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PART ONE - LADDER DEVELOPMENT AND DOCUMENTATION



SECTION 1 - INTRODUCTION

1.1 INTRODUCTION

The Giddings and Lewis Ladder Development System (GLLADD) is a group of software programs for the IBM Personal Computer or IBM compatible computers. These programs are designed to support the Giddings and Lewis Programmable industrial Computers (PiC's). GLLADD provides users with ladder diagram development and documentation capabilities and remote control of the PiC.

For your own protection, a backup copy of the GLLADD disk should be made as soon as possible. For disk copying instructions, refer to Section 2 in this manual and to the manual supplied with your disk operating system (DOS) software. Store the original GLLADD disk in a safe place. Use only the backup copy for ladder development and documentation.

The GLLADD disk is supplied with a write protect tab to prevent the software from being erased. DO NOT REMOVE THIS TAB. The backup disk however, must be "written to" during the initialization procedure. Do not put a write protect tab on the backup copy of GLLADD until after the initialization procedure described in Section 2.2 is completed.

1.2 DESCRIPTION

GLLADD is menu driven and easy to use. The software, ladder diagrams and documented ladder files will be saved on floppy or hard disks for easy storage and fast retrieval. GLLADD will perform the following functions:

1. Provide for creating, editing and compiling LDN's on an IBM PC or compatible computer.
2. Document and cross reference Ladder Diagram Networks (LDN's).
3. Output documented LDN's to a printer or disk.
4. Provide for renaming, copying and deleting LDN's and definition files on disk.
5. Keep a directory of LDN's on disk.
6. Support an RS-232C communications link to the G&L PiC control panel.
7. Provide for remote control of the PiC using the AUX 1 mode.
8. Load and install G&L Call Routines from a disk.

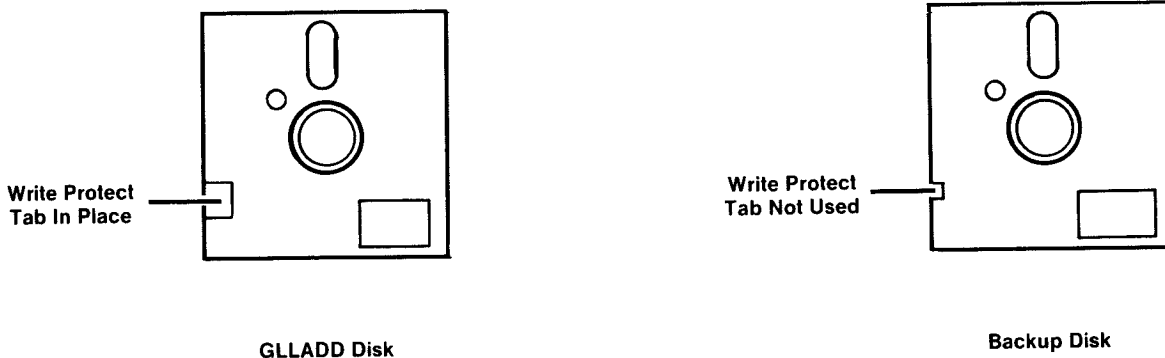


FIGURE 1.1 WRITE PROTECT TAB

9. Transfer LDN and data files between a disk and a G&L PiC.
10. Transfer LDN's and data files between a disk and a STR/LINK II or STR/LINK III tape loader.

1.3 SYSTEM REQUIREMENTS

The following items are required if GLLADD (version 2.0 or higher) is to be used.

1. One IBM Personal Computer or compatible system with the following features:
 - Two disk drives
 - At least 192K of internal memory (256K or more preferred).
 - An RS-232C port (COM1 or COM2)
 - A printer port
2. Disk operating system software (IBM PC DOS or MS DOS) and DOS manual.
3. One GLLADD Software Disk.
4. Floppy disks or hard disk for file storage and backup.
5. One Giddings and Lewis Programmable Industrial Computer (PiC).
6. A printer with at least 80 characters per line. A wide bed printer with 136 characters per line is recommended.

Optional:

1. STR LINK II cassette or STR LINK III data cartridge tape loader.
2. Ladder Diagrams on tape that require documentation.
3. Blank tapes for data storage.
4. Call Routine software on floppy disk.

1.4 PC400, PiC409 AND PiC49

GLLADD works primarily with the G&L PiC409 and PiC49. The software is capable of documenting a PC400 LDN if the LDN is recorded on tape using a STR LINK II or STR LINK III tape loader. However, the computer cannot be used as a terminal or editor for the PC400.

The references to the PiC409 are the same for the PiC49 and the PiC409. If you have a PiC49, use it the same way that a PiC409 is used.

1.5 KEYBOARD STICKERS

A set of keyboard stickers is supplied with each new GLLADD package. These stickers show the ladder programming symbols associated with a specific key. Remove any dirt or moisture from the computer keys. Remove the stickers from the backing sheet and adhere them to the tops of the corresponding keys on the computer keyboard.

SECTION 2 - START-UP

2.1 BACKING UP THE GLLADD SOFTWARE

Before running GLLADD, the user must create a backup copy on either a floppy or a hard disk. In addition to the GLLADD software files, the backup disk must also contain certain DOS (disk operating system) files. Refer to Section 2.1.1 if your system uses two floppy disk drives. Refer to Section 2.1.2 if your system uses one floppy and one hard disk drive.

NOTE

The user must be familiar with the G&L Programmable industrial Computer and Ladder Diagram programming to use the GLLADD software. Refer to the PiC409 Family Programming Manual for programming and operating instructions.

Before using GLLADD, the operator should also be familiar with the computer's DOS (disk operating system). It is beyond the scope and intent of this manual to provide instructions for using DOS. Please refer to your DOS manual when DOS commands are required.

2.1.1 Systems With Two Floppy Disk Drives

To format a file disk and create a backup copy of GLLADD onto another floppy disk, follow the steps listed as follows:

1. Insert your DOS disk into Drive A
1. Insert your DOS disk into Drive A
2. Insert a blank disk into Drive B
3. Format the blank disk in Drive B by entering "FORMAT B:/S" and a return after the A> prompt.

Start-Up

IMPORTANT

The FORMAT command will erase all of the memory on any disk including a hard disk. DO NOT FORMAT A DISK UNLESS IT HAS NEVER BEEN USED BEFORE OR IF THE DISK DOES NOT CONTAIN ANY INFORMATION THAT HAS TO BE SAVED.

4. When the formatting is complete, remove the disk from Drive B and set it aside. This disk will be used for LDN storage and the documentation database.

The computer will ask if you wish to format another disk. Press the Y (yes) key and insert another blank disk into Drive B. Once formatted, this disk will be used as the GLLADD backup disk.

5. The computer will ask you again if you wish to format another disk. press the N (no) key. The A> prompt will reappear.
6. Add a CONFIG.SYS file to the backup disk in Drive B by entering the following lines after the A> prompt.

```
COPY CON: B:CONFIG.SYS  
(return)  
BUFFERS=20 (return)  
(press the F6 key) (return)
```

Using less than 20 buffers will cause GLLADD to run inefficiently with a slow response time.

7. (optional) By adding an AUTOEXEC.BAT file to the backup disk, the computer will automatically start up the GLLADD software when the GLLADD backup disk is inserted into drive A and the power is turned on.

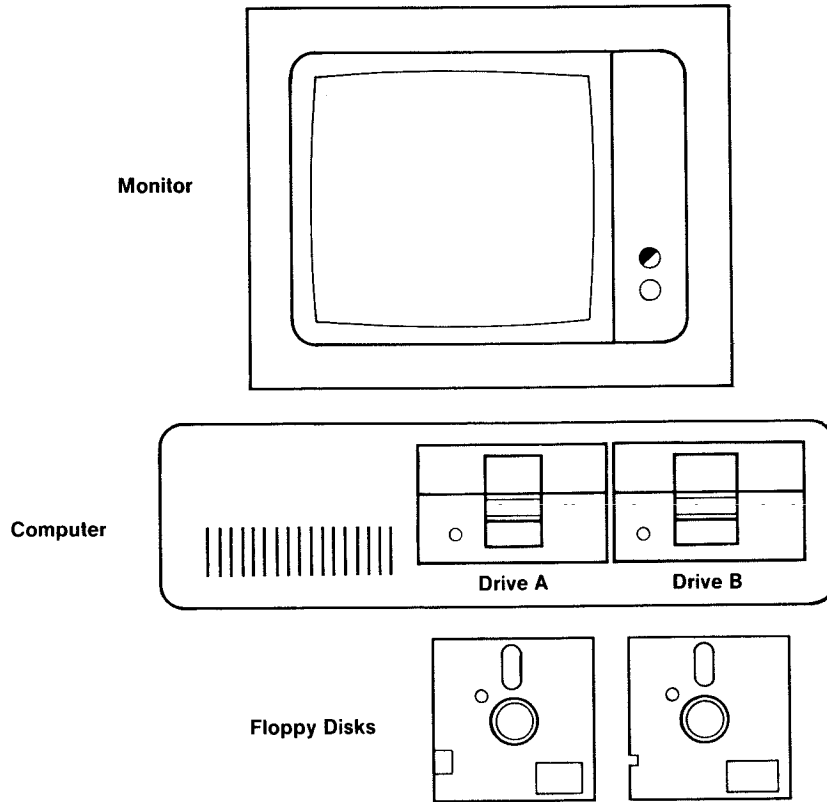


FIGURE 2.1 TYPICAL DUAL FLOPPY DISK SYSTEM

To add an AUTOEXEC.BAT file to the backup disk in Drive B, enter the following lines after the A> prompt.

```
COPY CON: B:AUTOEXEC.BAT
(return)
GLLADD (return)
(press the F6 key) (return)
```

To add more lines to the AUTOEXEC.BAT file, such as the time from a battery backed clock or RAM disk information etc., refer to the section on BATCH commands in the DOS manual.

8. Remove the DOS disk from Drive A and return it to its storage place.
9. Remove the backup disk from Drive B and insert it into Drive A.
10. Insert the G&L GLLADD disk into Drive B.

11. Copy all of the files from the GLLADD disk in Drive B to the backup disk in drive A by entering the following line after the A> prompt.

```
COPY B:*.*/V
```

When copying the GLLADD files, be sure to specify "*.*" (asterisk/period/asterisk) instead of a file name and extension. This allows you to copy all of the GLLADD files with a single COPY command.

The "/V" parameter in the COPY command is used to verify that the COPY operation is executed properly.

12. Remove the GLLADD disk from drive B and store it in a safe place.

13. Insert the formatted file disk set aside for LDN storage and the documentation database into Drive B.

14. Type "GLLADD" after the "A>" prompt and press the return key to run GLLADD.

From now on, each time GLLADD is to be used, insert the GLLADD backup disk into Drive A and the storage disk into Drive B. Turn the power on.

If you created an "AUTOEXEC.BAT" file (see step 7), the GLLADD software will start up automatically. Otherwise, type "GLLADD" after the DOS "A>" prompt to start up the GLLADD software.

IMPORTANT

After copying the GLLADD files onto a backup disk, store the original GLLADD disk in a safe place. It should only be used to make another backup copy if the first copy you made fails.

2.1.2 Systems With One Floppy and One Hard Disk

If you are using a computer with a single floppy and a single hard (fixed) disk drive, there are several options available. The hard disk can be used to store any combination of the GLLADD software, LDN and documentation database files, GLLADD ladder listings, data files and G&L Call Routines.

We recommend using a subdirectory on the hard disk to be used only for GLLADD files. Use the DOS MD (make directory) command to create the subdirectory.

Use the DOS COPY command to copy all of the files from the G&L GLLADD disk into this subdirectory.

If you are using a Call Routine disk supplied by G&L, copy all of the files from that disk into the GLLADD subdirectory as well.

If you intend to store your working files (ladder diagram networks, ladder listings, documentation files etc.), on the hard disk, store these files in the GLLADD subdirectory also. Otherwise, these work files can be stored on floppy disk using a different drive.

If you decide to use a GLLADD subdirectory on the hard disk, the following items are required before the computer can be used for GLLADD.

1. A subdirectory for use with GLLADD must be created using the DOS MD (make directory) command.
2. A PATH command must be set up to direct the computer to search for GLLADD related information within the GLLADD subdirectory.
3. GLLADD working files (LDN's, ladder listings, documentation files etc.) must be stored in the active directory on the disk drive.

If these files are to be stored in the GLLADD subdirectory on the hard disk, use the DOS CD (change directory) command to make the working file subdirectory the active directory.

The PATH and CD commands must be entered each time the computer is turned on. These commands may be typed in by hand. However, it is typically easier to put the commands in a BATCH file so they will be automatically entered and executed whenever GLLADD is used.

Refer to your DOS manual for instructions when creating subdirectories, BATCH files and using any of the DOS commands.

NOTE

At least 20 disk buffers (BUFFERS=20) are required for the GLLADD software to operate efficiently. Create a CONFIG.SYS file in your hard drive default directory that specifies at least 20 buffers (BUFFERS=20).

If any other application programs on your hard disk cannot work with 20 buffers, you may wish to use a floppy disk for the GLLADD backup disk instead. If this is the case, refer to Section 2.1.1. Otherwise, refer to your DOS manual for setting up a config.sys file.

IMPORTANT

After copying the GLLADD files onto a backup disk, store the original GLLADD disk in a safe place. It should only be used to make another backup copy if the first copy you made fails.

The FORMAT command will erase all of the memory on any disk including a hard disk. DO NOT FORMAT A DISK UNLESS IT HAS NEVER BEEN USED BEFORE OR IF THE DISK DOES NOT CONTAIN ANY INFORMATION THAT HAS TO BE SAVED.

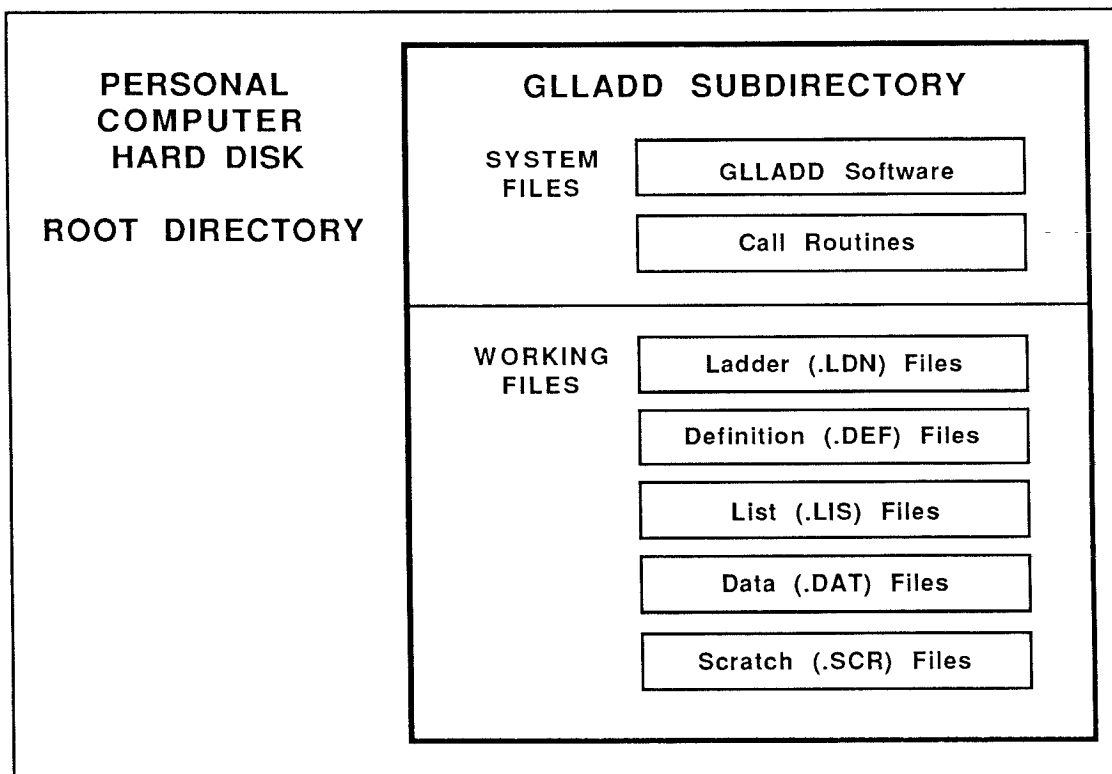


FIGURE 2-2 SUGGESTED HARD DISK CONFIGURATION

2.2 INITIALIZING THE GLLADD SOFTWARE

When running the GLLADD software for the first time, the word GLLADD will appear on the monitor with the version number and copyright notice.

The monitor will then display some descriptive information along with instructions for setting up an initialization file called GLLADD.INT. The initialization parameters of this file configure the software to fit the particular hardware for each user.

The initialization file is set up only once. After GLLADD is initialized, the instructions for setting up the file will not be run again.

Answer all of the initialization questions carefully. If the parameter to be used is the same as the one in the brackets ([]), the return key may be pressed without entering the parameter. This parameter will be entered into the file automatically.

After the initialization process is complete, the monitor will display the main menu. From now on, whenever the user inserts the GLLADD disk and turns on the computer, the software will go straight from the title display to the main menu.

NOTE

The write protect notch must not be covered during the initialization procedure. However, when the procedure is completed, cover the notch with a write protect tab to prevent accidental erasure of your disk files.

2.2.1 GLLADD Initialization Parameters

The specific questions asked by the GLLADD software to create the initialization file are as follows:

-
1. GLLADD will build ladder memory disk files '<laddername>.LDN', ladder documentation definition files '<laddername>.DEF' and data files '<filename>.DAT'. Please indicate the disk drive on which these working files are to be built. GLLADD will use the current directory on that drive. The drive in brackets will be used if none other is specified.

Working Drive (a,[b],c)?

Specify the disk drive where you intend to store both your ladder diagram and documentation files. If you are using two floppy disk drives, this would be drive B.

If you are using a system with one hard disk and one floppy disk drive, this would either be drive C (for storage on the hard disk) or drive A (for storage on the floppy disk drive).

2. GLLADD will need to build a scratch file 'GLLADD.SCR', to collect ladder contact cross reference information. Please indicate the disk drive on which this temporary file should be built. GLLADD will use the current directory on that drive. The drive in brackets will be used if none other is specified.

Scratch Drive (a,[b],c)?

Specify the disk drive where cross referencing will take place. If you are familiar with using a "RAM drive" (using the computer's memory to simulate a disk drive), you can perform the GLLADD cross referencing operations in

memory many times faster than with a normal disk drive.

If you choose not to use a "RAM" drive, we recommend using the same drive as the working drive for "GLLADD.SCR" files.

3. Most personal computers have provisions for more than one serial communications port. Please indicate which port you wish GLLADD to use for communications. The value in brackets will be used if none other is specified.

Communications Port ([1],2)?

Specify the serial port (1 or 2) on the personal computer that will be used for communicating with the PiC. This port will be used to transfer LDN's, Call

Routines and data as well as to allow the computer to act as a programming terminal for the PiC.

4. GLLADD is designed to communicate with the PiC409 at 9600 baud. For some reason it may be desirable to communicate at a slower rate. Please indicate which baud rate you wish GLLADD to use to communicate. The value in brackets will be used if none other is specified.

Baudrate (110,300,600,1200,4800,[9600])?

This feature allows you to communicate with the PiC409 or PiC49 at a slower rate. A slower rate may be desirable when using other devices during com-

munications such as a telephone modem. This feature may also be helpful if you experience communications overrun errors at the standard 9600 baud rate.

5. It is assumed that the line printer being used supports the form feed to be supplied by GLLADD. Please indicate the number of lines to be printed on a page. The value in brackets will be used if none other is specified.

Page Length (11 x 8.5 paper assumed [45])?

The number of lines per page is determined by the size of the paper you are using and by the number of lines that

are printed per inch. Enter the number of lines to be printed on each page and press the return key.

6. A wide bed printer is required for fully documented ladder listings. Please indicate the number of characters to be printed on each line. The value in brackets will be used if none other is specified.

NOTE: Any value less than 100 and GLLADD will not print cross reference information and/or comments to the right of the ladder.

Page Width (11 x 8.5 paper assumed 79-136 [110])?

The number of characters per line is normally limited by the printer you are using. However, some smaller printers, like the Okidata 82A which normally

prints only 80 characters per line, can be configured to print more characters if a condensed typestyle is used.

7. Based on the information you have just entered, the GLLADD software has been configured to support a given printer page size. In addition, the printer hardware itself must also be configured to support this page size, along with form-feed character recognition, and no auto-skip over the perforation. On many printers this configuring is done through a series of control codes which GLLADD will supply at the beginning of each listing. GLLADD has a number of built-in configuring patterns, you may enter your own pattern, or you may choose no configuring pattern.

Please make your selection.

- <F1> Epson FX100.
- <F2> Okidata Microline 82A (10 CPI, 80 columns).
- <F3> Okidata Microline 82A (16.5 CPI, 132 columns).
- <F4> Enter your own pattern.
- <F10> No configuring pattern.

Enter one of the first three patterns or enter a pattern of your own using selection F4. Other printers may be able to use the configurations given here. However, refer to the documentation supplied with your printer for

the correct control codes. If you press the F10 key to indicate that no configuring pattern is to be used, a printer cannot be used with the GLLADD software.

8. GLLADD normally outputs listings directly to the line printer. Although the files may get quite large (in excess of 100k), it might be desirable to output listings to a '<laddername>.LIS' disk file instead of the printer. Please indicate whether output should be re-directed to a '<laddername>.LIS' disk file on the working drive. Direct output to the printer will be assumed if nothing is specified.

Output to a <laddername>.LIS disk file (y,[n])?

You may output listings to a disk file instead of a printer. The disk file created will be a standard ASCII text file containing all of the information that would appear in a regular printout.

Disk files are useful if you want to print several copies of a documented ladder without performing the cross referencing operation for each copy. To print from a disk file, use the DOS PRINT commands as described in your DOS manual. The GLLADD software will put the extension ".LIS" after the ladder name for the disk file.

NOTE

The cross referencing operation requires a substantial amount of disk space. If you have a fairly large ladder diagram and/or definition file, you may need to use a system with a hard (fixed) disk. If you use a floppy disk, use a blank, formatted, double-sided, high-density disk for maximum storage space.

2.2.2 Changing The Initialization File Parameters

If at any time the initialization file parameters have to be changed, the initialization process can be repeated by

deleting the GLLADD.INT file. This is accomplished with the following procedure:

1. Remove the write protect tab from the backup disk and start up GLLADD.
2. With the Main Menu on the screen, press the F10 key. The computer will ask "Do you really want to return to DOS". Enter "Y" (yes).
3. When the prompt A> appears, type "DEL GLLADD.INT" and press the return key.
4. The A> prompt will reappear. Type "GLLADD". The GLLADD software will repeat the initialization process as described in the previous section.

2.3 MAIN MENU (G&L PiC Ladder Development System)

The main menu is a graphic display of the ten function keys found on the left side of a computer keyboard (non-IBM computers may have function keys in a different area). While viewing the display, you will notice that certain function keys are identified with short, descriptive titles. Press the "Help" function key (F9). A more detailed description will appear to the side of each function key used in the main menu.

NOTE

If you press the "Abort" function key, F10, while the main menu is displayed, the computer will ask you if you wish to return to DOS (disk operating system). If you answer Y (yes), the computer will leave GLLADD and return to DOS. When you wish to return to GLLADD from DOS, simply type "GLLADD" after the prompt "A>". The title display, followed by the main menu, will reappear on the screen.

Selecting any of the function keys used in the main menu besides the "Help" or "Abort" keys, will take you to different GLLADD functions and menus. GLLADD menus use the same keypad format as the main menu but assign different functions to the keys. Only the "Help" and "Abort" functions remain. The "Help" function provides a more detailed description of the function keys. The "Abort" function will return you to the menu you were previously in.

Follow each menu carefully and use the help function key (F9) when additional information is needed. GLLADD will instruct you through each procedure.

G&L PiC Ladder Development System

Provides for compiling and editing Pic409 ladders, and ladder messages.

Outputs a documented ladder, and cross reference listing.

Supports the Pic409 Aux 1 mode for remote control of the PiC.

Edit/ F1 Compile Ladder	Edit F2 Documen. Database
List F3 Documen. Ladder	Disk F4 File Handler
PiC409 F5 Aux. 1 Support	Aux. F6 Funcs.
F7	F8
F9 Help	Done F10 <Alt> Abort

Provides for creating or modifying a ladder documentation information file.

Provides for renaming, deleting or listing a catalog of LDNs on disk.

Provides functions such as cassette read and write to support the PiC.

Select an operation via the function keys.

FIGURE 2-3 MAIN MENU

2.4 LADDER NAMES

The GLLADD user must identify each Ladder Diagram Network (LDN) with a ladder name. Ladder names may be up to eight characters in length. The characters permitted for a ladder name include the entire alphabet (A-Z), the numerals 0-9, and the following symbols and punctuation marks:

\$ & @ ! % ' ` () - / _

A new ladder name is required when an LDN is transferred from the PiC to the computer or from a STR LINK tape loader to the computer. After an LDN is saved on disk, the user must identify the LDN by its ladder name before proceeding with any operations that affect the LDN and its documentation.

Because GLLADD is capable of storing several LDN's and their documentation on a single disk, files are used by the computer to effectively locate and process information. GLLADD files are grouped according to their ladder names.

The GLLADD software will create several files which use the same ladder name. These files include the LDN

itself, a definition file containing text for headings, labels and comments and a temporary "scratch" file used for cross referencing. When GLLADD documents an LDN, it combines these three files and sends the information to a printer. For a more complete description of the files used by GLLADD, refer to Section Six - Disk File Handler.

SECTION 3 - LADDER EDITOR/COMPILER

The GLLADD Ladder Editor/Compiler allows the programmer to create and edit Ladder Diagram Networks (LDN's) on an IBM or IBM compatible personal computer. No connection to the G&L PiC409 or PiC49 is required when creating an LDN.

The editing functions are much more comprehensive with the GLLADD software than they are with the standard PiC programming modules. The different modes of the GLLADD Editor/Compiler are listed below:

Insert Mode - This mode is for entering new LDN's or inserting new blocks into existing LDN's. A block can be a complete ladder type circuit or one of the four G&L PiC programming statements.

Display Mode - The entire LDN, or any portion of it, can be viewed on the computer screen using this mode. If the LDN is too large to fit on the screen, this mode can be used to "scroll" down through the LDN.

Modify Mode - The programmer can modify individual blocks in an LDN. With the modify mode, individual elements within a ladder rung can be added, modified or deleted without retyping the entire block.

Search Mode - With this feature, the programmer can search for every occurrence of an individual element in the LDN.

Copy, Move and Delete Modes - These three modes allow the programmer to choose a section of the LDN and either copy that section and duplicate it in another area of the LDN or to move the entire section elsewhere or to delete the section entirely.

Auxiliary Functions - In addition to creating standard LDN circuits and

statements, Call Routines and messages will probably need to be added to the program to take full advantage of the PiC's capabilities. The auxiliary functions provide these capabilities on the personal computer without the need to be connected to the PiC.

3.1 INSTRUCTION SET

Refer to the PiC409 Family Programming Manual for information regarding the format of the Ladder Diagram Networks (LDN's) and the instruction set.

3.2 ENTERING THE GLLADD LADDER EDITOR/COMPILER

To enter the GLLADD Editor/Compiler, display the Main Menu on the computer screen and press the F1 (Edit/Compile Ladder) function key. The following message will appear:

Enter the ladder name (<F9> for help, <F10> to abort):

At this point you must enter a name for the LDN. The ladder name may contain any combination of up to 8 alphanumeric characters and certain symbols. Press the F9 (Help) function key for a list of all the valid ladder name characters.

After entering the ladder name, press the return key. If you are creating a new LDN or if this ladder name does not already exist on your file disk, the following message will appear:

Warning, cannot open B:(your ladder name).LDN as ladder file! A new ladder file will be created.

This message simply indicates that a file with your ladder name was not found on the disk, and the GLLADD software will create one for you. The next message that will appear is:

Currently there are 0 nonvolatile variables indicated. How many nonvolatile variables are desired (starting with variable V0?)

Enter the number of nonvolatile variables desired. The maximum number is 900. Enter a 0 if no nonvolatile variables are desired. Press the return key after entering the correct number.

The next message that will appear is:

Currently there are 0 retentive relays indicated. How many retentive relays are desired (starting with relay 512)? Number must be 1000 or less, please reenter.

Enter the number of retentive relays desired. Up to 1000 retentive relays may be designated. Enter a 0 if no retentive relays are desired. Press the Return key after entering the correct number.

You will then be asked the following question:

The current LDN size limit is 0 bytes. Enter the desired LDN size limits in K bytes (2-40)?

The LDN size limit is based on two factors.

1. The amount of user memory in your PiC.

The maximum amount of user memory for a PiC is 40K. However, if you do not have enough memory modules in your PiC master rack, the actual number may be less. Also, if you are using a Call Routine EPROM module in your PiC rack, the maximum user memory available is 36K.

2. The area of user memory designated for Data Storage.

If you require a portion of your user memory for data storage using the Data Storage Call Routines, you must subtract this area from your total user memory area.

For example: If you have 36K of user memory in your PiC and 10K of that memory is to be reserved for data storage, the LDN size limit will be 26K.

Enter the LDN size limit and press the return key. The following message will appear:

In which bank will this LDN reside (1-8)?

This question is related to the Bank Select features of the PiC. If you are not using Bank Select in your PiC enter a "1" followed by a return.

If you are using Bank Select, you can select the bank of memory modules where this LDN will be stored.

Enter a bank number and press the return key. If you are using a Continuous LDN Memory Bank Select Call Routine, enter a "1".

NOTE

If you selected a "1", the following request will appear on the screen:

Bank 1 selected, enter the highest bank to be used (1-8)?

If you are not using a Continuous LDN Memory Bank Select Call Routine, enter a "1". Otherwise, enter the number of the highest bank that you will be using.

A new menu titled "Ladder Editor/Compiler" will appear.

Press the appropriate function key for the desired operation. The different GLLADD Editor/Compiler functions are described in the following sections.

To exit the GLLADD Editor/Compiler menu, press the F10 (Done) function key. This will save any changes you may have made while in the

Editor/Compiler and return you to the Main menu.

If you press the <Alt> <F10> Abort function keys at the same time, the following message will appear:

Operation aborted, ignore any changes (y,n)?

If you press "y" (yes), the software will not save any changes that you may have made in the Ladder Editor/Compiler and will return you to the main menu.

If you press "n" (no), the software will save any changes you may have made and return you to the Main Menu.

3.3 CREATING A NEW LDN

To create a new LDN, enter the

GLLADD Editor/Compiler menu using a new laddername and press the F3 (Insert) function key. This key is used to create new LDN's or to insert blocks into existing LDN's.

Creating a new Ladder Diagram Network or LDN on disk using the GLLADD software is similar to entering an LDN directly into the PiC. However, some additional options have been added to make entry easier.

A new display will appear on the screen with this prompt:

Insert after coil/statement #.

Press the letter "B". The "B" indicates that you wish to insert something after the beginning of the LDN.

When the prompt "!" appears, you may begin entering the LDN.

Ladder Editor/Compiler

Display a single ladder circuit, or portions of the entire ladder diagram.

Insert a new ladder circuit into the ladder diagram.

Copy a single circuit, or group of circuits, from one location to another.

Delete a single circuit, or group of circuits, from the ladder diagram.

F1 Display	F2 Search
F3 Insert	F4 Modify
F5 Copy	F6 Move
F7 Delete	Aux. F8 Function
F9 Help	Done F10 <Alt> Abort

Search the ladder diagram for I/O, statement numbers variables and call names.

Modify an existing circuit in the ladder diagram.

Move a single circuit, or group of circuits, from one location to another.

Additional menu items for functions such as name, allocate and install calls.

Select an operation via the function keys.

FIGURE 3.1 LADDER EDITOR/COMPILER MENU

3.3.1 Entering Ladder Diagram Circuits

To enter an LDC (ladder diagram circuit), press the letter "F" for a normally open contact (-] [-) or the letter "G" for a normally closed (-] / [-) contact. The appropriate symbol will appear on the screen with the cursor directly above it. Enter the contact number.

Additional contacts can be entered in the same manner by pressing the letters "F" or "G" depending upon the type of contact and by entering the contact number.

Branches to a lower rung are entered by pressing the letter "R". After

entering the last contact and/or branch in the top rung, the rung must be terminated with a regular coil or a timer coil.

To enter a regular coil (- () -), press the letter "T". When the coil symbol appears, enter the coil number. When the correct number is entered press the return key to terminate the rung.

To enter a time delay to energize (TE) coil, press the letter "Y". For a time delay to de-energize (TD) coil, press the letter "H". When the symbol (TE) or (TD) appears, enter the number of the timer coil and press the return key.

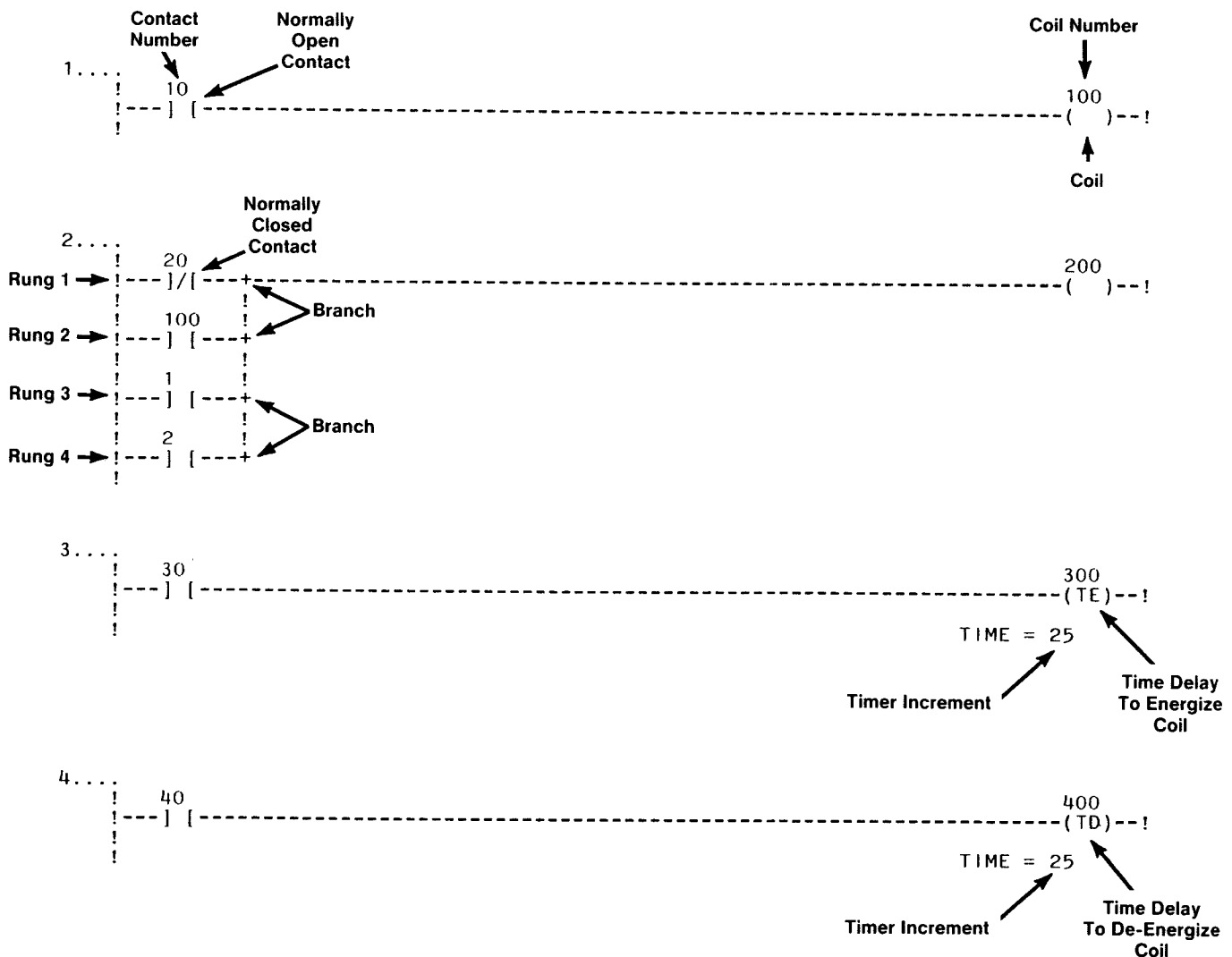


FIGURE 3.2 EXAMPLE LADDER DIAGRAM CIRCUITS (LDC's)

The cursor will drop below the coil symbol after the prompt: " TIME = ". Enter an integer value from 0 through 65535. This number indicates the number of timer increments the timer coil will use. Each timer increment will be either 10 milliseconds or 100 milliseconds long. See Section 3.11.6 for information regarding selecting the timer increment.

To terminate the rung, press the return key after entering the number of time increments.

If the top rung contains no branches to a lower rung the LDC is now complete and the prompt "!" will appear again. At this point a new block may be entered.

However, if the top rung contains a branch to a lower rung, the cursor will drop below the first contact of the LDC to await the entry of another rung. The procedure for entering contacts and branches is the same for the lower

rungs except that no coil entry is made. Instead, when the end of a lower rung is reached, pressing the return key will terminate that rung with the branch from a rung above it.

An LDC may have a maximum of eight rungs. Each rung may have a maximum of seven contacts. Only one coil at the end of the top rung is allowed. All of the rules for branching must be followed. The GLLADD software will not accept incorrect entries.

3.3.2 Entering Statements

Statements are also entered after the "!" prompt using the sequences shown below. The GLLADD software will enter many of the characters for you. The actual keystroke sequences are illustrated in the boxes below the example statements.

Statement Number	Optional Qualifier Contact	Target Variable	Target Variable Value
↓	↓	↓	↓
2300	IF (-) [- 20)	THEN LET V1	= 1000

The keystroke sequence needed for this statement is as follows.

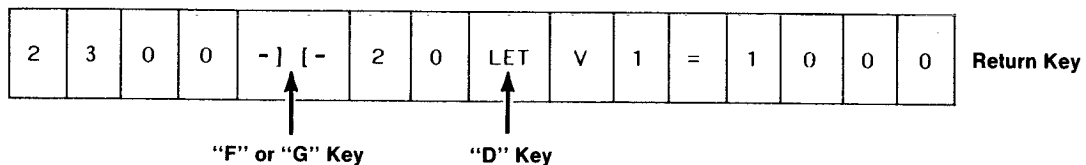


FIGURE 3.3 LET STATEMENT EXAMPLE

Statement Number
Optional Qualifier Contact
Target Coil
Variable Number
Comparison
Variable Value

↓
↓
↓
↓
↓
↓

2310 IF (-) [- 21) THEN SET 15 : V5 = 64

The keystroke sequence needed for this statement is as follows.

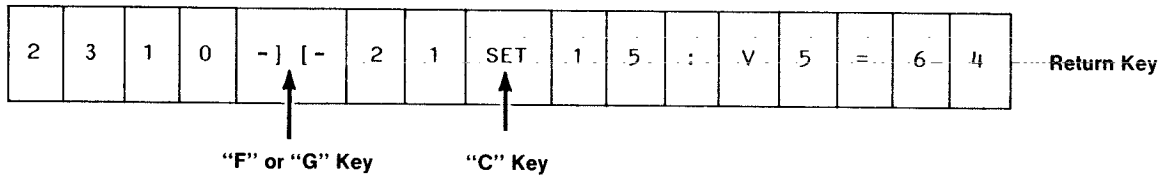


FIGURE 3.4 SET STATEMENT EXAMPLE

Statement Number
Optional Qualifier Contact
Target Statement (Or LDC)

↓
↓
↓

2320 IF (-) [- 45) THEN GOTO 500

The keystroke sequence needed for this statement is as follows.

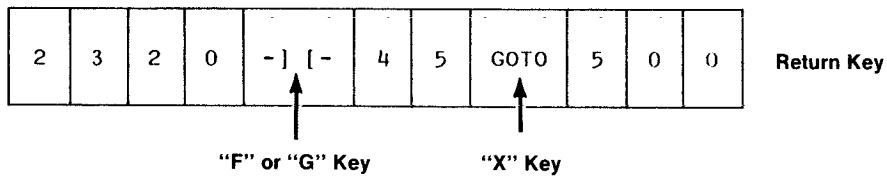


FIGURE 3.5 GOTO STATEMENT EXAMPLE

Statement Number
Optional Qualifier Contact
Call Routine Name
Call Routine Parameter

↓
↓
↓
↓

2330 IF (-)/[- 1000) THEN CALL C912 (29)

The keystroke sequence needed for this statement is as follows.

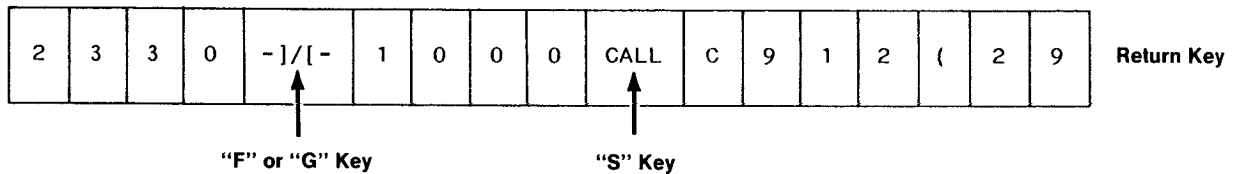


FIGURE 3.6 CALL STATEMENT EXAMPLE

NOTE

Call Routines must be installed before their names can be used in a CALL statement. Refer to Section 3.11.5 for instructions on installing Call Routines from diskette or EPROM.

NOTE

Incorrect entries can be deleted before an LDC or statement is terminated. The different delete keys available are as follows:

Clear Element (F7 Key) - To delete an entire element from an LDC or a statement while in the insert mode, press the F7 key. Individual elements include: contacts, coils, variables, branches, statement numbers, variables, Call Routine names and Call Routine parameters. Each time this key is pressed, the last element entered will be cleared. Elements are cleared from right to left beginning with the lowest rung and moving upward. After the incorrect elements are cleared, new ones may be entered in the usual manner.

Delete a Single Character (Backspace Key) - To delete a single character instead of an entire element, press the backspace key and reenter the correct character. The backspace key will only clear single characters in a parameter or characters used to identify the elements you are working on, such as contact numbers or Call Routine names. It will not clear the element itself.

Clear Line (F8 Key) - The F8 function key is used to clear an entire statement or LDC rung. This key will work from any location on the rung. However, it cannot be used to clear a previous rung.

Press the return key after entering the statement. This will terminate the statement and advance the cursor to the next line with the prompt "!". A new LDC or statement may now be entered.

3.3.3 Leaving The INSERT Mode

You can leave the INSERT mode at any time by pressing the F10 function key.

3.4 DISPLAY MODE

The Display Mode allows the PiC user to display the contents of an LDN on the screen. To display an LDN, enter the GLLADD Ladder Editor/Compiler menu and press the F1 (Display) function key. The computer will respond with the message:

```
Display starting at coil/statement #
```

If you wish to display the LDN from the very first block enter the letter "B" to indicate the beginning of the LDN. If you wish to display the LDN from any other block, enter the coil or statement number of that block.

The block indicated by your entry will be displayed on the screen. To view the next block, press the space bar. The display will advance one block at a time every time the space bar is pressed. Pressing a numeric key from one through nine will display the same number of blocks as the number on the key.

To scroll through the rest of the LDN, press the number "0". The computer will scroll through the remaining blocks in the LDN and stop after displaying the last one.

Press the F10 (Done) function key to exit the display mode and to return the Ladder Editor/Compiler menu.

3.5 SEARCH MODE

The Search mode is used to quickly locate contacts and coils, variables, statement and Call Routine numbers within an LDN.

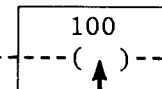
To enter the Search mode, press the F2 (Search) function key from the GLLADD Ladder Editor/Compiler menu. The computer will respond with the message:

Search for contact/coil, variable, statement, or CALL #:

Enter the number of the element you are searching for and press the return key. The block containing the first occurrence of that element will appear on the screen. The element itself will be highlighted by a large cursor and a choice of other functions will appear at the bottom of the screen. These functions are selected by pressing the corresponding function key on the left side of the keyboard.

Search for contact/coil, variable, statement, or CALL #100 ← Element Number

```
! 10
!----] [-----
```



Element Location

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Insert After	Modify Block	Move Block	Copy Block	Delete Block	Backup/ Advance	One Occur	One Block	Help	Done/ Abort

FIGURE 3.7 SEARCH MODE EXAMPLE

F1 Insert After

Enter the Insert mode by pressing this key. New blocks may be entered to follow the block currently on display.

F2 Modify Block

Pressing this key, puts the computer in the Modify mode. The block currently on display can be modified as described in Section 3.7 (Modify Blocks).

F3 Move Block

To move the block currently on display, press this key. Then enter the number of the block that the block on display will be placed after. Press the return key.

F4 Copy Block

To duplicate the block currently on display, press this key. Then enter the number of the block that the duplicate block will be placed after. Press the return key.

F5 Delete Block

Press this key to delete the block currently on display.

F6 Backup/Advance

Press this key to change the direction of the search function. If the word "Backup" is highlighted, the computer will search for an element from the end of the LDN to the beginning. If the word "Advance" is highlighted, the search function will go through the LDN from the beginning to the end.

NOTE

The search direction will automatically change when the beginning or the end of the LDN is encountered.

F7 One Occurrence

To search for the next occurrence of the element specified, press this key. The computer will search for the element in the direction specified by the F6 key.

F8 One Block

If the F6 key specifies "Backup", press this key to display the previous block in the LDN. If the F6 key specifies "Advance", pressing this key will display the next block.

F9 Help

Press this key for a brief description of the Search function keys.

F10 Done/Abort

To exit the Search mode and execute any changes specified using the Search function keys, press the F10 (Done) key.

3.6 INSERTING BLOCKS INTO AN EXISTING LDN

Inserting new blocks into an existing LDN is similar to creating a new LDN. However, when entering the GLLADD Ladder Editor/Compiler menu, specify the name of an LDN that already resides on the data disk. Otherwise a new LDN will be created.

Once the Ladder Editor/Compiler menu is on the screen, press the F3 (Insert) function key. The computer will respond with the message:

Insert after coil/statement #

To insert one or more blocks at the very beginning of the LDN, press the letter "B". To insert one or more blocks after the very last block, press the letter "E".

One or more blocks can also be inserted after any specific block in the LDN by entering that block's coil statement number.

Type in the blocks as described in Section 3.3 CREATING A NEW LDN. After entering the desired block or series of blocks, press the F10 (Done) function key to return to the Ladder Editor/Compiler menu.

```

8...  | 25      30      100      15
      |-----] [-----] [-----]/[-----] ( )---!
9...  | 2400 IF (-) [- 15 ) THEN LET V1 = 360 + 0
10... | 7
      |-----] [-----] ( )---!

```

Before Insertion

```

8...  | 25      30      100      15
      |-----] [-----] [-----]/[-----] ( )---!
9...  | 2400 IF (-) [- 15 ) THEN LET V1 = 360 + 0
10... | 2350          SET 7 = V1 = 360
      |-----] [-----] ( )---!
11... | 7
      |-----] [-----] ( )---!

```

After Insertion

FIGURE 3.8 INSERT EXAMPLE

3.7 MODIFYING BLOCKS

The Modify mode provides extensive editing capabilities for the PiC programmer. In this mode, the programmer can add, change or delete any of the elements of an individual block (LDC or statement).

To enter the Modify mode from the GLLADD Ladder Editor/Compiler menu, press the F4 (Modify) function key. The computer will respond with the following message:

Modify coil/statement #

Enter the coil number of an LDN or the number of a statement for the block you wish to modify. The screen will display the block to be modified and a selection of different modify functions.

3.7.1 Modifying A Ladder Diagram Circuit (LDC)

When editing an LDC, the entire screen will be available for adding as many contacts, rungs and branches as permitted by the PiC. The LDC Modify mode function keys are as follows:

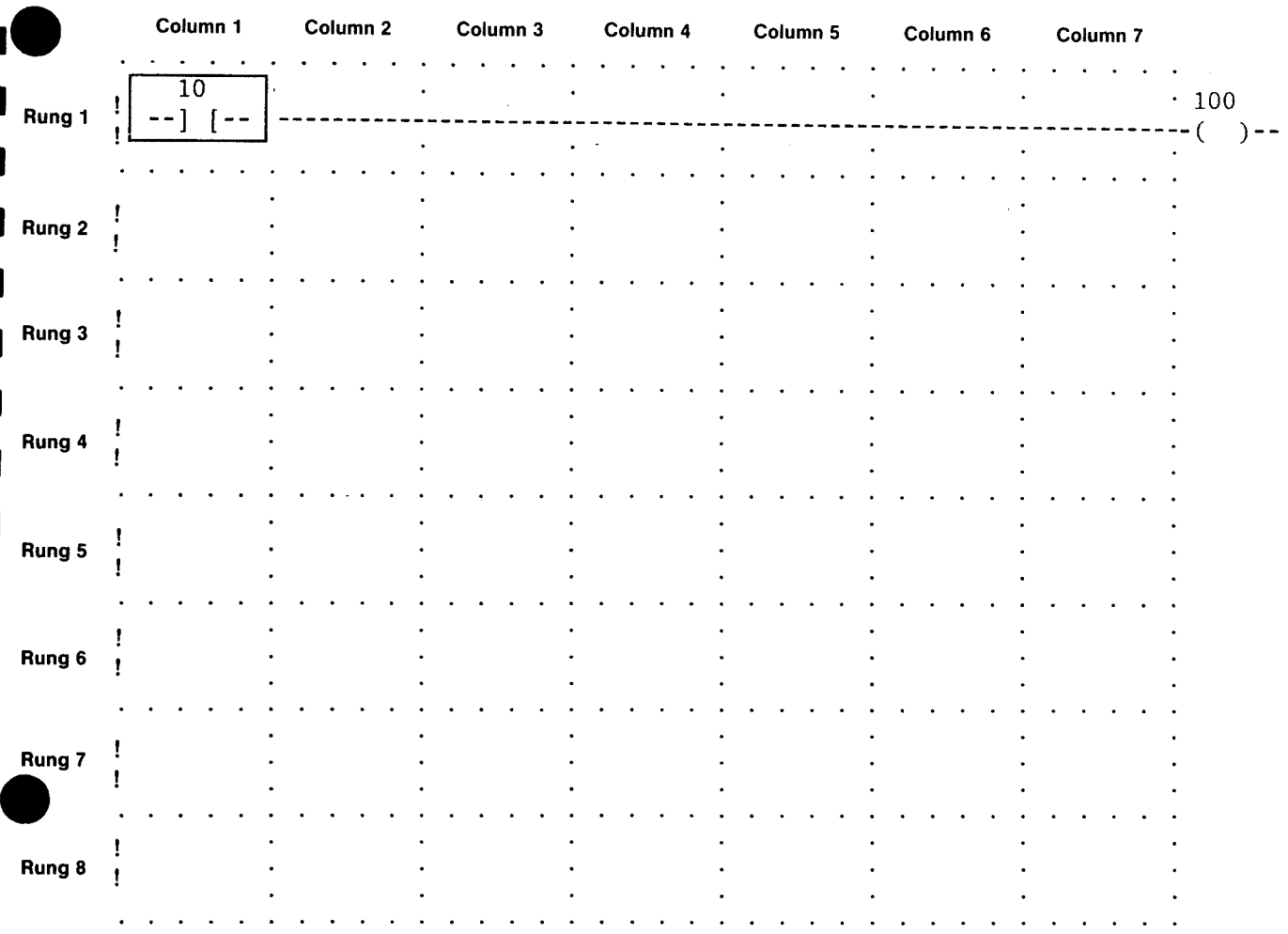
Cursor Keys

In the Modify mode, the cursor block highlights an entire element. The cursor keys (Up, Down, Left and Right Arrows) are used to move the cursor block around on the screen, one element at a time in the direction specified by the arrows.

Backspace Key

The backspace key will delete individual characters within an element.

Modify coil/statement #100 ← LDC To Be Modified



Function Key Selection

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Clear Rung	Clear Column	Cmprs Rung	Cmprs Column	Expand Rung	Expand Column	Horiz Short	Copy Contact	Help	Done/Abort

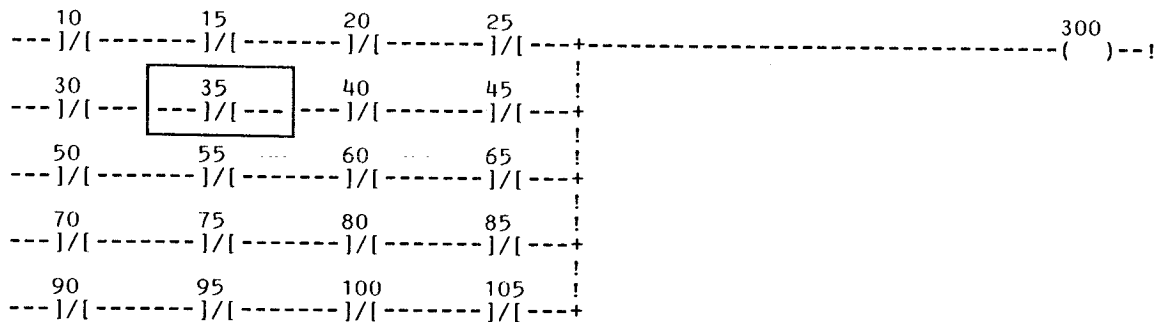
FIGURE 3.9 MODIFY MODE SCREEN FORMAT

"Del" Delete Key

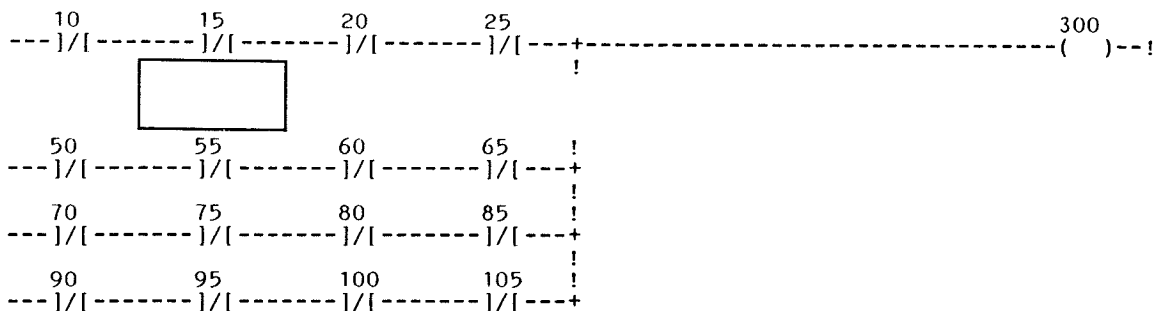
To delete an entire element, position the cursor block over that element and press the "Del" key.

F1 Clear Rung

Pressing this key will remove all of the elements in the horizontal rung containing the cursor block.



Before: Cursor Block positioned on rung to be cleared.

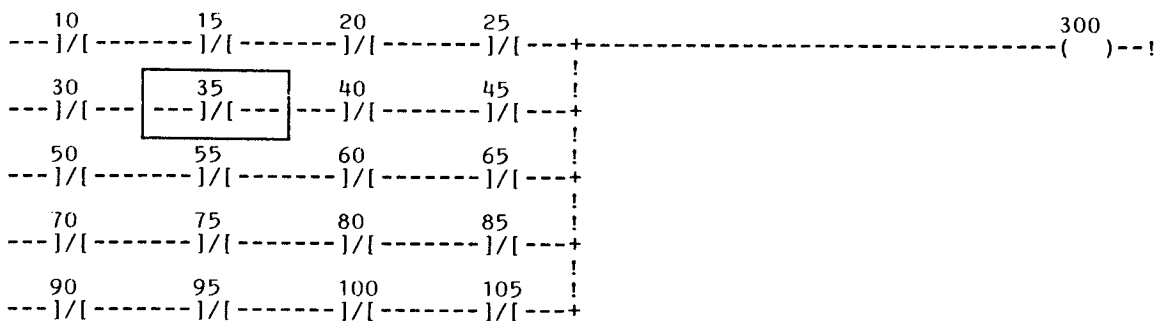


After: Rung cleared.

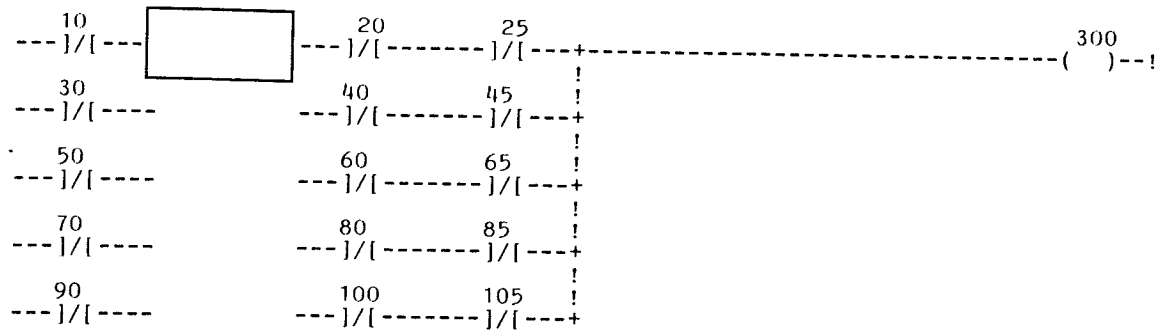
FIGURE 3.10 CLEAR RUNG EXAMPLE

F2 Clear Column

Pressing this key will remove all of the elements in the vertical column containing the cursor block.



Before: Cursor Block positioned on column to be cleared.



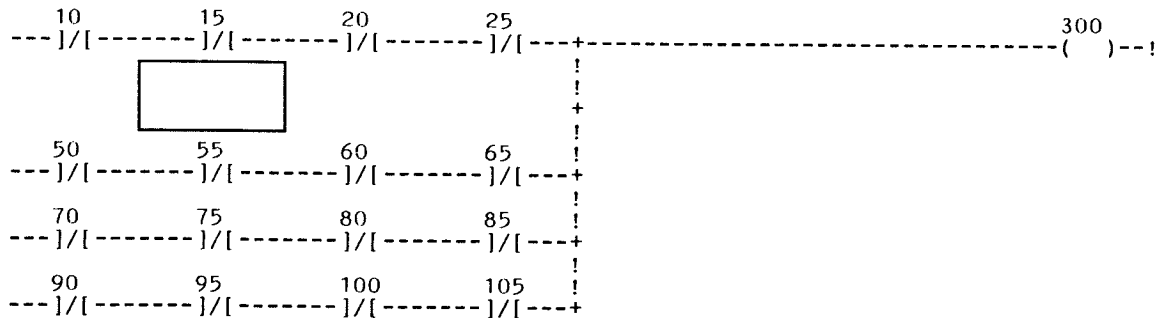
After: Column cleared.

FIGURE 3.11 CLEAR COLUMN EXAMPLE

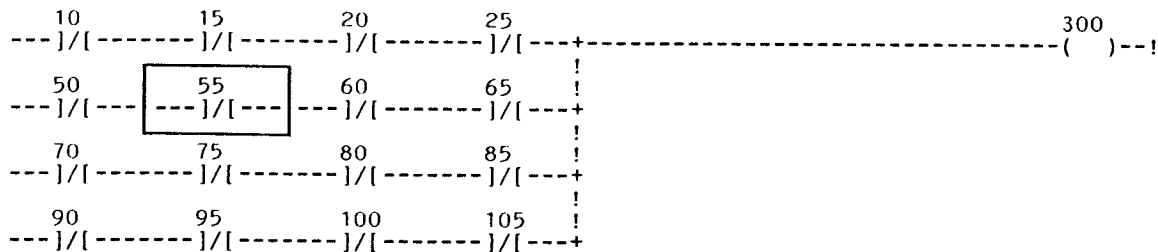
F3 Compress Rung

If all the elements of a rung are cleared, placing the cursor block in this rung and pressing this key will

delete the empty rung and move the rest of the LDC up one rung.



Before: Cursor Block positioned on rung to be compressed.



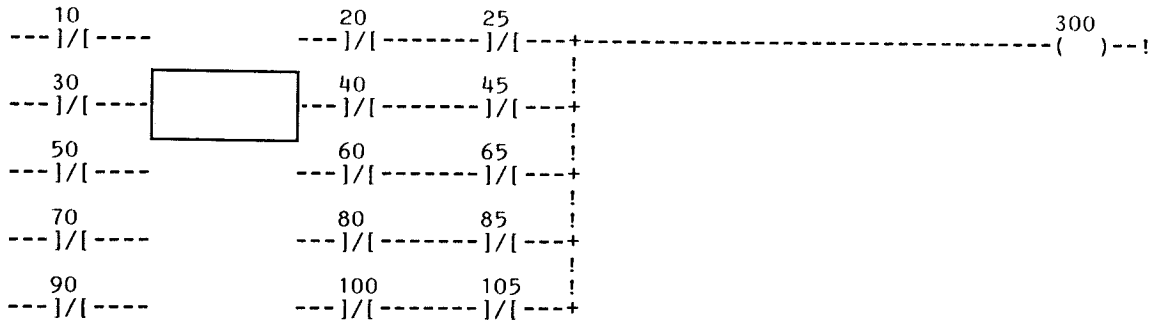
After: Rung compressed.

FIGURE 3.12 COMPRESS RUNG EXAMPLE

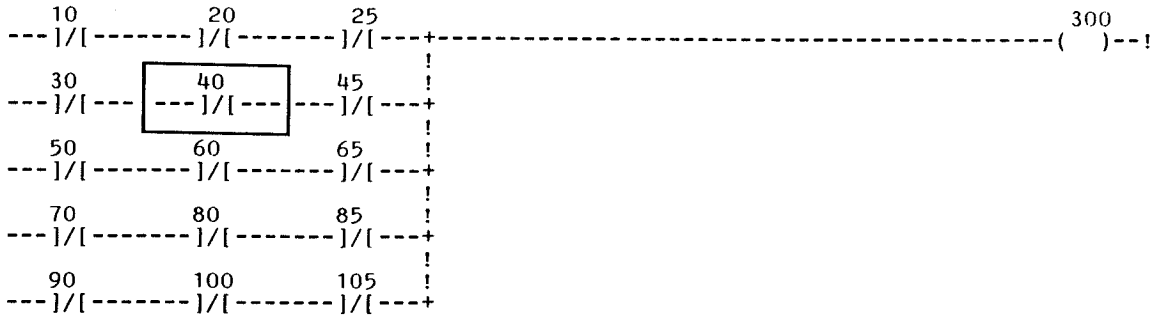
F4 Compress Column

If all the elements of a column are cleared, placing the cursor block in this column and pressing this key will

delete the empty column and move the rest of the LDC one column to the left.



Before: Cursor Block positioned on column to be compressed. —



After: Column compressed.

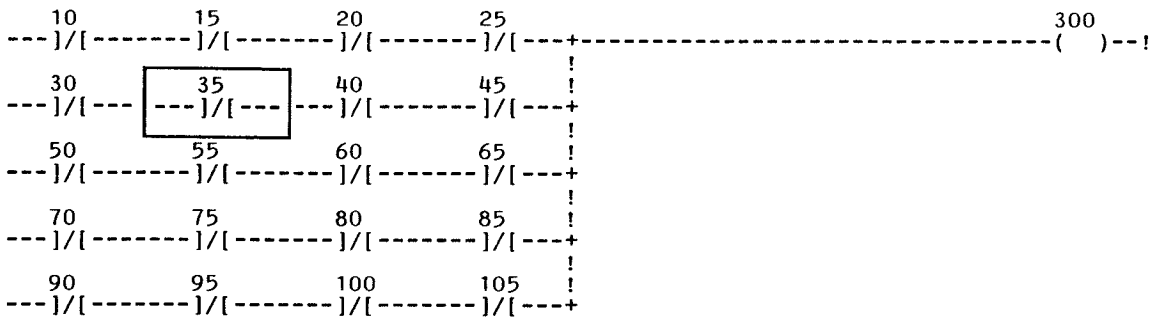
FIGURE 3.13 COMPRESS COLUMN EXAMPLE

F5 Expand Rung

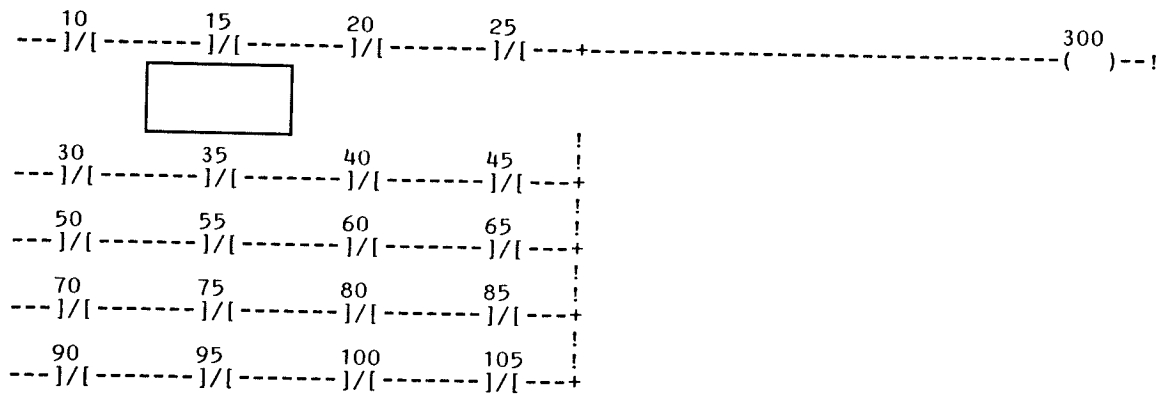
To insert a new rung above an existing rung, position the cursor block on the existing rung and press this key. The existing rung and the rest of the LDC below it will drop down one rung leav-

ing an empty rung for the entry of new elements.

This function will only work if there are no elements in the eighth rung.



Before: Cursor Block positioned on rung to be expanded.



After: Rung expanded.

FIGURE 3.14 EXPAND RUNG EXAMPLE

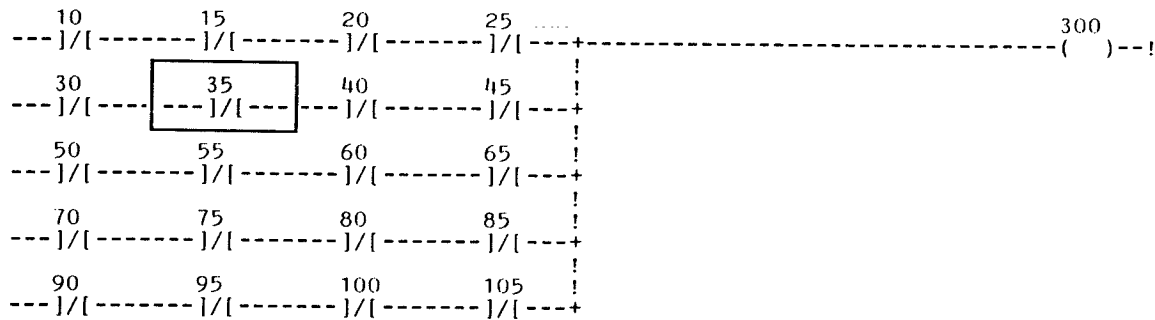
F6 Expand Column

To insert a new column to the left of an existing column, position the cursor block on the existing column and press this key.

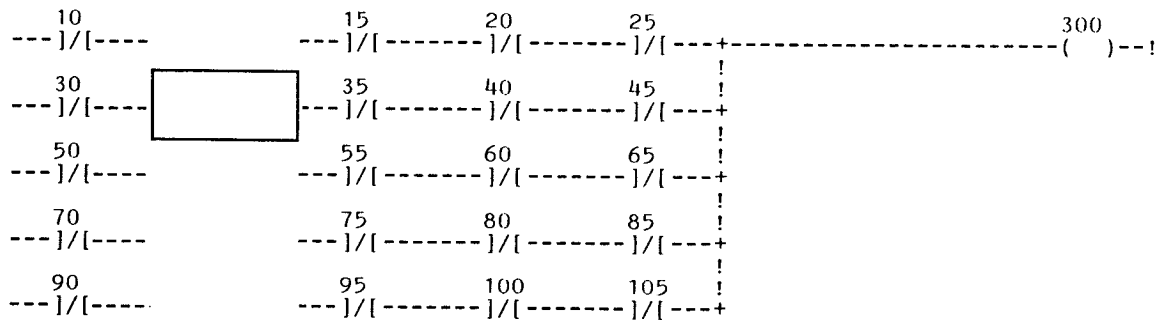
the right of it will move one column to the right leaving an empty column for the entry of new elements.

The existing column and the columns to

This function will only work if there are no elements in the seventh column.



Before: Cursor Block positioned on column to be expanded.



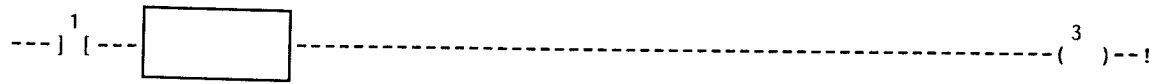
After: Column expanded.

F7 Horizontal Short

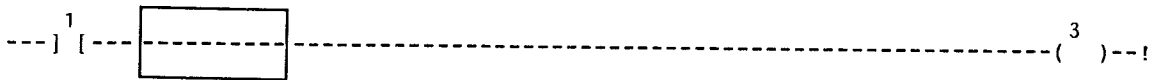
This key is used to insert a horizontal short in the LDC. The horizontal short key is a supplement to the standard LDC circuit symbol keys. It is used to fill in the gaps left by a deleted contact or branch and to extend a rung to the right for branching purposes.

NOTE

The GLLADD software will not accept an incorrect horizontal short entry. Incorrect entries include placing a short in the first (leftmost) column of an LDC or to the left of any contact on the same rung.



Before: Cursor Block positioned where Horizontal Short is to be positioned.



After: Horizontal Short inserted.

FIGURE 3.16 INSERTING A HORIZONTAL SHORT

F8 Copy Contact

This feature allows you to copy a contact and insert its duplicate anywhere in the LDC. To copy a contact, position the cursor block over the contact and press the F8 key.

The element will blink to acknowledge that the contact can now be duplicated. Position the cursor block to the desired location of the duplicate block and press this key again. If another element is already in this location, it will be replaced by the duplicate block.

F9 Help

Press this key for a brief description of the Modify function keys.

F10 Done <Alt>

To exit the Modify mode and to execute any changes specified using the Modify process, press the F10 (Done) key.

To exit the Modify mode without executing any of these changes, press the "Alt" and the F10 (Abort) keys at the same time.

Additional Functions

In addition to the operations covered by the function keys, the Modify mode has the following additional functions.

3.7.1.1 Inserting Elements Into An LDC

To insert an element in an LDC, use the cursor keys to position the cursor block in the desired column and row.

To insert a normally open contact, press the "F" key. Press the "G" key to insert a normally closed contact. Enter the number of the contact and press the return key.

To insert a horizontal short, position the cursor block to the desired location and press the F7 (Horiz. Short) function key.

To insert a branch, position the cursor block in the column directly to the left of the desired branch location and press the "R" key. Branches will appear in the far right side of the cursor block. The GLLADD software will not accept incorrect branching. Refer

to Section 2 in the PiC Family Programming Manual for the correct branching procedures.

To delete a branch, place the cursor block over the branch and press the "R" key.

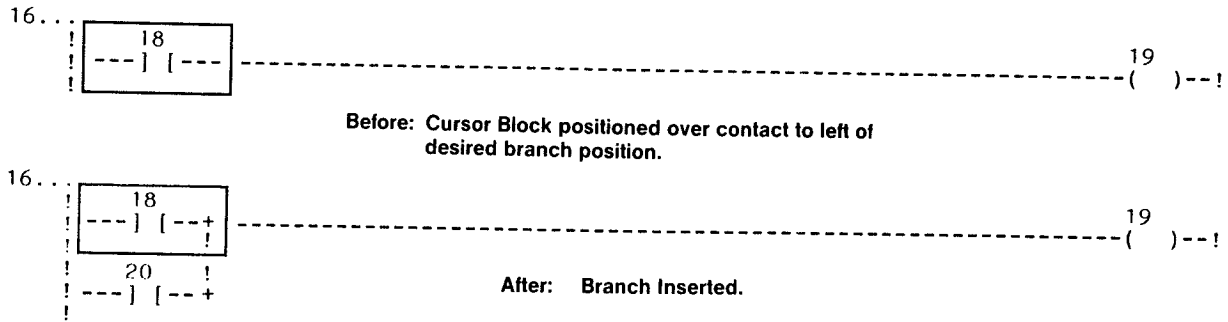


FIGURE 3.17 BRANCH EXAMPLES

3.7.1.2 Modifying Elements

In An LDC - To modify or replace an element in an LDC, position the cursor block over that element. Using the circuit symbol keys, enter the desired element.

If you entered a contact or coil, enter its number and press the return key. If the element is a timer coil, you will also have to enter the timer increment and another return.

NOTE

Unlike the Insert mode which uses a structured procedure for entering elements, the Modify mode allows you to move the cursor block from any location on a rung or column to any other location. This "free form" type of editing is designed to help you modify your ladder with as much flexibility and speed as possible.

However, because this mode is not heavily structured, you will need to check your LDC for incorrect entries. The GLLADD software will not accept finished LDC's into the ladder diagram that do not conform with the proper PiC LDN format. However, you will be allowed to enter almost anything you want while you are in the process of editing.

3.7.2 Modifying Statements

Because statements consist of only one line, editing them is much simpler. To edit a statement, enter the Modify mode and enter the statement number.

The cursor block will highlight an entire element that can be modified. Use the left and right arrow keys to move the cursor block forward or backwards through the statement. Pressing the "Home" key will return the cursor block to the beginning of the statement. Pressing the "End" key will advance the cursor block to the end of the statement.

To modify a highlighted element, simply type the correct element over it. If you press the wrong key at any time, use the backspace key to delete the incorrect character.

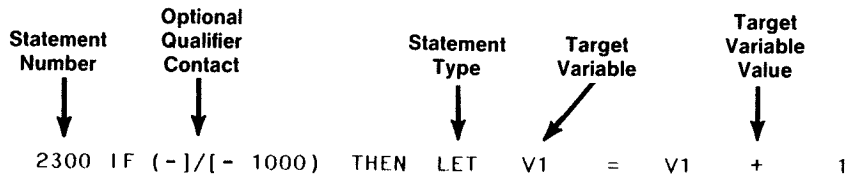
You can delete an optional qualifier contact by positioning the cursor block over the contact and pressing the F8 (Delete Contact) function key.

If you change the statement type, the remaining elements in the statement will be deleted so you can enter the specific information required by the statement.

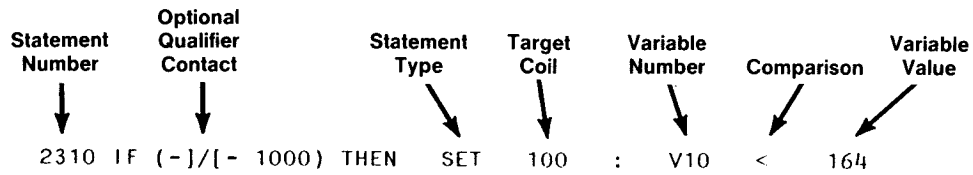
The type of element highlighted by the cursor block depends upon the type of statement used. The following examples illustrate the different elements for each

type of statement. Each one of these elements can be modified independently of the others.

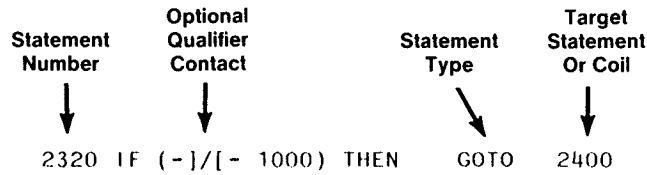
LET Statement Example



SET Statement Example



GOTO Statement Example



CALL Statement Example

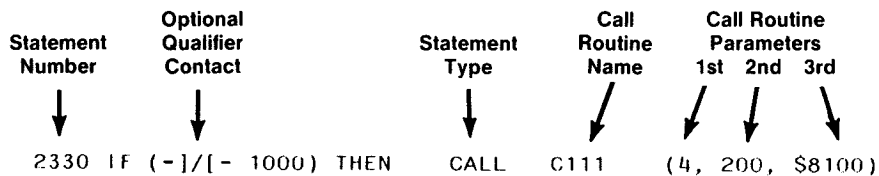


FIGURE 3.18 STATEMENT ELEMENTS

3.7.3 Exiting the Edit Mode

To leave the Edit mode and incorporate any changes that you have made, press the F10 (Done) key.

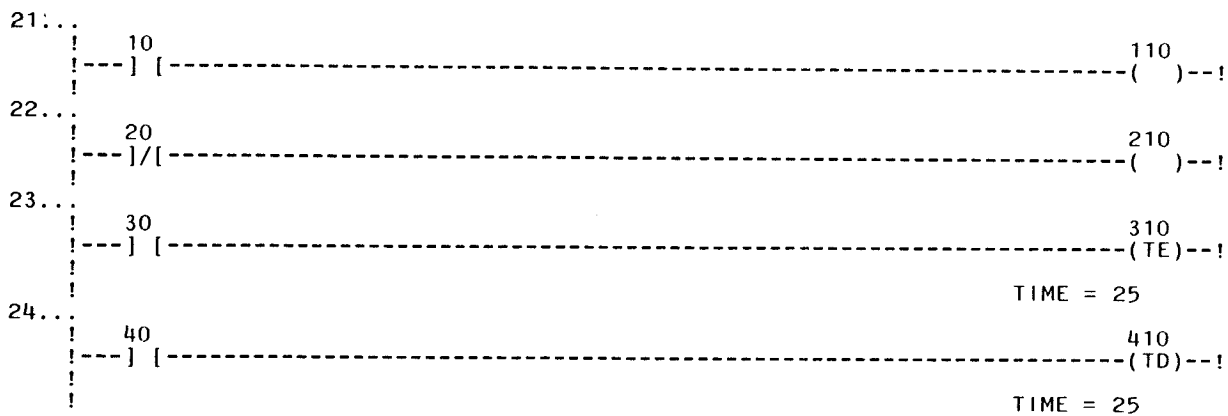
If you leave the Edit mode and want the computer to ignore any changes that you have made, press the "Alt" and F10 (Abort) keys at the same time.

3.8 COPYING SECTIONS OF THE LDN

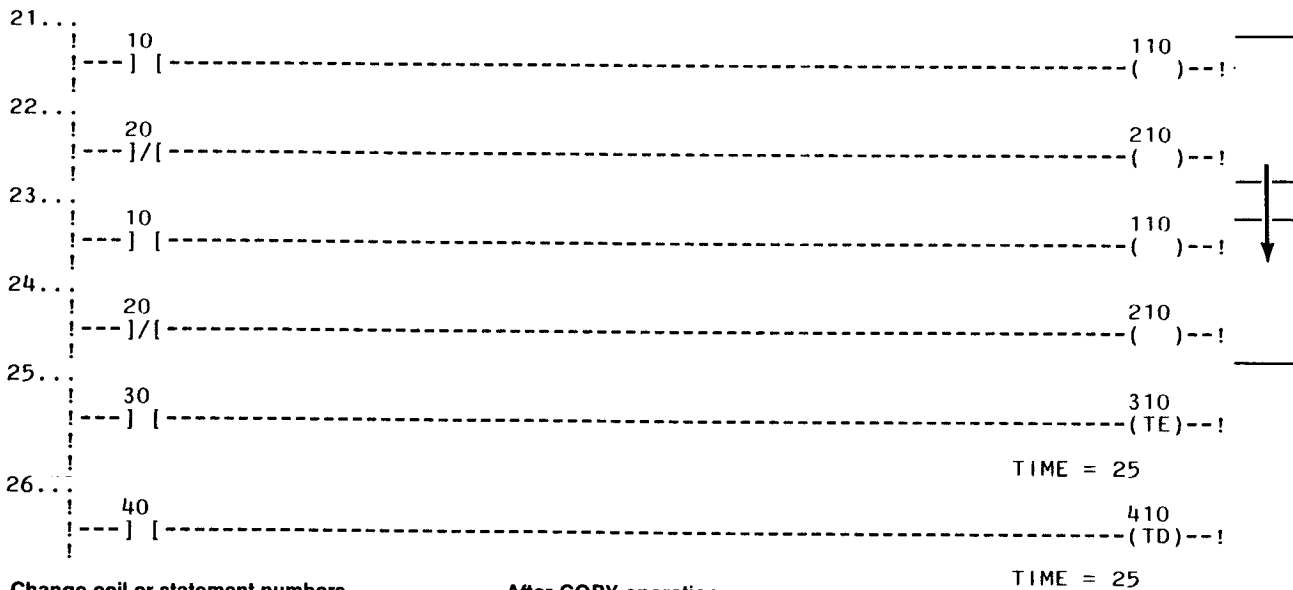
Any series of consecutive blocks can be copied and inserted anywhere else in

the LDN. This is especially useful if you want to create several complex sections that are almost identical to each other.

For example, if you want five identical devices to perform similar operations, you could type the same operation five times in the LDN. However, it is much easier to type in the operation only once and then duplicate it four times. After duplicating the operation, slight modifications can be made to eliminate duplicate coil and statement numbers and to account for different I/O points and module addresses etc.



Before COPY operation



Note: Change coil or statement numbers to eliminate duplication of numbers.

After COPY operation

FIGURE 3-19 COPY EXAMPLE

To enter the Copy mode from the GLLADD Ladder Editor/Compiler menu, press the F5 (Copy) function key. The computer will respond with the following message:

```
Enter statement or coil numbers.  
'B' for beginning, 'E' for end,  
(<Alt>F10) to abort.  
*****
```

```
COPY circuit(s), beginning with  
coil/statement #  
and ending with coil/statement #
```

You must decide which block or series of consecutive blocks you wish to copy.

If you want to copy one block only, use the same number followed by a return for the beginning and ending coil or statement number.

To copy a series of consecutive blocks, enter the coil or statement numbers for the first and last blocks in that series. Press the return key after entering each number.

After the last return the computer will respond with the following message:

```
Copy rung after coil/statement #
```

You must decide where the duplicated section of the LDN will be placed. To insert the section at the very beginning of the LDN, press the letter "B". To place the section at the very end of the LDN, press the letter "E".

To insert the duplicated section inside the LDN, enter the coil or statement number of a block located where you wish the section inserted. Press the return key. The duplicated section will then be inserted immediately after that block.

If you want to copy another section, follow the same procedure.

To exit the Copy mode without saving any of the duplicate blocks, press the "Alt" and F10 (Abort) keys at the same time.

IMPORTANT

Copying blocks will result in duplicate coil and statement numbers. Use the modify mode (see Section 3.7) to change the duplicate numbers to avoid problems with referencing coils and statements.

3.9 MOVING SECTIONS OF THE LDN

Any series of consecutive blocks can be moved and inserted anywhere else in the LDN. This will allow you to change the order of the blocks without retyping them.

To enter the Move mode from the GLLADD Ladder Editor/Compiler menu, press the F6 (Move) function key. The computer will respond with the following message:

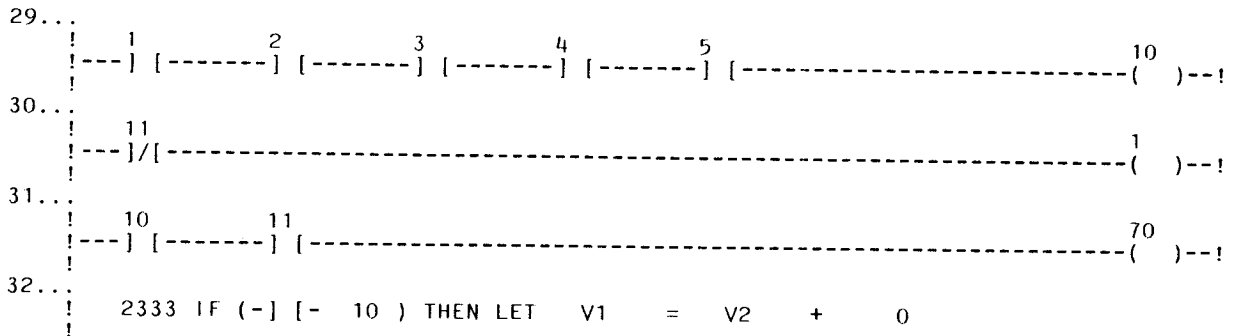
```
Enter statement or coil numbers.  
'B' for beginning, 'E' for end,  
(<Alt>F10) to abort.  
*****
```

```
MOVE circuit(s), beginning with  
coil/statement #  
and ending with coil/statement #
```

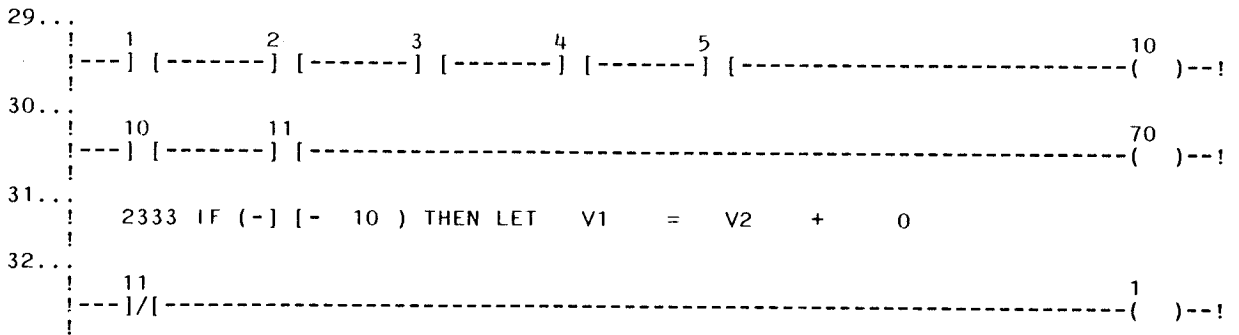
You must decide which block or series of consecutive blocks you wish to move.

If you want to move one block only, use the same number followed by a return for the beginning and ending coil or statement number.

To move a series of consecutive blocks, enter the coil or statement numbers for the first and last blocks in that series. Press the return key after entering each number.



Before MOVE operation



After MOVE operation

FIGURE 3-20 MOVE EXAMPLE

After the last return the computer will respond with the following message:

```
MOVE after coil/statement #
```

You must decide where the section of the LDN will be relocated. To insert the section at the very beginning of the LDN, press the letter "B". To place the section at the very end of the LDN, press the letter "E".

To insert the section inside the LDN, enter the coil or statement number of the block where you wish to insert the section and press the return key. The section will then be inserted immediately after that block.

If you want to move another section, follow the same procedure. To abort a move operation, leaving the blocks in their original position, press the "Alt" and the F10 keys at the same time.

3.10 DELETING SECTIONS OF THE LDN

Any block or series of consecutive blocks can be deleted from the LDN. This will allow you to rapidly remove sections of the LDN that are no longer needed.

To enter the Delete mode from the GLLADD Ladder Editor/Compiler menu, press the F7 (Delete) function key. The computer will respond with the following message:

```
Enter statement or coil numbers.
'B' for beginning, 'E' for end,
(<Alt>F10) to abort.
```

```
*****
```

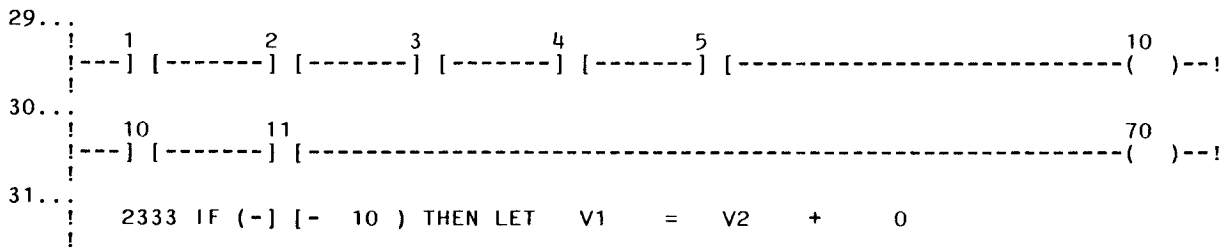
```
DELETE circuit(s), beginning with
coil/statement #
and ending with coil/statement #
```

You must decide which block or series of consecutive blocks you wish to delete.

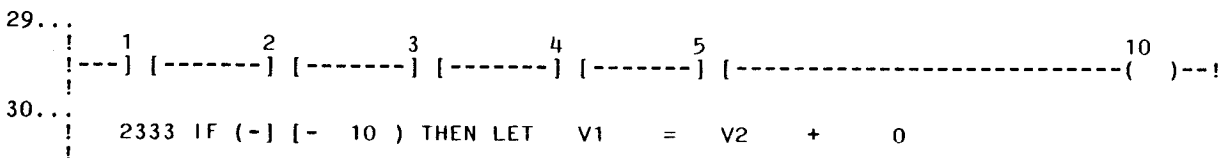
If you want to delete one block only, use the same number followed by a return for the beginning and ending coil or statement number.

To delete a series of consecutive blocks, enter the coil or statement numbers for the first and last blocks in that series. Press the return key after entering each number.

If you want to delete another section, follow the same procedure. Otherwise, to exit the Delete mode and return to the Ladder Editor/Compiler menu, press the F10 (Done) key.



Before DELETION



After DELETION

FIGURE 3.21 DELETE EXAMPLE

3.11 AUXILIARY FUNCTIONS

In addition to creating and editing ladder diagrams, the GLLADD Ladder Editor/Compiler also has a menu for auxiliary functions. These functions handle the remaining elements required for an LDN to function with a PiC.

To enter the Auxiliary Functions menu from the Ladder Editor/Compiler menu, press the F8 (Aux. Function) function key. A new menu will appear with the selections described below.

3.11.1 Reinitialize

When you first entered the GLLADD Ladder Editor/Compiler menu to create a new LDN, you were asked to enter the following information:

1. The number of non-volatile variables.
2. The number of retentive relays.
3. The LDN size limit.
4. The bank where the LDN resides.
5. The highest bank used by the LDN (if you entered a "1" for item 4).

If you wish to change these numbers, you can use the Reinitialize function.

Press the F1 (Reinitialize) function key. The computer will indicate what your previous choices were and will ask you to enter your new choices.

If you do not wish to change an entry, enter the same value that you used before. Otherwise, enter a new number.

Press the return key after each entry. After the last entry is made, the Ladder Editor/Compiler menu will then return to the screen.

3.11.2 Allocate Memory

This is the GLLADD equivalent to the PiC Allocate command. It is used to allocate the amount of memory reserved for Call Routines. To allocate this memory, press the F2 (Allocate Memory) key. The computer will respond with the following message:

Subroutine area = (X), From (\$XXXX) to (\$YYYY). New Size =

Ladder Editor/Compiler Auxiliary Functions

Re-establish the number of non-volatile variables and retentive relays.

Adds or modifies an identifying label for the ladder diagram.

Provides for inserting selected call routines into the ladder.

F1	Reini- tialize	F2	Allocate Memory
F3	Name Ladder	F4	Format Messages
F5	Install Call Routines	F6	Change Timer Incr.
F7		F8	
F9	Help	F10	Done <Alt> Abort

Assigns the amount of memory available for call routines to be installed.

Provides for inserting, renumbering, deleting and editing ladder messages.

Toggles the timer increment between 10 and 100 milliseconds.

Select an operation via the function keys.

FIGURE 3-22 EDITOR/COMPILER AUXILIARY FUNCTIONS MENU

The "X" will indicate the actual number of bytes already allocated. The two hexadecimal numbers "\$XXXX" and "\$YYYY" indicate the actual memory locations reserved for Call Routines. To change the allocation, type in the number of bytes that you will need for Call Routine storage and press the return key.

Modify Ladder Name

RUN PACK-09 1.0

Push F10 when finished.

Type in a name for the ladder to replace the line "RUN PACK-09 1.0" and press the F10 (Done) function key when finished. The Ladder Editor/Compiler menu will return to the screen.

NOTE —

If you are planning to install Call Routines from a diskette using the GLLADD software, there is no need to allocate memory using this function. The GLLADD Call Routine Installer will automatically allocate the correct amount of memory.

However, the Allocate Memory function can also be used to determine how much memory GLLADD automatically allocates for Call Routines on diskette. Press the F2 (Allocate Memory) function key to display the amount of memory allocated. If you press the <Alt> <F10> Abort keys at the same time instead of entering a number, the number of bytes reserved for the Call Routines will remain unchanged.

3.11.3 Name Ladder

This is an optional feature used to identify ladder diagrams. PiC ladder names created with this feature are independent of the ladder names used by the GLLADD systems for file handling purposes.

Although recommended for the sake of consistency, the ladder name created here does not have to match the ladder name used by the GLLADD software. To name an LDN from the Auxiliary Functions menu, press the F3 (Name Ladder) function key. The following message will appear on the screen:

3.11.4 Message Formatter

The PiC is capable of displaying messages on a variety of devices. ASCII messages containing text are created, formatted and stored using either the GLLADD or the PiC Message Formatter.

For detailed information about the functions of the Message Formatter, refer to Section 7 in the PiC Family Programming Manual. For information about displaying the messages, refer to the Message Call Routine documentation supplied with the PiC Part One Standard Call Routines.

To enter the GLLADD Message Compiler menu press the F4 (Format Messages) function key. Another menu will be displayed.

To leave the GLLADD Message Compiler menu press the F10 (Done) key. If you want to leave the Message Compiler menu but ignore any changes you may have made, press the "Alt" and the F10 keys (Abort) at the same time.

3.11.4.1 Creating New Messages - To create a new message, press the F2 (Insert) function key. The computer will display the following message:

Insert message #

Enter the message identification number and press the return key. This can be any integer from 0 through 255 as long as the number has not been reserved for another message.

Message Formatter

Display a single ladder message, or portions of the entire table.

Deletes an entry in the ladder message table.

Provides format constants for the CRT, from popular formats or enter your own.

F1 Display	F2 Insert
F3 Delete	F4 Renumber
F5 Format	F6 Edit
F7	F8
F9 Help	Done F10 <Alt> Abort

Inserts a new entry into the ladder message table.

Changes the number of an existing entry in the ladder message table.

Modifies an existing entry in the ladder message table.

Select an operation via the function keys.

FIGURE 3-23 MESSAGE FORMATTER MENU

The next message the computer will display is:

Enter the new message,
CTRL-X to enable hex entry.
<F10> when done,
<Alt> <F10> to abort.

Type in the desired message. Messages may contain up to 254 characters including spaces and returns. Incorrect entries can be deleted by pressing the backspace key. Press the F10 (Done) function key when finished. The computer will ask:

Enter this message (Y/N)?

Press the "Y" (yes) key to enter the message. If you don't want the message, press the "N" (no) key. After either entry, the computer will ask for the next message.

To create a message consisting of hexadecimal characters, press the "Ctrl" and the "X" keys at the same time before entering the message itself. The prompt "\$" will appear indicating

that the next entry will be a hexadecimal number. After typing in the first two digits, the prompt "\$" will appear again waiting for the entry of two more hex characters. This will continue until the F10 key or "Alt" and F10 keys are pressed or if the message exceeds 254 characters.

After entering the last message, press the F10 (Done) key to exit the Insert mode. To exit the Insert mode without saving the message, press the "Alt" and the F10 keys (Abort) at the same time.

3.11.4.2 Displaying Messages - After messages have been created, they can be viewed by pressing the F1 (Display) function key. After pressing this key the computer will display the following line:

Display starting at message #

Enter the identification number of the first message you want to view and press the return key. The message will appear on the screen with its identification number to the left.

Each time the space bar is pressed, the next message will be displayed until no more messages remain. Pressing the number "0" will display all of the remaining messages on the screen. The computer will also identify any unused message numbers that fall between the numbers of existing messages. To return to the Message Compiler Menu, press the F10 (Done) key.

3.11.4.3 Deleting A Message - To delete a message, press the F3 (Delete) function key. The computer will respond with:

Delete message #

Enter the identification number of the message and press the return key. The computer will display the message and as the following question:

Delete this message (Y/N)?

Press the "Y" (yes) key to delete the message. Otherwise, press the "N" (no) key. The computer will then ask for the number of another message to delete. Enter the number of another message followed by a return or press the F10 (Done) function key to return to the Message Formatter Menu.

3.11.4.4 Renumbering Messages - This function allows you to change the identification number of any message. A message number can be changed to any number from 0 to 255 if the new number is not being used by another message.

Press the F4 (Renumber) function key to renumber a message. The computer will respond with:

Renumber message #

Enter the existing identification number for the message you wish to renumber and press the return key. The computer will display the message and ask you to enter the new message number. Enter the new number and a return. Press the F10 (Done) key to return to the Message Compiler menu.

3.11.4.5 Editing Messages - To change the contents of a message, press the F6 (Edit) function key. The computer will respond with:

Edit message #

Enter the identification number of the message you wish to edit followed by a return.

If you are editing a standard ASCII message, the message will be displayed on the screen with the cursor on the first character of the message. Use the arrow keys to move the cursor throughout the message.

To insert characters, position the cursor in the desired location and type the characters in. Any characters on or after the cursor will move over to make room for the new characters.

Press the "Del" key to delete the character at the cursor position. Press the backspace key to delete a character to the left of the cursor.

Press the "Home" key to move the cursor to the beginning of the line. Press the "End" key to move the cursor to the end of the line.

After editing the message, press the F10 (done) function key. If you decide not to incorporate any changes you may have made, press the <Alt> <F10> (abort) function keys at the same time.

If you are editing a message consisting of hexadecimal characters, the message will be displayed on the screen along with the following:

Enter the new message,
CTRL-X to enable hex entry,
<F10> when done,
<Alt> <F10> to abort.

Press the "Ctrl" and the "X" keys at the same time. The prompt "S" appear indicating that the next entry will be a hexadecimal number. Type in a new hexadecimal or ASCII message.

After entering the new message, press the F10 (Done) function key. If you decide not to change the original message, press the "Alt" and the F10 keys (Abort) at the same time. The Message Compiler menu will reappear on the screen.

3.11.4.6 Configuring The CRT - This function only applies if you are going to display messages on a video monitor (CRT) using the G&L video modules. It allows you to determine the number of horizontal rows and the number of characters per row that will be displayed on a video monitor. To configure the display, press the F5 (Format) function key. The computer will display a small menu on the screen.

```
CRT CONFIGURED 32 X 16
```

```
CONFIGURE CRT
```

0. User Defined Constants
1. Standard Configuration 1 (32 x 16)
2. Standard Configuration 2 (40 x 18)
3. Standard Configuration 3 (64 x 16)

Enter number corresponding to choice

(<Alt> <F10> to abort)

FIGURE 3-24 CRT CONFIGURATION MENU

Select the desired format from the menu. Selection one is a standard configuration that has 16 rows with 32 characters per row. If no selection is made, the system will default to this format. Selection two has 18 rows with 40 characters per row and selection three has 16 rows with 64 characters per row.

Selection zero allows you to configure the CRT to a nonstandard format. If you press the number "0", the following message will be displayed on the screen:

```
Enter 17 bytes of hex CRT
configuration data! $
```

Ladder Editor/Compiler

Type in the hexadecimal codes for the desired configuration as listed in Section 7 of the PiC409 Family Programming Manual (Table 7-1). The configuration you use is limited by the type of crystal on the video interface module. The standard crystal supplied with this module is a 12.576 MHz crystal.

After entering the correct string of hexadecimal codes press the F10 (Done) key. If you decide not to change the configuration after entering the hexadecimal codes, press the "Alt" and F10 keys (Abort) at the same time.

3.11.5 Installing Call Routines

This function allows the programmer to copy and install Call Routines into the LDN. The Call Routines can be supplied from G&L on disk or they can reside on a Call Routine EPROM (Erasable Programmable Read Only Memory) module resident in the PiC.

If you are installing Call Routines from disk, read Section 3.11.5.1 before proceeding.

If you are installing Call Routines from a Call Routine EPROM module, read Section 3.11.5.2.

NOTE

If you are installing Call Routines from a cassette or cartridge tape, you cannot use this function. Refer to Section 9 in the PiC409 Family Programming Manual for instructions regarding Call Routines supplied on tape.

3.11.5.1 Installing Call Routines From From Disk - Press the F6 (Install Call Routines) function key from the GLLADD Ladder Editor/Compiler Auxiliary Functions menu. The computer will display the following message:

GLLADD will search the current directory on the system disk, and any directories indicated by PATH for the Call Routines. If the Call Routines are not on your system disk and are not in the PATH directory, remove the system disk and insert the Call Routine disk into the system drive.

Push any key when ready to continue.

If you are using a hard disk, you should have the Call Routines stored on that disk (see Section 2.1.2 for more information). However, if you are using a floppy disk system, remove the GLLADD disk from the system drive and replace it with the Call Routine disk. Do not remove the data disk containing your LDN files.

Press any key to continue. The computer will respond with the following message:

Do you wish to Scan the Call disk or enter Call names individually (S/I)?

At this point you have the choice of having the computer scan the Call Routine disk and search for the Calls in alphanumeric order, or you can select each Call Routine individually.

1. If you choose to have the computer scan the disk, press the letter "S". The computer will display this message:

Do you wish Call A110 installed (Y/N)?

Press the "Y" (yes) key if you are planning to use Call Routine A110. Otherwise press the letter "N" (no). The computer will then present the next Call Routine and ask if you wish to have it installed.

This procedure will continue until all of the Call Routines have been presented or if you press the F10 (Done) key). The computer will instruct you to return the system (GLLADD) disk to the system drive. After doing so, press any key to return to the Ladder Editor/Compiler menu.

2. If you choose to select each call individually, press the letter "I" instead of the letter "S". The computer will respond with the following message:

Enter the name of the Call routine you wish installed.

After entering the name of the Call Routine, press the return key. The computer will reply with the following:

Is this Call routine located in EPROM (Y/N)?

Press the letter "N" (no). The computer will copy the Call routine and then repeat the procedure to allow you to enter more Call Routines. After the last Call Routine is installed, press the F10 (Done) function key. The computer will instruct you to return the system (GLLADD) disk to the system drive. After doing so, press any key to return to the Ladder Editor/Compiler menu.

NOTE

If insufficient memory space is allocated for Call Routines, the GLLADD software will automatically allocate the correct amount.

After specifying which Call Routines to install, including C912 Real Time Debug (Section 3.11.5.3), enter the PiC Call Routine Installer from the PiC AUX 2 mode and use the REINSTALL function as described in Section 3.11.5.4. This is the operation that actually installs the Call Routines in the PiC.

3.11.5.2 Installing Call Routines From EPROM - Press the F6 (Install Call Routines) function key from the GLLADD Ladder Editor/Compiler Auxiliary Functions menu. The computer will display the following message:

Ladder Editor/Compiler

GLLADD will search the current directory on the system disk, and any directories indicated by PATH for the Call Routines. If the Call Routines are not on your system disk and are not in the PATH directory, remove the system disk and insert the Call Routine disk into the system drive.

Push any key when ready to continue.

NOTE

If you are installing Call Routines from the G&L Call Routine EPROM module, there is no need to switch any disks in the system drive. However, if you do not have Call Routines in the system drive, you will have to enter the number of parameters required for each Call Routine manually.

If you do not know the number of parameters required or do not wish to enter them manually, put the Call Routine disk in the system drive if Call Routines are not there already.

Press any key to continue. The computer will respond with the following message:

Do you wish to scan the Call disk or enter the Call names individually (S/I)?

Press the letter "I". The computer will respond with the following message:

Enter the name of the Call Routine you wish installed.

After entering the name of the Call Routine, press the return key. The computer will reply with the following:

Is this Call routine located in EPROM (Y/N)?

Press the letter "Y" (yes).

If you have Call Routines in the system drive, the computer will install the Call Routine and request the name of the next one.

If you do not have Call Routines in the system drive, the computer will respond with the following statement:

Warning! Unable to determine the correct directory for the GLLADD Call Routines.

Enter the number of parameters required.

Enter the correct number of parameters and press the return key. The computer will install the Call Routine and then repeat the procedure to allow you to enter more Call Routines. If you are unsure of the exact number of parameters, refer to the documentation supplied with the Call Routines or insert a Call Routine disk in the system drive.

After the last Call Routine is installed, press the F10 (Done) function key. The computer will instruct you to return the system (GLLADD) disk to the system drive. Return the system disk to this drive if it is not there already and press any key to return to the Ladder Editor/Compiler menu.

After specifying which Call Routines to install from EPROM, including Real Time Debug (C912) (Section 3.11.5.3), enter the PiC Call Routine Installer from the PiC AUX 2 mode and use the REINSTALL function as described in Section 3.11.5.4. This is the operation that actually installs the Calls in the PiC.

NOTE

The Call Routine EPROM module must be in your PiC main nest before Call Routines can be installed. The only exception is Real Time Debug (C912) which is already resident in the PiC Compiler module.

3.11.5.3 Installing Real Time Debug Debug (C912) - The Real Time Debug Call Routine C912 Routine is located on EPROM in all G&L PiC's. Follow the instructions for installing Call Routines from EPROM in Section 3.11.5.2. Note: C912 has only one parameter.

3.11.5.4 Reinstalling Call Routines

After loading the PiC with an LDN created using the GLLADD Ladder Editor/Compiler, a simple operation called "Reinstall" must be performed. This allows the PiC to accurately access the Call Routines from user memory or EPROM.

1. If you are using the AUX 1 Mode: Connect the computer to the Terminal port on the PiC control panel. Set the MODE switch on the control panel to the AUX 1 position and press the initialize button.

Select the AUX 1 Support mode from the Main Menu. From the AUX 1 menu, enter the AUX 2 mode. When the AUX 2 menu appears, select the Call Routine Installer. When the prompt "*" appears, press the "R" key for REINSTALL. The PiC will then install the Call Routines that you specified in the Ladder Editor/Compiler.

2. If you are not using the AUX 1 mode: Enter the Terminal mode as described in Section 8 - GLLADD AUXILIARY FUNCTIONS. Connect the computer to the Terminal port on the PiC control panel. Set the MODE switch on the PiC Control Panel to the AUX 2 position and press the initialize button.

When the AUX 2 menu appears, select the Call Routine Installer.

When the prompt "*" appears, press the "R" key for REINSTALL. The PiC will then install the Call Routines that you specified in the Ladder Editor/Compiler.

3.11.6 Changing The Timer Increment

To switch the timer increment for time delay to energize (TE) and time delay to de-energize (TD) coils, press the F6 (Change Timer Incr.) function key from the Ladder Editor/Compiler Auxiliary Functions menu. The computer will indicate which timer increment (10 milliseconds or 100 milliseconds) you switched into. All timer coils in the LDN will now use this increment unless it is changed back to the alternate increment.

3.12 EXITING THE GLLADD LADDER EDITOR/COMPILER

To exit the GLLADD Ladder Editor/Compiler menu, press the F10 (Done) function key. This will save any changes you may have made while in the Ladder Editor/Compiler and return you to the Main menu.

If you press the <Alt> <F10> Abort function keys at the same time, the following message will appear:

Operation aborted, ignore any changes (y,n)?

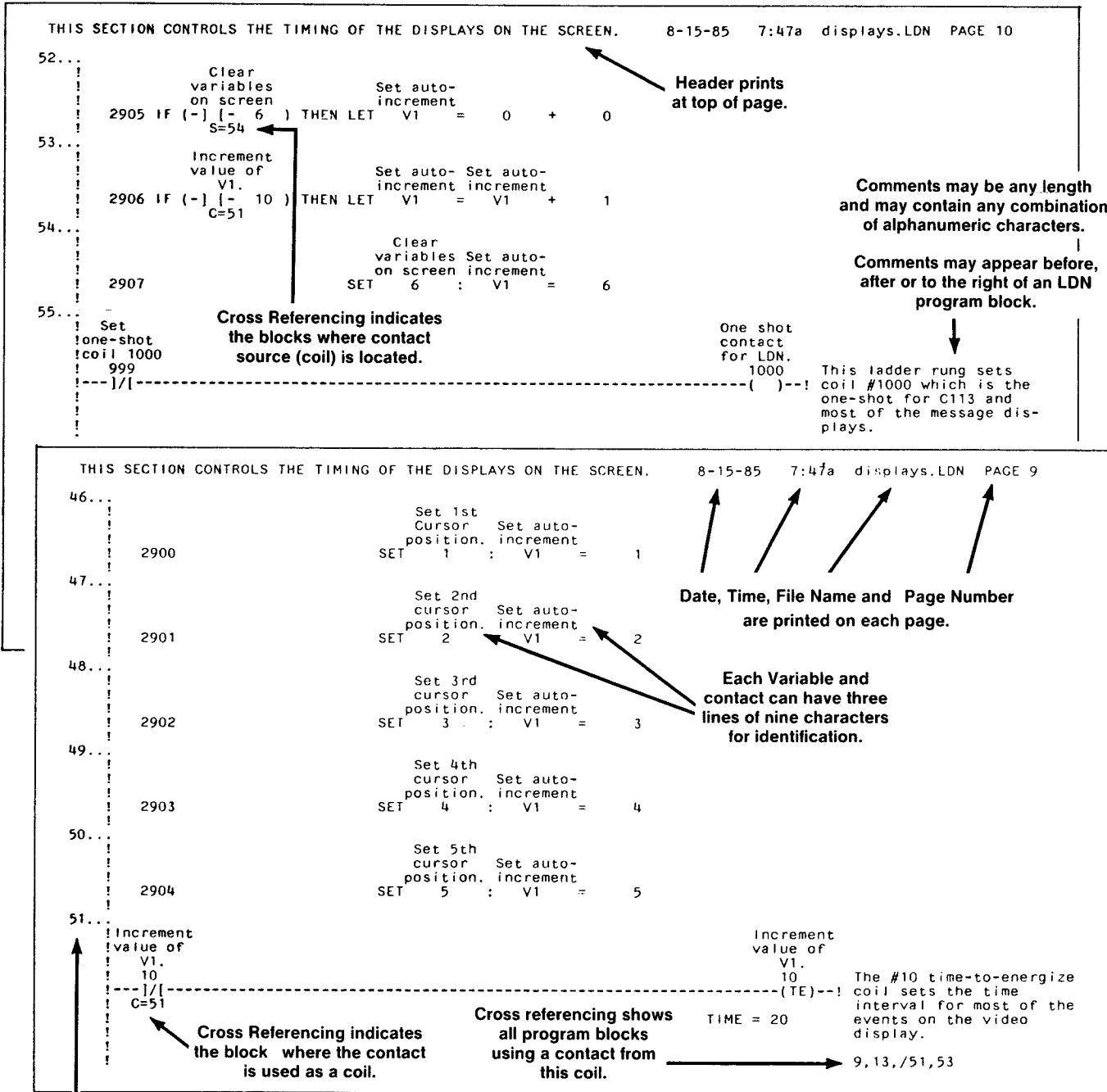
If you press "y" (yes), the software will not save any changes that you may have made in the Ladder Editor/Compiler and will return you to the Main Menu.

If you press "n" (no), the software will save any changes you may have made and return you to the Main Menu.

SECTION 4 - LADDER DOCUMENTER

The primary function of the GLLADD software is the development and documentation of LDNs. When used for documentation, the software allows the

user to assign meaningful labels to contacts, coils and variables, and provides for nearly unlimited commenting on an LDN printout.



Block Numbers are in numerical order for fast cross referencing.

FIGURE 4.1 SAMPLE DOCUMENTED LDN

4.1 DEFINITION FILES

The text required for documenting an LDN is stored in a separate file called a definition file. A definition file uses the same ladder name as the LDN file. However, the three letter extension is ".DEF" instead of ".LDN." Under most circumstances, you will only have to refer to the definition file by its ladder name and not by its extension.

To create or modify a definition file, return to the main menu and press the F2 key labeled "Edit Documen. Database." The computer will ask for a ladder name. Enter the name of the LDN you wish to document and press the return key.

The Documentation Database Menu will appear on the screen.

4.2 ADDING AND MODIFYING TEXT

Press the F1 key in the Documentation Database Editor menu to begin the actual documentation. The Add or Modify menu will appear on the screen. This menu is used to create and modify the text for headings, labels and comments etc.

Press the function key associated with the desired item from the menu. If you specify a contact label, the computer will ask for a contact number. If you specify a variable label, the computer will ask if you are using a PC400 controller or a PiC 409 controller. After indicating the correct controller followed by a return, the computer will then ask for a variable number.

If you specified a heading, comment or top of page, the computer will ask you for a coil or statement number. Enter the appropriate number followed by a return.

Documentation Database Editor

Add a new entry, or modify an existing entry in the documentation database.

Copy or duplicate an existing entry in the documentation database.

F1	Add or Modify	F2	Delete
F3	Copy	F4	Move
F5		F6	
F7		F8	
F9	Help	F10	Done <Alt> Abort

Delete an entry in the documentation database.

Move an existing entry in the documentation database.

Select an operation via the function keys.

FIGURE 4.2 DOCUMENTATION DATABASE EDITOR MENU

Add or Modify

Contact labels appear over all contact and coil references of a device.

Comments can appear above, below or to the right of a coil or statement.

Top-of-page causes a top of form before a specified coil or statement.

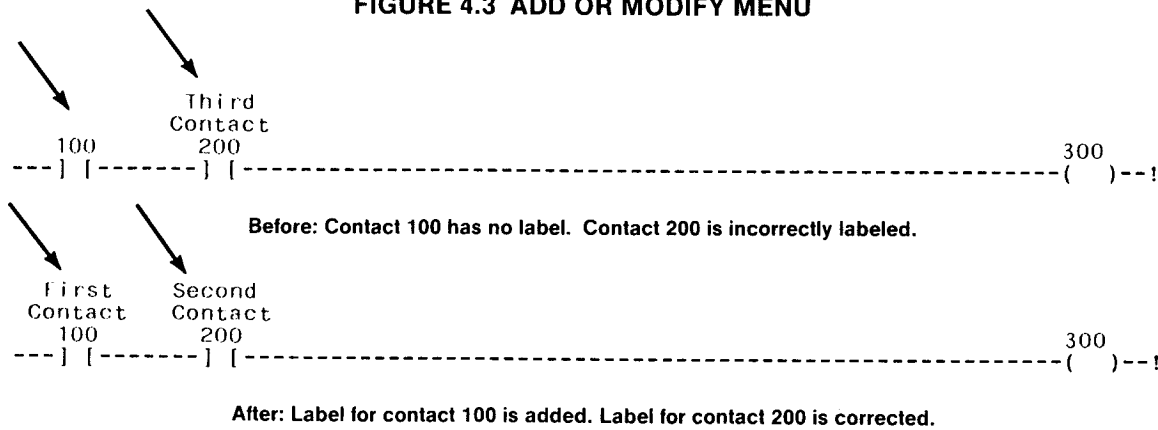
F1	Variable
Contact Label	F2 Label
F3	F4
Comment	Heading
F5	F6
Top of Page	
F7	F8
F9 Help	F10 Done <Alt> Abort

Variable labels appear over all LET/SET statement references of a variable.

Headings print on each page beginning with a specified coil or statement.

Select an operation via the function keys.

FIGURE 4.3 ADD OR MODIFY MENU



NOTE: This example required two ADD/MODIFY operations. The first operation was for contact 100. The second operation was for contact 200.

FIGURE 4.4 ADD OR MODIFY EXAMPLE

When you specify a comment number, the computer will ask if you want the comment to appear before (B), after (A) or to the right (R) of the comment. Press the letter corresponding to your choice

Except for the Top of Page function which requires no text, a text field will appear on the screen.

Type in the desired text to fill the field. If the text exceeds the maximum line width, a warning will sound and the computer will not accept any more characters on that line. When typing labels or comments, use the return key to advance to the next line.

The cursor can be controlled by the arrow keys on the numeric keypad for easy editing of the text. Press the

"Del" key to delete the character at the cursor position. Press the backspace key to delete the character to the left of the cursor.

To insert characters or spaces between parts of the text, position the cursor where the new characters will go and type them in.

After entering and editing the text, several options are available.

1. To save your entry and add another one, press the F6 (increment) key until the number of the next contact, variable, coil or statement number you want appears on the screen.
2. To save your entry and edit a previous entry, press the F5 (decrement) key until the desired element or block appears on the screen.
3. To save your entry and return to the Add or Modify Menu press the F10 (done) key.
4. To return to the Add or Modify Menu without saving your entry, press the "ALT" and F10 (abort) keys at the same time.

The different entries that can be made in the Add or Modify Mode are as follows:

4.2.1 Contact Labels

Contact labels are used to identify, in words, what a contact or coil actually is. These labels consist of three lines of text with a maximum number of nine characters per line. Each label identifies a particular control relay or I/O address and will be displayed above that item wherever it appears in the documented LDN.

To create a contact label from the Add or Modify Menu, press the F1 "Contact Label" function key. The computer will

ask for the contact number. Enter the number and press the return key.

The screen will then display the contact with an entry field above it. Type the desired information into this field and select one of the four options listed at the end of Section 4.2.

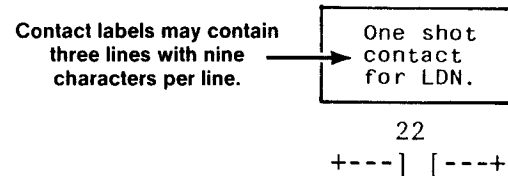


FIGURE 4.5 CONTACT LABEL EXAMPLE

4.2.2 Variable Labels

Variable labels, like contact labels, consist of up to three lines of nine characters each. Each variable label is assigned to a specific variable number. Once this label is assigned, it will be displayed above that variable wherever it appears in a LET or SET statement in the documented LDN.

To create a variable label from the Add or Modify Menu, press the F2 "Variable Label" function key. The computer will ask for the variable number.

Enter the number, correct number and press the return key. There is no need to begin a PiC409 or PiC49 variable number with the letter "V".

The screen will then display the variable with an entry field above it. Type the desired information into this field and select one of the four options listed at the end of Section 4.2.

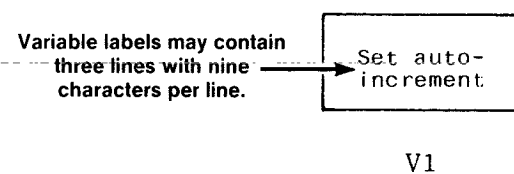


FIGURE 4.6 VARIABLE LABEL EXAMPLE

NOTE

When creating the first variable label in a definition file, the software will ask you to specify if you are using a PC400 or a PiC409. After indicating which control you are using, press the return key.

This sets up the file to accept only those variable numbers designated for that controller. The PC400 uses 260 variable numbers from A0 through Z9. The PiC409 and PiC49 use variable numbers 0 through 899.

4.2.3 Comments

Comments provide additional information about particular coils or LDN statements. The size of a comment is limited only by the amount of memory and available disk space. Comments may appear before, after or to the right of a particular coil or LDN statement.

Comments that appear before or after a block may be up to 86 characters in length. Comments that appear to the right of a block may contain as many as 50 characters.

The exact number of characters per line depends upon the page width specified in the initialization procedure (Section 2.2). Wider pages allow more characters for these comments.

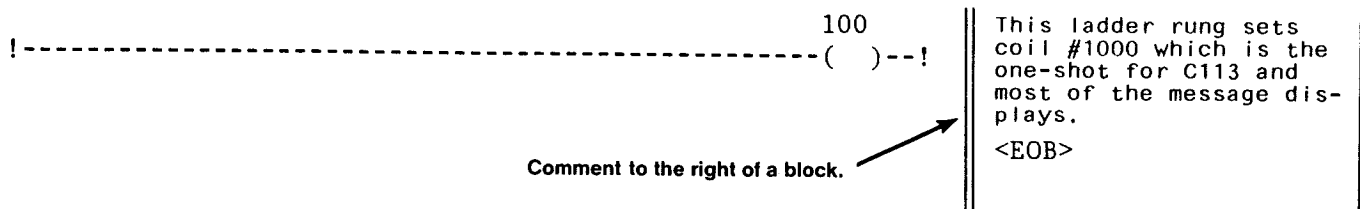


FIGURE 4.7 COMMENT EXAMPLE

NOTE

If less than 100 characters is specified for the page width during the initialization process, no comments will be printed to the right of any block.

or Modify Menu. The computer will ask which block you wish to comment. After entering the appropriate coil or statement number and a return, the computer will ask you where you want the comment in relation to that block.

If you want the comment to appear after (below) the block, press the "A" key.

Press the "B" key if you want the comment to appear before (above) the block.

If you want the comment to appear to the right of the block, press the "R" key.

After making your selection, the computer will display a sample block and a comment field on the screen. Type as much information as needed into this field. Use the return key to advance to the next line.

The cursor keys can be used to move through the comment for editing purposes. Characters can be deleted using the backspace or delete keys. To insert characters, position the cursor to the desired location and type the characters in. After entering and editing the comment, select one of the four options listed at the end of Section 4.2.

4.2.4 Headings

Headings are single lines of text printed at the top of each page beginning with a specified LDN block. Headings are typically used to identify different sections of an LDN.

The maximum heading length is 78 characters. However, the actual length depends upon the page width specified in the initialization process. Wider pages allow more characters per heading.

When a heading is first used, the GLLADD software forces a form feed to the printer so the heading and its

corresponding block number will appear at the top of the next page.

This heading will then appear at the top of all succeeding pages until it is replaced by another heading.

To create a heading, press the F4 "Heading" function key from the Add or Modify Menu. Enter the block number associated with the heading and press the return key.

A field will appear on the screen where one line of text can be entered. After entering the heading, select one of the four options listed at the end of Section 4.2.

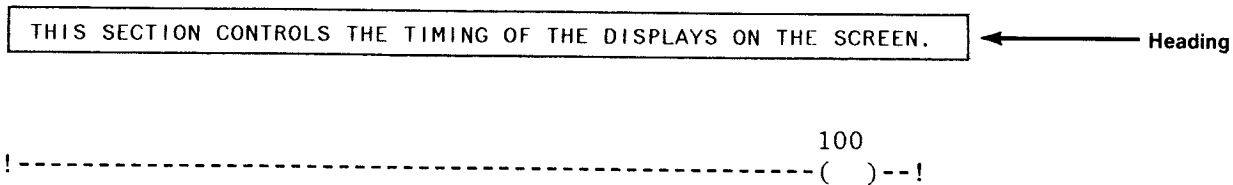


FIGURE 4.8 HEADING EXAMPLE

4.2.5 Top of Page

This function does not add any text to the document. Instead it commands a form feed before a specified coil or statement so that block will appear at the top of the next page when the documented LDN is printed.

To use this function, press the F6 (Top of Page) function key from the Add or Modify Menu. After assigning this function to a specific block, the Add or Modify menu will return to the screen.

4.3 DELETING TEXT

To delete a block of text or a top of

page command from the definition file, press the F2 (delete) function key from the Documentation Database Editor menu. The Delete menu will appear.

Select the appropriate function key to delete a contact label, variable label, heading, comment or top of page command.

Depending on the function key used, the software will ask for the number of a contact, variable or statement or coil. Enter the number and press the return key to complete the operation. The text associated with that number will be deleted from the file and the Documentation Database Editor menu will reappear on the screen.

Delete

Contact labels appear over all contact and coil references of a device.

Comments can appear above, below or to the right of a coil or statement.

Top-of-page causes a top of form before a specified coil or statement.

F1 Contact Label	Variable F2 Label
F3 Comment	F4 Heading
F5 Top of Page	F6
F7	F8
F9 Help	F10 Done <Alt> Abort

Variable labels appear over all LET/SET statement references of a variable.

Headings print on each page beginning with a specified coil or statement.

Select an operation via the function keys.

FIGURE 4.9 DELETE MENU

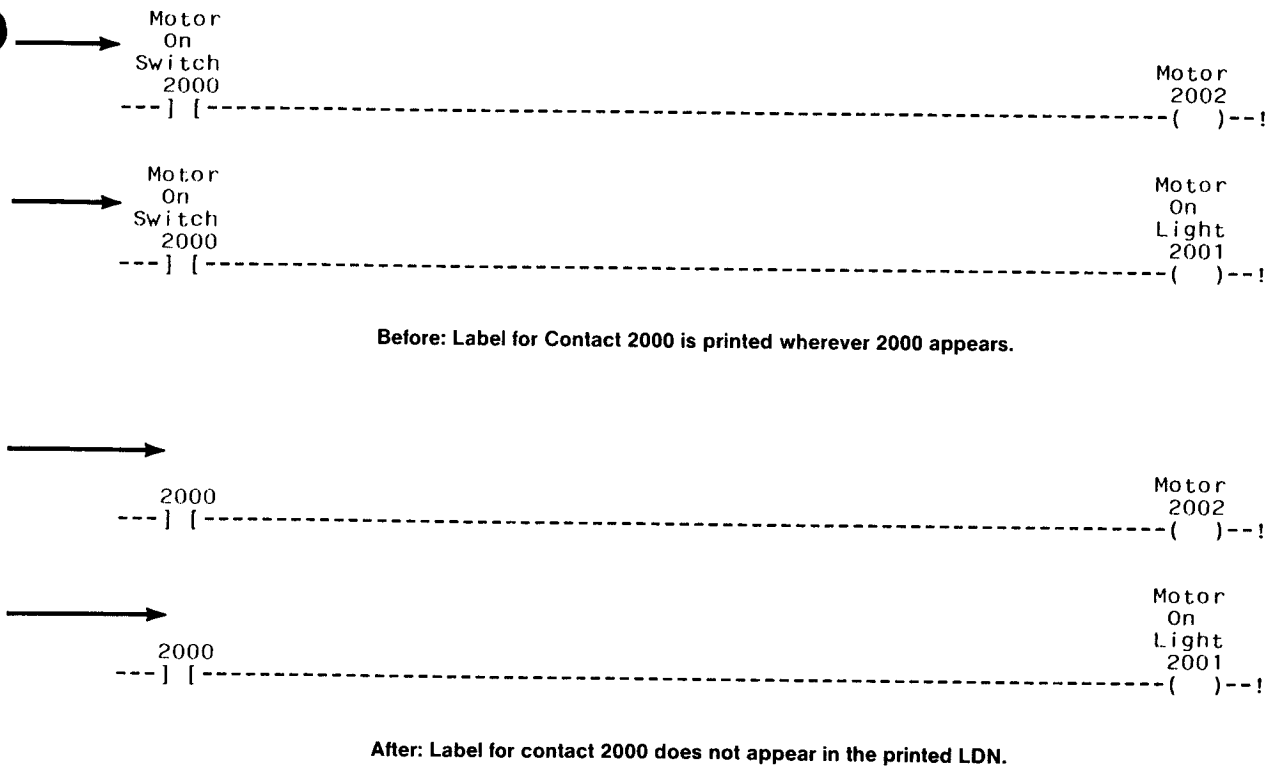


FIGURE 4.10 DELETE EXAMPLE

4.4 COPYING TEXT

The text used for one contact, variable, coil or statement number may be copied for use with one or more other numbers.

For example: The label for contact number 2003 may read ON/OFF/SWITCH. To use the same label for contacts 2004, 2005 and 2006, enter the Copy mode by pressing the F3 (copy) function key from the Documentation Database Editor menu. Another menu will appear on the screen.

Press the F1 key titled Contact Label. The software will request a contact number. Enter 2003 and press the return key.

The software will then ask for the contact number that will receive the copied text. Enter 2004 and press the return to complete the operation.

The Documentation Database Editor menu will return to the screen. Repeat the procedure two more times using contacts 2005 and 2006 in place of 2004. All four contacts should now have the same label.

Copy

Contact labels appear over all contact and coil references of a device.

Comments can appear above, below or to the right of a coil or statement.

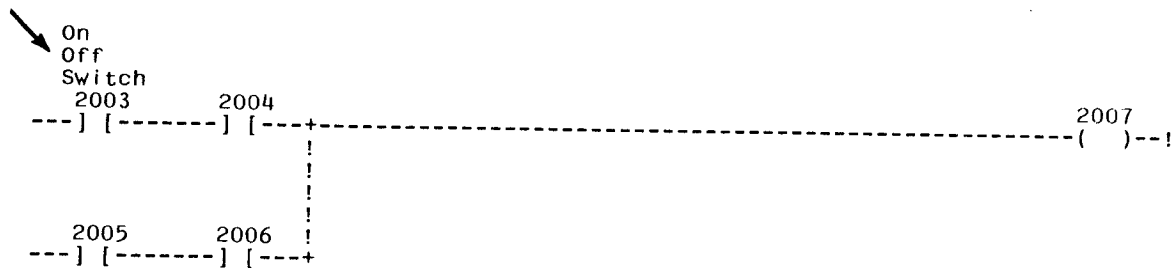
F1	Contact Label	F2	Variable Label
F3	Comment	F4	Heading
F5		F6	
F7		F8	
F9	Help	F10	Done <Alt> Abort

Variable labels appear over all LET/SET statement references of a variable.

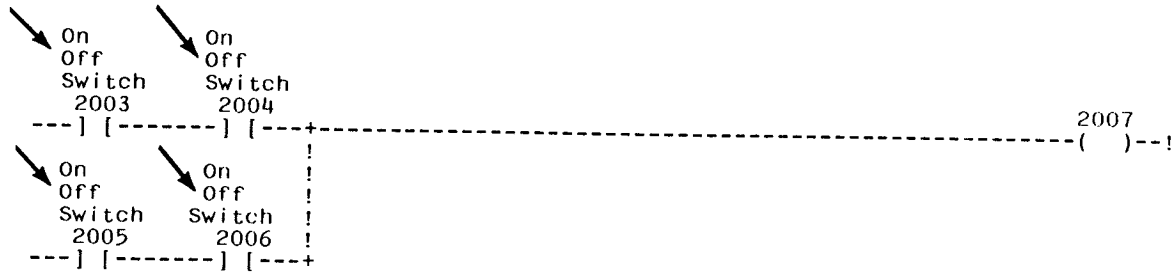
Headings print on each page beginning with a specified coil or statement.

Select an operation via the function keys.

FIGURE 4.11 COPY MENU



Before: Only contact 2003 is labeled.



After: All four contacts have the same label.

FIGURE 4.12 COPY EXAMPLE

4.5 MOVING TEXT

Text can be easily transferred from one contact, variable or coil or statement

number to another by using the F4 (move) function key from the Documentation Database Editor menu.

Move

Contact labels appear over all contact and coil references of a device.

Comments can appear above, below or to the right of a coil or statement.

Top-of-page causes a top of form before a specified coil or statement.

F1	Contact Label	F2	Variable Label
F3	Comment	F4	Heading
F5	Top of Page	F6	
F7		F8	
F9	Help	F10	Done <Alt> Abort

Variable labels appear over all LET/SET statement references of a variable.

Headings print on each page beginning with a specified coil or statement.

Select an operation via the function keys.

FIGURE 4.13 MOVE MENU

For example: A comment used for statement 2300 can be transferred to statement 2500. Once the comment is moved, it will be printed with statement 2500 and statement 2300 will no longer be printed with a comment.

To move the text, press the F4 (move) function key and wait for the Move menu to appear.

Select the appropriate key to move a contact label, variable label, heading,

comment or top of page. The software will request the number of the contact, variable, coil or statement associated with the text to be moved. Enter the number and press the return key.

The software will then request the number of the contact, variable, statement or coil that will receive the text. After entering this number, press the return key. This completes the operation and the Documentation Database Editor menu will return to the screen.

→ This ladder rung has only one contact.

```
      2000                                2030
----] [-----( )-----!
      2030                                2050
----] [-----( )-----!
```

Before: Comment appears above block 2030.

```
      2000                                2030
----] [-----( )-----!
```

→ This ladder rung has only one contact.

```
      2030                                2050
----] [-----( )-----!
```

After: Comment appears above block 2050.

FIGURE 4.14 MOVE EXAMPLE

SECTION 5 - LISTING A DOCUMENTED LDN

After all of the headings, comments and labels are entered and edited, the documented LDN may be listed on a printer or on a disk file.

NOTE

The initialization procedure determines whether your listing will be on a printer or a disk. To change the type of device used for listing documented ladders, refer to Section 2.2.2 - Changing The Initialization Parameters.

Return to the Main Menu and press the F3 (List Documen. Ladder) function key. Enter the ladder name of the LDN to be listed and press the return key.

The computer will provide you with several options for your listing. These options are as follows:

1. Ladder Listing. If you want to list the documented LDN, select this option.
2. Full or Partial Ladder Listing. If you selected the first option, you will be asked if you want to list the full LDN or a portion of it. If you want the full ladder listing, press the return key.

If you only want a portion of the LDN, indicate the coil or statement number of the first and last blocks that you want included in the listing. Separate the first and last blocks with a hyphen. For example,

to list the blocks from coil 100 through statement 2300, enter: "100-2300".

3. Cross Reference Listing. If you want your listing to include cross reference tables, select this option.

This information will then be printed whether you selected a ladder listing or not.

After the listing is complete, the Main Menu will return to the screen.

5.1 CROSS REFERENCE INFORMATION

In addition to its labeling capabilities, GLLADD also provides automatic cross referencing both in and at the end of the documented LDN. The user can quickly locate contacts, coils, variables and statements by referring to the block numbers provided in the cross reference tables. Block numbers are found in numerical order on the left side of each LDC or statement in the documented LDN.

5.1.1 Contact Cross References In The LDN

GLLADD will let you know where a contact number is controlled by a coil or where it is controlled by a SET statement. The block number of the coil or SET statement will be printed below the contact wherever it appears as a normally open or normally closed contact. In addition to the block number, the software also provides additional information as indicated in the following illustration.

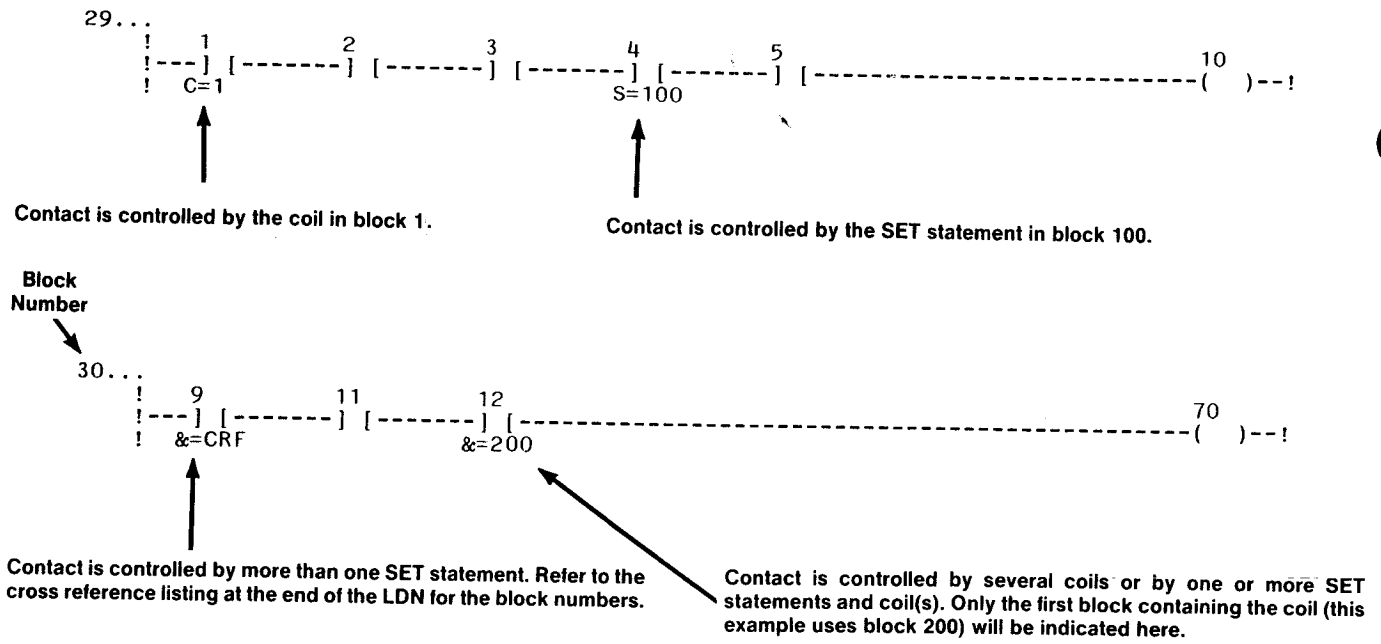


FIGURE 5.1 EXAMPLE CONTACT CROSS REFERENCES WITHIN THE LDN

5.1.2 Coil Cross References In The LDN

When a line width of 100 or more characters is specified during the initialization procedure, additional cross reference information is listed to the

right of the coil numbers. This information contains the block numbers where the coil appears as a contact in the LDN. The blocks are identified as shown below:

Block number where coil appears as a normally open contact in an LDC or SET statement.

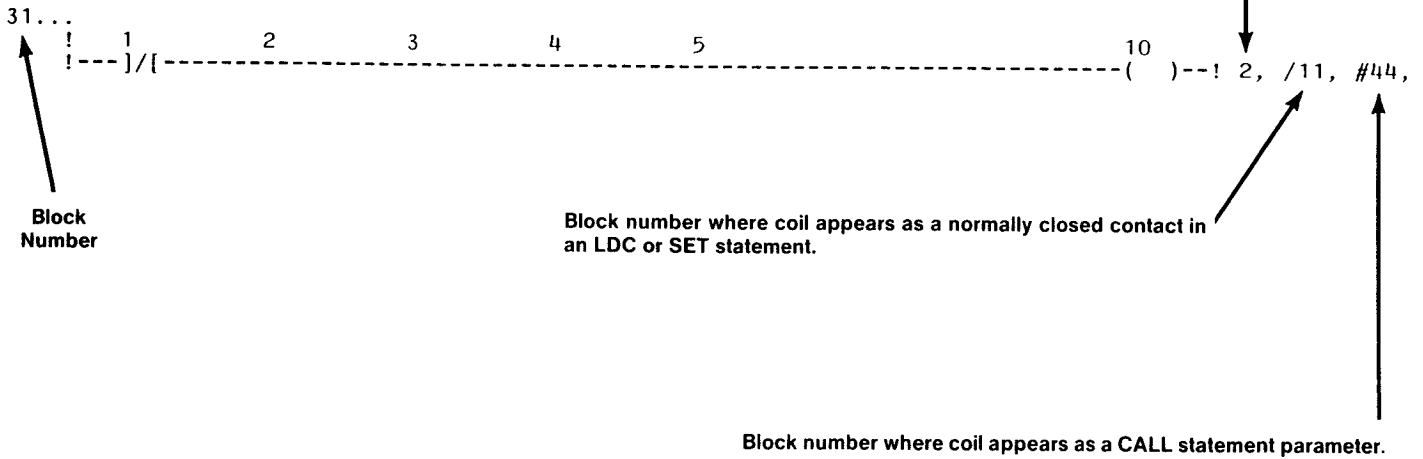


FIGURE 5.2 EXAMPLE COIL CROSS REFERENCES WITHIN THE LDN

5.1.3 Cross References At The End Of The LDN

Cross Reference Listings provide four different tables of information. The four different tables are:

1. messages
2. contacts
3. variables
4. statements.

Messages - If messages are included in the LDN, GLLADD will list all of the message numbers in numerical order, beginning with the first message used and ending with the last message used. GLLADD also lists the actual message to the right of the message number. If no message was created for a particular number, GLLADD will print "?????". If the message was formatted in hexadecimal, the message number will be listed with an "H" attached to it and the message itself will be listed as a string of hexadecimal numbers, each preceded by a "\$".

Message Number	Message Text
↓	↓
I.D.	MESSAGE
1	THE MESSAGE CALL ROUTINES CAN DISPLAY A VARIETY OF INFORMATION ON A VIDEO MONITOR INCLUDING:
2	CONTENTS OF A VARIABLE
3	STATE OF A CONTROL RELAY
4	CR1= (1=SET) (0=RESET) + & - SIGNS AND DECIMAL POINTS
5	DISPLAY THE CURSOR TALL OR SHORT SLOW, FAST OR FIXED
6	V1=
7	SET CURSOR BLINK RATE FAST OR SLOW

FIGURE 5.3 MESSAGES

Contacts - GLLADD lists all the contact numbers used in an LDN. This listing is in numerical order and contains

several columns of information as shown below:

Contact Number	Contact Label	Number Of The Block Controlling Contact	Blocks Where Contact Is Used in the LDN.
↓	↓	↓	↓
I.D.	DESCRIPTION	SOURCE	USED
1	\ Set 1st \ cursor \ position.	S 46	#21,34,35 ← Normally Open Contact
2	\ Set 2nd \ cursor \ position.	S 47	36,37
3	\ Set 3rd \ cursor \ position.	S 48	38,39
4	\ Set 4th \ cursor \ position.	S 49	40,41
5	\ Set 5th \ cursor \ position.	S 50	11,15,42,43
6	\ Clear \ variables \ on screen	S 54	16,17,18,19,20,44,45,52
10	\ Increment \ value of \ V1.	C 51	9,13,/51,53
11	\ Change \ values of \ V2,V3,V4.	C 33	24,30,/33
15	\ Reset V2 \ to -1000.	S 25	26
16	\ Reset V4 \ to \$A077.	S 31	32
999	\ Set \ one-shot \ coil \ 1000.	S	/55 ← Normally Closed Contact
1000	\ One shot \ contact \ for LDN.	C 55	/1,/3,/4,/5,/6,/7,/8,/10,/12,/14,/29

Indicates Coil Indicates SET Statement

FIGURE 5.4 CONTACT CROSS REFERENCES

Variables - The variable list is similar to the contact list. However, the

source column is not used because it does not apply to variables.

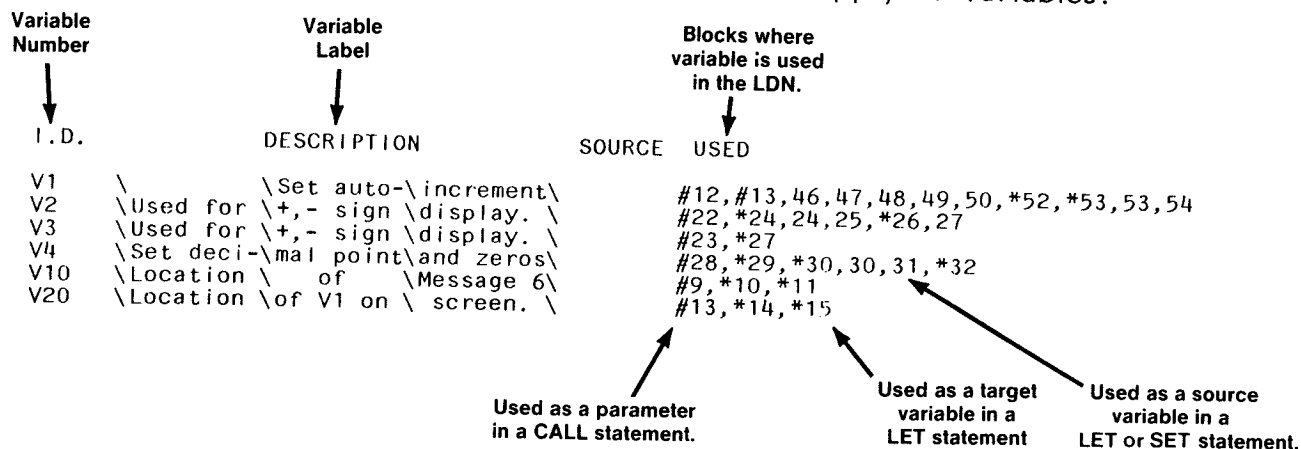


FIGURE 5.5 VARIABLE CROSS REFERENCES

Statements - The last cross reference table lists the statement numbers used in an LDN. It also provides a short description and the location of each statement.

LET statements are listed with their target variables.

The short description identifies the type of statement and lists the main element associated with it.

SET statements are listed with the contacts they control.

GOTO statements are listed with their target statement or coil numbers.

CALL statements are listed with the call routine numbers they are used with.

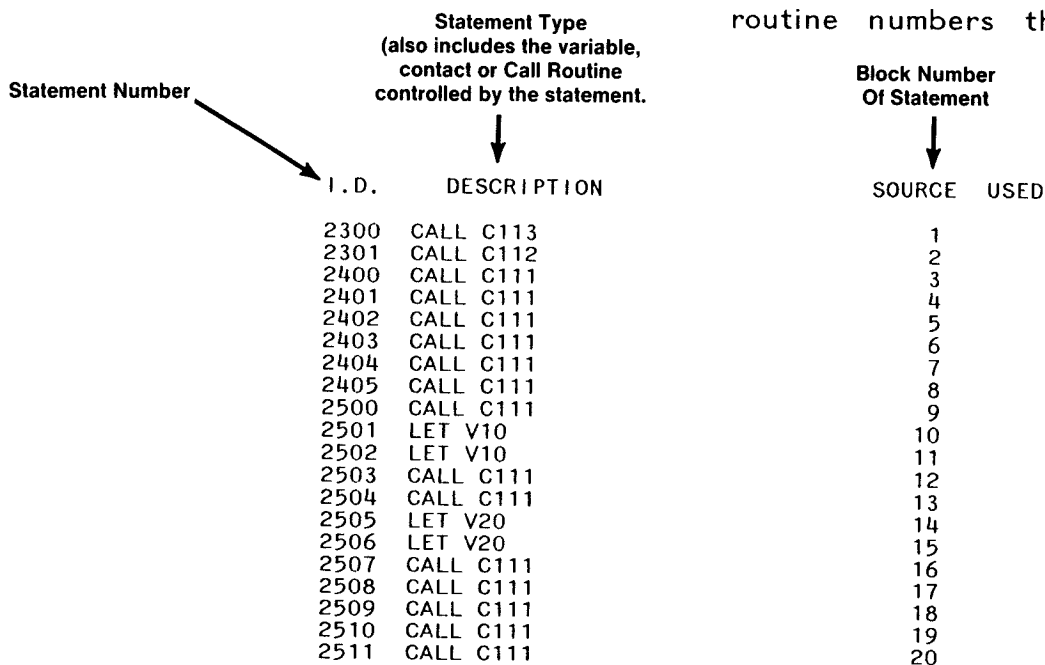


FIGURE 5.6 STATEMENT CROSS REFERENCES

SECTION 6 - DISK FILE HANDLER

Each LDN stored on disk may have several files associated with it. These files, identified by a ladder name and a three letter extension, include:

1. (Laddername).LDN

.LDN files which are the actual ladder diagram networks that can be used by the PiC.

2. (Laddername).DEF

.DEF files used for documentation. These files contain the labels, comments and headings used for documented LDN's.

3. (Laddername).DAT

.DAT files contain data such as the contents of non-volatile variables and the state of retentive control relays. These files may also store information generated using the Data Storage Call Routines.

4. (Laddername).LIS

.LIS files are ladder diagram and/or cross reference listings stored on disk.

5. (Laddername).SCR

.SCR files are temporary files used by the GLLADD software for cross referencing during the listing process.

Because .SCR files are deleted automatically when the listing is complete, the user will never see them on the file directory unless the listing process is interrupted.

6. (Laddername).LBK

7. (Laddername).DBK

.LBK and .DBK files are backup files which are described in the next section.

6.1 BACKUP FILES

Whenever an LDN or a definition file is edited, the computer creates a backup file containing the older version of that file. For example, if a file named "TOOLS.LDN" is edited to include three more ladder rungs, the new file containing these rungs will be called "TOOLS.LDN". The previous file which did not contain these rungs will become the backup file. Its name will be changed to "TOOLS.LBK".

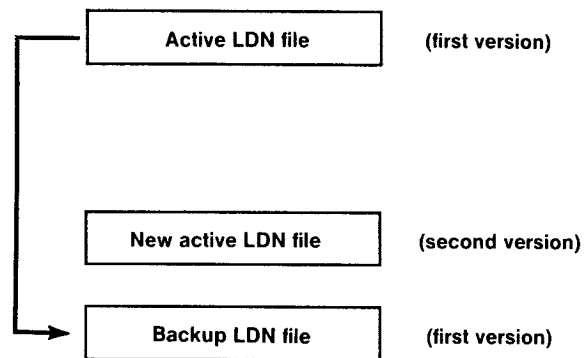
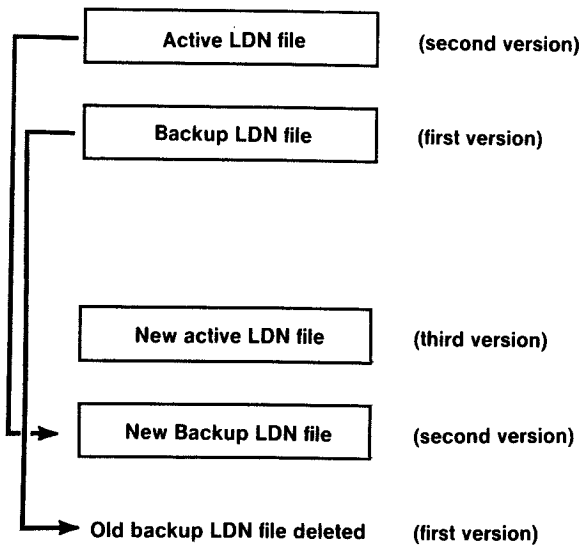


FIGURE 6.1 FILE BACKUP EXAMPLE (first revision)

Likewise, if a file named "TOOLS.DEF" is changed to include extra comments or labels, the new file will be called "TOOLS.DEF". The previous file which does not have these changes will become the backup file called "TOOLS.DBK".

If a backup file already exists and the LDN or definition file is edited again, the third or newest version of the file will become the .LDN or .DEF file. The version that was the .LDN or .DEF file will become the backup file. The original version that was the backup file will be eliminated.



files. If, after changes are made, the user decides that the newer version of the file is unacceptable, the previous version will be available as the backup file. By changing the backup file to an active file, the original version will be restored as the active .LDN or .DEF file.

IMPORTANT

The GLLADD software will not back up .LIS or .DAT files. If a newer version of one of these files is created, the previous version will be deleted unless it has been renamed or copied using DOS.

FIGURE 6.2 FILE BACKUP EXAMPLE (second revision)

The GLLADD backup files provide an extra measure of safety when editing

6.2 DISK FILE HANDLER MENU

Disk files are handled through the Disk File Handler menu. To access this menu, press the F4 (Disk File Handler) function key from the Main Menu.

Disk File Handler

List a directory of the working drive, with only the filename and extension.

Delete a file from the working drive.

Create a duplicate of a file on the working drive.

F1	Short Directory	F2	Long Directory
F3	File Delete	F4	Change Filename
F5	File Copy	F6	Change Fileext.
F7		F8	
F9	Help	F10	Done <Alt> Abort

List a directory, with the filename, extension, size, modification data and time.

Change the name of a file on the working drive.

Change the extension of a file on the working drive.

Select an operation via the function keys.

FIGURE 6.3 DISK FILE HANDLER MENU

6.3 SHORT DIRECTORY

From the Disk File Handler Menu, the F1 (Short Directory) function key provides a list of all files found in the working drive. This list contains only the names and extensions of each file

and is useful for quickly finding out which files are stored on the disk and what the exact spelling of the file names are. At the bottom of the listing, the computer indicates the number of files found and the amount of memory available on the disk.

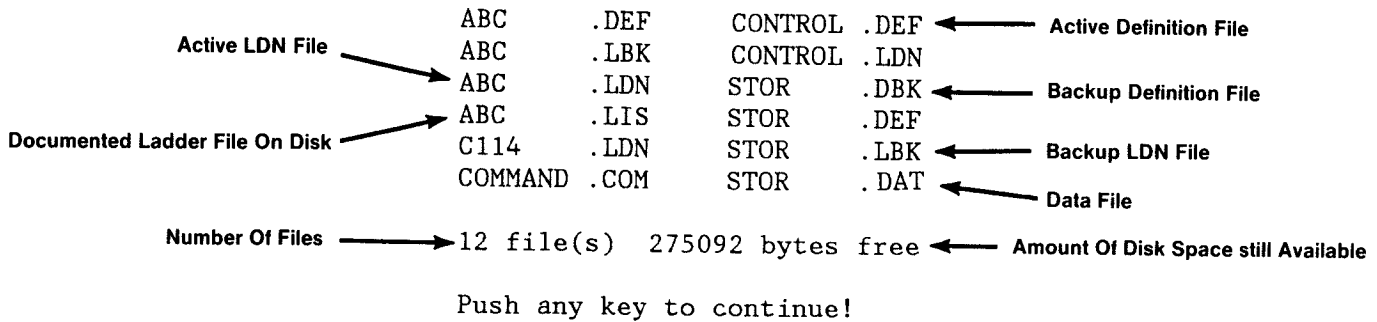


FIGURE 6.4 SHORT DIRECTORY EXAMPLE

6.4 LONG DIRECTORY

The F2 (Long Directory) function key provides a more detailed account of each file. This list includes the file name, the size of the file (in bytes of memory) and the date and time that the

file was created (if a DOS clock function is used with the computer). At the bottom of the list, the computer indicates the number of files found and the amount of memory available on the disk.

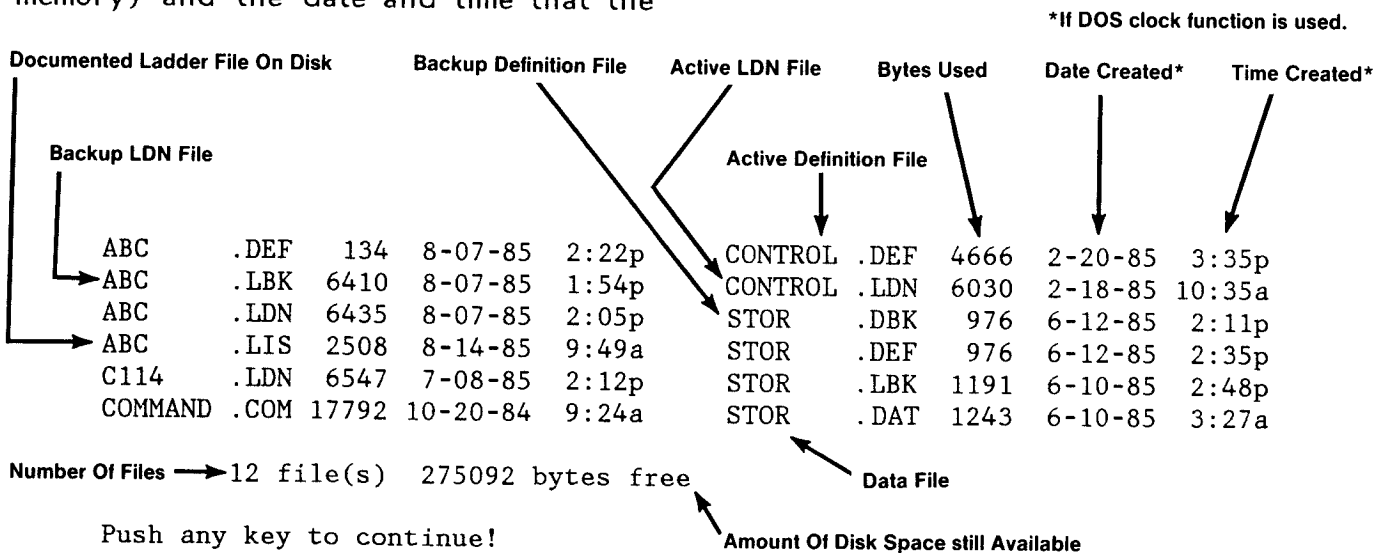


FIGURE 6.5 LONG DIRECTORY EXAMPLE

6.5 DELETING FILES

The F3 (Delete File) function key is for deleting files that are no longer needed. This should be done periodically to conserve disk space and shorten the file directories.

To delete a file, press the F3 key. Another menu will appear asking you to

specify the type of file(s) to be deleted. After making a selection, the software will then request a ladder name. Enter the ladder name and press the return key.

To verify that the file(s) has been deleted, press the F1 key and check the new directory of the file names found on the disk.

Delete File

Delete an active ladder file. (.LDN)

Delete a backup ladder file. (.LBK)

Delete all related active and backup, ladder and definition files.

F1	Active Ladder File	F2	Active Defin. File
F3	Backup Ladder File	F4	Backup Defin. File
F5	All Related Files	F6	
F7		F8	
F9	Help	F10	Done <Alt> Abort

Delete an active definition file. (.DEF)

Delete a backup definition file. (.DBK)

Select an operation via the function keys.

FIGURE 6.6 DELETE FILE MENU

6.6 CHANGING FILENAMES

If you press the F4 (Change Filename) key, another menu will appear on the screen.

The menu selection allows you to specify the type of file(s) to be renamed. After making a selection, the software will then request the file's ladder name. Enter the ladder name and press the return key.

The software will then ask for a new ladder name that the existing name will be changed to. Enter the new name and press the return key.

To verify that the file(s) has been renamed, press the F1 key and check the new directory of the file names found on the disk.

Change File Name

Change the filename of an active ladder file.

Change the filename of a backup ladder file.

Change all the filenames of a related ladder and definition file set.

F1	Active Ladder File	F2	Active Defin. File
F3	Backup Ladder File	F4	Backup Defin. File
F5	All Related Files	F6	
F7		F8	
F9	Help	F10	Done <Alt> Abort

Change the filename of an active definition file.

Change the filename of a backup definition file.

Select an operation via the function keys.

FIGURE 6.7 CHANGE FILE NAME MENU

6.7 COPYING FILES

To copy a file, press the F5 (File Copy) function key. Another menu will appear asking you to specify the type of file to be copied. After making a selection, the software will then request the ladder name of the file or files you want to copy. Enter the ladder name and press the return key.

The computer will then ask you for a ladder name for the new file(s). Enter a new ladder name and a return.

To verify that the file(s) has been copied, press the F1 key and check the new directory of the file names found on the disk.

File Copy

Copy a backup ladder file to active.
(.LBK to .LDN)

Make a copy of an active ladder file, under a new filename.

Make a copy of a backup ladder file, under a new filename.

Make copies of a related ladder and definition file set under a new filename.

F1	Ladder Backup to Act.	F2	Defin. Backup to Act.
F3	Ladder Act. to Newname	F4	Defin. Act. to Newname
F5	Ladder Bkup. to Newname	F6	Defin. Bkup. to Newname
F7	All Files to Newname	F8	
F9	Help	F10	Done <Alt> Abort

Copy a backup definition file to active.
(.DBK to .DEF)

Make a copy of an active definition file, under a new filename.

Make a copy of a backup definition file, under a new filename.

Select an operation via the function keys.

FIGURE 6.8 FILE COPY MENU

6.8 CHANGING FILE EXTENSIONS

The F6 key is used for changing file extensions. By changing the extensions, active files can be changed to backup files and backup files can be changed to active files.

IMPORTANT

If a backup file is changed to an active file, the active file will be automatically erased from the disk. Likewise, if an active file is changed to a backup file, the backup file will be erased.

From the Disk File Handler Menu, press the F6 (change file extension) function key. A new menu will be displayed. This menu will provide you with several options for changing file extensions. After selecting the appropriate function key, the software will request the ladder name of the file to be changed. Enter the ladder name and press the return key to complete the operation.

To verify that the file extensions have been changed, press the F1 (short directory) function key and check the file names found on the disk.

Change File Extension

Change a ladder file from backup to active status. (.LBK to .LDN)

Change a ladder file from active to backup status. (.LDN to .LBK)

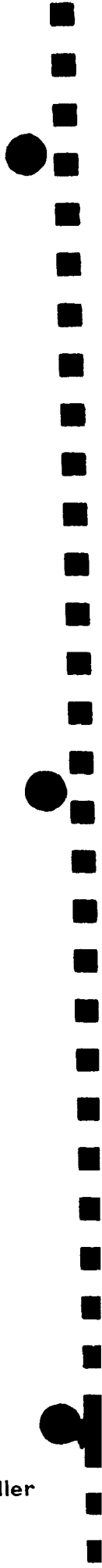
F1	Ladder Backup to Act.	F2	Defin. Backup to Act.
F3	Ladder Active to Bkup	F4	Defin. Active to Bkup
F5		F6	
F7		F8	
F9	Help	F10	Done <Alt> Abort

Change a definition file from backup to active status. (.DBK to .DEF)

Change a definition file from active to backup status. (.DEF to .DBK)

Select an operation via the function keys.

FIGURE 6.9 CHANGE FILE EXTENSION MENU





PART TWO - PiC SUPPORT FUNCTIONS



SECTION 7 - PiC409 AUX1 SUPPORT

7.1 INTRODUCTION

The GLLADD software supports an RS-232C communications link between the computer and the G&L PiC control panel. This allows the computer to act as a terminal for the Giddings and Lewis PiC409 family.

In addition to performing all of the functions of a PiC terminal, the computer also provides mass data storage capabilities such as recording LDN's onto disk and loading them from disk into the PiC.

The GLLADD PiC409 AUX 1 Support function allows the use of the computer as a PiC terminal. It provides a more convenient method of operating and programming the G&L PiC by using the AUX 1 mode on the PiC Control Panel.

The primary function of the AUX 1 mode is to allow the operator or programmer to use a personal computer (or programming terminal) for remote control of the PiC Mode selection.

Another important feature of the AUX 1 Mode is the User Authorization Code. This is a password created by the programmer or operator that prevents unauthorized use of the PiC. When the Mode selector switch on the PiC control panel is covered by a locked panel, the only way to access the PiC is with a programming terminal or a personal computer and the user authorization code.

All communication with an IBM or IBM compatible personal computer can be directed though the Terminal port on the PiC control panel. This eliminates the need to insert the interface cable into the Loader port on the control panel every time a LOAD, RECORD or VERIFY operation is performed for files on disk.

7.2 AUX 1 SOFTWARE ON THE PIC

The AUX 1 Support function will not work unless the PiC has the proper AUX 1 software in the Compiler and CPU modules. G&L PiC409's and PiC49's built after July 1985 will feature the AUX 1 software.

PiC's released prior to this date can be updated with a special kit containing seven EPROM (Erasable Programmable Read Only Memory) chips. These chips contain all of the software needed to provide older PiC's with the latest G&L version of the Compiler and CPU modules.

The following software numbers are found on the new EPROM chips. If the chips on your Compiler and CPU modules do not have the same first five digits as the numbers listed here, you do not have the updated software. If you are installing the new EPROM chips yourself, refer to the instructions supplied with the kit.

COMPILER MODULE Part Number	6809 CPU MODULE Part Number
502-03174-00	502-03017-21

88168-XX	88162-XX
88169-XX	
88170-XX	
88171-XX	
88284-XX	
88285-XX	

(XX = version number)

7.3 USING THE AUX 1 SUPPORT FUNCTION

There are several things to consider when using the AUX 1 mode with the GLLADD software.

1. The female end of the GLLADD cable must be connected to the personal computer serial port specified during the GLLADD initialization procedure (Section 2.2). The male end of the cable must be connected to the Terminal port on the PiC control panel.
2. The terminal baud rate rotary switch on the PiC control panel must be set to the baud rate specified during the GLLADD initialization procedure (Section 2.2).

After connecting the personal computer to the PiC, set the MODE switch on the PiC control panel to the AUX 1 position. Turn on the power to the computer and the PiC and start up the GLLADD software. Press the "PiC Aux 1 Functions" (F1) key from the GLLADD Main Menu. *FS*

7.4 CREATING A USER AUTHORIZATION CODE

If the computer is set up correctly as indicated in Section 7.3, the following message will be displayed on the screen:

PLEASE ENTER THE SYSTEM'S
DEFAULT AUTHORIZATION CODE.

Type the characters "PC409" and press the return Key. The next message that will appear is:

TO DEFINE YOUR USER AUTHORIZATION CODE,
ENTER 1-9 CHARACTERS FOLLOWED BY A
CARRIAGE RETURN. REMEMBER THE CODE IS NOT
SHOWN ON THE SCREEN, EACH TIME A
CHARACTER IS ACCEPTED A "*" IS DISPLAYED.

Type in a code consisting of one to nine characters and press the return key. These characters may include any combination of the letters of the alphabet and numerals from 0 through 9.

Instead of the characters you type in, the computer will only display a series of asterisks on the screen. This is to

prevent an onlooker from viewing your authorization code when you type it in.

This code will be the password used to access the system through the AUX 1 Mode. From now on, this code will be required when using the AUX 1 mode.

IMPORTANT

After creating a user authorization code, write it down and store the code in a safe place. If you forget your user authorization code and do not have it written down anywhere, you must clear the memory on the PiC Support Module and repeat the procedure for setting up a new code.

To clear the memory from the PiC Support Module, turn off the power to the PiC and remove the module from the nest. Remove the IBE (internal battery enable) jumper from the module for several minutes. Return the jumper, reinsert the PiC support Module and restart the system.

CAUTION: CLEARING THE MEMORY FROM THE PiC SUPPORT MODULE WILL RESULT IN THE PERMANENT LOSS OF ANY BATTERY BACKED DATA STORED ON THIS MODULE. TO SAVE NON-VOLATILE VARIABLE AND RETENTIVE RELAY DATA BEFORE REMOVING THE IBE JUMPER, READ SECTION 7.12.

7.5 AUX 1 MENU SELECTION

After entering the authorization code, the AUX 1 menu will appear on the screen.

The first seven functions are the same as the standard selection available from the MODE switch on the PiC control panel. If you are not familiar with these functions, refer to the PiC409 Family Programming Manual for instructions.

PIC 409 AUX. 1 MODE SELECT MENU VER. 1.0

1. RUN
2. PROGRAM
3. LOAD
4. VERIFY
5. RECORD
6. AUX 2
7. AUX 3

ADDITIONAL FUNCTIONS

8. RE-DIRECT DATA I/O PORT
9. CHANGE AUTHORIZATION

TO MAKE YOUR SELECTION, ENTER THE NUMBER AND CARRIAGE RETURN. TO RETURN TO THE AUX 1 MENU FROM ANY MODE, ENTER "CONTROL Q".

FIGURE 7.1 AUX 1 MENU

To use any of these functions, press the number from the menu to the left of the desired function followed by a return.

To leave any of the selected modes and to return to the AUX 1 menu, press the "CTRL" and "Q" keys at the same time. The PiC will ask for your user authorization code. Enter the code and press the return key.

NOTE

When entering the RUN mode (selection 1), the PiC will ask you to verify your selection by entering your selection a second time followed by a return. This is to prevent you from unintentionally entering the RUN mode.

If you enter the incorrect code, the PiC will not allow you to reenter the AUX 1 mode. Press any key to reset the code entry operation and enter your code again. When the correct code is entered, the screen will display the AUX 1 menu again.

IMPORTANT

You cannot reenter the AUX 1 mode from the RUN mode by using the "CTRL" and "Q" keys unless Real Time Debug (Call Routine C912) is installed and working in your LDN. Instead, you must switch the Mode switch on the PiC control panel out of the AUX 1 mode and then switch back to the AUX 1 mode and press the initialize button.

To avoid this situation, always include Real Time Debug with every LDN you use.

7.6 REDIRECTING COMMUNICATIONS FROM THE LOADER PORT TO THE TERMINAL PORT

Select the "RE-DIRECT DATA I/O PORT" function by pressing the number "8" from the AUX 1 menu and a return. After doing so, the following line will appear on the screen:

DATA I/O IS CURRENTLY
VIA TERMINAL PORT.

This message indicates that all communications, including LOAD, VERIFY and RECORD operations, will now be performed through the Terminal port on the PiC control panel. The Loader port on the control panel will not be used.

As long as this message appears on the screen, LDN's, Call Routines and data can be transferred between a personal computer and the PiC by remote control using the computer keyboard and the GLLADD software (version 2.0 or higher).

Previously, with GLLADD version 1.4, these operations required someone to manually switch the GLLADD cable between the Loader and the Terminal ports.

To restore the use of the Loader port, select Function 8 from the AUX 1 menu a second time. After pressing the return key, the message "DATA I/O IS CURRENTLY VIA TERMINAL PORT" will disappear indicating that the use of the Loader port is now restored.

NOTE

The LOADER port will be reactivated if power to the PiC is turned off and then back on again, or if the MODE selector switch on the PiC control panel is switched out of AUX 1. Communications through the TERMINAL port must be activated every time the AUX 1 mode is initialized.

7.7 CHANGING THE AUTHORIZATION CODE FUNCTIONS

To change your authorization code or the way it works with the PiC, select function 9 from the AUX 1 menu.

The PiC will ask you to enter your authorization code. After entering the correct code, press the return key. The following menu will appear on the screen.

1. CHANGE THE AUTHORIZATION CODE
2. CODE NOT REQUIRED FOR ENTRY TO THE TERMINAL MODE
3. CODE REQUIRED FOR ENTRY TO THE TERMINAL MODE

TO MAKE YOU SELECTION, ENTER THE NUMBER
AND RETURN.

CHOICE?

Selection 1 - If you wish to change your existing code, press "1" followed by a return.

After doing this, the instructions for entering a new authorization code will appear. Enter in a new code using one to nine alphanumeric characters just as you did for the original authorization code. Press the return key. The AUX 1 menu will return to the screen.

Selection 2 - If you find it inconvenient to enter the authorization code every time you reenter the AUX 1 mode from a different mode, press "2" followed by a return.

After doing this, you will no longer need to enter your authorization code as long as you remain in AUX 1 and the power is left on. The only exceptions are if you wish to change the authorization code (selection 1) or if you decide to require the use of the authorization code again (selection 3).

NOTE

Every time you leave and return to the AUX 1 position on the MODE selector switch, or if power to the PiC is turned off and then back on again, the system will once again require the authorization code every time you return to the AUX 1 Mode.

Selection 3 - Selecting "3" restores the requirement for the user authorization code every time you reenter the AUX 1 Mode.

7.8 LEAVING AND RETURNING TO THE AUX 1 MODE

Although its use is highly recommended for the sake of security and convenience, the AUX 1 mode does not have to be used all of the time.

By setting the mode selector switch on the PiC control panel to a mode other than AUX 1, remote control of the PiC is terminated and the manual selection of the control control panel operations take place.

To return to the AUX 1 mode, rotate the mode selector switch on the control panel to the AUX 1 position. Press the Initialize button on the control panel.

The PiC will ask for your user authorization code. Enter the code and press the return key. The AUX 1 menu will then appear on the screen.

CAUTION

Because the Aux 1 mode can be exited at any time by rotating the mode selector switch on the PiC control panel, this switch should be made inaccessible to all unauthorized personnel.

This can be accomplished by putting a locked door or panel in front of the control panel or keeping the entire PiC in a restricted area.

7.9 LOADING RECORDING AND VERIFYING LDN'S ON DISK

If you are using the GLLADD software, all LDN storage functions can be performed on disk instead of the STR LINK II or III tape devices.

PiC409 AUX 1 Support

NOTE

Communications must be redirected from the LOADER port to the TERMINAL port to perform these operations on disk.

7.9.1 Loading LDN's From Disk Into The PiC

To load an LDN into the PiC, use the following procedure.

1. Choose selection 3 (load) from the AUX 1 menu.
2. The computer will ask for the name of the LDN you will be loading. You must use the ladder name of an LDN that is on the disk in your working drive. Type in the ladder name press the return key.
3. The computer will then load the LDN into the PiC. Use the verify function to insure that the loading operation is successful.

IMPORTANT

If Call Routines are used, an LDN created with the GLLADD Ladder Editor/Compiler, must go through a Reinstall process before it can be used in the PiC.

After loading the LDN, enter the AUX 2 Call Routine Installer and press the "R" reinstall key. Refer to Section 3.11.5.4 for more information.

7.9.2 Verifying LDN's On Disk And The PiC

To verify LDN's use the following procedure.

1. Choose selection 4 (verify) from the AUX 1 menu.

2. The computer will ask for the name of the LDN you will be verifying. Type in the ladder name of the LDN on the disk in your working drive that is to be verified with the LDN in the PiC.
3. The computer will then verify the LDN in the PiC with the LDN on disk. If both LDN's are identical, the computer will announce that verification is complete.
4. If the verification process indicates a discrepancy between the two LDN's, an error message, based on the problem, will be displayed.

7.9.3 Recording LDN's From The PiC Onto Disk

To record an LDN from the PiC onto a disk, use the following procedure.

1. Choose selection 5 (record) from the AUX 1 menu.
2. The computer will ask for the name of the LDN you will be recording. If it is a new LDN, type in a new ladder name.

If you are updating an existing LDN, type in the existing ladder name. The previous version on disk will become the backup (.LBK) file and the version in the PiC will become the new active (.LDN) file.

Press the return key.

3. The computer will record the LDN from the PiC onto the disk. Use the verify function to insure that the recording operation is successful.

7.10 LOADING, RECORDING AND VERIFYING LDN'S USING A STR LINK II OR III TAPE DEVICE

If you intend to use a STR LINK II or III to perform load, record and verify functions, you must use the LOADER port on the PiC control panel. Do not

redirect the communications from this port to the TERMINAL port.

These operations are performed in the same way indicated in Section 4 of the PiC409 Family Programming Manual.

NOTE

Because it is faster and more convenient to use disks, we recommend not using the STR LINK devices directly with the PiC. We suggest that any LDN's stored on tape be copied onto disk.

LDN's stored on disk can also be copied onto tape if an STR LINK II or III is used as a backup device.

Refer to Section 8.2 for information on transferring LDN's directly between tapes and disks.

7.11 INSTALLING CALL ROUTINES FROM DISK

NOTE

All communications with the PiC must be redirected from the LOADER port to the TERMINAL port on the PiC control panel before loading or installing Call Routines from disk.

Call Routines can be loaded directly into the PiC from the G&L Call Routine Disk. Enter the AUX 1 mode from the Main Menu. When the AUX 1 menu appears on the screen enter a "6" (AUX 2).

The AUX 2 menu will appear on the screen. If you are using a dual floppy disk system, remove the GLLADD backup disk from drive A and replace it with the Call Routine disk.

Hard disk users typically copy the Call Routines onto the hard disk so there is no need for them to swap floppy disks.

Choose Selection 3 (Call Routine Installer) from the AUX 2 menu. When the asterisk prompt "*" appears, press the "L" key to load Call Routines.

Use the "I" key to install the Call Routines. If other Call Routines are already installed, use the "R" (rein-stall) key.

The procedure for using the Call Routine Installer is described in Section 9 of the PiC409 Family Programming Manual. The only difference is that the Calls will be loaded from the Call Routine Disk in the system drive instead of a STR LINK II or III tape device.

7.12 VARIABLE AND CONTROL RELAY BACKUP

This feature allows the programmer to save the contents of non-volatile variables and the state of retentive relays on disk. This provides added protection in case of a memory failure. In the event that memory is lost, the stored data can be loaded back into the PiC using the LOAD command.

7.12.1 Saving Data on Disk

To save non-volatile variable or retentive relay data, select option 5 from the AUX 2 menu. The PiC will display the following instructions:

TO RECORD NON-VOLATILE VARIABLES THROUGH THE PORT, ENTER "V", RETURN.

TO RECORD THE STATE OF NON-VOLATILE CONTROL RELAYS THROUGH THE PORT, ENTER "C", RETURN.

TO LOAD NON-VOL. CRS OR VARIABLES, USE THE LOAD MODE OF AUX 1 OR THE ROTARY MODE SWITCH.

NOTE

To save this information on disk, all communications with the PiC must be redirected through the Terminal port.

Press the "V" key if you want to save the contents of your non-volatile variables. Press the "C" key if you want to save the state of your retentive relays.

The computer will first ask you to enter a file name. Enter a name consisting of up to eight characters (press the personal computer F9 key if you need to know which characters are valid). This file name does not have to be the same as the ladder name.

After entering the file name and a return, you will be asked to indicate whether this is a Ladder (L) or Data (D) file. Enter a "D" to indicate that you are saving data.

The computer will then proceed to save the data on the disk in the working drive.

After a successful record operation, the computer will respond with the following message:

```
CONTROL RELAYS RECORDED,  
AUTO VERIFY IN PROGRESS.
```

The Auto Verify function is automatic with a STR LINK device. However, when you are storing the data on disk, you must verify the accuracy of the recording by reentering the file name and a return when the computer asks for the file name a second time. When the computer asks if the file is a Ladder or Data file, press the "D" key.

If the verification process indicates that a file saved on tape or disk is valid, the PiC will display the following message:

GOOD

CHANGE MODES TO EXIT. ENTER ANY KEY TO
START THIS MODE OVER.

When you are satisfied with the record operation, move to a different mode by pressing the "CTRL" and "Q" keys at the same time.

7.12.2 Loading Data From Disk Or Tape

Before loading the data back into the PiC, be sure that the PiC is set up to save at least the same number of non-volatile variables and retentive relays. Otherwise, this data will be lost again when power to the PiC is shut off.

To load the non-volatile or retentive relay data back into the PiC, enter the LOAD mode from the AUX 1 menu.

After entering this mode, the computer will ask you to enter a filename. Enter the name of the disk file containing the desired data and press the return key. The computer will then ask if the file is a Ladder or Data file. Enter a "D" to begin the Load operation.

After a successful load operation, the computer will respond with the following message:

CONTROL RELAYS LOADED
AUTO VERIFY IN PROGRESS.

The Auto Verify function is automatic with a STR LINK device. However, when loading the data from disk, you must verify the accuracy of the load operation by reentering the file name and a return when the computer asks for the file name a second time. When the computer asks if the file is a Ladder or Data file, press the "D" key.

If the verification process indicates that the file loaded from tape or disk is valid, the PiC will display the following message:

GOOD

CHANGE MODES TO EXIT. ENTER ANY KEY TO
START THIS MODE OVER.

When you are satisfied with the record operation, move to a different mode by pressing the "CTRL" and "Q" keys at the same time.

SECTION 8 - GLLADD AUXILIARY FUNCTIONS

The GLLADD Auxiliary Functions menu has several additional options using the computer's serial communications port.

These options provide control panel support and the transfer of LDN's and data files between the computer and a STR LINK II or III tape device.

To display the Auxiliary Functions Menu, press the F6 (Aux. Funcs.) function key from the Main Menu.

NOTE

The GLLADD Auxiliary Functions will not operate with the G&L PC400.

Auxiliary Functions

Supports an RS232 link to the PiC409 control panel's terminal connector.

Provides for reading an LDN from a STR LINK II/III to a disk file

F1	Control Panel Support	F2	
F3	Read From a STR LINK	F4	Write To a STR LINK
F5		F6	
F7		F8	
F9	Help	F10	Done <Alt> Abort

Provides for writing an LDN from an disk file to a STR LINK II/III.

Select an operation via the function keys.

FIGURE 8.1 AUXILIARY FUNCTIONS MENU

8.1 CONTROL PANEL SUPPORT

With the exception of transferring data files using the Data Storage Call Routines, the Control Panel Support functions are similar to the PiC409 AUX 1 functions.

To display the Control Panel Support menu, press the F1 (control panel support) function key from the Auxiliary functions menu. This menu has three choices that are described in the following text.

NOTE

Whenever possible, it is better to use the AUX 1 Support functions instead of the Control Panel Support functions because they are easier to use and can be controlled remotely from the computer.

The AUX 1 Support functions cannot be used when the PiC Compiler and CPU modules do not contain the AUX 1 software on EPROM. To determine if your PiC has this software, refer to Section 7.2 in this manual.

PiC409 Support Mode

Allows the personal computer to act as a dumb terminal to the PiC409.

Allows call routines to be transferred from a call diskette to the PiC409.

Terminal F1 Mode	Mass F2 Storage Mode
Install F3 Call Routines	F4
F5	F6
F7	F8
F9 Help	Done F10 <Alt> Abort

Uses the personal computer to replace a STR LINK II or III as mass storage.

Select an operation via the function keys.

FIGURE 8.2 PiC409 SUPPORT MODE MENU

8.1.1 Terminal Mode

The F1 (terminal mode) function key on the Control Panel Support menu allows the computer to act as a "dumb" terminal for PiC409 family.

After pressing the F1 key, the computer will provide instructions for establishing the proper link between the computer and the PiC. Follow these instructions carefully.

After the link is established, select the desired mode on the PiC control panel and press the initialize button. The computer will now perform all of the functions of a Lear Siegler ADM3A or Televideo 910 Plus terminal.

If you want to leave the terminal mode at anytime, press the "Alt" and F10 keys at the same time.

8.1.2 Mass Storage Mode

The Mass Storage Mode provides for the transfer of files between the computer and the G&L PiC. The file transfer operations include:

1. Recording LDN's and data files from the PiC onto disk.
2. Loading the files from disk into the PiC.
3. Verifying that the file transfers are accurate.

If you are transferring Ladder (LDN) files, read Section 8.1.2.1. If you are transferring data files used by the Data Storage Call Routines, read Section 8.1.2.2.

8.1.2.1 Transferring LDN's Between The Computer And The PiC - Press the F2 (mass storage mode) function key from the Control Panel Support Menu. The computer will display the following message:

Enter the filename (<F9> for help, <Alt><F10> to abort:

Enter the name of the file and press the return key. The computer will respond with this question:

Please indicate whether this is a Ladder or Data file (L/D)?

Press the "L" key. The computer will provide instructions for establishing the proper link between the computer and the PiC using the LOADER port on the PiC control panel.

When the proper link is established, you may select the LOAD, RECORD or VERIFY modes using the rotary switch on the PiC control Panel. Instructions for using these modes are covered in Section 4 of the PiC409 Family Programming Manual.

When the operation is complete, the GLLADD software will return the computer to the Control Panel Support Menu.

IMPORTANT

If Call Routines are used, an LDN created with the GLLADD Ladder Editor/Compiler, must go through a Reinstall process before it can be used in the PiC.

After loading the LDN, enter the AUX 2 Call Routine Installer and press the "R" reinstall key. Refer to Section 3.11.5.4 for more information.

8.1.2.2 Transferring Data Files Between The Computer And The PiC - Press the F2 (mass storage mode) function key from the Control Panel Support Menu. The computer will display the following message:

Enter the filename (<F9> for help, <Alt><F10> to abort:

Enter the name of the file and press the return key. The computer will respond with this question:

Please indicate whether this is a Ladder or Data file (L/D)?

Press the "D" key. A series of instructions will appear on the screen. IGNORE THESE INSTRUCTIONS AND FOLLOW THE NEXT PROCEDURE INSTEAD!

IMPORTANT

Do not use the LOAD, RECORD or VERIFY modes on the PiC Control Panel when transferring files with the Data Storage Call Routines. The PiC must be in the RUN mode for Data Storage to work.

-
1. Connect the computer to the LOADER port on the PiC Control Panel.
 2. Set the Loader Baud Rate switch on the PiC Control Panel to the 9600 position.
 3. If the PiC is not in the RUN mode, set the mode switch on the PiC Control Panel to RUN and press the initialize button.
 4. The LOAD, RECORD and VERIFY operations will be handled in the LDN by the Data Storage Tape I/O Call Routine B312. The computer will operate just like a STR LINK tape device it is set up as indicated in this section.

Refer to the PiC409 Family Standard Call Routine Manual for specific instructions regarding the use of the Data Storage Call Routines.

8.1.3 Installing Call Routines

Call Routines can be installed directly into the PiC from a G&L Call Routine Disk using the Control Panel Support menu.

NOTE

This method of installing Call Routines is a remnant from a previous version of the GLLADD software. Although it is perfectly capable of loading and installing Call Routines from disk, it is more cumbersome than the newer methods now available.

We strongly suggest that you install the Call Routines using the GLLADD Ladder Editor/Compiler (See Section 3.11.5 in this manual) or the PiC AUX 1 Support functions (See Section 7.11 in this manual).

Insert the G&L Call Routine disk in the working drive and press the F3 (install Call Routines) function key from the Control Panel Support Menu. The computer will provide instructions for loading the Call Routines into the PiC.

After the calls are loaded, they must be installed. The software will instruct you to enter the AUX 2 mode on the PiC. After entering this mode, the computer is used as a "dumb" terminal for the PiC. Call Routines are then installed by selecting the third option in the AUX 2 mode (Call Routine Installer), and using the install (I) or reinstall (R) commands in the usual manner.

When the operation is completed, press the escape (ESC) key and then the F10 key on the function keypad. The Control Panel Support Menu will return to the screen.

8.2 USING A STR LINK II OR III

Although the disk drives are the easiest method for storing and loading user memory, many users will still require a STR LINK II or STR LINK III for handling data. The F3 (read from a STR LINK) and F4 (Write to a STR LINK) function keys on the Auxiliary

functions menu provides support for both of these tape devices.

There are several reasons for using a STR LINK with the computer. LDN's saved on tape may now be uploaded directly to a computer disk. Also, if the computer is located too far away from the PiC, the STR LINK may be used to transfer LDN's back and forth without moving or reconfiguring either system.

8.2.1 Connecting The STR LINK II Or III To The Computer

The same cable used for connecting the computer to the PiC can be used for connecting the computer to the STR LINK tape device.

1. Connect the female end of the cable to the 25 pin connector of the serial port you specified during the GLLADD initialization procedure (Section 2.2).
2. Connect the male end of the cable to the 25 pin Data Terminal Interface connector on the STR LINK II or III tape device.
3. Set the switches for the STR LINK device as indicated in Appendix C of the PiC409 Family User's Manual.

8.2.2 Saving An LDN From Tape Onto Disk

To save an LDN from a tape onto a disk, press the F3 (Read From A STR Link) function key from the Auxiliary Functions menu. The computer will then request that you specify the type of tape device used.

Enter a "2" for a STR LINK II cassette recorder or a "3" for a STR LINK III data cartridge recorder.

Instructions for using the specified tape device with the computer will appear.

After setting up the STR LINK as directed, press the return key.

The computer will ask for a ladder name. Type in a new ladder name and press the return key.

If the LDN is to be a revision of an existing LDN, you may use the same ladder name. The previous LDN will then become the backup (.LBK) file and the LDN on the tape will become the active (.LDN) file.

After entering the ladder name the computer will copy the LDN stored on tape onto the disk in the working drive. When the operation is completed, the Auxiliary Functions Menu will appear on the screen.

8.2.3 Saving An LDN From Disk Onto Tape

To save an LDN from a disk onto a tape, press the F4 (write to a STR Link) function key from the Auxiliary Functions menu. The computer will then request that you specify the type of tape device used.

Enter a "2" for a STR LINK II cassette recorder or a "3" for a STR LINK III data cartridge recorder.

Instructions for using the specified tape device with the computer will appear. After setting up the STR LINK as directed, press the return key.

The computer will ask for a ladder name. Type in the name of the ladder on the disk that you wish to copy and press the return key.

After entering the ladder name the computer will copy the LDN stored on the disk in the working drive to the tape in the STR LINK unit. When the operation is completed, the Auxiliary Functions Menu will appear on the screen.



PART THREE - APPENDIX



APPENDIX A - GLLADD MENU STRUCTURE



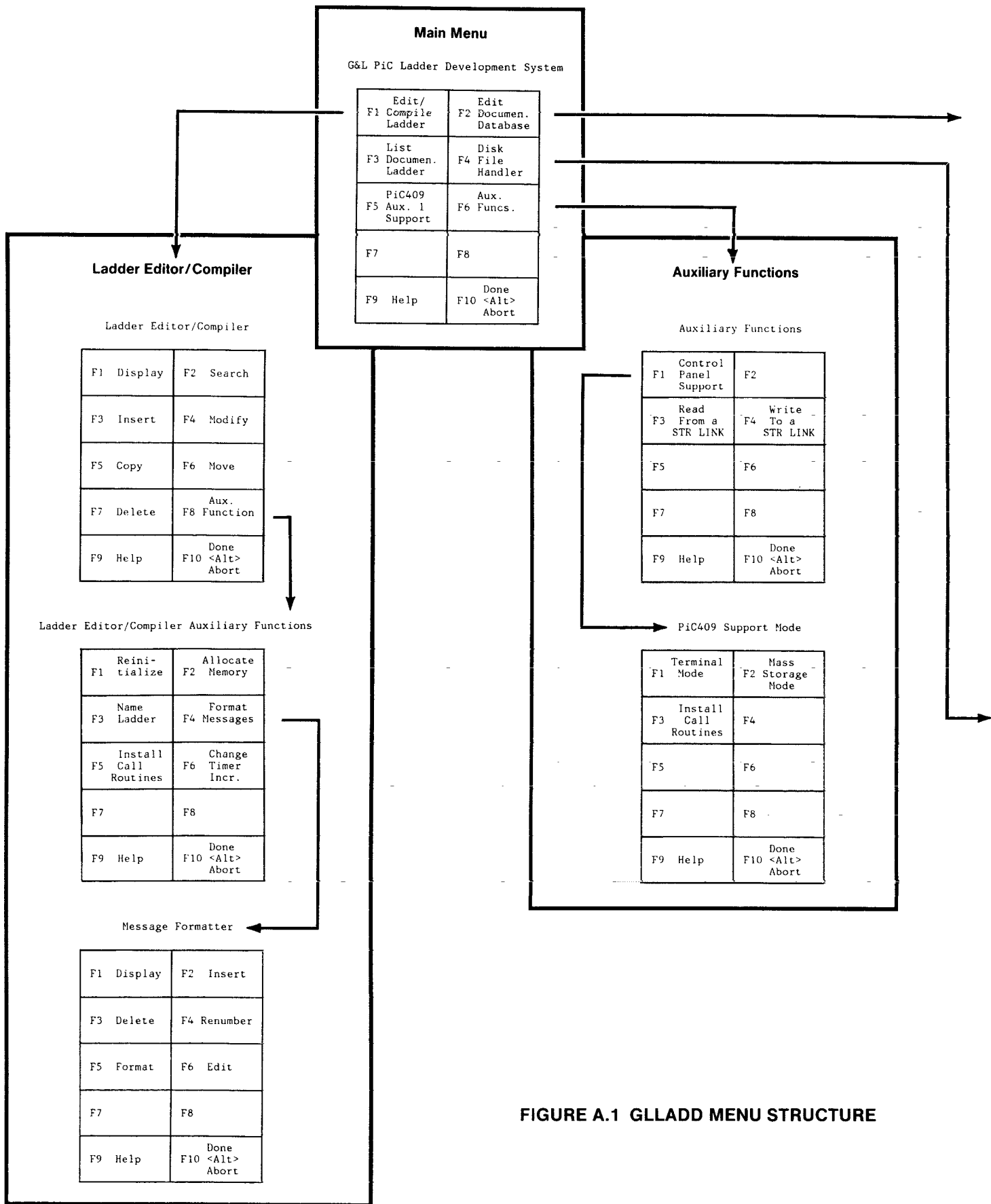


FIGURE A.1 GLLADD MENU STRUCTURE

Ladder Documenter

Documentation Database Editor

F1 Add or Modify	F2 Delete
F3 Copy	F4 Move
F5	F6
F7	F8
F9 Help	F10 Done <Alt> Abort

Add or Modify

Copy

Move

Delete

F1 Contact Label	F2 Variable Label
F3 Comment	F4 Heading
F5 Top of Page	F6
F7	F8
F9 Help	F10 Done <Alt> Abort

F1 Contact Label	F2 Variable Label
F3 Comment	F4 Heading
F5	F6
F7	F8
F9 Help	F10 Done <Alt> Abort

F1 Contact Label	F2 Variable Label
F3 Comment	F4 Heading
F5 Top of Page	F6
F7	F8
F9 Help	F10 Done <Alt> Abort

F1 Contact Label	F2 Variable Label
F3 Comment	F4 Heading
F5 Top of Page	F6
F7	F8
F9 Help	F10 Done <Alt> Abort

Disk File Handler

Disk File Handler

F1 Short Directory	F2 Long Directory
F3 File Delete	F4 Change Filename
F5 File Copy	F6 Change Fileext.
F7	F8
F9 Help	F10 Done <Alt> Abort

Delete File

File Copy

Change File Extension

Change File Name

F1 Active Ladder File	F2 Active Defin. File
F3 Backup Ladder File	F4 Backup Defin. File
F5 All Related Files	F6
F7	F8
F9 Help	F10 Done <Alt> Abort

F1 Ladder Backup to Act.	F2 Defin. Backup to Act.
F3 Ladder Act. to Newname	F4 Defin. Act. to Newname
F5 Ladder Bkup. to Newname	F6 Defin. Bkup. to Newname
F7 All Files to Newname	F8
F9 Help	F10 Done <Alt> Abort

F1 Ladder Backup to Act.	F2 Defin. Backup to Act.
F3 Ladder Active to Bkup	F4 Defin. Active to Bkup
F5	F6
F7	F8
F9 Help	F10 Done <Alt> Abort

F1 Active Ladder File	F2 Active Defin. File
F3 Backup Ladder File	F4 Backup Defin. File
F5 All Related Files	F6
F7	F8
F9 Help	F10 Done <Alt> Abort

APPENDIX B - CONNECTING CABLE

G&L Part No. 503-15463-00

Data is transmitted between the computer and the Giddings and Lewis Programmable industrial Computer (PiC) or STR LINK tape devices via a connecting cable. This cable uses a female, 25 pin "D" connector at the computer end and a male, 25 pin "D" connector at the PiC/Tape device end. The same cable is used for both the PiC and the tape loaders.

Attach the female end of the cable supplied with the GLLADD package to the serial port specified during the GLLADD initialization procedure (Section 2.2).

The other end of the cable can be attached to either the LOADER or TERMINAL sockets of the PiC control panel or to the DATA TERMINAL INTERFACE socket on the STR LINK tape loaders. The GLLADD software will indicate when these sockets are to be used.

The schematic diagram shows the cable's pin configurations and wire descriptions.

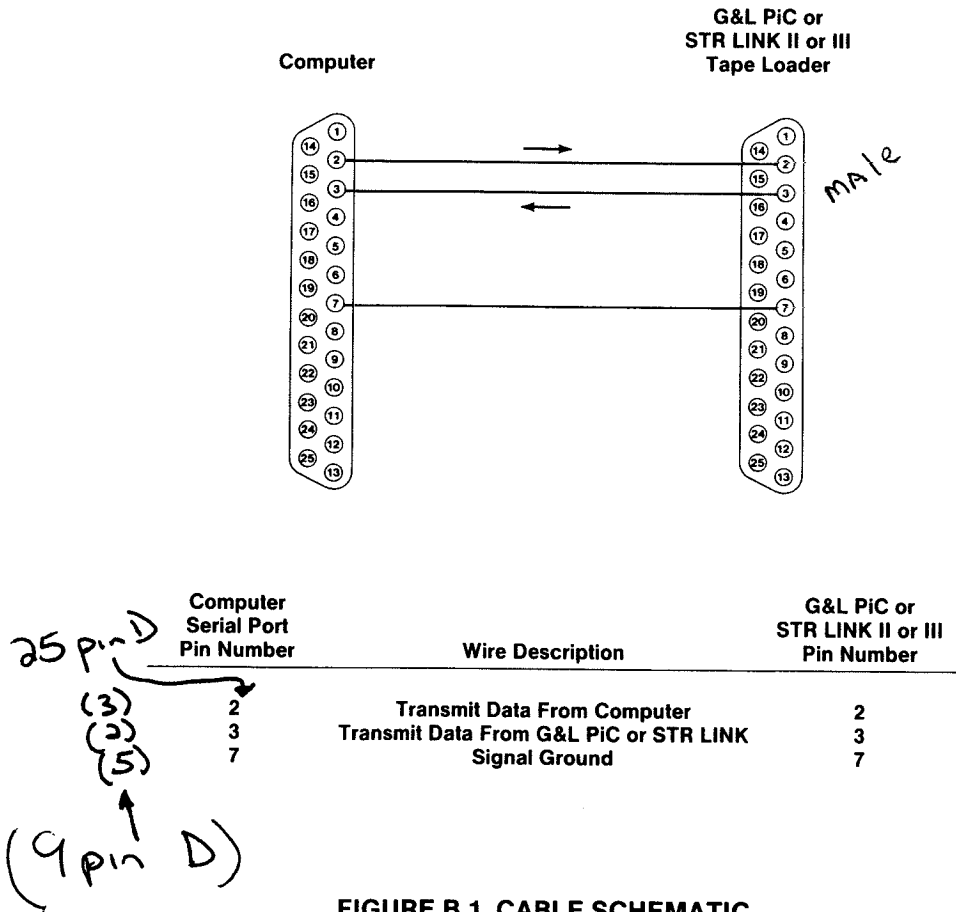


FIGURE B.1 CABLE SCHEMATIC



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PART THREE - APPENDIX

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