

# Lawrence Berkeley National Laboratory

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Volume 24, Number 1  
January, 1987

L B L  
COMPUTING  
NEWSLETTER

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"In nature there are few sharp lines."  
... A. R. Ammons

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Newsletter Closing Date is Friday, January, 16, 1987 . . . and no later.  
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**For Reference**  
Not to be taken from this room

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JANUARY 1987

## NAMES & NUMBERS TO KNOW

From on-site, dial <xxxx>    From off-site, dial (415) 486-<xxxx>    From FTS line, dial 451-<xxxx>

### INFORMATION & COMPUTING SCIENCES DIVISION

Head: Leroy Kerth (LTKerth) .....7474    50B - 2232E  
Deputy: Sandy Merola (AXMerola).....4389    50B - 2232C

### OFFICE OF COMPUTING RESOURCES

Head: Ken Wiley (KGWiley) .....7083    50B - 2258E  
Ethernet Manager: Sig Rogers (SGRogers)..6713    50B - 2258G

### ADVANCED DEVELOPMENT PROJECTS

Head: Dennis Hall (DEHall).....6053...50B - 3238  
**Workstation Group**  
Group Leader: Richard LaPierre (RLLaPierre)....4692.....46A - 110

### COMPUTING SERVICES

Head: Marv Atchley (FMAatchley) .....5455    50B - 2245  
Asst.Head: Dennis Hall (DEHall).....6053    50B - 3238B  
Central Office .....5871,2    50B - 2239

### VMS SYSTEM

Wayne Graves (WRGraves).....7035    50F - 146  
VMS Cluster Manager (RBallen).....6203    50F - 116

### UNIX SYSTEM

Daye Cleveland (DHCleveland).....5336    50F - 115  
System Manager (EHSheena).....5176    50F - 120

### DISTRIBUTED PRINTING

Bob Rendler (RERendler).....5629...50F - 119  
System Manager (RJCochran).....5565    50B - 2272

### USER RESOURCES

Jerry Borges (JTBorges).....5568    50F - 144  
Accounting .....7008    50B - 1232  
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Terminal or Port Repair (PGMurray).....5354    50B - 2259

### COMPUTING APPLICATIONS

**Applications Group**  
Head: Jerry Borges (JTBorges) .....5568    50F - 144

### CENTRAL ELECTRONIC MAIL FACILITY

FIRST INITIAL-MIDDLE INITIAL-LAST NAME is the standard recipient format in Lab-wide mailing address.

Examples: VMS: lbl::JASmith  
          UNIX: JASmith@lbl.arpa  
          Software Tools: JASmith@lbl.arpa

### DEVELCON

#### DEVELCON Access Names

[VAX 8600's (GENERIC).....CSA]  
VAX 8600 (VMS) .....CSA1  
VAX 8600 (VMS) .....CSA2  
VAX 8650 (VMS) .....CSA3  
VAX 8600 (VMS) .....CSA4  
VAX 8600 (VMS) .....CSA5  
  
VAX 11/780 (UNIX4).....UX4  
VAX 11/750 (UNIX5).....UX5  
IS V-24        (UNIX8).....UX8

#### Dial-up Access Numbers

All Machines - 300 BPS ..... 486-4959  
All Machines - 1200 BPS ..... 486-4979  
All Machines - 2400 BPS ..... 486-4969

#### Local TYMNET Access Numbers for DEVELCON

Oakland	430-2900	Vallejo	707-644-1192
Walnut Creek	938-9550	Concord	685-6003
Pleasanton	462-8900	Fremont	490-7366
San Francisco	974-1300	Antioch	754-8222
Santa Clara	408-986-0646	Palo Alto	415-366-1092

MFE Consulting Number is ..... 422-1544

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## COMPUTER CLASS SCHEDULE

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Jerry Borges

The following computer classes are to be offered by the Computing Division. With the exception of the T<sub>E</sub>X class (see article below), there is no charge for these classes; to enroll, obtain your supervisor's approval and then contact Pat Bean (x7008). If you have questions about what's being offered, or suggestions for other computer-oriented topics, contact Jerry Borges (x5568).

DATE	TIME	DESCRIPTION	INSTRUCTOR
Jan 6, 8, 13, 15	9:30AM-NOON	C Programming	Marty Gelbaum
Jan 15	11 AM-NOON	Electronic Mail	William Jaquith
Jan 26, 27, 29	9 AM-NOON	Introduction to VAX/VMS	Rosemary Allen
Feb 3, 5, 10, 12	9AM-NOON	Introduction to VAX/UNIX	Dave Cleveland
Feb 2, 6, 9, 13	10AM-NOON	Introduction to T <sub>E</sub> X	Jerry Borges
Feb 23-27	9AM-4PM	Intermediate and Advanced T <sub>E</sub> X	See Below
Feb 12	11 AM-NOON	Electronic Mail	William Jaquith

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### T<sub>E</sub>X CLASS

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Jerry Borges

A one-week class in T<sub>E</sub>X will be given at the Laboratory during the week of February 23-27, 1987 by an instructor from the T<sub>E</sub>X Users' Group.

The material to be covered will be the same as that presented in the two-day Intermediate and three-day Advanced T<sub>E</sub>X classes given periodically during the year at various academic institutions by the Users' Group.

Cost of the class at LBL depends upon the number of students, and will probably be between \$400. and \$500. per student. The equivalent classes taken at Stanford University would cost \$850. per student.

Space is limited to a maximum of 12 students; be sure to enroll early to save a spot.

For more info, contact Jerry Borges (x5568), or

VMS Mail:       lbl::JTBorges

UNIX or

Software Tools Mail:   JTBorges@lbl.arpa

### FOCUS NEWS

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Bert Albrecht

• FOCUS USERS' GROUP

The next meeting of the FOCUS Users' Group will be from 10 AM to noon on Thursday, January 22 in the Bldg. 50F Conference Room.

The agenda will include:

- News of new releases
- Function of the User's Group
- A report by Barbara Goto on the the travel database system she has implemented in AFRD
- Open discussion.

Forward comments or questions to me (x6280) or

VMS Mail:       lbl::HGAlbrecht

UNIX or

Software Tools Mail:   HGAlbrecht@lbl.arpa

## LAB-WIDE ETHERNET NEWS

Bob Fink

This article is the first in a series of monthly reports on Laboratory-wide Ethernet activities, plans and information. Hopefully, we won't miss the monthly deadline very often. If we do, we will publish the missed month's information in the following Newsletter.

### • ETHERNET ACTIVITY MAP

On the opposite page is an activity map showing the packet-per-second rate of each local Ethernet in the Laboratory-Wide Ethernet. The ellipses represent separate Ethernets that are interconnected via Digital LanBridge-100 devices. The interconnecting packet rates between Ethernets, via the LanBridges, are also shown. Each LanBridge-100 can forward a full 10 Mbits/second at packet rates up to the maximum (i.e., over 15,000 packets-per-second). These "bridges" operate transparently to protocols such as TCP/IP and DECnet.

### • ETHERNET PLANS

Short-term plans for the Laboratory-Wide Ethernet include reducing packet rates for the CSLAN (Computing Services Local Area Network) and the BACKBONE by reconfiguration, and adding two new LANs, CSRLAN and MISCLAN.

CSLAN will be reconfigured by removing non-Computing Services computers from it. This will affect several groups:

- The Computer Science Research Department will then have its own LAN called CSRLAN. The file server - **Oliver** - will move to CSRLAN as will CSMF, LBLG, LBLH and all CSR SUN Workstations.
- The Administrative Data Processing Department will eventually have its PC equipment moved to 65LAN, but will temporarily remain on CSLAN.
- Applied Science Division will have its ELXSI moved to MISCLAN.
- The Computing Division IBM PC thinwire LAN will move to MISCLAN.
- The CSR thinwire LAN will move to CSRLAN.

The BACKBONE will have all computer systems removed, leaving only LanBridges attached to it. To do this, a new LAN, called MISCLAN, will be created.

MISCLAN will have the following existing LAN facilities added to it.

→ Bldgs 88, 55, 70, 70A, and 46 Trailers

→ Those Bldg 50 Complex Ethernets not specifically mentioned above

All of the abovementioned changes should be transparent to users. They will be implemented during the December/January timeframe and if any outage or disruption is scheduled, the affected users will be notified.

### • ETHERNET INFORMATION

The measurement of long-term packet rates is done with the assistance of RBMS, the Remote Bridge Management System, a Digital software product that collects statistics from LanBridge-100's.

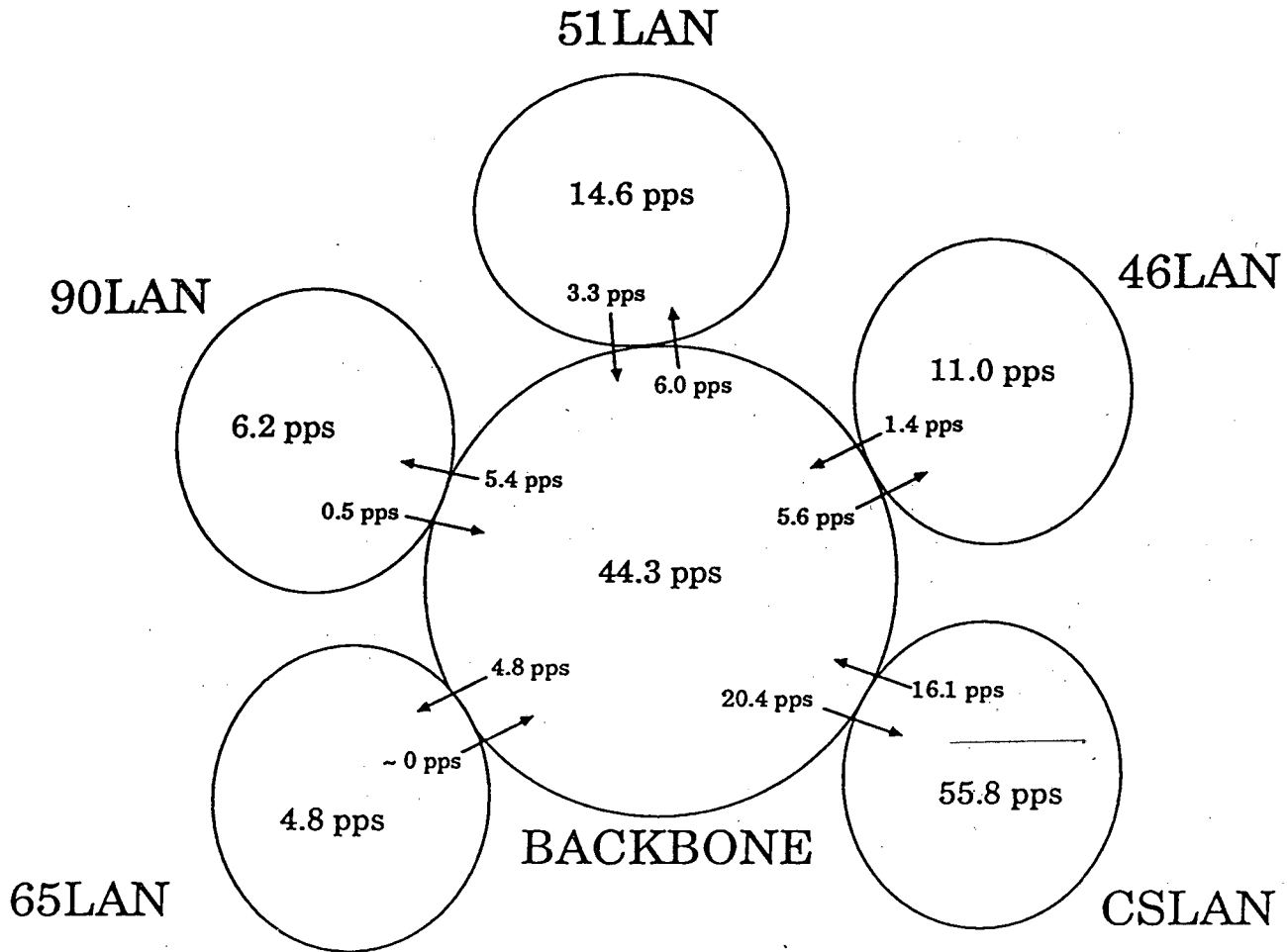
The measurement of short term rates, as well as reconfiguration studies, is performed with an Excelan LANalyzer Ethernet monitor. Note that no short-term packet rates are shown on the accompanying Activity picture.

Dynamic packet rates on CSLAN have been measured for ten second sample intervals at just over 600 pps and just under 4 Mbits/sec. These typically occur between 2 and 4 PM on a work day (i.e., the afternoon busy hours).

It's a well-established rule of thumb that a general-use Ethernet with many computers (i.e., ten to twenty or more) is saturated if its peak rates are 1000 pps for extended sample intervals, and that these peak rates are approximately ten times the long-term averages. Thus we can say, again only as a rule of thumb, that the long-term pps rate represents the approximate percent loading of a given Ethernet. For example, a 45 pps long-term average Ethernet is at 45% of capacity. Caution: this may change over time as use modes change.

In the coming months we will attempt to present useful additional information about the Laboratory-Wide Ethernet. Please contact us if you have questions or suggestions as to future articles. Forward comments or queries to me (x5692) or Sig Rogers (x6713).

VMS Mail:	lbl::RLFink
UNIX or Software Tools Mail:	RLFink@lbl.arpa
VMS Mail:	lbl::SGRogers
UNIX or Software Tools Mail:	SGRogers@lbl.arpa



pps = packets per second; all figures are monthly averages

arrows represent packet flow through a LanBridge from one LAN to another

Note: Each ellipse shown above is a separate Ethernet that is interconnected to the others via Digital LanBridge-100 devices that provide forwarding of packets based on a learning algorithm that minimizes traffic between networks to those packets addressed to computers on another Ethernet.

## Laboratory-Wide Ethernet Activity November 1986

ICSD/OCR

Fink/Rogers

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## TYMNET ACCESS TO LBL

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William Jaquith

### PLANNED CHANGES FOR MID-JANUARY 1987

The Information and Computing Sciences Division (ICSD) will be implementing the following changes to Tymnet service in mid-January.

(1) **INSTITUTING DIVISIONAL USERNAMES AND PASSWORDS**

One of the services that Tymnet now provides to LBL is the ability to have multiple usernames and locally-generated passwords. ICSD will take advantage of this service to increase the security associated with Tymnet by assigning a username and password to each LBL division.

In addition to providing greater security, Divisional Usernames will allow ICSD to gain information about who is using the Tymnet service.

An example of a new Tymnet username is LBLICSD, (which has been assigned to ICSD). There are at least two people in our group who know our username and its associated password.

Other proposed usernames:

LBLAFRD	LBLADMIN	LBLBIO
LBLCAM	LBLBESD	LBLMMRD
LBLPHYSICS	LBLSSC	LBLCBD
	LBLNSD	

These are proposed division Tymnet usernames and can be changed to whatever divisions prefer.

In assigning Tymnet Divisional username/passwords, ICSD will follow the guidelines that are already associated with individual user's passwords, i.e., the passwords should not be trivial and they will be changed on a regular basis. Trivial passwords are words that are in the dictionary or are easily guessable. An example of creating a non-trivial password is substituting a special character for one of the characters in the word or adding a special character to a word (i.e., changing **add** to **+add**).

(2) **lbl/... ACCOUNT TO GO AWAY**

Tymnet users get to Lawrence Berkeley Laboratory by dialing an access number (the local telephone number that you dial) and then using a username/password. The current username/password (**lbl/...**) is well known. The **lbl/...** account will go away shortly after we assign the divisional Tymnet names and passwords.

(3) **CHANGING PASSWORDS REGULARLY**

We will change each Tymnet password every six months.

Forward comments or questions to me (**x4388**) or

VMS Mail:	lbl:WDJaquith
UNIX or	
Software Tools Mail:	WDJaquith@lbl.arpa

"Do not multiply the explanations  
for a phenomenon  
beyond the absolute minimum necessary."

... *William of Occam*



# THE WORKSTATION SCENE

[24.1.1].....

## ● WORKSTATION GROUP ELECTRONIC MAIL

**W**orkstation Group members can now be reached from the VMS cluster or the Computing Division's UNIX machines by sending mail to

VMS Mail:       lbl::WKSG

UNIX or

Software Tools Mail:   WKSG@lbl.arpa

We hope this alternative (to the telephone) will be of assistance to users who have problems or would like to forward helpful hints.

[24.1.2].....

## ● PC-MAC LOCKDOWN SECURITY DEVICES

**D**id your PC or Apple MAC become someone else's present on Christmas just past? You should have heard by now that more than a few personal computers were stolen from LBL last year. Did you trust to luck that you would find your PC in its appointed place on your first day of work this new year?

It makes sense -- and it's a sound insurance move -- to invest a few hundred dollars in a lock-down device on a PC that costs several thousand dollars. Many Divisions on the Hill have already sent out memos concerning this issue.

In an ongoing effort to find the most secure, easily installed, and least expensive lock-down device, the Workstation Group has obtained a list of approved lock-down device vendors from the Crime Prevention Unit of the UC Police Department. We've contacted all of these vendors, and have requested data and prices of their respective devices.

We'll keep our readers informed of new developments. (x8858).

[24.1.3].....

## ● LASERJET TRANSPARENCIES

**A** penny-wise constant reader forwards this helpful info: An alternative transparency for use in the LaserJet is now available. 3M-type 503 transparencies work successfully and are considerably less expensive than the Hewlett-Packard brand name product.

The 3M product is designed for use with the Canon engine which coincidentally runs the HP LaserJet Printer. If your group uses an exceptionally large number of transparencies, this product could be a real cost saver.

(Editor's note: Avery labels for the LaserJet are now also available.)

[24.1.4].....

## ● TESTING THE SHARESPOOL

**I**n our continuing search for the ultimate printer sharing device, we have tried out the Extended Systems' ShareSpool model ESI-2078. This unit will allow up to 7 PC's with serial output ports to share one printer with a parallel input port. The ShareSpool includes a 256 Kbyte buffer, portions of which are assigned to each input port on an "as needed" basis.

There are numerous options which can be activated by command strings embedded in the text to be printed.

The only feature that this unit seems to be missing is the ability to generate a "header" page at the beginning of each job.

When we first started looking at printer sharing devices, there were very few available. Now there are more of them on the market than we will ever be able to evaluate. We hope to make a firm recommendation in the next few months.

[24.1.5].....

## ● PC SOFTWARE UPGRADES

### VOLKSWRITER3 UPGRADE

**I**f you've got complaints about VW3's lack of printer support, complain no longer. The Workstation Group now has a printer table upgrade for licensed VW3 users. This upgrade will recognize over 130 printers.

Early tests with the Hewlett-Packard Soft Fonts have been very successful with VolksWriter3. The Soft Fonts offer much more power than cartridges for multiple fonts in a document.

(See article 23.12.11, December 1986 LBL Computing Newsletter for more details).

There is no charge for this upgrade; licensed VW3 users should bring their original Program 1 diskette to Dan Van Zile (x5589 or at the HELP DESK - x5981) along with 2 blank diskettes. He'll make copies of the upgrade disks and provide instructions for installation.

**WORDPERFECT 4.2 UPGRADE**

**A**n upgrade from Version 4.1 to 4.2 is now available from SSISoftware Corporation. See details on this upgrade in article **23.12.2**, of the December 1986 LBL Computing Newsletter.

Although WordPerfect 4.1 does not yet officially support the HP Soft Fonts, limited tests have shown the Soft Fonts do work. Implementation of the fonts in a document is a bit more awkward than in VolksWriter, however they do work.

**IBM DISPLAYWRITE4 UPGRADE**

IBM has announced an upgrade of DisplayWrite, its text processing program (to **DisplayWrite\$**).

Depending upon your current version, upgrades are \$75 to \$175 each. To get a copy of the upgrade order form and other details, contact Workstation Group member Bruce Burkhart (x**8858**).

**dBASE III PLUS 1.1 UPGRADE**

Ashton-Tate now has a non-copy-protected upgrade from **dBASE II**, **dBASE III**, and **dBASE III PLUS** to **dBASE III PLUS 1.1**. In addition, **FRAMEWORK** and **FRAMEWORK II** are upgraded to **FRAMEWORK II 1.1**.

If you purchased **dBASE III PLUS**, or **FRAMEWORK II** on or after July 5, 1986, this upgrade to 1.1 is free. An upgrade from **dBASE III** to **dBASE III PLUS 1.1** (2 steps up) costs around \$250. For further details, call the WorkStation Lab (x**6858**).

[**24.1.6**].....

**• SUN MICROSYSTEMS PRODUCT SHOWCASE**

**R**epresentatives from SUN MicroSystems will be conducting a demonstration of their product line on Wednesday January 21, from 10 AM to 2 PM in the Bldg. 70A Conference Room (Rm. 3377).

Hardware to be demonstrated includes a "file-server", and a "disk-less" workstation running BSD's UNIX operating system. The systems will be connected to the Laboratory's hill-wide Ethernet. Also to be demonstrated is a PC-AT clone card which plugs into the SUN computer and runs under a SUN window. The PC-AT clone runs PC application programs in an MS-DOS operating environment.

The product showcase will include demonstrations of several third party software packages available for the SUN systems.

Watch the *LBL Currents* for additional information.

[**24.1.7**].....

**• A SIMPLE HARD DISK UPGRADE FOR A PC**

*The following article falls under the category of "I am glad I did this on my own free time because I could not bear charging my time to a customer's account number" . . . RLP*

**L**ike many LBL employees, I have found that my own personal PC, a four-year old model with nothing but floppy drives, has lost much of its original appeal. (Please note that my wife uses the PC all day for word processing and doesn't mind the occasional grinding and groaning of the floppy drives.) The obvious solution: spend some more bucks for a hard-disk upgrade and then I would once again enjoy working on my PC at home.

I encountered a problem however, when I explained to my wife that installation of a hard disk would increase the noise level. A home without teenagers is very quiet compared to a normal office environment with a standard level of background noise. We tried a compromise solution. We purchased one of the new 3½" 20 Mbyte hard card disks. This disk, mounted in an expansion slot, is pretty quiet compared to the normal 5¼" disk drive.

I went to the PC Faire last fall and came home with an easy-to-install **Drive Plus** 20 Mbyte Tandon disk with a Western Digital controller; it's all on a card designed to occupy one expansion slot .... provided you mount it in the far-left position. I got into trouble the moment I decided to evaluate this product with the goal of being able to offer "upgrade solutions" to fellow LBLers.

**FIRST . . .**

The first potential problem occurred as I read the card installation instructions. The instructions showed a separate power cable connection; however, this **did not apply to the unit at hand**.

Then I noticed that there was one defective "bad spot" identified for the disk drive unit.

The literature said that the drive was "ready to go" and one had only to use the **DOS Format /S** routine to transfer the DOS system files. After following instructions, I proceeded to build the disk and finally got to the reboot phase with a **CHKDSK** in the **autoexec.bat** file. **CHKDSK** showed the number of defects -- "bad spots" -- known to the system and in this case it did not know of that one defect clearly identified on the disk unit. Several hours later, after using the undocumented tools provided with the system, I gave up and used one of my own utilities to

inform the system of the one defect on the disk.

Because of my working experience, I knew after two days of testing that I had a properly-prepared disk. I proceeded to invest several more hours building my hard disk system.

**THEN...**

The system worked fine for about a week and just about the time my wife was starting to enjoy the benefits of a hard disk, the unit developed an unbearable high-pitched noise that sent the unit back to the dealer for a warranty exchange unit. The replacement unit was installed without any major setbacks. Of course it still took at least four hours to get fully operational.

Unfortunately this unit developed "seek error" problems after about 14 days of operation and there was no way to recover the data on the disk.

**FINALLY...**

For a third attempt to upgrade the PC, I abandoned the disk-on-a-card design and selected the same disk unit in a conventional mounting position. I had the mounting space since I have two half-height floppy drives.

I selected this alternative because there was a noticeable heating effect in the chassis with the hard disk card. The conventional mounting unit appeared to be much better cooled.

This third attempt appears to have been the successful one. However, it has only been on-line for about one month. The noise-level for the standard disk-mounting of the 3½" drive is appreciably less than for the regular 5¼" drives used on the PC.

[24.1.8].....

**● A SUCCESSFUL PC UPGRADE WITH THE HARDCARD**

**W**e've heard from an LBL employee who attests to the fact that it sometimes costs less to go top-of-the-line. This individual, after hearing my sad saga of upgrading my PC, decided to go first-class and ordered a 20 Mbyte **HardCard** manufactured by Plus Development Corporation. This is the company that introduced the hard-disk on a card.

The installation went very smoothly. The only complaint was the absence of a red light to indicate disk access. When the vendor's software is installed there is no longer a problem; disk activity is indicated by a plus sign in the upper right corner of the monitor. (One can alternatively select a beeping sound to indicate disk activity).

The **HardCard** from Plus Development Corp is very quiet, comes with excellent documentation, and is a very high-performance disk drive (comparable to IBM PC-AT). Using a standard disk performance test, the **random seek** times for various drives are as follows:

system+	time
PC <b>HardCard</b>	44ms.
AT	35ms
PC/XT	85ms
PC Tandon Drive	100ns

[24.1.9].....

**● IBM PC-AT SPEEDUP**

**I**f you have an original IBM AT (6 Mhz) and would like to get more performance from it, here's a simple inexpensive fix. Have an RTSG technician (x6411), install a faster master clock crystal. The original AT comes with a 12 Mhz socketed crystal. It is relatively simple to replace this crystal with a 16 Mhz crystal (the part costs only about \$5.00). The CPU chip will then run at 8 Mhz, the same speed as the enhanced AT. It seems that virtually all ATs will run (and indeed were designed to run) at the faster speed. Some of IBM's internal documentation refers to the 8 Mhz speed for the AT. We have tested the faster speed crystals in a fair number of AT's with good results. Operations which are compute-intensive (such as recalculating a LOTUS spreadsheet or running a FORTRAN number cruncher) will run about 30% faster. Operations which are I/O bound (reading and writing to the disks) will not see as much improvement.

There is a small percentage of AT's that cannot be modified in this way. If the ROM BIOS date is anything but June 10, 1985, you should not have any problem. The Norton Utility SI can easily determine what the ROM date is (as well as give a measure of the performance relative to an IBM PC - 5.0x before the speedup and 7.1x after the speedup).

Another significant speedup *FOR SOME APPLICATIONS*: install an 80287 math co-processor. If your use of the AT involves math operations (such as FORTRAN or PASCAL programs or LOTUS 1-2-3 spreadsheet calculations), you could see a significant (5 - 10x) speedup in your work. The 80287 chip costs about \$175 and plugs into a socket on the motherboard.

For more information, contact WKSG member Dan Van Zile (x5589).

[24.1.10].....

● SOFTWARE RATINGS

**T**he Workstation Group subscribes to a monthly **RATINGS NEWSLETTER** that does a comprehensive testing and evaluation of the more popular PC programs in a selected category. For example, the December 1986 issue evaluated Free Form Graphics Programs. Included in the 58-page report were evaluations of **DRAW** programs and **PAINT** programs. Business Graphics programs were evaluated in the November 1986 issue. If you wish to see how a favorite software package is ranked by the "experts", contact Maggie Morley (x5529) at the Computing Library for a short-term loan of the **RATINGS NEWSLETTER**.

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**MAC NEWS**

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[24.1.11].....

● **MACINTOSH UPGRADE FOR MICROSOFT WORD**

**T**he Workstation Group will be handling upgrades for MicroSoft **WORD** for the Macintosh. Price: \$50 if date of purchase is before October 1, 1986 -- \$25 if date of purchase is October 1, 1986 or after. We have ordered several copies of the upgrade and expect delivery late this month. To get your copy, contact the Workstation Group (x6858).

[24.1.12].....

● **MACINTOSH UPGRADE FOR MICROSOFT EXCEL**

**T**he Workstation Group will also be handling upgrades for Macintosh **EXCEL** to Version 1.03. This product should be available in the middle of this month at a cost of \$12.50. To get your upgrade, contact the Workstation Group (x6858).

[24.1.13].....

● **SCHOLAR'S WORKSTATION BACK IN BUSINESS**

**A**fter a hiatus of several months, the Scholar's Workstation, UCB's Macintosh Store, is now open for business. Currently located at 203 Moffitt Library, it offers educational discounts for Macintosh products (for example, the new MicroSoft **WORD** will be available from these folks for less than \$100). Call 642-8424 for pricing and availability.

[24.1.14].....

● **SIGN UP FOR THE NEWSLETTER!!**

**A**ttention LBL employees: If you are a new owner or user of a PC or a Mac, you should sign up to receive the Laboratory's Computing Newsletter, which has a helpful **Workstation News** section, supported by the Information and Computing Sciences Division's Workstation Group. This section offers support and helpful hints for PC users. It's also a place for you to send questions and comments.

Contact Workstation Member Maggie Morley, (x5529), to add your name to the Newsletter Mailing List.

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JANUARY 1986 to DECEMBER 1986

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