

MiniMINC

Book 1: Introduction to MiniMINC

August 1979

This document introduces the MiniMINC computer system, explains its features, and demonstrates its use. *Book 1: Introduction to MiniMINC*, which contains a programming primer, a system error message compendium, and a system glossary, addresses the new user in particular. The glossary and error message compendium will also benefit the experienced user.

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MiniMINC

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FIGURES

PREFACE

This manual contains the following information:

- an overview of the MiniMINC computer system
- instructions for starting and using the system
- instructions for use of the demonstration programs ALPHA, APPROX, CYCLES, LISSJU, PLOT, TRIG, and WINDOW
- a programming primer for computer novices who wish to learn effective program development techniques
- an error message compendium for finding MiniMINC error messages with their descriptions and recommended actions, or references for finding this information in the manuals
- a system glossary for finding definitions of terms used in the MiniMINC manuals

CHAPTER 1

A DESCRIPTION OF MiniMINC

MiniMINC is a general-purpose, desktop computer system. With it you can perform calculations, develop programs, control experiments, monitor laboratory processes, and acquire data. MiniMINC's video graphic terminal displays your data in a manner you select from an assortment of modifiable graph forms.

MiniMINC is designed for convenient operation and installation.

The Equipment	runs on 115V ac or 230V ac in temperatures ranging from 15 C to 32 C (59 F to 90 F) and in a relative humidity of 20% to 80%.
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<i>Unpacking and Installing MiniMINC</i>	tells you how to unpack, install, and test the system in straightforward, nontechnical terms.
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The MiniMINC Manuals	<ul style="list-style-type: none">• describe the system components• teach BASIC programming and MiniMINC system operation• explain MiniMINC's graphic capabilities• explain MiniMINC's serial ASCII, data processing, and program control capabilities• guide you through some helpful troubleshooting procedures
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INTRODUCTION TO MiniMINC

The MINC BASIC programming and command language

uses English-like commands and statements to promote quick comprehension.

The MINC Newsletter

keeps you current with programming hints, new applications, and maintenance bulletins. The MINC Newsletter is issued regularly to all MiniMINC owners.

The MINC Product Services Center

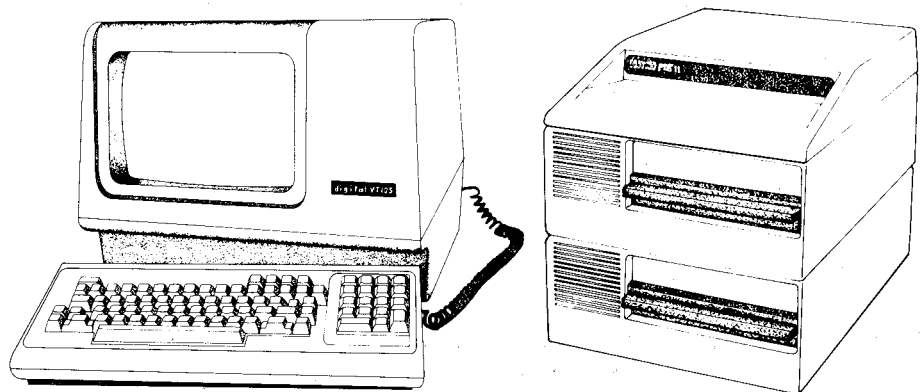
answers your MiniMINC-related questions through its toll-free phone service.

MiniMINC's large memory, graphics capability, and small size qualify it as a versatile desktop computer that's well suited for most computational needs. The system can communicate with external instruments such as plotters (for creating graphic representations on paper), printers (for producing paper copies of alphabetical, numerical, and special character data), and other instruments that conform to the EIA standard RS-232C for serial data transfer (see Chapter 4, Using MiniMINC With Serial ASCII Equipment).

You can interchange data between MiniMINC and another computer system with an optional package called MINC NFT (Network File Transfer). MINC NFT enables MiniMINC to share information and equipment with another Digital computer system when both systems are connected by modems (modulator/demodulator devices used in long distance data transmission), acoustic couplers, or direct cable.

THE MiniMINC EQUIPMENT

The MiniMINC equipment comprises the terminal, the keyboard, and the chassis pictured below.



MR-S-175-79

Figure 1. The MiniMINC Equipment

The Terminal

The MiniMINC terminal is your means of communicating with the system. MiniMINC receives most of its information from the keyboard and displays its queries, messages, and replies on the terminal's screen.

The terminal allows you to select a variety of display modes and character modes to suit your own taste or a certain environment. With the character modes you can display text in normal, bold-face, flashing, underlined, or reverse video characters and can combine these modes in the same display. Screen display modes permit black or white backgrounds, 80- or 132-column widths, and smooth or jumping movement of text lines (scrolling). Your selections of character and display modes remain in effect until you change them explicitly.

Detailed descriptions of available modes exist in *Book 4: MINC Graphic Programming* (see CHAR_MODE and DISPLAY_MODE) and the *MiniMINC Supplement* (see Changing Operating Modes on the MiniMINC Terminal). Figure 2 shows some character mode combinations.

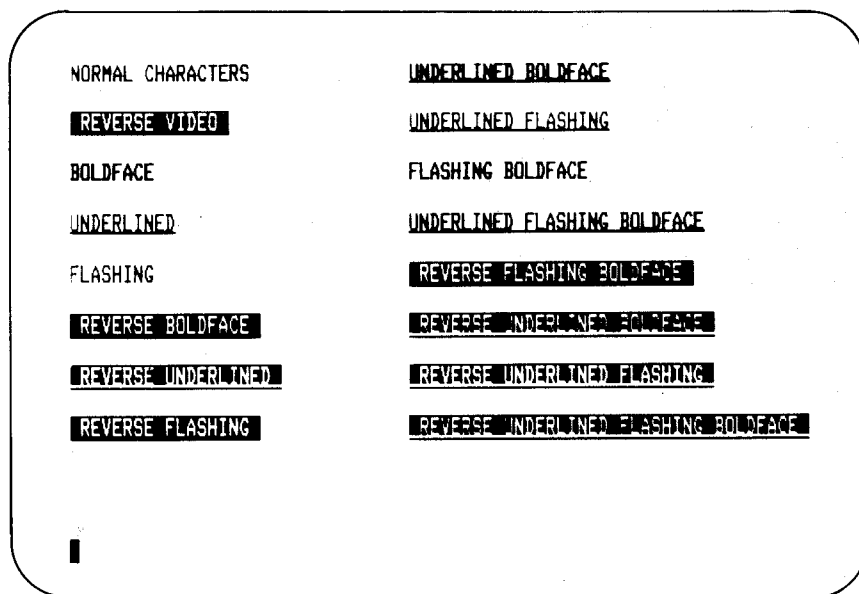


Figure 2. Some MiniMINC Character Modes

MR-S-176-79

Supplied with the MiniMINC are over 30 graphic routines that arrange data in point-plot graphs, bargraphs, and strip charts for dynamic data representation (graphic routines can be used alone or within programs). Most of these routines accept modifications such as shading, an altered shadeline, and double-width characters. The terminal also can simultaneously display two

graphs, decrease or increase the screen area devoted to text, and even find the graph coordinates of a point you select on the screen. Consult *Book 4: MINC Graphic Programming* and the *MiniMINC Supplement* for complete details and instructions on graphic programming. Figures 3 and 4 illustrate three of the many graphic variations possible with MiniMINC.

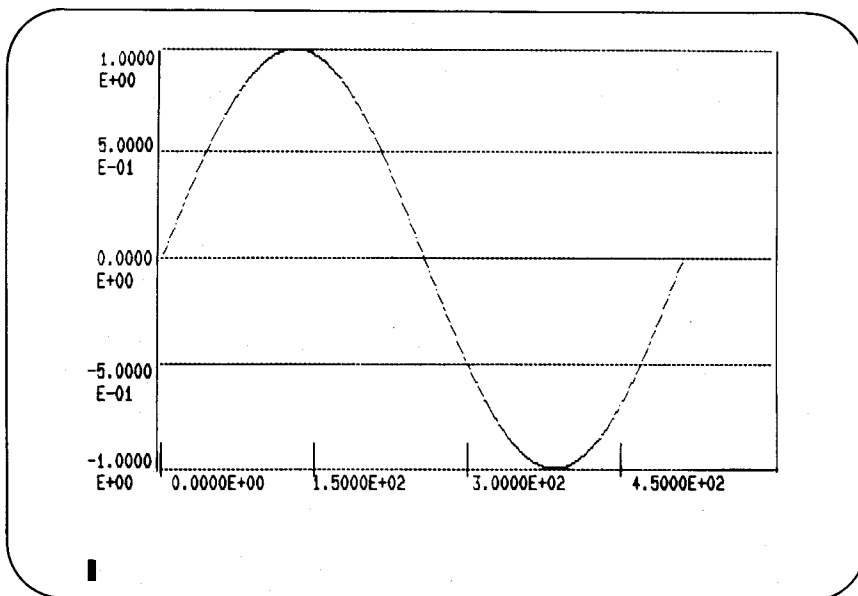


Figure 3. Sample Graph — Sine Wave

MR-S-177-79

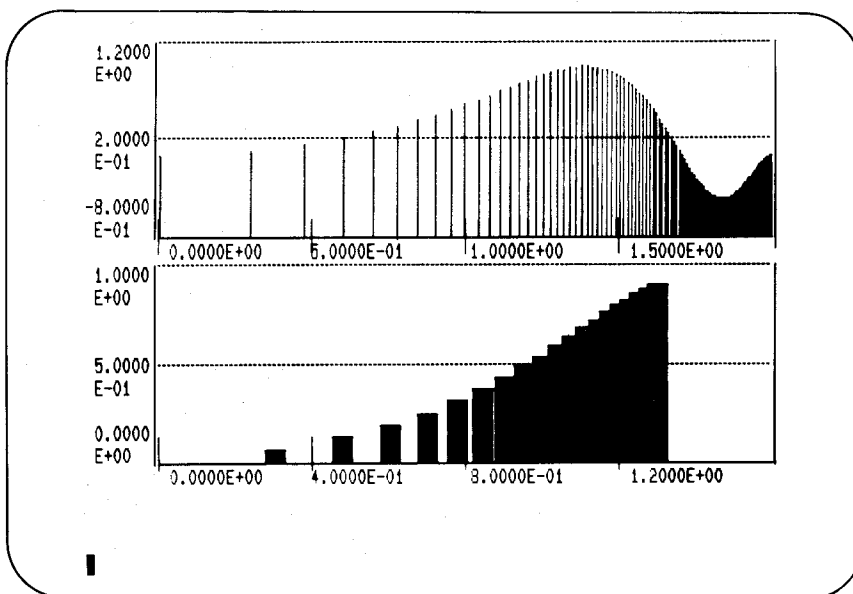


Figure 4. Split Screen with 2 Graphs — Bargraph and Point-plot Graph with Shading

MR-S-178-79

A detachable keyboard with 6 feet (1.8 m) of coiled cord accompanies the terminal (see Figure 1). Designed to resemble a standard typewriter keyboard, this unit also has an 18-key auxiliary keypad situated on its righthand side to facilitate rapid text manipulation (see Chapter 15, *Book 2: MINC Programming Fundamentals* for information on keypad editing). With the movable keyboard, your typing position can vary with your needs. This feature also permits others to view the terminal's screen while you and MiniMINC communicate. Chapter 2 contains an illustration of the keyboard and explains the function of some of its specialized keys.

The Keyboard

A minicomputer and two diskette drive units are combined within a free-standing chassis that attaches to the terminal with a single cable.

The Chassis

The minicomputer stores, retrieves, and processes all MiniMINC instructions and data and regulates devices composing the system.

The chassis' two diskette drive units supply MiniMINC with a large program and data storage capacity. These drives accept one diskette each and retrieve or store information on them when you give the appropriate directive. Diskettes, described in the following section, are interchangeable, thus permitting information storage as extensive as your supply of diskettes.

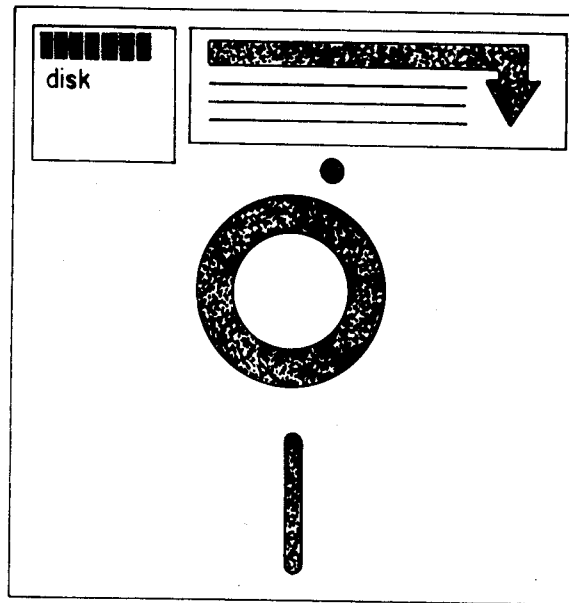
On the back of the chassis are six ports or jacks that can accommodate serial line devices such as printers, graphic plotters, and many other instruments. These ports are referred to as SLU (Serial Line Unit) ports. A serial line transfers data from a sending to a receiving device according to a protocol established by EIA standard RS-232C for serial line data transmission (see Chapter 4 for more information on MiniMINC's serial lines).

A diskette is a thin, flexible, oxide-coated disk similar in size to a 45-rpm phonograph record. A diskette is recorded on one side only and is permanently contained in an 8-inch square envelope.

DISKETTES

A diskette is well suited as a storage and distribution medium. It's inexpensive, compact, and easily transportable via briefcase or manila envelope. Figure 5 shows the upper side of a diskette.

Random-access and *mass-storage* are two terms commonly used to describe the diskette and its drive unit. *Random-access* refers to the drive unit's ability to access data in any order. This form of



MR-S-179-79

Figure 5. A Diskette

data acquisition contrasts with sequential-access devices like magnetic-tape and cassette drives that search for data in one direction only, sometimes winding through an entire tape and back again to find data. *Mass-storage* pertains to the large amounts of data a diskette can hold as contrasted to the computer's memory storage, which is more limited.

Each diskette contains 480 uniform divisions called *blocks*, and each block can hold 512 characters. A block is a standard unit of measure for diskettes used in MiniMINC to represent their occupied and unoccupied regions. Most characters are numeric (0-9), alphabetic (A-Z, lower and upper case), or special (@,!,\$,etc.).

Collections of data (reports, tables, etc.) and programs are stored on diskettes as files. A file can occupy one or more adjacent blocks. When you direct MiniMINC to retrieve a file, you specify the file's own particular name as part of the direction (a command or statement) and MiniMINC searches the diskette for that file. The procedure requires a few seconds once you've typed the command. Chapter 3, Using MiniMINC, describes the structure and use of commands in detail.

THE MiniMINC PROGRAMMING SYSTEM

So far, this manual has focused on the equipment, that is, the physical portion of MiniMINC. Yet the equipment, while important, constitutes only one part of the MiniMINC computer system.

The programming system is an intangible part of MiniMINC.

It's composed of system programs each of which, like any other program, is a set of computer instructions combined to perform certain tasks. Unlike most programs, including the demonstration programs you will be using in Chapter 3 of this manual (or the user programs that you might create later on), system programs are essential for the operation of the MiniMINC system. They initiate, coordinate, and monitor the equipment functions necessary for executing your commands, statements, and user programs. System programs operate the system.

As a user of MiniMINC, you have in your possession a *system diskette*. The system programs comprising the MiniMINC programming system are on this diskette; they can perform their tasks only after you have loaded the system diskette into its designated drive and properly initiated operation (Chapter 2, Starting MiniMINC, contains all the required steps).

Invisibility shields the system's programs from inspection or alteration. If you command MiniMINC to list the name of every file on the system diskette (remember that a diskette has a total capacity of 480 blocks), the number of free and used blocks listed for a new system diskette will appear to equal less than 100. This apparent incongruity exists because the large number of blocks used by the system programs is shielded from common use and thus protected from deletion or interference. However, you can still use the free blocks on the system diskette for personal data and program storage.

User diskettes (diskettes that store user programs) contain a system file that supports the HELP feature (see Chapter 3, Getting HELP).

Up to this point you've encountered the terms *program*, *routine*, *file*, and *data*, and perhaps experienced some confusion over their precise meanings. Consider the following definitions:

- | | |
|---------|--|
| program | a set of computer instructions or symbolic statements combined to perform some task. A program can be part of the system or written by a user. It can contain multiple routines. |
| routine | a set of instructions arranged in proper sequence to cause a computer to perform a desired operation. Some routines are an integral, predefined part of the system. |
| file | a collection of data treated as a unit, which occupies one or more blocks on a mass- storage |

volume, and has an associated file name and file type.

data a term used to denote any or all facts, numbers, letters, and symbols: basic elements of information that can be processed by a computer.

A *system program* is a set of computer instructions written in an assembly language (a symbolic programming language commonly used in the development of programming systems) and translated into a machine language (the actual language used by the computer when performing operations). A *user (or demonstration) program* is a set of symbolic statements frequently written in a high-level language like MINC BASIC or FORTRAN that triggers a sequence of computer operations with each statement or command. Thus, in a general way, a language is a machine language when one instruction corresponds to a computer operation and a high-level language when one instruction (or statement) corresponds to a sequence of computer operations.

For instance, when combined with a program name, the MINC BASIC command RUN causes a search for the program on the diskette, the conveying of its image into memory, a scan of the program for consistency, preparation of the computer's internal state, and finally, execution of the designated program.

A MiniMINC *routine* is a set of instructions invoked by a single statement that causes the computer to perform an often-repeated set of operations. MiniMINC routines come as part of the system.

A *file* can contain a program or a collection of data such as a report, the results from an experiment, or a statistical compilation.

To create a file, all you need is sufficient space on your diskette, a unique file name and type to identify it, and the appropriate command. Entering a program into MiniMINC requires standard typing procedure; entering data requires program interaction with external instruments or the MiniMINC editor, a system facility that allows you to create, modify, or inspect any text file (Chapter 15 of *Book 2: MINC Programming Fundamentals* fully describes the editor and its use). It is important to remember that the term *file* refers to any gathering of information stored on a diskette, not just facts and figures but programs as well.

MINC BASIC is a high-level language developed for MINC (Modular INstrument Computer), MiniMINC's larger laboratory-oriented cousin. An offshoot of the standard BASIC language, MINC BASIC serves as a medium for both operating the computer and programming. Since many other computer systems require a set of commands separate from the programming language for their operation, MiniMINC's use of a common programming and operating language stands out.

The MINC BASIC Language

MINC BASIC has concise commands and statements that resemble English but avoid its ambiguities. For example, the EDIT command invokes the editing feature described earlier for modifying data or program files and the INITIALIZE command performs a sequence of steps that prepares a new diskette for use with MiniMINC. This matching of command name with function facilitates quick comprehension and ease of use. *Book 2: MINC Programming Fundamentals* describes and illustrates the fundamentals of MINC BASIC while *Book 3: MINC Programming Reference* presents each command and statement in alphabetical order with a complete description of each.

MiniMINC Graphic Routines

When you invoke a graphic routine by typing its one- or two-word name, you can summon features such as simultaneous display of two graphs on the terminal screen, bargraphs, dynamic strip chart modes, and many more. *Book 4: MINC Graphic Programming* and the *MiniMINC Supplement* together describe all the routines and how to use them.

MiniMINC Serial ASCII Routines

The MiniMINC system can communicate with serial ASCII (American Standard Code for Information Interchange) equipment through the serial ASCII routines. Incorporated within a program or used alone, these routines allow MiniMINC to transmit and receive data over serial lines connected to the SLU ports on the back of the chassis. Chapter 4 and the *MiniMINC Supplement* provide additional information on the routines.

MiniMINC Data Processing Routines

The MiniMINC system includes two data processing routines, FFT (Perform Fast Fourier Transform) and POWER (Calculate Power Spectrum Coefficients). FFT creates a discrete, numerical approximation of a continuous Fourier transform based upon a set of data. POWER calculates the power spectrum of a set of data by using the real and imaginary coefficients calculated by FFT. The *MiniMINC Supplement* explains these data processing routines in detail.

MiniMINC Program Control Routines

MiniMINC's program control routines permit programs to suspend execution for a specified time interval and to perform a designated procedure when a specified time event occurs. The

time event is either completion of a specified time interval or a specified time of day. The *MiniMINC Supplement* provides complete descriptions of these routines.

MiniMINC DOCUMENTATION

MiniMINC's manuals are a major reason for the system's ease of use. They explain and expand on such topics as:

- MiniMINC's capabilities
- MiniMINC's operation
- MINC BASIC programming
- MiniMINC's routines
- diagnosis and correction of possible MiniMINC problems

Unpacking and Installing MiniMINC tells you how to unpack and assemble the equipment in clear language accompanied by uncomplicated diagrams. You should have found this document attached to the outside of one of MiniMINC's shipping cartons.

Book 1: Introduction to MiniMINC acquaints you with the MiniMINC system. This manual familiarizes you with the concepts and terminology relevant to MiniMINC, its components and operation, and the perspective necessary to program effectively. The back of the manual contains directions for reading the other MiniMINC manuals, a glossary of computer terms used in the MiniMINC manuals, and a compendium of system error messages. This document is directed particularly at the computer novice, although the error message compendium benefits all MiniMINC users.

Book 2: MINC Programming Fundamentals leads you through the procedures for calculating, programming, and editing with MINC BASIC. Each chapter is designed to increase your comprehension and familiarity with MINC BASIC over that gained from the previous chapter. It provides numerous programming examples that you can try with MiniMINC while you read. This manual continues where the Introduction to MiniMINC leaves off.

Book 3: MINC Programming Reference is an alphabetically-ordered reference book containing detailed descriptions of every MINC BASIC command and statement. Book 3 also dis-

cusses such topics as Routines and Error Recovery. This manual gives examples and cross-references to Book 2 when applicable.

Book 4: MINC Graphic Programming teaches the concepts of graphic programming for the MiniMINC system. The back of the manual contains descriptions of the graphic routines arranged in alphabetical order and fortified with examples and illustrations. You should read Books 1 through 3 before starting this manual.

Note that Books 2 through 4 are also part of the MINC manual set, due to MINC and MiniMINC sharing the MINC BASIC language. For this reason, the books contain references to MINC equipment and manuals. You should ignore these references or, in some cases, substitute the appropriate MiniMINC term.

The *MiniMINC Supplement* contains such things as detailed troubleshooting procedures, directions for running the terminal's self-test and setting terminal characteristics, and information on optional devices such as printers that are available with the MiniMINC system.

The *MiniMINC Summary* presents the format and a one-line description of each MINC BASIC command, statement, and routine. It serves as a pocket-ready reference, something you can use at the terminal to recall a command's name, function, or form.

Demonstration programs are comparable to those programs you will create for your own particular applications. In fact, some of the demonstration programs used in Book 2 perform tasks fundamental to many real-life operations.

The MiniMINC manuals make liberal use of demonstration programs as interactive aids to learning MINC BASIC and the routines. Some you type in as you progress with a lesson; others already reside on the Demonstration diskette. If you follow the directions and fully participate in the computer exercises, you should find MiniMINC an extremely easy system to learn.

DEMONSTRATION PROGRAMS