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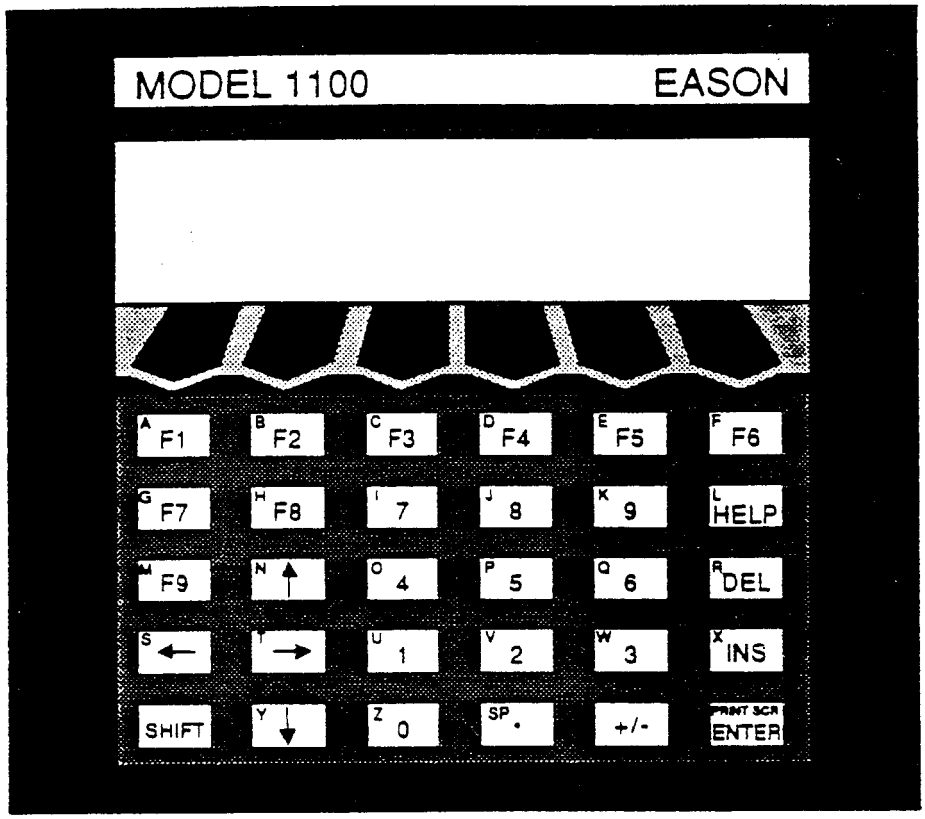
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Model 1100
Intelligent Operator Interface



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Preface

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Revision 3.2 p/n 50-00004-01

Eason Technology, Inc.

241 B Center Street Healdsburg, CA 95448

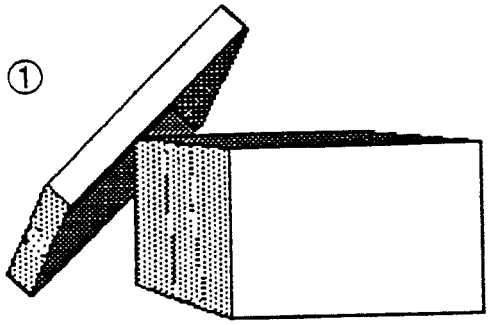
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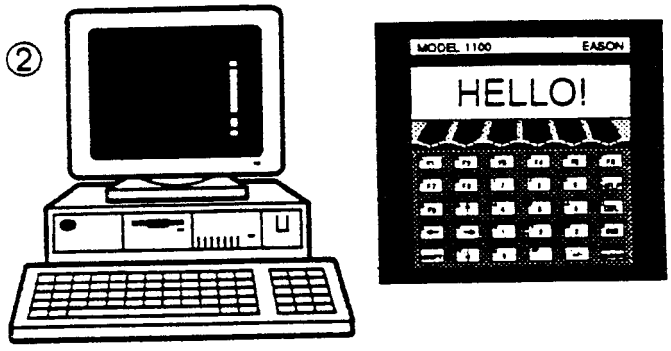
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Getting Started Without Reading The Manual. . . *This Means You!*

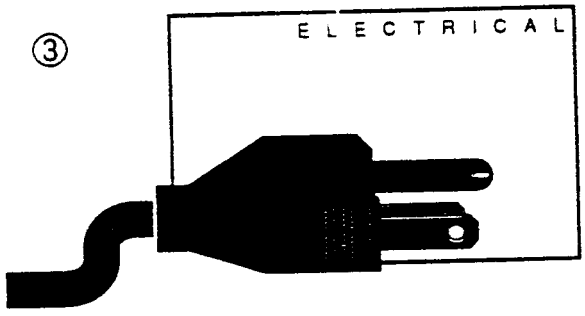
If you are not the first user of this Model 1100, the tutuorial may not be loaded into it. If for some reason this program has been erased or overwritten, follow the instructions on the next page.



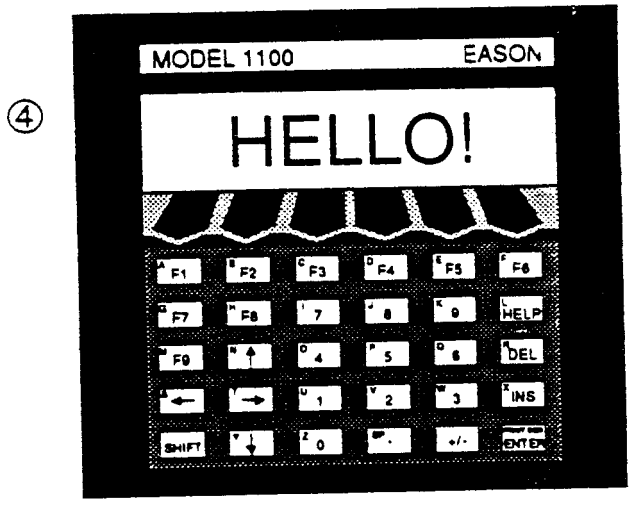
① Carefully unpack the Model 1100. Be sure to save the entire contents (including the box).



② Set the Model 1100 near an IBM PC-compatible computer.



③ Plug the Model 1100 into 110VAC.



④ Follow the instructions on the Model 1100's screen.

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IF YOU ARE NOT THE FIRST USER OF THIS MODEL 1100

If you are not the first user of this Model 1100, the tutorial may not be loaded into it. If the tutorial is loaded into the Model 1100, the unit will greet you with a hearty "HELLO!" when the program starts. If for some reason this program has been erased or overwritten, complete the following instructions to get up and running.

① Plug the RS-232C NULL modem cable (supplied) between COM 2 on the Model 1100 and either COM 1 or COM 2 on your PC. Note which serial port on the PC that you are connected to (for information on the serial ports for your PC, refer to your PC's instruction manual).

② Copy the contents of your disk(s) onto your hard drive if you have one (copy both disks for 5 1/4" systems, only 1 disk for 3 1/2" systems). If you have a hard drive, log onto drive C: (i.e., type **C:** followed by **Enter**). Proceed to step ④.

③ If you do not have a hard drive, insert the ApplicationBuilder™ disk into your PC. If your PC has 5 1/4" drives, insert the 5 1/4" disk labeled DISK 1. If your PC has 3 1/2" drives, insert the 3 1/2" disk. Log on to the drive containing the ApplicationBuilder™ disk (i.e., type **A:** or **B:** followed by **Enter**).

④ Type **BUILD** followed by **Enter**. After a few seconds, a menu-bar and multiple windows will appear on your PC's screen.

⑤ Press **ALT-S**. A pull-down SETTINGS menu will appear at the top of your PC's screen (press **F1** on your PC's keyboard for help if you need it). Select the COM port on your PC that you have connected the NULL modem cable to in step ①. Perform the selection by moving the highlighted text bar in the window up or down using the UP or DOWN cursor keys. Press **Enter**. Press **Esc**.

⑥ Press **ALT-T**. The TRANSFER pull-down menu will appear. Select the **DOWNLOAD FILE** selection using the UP or DOWN cursor keys. A window will appear that contains a list of basic files to download.

⑦ Move the highlighted bar using the cursor keys and select the file **TUTOR.BAS**. Press Enter. The program will begin loading into the Model 1100. A counter on the PC's screen will show the number of characters transferred, the Model 1100's screen will display the BASIC program being downloaded.

⑧ Wait until the download is complete. The PC's screen will indicate when the download is complete. Press **F1** (RUN) on the Model 1100. This will begin the execution of the tutorial you have just downloaded into the Model 1100.

⑨ Press **ALT-X**. This will exit the ApplicationBuilder™ and return to DOS. The Model 1100's screen will display a tutorial that will guide you through the use of the ApplicationBuilder™ program and the Model 1100.

⑩ Ignore instructions on connecting the Model 1100 to the PC, and selecting the COM port for your PC. You have already performed the necessary steps and they have been stored by the ApplicationBuilder™'s configuration file (this is automatically done).

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① Introduction

Features

- ❑ 8-line by 40-character back-lit LCD display with graphics
  - ● Powerful I/O capability
  - ● 2 serial ports (RS-232, RS-422, or RS-485)
  - ● 24 parallel I/O lines
  - ● IBM keyboard interface
  - ● IBM printer interface
  - ● All I/O is optically isolated
- ❑ Fully featured BASIC programming language
  - ● Interrupt capability
  - ● Floating point math
  - ● Formatted data entry
  - ● Graphics
  - ● Easy-to-use commands for on-board I/O
- ❑ Programmable, context sensitive help key
- ❑ NEMA 4 panel-mount housing
- ❑ Powerful PC-based ApplicationBuilder™ software included
  - ● Automatically builds BASIC programs
  - ● Place text on the Model 1100's screen in a wordprocessor-like manner
  - ● Build complex programs without in-depth knowledge of BASIC
  - ● Exchange programs between the PC and the Model 1100
  - ● Built-in terminal emulator
- ❑ Large full-travel, 30-key waterproof keypad
  - ● 9 soft keys
  - ● Tactile feedback

Features Description

The Model 1100 Smart Operator Interface allows you to quickly and easily set up and operate many types of industrial controllers. The Model 1100 provides overall control and a user interface for most types of controllers or computers that need an easy-to-use, intelligent operator interface. Stepping and servo motor controllers, PLC's, and process controllers are a perfect match for the Model 1100. With a Model 1100, an operator can view and change machine parameters, or follow instructions to perform operations. Users no longer have to fumble about with clumsy switches, thumbwheels, and indicator lights. Instead, a back-lit, 8-line by 40-character "super-twist" LCD display, and a large full-travel, 30-key waterproof keypad prompts and "listens" to the operator through machine operations.

Operators can be given as little or as much help required by programming the HELP key function with programmable help instructions. The Model 1100's LCD screen can display TEXT or GRAPHICS so block diagrams, flow charts, wiring diagrams, and statistical information can be displayed for the operator. For machine control, the Model 1100 provides 24 lines of parallel I/O, two serial ports (either RS-232C, RS-422, or RS-485), 8 timers, and

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a printer port to facilitate machine monitoring and control functions. Optionally, up to 16 12-bit A/D, up to 4 12-bit D/A, up to 120 lines of I/O and up to 4 high-speed quadrature counters can be added. All I/O is optically isolated and designed to be extremely noise tolerant. Included with the Model 1100 is a disk containing the ApplicationBuilder™, a PC DOS program that allows you to quickly generate programs for the Model 1100. The ApplicationBuilder™ generates BASIC programs from simple menu selections and direct screen entry of text. It consists of three components:

Integrated into all ApplicationBuilder™ functions is an UPLOAD/DOWNLOAD capability and a comprehensive, context sensitive HELP system

- The ***Builder*** converts menu selections and direct screen text entry into BASIC code
- The ***Editor*** performs text editing of BASIC or other ASCII files
- The ***Terminal Emulator*** performs like a "dumb" terminal to talk to the Model 1100.

Functional Description

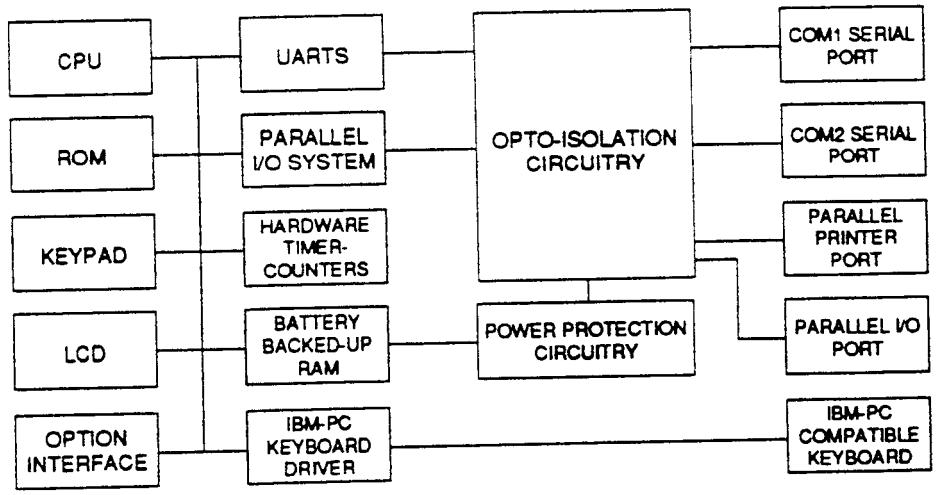
The Model 1100 is housed in a rugged cast housing that is meant to be flush-mounted in an equipment panel. A full gasket and a rigid mounting system form a water tight seal about the opening. The display is sealed and the keypad is constructed of a water tight silicone rubber. The keypad on the front of the Model 1100 is organized into three color coded groups.

- WHITE - NUMERIC ENTRY
- BLUE - ACTION- CURSOR, ENTER, INSERT, DELETE, HELP
- YELLOW - FUNCTION KEYS

The 8-line by 40-character LCD display serves as a display port, programming tool, and soft key label. In ***Edit Mode***, the display can be used to scroll through text, make changes, or debug programs. In ***Run Mode*** text, soft key titles, and graphics can be displayed under program control.

The rear of the Model 1100 incorporates the entire connector system for parallel, serial, and printer I/O. Half of the rear panel is reserved for options. The figure below diagrams the internal components of the Model 1100. The heart of the unit is a high speed 64180, 8-bit high integration CPU chip. The CPU communicates with UARTS (serial ports), ROM, RAM, TIMERS, I/O, and the option connector. Battery backed-up RAM stores programs and variables even if power is removed. It can hold a program for more than 5 years without power applied. The opto-isolation circuitry is designed to provide a barrier between the outside world (I/O ports) and the CPU. This eliminates CPU errors in high noise environments. The serial ports, parallel I/O ports, and printer port have their own power supply to further insure that noise does not disrupt the CPU's operation.

Model 1100 Block Diagram



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② Installation

This chapter focuses on the steps necessary to unpack and install the Model 1100. Read this section before attempting to apply the Model 1100. System installers should read this chapter before installing the unit into a cabinet, or connecting any electrical power to the Model 1100.

Unpacking and Inspection

Inspect the Model 1100's shipping container. Is there evidence of damage or mishandling? If damage exists contact your shipping carrier immediately. Eason Technology cannot be held responsible for damage in shipment. Compare the contents of the container with the packing list that is attached to the exterior of the shipping container. Your Model 1100 shipping container should include the following:

If any items are missing or damaged, contact Eason Technology immediately.

① Model 1100 with installed options
② ***Model 1100 User Guide***
③ ***Eason BASIC Programming Guide***
④ ApplicationBuilder diskettes
⑤ Power cable (attached to the Model 1100)
⑥ Null modem cable
⑦ Mounting clips (four)
⑧ Mounting template
⑨ Optional cables and connectors as indicated on the packing list.

Site Preparation

The Model 1100 is designed to be mounted in an equipment panel or other flat metal surface. If mounted properly, the Model 1100 will resist water, and seal the opening from water and dust. Improper installation could result in damage to the Model 1100 and other equipment installed in or adjacent to the panel containing the Model 1100. For safety reasons, follow the instructions below closely.

① Prepare the opening in the panel.
- ❑ Tape the enclosed mounting template to the front of the panel in the desired location.
- ❑ Drill 3/8 " inside the cutout to facilitate cutting.
- ❑ Use a sabre saw or some other type of sheet metal cutting device to cut out along the "cut here" line.
- ❑ Using a file, carefully remove any burrs or rough edges that may cut or scratch during the remainder of the installation.
- ❑ Remove the paper template and discard.

② Carefully insert the Model 1100 into the hole in the panel from the front side.

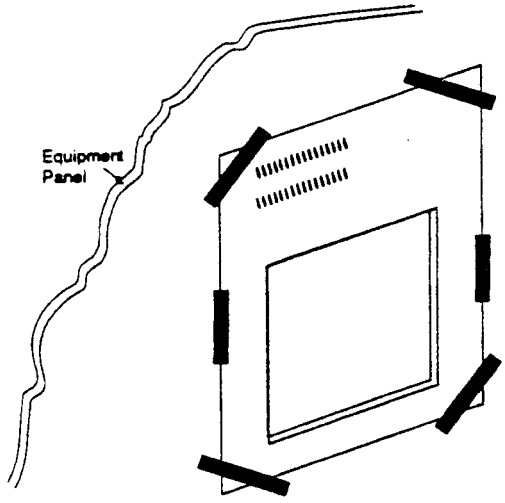
③ Hold the Model 1100 to the panel, and insert the mounting pins as shown in the figure on the following page.
- ❑ If the Model 1100 is to be used in continuously wet applications, apply a silicone sealer to the gasket prior to installation.

④ Tighten the mounting pins to secure the Model 1100 to the front panel.

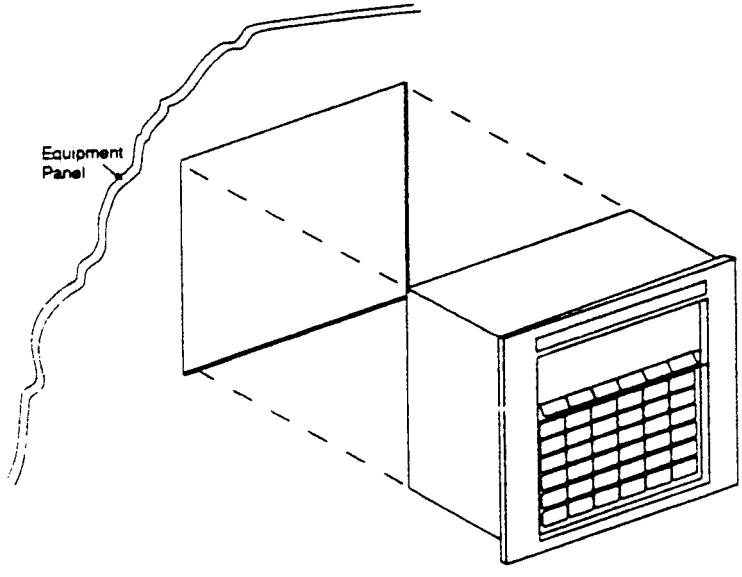
⑤ Ensure that the Model 1100 fits snugly against the front panel, and that there are no gaps or holes that may allow water or dirt to enter the cabinet.

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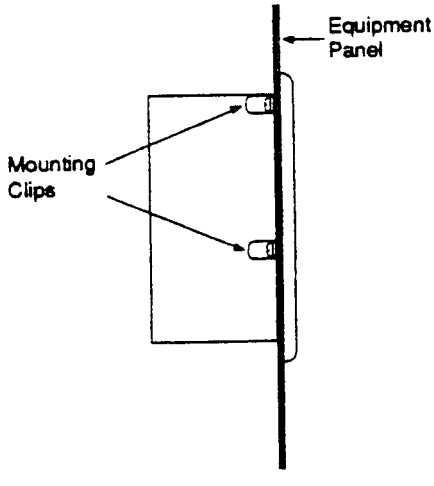
Panel Cut-Out



Mounting



Mounting Pin Installation

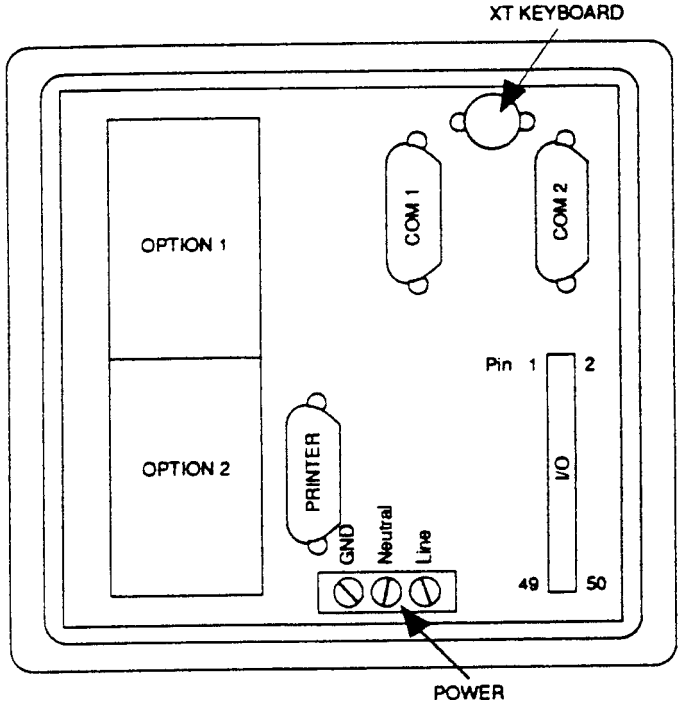


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System Interconnect

The Model 1100 is designed to meet a variety of applications. Therefore, it is impossible to describe a "standard" interconnect for the Model 1100. This section describes each individual connector on the Model 1100 and how to apply them.

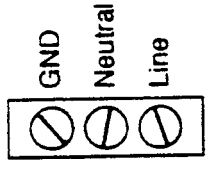
Model 1100 Rear Panel



• Power Connector

The Model 1100 is equipped with a three-prong USA power cable properly attached to the power connector. Should it become necessary to remove the Model 1100's power cable, or direct wire to the connector, follow the diagram below carefully.

Model 1100 Power Connector



WARNING !

MISWIRING THE MODEL 1100's POWER CONNECTOR MAY RESULT IN PERSONAL INJURY OR DEATH. PRODUCT DAMAGE OR FIRE MAY OCCUR.

• IBM PC-XT Keyboard Connector

Note that the IBM KEYBOARD connector is not optically isolated, and use in a high noise environment should be avoided.

An industry standard IBM PC-XT keyboard can be connected into the 5-pin DIN connector on the upper rear panel of the Model 1100. Some keyboards have switches that select XT or AT mode. Be sure that the switch is in XT mode. Some "auto-switch" type keyboards may not work with the Model 1100. If the keyboard you select is a universal keyboard, make sure it has a switch. The primary use for this connector and the IBM keyboard is program development. If necessary, remove the keyboard from the connector while running your application.

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• COM1 and COM2 Connectors

COM1 and COM2 are the serial port connectors (DB-25 style, male). The pin-outs for these connectors are as follows:

All other pins not connected

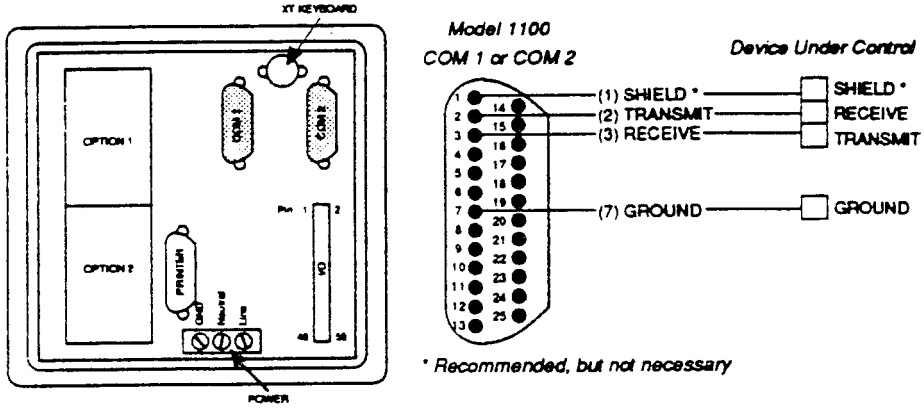
Pin	Connection
1	SHIELD
2	RS-232 TRANSMIT (OUTPUT)
3	RS-232 RECEIVE (INPUT)
7	SIGNAL GROUND
12	RS-422 TRANSMIT + (OUTPUT)
13	RS-422 TRANSMIT - (OUTPUT)
14	RS-422 RECEIVE + (INPUT)
15	RS-422 RECEIVE - (INPUT)

Important note to users of early Model 1100 versions

Some early versions of the Model 1100 (with serial numbers begining with **B** or **S**) have connections to pins #4 and #5 (CTS and RTS). In current units, these pins are connected but inactive.

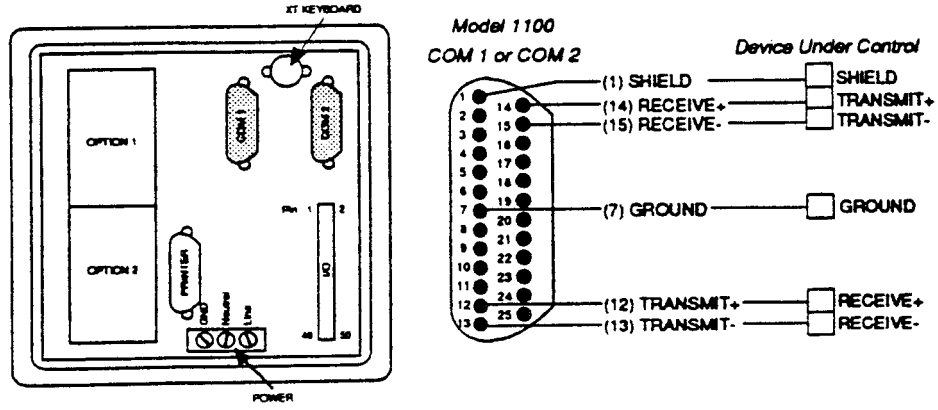
These connectors provide connection for serial communications between the Model 1100 and a variety of devices. Connections made with this connector are most commonly referred to as SERIAL PORTS. Examine your application carefully and make sure that you have TRANSMIT (Tx) on the Model 1100 connected to the RECEIVE (Rx) of the device under control, and RECEIVE of the Model 1100 connected to the TRANSMIT of the device under control.

Minimum RS-232 Connections



To use the RS-422 connections, follow the same conventions outlined above, connecting outputs on the Model 1100 to inputs on the device under control, and inputs on the Model 1100 to outputs on the device under control. To enable the RS-422 transmitters, refer to the RS-422 Statement in the ***Eason BASIC Programming Guide***.

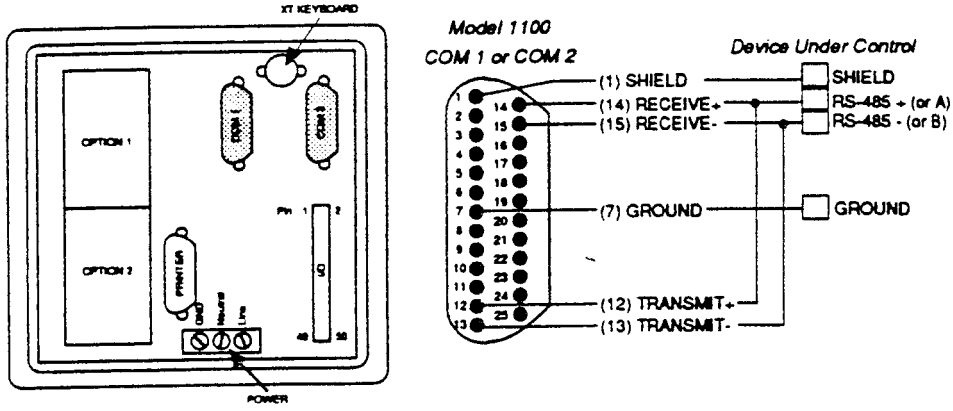
RS-422 Connections



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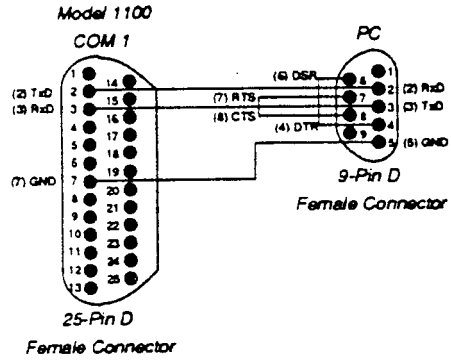
To perform RS-485 serial communications with the Model 1100, the RS-422 transmitter and receiver lines must be tied together. Since the RS-422 transmitters are disabled after power up, it is safe to assume that no line driver conflicts will occur. Refer to the RS-422 Statement in the *Eason BASIC Programming Guide.*

RS-485 Connections

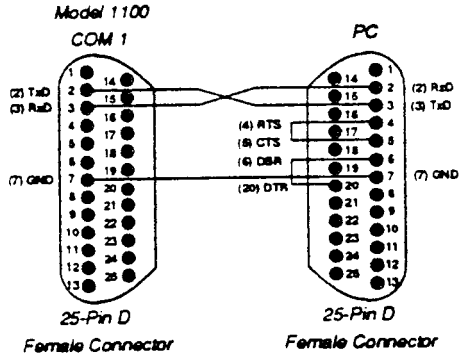


When programming the Model 1100 from a computer acting as a terminal emulator, a null modem cable must be used to connect RS-232C from the COM port on your PC to COM2 on the Model 1100. The Model 1100 is shipped with an appropriate null modem cable with DB-25 on one end for the Model 1100 and either a DB-25 or a DB-9 on the other end for the computer.

DB-9 to DB-25
Null Modem Cable



DB-25 to DB-25
Null Modem Cable



• I/O Connector

The I/O connector on the Model 1100 provides 24 bits of parallel I/O. Each line can be configured in software to perform input, output, or bidirectional operations. The pin-out is an industry standard 50-pin ribbon cable, compatible with PB-24 I/O boards.

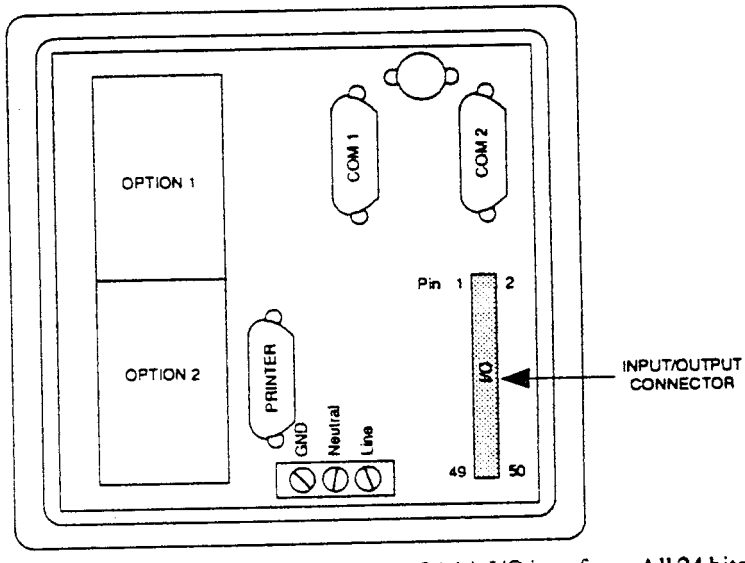
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I/O Connector Pin-out

(Even-numbered Pins: Logic Ground):

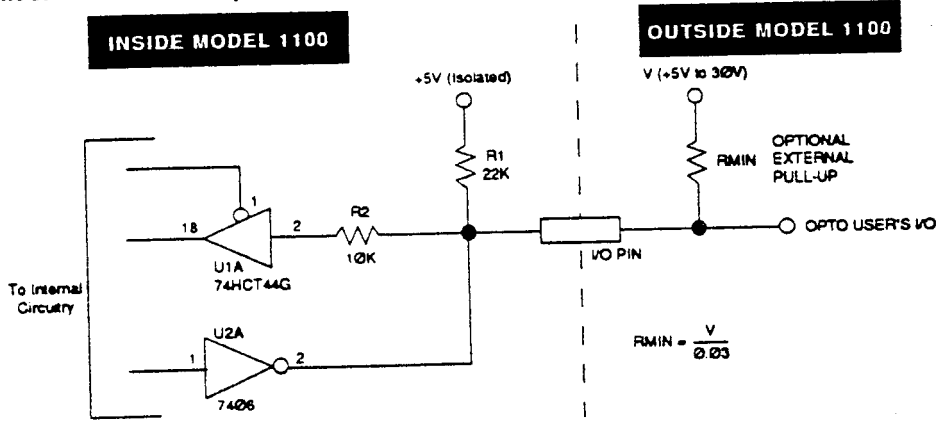
Pin	Function	Pin	Function
49	+5VDC OUT *	23	I/O 12
47	I/O 0	21	I/O 13
45	I/O 1	19	I/O 14
43	I/O 2	17	I/O 15
41	I/O 3	15	I/O 16
39	I/O 4	13	I/O 17
37	I/O 5	11	I/O 18
35	I/O 6	9	I/O 19
33	I/O 7	7	I/O 20
31	I/O 8	5	I/O 21
29	I/O 9	3	I/O 22
27	I/O 10	1	I/O 23
25	I/O 11		

* (100 MA LOAD MAXIMUM)



The schematic below represents one I/O bit on the 24-bit I/O interface. All 24 bits are identical.

One Channel of the 24-Bit I/O



U1 is a CMOS receiver that constantly monitors the status of the I/O line. Its input is current limited by R2 and pulled up by R1. A current limit (R2) is needed to allow the I/O pin to exceed the supply voltage of U1 without damage. *The pull-up (R1) is a fairly high value (22K).* Any voltage from 5 to 30VDC can be connected to the pin without damage to the pull-up resistor. U1 senses a logic high (1) on the I/O pin at 3.2V and a logic low (0) on the I/O pin at 1.4V regardless of the externally applied pull-up voltage.

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U2 is an open collector output driver that can withstand 30 V and 30 MA load. When a BASIC program writes a 1 to the output port, U2 is off, allowing the pull-up resistor (R1) or the user's externally connected pull-up to pull the I/O line high. In this condition, it is possible for an external device (like a switch) to pull the line low thereby allowing the input U1 to sense a logic low. When a BASIC program writes a Ø to the output port, the output transistor in U2 turns on, thereby driving the I/O line low. When the Model 1100 powers up, all I/O lines are driven to a 1, thereby allowing the I/O pins to operate as inputs.

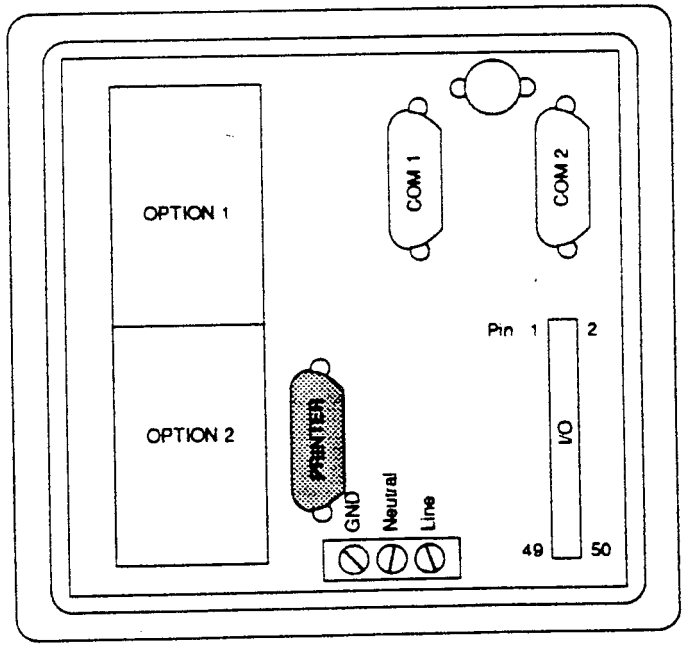
Use the OUT and INP commands to program the 24 bit I/O port (refer to *Chapter* ⑥).

Printer Connector

The Model 1100's printer connector is designed to interface with standard IBM-compatible printers. Programs can access the printer with the LPRINT or LPRINT USING statements. The printer connector is a DB-25 style female connector. You can use an IBM-PC compatible parallel printer cable to connect directly between the Model 1100 and your printer.

Model 1100
Printer Connector Pin-out

Pin	Connection	Pin	Connection
1	STROBE	10	ACKNOWLEDGE -
2	DATA BIT Ø	11	BUSY
3	DATA BIT 1	12	PE
4	DATA BIT 2	13	SELECT
5	DATA BIT 3	14	AUTOFEED -
6	DATA BIT 4	15	ERROR -
7	DATA BIT 5	16	INITIALIZE -
8	DATA BIT 6	17	SELECT IN -
9	DATA BIT 7	18 - 25	Signal Ground



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③ ApplicationBuilder™

Included with the Model 1100 is a disk containing the ApplicationBuilder™, a PC program that allows you to quickly generate programs for the Model 1100. It consists of three components:

- The *Builder* converts menu selections and direct screen text entry into BASIC code
- The *Editor* performs text editing of BASIC or other ASCII files
- The *Terminal Emulator* performs like a "dumb" terminal to talk to the Model 1100

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EASON TECHNOLOGY APPLICATION BUILDER
Version 2.21 August 24, 1992

EASON TECHNOLOGY, INC.
241B CENTER STREET
HEALDSBURG, CA 95448

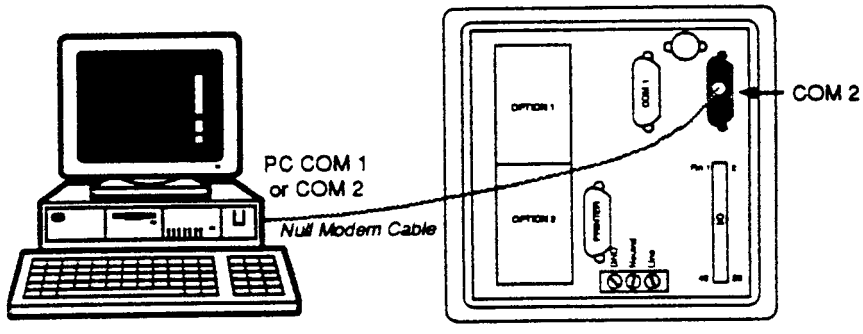
FAX: 707-433-3706 PHONE: 707-433-2854

ApplicationBuilder Start-Up Screen

Getting Started

The ApplicationBuilder™ generates BASIC programs from simple menu selections and direct screen text entry. Integrated into all ApplicationBuilder™ functions is an UPLOAD/DOWNLOAD capability and a comprehensive, context sensitive HELP system. Running the ApplicationBuilder™ is simple and requires no special software skills.

① First, you must connect the Model 1100 to your PC. Connect one end of the supplied NULL MODEM cable to COM2 on the Model 1100 and the other end to an available serial port on your PC (either COM1 or COM2).

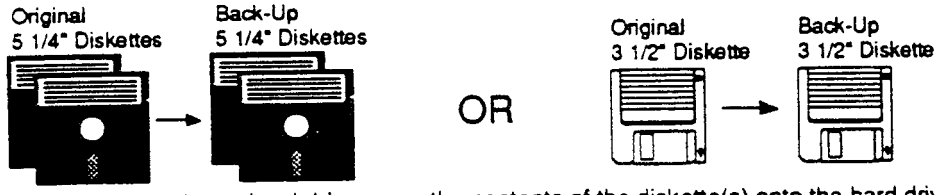


Model 1100 Rear Panel

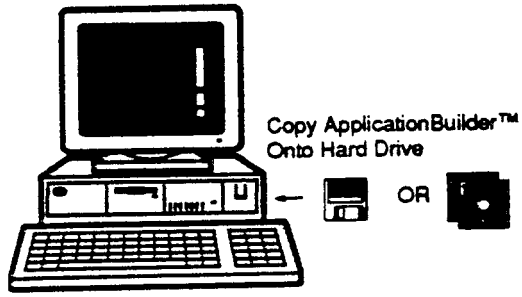
Note which serial port on the PC that you have connected to (for information on the serial ports for your PC refer to your PC's instruction manual).

② The ApplicationBuilder™ is provided on two 5 1/4" diskettes or one 3 1/2" diskette. Make back-up copies of your diskettes before attempting to use them. Use the back-up copies to run the program. Save the original ApplicationBuilder™ diskettes in a safe place.

Refer to the operating system manual for instructions on making diskette back-up copies (DOS or Windows™)



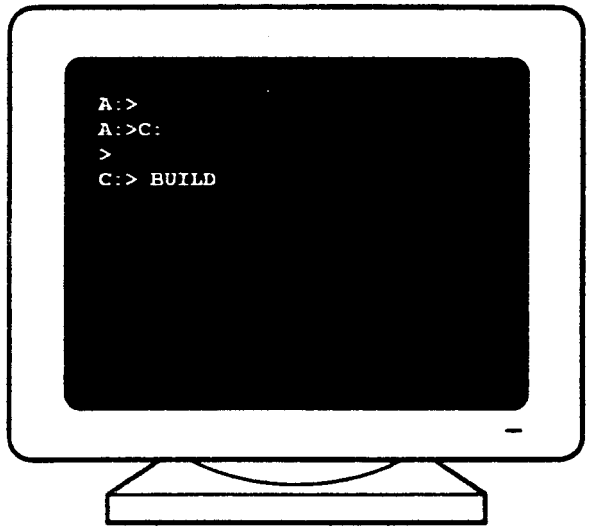
③ If your system has a hard drive, copy the contents of the diskette(s) onto the hard drive (make a separate directory first for ease of use).

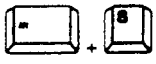


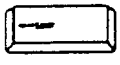
*If you do not have a hard drive, place the diskette labeled **DISK 1** into your disk drive. You can run the program from the disk. Be sure to use the back-ups.*

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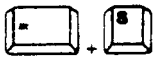
④ Log onto the drive with the ApplicationBuilder™ on it (i.e., type **A:** or **B:** or **C:** and press **Enter**). Type **BUILD** and press **Enter** to run the ApplicationBuilder™.



 = SETTINGS

 To Choose Color

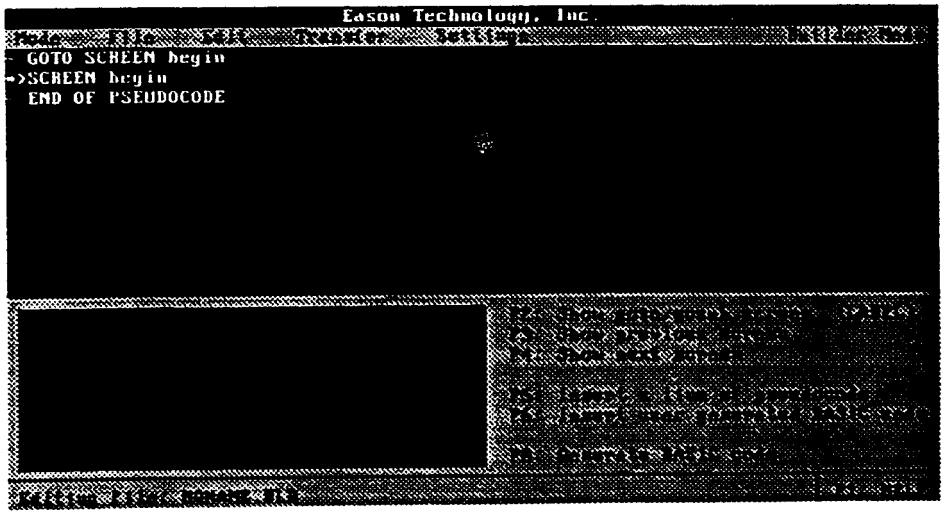
The ApplicationBuilder™ will start up for the first time in LCD mode (the simplest display mode). If your computer has a color monitor, selecting the **SETTINGS** menu by pressing **Alt + S**, and choose the **COLOR** selection by moving the cursor to the **COLOR** text. Press **Enter**. This will display ApplicationBuilder™ screens in color. The change will be recorded to a configuration file on disk, so subsequent program operation will be in color.

 = SETTINGS

 Closes SETTINGS menu

⑤ To select the COM port on your PC that is connected to the Model 1100, press **Alt + S** to pull down the **SETTINGS** menu. Choose either COM 1 or COM 2 depending upon which port the null modem cable is connected to on your PC. Perform the selection in the same manner described above. Again, the settings will automatically be saved for you when you exit the ApplicationBuilder™ program. Press **Esc** to close **SETTINGS** menu.

The figure below shows the layout of the BUILD screen. It consists of four basic components. At the top there is the *MENU BAR*. This is where the pull-down menus for operating the ApplicationBuilder™ originate. In the center is the *PSEUDOCODE GENERATION* area. This is where English language program statements (called PSEUDOCODE) are placed and edited. In the lower left is the *SIMULATION* of the Model 1100's screen. This represents the 8-line by 40-character LCD screen on the Model 1100. The lower right contains descriptions for the function keys. These keys generate the PSEUDOCODE.

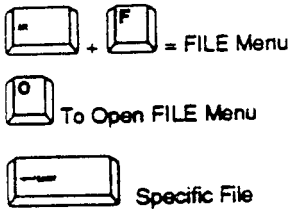


ApplicationBuilder™
Build Screen

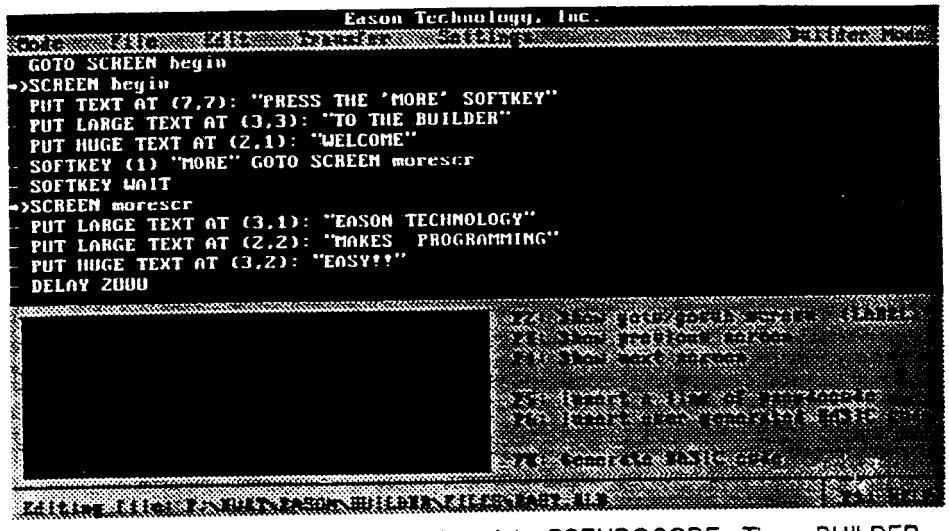
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ApplicationBuilder™ Example

To demonstrate the power of the ApplicationBuilder™, a simple example program will be read from disk, viewed, converted to BASIC, downloaded, and run. **Run the ApplicationBuilder program (described in *Getting Started*) and complete the following steps.**

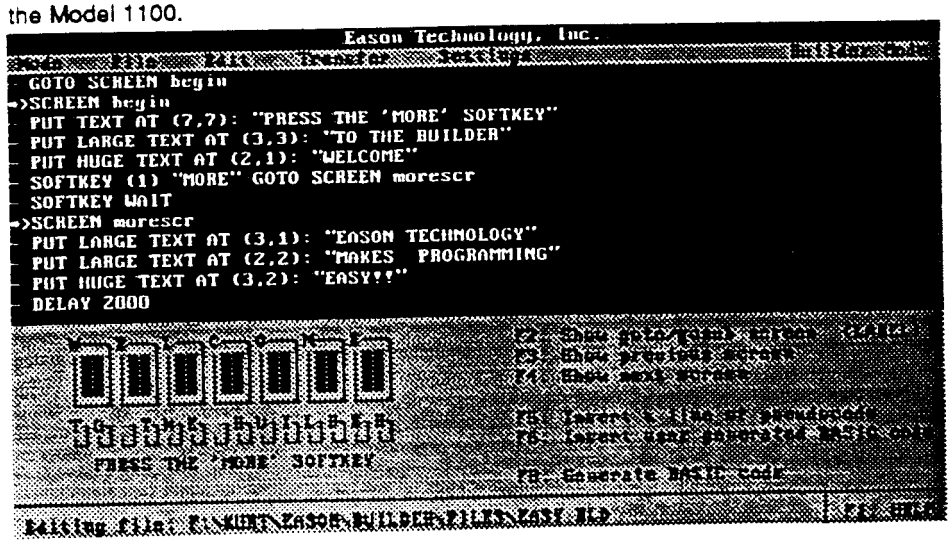


① Select the **FILE** menu (**Alt** + **F**) and **OPEN** (move the cursor or type **O**) and press **Enter**. You will see a window appear that contains a listing of the demonstration builder files on the ApplicationBuilder diskette. Move the highlight to **EASY.BLD** and press **Enter**. The PSEUDOCODE for **EASY.BLD** will appear on the screen. Scroll up and down through the PSEUDOCODE with the cursor keys. The PSEUDOCODE for **EASY.BLD** is below:



Observe the first two lines and the last line of the PSEUDOCODE. These BUILDER automatically inserts these three lines. These lines cannot be deleted, edited, or moved. They are essential for the BUILDER's operation. *Each line begins with a dash (-) or a "> sequence. These tell the BUILDER that the line is PSEUDOCODE, and what to do with it.* A line starting with "> is a new screen. A line starting with a dash is PSEUDOCODE that will execute for that screen. Don't worry about generating these special symbols, the BUILDER does that for you.

② Next, move the cursor (blinking block) over the **"->SCREEN begin"** PSEUDOCODE. Notice that the simulation of the Model 1100's SCREEN contains text. This text will be placed on the Model 1100 screen when BASIC is generated and the program is run on the Model 1100.



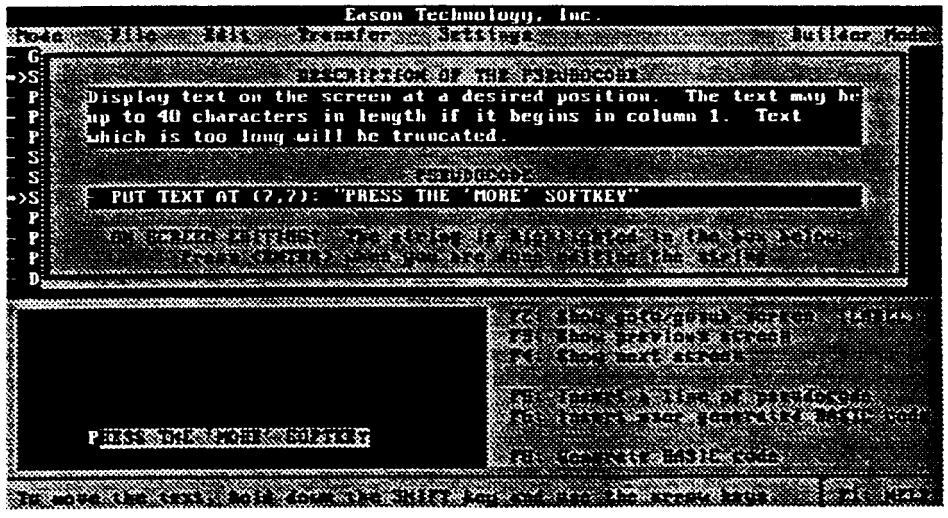
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② Now place the cursor over the third line. Press **Enter**. Notice that the **"PRESS THE 'MORE' SOFTKEY"** is highlighted on the Model 1100's screen. If you hold down the **Shift** key and move the cursor key (on the PC's keyboard), the text block will move on the screen (the Model 1100 screen). Notice that the two numbers in parentheses are changing. This action changes the place where the BUILDER will place the BASIC text string when the PSEUDOCODE is converted to BASIC. Press **Esc** (leave the program unchanged). *If you were to press Enter, the new position would have been saved.*

Press The More Softkey

+ Keyboard Changes Text Block

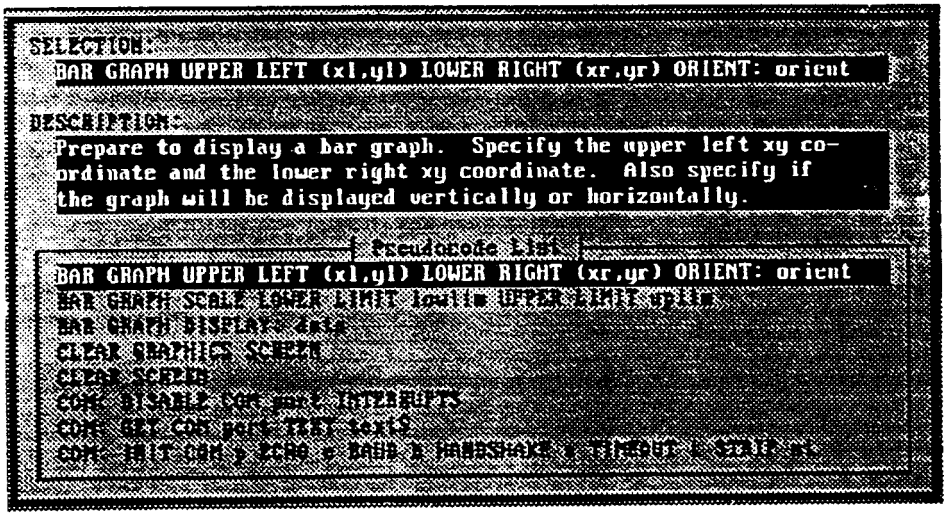
Exit Program



③ Press SOFTKEY **F5**. This is how you select PSEUDOCODES to place on screen. Type an **S**. Press **Enter**. The **SCREEN PSEUDOCODE** has been selected. This allows you to type text directly on the screen. Press **Esc** (leaves the program unchanged).

Select PSEUDOCODES

Exit Program

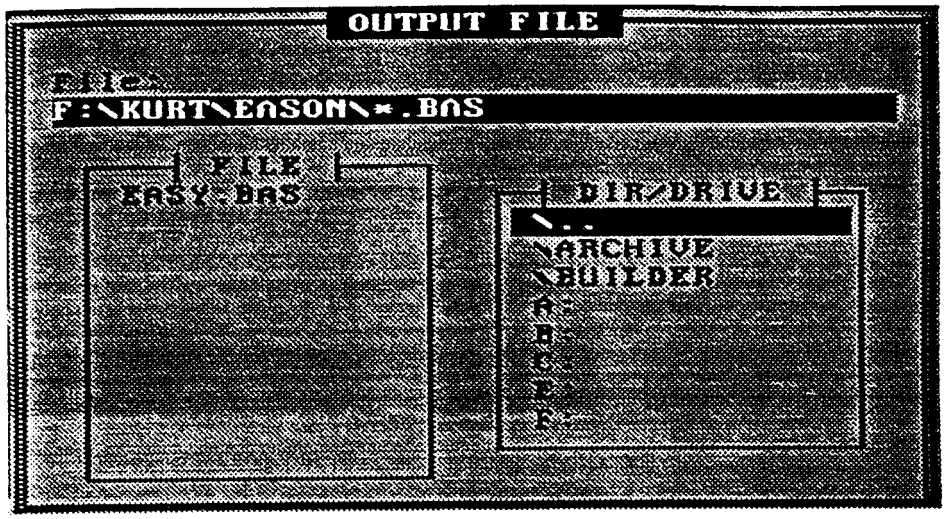


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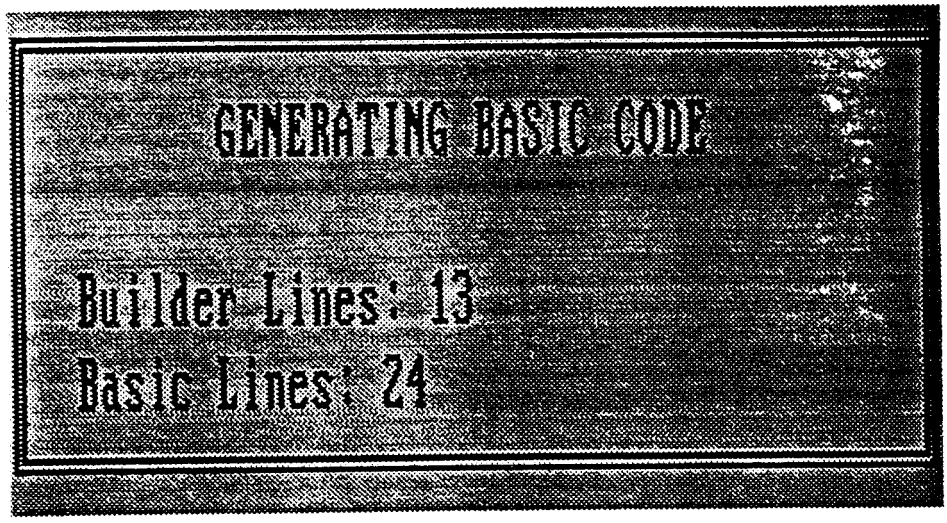
④ Press SOFTKEY **F8**. This softkey generates BASIC. You may be asked if you wish to write over the existing BASIC program—answer **Y** for YES or press **Enter** (if the ApplicationBuilder™ has been used before, the file **EASY.BAS** may already exist on the disk).


Generates BASIC

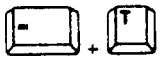

or
To Write Over BASIC Program



Notice that the number of basic lines generated are displayed on screen during this process. You will be asked if you want to load the BASIC program into the EDITOR—answer **YES**. You will be asked if you want to save **EASY.BLD**, answer **NO**, since you did not change anything (or mean to change anything!).



⑤ The BASIC program generated by **EASY.BLD** is now loaded into the EDITOR. The EDITOR has the normal attributes of a text editor. CUT/PASTE/INSERT/etc. After examining the BASIC code generated, download it into the Model 1100.


Disk Files


Download Disk File


Run (From Model 1100)

⑥ Press **ALT-T** and select Download Disk File (by selecting it or typing **D**). Select **EASY.BAS** and press **Enter**. This begins the download process from the PC to the Model 1100. While data is transferred between the PC and the Model 1100, a counter will show the number of bytes being transferred. When the process is complete, the program has been downloaded. Press F1 (RUN) on the Model 1100. You should see the screens and softkeys that were present on the SIMULATION OF THE MODEL 1100'S SCREEN on the PC. Once you have successfully downloaded and run **EASY.BLD**, try loading, examining, and compiling other programs on the ApplicationBuilder™ diskette(s). Some programs are only available in BASIC form. They may be loaded with the ApplicationBuilder™ even though their corresponding BUILDER file is not present.

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Troubleshooting Communications

If your attempt at down-loading a program to the Model 1100 was unsuccessful, check the serial port connections between the Model 1100 and the PC. Look for the following things:

① Is power applied to the Model 1100?

② Is one end of the NULL MODEM cable connected to COM 2 of the Model 1100? If it is not, reconnect it to COM 2.

③ Which port on the PC is the other end of the serial cable connected to: COM 1 or COM 2? Does this match the selections made in the SETTINGS menu? If you are unsure, recheck the SETTINGS menu (ALT-S) and make sure that you have the correct setting?

④ Are the NULL MODEM cable connectors securely seated into their respective sockets. Try tightening the hold-down screws on the NULL MODEM cable.

⑤ Are you using the NULL MODEM cable supplied by EASON TECHNOLOGY? If you are unable to find the NULL MODEM cable supplied by us, most computer stores can provide them for a modest cost. Be sure to ask for a NULL MODEM cable with female to female connectors on it.

⑥ Do you have memory resident programs loaded (TSR programs) that are presently running on your PC (disk spoolers, communications drivers, etc.)? If so, remove them.

Operating Modes


HELP

This portion of the manual has been created from excerpts of the on-line HELP, which is integrated into the ApplicationBuilder™ program. If you feel comfortable with the discussion so far, go ahead and try the ApplicationBuilder™ on your own. If you need help at any time, press F1. A help message will appear which will describe the operation required to run the ApplicationBuilder™. After trying out the ApplicationBuilder™, read this section of the manual to master its power. A keystroke summary is included later in this chapter.

The ApplicationBuilder™ has three basic operating modes.

❑ **BUILDER** ❑ **EDITOR** ❑ **TERMINAL**

These modes can be selected from the MODE menu. The ApplicationBuilder starts up in BUILDER mode. To change modes, use the MODE menu. You can switch from mode to mode without closing the current document allowing you to work on a number of things at once. You also quit the program from the Mode menu. You can access the MODE menu by pressing the **Esc** key or **Alt + M**.


MODE Menu


BUILDER Mode

BUILDER—The Builder Mode provides a user-friendly program generation environment to help you develop your BASIC program to run on your Model 1100. Typing **B** while anywhere in the MODE menu will also activate this command.


EDITOR Mode

EDITOR—The Editor Mode is a standard text editor that allows users to develop and modify BASIC programs. You can cut, copy, and paste blocks of text, and you can also renumber BASIC programs in this mode. Typing **E** while anywhere in the MODE menu will also activate this mode.


TERMINAL Mode

TERMINAL—The Terminal Mode turns your computer into a dumb terminal that communicates directly to the Model 1100's interface. For all practical purposes, keystrokes entered onto your computer keyboard are echoed on the interface screen. Typing **T** while anywhere in the MODE menu will also activate this mode.


RUN Tutorial

RUN TUTORIAL—After the initial running of the ApplicationBuilder™ Tutorial, this option will allow you to run the tutorial again later. Typing **R** while anywhere in the MODE menu will also run the tutorial.


QUIT

QUIT—This option exits the ApplicationBuilder™ program and returns control to DOS. Typing **Q** while anywhere in the MODE menu will also exit the ApplicationBuilder program.

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Builder Mode


Enter PSEUDOCODE


Enter BASIC Directly

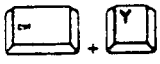

Converts PSEUDOCODE To BASIC

Builder Mode is the heart of the ApplicationBuilder™ package. It allows you to easily develop a control and interface program, test the operator interface functionality of the program, and then generate the proper BASIC code to run in a Model 1100. You accomplish this by generating PSEUDOCODE. You can enter a line of PSEUDOCODE by pressing **F5**, finding the appropriate PSEUDOCODE for the task you want to accomplish, pressing **Enter**, and following the instructions for entering the requested data. You write a program in PSEUDOCODE that represents what you want the interface and control program to do. Not all of the functionality of the Eason BASIC is represented in PSEUDOCODES. If at any time during the process of generating the program you find that you need functionality that the current PSEUDOCODES don't provide, you can press **F6** and enter BASIC directly. Once you have a PSEUDOCODE (and possibly BASIC) representation of what you want your program to do, press **F8** to convert the PSEUDOCODE program into a line numbered BASIC program.

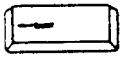
• Operating the Builder

The box in the lower left-hand corner of your computer screen is a representation of your Model 1100's screen. While you are generating your PSEUDOCODE program, any line of code that generates information that will be displayed on the LCD display will be shown here. Text, softkey labels, placeholders for variable and operator numeric entry will all be displayed and can be moved to any legal location you desire. As you move the cursor down from PSEUDOCODE line to PSEUDOCODE line, the screen will build up one line at a time in synchronization with the PSEUDOCODE line you are on.

There are a few other important keys and keystrokes to keep in mind.


Delete Code


Add Code


Edit Code

- **Ctrl-Y** will delete the line of PSEUDOCODE where the cursor is currently located.
- **Cut**, **Copy**, and **Paste** are all functions that allow blocks of text to be manipulated.
- Pressing **F5** when the cursor is on a line of PSEUDOCODE will add a new line of PSEUDOCODE above the cursor location.
- Pressing **Enter** while on a line of PSEUDOCODE will allow you to edit that line.

The PSEUDOCODE you generate will be organized into screens. Each screen will have a name (defined by the SCREEN PSEUDOCODE).

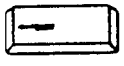
- The **GOTO** screen and SOFTKEY PSEUDOCODES will move your program from screen to screen.
- **F2**, **F3**, and **F4** help you navigate through your PSEUDOCODE program as you are developing it. If you are on a line of PSEUDOCODE that defines a GOTO or GOSUB to a screen or a label and press **F2**, the cursor will move to the beginning of that screen or to that label. **F4** will send you to the beginning of the next screen definition. **F3** will send you to the beginning of the previous screen definition. These function keys become increasingly helpful as your programs get longer and more involved.


Beginning of Current Screen or Label


Beginning of Previous Screen or Label

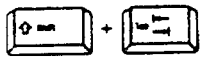

Beginning of Next Screen or Label

Entering PSEUDOCODE falls into two categories: Entering/placing text on the screen and everything else. PSEUDOCODES that have nothing to do with text on screen are relatively simple. Each bit of information needed to complete a PSEUDOCODE command is asked for one piece at a time. You can get from entry to entry with the **Tab** key or the **Enter** key.


Exits PSUEDOCODE

- The **Enter** key exits the PSEUDOCODE entry box once everything has been defined.
- The **Tab** key takes you from entry to entry and from the last entry to the first without exiting the screen. ***Shift-Tab** takes you backwards.*


Entry to Entry (Forward)


Entry to Entry (Backward)

On screen entry allows you to do powerful things. Any command that generates text to be placed on the screen takes advantage of On Screen Editing. The SCREEN command allows you to place regular text, large text, and huge text anywhere on the screen. When entering text on screen, you are always in overtype mode. You change text sizes with the **Tab** key. Once you have typed the text to be displayed on the screen, press **Enter**. You will be prompted for

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a name for the screen. Once that is done (press **Enter** again), a series of PUT TEXT commands will be generated. Whenever you enter a new PUT TEXT command or edit an existing one, your cursor will be on the screen. You can add or change text or move it around. To move text, hold down the **Shift** key and use the Cursor keys to move the text to the desired location. Once the proper text is on the screen in the proper location, press Enter to generate the PSEUDOCODE.

Some PSEUDOCODES (like PUT NUMBER) allow you to specify numeric formats for printing numbers on the screen. You may specify a digit placeholder with a # character. Use the decimal point (.) character to specify the decimal point location. Use a plus (+) or minus (-) sign to specify a sign. For a scientific notation, use **E**. Refer to the following example:

E Scientific Notation

##.###	**Specifies from 0.000 to 99.999**
+#.#	**Specifies from -9.9 to +9.9**
###	**Specifies from 0 to 999**

PUT TEXT places text from string variables directly on screen (See Chapter ⑥ for a description of string variables). To place the contents of a string variable with the PUT TEXT PSEUDOCODE, press **F5** followed by **P**. Select **PUT TEXT** with the cursor, and press **Enter**. You are now in "ON SCREEN" text entry (i.e., your cursor is on the simulated Model 1100 screen and blinking). Move the cursor to the desired starting location of the text string. Type a dollar sign ($) and press **Enter**. A new window will appear in the PSEUDOCODE entry area that will ask for the name of the string variable (a string variable must end with a dollar sign ($)). Enter the string variable and press **Enter**.

P PUT TEXT

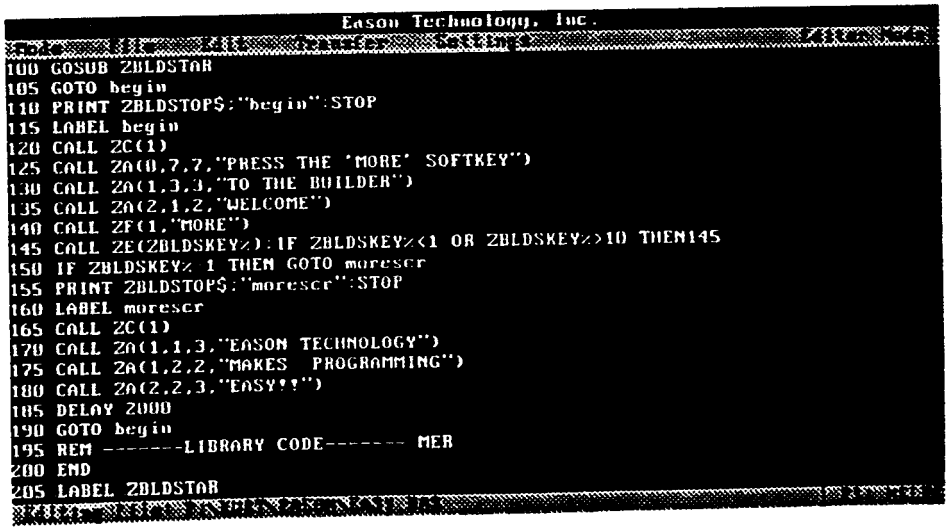
Selecting a PSEUDOCODE is simple. Pressing **F5** displays a list of PSEUDOCODES that you can choose. The PSEUDOCODE selection screen displays the PSEUDOCODE list, the currently selected PSEUDOCODE, and helpful information about the currently selected PSEUDOCODE. If you press **Enter**, you will go to the entry screen (if one is needed) for the currently selected **PSEUDOCODE**. You can use the Up and Down arrows, as well as the Page Up and Page Down keys, to scroll through the PSEUDOCODES. You can also press a letter key to get to the first command in the PSEUDOCODE list that begins with that letter. *For instance, if you are in the list and press S, you will go to the SCREEN command location in the PSEUDOCODE list.*

↵ List PSEUDOCODES

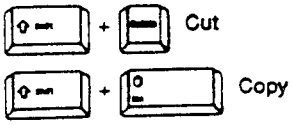
8 Screen Command in PSEUDOCODE List

Editor Mode

Editor Mode is a text editor that allows you to edit files off-line from any serial device (such as a Model 1100.) This allows you to write and modify programs away from your machine and to use more powerful editing features than BASIC can provide. With the Editor, you can easily cut, copy, and paste blocks of text from one area or program to another. You can even cut or copy text in the Editor and paste it into the Builder and vice versa.



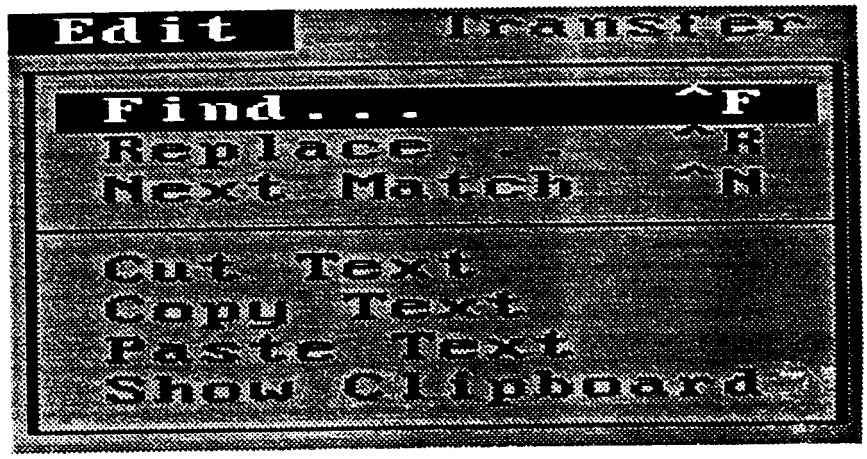
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To select text to cut or copy, use the following procedure.

- Position the cursor at one end of the block of text in question—hold down the **Shift key** as you move the cursor with the arrow keys and Page up/Page down keys.
- Select **Cut** or **Copy** from the Edit menu. *You can also use Shift-Delete or Ctrl-Insert, respectively, to perform the same functions.*
- You can paste the text anywhere you put the cursor (or over any block of text you choose) by choosing **Paste** from the Edit menu or by using **Shift-Insert**.

When you cut or copy text from a document, it is saved in the "Clipboard." You can view the clipboard at any time by choosing View **Clipboard** from the Edit menu. You will notice that the last block that was cut or copied is highlighted and that many of the previous cut or copied blocks are still in the clipboard. If you would rather paste a previously cut or copied block of text, just highlight that block, return to your document, and paste that previously (and now currently) chosen text. The following submenus appear when you select the Edit menu:





Find Text

FIND Text—This option allows you to find a specific text selection. Typing **F** while in the Edit menu will also activate this command. Typing ^ - **F** while editing will also activate the **FIND** Text command.



Replace Text

REPLACE Text—This option allows you to find a specific text selection and replace it with another selection. Typing **R** while in the Edit menu will also activate this command. Typing ^ - **R** while editing will also activate the **REPLACE** Text command.



Next Match

NEXT MATCH—This option allows you to find and or replace the last selection of text specified by the **FIND** or **REPLACE** commands. If **FIND** was the last operation performed, the selection will be searched for again. If **REPLACE** was the last operation performed, you will be able to replace the last selection. Typing **N** while in the Edit menu will also activate this command. Typing ^ - **N** while editing will also activate the **NEXT MATCH** command.



Cut Text

CUT Text—This option removes the currently selected text and places it in the clipboard. It can then be pasted into another location or file. Typing **T** while anywhere in the Edit menu will also activate this command.



Copy Text

COPY Text—This option takes a copy of the currently selected text and places it in the clipboard. It can then be pasted into another location or file. Typing **C** while anywhere in the Edit menu will also activate this command.



Paste Text

PASTE Text—This option takes the currently selected text from the clipboard and pastes it into the currently selected location in your document. Unless you explicitly select otherwise in the clipboard, the text that is pasted will be the last block of text cut or copied. Typing **P** while in the Edit menu will also activate this command.



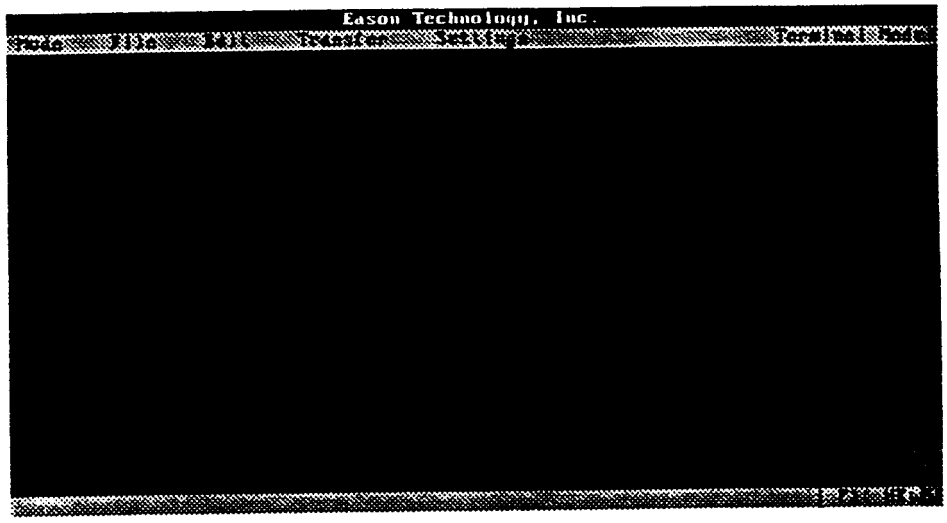
Show Clipboad

SHOW Clipboard—This option opens the clipboard so you can view its current contents. You can also select text other than the most recently cut or copied text to paste into a document just by highlighting a different section of text. Typing **S** while in the Edit menu will also activate this command.

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Terminal Mode

Terminal Mode basically turns your computer into a dumb terminal. Virtually all keys that you hit on your keyboard are sent directly over the serial link from your PC to Model 1100. Also, anything sent out of the Eason device's serial port connected to your PC will show up on the screen of your PC when in Terminal Mode. In effect, using the Terminal Mode to communicate with the Model 1100 is quite a bit like typing on a keyboard plugged into the keyboard port on your Eason product (the exception being the use of <Ctrl> and function keys). *The Up and Down cursor keys are not currently functional.* If you want to move up or down on the screen, you must do it from the cursor keys on your Model 1100. If you are editing a line of BASIC, use the **EDIT** command to position the cursor on the line you want to change.

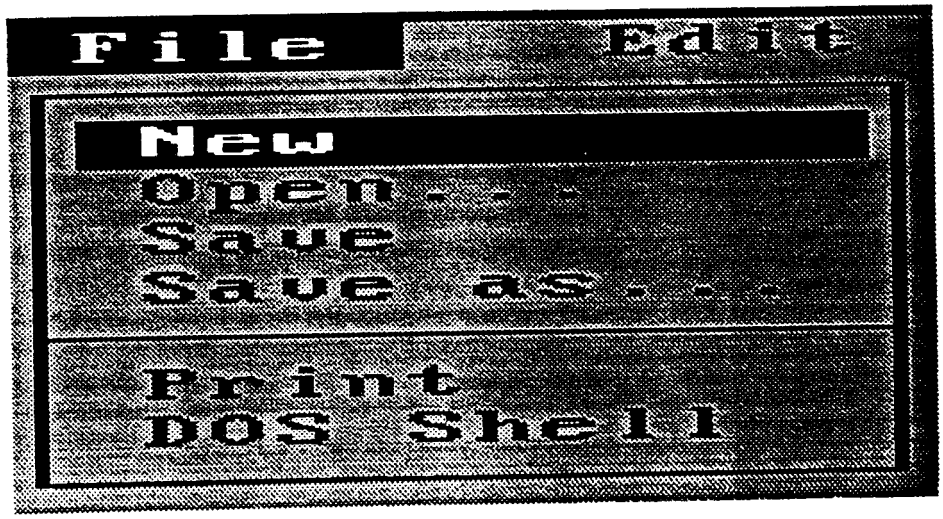


If you enter Terminal Mode and have problems communicating, verify that you have the correct COM port selected in the Settings Menu and that you have a null modem cable between that COM port and COM2 on your Eason product. Once you have verified this setup, select **Start Communications** from the Terminal menu to get things going.

File Menu

The File menu is used to manipulate files. You begin a New file, Open a preexisting file, Save a file, save a file under a different name, or Print a file. If you need to get to DOS briefly, the DOS Shell command allows you to go to DOS and get back easily. You can access the File menu by pressing **Alt-F**. The following options appear when the File menu is selected.





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N New File

NEW—This option closes any currently open file and starts a new one. This only affects the currently active mode. Typing **N** while anywhere in the File menu will also activate this command.

O Open File

OPEN—This option allows you to close any currently open file and open the file of your choice. You will be prompted to select from a list of acceptable files or you can type in the path and filename directly. Typing **O** while anywhere in the File menu will also activate this command.

S Save File

SAVE—This option immediately saves the currently active file to the most recent filename assigned to it. Typing **S** while anywhere in the File menu will also activate this command.

A Save File As...

SAVE_AS—This option saves the current active file, but it first requests a new path and/or file name. Typing **A** while anywhere in the File menu will also activate this command.

P Print File

PRINT—This option prints the currently active file to the default printer. Typing **P** while anywhere in the File menu will also activate this command.

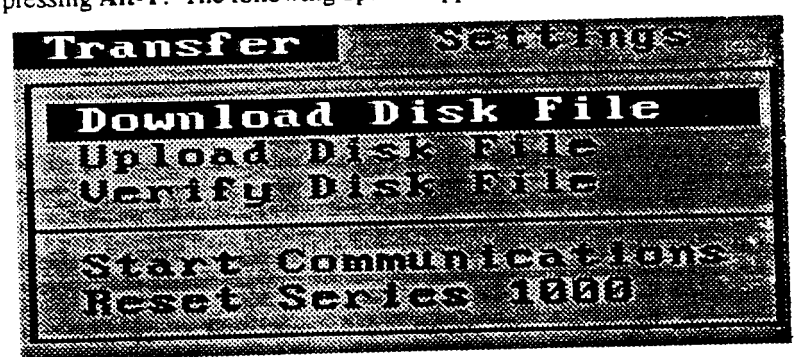
D Return Control To DOS

DOS SHELL—This option sends control back to DOS to perform some brief task. Typing **EXIT** returns control to the ApplicationBuilder™. Typing **D** anywhere in the File menu will also activate this command.

Transfer Menu

The Transfer menu transfers files back and forth between your Model 1100 and your PC. You can download from the PC to the Model 1100 or upload from the Model 1100 to your PC. You can also verify whether a program in your interface matches one on your PC or not. You can also start and verify communication between the two devices. You can access the Transfer menu by pressing **Alt-T**. The following options appear when the Transfer menu is selected.

Alt + T Transfer Menu



D Download Disk File

DOWNLOAD Disk File—This option transfers a file from your PC to the Model 1100. You will be prompted to select a currently saved BASIC file, or you can enter in the filename of the program directly. Typing **D** in the Transfer menu will also activate this command.

U Upload Disk File

UPLOAD Disk File—This option transfers a file from the Model 1100 to the PC. You will be prompted to select a filename for the uploaded file. You can save it as an existing filename and overwrite the existing file with the uploaded file or assign a new name to the uploaded file. Typing **U** in the Transfer menu will also activate this command.

V Verify Disk File

VERIFY Disk File—This option is not currently functional.

C Start Communications

START COMMUNICATIONS—This option does a number of useful things. First, it stops the execution of any program currently running in your Model 1100. It then enables remote communication and verifies that the communication link is working correctly. If you cannot communicate with your Eason product, verify that the correct COM port is selected in the Settings Menu and that a null modem cable is between that COM port and COM2 on the Eason product. Once this setup is verified, select Start Communications. Typing **C** in the Transfer menu will also activate this command.

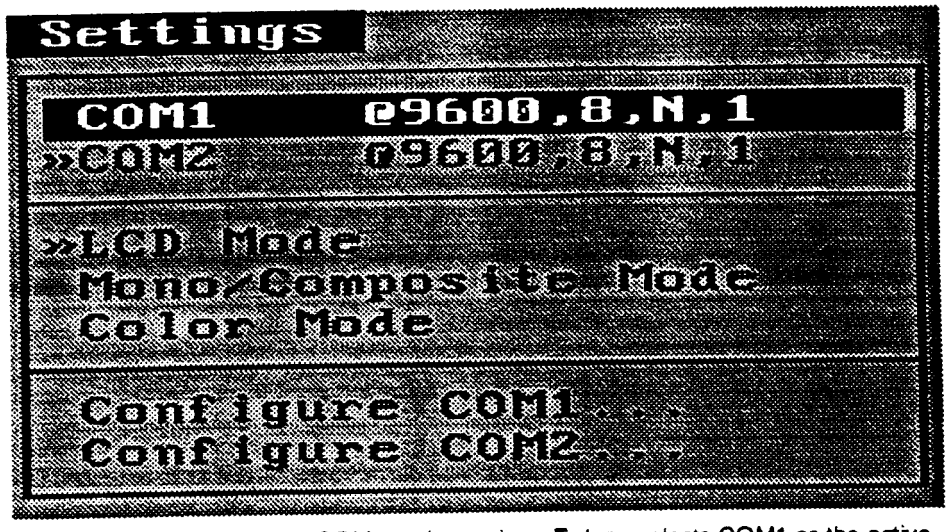
R Reset Series 1000

RESET SERIES 1000—This option is the same as typing **Ctrl-Alt-Delete**. The current program in the Model 1100 will be erased and all memory is cleared. ***Nonvolatile data registers are not cleared with the RESET command.***

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Settings Menu

The Settings menu configures your PC. You can specify the configuration of your PC's serial ports and which serial port you will use to communicate with your Model 1100. You can also configure the ApplicationBuilder™ to use colors that match the capability of your computer screen. You can access the Settings menu by pressing **Alt-S**. The following submenus appear when the Settings menu is selected.



Select COM1

SELECT COM1—Highlighting COM1 and pressing **<Enter>** selects COM1 as the active COM port in your PC for communication with your Model 1100. Typing **1** while anywhere in the Settings menu will also activate COM1.

Select COM2

SELECT COM2—Highlighting COM2 and pressing **<Enter>** selects COM2 as the active COM port in your PC for communication with your Model 1100. Typing **2** while in the Settings menu will also activate COM2.

LCD Mode

LCD—Highlighting LCD Mode and pressing **<Enter>** configures the ApplicationBuilder™ to run effectively on a computer with an LCD based screen (common on laptop or notebook PC's.) The program uses only black and white colors for visibility. Typing **L** while in the Settings menu will also put the ApplicationBuilder™ into LCD mode.

Mono/Composite Mode

MONO—Highlighting Mono/Composite Mode and pressing <Enter> configures the ApplicationBuilder™ to run effectively on a computer with a Monochrome monitor The program uses black, white and intense white colors only for visibility. Typing **M** while in the Settings menu will also put the ApplicationBuilder™ into Mono/Composite mode.

Color Mode

COLOR—Highlighting Color Mode and pressing <Enter> configures the ApplicationBuilder™ to run effectively on a computer with a color monitor The program uses many colors to enhance the readability of the screen. Typing **C** while anywhere in the Settings menu will also put the ApplicationBuilder™ into Color mode.

CONFIG COM1—Selecting Configure COM1 allows you to set the communication parameters for COM1 in your PC. The values you can set are: baud rate, number of data bits, number of stop bits, parity, and whether you want local echo on or off. Once you have selected **CONFIG COM1...**, you will see a dialog box for setting these parameters with help information located at the bottom of the screen.

CONFIG COM2—Selecting Configure COM2 allows you to set the communication parameters for COM2 in your PC. The values you can set are: baud rate, number of data bits, number of stop bits, parity, and whether you want local echo on or off. Once you have selected **CONFIG COM2...**, you will see a dialog box for setting these parameters with help information located at the bottom of the screen.

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Summary of ApplicationBuilder™ Operation

The following is a summary of the sequence of operations required to make a functional program in the ApplicationBuilder™ (this example assumes you are starting from the DOS prompt with the ApplicationBuilder™ diskette or hard disk ready). Your Model 1100 should be connected to the PC with a NULL MODEM cable.

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	Operation	Keystroke	Description
	Running the Program	BUILD	At the DOS prompt, run the ApplicationBuilder™ program.
		ALT-F	File Menu
		Enter	"NEW"—clear out workspace and begin a new Pseudocode program.
	Making the First Screen	Cursor	Move the cursor to the second line in the Pseudocode List (">SCREEN begin).
		Enter	The cursor is now on the screen. You are now building a new screen named "begin". You may position the cursor, enter characters or press the TAB key to change the character size.
		Enter	This terminates the data entry and adds Pseudocodes to your program that will generate the text you have typed on screen.
	Adding a Softkey	Cursor	Move the cursor below the last "PUT TEXT" Pseudocode in the list below the begin screen.
		F5	Select the Pseudocode List
		S	Move to the "S" section.
		Cursor	Move the cursor to the SOFTKEY (skey)... Pseudocode.
		Enter Softkey Number	Select a softkey number between 1 - 10 (keys 7 - 10 do not place text on screen).
		Enter Softkey Text	Enter the 5-character label you want to place above the softkey.
		Enter Screen To Go To	Enter the name of a screen that you want your program to jump to when the softkey is pressed.
		Enter	Adds the Pseudocode to your program.
	Add 2 More Soft Keys in The Same Manner		
	Waiting for a Softkey	F5	Select the Pseudocode List.
		S	Move to the "S" section.
		Cursor	Move the cursor to the SOFTKEY WAIT Pseudocode.
		Enter	Adds the Pseudocode to your program.
	Building More Screens	Cursor	Move the cursor to one of the SOFTKEY (skey)... Pseudocodes.
		F2	GOTO or Build a screen.
		Enter	Answer "YES" to add a new screen.
		Cursor/Tab/Type	Move cursor, use Tab key to change size/type of any text you want on the new screen.
		Enter	Accept Changes to screen.
		Cursor	Move the cursor below the last "PUT TEXT" Pseudocode in the new screen.
		F5	Select the Pseudocode list.
		D	Move to the "D" Section.
		Enter	Select the "DELAY" Pseudocode.
		1500	Enter 1.5 second delay.
		F5	Select the Pseudocode list.
		G	Move to the "G" Section.
		Cursor	Move cursor to the "GOTO SCREEN" Pseudocode.
		Enter	Select it.
		Begin	Go to screen BEGIN after the 1.5 second delay.
		Repeat Steps Above	Repeat this process to define new screens for the other two softkeys in screen BEGIN.
When Done Adding Screens	**Save Program**	ALT-F	File menu
		Cursor	Select SAVE AS.
		Enter	You will be prompted for a "SAVE AS" file name.
		Filename	Enter a valid DOS filename with a ".BLD" extension (i.e., NEWFILE.BLD").
		Enter	Save the file.
	Convert to BASIC	F8	Build BASIC
		Enter	Save file listed as a file with a ".BAS" extension (i.e., "NEWFILE.BAS").
		Enter	Answer "YES" to enter the file into the EDITOR.
		ALT-T	Transfer menu.
		Enter	Download.
	Run Program	F1 (on Model 1100)	Run the program on the Model 1100.

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④ Screen Editor

This Chapter describes the operation of the Model 1100's built-in screen editor. For a detailed description of the built-in screen editor, refer to the ***Eason BASIC Programming Guide***. This editor allows programmers to edit programs directly on the Model 1100's screen without a PC. This feature is most useful for program debugging or for constructing and modifying short programs. We recommend that you use the ApplicationBuilder to generate more substantial programs. The ApplicationBuilder will shorten your development time, give you much more accurate BASIC code, and provide a means of storing, documenting, and cataloging programs.

Editor Capabilities

The built-in screen editor has a complete set of features that allow the programmer to develop programs directly on the Model 1100's screen. Operation of the editor requires the connection of an external PC-XT keyboard (see *Chapter ② Installation*). Once the keyboard is connected, you can access every programmable function in the Model 1100. The editor capabilities center around the Model 1100's 8 line by 40 character display. It has a built-in, 50-line scroll buffer that can be used to view sections of programs (or entire programs if they are short enough). The editor has the following feature set.

- Line oriented editor - change a line by over-typing on it, press **Enter** and it is modified in the BASIC program.
- 78 character line capability. The editor can edit lines longer than the screen width. If you keep typing after the first 40 characters, the editor will insert a "|" character at the end of the current line and the beginning of the next line. You may continue typing on the next line. The "|" characters do not consume space in your program memory.
- Full cursor control: Up, Down, Left, Right, Page-Up, Page-Down, Home, End, Insert, Backspace, and Delete
- Special functions: **Ctrl-C** stop program execution and return to the editor; **Ctrl-Y** Delete to end of line.

Active Function Keys:

F1	RUN	
F2	LIST	
F3	REMOT	(remote on/off *)
F4	CONT	
F5	AUTO	
F6	EDIT	

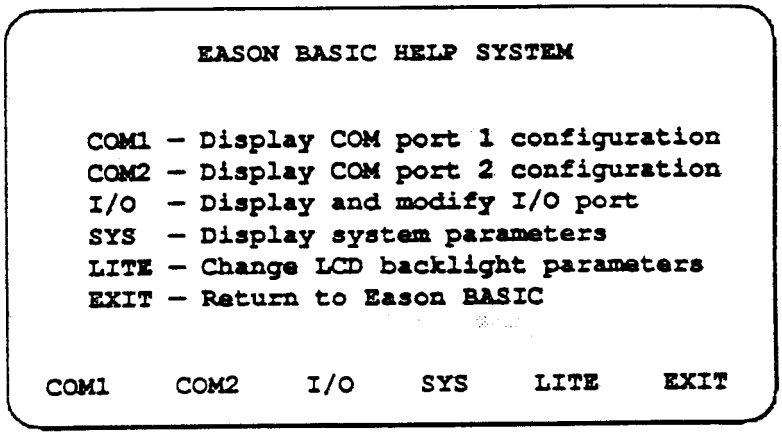
* Useful for uploading and downloading programs with programs other than the ApplicationBuilder. See the REMOTE Statement in the ***Eason BASIC Programming Guide***.

NEW command erases the contents of the editor memory.
DELETE command erases sections of the program by line number.
LIST lists all or sections of the program to the screen.
LLIST can list all or sections of the program to the printer.

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Help Key

The Model 1100 is equipped with a powerful HELP feature. By pressing the HELP key on the Model 1100 Series Product's front panel or F10 on the IBM keyboard while in the BASIC Interpreter Screen Editor (not running a program), the following screen appears:



The HELP screen gives you access to the following functions via keys F1 - F6.

F-Key	Label	Function
F1	COM1	Displays the buffers and status of COM1.
F2	COM2	Displays the buffers and status of COM2.
F3	SYS	Displays system related status.
F4	I/O	Displays 24-bit I/O positions and allows the operator to change them.
F5	LITE	Select LCD backlight auto shutdown, ON, or OFF:
		ON leaves the backlight on at all times.
		OFF leaves the backlight off at all times.
		AUTO turns backlight off after 10 minutes if no activity occurs (i.e., program execution or a key press). The backlight comes back on as soon as a key is pressed.
F6	EXIT	Press this key to leave the HELP system.

The HELP key is treated differently when the BASIC Interpreter is running a program. When running a BASIC program, the HELP key becomes a function key, F10. For example, ON KEY (10) GOSUB 1000 will generate an interrupt subroutine call to location 1000 when the HELP key is pressed. Think of the HELP key as a *pre-labeled* function key, F10. By keeping track of the operational status of your program you can generate context sensitive HELP for your application. For example, by providing a variable named HELP which gets updated whenever the screen contents change, the subroutine which responds to the HELP key can examine this variable and print a specific message out to the user which instructs the user what to do at any given time.

Examine the demo programs supplied with the Model 1100. These programs make use of the function key interrupts, and in particular, the F10 or HELP interrupt.

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⑤ Application Examples

This chapter demonstrates a few of the many applications possible with the Model 1100. Perhaps the best way to think of the Model 1100 is as an industrial controller with an integrated operator interface and very capable I/O. In many systems the Model 1100 can provide the entire system control. In others, intelligent controllers such as motion controllers with integrated motor drivers perform the low-level control while the Model 1100 performs the man-machine interface and overall orchestration. In all, the Model 1100 is as "smart" as you need to make it. The ApplicationBuilder and the EASON TECHNOLOGY BASIC can perform some powerful control functions.

Communicating With The Operator

Most applications require some sort of *man-machine* interface. During set-up, it may be necessary to allow a significant number of parameters to be adjusted. During machine operation, it is often desirable to display status information and limit the operator's ability to change crucial process parameters. The Model 1100 can provide this flexibility, and it is especially easy to program into the Model 1100.

The first example program is **NUMBER.BLD**. Load the program into the ApplicationBuilder (if you are not familiar with the ApplicationBuilder, refer to *Chapter ③ ApplicationBuilder*). **NUMBER.BLD** is very simple. It asks for a numeric entry from the operator, and re-displays it on the screen in another location. *Go ahead, try it.*

Notice that the operator entry is performed in a calculator-like fashion. A default value is displayed on screen. The first key that you press clears the data entry area and allows you to edit data with the left and right arrow keys or the insert and delete keys. When you press **Enter**, the data is stored. The PSEUDOCODE that generates this function is **GET NUMBER**. The ApplicationBuilder uses the **CALL NINPUT** BASIC statement to construct this entry. The ApplicationBuilder calls this function to perform data entry.

The number you have entered is printed out on screen in three different character sizes. **PUT NUMBER** places regular size characters on screen. This function is performed by positioning the cursor with the **POS** command and using **PRINT**. **PUT LARGE NUMBER** and **PUT HUGE NUMBER** places large (20 characters by 4 lines) or huge (10 characters by 2 lines) on screen. These PSEUDOCODES are implemented by the **CALL BANNER BASIC** function.

Performing data entry and data display with the ApplicationBuilder is as easy as using a basic word processor. Use **GET NUMBER** to get data and use **PUT NUMBER** or **PUT TEXT** to place information on the screen.

Serial Communications Made Simple

The real power of the Model 1100 is demonstrated when I/O is used. The ApplicationBuilder file **SERIAL.BLD** demonstrates simple serial communications between the Model 1100 and a serial device (in this case, the ApplicationBuilder's Terminal Emulator).

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Load and convert **SERIAL.BLD** into a BASIC file (**F8** function). Load it into the Model 1100. Now, enter the terminal emulator (**Alt** + **M** then type **T**). Press the RUN (**F1**) softkey on the Model 1100. You will be asked a question on your PC's screen. Answer it and press **Enter**. *Watch what happens.*

The ApplicationBuilder uses the **COM: PUT TEXT** Pseudocode to transmit serial data. Actually, **COM: PUT TEXT** is converted into the **PRINT #** BASIC statement to perform serial I/O. Data is gathered into a string variable and output directly to the port in a single instruction. The **COM: INIT** Pseudocode generates a **CONFIG #** BASIC statement to initialize the serial port. The complexities of the **CONFIG** statement are hidden from the programmer with the simplicity of the Pseudocode.

Parallel I/O Made Simple

An example program that sequences I/O bits one at a time is on the ApplicationBuilder diskette: **IO.BLD**. Try loading it and running it. This program describes itself with on-screen messages.

If you thought Serial I/O was easy, wait until you take a look at Parallel I/O. The Model 1100 has 24 parallel I/O lines built into it. The ApplicationBuilder has a host of I/O pseudocodes. To look at them, press **F5** then press the **I** key. This will display a list of available I/O Pseudocodes.

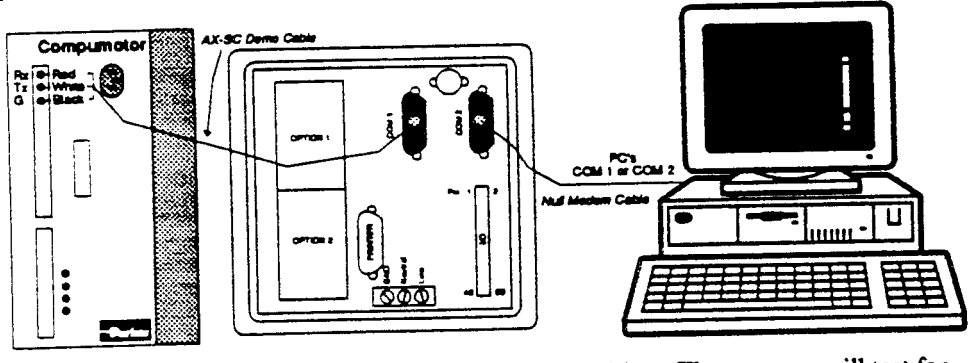
Parker Compumotor AX/SX Demo Program

This program demonstrates the Model 1100's capability to control a Parker Compumotor X Series Motor/Driver. This program is on your ApplicationBuilder disk—**PARKER.BLD**. The Model 1100 starts the program at power on and begins communicating with the Compumotor X Series Motor/Driver. It then allows the user to make simple moves, download sequences, and scale units. This program is a good starting place for understanding how to communicate with Compumotor X Series Motor/Drivers.

• Installation

Connect the Model 1100 to the PC and the Model 1100 to the drive as shown. Model 1100 COM2 connects to the PC's COM1 or COM2 port. This connection must be made with the supplied NULL MODEM cable. The Model 1100's COM1 port connects to the indexer's serial communication interface. You will need a 3-wire communications cable to connect your indexer to the Model 1100 (this cable, part number AX-SC, can be purchased from Eason Technology).

RED is the indexer's RX
WHITE is the indexer's TX
BLACK is the indexer's ground



Turn the power on to the Model 1100 and the indexer/ drive. The program will test for communication's integrity and begin execution. If it is unable to communicate, check the following areas.

① Have you verified that the indexer/drive is in working order?
② Do you have some power-on sequences that automatically start execution on power on?
③ Verify the connections between the indexer/drive and the Model 1100.

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⑥ Model 1100 BASIC Programming Language

This chapter gives an overview of the capabilities of the EASON TECHNOLOGY BASIC. The BASIC language integrated into the Model 1100 has been custom designed and optimized for speed of execution and ease of use with the specific hardware features of the Model 1100. A complete description of the syntax is available in the ***Eason BASIC Programming Guide***. This guide is provided with the Model 1100 and is available from EASON TECHNOLOGY or your EASON TECHNOLOGY DISTRIBUTOR.

Variables, Constants, and Strings

Eason Technology BASIC has a range of numeric and string variable and constant types. Variable names may be up to 8 characters long. The characters allowed in a variable name are letters, numbers, and the decimal point. The first character in the variable name must be a letter. Special type declaration characters are also allowed. The types and their dynamic ranges:

Type	Symbol	Description
Float	! (or none)	Floating point numeric variables and constants. Positive or negative numbers represented in exponential form (similar to scientific notation). A floating-point constant consists of an optionally-signed integer or fixed-point number (the mantissa), followed by the letter E and an optionally signed integer (the exponent). The allowable range for floating-point constants is 0.8388607X10-19 to -0.8388607X1014. For example: 235.988E-7 = 0.0000235988 2359E6 = 2359000000
Integer	%	Integer numeric variables and constants. Whole numbers between -32768 and +32767. They do not contain decimal points.
Long Integer	&	Whole numbers between -2147483648 and +2147483647. They do not contain decimal points.
String	$	String variables and constants. A string can consist of up to 127 alphanumeric characters.

The default type for a numeric variable name is single-precision. You should be very careful when making conversions between integer, single-precision, and double-precision integers variables, rounding errors may occur.

Double-precision integers are useful for moderately fast math functions. Many different types of machine controllers require double precision numeric ranges for their input. Double-precision integers were implemented primarily for this purpose.

Array Variables

An *array* is a group or table of values referenced by the same variable name. Each element in an array is referenced by an *array variable* that is a subscripted integer or an integer expression. The subscript is enclosed within parentheses. An array variable name has as many subscripts as there are dimensions in the array.

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For example, **V(10)** references a value in a one-dimensional array, while **T(1,4)** references a value in a two-dimensional array.

The maximum number of dimensions for an array in EASON TECHNOLOGY BASIC is 16383. Arrays cannot have a size greater than 32767 bytes. e.g. A(8191), b%(16383), and s$(16383) are all valid. A(8192), b%(16384), and s$(16384) are all invalid sizes for arrays. See the ***Eason BASIC Programming Guide*** for a description of memory space requirements.

Multi-dimensional arrays (more than one subscript separated by commas) are useful for storing tabular data. For example, an array dimensioned with DIM A(2,5) could be used to represent a two-row, five-column array such as the following:

In this example, element A(2,3)= 80 and A(1,4)= 40

Column	1	2	3	4	5
Row 1	10	20	30	40	50
Row 2	60	70	80	90	100

Arithmetic Operators

The following are the arithmetic operators recognized by EASON TECHNOLOGY BASIC. They appear in order of precedence.

Operator	Operation
^	Exponentiation
-	Negation
*	Multiplication
/	Floating-point Division
MOD	Modulus
+	Addition
-	Subtraction

Operations within parentheses are performed first. Inside the parentheses, the usual order of precedence is maintained. Two consecutive operators must be separated by parentheses.

Relational Operators

Relational operators let you compare two values. The result of the comparison is either true (-1) or false (0). This result can then be used to make a decision regarding program flow.

Operator	Relation	Example
=	Equality	X = Y
<>	Inequality	X <> Y
<	Less than	X < Y
>	Greater than	X > Y
<=	Less than or equal to	X <= Y
>=	Greater than or equal to	X >= Y

The equal sign is also used to assign a value to a variable.

When arithmetic and relational operators are combined in one expression, the arithmetic is always performed first: **X+Y < (T-1)/Z**

This expression is true if the value of X plus Y is less than the value of T-1 divided by Z.

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Logical Operators

Logical operators perform tests on multiple relations, bit manipulation, or boolean operations. The logical operator returns a bit-wise result which is either true (not zero) or false (zero). In an expression, logical operations are performed after arithmetic and relational operations. The following table lists the available logical operators.

Operator	Operation
NOT	Logical negation
AND	Logical AND
OR	Logical OR
XOR	Logical exclusive OR

Just as the relational operators can be used to make decisions regarding program flow, logical operators can connect two or more relations and return a true or false value to be used in a decision. For example:

```
IF D<200 AND F<4 THEN 80
IF I>10 OR K<0 THEN 50
IF NOT P THEN 100
```

It is possible to use logical operators to test bytes for a particular bit pattern. For instance, the AND operator may be used to mask all but one of the bits of a status byte at a machine I/O port. The OR operator may be used to merge two bytes to create a particular binary value. The following examples demonstrate how the logical operators work:

Example	Explanation
63 AND 16=16	63=binary 111111 and 16=binary 10000, so 63 AND 16=16
10 OR 10=10	10=binary 1010, so 1010 OR 1010=1010(10)
NOT X = -(X+1)	The two's complement of any integer is the bit complement plus one.

Functional Operators

A function is used in an expression to call a predetermined operation that is to be performed on an operand. BASIC has intrinsic functions that reside in the system, such as **SQR** (square root) or **SIN** (sine).

BASIC also allows user-defined functions written by the programmer. See the **DEF FN** statement in the *Eason BASIC Programming Guide*.

The **CALL** instruction allows access to Model 1100 machine specific features such as special screen functions or option board functions. The **CALL** instruction may have optional parameters associated with it. Refer to the **CALL** instruction in the *Eason BASIC Programming Guide.*

String Operators

To compare strings, use the same relational operators used with numbers:

Operator	Meaning
=	Equal to
<>	Unequal
<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to

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The BASIC Interpreter compares strings by taking one character at a time from each string and comparing their ASCII codes. If the ASCII codes in each string are the same, the strings are equal. If the ASCII codes differ, the lower code number will precede the higher code. If the interpreter reaches the end of one string during string comparison, the shorter string is said to be smaller, providing that both strings are the same up to that point. Leading and trailing blanks are significant.

Example

```
"AA"          <    "AB"
"FILENAME"    =    "FILENAME"
"SMYTH"       <    "SMYTHE"
B$            <    "9/12/78" where B$ = "8/12/78"
```

String comparisons can also be used to test string values or to alphabetize strings. All string constants used in comparison expressions must be enclosed in quotation marks.

Strings can be concatenated by using the plus (+) sign. For example:

```
10 A$="FILE":B$="NAME"
20 PRINT A$+B$
30 PRINT "NEW " + A$+B$
RUN
FILENAME
NEW FILENAME
```

• EASON BASIC Statements, Commands, and Functions

The following is an alphabetized list of statements, commands, and functions available in EASON TECHNOLOGY BASIC. The ***Eason BASIC Programming Guide*** contains a detailed description of the each of these commands. Eason Technology constantly adds new capability to the Model 1100. Please contact the factory or your Eason Technology Distributor for the latest copy of the ***Eason BASIC Programming Guide***.

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ABS	Absolute value
ASC	ASCII to number
ATN	Arctangent
AUTO	Auto line number
BIN	Binary to decimal
BIN$	Decimal to binary
CALL	Model 1000 special function
CALL BACKLIGHT	Control LCD backlight
CALL BANNER	Print large characters
CALL BOX	Graphics box draw function
CALL CLRSTK	Clear the BASIC stack
CALL COMLNK	Enable COM port 'pass through'
CALL CURSOR	Turn cursor on/off
CALL GCLS	Clear graphics screen
CALL GETIMAGE	Store graphic image in memory
CALL HELP	Display text with help text
CALL INVERTIO	Invert I/O bits
CALL IOBANK	Specifies active I/O Bank
CALL LINE	Draw graphics line
CALL LOWBITS	I/O interrupt control
CALL NFORMAT	Formatted numeric string conversion
CALL NINPUT	Formatted numeric entry
CALL NSETUP	Formatted numeric setup
CALL NKEY	Formatted numeric input
CALL POINT	Return color of graphics point
CALL PUTIMAGE	Display graphic image from memory
CALL RDNVOLS	Read string data from storage array
CALL READMS	Read millisecond timer
CALL SCANKEY	Scan the keyboard return keycode
CALL SET	Draw graphics pixel
CALL SETNVOLS	Sets nonvolatile string register size
CALL SINPUT	Perform formatted string input
CALL TERM	Enable dumb terminal functionality
CALL WRNVOLS	Write string data into storage array
CHR$	Number to ASCII
CLEAR	Clear variables
CLS	Clear screen
COM(n)	Communications trapping
CONFIG	Communications settings
CONT	Continue
COS	Cosine
CSRCOL	Cursor row
CSRROW	Cursor column
DATA	Data storage
DEF FN	Define function
DELAY	Millisecond delay
DELETE	Delete program lines
DIM	Dimension array
EDIT	Edit program lines
END	End of program
ERASE	Erase arrays
ERL	Line number with an error
ERR	Error code
ERROR	Simulate error
EXP	Exponentiate
FIX	Truncate to whole number
FOR...NEXT	FOR-NEXT loops
FRE	Free Space
GOSUB	Subroutine call
GOTO	Jump to line number
HEX	Hexadecimal to decimal
HEX$	Decimal to hexidecimal
IF	Conditional Statement
INKEY	Read keyboard (returns number)
INKEY$	Read keyboard (returns string)
INP	Input from 24-bit I/O
INPUT	Get user input
INPUT#	Input from comm port
INPUT$	String input
INSTR	Search for string
INT	Truncate to whole number
IO24	Specify an I/O bit pattern to trap
KEY	Function key statements
KEY(n)	Function key interrupts
LABEL	Line label
LEFT$	Left characters of a string
LEN	Length of string
LINE INPUT	Input until Enter
LINE INPUT #	Line input from comm port
LIST	Display lines on screen
LLIST	Print lines
LOC	Get number of bytes in COM buffer
LOG	Natural log
LOCK	Secure program from edit, view
LPRINT	Write to printer
LPRINT USING	Formatted LPRINT
MID$	Substring operations
NEW	Clear program
OCT	Octal to decimal
OCT$	Decimal to octal
ON COM(n)	Interrupt on comm port
ON IO24	Interrupt on I/O bit pattern
ON KEY(n)	Interrupt on function key
ON TIMER(n)	Interrupt on timer
ON ERROR GOTO	Interrupt on error
ON...GOSUB	GOSUB to list of line numbers
ON...GOTO	GOTO list of line numbers
OUT	Output to 24-bit I/O
OUT XOR	Logical exclusive OR to 24-bit I/O
OUT AND	Logical AND to 24-bit I/O
OUT MAP	Set/clear bits on 24-bit I/O
OUT OR	Logical OR to 24-bit I/O
POS	Position Cursor
POWER RESUME	Auto startup
PRINT	Write to display
PRINT USING	Formatted PRINT
PRINT #	Write to comm port
PRINT # USING	Formatted PRINT #
PRN	Enable/disable/redirect printer port
READ	Read data
REM	Comment
REMOTE	Host computer control
RENUM	Update line numbers
REPEAT...UNTIL	REPEAT...UNTIL loops
RESTORE	Re-read data statements
RESUME	Continue after error
RETURN	Exit GOSUB
RIGHT$	Substring operations
RND	Random number
RS422	RS422 port control
RUN	Start program
SGN	Get sign of number
SIN	Sine function
SPACE$	Generate spaces
SQR	Square root
STOP	Halt program
STR$	Convert to string
STRING$	Multiple copies
TAB	Tab spaces
TAN	Tangent
TIME	Internal timer
TIME$	Set/retrieve time
TIMER	Initialize timer interrupt
TRACE	Trace ON/OFF
VAL	String to number
VER	Report software version
WHILE...WEND	WHILE-WEND loops

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⑦ Model 1100 Option Modules

Counter Interface

The Eason Technology Model 1100 counter option (option C02) allows the Model 1100 to count quadrature counter inputs, up/down pulses or count/direction pulses at clock rates up to 1.0 Mhz. The C02 option provides two counters. Up to 32 bits of position information can be gathered and used by BASIC program statements. The power of the counter option is supported by built-in BASIC functions in the Model 1100. Two counter options can be installed in a Model 1100, thereby allowing up to four high-speed counters to be integrated into the unit.

Programming support for the counter option is fully provided with built-in BASIC commands that simplify I/O initialization. The ApplicationBuilder also provides the direct support for the counter options. Simply press **F5** and type **O** (OPTION). Several commands are available that read and initialize the counter options without the user having to know the actual BASIC syntax. Refer to the ***Eason BASIC Programming Guide*** for a detailed description of the available commands. *Chapter ⑤ Model 1100 BASIC Programming Language* has a brief description of the commands that support the counter options.

Each channel can count differential A and B quadrature inputs and sense a differential Z channel (marker channel) input. All inputs are received with 26LS32 differential line receivers, and optically isolated. For non-differential output encoders, a reference voltage is provided that allows the unused differential inputs to be terminated.

When configured as an up/down pulse counter, transitions on the A input will cause the counter to count *UP*, while transitions on the B input will cause the counter to count *DOWN*. The Z input can be configured to reset or gate the counter.

The Count/Direction mode allows the counter option to monitor many process and motion control devices. The transitions on the A input will cause the counter to count up when the B input is *LOW*, down when the B input is *HIGH*.

A +5V power output is supplied to provide power (up to 200 MA total) for encoders. The quadrature inputs may also be configured as an up/down counter or step and direction inputs under software control.

• Quadrature Application

The C02 Counter Interface Option for the Model 1100 is designed to allow easy hook-up with conventional rotary and linear encoders, or resolvers that have quadrature outputs. The C02 can also be configured to accept count inputs up to 1.0 Mhz.

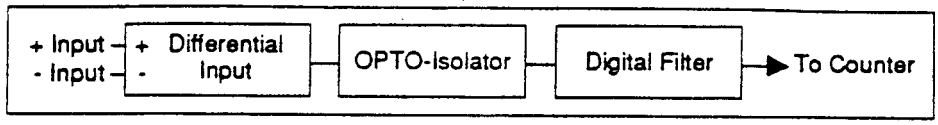
The C02 option is designed to provide the optimum performance when connected to a differential output encoder. The following figure is a block diagram of a single channel input—all inputs are identical. The inputs are resistor-terminated and optically isolated, capable of receiving 1.0 Mhz quadrature inputs. These inputs can also work with a single-ended encoder, with somewhat reduced bandwidth (typically 500KHz).

After being differentially received, the signals are optically-isolated, and transmitted to a programmable digital filter system. The digital filter provides extremely sharp cut-off frequencies that eliminate unwanted noise or glitches. The frequency is set in the

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default condition to allow 1.0 Mhz to pass. By issuing **WRITECNT** commands, the frequency can be changed, thereby reducing the allowable pass frequency, and increasing the ability to reject noise or glitches.

Encoder Input Channel Block Diagram



Pin-out connections for the C02 are shown in the following tables. *Notice the '+' and '-' inputs.* If your encoder has differential outputs, connect each corresponding + *output* to the + *input* and the - *output* to the - *input* for each output signal. For example, if your encoder has the following outputs, connect them as follows.

Encoder Output	→	Counter Input Connection
A+		A+
A-		A-
B+		B+
B-		B-
Z+ (or M+)		Z+
Z- (or M-)		Z-
POWER		+5V
VREF (unconnected)		
GROUND		GND
SHIELD		SHIELD

If your encoder has single-ended outputs, connect your encoder as follows.

Encoder Output	→	Counter Input Connection
A		A+
		A- jumper to VREF
B		B+
		B- jumper to VREF
Z (or M)		Z+
		Z- jumper to VREF
POWER		+5V
		VREF
GROUND		GROUND
SHIELD		SHIELD

Depending upon the type of encoder that you have, you may have to invert the sense of the Z or MARKER channel. C02 expects to have a Z input that goes **LOW** when true. If your encoder outputs a high pulse when the marker is encountered, swap the connections to the Z+ and Z- inputs. This applies to both differential and single-ended encoders. Set up your Z input as follows:

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Low True Marker Output From Encoder (Differential Output)

Encoder Output	→	Counter Input Connection
Z+		Z-
Z-		Z+

High True Marker Output From Encoder (Differential Output)

Encoder Output	→	Counter Input Connection
Z+		Z-
Z-		Z+

Low True Marker Output From Encoder (Single-Ended Output)

Encoder Output	→	Counter Input Connection
Z		Z+
		Z- jumper to VREF

High True Marker Output From Encoder (Single-Ended Output)

Encoder Output	→	Counter Input Connection
		Z+
		Z- jumper to VREF

• Specifications

A, B INPUTS: 1.0 Mhz quadrature input A-B quadrature, up/down, or step and direction configurable

Z INPUT: Marker channel

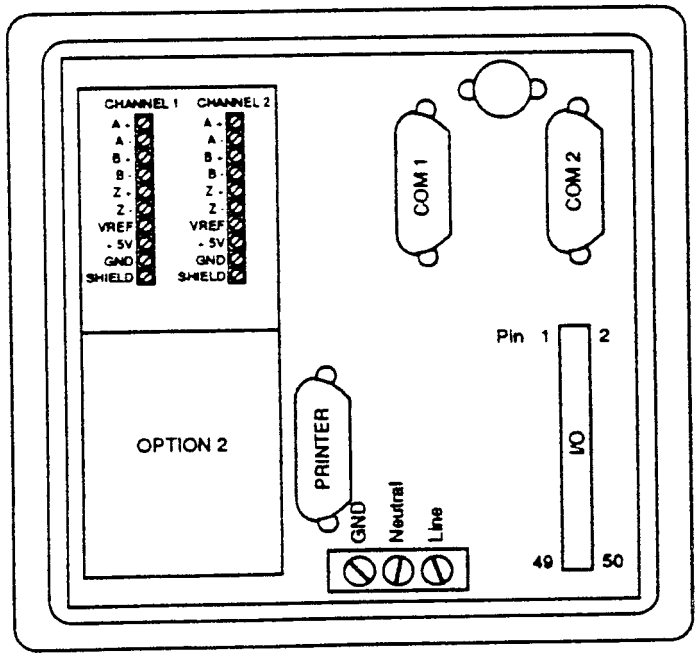
ALL INPUTS: ±25V input MAX (+7V input MAX recommended)
Logic low: (other channel or VREF) - 0.2V
Logic high: (other channel or VREF) + 0.2V

POWER OUTPUT: +5V, +/-5%, 300 MA MAX

VREF OUTPUT: +1.5V +/- 5% 10 MA MAX

Option C02: Connections

Model 1100 Option C02



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Analog Interface

The Eason Technology Analog Interfaces allow the Model 1100 to monitor and stimulate devices that generate or receive analog voltages. Two analog interfaces are available:

Option	Capabilities
A02	2 channel analog output, 12-bit D/A
A03	Combination 8-channel differential analog input; 2-channel analog output; 12-bit A/D and D/A

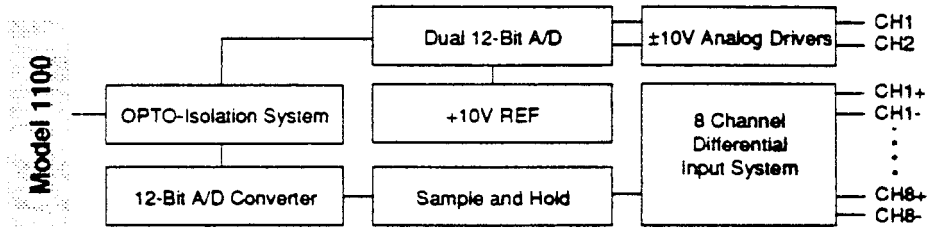
The figure below shows a complete A03 Analog Interface Option and all of its major functional blocks. The A02 option deletes the A/D, sample and hold, and the 8-channel differential input system.

Two analog options can be installed in the Model 1100. This allows a capability of up to 16 analog inputs, and/or 4 analog outputs.

The Analog Interface is isolated from the Model 1100 by an integral opto-isolation system. This scheme drastically eliminates problems associated with ground loops and noise commonly associated with A/D and D/A systems. Analog inputs are input current limited to reduce the susceptibility of damage from ESD (electrostatic discharge), and applied voltage when the Model 1100's power is off. The input and outputs are preset to generate and accept ±10V signals.

Programming support for the analog options is fully provided with built-in BASIC commands that simplify I/O initialization. The ApplicationBuilder also has direct support for the analog options. Simply press **F5** and type **O** (OPTION). Several commands are available that read A/D's and write to D/A's without the user having to know the actual BASIC syntax. Refer to the ***Eason BASIC Programming Guide*** for a detailed description of the available commands. *Chapter 6 Model 1100 BASIC Programming Language* has a brief description of the commands that support the analog options.

A03 Block Diagram

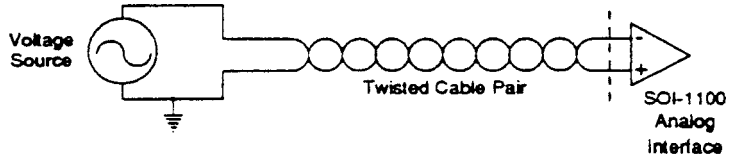


Inputs and outputs have the following numeric ranges.

Voltage	Count
+10V	2047
0	0
-10V	-2048

The A03 A/D input voltage is differentially received. This allows signals to be read in the presence of a high ambient noise level with great accuracy. The A/D will only read the DIFFERENCE between the + *inputs* and - *inputs*. Hence, noise that is present on both the + *inputs* and - *inputs* will not be received and converted. Many outputs do not have a differential output (rather they are "single-ended"), so the use of the + *inputs* and - *inputs* may seem complex. When receiving single-ended signals, receive them with twisted pair wires (shown terminated in the figure below). This will allow the differential input to reject ambient noise that the connecting wire is subjected to.

Single-Ended Analog Connection



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The built-in sample and hold allows the converter to read signals that may be varying. A/D's require the input voltage to be held steady for the complete conversion time (30 microseconds) to minimize the error. A sample and hold reduces the required steady input voltage time to about 1 microsecond.

• Specifications

INPUTS:

- ±10V full scale—4.88 mV / count *(can be factory adjusted for lower voltages)*
- ±18V maximum applied voltage power applied
- ±10V maximum applied voltage power off isolation ground referenced with other inputs and outputs

OUTPUTS:

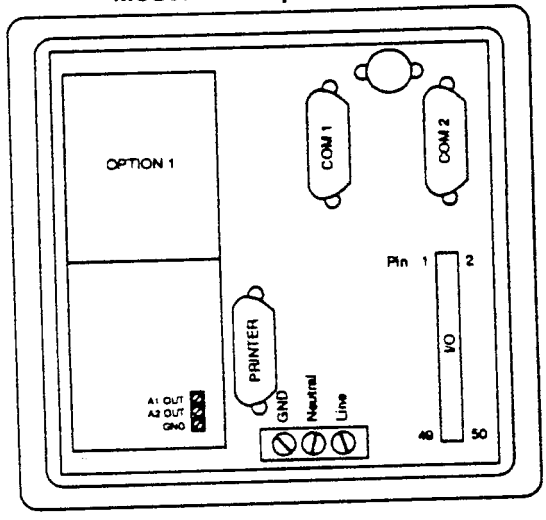
- ±10V—4.88 mV/count
- 35 mA out (short-circuit protected)
- Isolation ground referenced with other inputs and outputs

EXECUTION TIME:

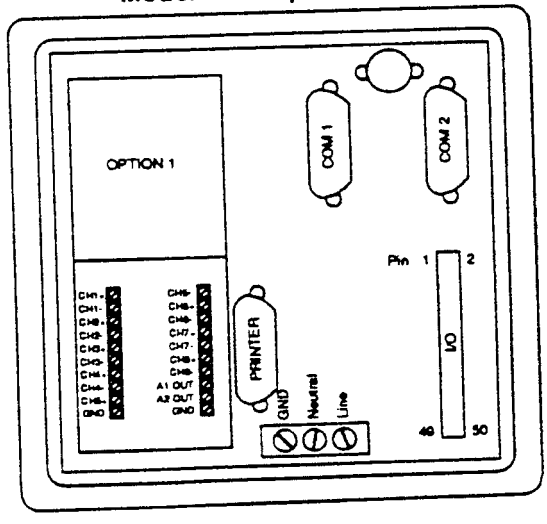
- CALL READAD(n,advalue)—5 milliseconds
- CALL WRITEAD(n,advalue)—5 milliseconds

Model 1100 Options A02, A03: Connections

Model 1100 Option A02



Model 1100 Option A03



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Digital I/O Interface

The Eason Technology Digital I/O interface option (04B) allows an additional 48 I/O points to be added to the 24 I/O that comes standard in the Model 1100. The specifications for the I/O on the D48 option are identical to the standard internal 24 I/O (see page 7).

The I/O on the D4B option is arranged in banks of 24 points. The internal I/O is always designated bank O. If you have one D48 installed in your Model 1100, you have access to banks 1 and 2. If you install 2 D48's in your unit, you also have access to banks 3 and 4.

I/O Bank	Option(s) Needed	I/O Points Available
0	None	0-23
1	D48	24-47
2	D48	48-71
3	2 D48's	72-95
4	2 D48's	96-119

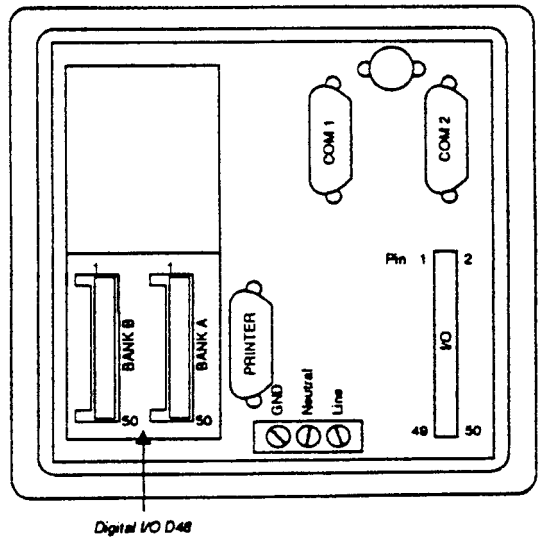
Note: The only idiosyncrasy that occurs is when a D48 is used in the same Model 1100 as a C02. If you have a unit configured in this way, the D48 I/O will be in banks 3 and 4, instead of banks 1 and 2.

All I/O commands that work with the internal 24 I/O (with the exception of I/O interrupts) operate on the currently active I/O bank. The active I/O bank is specified with the CALL IOBANK Basic command. Please see the ***Eason BASIC Programming Guide*** for more information on this command. Pinouts for each I/O bank are provided in the following table:

Pin	Function	Pin	Function
49	+5VDC Out*	23	I/O 12
47	I/O 0	21	I/O 13
45	I/O 1	19	I/O 14
43	I/O 2	17	I/O 15
41	I/O 3	15	I/O 16
39	I/O 4	13	I/O 17
37	I/O 5	11	I/O 18
35	I/O 6	9	I/O 19
33	I/O 7	7	I/O 20
31	I/O 8	5	I/O 21
29	I/O 9	3	I/O 22
27	I/O 10	1	I/O 23
25	I/O 11		

*100 mA Load Maximum

All even-numbered pins are logic ground



Digital I/O D48

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⑧ Memory Options

64K Memory Option (M02)

The M02 option adds 32K bytes of storage to the Model 1100's battery-backed up memory to bring the total memory up to 64K bytes. Larger programs and more data can be stored in this additional memory. In addition, nonvolatile storage registers can also be used when this option is added. 512 numeric registers, floating point, fixed precision, and integers (in any combination), as well as 16 string registers (128 bytes each) are available for storing seldom-changed program constants and data. Power failure, program loading, variable clearing, or GOSUB stack clearing will not affect the data stored in these registers.

Eason Technology has recently added a larger, more flexible nonvolatile string register space to the 16 128-byte strings mentioned above. This allows you to use 4096 bytes of previously unavailable storage space for nonvolatile string registers. You can also partition this memory into any size registers that you would like. This means that you can store 490 10-character strings, 81 50-character strings, 4096 1-character strings, etc. See the ***Eason BASIC Programming Guide*** for information on using the CALL SETNVOLS statement to set the register size for this nonvolatile storage area. CALL WRNVOLS and CALL RDNVOLS are used to set and read these registers, respectively. These registers are not available if you are using obsolete features like the event manager or yet-to-be released features like the Background PLC.

You can tell if the M02 option has been installed in your unit by pressing the HELP key when the Model 1100 is not running a program (in Command mode). Press the **SYS** key and the amount of memory installed will be displayed on the screen. It should read 64K. The amount of free memory will vary depending upon data and programs loaded. With no data or no programs loaded, the free memory should be 52735 bytes.

The M02 option adds access to a pre-dimensioned array called NVOL. NVOL can contain up to 512 floating point, short integer or long integer variables. In addition, the M02 option adds access to a pre-dimensioned string array called NVOL$. NVOL$ allows access of up to sixteen 128-byte string array variables.

128K Memory Option (M03)

The M03 option adds an additional 96K bytes of storage to the MODEL 1100's battery-backed up memory to bring the total memory up to 128K bytes. This option adds the M02 option (refer to Chapter ⑥ Model 1100 BASIC Programming Language), which increases the program storage area and adds its NVOL variable. The M03 option goes beyond the M02 option by adding an additional 64K bytes of Nonvolatile RAM memory to the Model 1100.

Before being used, this memory must first be initialized. Out of the 64K of memory in M03, 128 bytes are used for internal bookkeeping. The rest of the memory can be partitioned into storage space for non-volatile strings and numeric registers according to your needs. The CALL SETNVOLS(n) command allows you to set this partition, thereby allow the maximum memory flexibility in your application. You can configure up to 16864 numeric registers and 16 string registers, or 512 numeric registers and 527

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string registers. By default, the M03 contains 256 strings and 8160 numeric registers, which can be modified using the CALL SETNVOLS statement.

The CALL RDNVOL statement reads data from the nonvolatile registers. This works for memory that is placed in both the M02 and M03. M02 contains 16 strings and 512 numeric registers, while the allocation of the memory in the M03 is dependent upon the CALL SETNVOLS statement.

The CALL WRNVOLS statement writes data to the nonvolatile registers. There are four distinct commands, each allowing access to its own data type.

The registers accessed through the CALL SETNVOLS, CALL WRNVOLS, and CALL RDNVOLS statements described above for the M02 are also available with the M03 option.

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⑨ Hardware Reference

Electrical/Mechanical Specifications

Memory:
- ❑ 32K bytes battery-backed RAM standard, up to 128K bytes optional

Communications:
- ❑ Two RS-232C / RS-422C / RS485 ports, XON/XOFF handshaking, optically isolated

I/O:
- ❑ 24-bit parallel I/O; optically isolated
- ❑ -0.5 to +30V input, pulled up to +5V by 22K resistor
- ❑ Open-collector output, sink 30 mA
- ❑ Industry standard PB24 compatible

Printer Port:
- ❑ Parallel, IBM-PC compatible, optically isolated

Keyboard Connector:
- ❑ IBM-PC XT compatible

Display:
- ❑ High-contrast, Super-Twist LCD (liquid crystal display)

Size:
- 8 lines by 40 characters

Characters:
- 5 x 8 dot matrix; 0.095 x .15 (2.40mm x 3.84mm)

Dot Size:
- 0.019" x 0.019" (0.48mm x 0.48mm)

Backlight:
- Electro-luminescent panel (*auto-shutdown feature*)
- Graphics capability

Keyboard:
- ❑ 30 large, full-travel keys, rubber elastomer type

Help Function:
- Context sensitive HELP key available

Functions:
- 9 programmable function keys
- Cursor, insert, delete, alpha, and print keys

Power:
- ❑ 95VAC - 145VAC, 50 - 60 Hz (10W max) *240VAC available*

Weight:
- ❑ 5.73 lbs (2.60 Kg)

Environment:
- ❑ +32°F to +122°F (0°C to +50°C)
- ❑ 5% to 95% relative humidity (non-condensing)
- ❑ Designed to NEMA 4 (water-tight) and NEMA 12 (dust-tight) specifications.

Mounting:
- ❑ Panel mount 8.5" x 8.5" by 3.15" deep
- ❑ Rugged, cast front housing

Physical size:
- ❑ 8.5"H X 8.5"W X 3.15"D

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Connector Pin-Out Specifications

I/O Connector

Pin	Function
49	+5V *
47	I/O 0
45	I/O 1
43	I/O 2
41	I/O 3
39	I/O 4
37	I/O 5
35	I/O 6
33	I/O 7
31	I/O 8
29	I/O 9
27	I/O 10
25	I/O 11
23	I/O 12
21	I/O 13
19	I/O 14
17	I/O 15
15	I/O 16
13	I/O 17
11	I/O 18
9	I/O 19
7	I/O 20
5	I/O 21
3	I/O 22
1	I/O 23

* (100 MA Load Maximum)
All Even-Numbered Pins Are Connected To Logic Ground

Printer Connector

Pin	Connection
1	STROBE
2	DATA BIT 0
3	DATA BIT 1
4	DATA BIT 2
5	DATA BIT 3
6	DATA BIT 4
7	DATA BIT 5
8	DATA BIT 6
9	DATA BIT 7
10	ACKNOWLEDGE -
11	BUSY
12	PE
13	SELECT
14	AUTOFEED -
15	ERROR -
16	INITIALIZE -
17	SELECT IN -
18 thru 25	SIGNAL GROUND

IBM Keyboard Connector

Pin	Connection
1	KEYBOARD CLOCK
2	KEYBOARD DATA
3	KEYBOARD RESET
4	+5V
5	GROUND

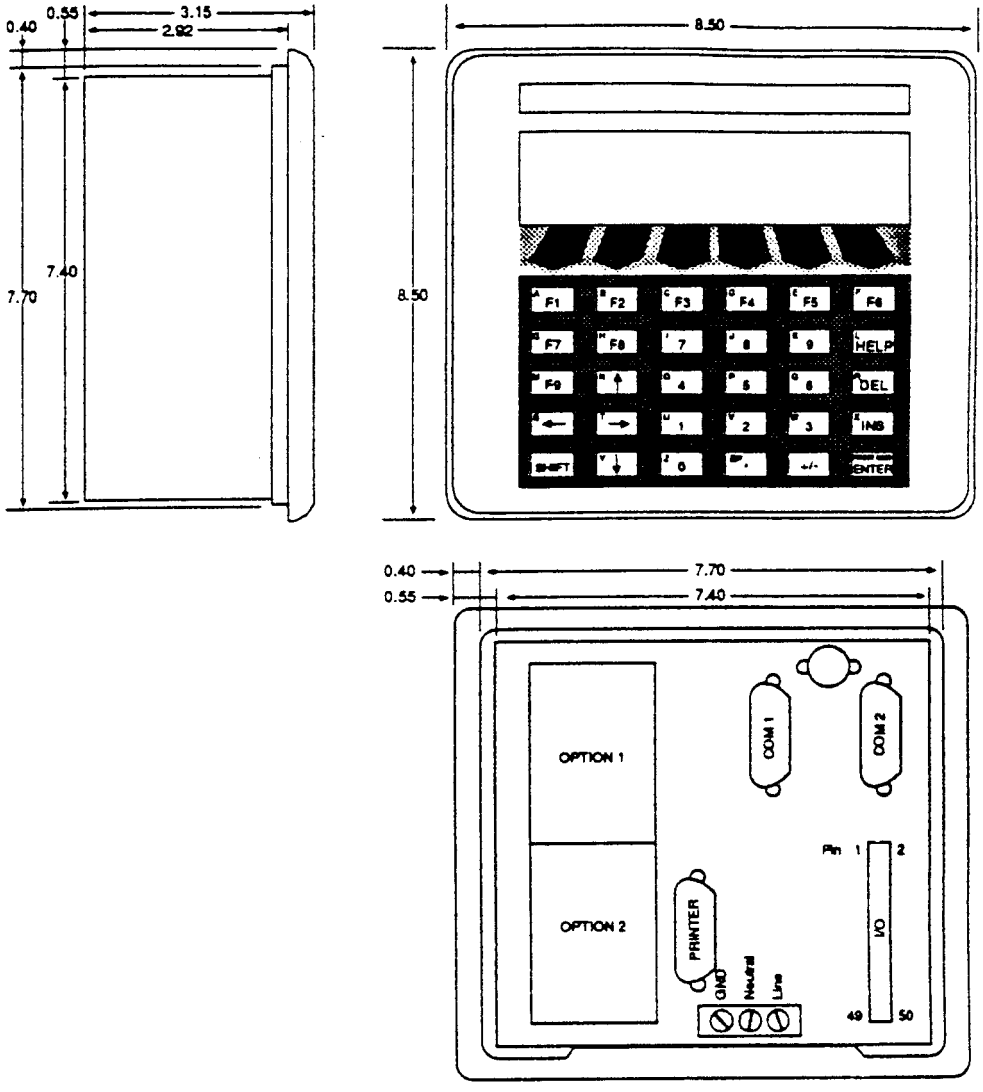
COM1 & COM2 Pin-Outs

Pin	Connection
1	SHIELD
2	RS232 TRANSMIT (OUTPUT)
3	RS232 RECEIVE (INPUT)
7	SIGNAL GROUND
12	RS422 TRANSMIT + (OUTPUT)
13	RS422 TRANSMIT - (OUTPUT)
14	RS422 RECEIVE + (INPUT)
15	RS422 RECEIVE - (INPUT)

All Other Pins Are Not Connected

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Physical Dimensions



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Appendices

Changing The Model 1000 Series' Battery

Follow these steps to change the battery for the battery-backed RAM in a 1000 Series Controller:

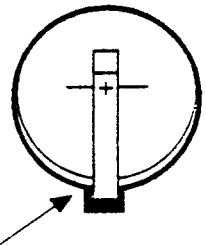
1. Save the contents of the program memory. Use a PC and the ApplicationBuilder program to do this. Changing the battery may reset the system if you wait too long to change it or don't change it quickly, thereby erasing all memory contents.
2. Remove power connections to the unit.

Warning

Disconnect power from the Model 1100 or 1000 before attempting to change the battery hazardous voltages exist inside the unit with power connected. Personal injury or death may result if the power is not disconnected.

3. Carefully unscrew the top two screws and each of the screws on the side of the unit.
4. Lay the unit face down on a soft, clean surface.
5. Remove the rear cover by carefully lifting it off the unit.
6. Position the cover to the side of the unit being careful not to stress the internal cables.
7. To remove the old battery, insert a small screwdriver between the edge of the battery and the battery holder near the battery clip (see diagram). Push gently and the battery should slide out.

For replacement, use Panasonic Battery BR2330 or equivalent



Insert screwdriver here

8. Before installing the new battery, press down on the battery clip to make sure that there will be good retention force when the battery is in place. Also make sure the all contact surfaces are clean. As noted on the battery clip, make sure that the positive (+) side of the battery is up. Slide the battery under the clip and into the battery holder. Make sure that the battery is held firmly in place.

Warning

Improper orientation of battery will not allow the battery-backed RAM to function and your memory will cease to be nonvolatile. However, this will not damage the battery of the controller, so just turn the battery over and continue with the installation procedure.

9. Replace cover and cover screws.
10. Reconnect power to the unit.
11. If you notice any problems that cannot be explained by the battery being installed upside down (no nonvolatile memory), disconnect power and connect an IBM KEYBOARD to the KEYBOARD connector. Make sure that the keyboard is a type that is compatible with an IBM PC XT (not AT).
12. Reconnect power to the unit. Press Ctrl, Alt, and Del keys on the IBM KEYBOARD simultaneously. This will reset the unit and normal operation will begin. Call Eason Technology if any problems persist.

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Generating Customer Program ROMs

Batteries wear out. The batteries used for the battery-backed RAM in Eason Technology products are good for 5-7 years of use. Once they wear out, you have roughly 90 minutes to change the battery without losing the contents of your nonvolatile memory. For most users, this is acceptable. For those who don't like battery-backed RAM, Eason Technology has developed a means for using customer-generated programs stored in EPROM. It is a simple process for anyone with an EPROM burner.

You must use a 27C010 150 nanosecond 128K x 8 EPROM. Eason Technology uses Intel Part # 27C010-150VIO in its products.

Your ASCII BASIC file can be burned into the ROM with only minor differences from the program you would normally store in the battery-backed RAM in the standard configuration. The only change is that your program must be both preceded and followed by the text: Eason Technology (followed by a carriage return). Please refer to the simple example below.

```
Eason Technology
10 CALL GCLS() :CLS
20 POS 11,1:PRINT "E   A   S   O   N";
30 POS 1,5:PRINT "T   E   C   H   N   O   L   O   G   Y";
40 POWER RESUME ON
50 DELAY 500
60 CLS
70 END
Eason Technology
```

Once you have your ASCII file saved, you are now ready to begin the burn process. You need to use the Binary Load method to load the file into your ROM programmer. Once this is accomplished, burn the program into the EPROM with a 0 (zero) offset. That's all it takes!

Once your EPROM is ready, you need to install it into your 1000 Series product. It goes in ROM socket U9 in the Model 1100 and in ROM socket U7 in the Model 1000. The installation instructions for the Model 1100 are attached. The instructions for the Model 1000 are similar. If you have any questions or problems, contact Eason Technology at (707) 433-2854.

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Installing Customer Program ROMS

Follow these steps to change a customer program ROM in the MODEL 1100:

1. Remove power connections to the unit.

Warning

Disconnect power from the Model 1100 before attempting to replace ROMs. Hazardous voltages exist inside the unit if the power is not disconnected.

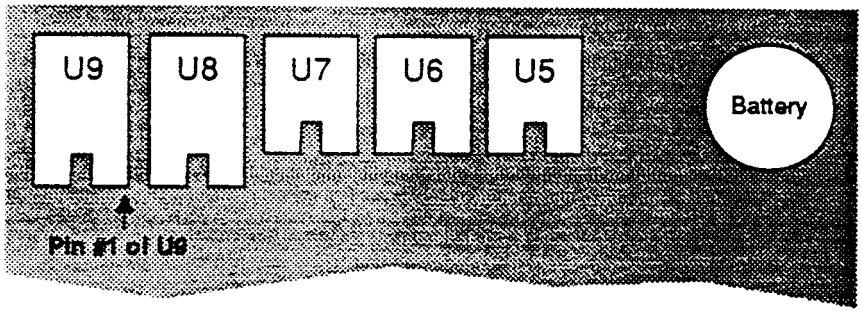
2. Carefully unscrew the top two screws and each of the screws on the side of the unit.
3. Lay the unit face down on a soft, clean surface.
4. Remove the rear cover by carefully lifting it off the unit.
5. Position the cover to the side of the unit, being careful not to stress the internal cables.
6. Remove any ROM that may be in ROM socket U9. ROM socket U9 is located at the top the main board (top being closest to the display). Note the orientation of PIN 1 on the device.
7. Insert the new ROM in location U9. Be sure that PIN 1 (location on ROM with notch or dot) is facing down (towards the center of the unit). Check carefully for bent or damaged pins.

Warning

Improper orientation of U9 will destroy the ROM and may damage the unit.

8. Replace cover and cover Screws.
9. Connect an IBM KEYBOARD to the KEYBOARD connector. Make sure that the keyboard is a type that is compatible with an IBM PC (not AT) compatible.
10. Re-connect power to the unit. Press the Ctrl, Alt, and Del keys on the IBM keyboard simultaneously. This will reset the unit and normal operation will begin.

Top of Board Inside Unit



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Warranty Information

Congratulations and thank you for purchasing one of Eason Technology's operator interface products. We strive to provide customers with unparalleled service and support. Your feedback and suggestions are crucial to our success.

Please take a few minutes to complete the Warranty and Product Registration Form so that we may better serve your needs. Completing and returning this form within 30 days registers and validates your warranty. Upon receipt of this form, we will ensure that you receive information about product and documentation updates.

Thank you for your response.

THIS EASON TECHNOLOGY, INC. PRODUCT IS WARRANTED AGAINST DEFECTIVE MATERIALS OR WORKMANSHIP FOR A PERIOD OF 365 DAYS FROM THE DATE OF ORIGINAL SHIPMENT.

PRODUCTS COVERED BY THIS WARRANTY WILL BE REPAIRED WITHOUT CHARGE EXCEPT FOR SHIPPING. BEFORE RETURNING PRODUCT FOR WARRANTY SERVICE, CALL OUR CUSTOMER SERVICE DEPARTMENT AT (707) 433-2854 TO OBTAIN AN RMA # (RETURNED MERCHANDISE AUTHORIZATION NUMBER). WHEN RETURNING YOUR EQUIPMENT FOR WARRANTY SERVICE, THE SHIPPING CHARGES MUST BE PREPAID AND THE RMA # MUST BE CLEARLY MARKED ON THE BOX. SEND THE EQUIPMENT TO EASON TECHNOLOGY, INC., 241 B CENTER STREET, HEALDSBURG, CA 95448, ALONG WITH A DESCRIPTION OF THE PROBLEM. WE WILL PAY NORMAL GROUND SHIPPING CHARGES TO SEND THE PRODUCT BACK TO YOU. IF OTHER MEANS OF SHIPPING ARE REQUESTED, YOU WILL BE BILLED AT COST FOR ADDITIONAL SHIPPING FEES.

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RETAIN THIS WARRANTY SHEET FOR YOUR REFERENCE.

Model: _____ Date Purchased: _____

Serial Number: _____ Purchased From: _____

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