

MEET MINC

Personal Laboratory Computer Systems





What is MINC?

These days, computers are virtually indispensable to anyone in the sciences or engineering. Chances are, not a day passes but that you use one in some way . . . for computation, to collect data, to control instrumentation, to generate reports.

Chances are, too, the computer you use is being used by a lot of other people for a lot of other things. You may have to wait a day or two, or even a week for service or your results. And you probably pay a heavy premium for the time, especially if you're relying on a remote mainframe. In fact, you may spend more of your valuable time waiting than working, and more of your budget on services than research.

MINC can change all that.

It can because MINC is a family of three individualized computers designed specifically for the laboratory. They're the culmination of Digital's more than 20 years of pioneering and perfecting small but powerful interactive computers exclusively for laboratory work. And here are the reasons why you should be looking at MINC to solve your laboratory computing needs.

To be efficient, you need control over your data processing resources. MINC gives you complete control. Each is a totally self-contained system you can keep at your elbow in office or lab. You plug it in, it's ready to perform. No waiting for the mainframe.

To be economical, you need control over how much your data processing costs. MINC is a one-time expense, so you can compute, control instrumentation, generate reports or whatever—as much as you want—without worrying about time charges or mainframe overhead.

To be effective, you need a computer resource that will let you do what needs doing, when it needs doing, and the way you want to do it. Without any hassle. That's why we made versatility a major design consideration. MINC lets you: compute, program, generate and display graphics, control instruments and processes, collect data, create reports, and even communicate with other Digital computers.

Being easy to use was another major consideration. If you can type—even with only one finger—you can start using MINC productively the day it's delivered. That's because MINC systems have built-in prompts that guide you along, and because MINC commands are easy to master and use.

And to be prepared, you need a laboratory computer that can be modified or expanded as your needs change or grow. MINC can be. Select the MINC that answers your present needs. As they change, expand or upgrade to meet tomorrow's demands. Depending on the model, you can add more main memory, extra mass storage, input/output modules, a printer, an advanced graphics terminal, computer-to-computer communications, other languages and operating systems . . . and more.

Why a choice?

The current MINC family includes three members: MINC-11, MINC-23 and MINC/DECLAB23.

But why three? Very simply, to give you choices. Choices that let you select the computing capability you need without compromising your budget. Moreover, whichever your selection today, you won't compromise the future either. That's because you can modify or expand MINC anytime, or you can upgrade to a more powerful processor. And when you do make changes, one of them won't be your applications programming. What works on your MINC now will work on it after the changes—*unchanged*.

What does the MINC family have in common?



Obviously, since the three are a family, they have a lot in common. By design. Here are some of the more important common features:

- **Ease of use.** MINC was conceived with the laboratory in mind. MINC systems offer tools that are powerful, yet easy to master and apply. Tools that work with you as well as for you.
- **Graphics.** When a picture is worth a thousand words, MINC terminals provide them. Curves, histograms, bar graphs, along with alphanumeric labeling.
- **Communications.** Many organizations have larger Digital system installations. With a MINC communications option, many of the resources of those installations can be available to you... such as existing programs, more powerful computing capability, more mass storage, access to other data bases, and utilization of a variety of output devices.
- **Installation.** Mainframes can take weeks and a corps of experts to install. With MINC-11 and MINC-23, you just plug in your system and you're in business. Elapsed time, including unpacking and assembly—two hours at most. Because MINC/DECLAB23 is a more sophisticated system, it requires installation by Digital.
- **Low cost.** Budgets are seldom what they should be. That's why we offer you a choice... to make the best match between budget and need. MINC-11 is our answer to tight budgets. It offers a lot of capability for a low price. MINC-23 offers more for a little more, with MINC/DECLAB23 at the high end of the performance scale. But whichever your choice, you'll profit.
- **Versatility.** Since no two laboratories have exactly

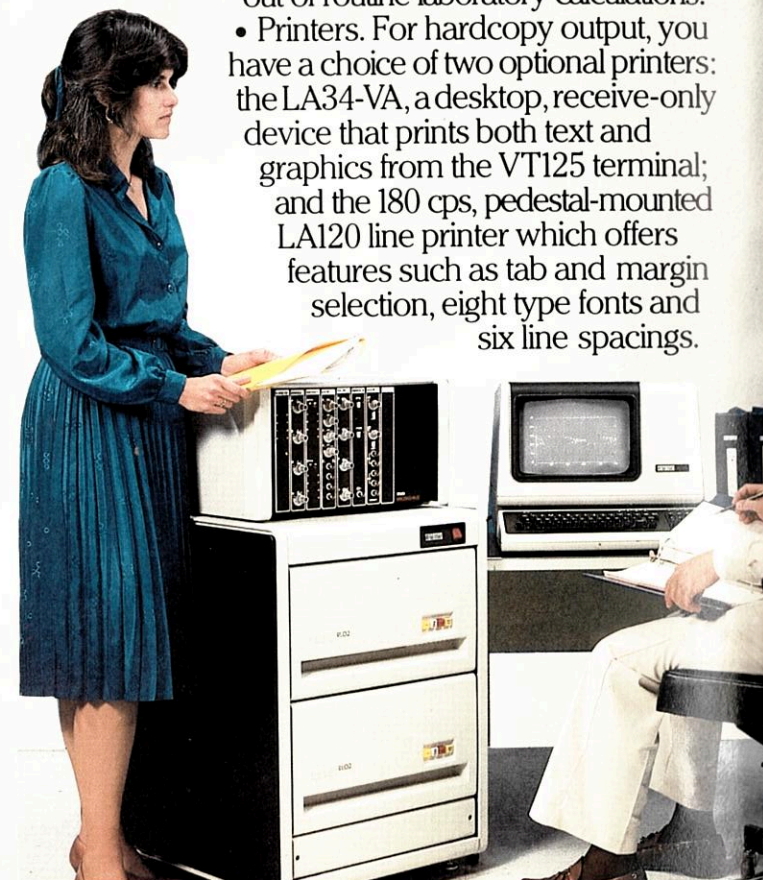
the same requirements, MINC is designed to handle them all... from graphics and data processing to controlling instruments and processes. Moreover, MINC includes an IEEE 488-1975 standard instrument bus, four RS232C ports, and a chassis for up to eight MINC input/output modules.

- **Mobility.** Sometimes, it's handy to move your computer to where the work is. MINC-11 and MINC-23 come equipped with four-wheel carts so they can be placed wherever needed. Just disconnect, wheel and reconnect. It's that simple. MINC/DECLAB23 is a larger system so it's not mobile. However, its compactness will let you place it anywhere in lab or office, at hand but not obtrusive.
- **Expandability.** Since needs change, we designed the MINC to be upgradable. A MINC-11 can be

upgraded to a MINC-23, and a MINC-23 to a MINC/DECLAB23. You can add more mass storage, more main memory, add or switch input/output modules, add an optional line printer, and exercise one of the communications options to share files and programs or take advantage of the power and storage capacity of a larger remote Digital system.



- **Modularity.** Optional MINC input/output modules are metal encased for protection and slip easily into and out of the chassis. In combinations of your choice, they support a wide range of real-time data acquisition, processing and control functions.
- **MINC BASIC.** For convenience, we've packaged MINC operating system software with a programming language. That's MINC BASIC. It's powerful as well as easy to learn and use.
- **Software Packages.** Standard with MINC is a set of statistical, mathematical and analysis packages that can take much of the drudgery out of routine laboratory calculations.
- **Printers.** For hardcopy output, you have a choice of two optional printers: the LA34-VA, a desktop, receive-only device that prints both text and graphics from the VT125 terminal; and the 180 cps, pedestal-mounted LA120 line printer which offers features such as tab and margin selection, eight type fonts and six line spacings.



How do the MINCs differ?

This is an important question because, along with price, the differences will help you make your selection. For the sake of easy comparison, we've tabulated key differences (actually, features) below and, below that, have provided brief descriptions of each.

FEATURE	MINC-11	MINC-23	MINC/DECLAB23
Processor	PDP-11/03	PDP-11/23	PDP-11/23
Main Memory	64Kb MOS standard	128Kb MOS standard	128Kb MOS standard
Mass Storage	RX02 floppy drive	RX02 floppy drive	RL02 disk cartridge drive
Terminal	VT105	VT125	VT125
Upgrade Options	VT125 kit, PDP-11/23 processor* RL02 kit	RL02 kit, FPF11 floating point accelerator, 128Kb memory	FPF11 floating point accelerator, 128Kb memory
Language Options	FORTAN IV	FORTAN IV	FORTAN IV, FORTAN 77
Packaged Operating Systems Options	FEP/RT-11	FEP/RT-11	FEP/RT-11 FEP/R SX-11M
Communications Options	DECnet-RT	DECnet-RT	DECnet-RT, DECnet-RSX

*Upgrading to the PDP-11/23 processor provides 128Kb of MOS memory in place of the 64Kb MOS memory standard with the PDP-11/03 processor.

The differences in detail

Processors:

The PDP-11/03 processor has a word length of 16 bits, its memory address range is 64Kb, and it offers both an extended instruction set and floating point instructions. Its basic instruction set includes more than 400 standard PDP-11 instructions.

The PDP-11/23 processor is on a single module which also contains a Floating Point Processor and Memory Management Unit. The processor's word length is 16 bits and its memory address range is 256Kb. It offers the basic instruction set of more than 400 standard PDP-11 instructions, plus an extended instruction set and floating point instructions. Its computation speed is approximately twice that of the PDP-11/03.

Main Memory:

While all three MINCs utilize fast, dynamic MOS memory, only the MINC-23 and MINC/DECLAB23 memories can be expanded to 256Kb.

Mass Storage:

The RX02 is a dual floppy diskette drive with a random-access storage capacity of 512Kb per diskette. The diskettes are easy to use, handle, duplicate, store and transport (even through inter-office mail).

The dual RL02s are removable cartridge disk drives with a random-access storage capacity of 10.4Mb per drive. Built-in reliability and maintenance features are designed to keep the cost of ownership low.





Terminals:

MINC-11 comes with our VT105 graphing terminal. Featuring a detached keyboard for greater positioning convenience, the terminal offers a wide variety of video attributes, including: double-width, double-size characters, 80- and 132-column lines, smooth forward and reverse scrolling, blinking, split-screen display, bold, underlining, reverse video, dual density, and white characters on a black screen or vice versa.

For graphing, the VT105 provides a resolution of 512 positions horizontally and 190 vertically. Two graphs can be presented simultaneously—either separately or superimposed, and each can be independently plotted in point-plot, shaded point-plot, or bar graph mode.

An RS-170 composite video output allows alphanumeric and graphic material to be displayed on remote monitors, recorded on videotape, or produced as hard copy.

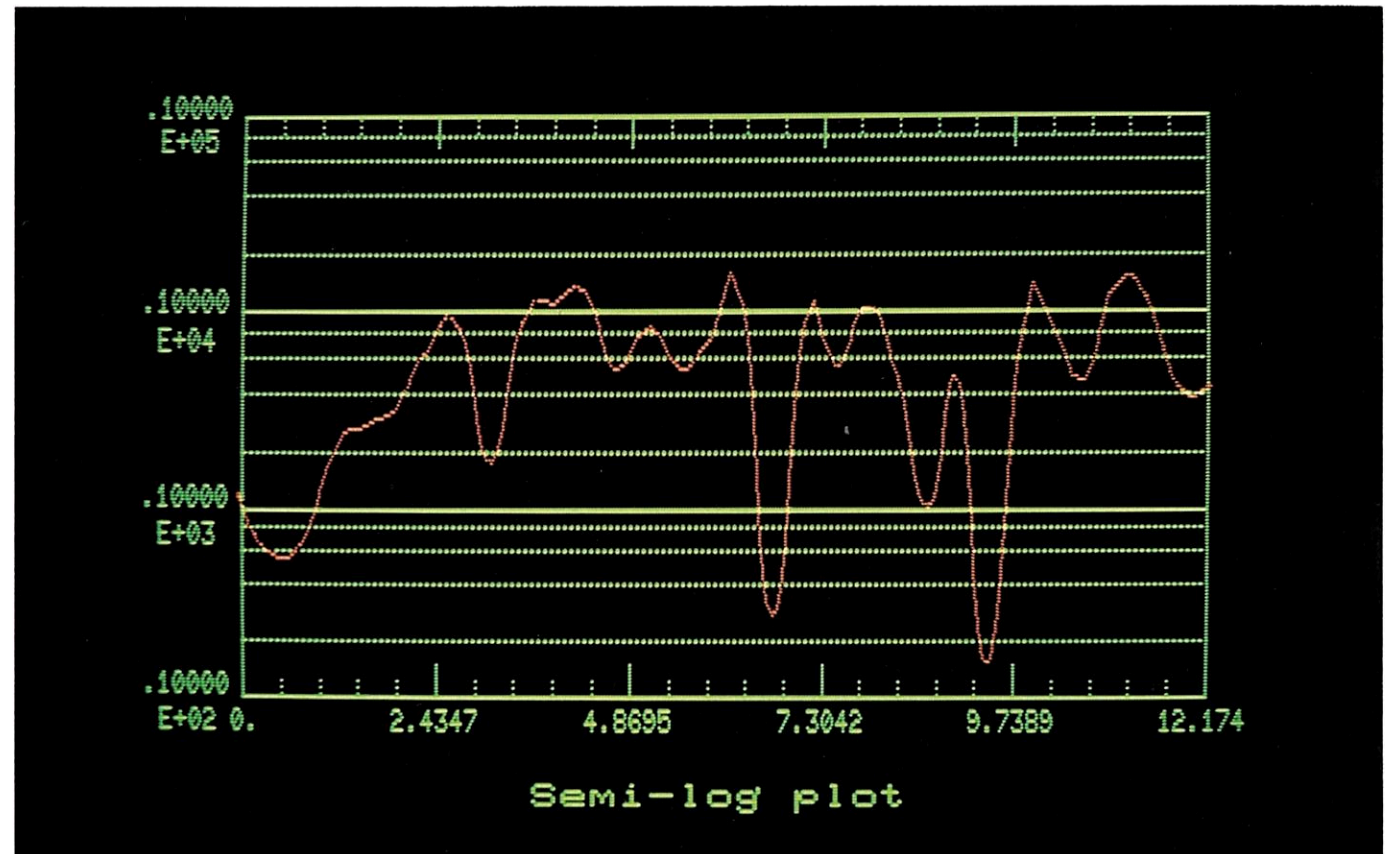
Both MINC-23 and MINC/DECLAB23 come with the advanced VT125 graphic terminal. This terminal offers the same attributes and capabilities as the VT105, but provides a resolution of 768 positions horizontally and 240 vertically, and will run all VT105 graphics software. In addition, bit-map graphics provide four gray scales for graphics highlighting and allow data plotting and both print and line graphics.

Color: When driven by a subset of Digital's ReGIS Graphics Library software, the VT125 can transmit four colors simultaneously to an RGB color monitor.

As indicated earlier, upgrade options are available for each of the MINCs. In fact, MINC-11 can be upgraded to either a MINC-23 or a MINC/DECLAB23 and, obviously, MINC-23 can be upgraded to a MINC/DECLAB23. Even the performance of the MINC/DECLAB23 can be upgraded through the addition of our FPF11 floating point accelerator, increasing its floating point computation speed 400 to 500 percent over that provided by the standard floating point unit.

For MINC-11

Three upgrade kits are available for MINC-11. One will convert the VT105 graphics terminal into a VT125 graphics terminal for greater graphics capability. A second allows replacement of the standard RX02 floppy disk drives with our RL02 cartridge disk drives to provide more storage capacity with increased data transfer speed. And the third enables substitution of the PDP-11/03 processor with the more powerful PDP-11/23 microprocessor.





For MINC-23

Three upgrade options are available for MINC-23. One allows replacement of the standard RX02 floppy disk drives with the RL02 cartridge disk drives, providing increased storage capacity and data transfer speed. The second is the addition of the FPF11 floating point accelerator for faster floating point computation speed. And the third allows expansion of main memory from the standard 128Kb to 256Kb maximum.

For MINC/DECLAB23

For a major increase in floating point calculation speed, the FPF11 floating point accelerator can be

added to MINC/DECLAB23. Also, its main memory can be expanded from the standard 128Kb to 256Kb maximum.

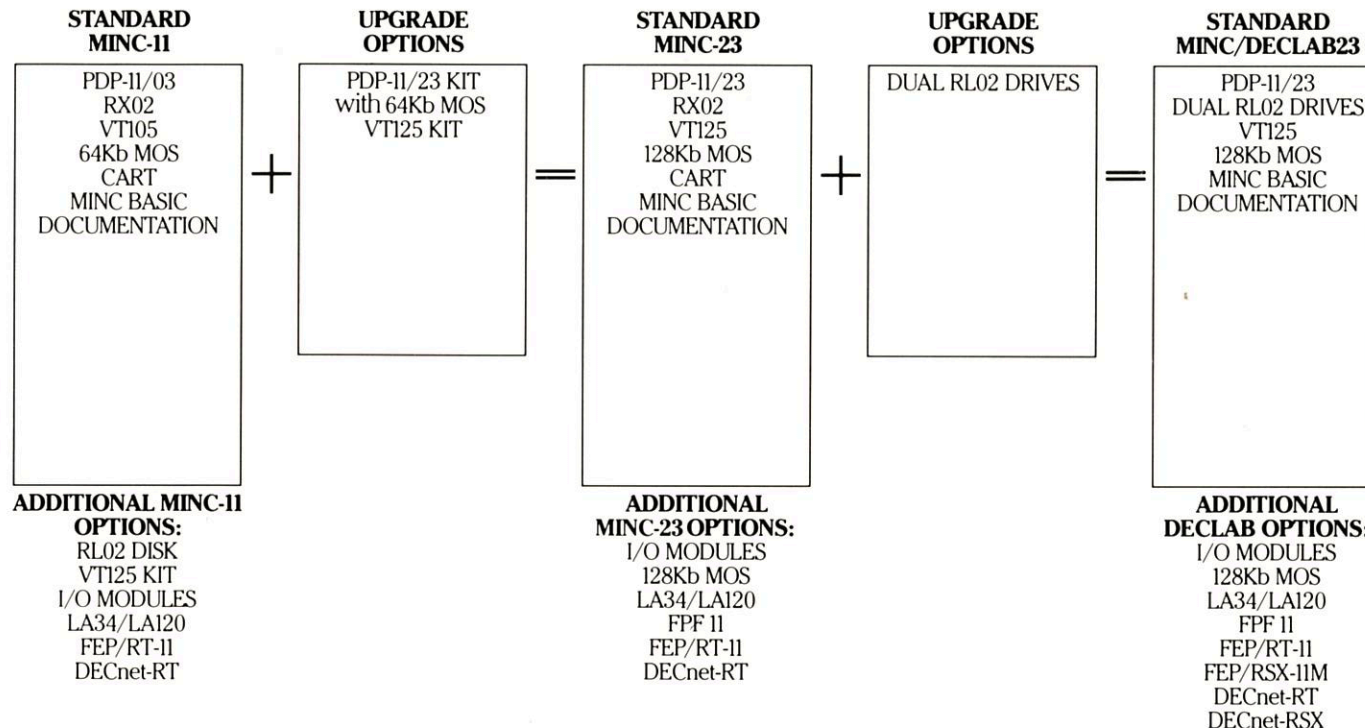
Languages:

Though MINC BASIC is the standard language provided with all three MINCs, FORTRAN IV is optionally available for computation-intensive applications and runs under Digital's RT-11 real-time operating system. FORTRAN IV is based on the ANSI FORTRAN 1966 standard and supports one-word integers, single-precision real, double-precision real, complex, logical, and byte data types.

With MINC/DECLAB23, FORTRAN 77 is also an option. Used with Digital's RSX-11M real-time operating system, it fully conforms to the ANSI FORTRAN - 77 subset standard. Digital's FORTRAN 77 offers a number of special features such as block-structured IF statements, internal files which replace ENCODE and DECODE statements, a zero-trip DO loop, and a SAVE statement which saves the values of variables in a subroutine across several calls.

UPGRADING FROM MINC-11 TO MINC-23 TO MINC/DECLAB23

Possible migration path from the MINC-11 to the MINC/DECLAB23 options may be interdependent





Through packaged operating systems, MINC owners enjoy the best of both worlds... a powerful, proven operating system and a complementary programming language matched to the needs of a given laboratory environment.

For all three MINCs, FEP/RT-11 is optionally available. It includes Digital's RT-11 real-time operating system and FORTRAN IV. For MINC/DECLAB23 only, we offer the FEP/RXS-11M option. This includes Digital's RSX-11M multitasking real-time operating system and FORTRAN 77. With both FEP/RT-11 and FEP/RXS-11M, MINC owners receive the FORTRAN Enhancement Package (FEP). This is a set of FORTRAN-callable software subroutines for greater ease in real-time data acquisition and analysis.

RT-11 Operating System:

RT-11 is a real-time operating system that functions in either single-job or foreground/background mode. The single-job mode enables interactive system use, while the foreground/background mode allows a time-critical task such as data sampling to run in the foreground and a time-independent task such as program development to run in the background.

RSX-11M Operating System:

RSX-11M is the culmination of over a thousand man-years of development effort at Digital. It is an extremely powerful disk-based real-time operating system that features concurrent processing of two or more tasks.

The FORTRAN Enhancement Package (FEP):

Intended for applications where computation speed is critical, FEP includes:

- Routines for collecting and processing real-time data. The routines support MINC input/output modules

- Routines which support the IEEE bus interface (RT-11 only).
- Routines which support the VT125 graphics terminal.
- Subroutines which perform peak processing, envelope processing, interval histogramming, fast Fourier transforms, phase-angle and amplitude spectra analysis, and power spectrum analysis.
- Over 100 scientific subroutines that perform statistical and mathematical manipulations on collected data.
- An on-line programming tool for interactively debugging FORTRAN IV programs (RT-11 only).

Communications

To date, there are well over 200,000 PDP-11 computer installations worldwide, and nearly 300,000 Digital computers altogether. Through MINC's optional DECnet communications software, you may be able to utilize many of the resources of other Digital computer installations in your organization. The benefit to you is the potential availability of existing programs, more extensive computing capabilities and mass storage, and access to other data bases.

DECnet is a set of communication products which provides networking capabilities for all of Digital's computers. In support of networking, DECnet functions fall into two categories: communications and user/program functions. Both DECnet-RT and DECnet-RSX support point-to-point communications. They also allow user programs to exchange messages with other user programs, users to transfer sequential ASCII files bidirectionally between file devices, and users to read from or write to files in a remote system.

All three MINC models support DECnet-RT; only MINC/DECLAB23 will support DECnet-RSX.

The real world is what laboratory work is all about. MINC puts you in touch with that world through the standard IEEE bus and RS232C interfaces and your choice of these nine optional input/output modules:

Analog-to-Digital Converter (A/D)

This module is a successive-approximation type A/D converter that accepts data on up to 16 single-ended channels. In conjunction with MINC dual multiplexer modules, the A/D converter can support up to 64 single-ended input channels.

Preamplifier

This module provides differential amplification or attenuation of signals on four input channels. It can be connected to nearly any transducer or sensing device and can be used under program control or through switch-controlled fixed-gain selection.

Dual Multiplexer

This module serves whenever more A/D input channels are required than can be connected to the A/D converter alone.

Programmable Clock

This module is a programmable counter that can be driven by events occurring inside or outside a MINC system. The MINC software uses the clock in conjunction with other modules to control data transfer rates. The module provides two Schmitt triggers which can work interactively with or independently of the clock. The software requires connection to the clock only when a program invokes one or both Schmitt triggers.



How do you become acquainted with your MINC?

Thermocouple Preamp

This module is always used with an A/D converter and provides programmable signal processing and amplification for up to eight thermocouple input signals. Up to seven modules can be installed with a single A/D converter, giving a total of 56 thermocouple channels.

Digital-to-Analog Converter (D/A)

Housing four separate D/A converters, this module can be used to control XY plotters, CRTs, and devices such as voltage-controlled oscillators. MINC supports up to four D/A converter modules.

Digital Input Unit

This unit accommodates up to 16 input lines. It reads digital data from external instruments, producing standard digital logic levels, analog voltages, or contact closures, and it can collect data on command.

Digital Output Unit

The digital output unit enables program-controlled output of digital signals on 16 different lines. This permits a number of different functions such as programmable control of ON/OFF status of electrical devices, signal attenuator control, and the outputting of signals at a rate determined by an external device.

Foundation Module

This module allows you to assemble an interface to special-purpose devices not served by existing MINC modules. Assembly hardware is included.



No problem. Each MINC comes with plenty of self-paced training material; in fact, a complete set of award-winning documentation that covers all aspects of system operation and use. Here is the list of titles for all eight books:

- Book 1: Introduction to MINC
- Book 2: MINC Programming Fundamentals
- Book 3: MINC Programming Reference
- Book 4: MINC Graphic Programming
- Book 5: MINC IEEE Bus Programming
- Book 6: MINC Lab Module Programming
- Book 7: Working with MINC Devices
- Book 8: MINC System Index



What about service?



A very good question. No one designs more reliability into its systems than Digital. Still, with use, every system needs periodic preventive maintenance to continue performing up to specification. Without it, problems could arise that might result in lost time and, even worse, the loss of valuable data. An ounce of preventive maintenance is worth a pound of cure.

Also, in rare instances a system will go down because of a hardware or software problem. While it's down, work may stop and you wait. We understand, so to assist our customers in keeping their systems up and running, we maintain professionally staffed Telephone Service Centers for Canada, Europe, and the United States to provide immediate assistance. This support is backed by Digital's worldwide Customer Services organization of more than 14,000 professionals. This organization offers a variety of hardware and software service agreements that range from per-call support to on-site resident consulting.

DECUS

DECUS is an acronym for the Digital Equipment Computer Users Society. Established in 1961, DECUS today is among the largest of such groups and one of the most active. Its primary purpose is to advance the effective utilization of Digital's products, but it also serves as a way of channeling new information to its membership, and of facilitating the exchange of computer programs among its members. DECUS maintains a library containing several thousand programs available to its members, periodically publishes a catalog of program holdings, and sponsors both domestic and international symposia. Membership is voluntary.





digital

We change the way the world thinks.

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