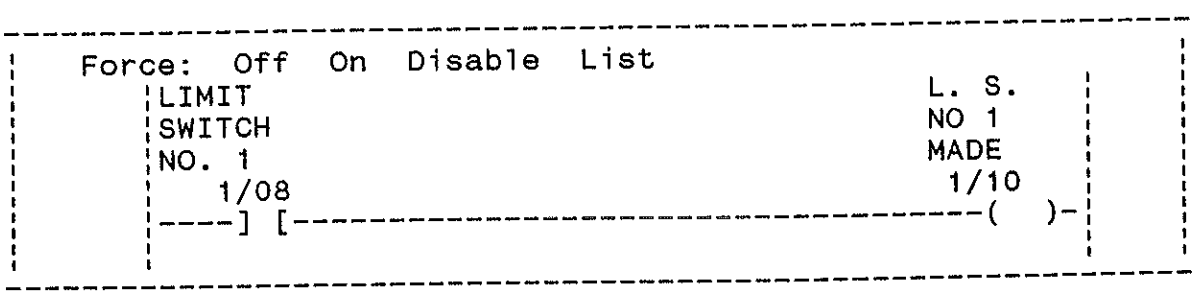
Timers will not always clock properly in the scan mode as you may scan when the timer is not being clocked.

FORCE

Choosing this option allows you to command logic elements in your program to be on or off. You can save many valuable hours while trouble shooting by simulating the effect of turning something on or off at just the right time. This will save time in checking the effect of turning remote devices such as limit switches on or off. Being able to force functions will also be a valuable time saver.

To force any logic element in your program, you must place the cursor over the element to be able to force it.

When you exit DOC & return to DOS all forced items are disabled.



4-07 Run Program (con't)

Off

With this option you can command logic off even if the LED is on.

On

With this option you can command logic on even if the LED is off.

Version 1.74 and Emulator

If the contact is N.O. and forced on it will be energized. If the contact is N.C. and forced on it will be de-energized.

All versions

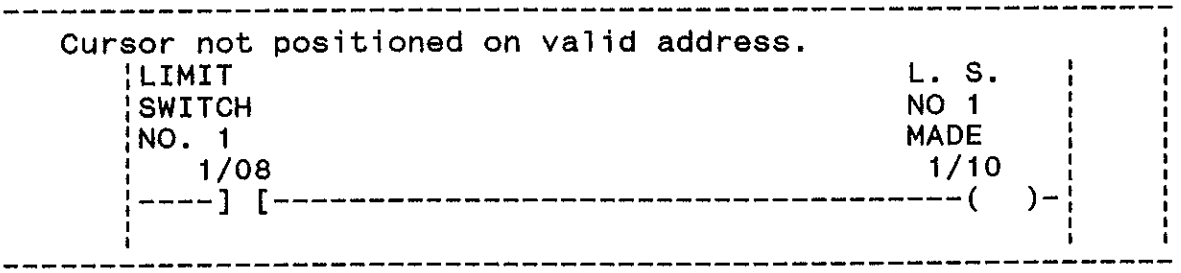
Disable

Disable will clear the forcing command for the element that the cursor is on.

List

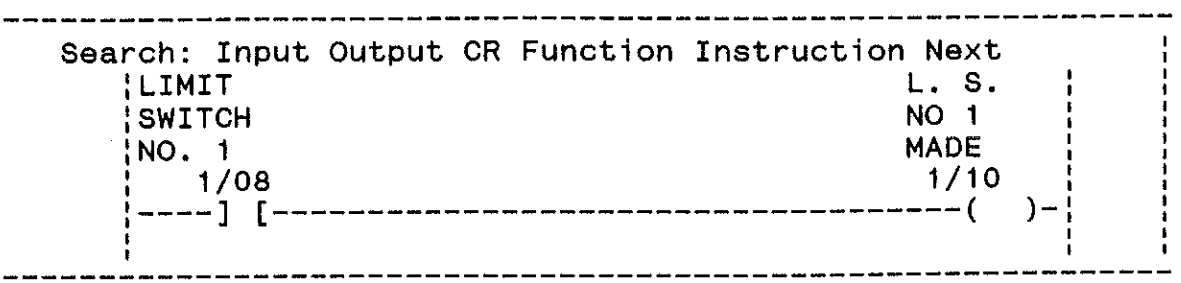
List will display all forced elements (Off & On)

If you attempt to force on or off when the cursor is not over a legal element, you will see this prompt:



SEARCH

Search lets you search for any of the listed items. It is very much like the Search menu in the Edit Ladder Diagram menu. Many of the displays are identical to the displays in the Edit Ladder Diagram mode.



Input

4-07 Run Program (con't)

The Input mode allows you to find any of the 125 inputs available to you. You can find any input anywhere in the program you have written. See Next for repeat searches of a given input.

Output

The Output mode allows you to find any of the 125 outputs that are available to you. You can find any output anywhere in the program. See Next for repeat searches of a given output.

CR

The CR mode allows you to find any of the 490 plus control relays available to you. You can find any relay anywhere in the program you have written.

Function

The Function mode allows you to find any of the 32 functions available to you. You may search for either the coil or the contact(s). This value added feature allows you to find any Drum or Shift Register contact just by entering its label.

Instruction

This mode permits you to search for the (L), (U) coils and contacts. In addition you can find the MCR, OEN and all the other powerful features of the Instruction set.

Next

This is one of the most used features during start up. Once you enter an element and you want to find all the other elements of the same address, use the Next feature. This minimizes the problem of entering the wrong address on subsequent searches.

COMPRESS

This is a toggle. You can compress the display which shows the ladder diagram by eliminating the I/O labels. If you are in the compress mode and select compress again, you will allow the I/O labels to be seen again. Without compress you can view 3 lines of ladder without having to scroll. With compress you can view 6 lines of ladder without having to scroll.

EXIT

Selecting Exit allows you to return to the Main Menu.

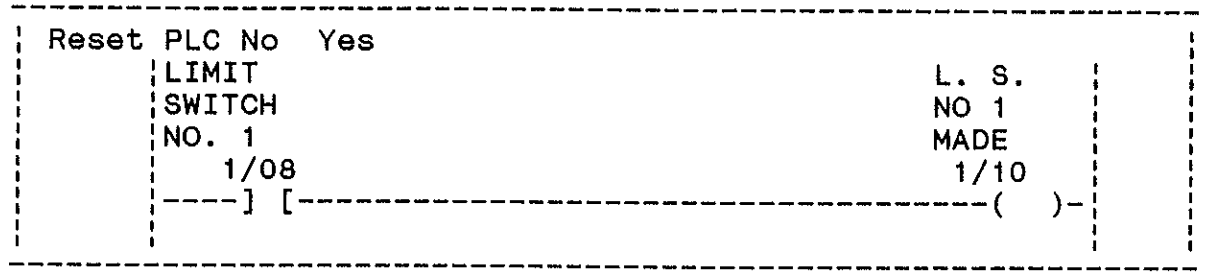
Version 1.69 and lower

When you exit the Run mode all outputs and CR's will be immediately reset. All functions will be returned to their "shelf" state.

Version 1.70 and higher

4-07 Run Program (con't)

When you exit the Run mode you will be given a chance to allow the CPU to continue to run. You must be using the ICM-EM-02 to take advantage of this feature. If you are using the ICM-IF-BB you cannot use this feature. If you are using the ICM-EM-02 then you will be prompted with this display.



If you choose Yes all outputs and CR's will be immediately reset. All functions will be returned to their "shelf" state.

C A U T I O N ! ! !

Exiting the RUN mode and leaving the CPU running should be done by experienced personnal only. You must read and understand all the listed comments before you attempt to take advantage of this feature.

If you choose No the PLC will continue to run and you will be returned to the Main Menu. Now you can execute any Main Menu item while the CPU is running.

Read Program from Disk

Read in the new program. You will reset all Outputs, CR's and Functions when you attempt to Run the new program.

Edit Ladder Diagram

You may edit the existing program or load in a new one. If any changes are made and you attempt to Run the Outputs, CR's and Functions will be reset before the revised or new program can be executed.

Edit Text Documentation

Changes will not effect the CPU operation.

Edit Wire Diagram

Changes will not effect the CPU operation.

Write Program to Disk

Writing your program to disk will not effect the CPU operation.

4-07 Run Program (con't)

Print Menu

You may print your program while it is running without effecting CPU operation.

Run Program

You may re-initiate this mode without effecting CPU operation providing no program changes were made. See Edit Ladder Diagram and Change Function Setpoint.

EPROM / Memory Menu

You may perform any EPROM function while running without effecting CPU operation.

Title Configuration

Any change other than PLC type will not effect operation. If you change PLC type to a non-compatible type you will get an error message when you attempt to run again.

Change Function Setpoint

Changing the setpoint of any function will cause all Outputs, CR's and Functions to be reset when you re-run the program.

DOC Configuration Menu

If you change the Intelligent Programmer address or Baud rate the Outputs, CR's and Functions will be reset when you re-run the program.

QUIT, Exit to DOS

Reset all Outputs, CR's and Functions when you exit to DOS.

4-08 EPROM / Memory Menu

After creating and testing your program you will use this mode to write your program to an EPROM. This mode also provides for reading a program from EPROM. You may even call up a program from PR-05 memory.

Place the highlight bar over the EPROM / Memory Menu item and press <ENTER>. The other method is to Press <E>. You will then see this menu. This example assumes that 2732A is the EPROM type to be used.

```
Divelbiss Advanced Documentation Software

E P R O M  /  M E M O R Y  M E N U

Program filename:

        R - Read Program from EPROM

        W - Write Program to EPROM

        V - Verify EPROM

        B - Blank EPROM Check

        U - Upload Program from Memory

        C - Change EPROM Type   2732A


Press SPACE to select, or ENTER to accept.
```

NOTE ! DOC 1.70 and above includes the ability to program Normal, Fast, & Quick configured EPROMS.

Items are selected from the Eprom/Memory Menu just as they are from the Main Menu. Use the arrow keys to move the highlight bar. If the item you want is highlighted press, <ENTER>. You also can select an item by pressing the highlighted key.

Take time now to review data sheet 7809-49 for the PIC Bear. This document shows how to insert the EPROM into the socket and insure a proper connection for the PR-05 as well. Orientation and polarity are your responsibility.

The DOC 1.70 or higher program allows you to select three speed ranges of eprom. This will reduce the time required to program the larger eproms. You must have a PR-05 Intelligent Programmer version 1.70 or higher to use this feature.

4-08 EPROM / Memory Menu (con't)

Read Program from EPROM

Once selected you will see this display.

```
Divelbiss Advanced Documentation Software

R E A D   E P R O M

Uploading program data..
```

After the EPROM has been read you will see this display.

```
Divelbiss Advanced Documentation Software

R E A D   E P R O M

EPROM read complete.
```

Since we check the EPROM while reading, the display might read "Failed Verification". This means the EPROM programming was not successful. You must erase the EPROM or try a new one.

Here is your display.

```
Divelbiss Advanced Documentation Software

V E R I F Y   E P R O M

Failed verification.
```

Once your display shows "EPROM read complete.", press <ENTER>. If a program is password protected you will see this display.

```
Divelbiss Advanced Documentation Software

R E A D   E P R O M

Enter access password:
```

4-08 EPROM / Memory Menu (con't)

Here you must enter one of the three possible passwords; USER Operator, or OEM. Section 4-09 explains each of these passwords.

```
Divelbiss Advanced Documentation Software

R E A D  E P R O M

Enter access password:  4
```

The password 4 is entered, but the correct choices are 1 for the Operator, 2 for the User or 3 for the OEM. You are not limited to these choices we use them for examples only.

```
Divelbiss Advanced Documentation Software

R E A D  E P R O M

Enter access password:  4

Unauthorized password.
```

Here we have pressed <ENTER> and we are denied access to the program because we have not entered one of the preprogrammed passwords. After three attempts, you will be returned to the EPROM menu.

If we had entered one of the correct passwords, or if there were no password in the EPROM, we would see this display.

```
Divelbiss Advanced Documentation Software

R E A D  E P R O M

Enter program filename:
```

Here again we remind you that a name is required for temporary disk storage. If you try to bypass this requirement this is your display.

4-08 EPROM / Memory Menu (con't)

```
Divelbiss Advanced Documentation Software

R E A D   E P R O M

Directory of A:\DEF\*
5 files 280K free

TEST  BEST  TEST1  BEST1  TAST

Press SPACE to select, or ENTER to accept
```

If you use an already existing file, DOC will upload the current ladder diagram from the PR-05 using the existing I/O descriptions text, and wire diagram files.

```
Divelbiss Advanced Documentation Software

R E A D   E P R O M

Enter program filename:  B:\ABC\PRG#1
```

The example filename will allot a temporary disk filename to save your program to. You must write your program to disk as explained in section 4-05.

Write program to EPROM

Writing a program to EPROM is just as easy as reading. Once selected you will get this display.

```
Divelbiss Advanced Documentation Software

W R I T E   E P R O M

Insert 2732A EPROM in PR-05 socket

Press SPACE to continue.
```

Should the EPROM type be incorrect, press <ESC> and refer to that part of this section to find out how to change EPROM types. Once the EPROM type is correct, press <SPACE> to display.

NOTE ! DOC 1.70 and higher

If eprom types are 2732 or 2732A you will be prompted to verify the PLC type of BB-2K or PIC-8K.

4-08 EPROM / Memory Menu (con't)

```
Divelbiss Advanced Documentation Software

W R I T E  E P R O M

Writing program to EPROM..
```

If the write process is a success this is your next display.

```
Divelbiss Advanced Documentation Software

W R I T E  E P R O M

Write complete.
```

Should you get a "Bad Verify" prompt your EPROM must be erased or replaced. Then you must try again. You could write to disk. See section 4-05 and try programming an EPROM later.

Verify EPROM

This mode allows you to check an EPROM against the program in memory. You can use this feature to verify one EPROM against another. Once selected you will see this display.

```
Divelbiss Advanced Documentation Software

V E R I F Y  E P R O M

Verifying memory with EPROM..
```

This next display follows without any action on your part.

```
Divelbiss Advanced Documentation Software

V E R I F Y  E P R O M

EPROM verification complete.
```

Should the EPROM fail verification this is the display.

4-08 EPROM / Memory Menu (con't)

```
Divelbiss Advanced Documentation Software

V E R I F Y   E P R O M

Failed verification.
```

Failed verification means that the program in computer memory and the EPROM program are not the same. It is not possible to determine which is correct for your application unless you test the program.

Blank EPROM check

Once selected this is your display

```
Divelbiss Advanced Documentation Software

B L A N K   E P R O M

Insert 2732A EPROM in PR-05 socket.

Press SPACE to continue.
```

Please review inserting EPROMS at the beginning of this section and selecting EPROM types at the end of this section before you continue. EPROMS can be electrically damaged if mishandled.

Once you select and insert the EPROM, here is your display.

```
Divelbiss Advanced Documentation Software

B L A N K   E P R O M

Checking blank EPROM
```

4-08 EPROM / Memory Menu (con't)

At this point you will get one of the following displays.

```
Divelbiss Advanced Documentation Software

B L A N K   E P R O M

EPROM blank check passed.
```

This is an erased EPROM and may be programmed.

```
Divelbiss Advanced Documentation Software

B L A N K   E P R O M

EPROM blank check failed.
```

This EPROM may not be programmed. It must be erased or replaced.

Upload Program from Memory

If you wish to upload a program directly from the PR-05 without programming an EPROM, we have provided this menu item. If you have an ICM program in the computer memory, this is your first display.

```
Divelbiss Advanced Documentation Software

U P L O A D   P R O G R A M

Save current program changes?  No  Yes
```

With this feature we won't let you forget to save all that time you spent entering a program. If you select Yes, this will be your next display.

```
Divelbiss Advanced Documentation Software

U P L O A D   P R O G R A M

Enter program filename:  A:\ABC\PRG#1
```

4-08 EPROM / Memory Menu (con't)

We have already entered our filename. This filename is for the program in the computer not in the PR-05.

If you have a filename like the one listed, you will see this.

```
Divelbiss Advanced Documentation Software

U P L O A D   P R O G R A M


Save current program changes?  No  Yes
```

Selecting Yes will be the same as Yes in the previous menu. The program will be written to disk unless it already exists. If you select No on the following menu, the current changes will be lost.If you select yes, you will overwrite the program on disk with the one in the computer. Once you have saved or not saved the current program, you will get this display.

```
Divelbiss Advanced Documentation Software

U P L O A D   P R O G R A M


Enter program filename:  A:\ABC\PRG#1
```

We have already entered our filename. This filename is for the program in the PR-05 not in the computer. Now press <ENTER> to get this display.

```
Divelbiss Advanced Documentation Software

U P L O A D   P R O G R A M


          Uploading program data..
```

Once the program is loaded you will be returned to the EPROM Main Menu.

Change EPROM Type

The last option in out EPROM Menu is Change EPROM Type. Once you choose this item, this is your display.

4-08 EPROM / Memory Menu (con't)

```
-------------------------------------------------------------
|          Divelbiss Advanced Documentation Software        |
|                                                           |
|                     E P R O M   T Y P E                   |
|                                                           |
|                                                           |
|   EPROM type: 2716 2732 2732A 2764 2764A 27128 27128A     |
|                                                           |
|                                                           |
-------------------------------------------------------------
```

As with all our highlighted sub-menus, you strike the space bar to highlight the item you want and then press <ENTER>. You will then see this screen.

You may change the PLC type if it does not match the eprom type.

NOTE ! DOC 1.70 and higher

Your next display will allow selection of:

```
Normal  Programs at  50ms per pulse.
Fast    Programs at   1ms per pulse.
Quick   Programs at 0.1ms per pulse.
```

```
-------------------------------------------------------------
|          Divelbiss Advanced Documentation Software        |
|                                                           |
|                     E P R O M   T Y P E                   |
|                                                           |
|                                                           |
|                     Storing EPROM type. .                 |
|                                                           |
|                                                           |
-------------------------------------------------------------
```

You will see this display only briefly. The EPROM Menu will be displayed with the EPROM type you have chosen on the screen to remind you of your current EPROM type.

Use caution when handling eproms. Be very careful to carry them only when protected against static. Handing an eprom to another person can also damage the eprom. Always set the eprom down and let the other individual pick it up.

4-09 Title Configuration

You can personalize your print out. You also select the type of controller, enter passwords, and allow the USER to see or print your program.

Place the highlight bar over the Title Configuration menu item and press <ENTER>. The other method is to press <C>. You will then see a display similar to this one. This display is for version 1.70 and higher.

All of the information in the Title is programmed into your EPROM.

```
          Divelbiss Advanced Documentation Software

                T I T L E   C O N F I G U R A T I O N

Program Title:                Can be up to 30 characters.
Revision:                     Revision can be up to 6 characters.
Date:  mm/dd/yy               Date is entered in standard form.
PLC model:  2  1.BB-2k  2.BB-4k  3.320A  4.PIC-8k  5.PIC-16k

Programmer:                   Can be up to 40 characters.
Company name:                 Can be up to 40 characters.
Company data:                 Can be up to 40 characters.
Company data:                 Can be up to 40 characters.

Operator password:            Can be up to 6 characters.
User password:                Can be up to 6 characters.
OEM password:                 Can be up to 6 characters.

User view OEM rungs:  Yes
User print OEM rungs:  Yes
```

Should you wish to bypass any of the options, just press <ENTER> at that option or the down arrow key. To bypass all options press <ESC>.

Program Title can refer to a specific project or machine. The Revision can reflect modifications and when used with the disk filename (see section 4-05) will give you a history of any job. Date will be used to remind you of when the program or upgrade was done.

You must select a PLC number. This is necessary information used when running a program in real time. Refer to the appendix for the data sheet specifications for your Bear Bones. We have built in a default to item 2 (BB-4K), unless there is another type PLC stored in the PR-05 as a result of your last selection.

You can put your name in as a programmer. The Company area can be used for the name, street address, city & state data.

4-09 Title Configuration (con't)

Password protection can be very important if you want to limit access to your program. The password security system is divided into three levels: Operator, User, and OEM.

Operator

With this password you can access the function setpoints only. You cannot add to or change the program. If you attempt to get into the program you will be denied access.

User

With this password you can do anything the operator can plus you will be able to add to the OEM program. You will not be allowed to change the OEM part of the program.

OEM

With this password you can do anything the user can plus you can change the program.

The last two items give the User the right to view and/or print the program. This permission is given by the OEM.

Here is an example of what the Title Configuration can do.

```
Divelbiss Advanced Documentation Software

T I T L E   C O N F I G U R A T I O N

Program Title:              Three Floor Elevator.
Revision:                   02
Date:  mm/dd/yy             10/15/87
PLC model:  2  1.BB-2k  2.BB-4k  3.320A  4.PIC-8k  5.PIC-16k

Programmer:                 Joe Q. Doe
Company name:               Z. P. Q. Elevators
Company data:               1919 South Harris Road
Company data:               Anytown, Ohio 43019

Operator password:          3FE
User password:              FE6
OEM password:               1a4c

User view OEM rungs:  No
User print OEM rungs:  No
```

4-10 Change Function Setpoint

You can re-program any function setpoint that is entered in your PR-05. This mode may be accessed with any password.

Place the highlight bar over the Change Function Setpoint menu item and press <ENTER>. The other method is to press <S>. You will then see this menu.

```
Divelbiss Advanced Documentation Software

F U N C T I O N   S E T P O I N T


Function type:  TDPU  TDDO  RET  PGEN  CNTR  DR
```

Here you can select which function to change. Keeping this item choice separate from the Edit mode is how we allow the operator to change setpoints without getting into your program. After the function TDPU is chosen, here is the next sub-menu.

```
Divelbiss Advanced Documentation Software

F U N C T I O N   S E T P O I N T


Enter TDPU number:  2
```

In our original program we programmed TDPU 1. This prompt is for the next TDPU number. Should you press <ENTER> without selecting a valid function number, you will see this display.

```
Divelbiss Advanced Documentation Software

F U N C T I O N   S E T P O I N T


Enter TDPU number:  2              Function not found.
```

Press <Esc> to return to the Main Menu and choose TDPU 1. You will then find yourself at this sub-menu.

4-10 Change Function Setpoint (con't)

```
Divelbiss Advanced Documentation Software

F U N C T I O N   S E T P O I N T


Timer base:  0.1 sec  1 sec  0.1 min  1 min
```

After choosing your base, your next menu will be.

```
Divelbiss Advanced Documentation Software

F U N C T I O N   S E T P O I N T


Setpoint value:  15
```

Here we have entered the digit 15. If the time base had been 0.1 sec and we had chosen Internal, our timer setpoint would be 1.5 seconds.

Changing a function setpoint is identical to programming the setpoint originally.

Of course you cannot change ABR setpoints in this program as the ABR setpoints are stored in the Access Bear. Since the SR's do not have programmed setpoints, you cannot change them in this mode.

4-11 DOC Configuration Menu

This mode simplifies setting up your computer to take advantage of the ICM programming capabilities.

Place the highlight bar over the DOC Configuration Menu item and press <ENTER>. The other method is to press <D>. You will then see this menu.

```
Divelbiss Advanced Documentation Software

D O C   C O N F I G U R A T I O N   M E N U

     C - PC Configuration

     P - Printer Configuration

     L - Wire Label Configuration

Press SPACE to select, or ENTER to accept.
```

Items are selected from the Configuration Menu just as they are from the Main Menu. Use the arrow keys to move the highlight bar. If the item you want is highlighted, press <ENTER>. You also can select an item by pressing the highlighted key.

When you choose PC Configuration this is your new menu.

```
Divelbiss Advanced Documentation Software

     P C   C O N F I G U R A T I O N


Intelligent Programmer serial port: 1
Intelligent Programmer baud rate: 4800

Parallel Printer port: 1

Serial Printer port: 2
Serial printer baud rate: 300

Foreground screen color:   2
Background screen color:   0
Highlight screen color:   15
Reverse screen color:      2
```

4-11 DOC Configuration Menu (con't)

You may choose serial ports 1 or 2 for your PR-05 or serial port printer. If you set both to the same port you will get an error prompt.

You may choose parallel printer ports 1, 2, or 3.

If you change the programmer baud rate, be sure to set up the PR-05 for the same baud rate. Press <ESC> to return to the DOC Configuration Menu. Your options are 300, 600, 1200, 2400, 4800, and 9600 for version 1.59 or lower. If you have version 1.70 or higher you may also choose 19,200.

If you change the printer baud rate, be sure there is a setting in your printer for the baud rate you select.

See paragraph 2.05, section 2 for an explanation of character values for color and monochrome monitors.

```
Divelbiss Advanced Documentation Software

P R I N T E R   C O N F I G U R A T I O N


Page length:  66
Printable lines per page:  60
Horizontal character value:  45
Vertical character value:  124
Junction character value:  43
Branch down character value:  43
Branch up character value:  43
Branch right character value:  43
Branch left character value:  43
Upper left corner character value:  43
Upper right corner character value:  43
Lower left corner character value:  43
Lower right corner character value: 43
```

Normally these values do not need to be changed. Refer to your printer manual before making any changes. Be sure to record our listed values prior to making any changes. Press <ESC> to return to the DOC Configuration Menu.

Since not all tractor or friction fed labels are the same configuration, we give you the chance to set up to meet the requirements of your format.

4-11 DOC Configuration Menu (con't)

```
Divelbiss Advanced Documentation Software

W I R E  L A B E L  C O N F I G U R A T I O N

Wire label characters:  10

Wire label lines:  2

Wire labels across carrier:  4
```

We have selected what we believe to be reasonably standard settings. You may change them to suit your requirements. Press <ESC> to return to the DOC Configuration Menu.

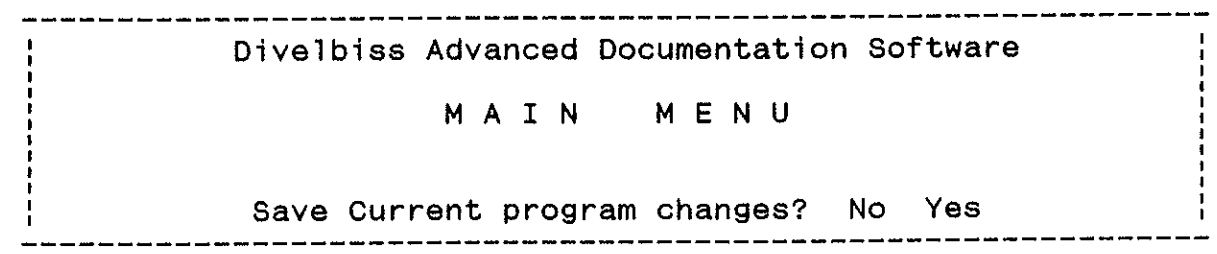
4-12 Quit, Exit to DOS

You can go directly to DOS from your ICM program.
Do not forget to save your ICM program to disk first.

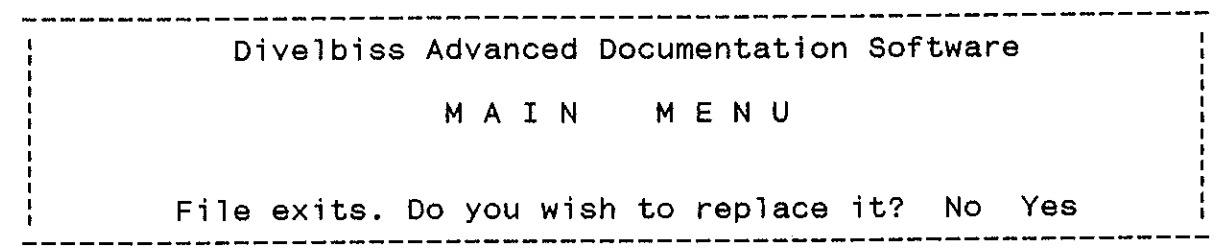
Place the highlight bar over the Quit, Exit to DOS menu item and press <ENTER>. The other method is to press <Q>.

If you have saved all your program files to disk, you will be returned to the DOS directory you were in when you typed in <DOCSTART>.

If you have not saved all your program files to disk, you will see this prompt.



If you have modified an existing file you will see this prompt.



If you say YES, the disk will be rewritten with your new program. If you say NO, you will be prompted for a new filename. If you press <ESC> to get out of this mode, all changes will be lost.

The Keyboard

The Divelbiss Advanced Documentation Package contains some very special capabilities. Some of these advanced features are special key strokes which make your ladder programming easier. These special features exist in EDIT, RUN, & WIRE modes.

The following sections make it easy for you to find the keys which perform those special functions. We have listed these features by symbol (-] [-). Most of us recognize the N.O. or normally open contact symbol. By scanning the following pages you will find all ladder elements grouped. This makes it very easy to find any contact element and the key stroke that will put that symbol on the screen.

Ladder Symbol Assignments

Symbol	Description	Menu(s)		Key
-] [-	N.O. Contact	Edit Ladder	And	Q
-]/[-	N.C. Contact	Edit Wire	And	W
-( )-	Standard Output	Run		E
-(/)-	Complimented Output	"		R
CR	Control Relay	"		T
-(L)-	Latch Coil	"		A
-(U)-	Unlatch Coil	"		S

Instruction Symbol Assignments

Instr.	Description	Menu(s)		Key
MCR	Master Control Relay	Edit Ladder	And	D
OEN	Output Enable	Edit Wire		F
CMP	Compare	"		Z
SKP	Skip	"		X
END	End	"		C

The Keyboard (con't)

Connection Symbol Assignments

Symbol	Description	Menu(s)	Key
-	Horizontal Line	Edit Ladder And	U
¦	Vertical Line	Edit Wire	I
+	Cross Connection	"	O
¦-	Branch Right	"	J
-¦	Branch Left	"	L
--- ¦	Branch Down	"	K
¦ ---	Branch Up	"	<
¦ -	Elbow Right	"	M
¦ -	Elbow Left	"	>
-- ¦	Elbow Left Down	Wire Only	:
-- ¦	Elbow Right Down	"	?
¦ ¦	Wire Through	"	P

Special Key Assignments

ADD	Change Address	Edit Ladder And	G
FUN	Select Function	Edit Wire	V
DES	Change Description	"	B

NOTE ! The word processor used for this document does not support the IBM character set. The key symbols are done with as close as possible to the symbols that are displayed on your screen.

The Keyboard (con't)

Cursor Movement Keys

The input fields may be edited with the following keys.

CTRL-S. or left arrow:	Moves the cursor one character left.
CTRL-L. or right arrow:	Moves the cursor one character right.
CTRL-E. or up arrow:	Moves the cursor up one line.
CTRL-X. or down arrow:	Moves the cursor one down one line.
CTRL-A. or CTRL-left arrow:	Moves the cursor one word left.
CTRL-F. or CTRL-right arrow:	Moves the cursor one word right.
CTRL-W. or HOME:	Moves the cursor to the beginning of the field.
CTRL-Z. or END:	Moves the cursor to the end of the field.
BACKSPACE:	Deletes the character before the cursor and moves the cursor one character left.
CTRL-G. or DEL:	Deletes the character under the cursor.
CTRL-V or INS:	Toggles the insert mode ON & OFF. The cursor will change to a smaller size when the insert mode is on.
CTRL-L:	Restores the line with the original contents as long as the cursor has not left that line.
CTRL-Y:	Removes characters beginning at the cursor position to the end the field.
ENTER:	Enters the value.

Ladder Diagram Keys

PGUP PGDN ENTER HOME END ¦ ¦ <- -> SPACE

Wire Diagram Keys

SPACE ¦ ¦ <- -> HOME END

Text Keys

PGUP PGDN HOME END ¦ ¦ <- ->

Versions

There are four versions of the Advanced Documentation Package.

Version 1.52

This is the oldest version and offers the fewest enhancements. The maximum recommended baud rate to be used with the PR-05 is 4800. This version will not support PR-05s version 1.62 or 1.74.

Version 1.52 can be upgraded to 1.74 at a minimal fee. Call for the current cost.

Version 1.61

This version offers some enhancements over version 1.52. The maximum recommended baud rate is 9600. This version will not support PR-05s versions 1.50 or 1.74.

Version 1.61 is replaced by version 1.74. Call for a free upgrade.

Version 1.74

This version and offers significant enhancements over versions 1.52 or 1.61. The maximum recommended baud rate is 19.2K. This version will not support PR-05s versions 1.50 or 1.62.

Version 1.81

This is the current version and offers some enhancements over versions 1.52, 1.61 and 1.74. The maximum recommended baud rate is 19.2K. This version will support the High Density Central Processing Units with the rententive memory features. This version will not support PR-05's versions 1.50, 1.62 or 1.74.

NOTE:

Software upgrades for registered users are free of charge. Before requesting an upgrade be sure of your hardware compatibility.

ADVANCED DOC VERSION 1.81 SUPPLEMENT TO 1.74 MANUAL

Version 1.81 of the Advanced DOC enables the Advanced DOC to be used with the Divelbiss High Density product line.

Divelbiss Corporation makes every effort to keep all our new releases downward compatible. Version 1.81 for the Advanced DOC is no exception to this rule. Version 1.81 will work with all the products & programs that version 1.74 did, the only changes made were for the addition of the High Density products.

Description of the High Density Product Line

The high density product line programs the same as the ICM or PIC products. The major differences are listed below.

1. Smaller board size with same processing power.
2. All High density Controllers come standard with 16k Eprom
3. Available Retentive memory features to save values of on- board timers, counters, shift registers, drums & control relay states in the event of power loss.
4. Din Rail mounting.
5. No I\O on CPU. All I\O is done with expander boards for more flexibility when configuring a system.

VERSION 1.81 ENHANCEMENTS FOR Advanced DOC

1. There are two additional PLC types you can select in the CONFIGURE menu. They are HD-16k & rHD-16k. The rHD-16k is the CPU with the retentive memory.

2. When rHD-16k is selected as the PLC type. An option will be given to retain the state of a CR or the value of a function.

3. While editing the ladder diagram, another command is available to you called REDISPLAY. The REDISPLAY command is used to redisplay a rung that has been changed. A change meaning a Control Relay or a Funcion has been changed from retentive to non-retentive or vice-versa. The REDISPLAY option will allow the display on the personal computer to reflect the global change. See next page, section 2 C for invoking the REDISPLAY command.

Note: Be sure to select rHD16K when you are using the Nov Ram option. You must select the rHD16K before reading from or writing to an EPROM and before you edit a program using the retentive option.

SELECTING THE RETENTIVE OPTION

1. For Functions or Control Relays (CR) used for the first time.

   A. After entering a CR and its address, you are given the option of making that CR retentive. To make your selection, highlight your selection using your cursor control keys or by pressing the highlighted letter corresponding to your selection. The state of the CR will be retained when power is lost.

   B. After selecting a function, the Advanced Doc will give you the option of making the function retain its value upon power loss. To make your selection, highlight your selection using your cursor control keys or by pressing the highlighted letter corresponding to your selection.

   The following table lists the function and the values that are retained upon power loss.

FUNCTION	RETAINED VALUE
Drum Sequencer	Step
Counter	Count
Timer	Time
Shift Register	Bit Registers

NOTE: **Care should be exercised when selecting a function or CR to retain its value when the power is restored. It is possible that damage to Personnel or machinery may result if an incorrect decision is made. When trouble shooting a machine or program that has the retained values special precautions need to be taken to assure the retained items pose no threat to personnel or machinery.**

2. Changing the retentive feature for Functions or CRs already programmed.

   A. To change an existing CR, position cursor over contact or coil to be changed. When the cursor is in position, press the T key and reenter the CR number. After entering the CR number, you are given the option of making that CR retentive. To make your selection, highlight your selection using your cursor control keys or by pressing the highlighted letter corresponding to your selection.

B. To change an existing Function, position cursor any place inside of the function box, press escape and choose the SETPOINT menu item. After entering the setpoint, you are given the option of making that Function retentive. To make your selection, highlight your selection using your cursor control keys or by pressing the highlighted letter corresponding to your selection.

C. If a CR or Function appears in several places on the screen, changing the retentive status in one place may not update the display of the changed status on the same screen, even though the change was made. To update the screen to reflect the change in status, choose the REDISPLAY command by pressing ESCAPE and selecting RUNG from the menu, then select REDISPLAY and the updating is done. If you switch to another rung and return to the previous rung, the updating will be done automatically. REDISPLAY only effects the display. The program will have made the change even if REDISPLAY is not preformed.

Example: In Rung #1 are the contacts for CR-001 programmed several times. After changing CR-001 to the retained state (rCR-001), the change will only be reflected on that particular CR (contact or coil). The change was made globally throughout the program, but is not reflected on that rung yet. When you select redisplay you can see the change reflected on all the contacts for CR-001.

NOTES: **On the status line of the LCD display on the PR-05 retentive CRs or functions will have a lower case r in front of the address.**

Example rCR-001 or rTDPU01

For EPROMS 27C128(12.5v), use the 27128A