TERMINAL, TERMINAL, WHO'S GOT A TERMINAL

This summer, we at UCC are making some significant changes in our public and private RJE network. We hope to improve our service to you by reallocating old resources (and providing some new ones) and by offering a new service to private users of the network. We outline here the nature of the changes and our rationale for the decisions we have made. As always, your comments are welcomed.

Public RJE Changes

We will remove four East Bank and two St. Paul campus Univac 1004 RJEs during July. One 1004 has already been removed from the West Bank and two from the East Bank campus. These Univac 1004s have served us well for 10 years, but the cost of maintaining their aging discrete component CPU design (circa 1960) has become exorbitant. Also, the UCC SUPIO program that supports their interface to the system would need major revision to accomodate our newer service (described below). The cost of this significant software development would exceed its usefulness. Therefore, all support for the Univac 1004 will be dropped by July 1, 1983. We will continue to provide support for UT-200 as well as several other RJE protocols described below. We will also remove sixteen keypunches, one card sorter, one verifier, and one duplicator. We have revised the list of public lab sites that appears in each issue of the *Newsletter* to accurately reflect the labs we anticipate will be available on July 1, 1982. The 1004s will be removed from Mines and Metallurgy, Territorial Hall, Electrical Engineering, and Zoology on the East Bank. Those to be removed from the St. Paul campus have not yet been determined. All the keypunch equipment in Experimental Engineering (with the exception of four five-minute-limit machines for error correction in room 131) will be removed.

To offset these reductions, we will upgrade two existing 1004 sites, provide a new keypunch facility, and increase the number of public terminals available through our research cluster program (announced in the May *Newsletter*). We will expand the sites in Kolthoff and Elliott Halls to include two fully connected 1004s. This redundancy will provide quick backup if one machine goes down. The throughput will also be doubled at these sites. Four new keypunches will replace the two old ones in Kolthoff Hall. A new keypunch facility with four machines will be installed in 38 Electrical Engineering. We may move the new PDP-11 in 130 Experimental Engineering to a more convenient location if we can find an appropriate space. A new PDP-11 based RJE is being installed in Folwell Hall.

Just a couple of users at UCC's Folwell Hall research cluster.

Research Clusters

In addition to the existing public access research clusters in Folwell Hall and Social Sciences, three new clusters are planned. One will replace the 1004 in Physics. Another will be installed in Experimental. The location of the third will be determined by our experience with the operations of the first four. Each cluster consists of three VT-100 terminals directly connected at high speeds to the Shepherd Labs VAX/VMS, the Cyber 730 + 74 + Cray computers, and a medium speed MX-100 printer (with graphics capability). One terminal each at the Physics and unallocated sites will have graphics capability. All three at the Experimental Engineering site will be equipped for graphics. These research clusters are open to the public. They are financed by adding a $1.55/connect hour surcharge to the connect time you use while on the terminal.

New Service

We will add a new service in the near future. This service, support of the IBM HASP RJE terminal protocol on the Cyber 730 + 74 + Cray system, will be of interest to those of you who have your own microcomputer or RJE equipment and want to connect it to the UCC network. By obtaining Control Data's RBF software package, we have made this protocol available to those who cannot currently communicate with the network because their equipment lacks the protocol. WRITEUP(RBF) documents the use of HASP and other protocols through RBF. If you require other protocols (such as 3780 or higher speed service), or would like to begin using HASP immediately, please call Joe Cornell, 376-2703, to discuss it. *(Joe Cornell, 376-2703)*

CONTENTS

The University of Minnesota adheres to the principle that all persons shall have equal opportunity and access to facilities in any phase of University activity without regard to race, creed, color, sex, national origin or handicap.

SYSTEM NEWS/NOTES

Microcosm

MICRO GROUP NEWS

COM, UCC's microcomputer communications program, is currently available for a variety of different computers, including the Terak under the MMOS operating system and the Apple UCSD operating system. Under the CP/M operating system, COM is available for the Xerox 820, Zenith 89, Vector Graphics, and Osborne. You may purchase all versions at the Computer Store, 211 Experimental Engineering.

The UCC microcomputer plotter library is now available for the Xerox 820. This library provides a set of Pascal procedures for use with the Houston Instruments Hi-Plot plotters. It is also available from the Computer Store.

An all-University purchase agreement has been arranged for IBM Personal Computers; you can get details from the Micro Group. We hope to have most of our software available for the IBM later this summer. (*Michael D. Collins, 376-8806*)

USER CARD PRICE CHANGE

Effective immediately, all microcomputer user cards (student, faculty, and staff) will cost $10/quarter. You can use the same card for both summer sessions; cards for all other quarters will cost $10 each. This is a substantial price reduction for faculty and staff. Cards are available at the Computer Store, 211 Experimental Engineering.

Cyber Notes

NO MORE FREE GUIDES

During the past few years, we have steadily expanded and improved the Cyber Guides to Interactive and Batch Computing. We believe that these *Guides* are excellent publications, providing you with pertinent and accurate information about the UCC Cyber systems. We have given the *Guides* to you, without cost, in 140 Experimental Engineering and through various short courses.

Because we have been affected by the budget cuts applied to all University units, we unfortunately can no longer distribute these booklets free of charge. Both *Guides* are now available only at our Computer Store, 211 Experimental Engineering, and through certain UCC short courses. The *Guides* are priced at $1.20 each.
(Mary C. Boyd, 373-4599)

LONG LINE XEDIT

We have placed a new version of XEDIT on the Cyber systems (including MERITSS) as a FETCH package. This version allows you to edit files with lines up to 500 characters long. You can use it by entering the following control statements:

```
X,FETCH(XED500)
X,XED500(filename)
```

Effective Graphics for Engineers and Scientists

Introduction

This month we are taking a slightly different approach to our series on TELL-A-GRAF and DISSPLA graphics. In the May *Newsletter*, we introduced you to TELL-A-GRAF and DISSPLA, pointed out their ease of use, variety of formats, reasonable costs, and applicability in many areas. The June *Newsletter* discussed TELL-A-GRAF's ability to pro-duce graphs useful to statisticians for viewing data and related statistics. This month, we are reprinting an article from *IEEE Computer Graphics and Applications* that offers a useful set of hints for creating effective graphics from data collected in engineering or scientific applications.

The Display of Engineering and Scientific Data

James E. George, Mesa Graphics, and Anders Vinberg, Integrated Software Systems Corporation

Computer graphics has been used to display engineering and scientific data for a number of years. Early uses included graphing of simple functions or experimental data as an aid to understanding complex models. Significant improvements in graphics system capability have occurred since such early uses. Here, we will follow a typical engineering problem and analyze a number of "graphical" solutions to it, in order to show how state-of-the-art computer graphics can aid engineers, scientists, and problem solvers.

The Problem

Suppose that an engineer has run a simulation or experiment and obtained data for temperature variation as a function of distance from the corner of an object (Table 1).

This table is only 15 X 15 and is not as complicated as data obtained in many engineering applications. But even this small data set, as presented, challenges our understanding of the experiment.

Solution 1

This solution is typical of early computer graphics. All of the data has been plotted as an aid to problem solving; each curve represents one row of Table 1.

Tables are a compact and effective way to *present* data. Graphics, however, are effective for aiding the *analysis* of data, but only if the graphic image has been carefully planned.

Solution 1 violates several principles of effective communication—there are too many line types and symbols; the lines are too narrow; the lettering is of poor quality. The greatest problem is that the annotation dominates the data.

Solution 2

The solution shows the improvement provided by a better character set—here, one developed by Alan Hershey and available from the National Bureau of Standards. (1) This set, in which characters are defined as line strokes, helped computer graphics to become more widely accepted. The line stroke structure of such characters becomes apparent only when they are used in large sizes.
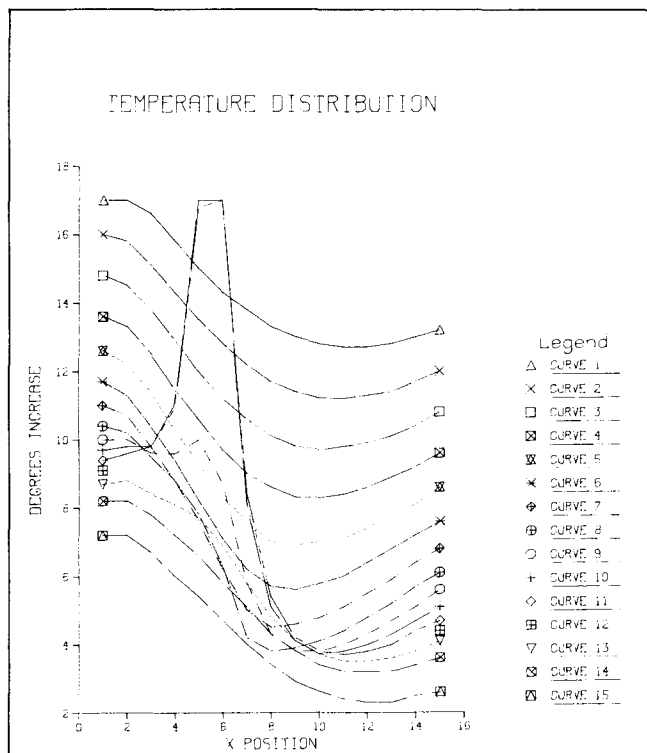
Although Solution 2 provides characters of better quality, the basic problem persists—the annotations dominate the data.
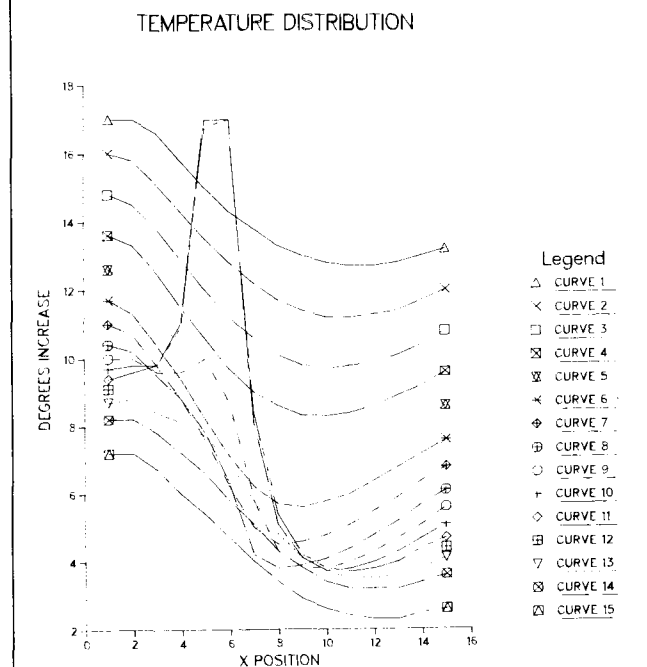
Solution 3

Solution 3 shows the effect of using typeset-quality characters. Unfortunately, the heavier, more impressive

Table 1														
17.0	17.0	16.6	15.8	15.0	14.3	13.8	13.3	13.0	12.8	12.7	12.7	12.8	13.0	13.2
16.0	15.8	15.1	14.3	13.5	12.8	12.2	11.7	11.4	11.2	11.2	11.3	11.4	11.7	12.0
14.8	14.5	13.8	12.9	12.0	11.2	10.6	10.1	9.8	9.7	9.8	9.9	10.1	10.4	10.8
13.6	13.3	12.5	11.5	10.6	9.7	9.0	8.6	8.3	8.3	8.4	8.6	8.9	9.2	9.6
12.6	12.2	11.4	10.3	9.3	8.3	7.6	7.0	6.9	7.0	7.1	7.4	7.8	8.1	8.6
11.7	11.3	10.4	9.4	8.2	7.1	6.2	5.7	5.6	5.8	6.0	8.4	6.8	7.2	7.6
11.0	10.7	9.8	8.8	7.6	6.2	5.0	4.5	4.6	4.8	5.1	5.5	5.9	6.4	6.8
10.4	10.2	9.5	8.8	7.8	6.3	4.2	3.8	3.9	4.1	4.4	4.8	5.2	5.7	6.1
10.0	10.0	9.6	9.6	10.0	8.7	5.8	4.3	3.8	3.8	4.0	4.3	4.7	5.1	5.6
9.7	9.8	9.8	11.0	17.0	17.0	8.1	5.1	4.1	3.7	3.8	4.0	4.3	4.7	5.1
9.4	9.6	9.8	10.9	16.8	17.0	8.4	5.4	4.2	3.8	3.7	3.8	4.0	4.4	4.7
9.1	9.2	9.1	9.3	9.9	9.1	6.9	5.2	4.2	3.8	3.6	3.6	3.8	4.1	4.4
8.7	8.8	8.4	8.1	7.7	6.9	5.8	4.8	4.1	3.7	3.5	3.5	3.6	3.8	4.1
8.2	8.2	7.8	7.2	6.6	5.8	5.1	4.3	3.8	3.4	3.2	3.2	3.2	3.4	3.6
7.2	7.2	6.7	6.0	5.4	4.7	4.0	3.4	2.9	2.6	2.4	2.3	2.3	2.5	2.6

TEMPERATURE DISTRIBUTION

DEGREES INCREASE

X POSITION

Legend
△ CURVE 1
✕ CURVE 2
☐ CURVE 3
⊠ CURVE 4
✕ CURVE 5
✕ CURVE 6
◈ CURVE 7
⊕ CURVE 8
○ CURVE 9
+ CURVE 10
◇ CURVE 11
⊞ CURVE 12
▽ CURVE 13
⊠ CURVE 14
⊠ CURVE 15

Solution 1

TEMPERATURE DISTRIBUTION

DEGREES INCREASE

X POSITION

Legend
△ CURVE 1
✕ CURVE 2
☐ CURVE 3
⊠ CURVE 4
✕ CURVE 5
✕ CURVE 6
◈ CURVE 7
⊕ CURVE 8
○ CURVE 9
+ CURVE 10
◇ CURVE 11
⊞ CURVE 12
▽ CURVE 13
⊠ CURVE 14
⊠ CURVE 15

Solution 2

characters make the data even harder to perceive.

Solution 4

Two adjacent rows of Table 1 have been selected for comparison in Solution 4. The graph indicates a large temperature rise between these rows. Bold characters emphasize a title that calls out a specific interpretation of a subset of the data, and thick curves emphasize that subset. Additionally, the axes have been de-emphasized, so that the viewer notices the data before the annotations.

Solution 5

Here, shading between the two curves used in the preceeding solution emphasizes an area of unusually high temperature. Simple line plots are not effective in locating areas, like this one, that share similar character- istics. Note that this graph would have been even more effective if the X axis—indicating distance—had been restored. Without it the location of the hot spot is unclear.

Solution 6

Solution 6 is a contour graph derived from Table 1, with the contours representing lines of constant tempera- ture. It clearly shows a temperature increase in the upper left corner, a hot (or cold) spot, and the location of that spot.

Note our comment, "or cold." Without appropriate annotations on the contours representing the spot, it is impossible to tell if it is a hot or cold area. Yet, if such annotations had been added, they would have obscured the contours.

Solution 7

This solution presents the data as a three-dimen- sional, perspective view of a surface, with hidden line removal. The hot spot shows up clearly as a peak—we know it is hot because it IS a peak and not a valley.

This graph provides information about both location and intensity, but lacks annotations to tell the viewer what the actual temperature values are. Moreover, be- cause the data is modeled as a 3-D "wire-frame" surface, some detail is lost behind the peak.
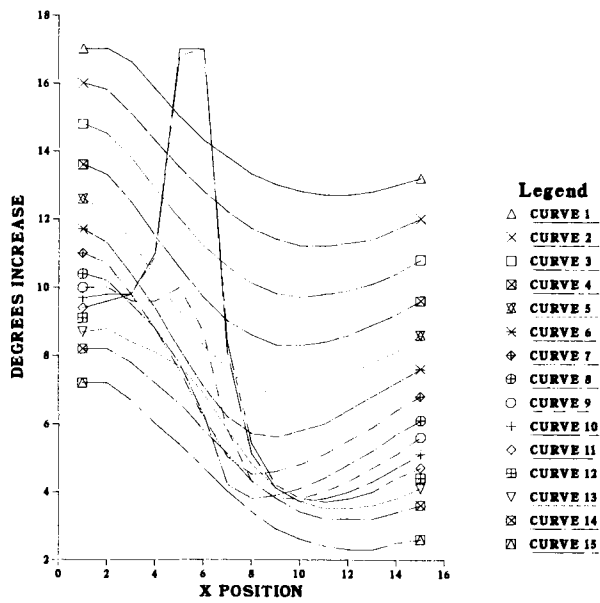
Solution 8

Solution 8 is a composite of Solutions 6 and 7. It provides information about the location and intensity of the spot and about the distribution and value of tempera- ture. Most important, it presents this information without clutter—there are no superfluous graphics or annota- tions.

Other Solutions

These solutions illustrate various ways to present data. There are others, as suggested in various books and articles on graphical presentation. (2-4) Experiments with nontraditional graphics—such as kiviat diagrams (5), faces (6,7), and trucks (6)—have been carried out and may be of interest. Finite element analysis is often used in engineering; its output can be used to create elaborate line or shaded images (8).
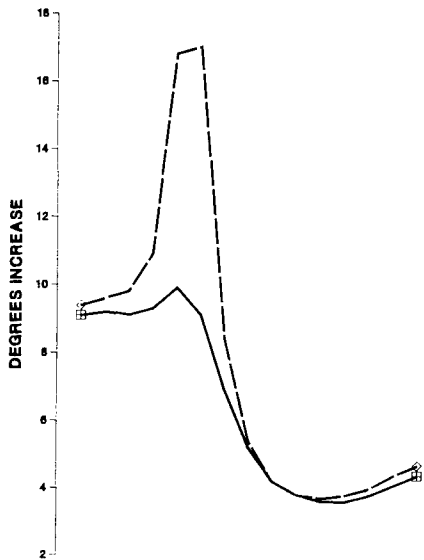
In chemical engineering, it is often useful to be able to visualize the molecular model—spectacular shaded im- ages, movies, and stereo pairs have been generated (9).
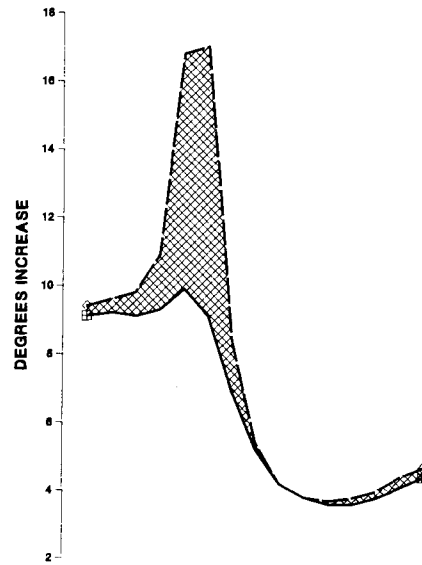
TEMPERATURE DISTRIBUTION

Legend

△ CURVE 1
✕ CURVE 2
☐ CURVE 3
⊠ CURVE 4
⊠ CURVE 5
✳ CURVE 6
✦ CURVE 7
⊕ CURVE 8
○ CURVE 9
+ CURVE 10
◇ CURVE 11
⊞ CURVE 12
▽ CURVE 13
⊠ CURVE 14
⊠ CURVE 15

DEGREES INCREASE

X POSITION

Solution 3

FAST TEMPERATURE RISE

DEGREES INCREASE

Solution 4

LOCAL HOT SPOT
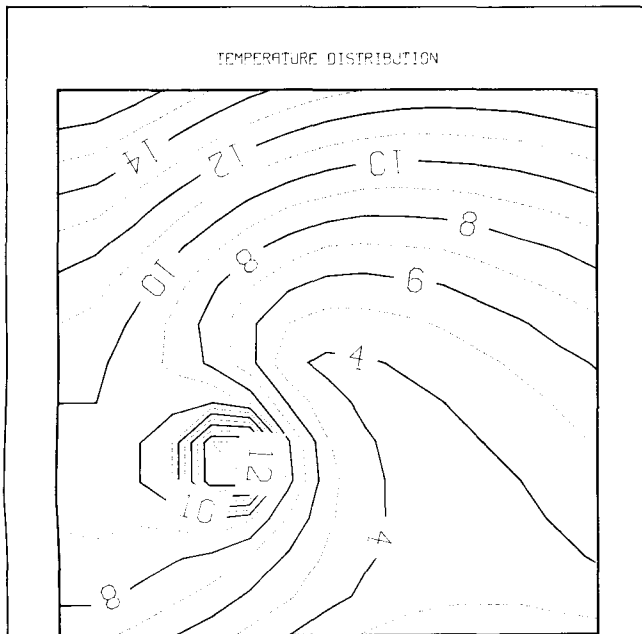

DEGREES INCREASE

Solution 5

Graphics with simple line plots and high-quality text have been heavily used in engineering applications. Recent applications are beginning to utilize shaded images(10), sometimes in real time for realistic simulations (11,12). Three-dimensional techniques have been combined with two-dimensional graphing, as in our Solution 8. An exciting revolution is occurring in the form of desktop computers with graphics capabilities (13). Given such developments, engineers and scientists should not limit themselves to graphics systems which cannot produce publication-quality output and cannot handle a variety of graphical displays. With state-of-the-art systems, they can readily produce line, linear, log, bar, pie, contour, and 3-D plot surface plots.
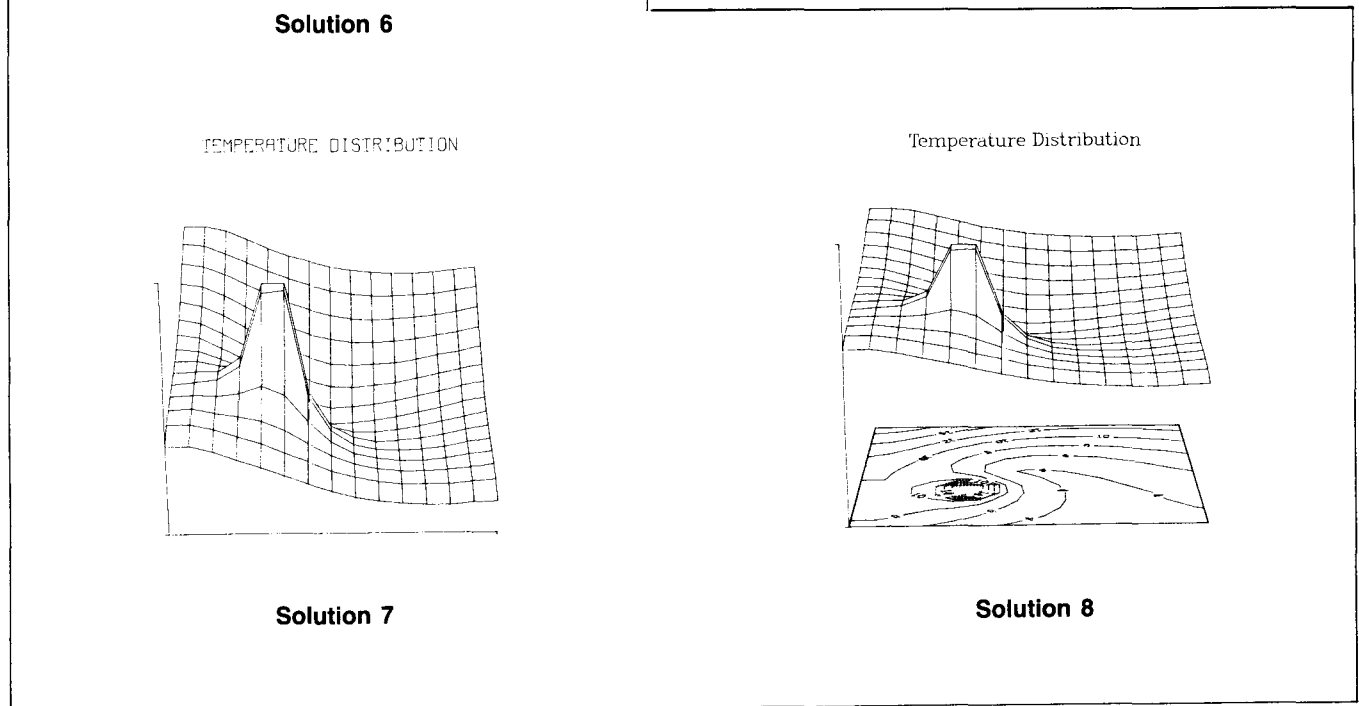
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1. N.M. Wolcott and F.L. McCrackin, "A Fortran IV Program to Draw Enhanced Graphic Characters," *Computer Graphics*, Vol. 11, No. 2, Summer 1977, pp. 121-127.
2. J.D. Foley and V.L. Wallace, "The Art of Natural Graphic Man-Machine Conversation," *Proc. IEEE*, Vol. 62, No. 4, Apr. 1974, pp. 462-471.
3. Anders Vinberg, "Computer Graphics: Coming of Age," in *The Electronic Office*, Auerbach Publishing, Pennsauken, NJ, Oct. 1979.
4. C.F. Schmid and S.E. Schmid, *Handbook of Graphics Presentation*, John Wiley and Sons, New York, 1979.
5. Michael F. Morris, "Kiviat Graphs and Single Figure Measures," *Computerworld*, Feb. 9, 1976.
6. Lawrence A. Bruckner, "Computer Drawn Figures-A New Tool for Data Analysis in Management Planning and Decision Making," Tech. Report LA-UR-78-1726, Los Alamos Scientific Laboratory, Los Alamos, NM, 1978.
7. Peter C. C. Wang, ed., *Graphical Representation of Multivariate Data*, Academic Press, New York, 1978.
8. Bruce Eric Brown, "Computer Graphics for Large Scale Two- and Three-Dimensional Analysis of Complex Geometries," *Computer Graphics*, Vol. 13, No. 2, Aug. 1979, pp. 33-40.
9. Nelson L. Max, "ATOMLLL: ATOMS with Shading and Highlights," *Computer Graphics*, Vol. 13, No. 2, Aug. 1979, pp. 165-173.

Graphics to 69

TEMPERATURE DISTRIBUTION

Solution 6

TEMPERATURE DISTRIBUTION

Solution 7

Temperature Distribution

Solution 8

a	α	A	A	alpha
b	β	B	B	beta
g	γ	G	Γ	gamma
d	δ	D	Δ	delta
e	ϵ	E	E	epsilon
z	ζ	Z	Z	zeta
h	η	H	H	eta
q	θ	Q	Θ	theta
i	ι	I	I	iota
k	κ	K	K	kappa
l	λ	L	Λ	lambda
m	μ	M	M	mu
n	ν	N	N	nu
x	ξ	X	Ξ	xi
o	o	O	O	omicron
p	π	P	Π	pi
r	ρ	R	P	rho
s	σ	S	Σ	sigma
t	τ	T	T	tau
u	υ	U	Υ	upsilon
f	ϕ	F	Φ	phi
c	χ	C	X	chi
y	ψ	Y	Ψ	psi
w	ω	W	Ω	omega

Equivalent English and Greek alphabet characters. Access to Greek alphabet characters is available with Scribe's @g(text) command.

Text Processing

SCRIBE GREEK

Scribe now lets you use Greek characters in a document printed by the Xerox 9700 laser printer. This means that you can now quote your favorite Greek philosopher in the original and, using Scribe's superscript and subscript facilities, you can produce simple equations that incorporate Greek symbols. Access the Greek alphabet with the @g(text) command. The table above lists the Greek alphabet characters and their English equivalents recognized by Scribe.

To get the Xerox 9700 to print an uppercase Greek alpha, for example, just type @g(A) into your text file. Note that if you send a Scribe file with @g commands in it to any printing device other than the Xerox 9700, you will get English characters in place of Greek. The punctuation marks . , ; : ' ! remain unchanged in the @g environment. The Xerox 9700 service bureau is in the process of adding diacritical marks to the Greek character set. We will announce them in the UCC *Newsletter* when they are available.

WORDSTAR WORKSHOP

Has your department purchased a Xerox 820 microcomputer to use in the office? Are you running the WordStar program for office word processing? Do you have some questions about how WordStar works and how you can get the most out of it? If you answered yes to all three questions, have we got a deal for you! Elaine Collins will offer a WordStar workshop Wednesday, July 14, 9:30-11:30 a.m. in 113 Shepherd Labs. She will address such questions as: how the word processor works, what CP/M commands you need to know, and what optional programs (such as DataStar and Mail-Merge) are available to use in conjunction with the word processor. Because of space limitations, participation in the workshop will be limited to 20 people. Please call us at 376-2943 to reserve a place if you would like to attend.

IMS Journal

SYSTEM 2000

In keeping with our policy of providing information on the more obscure or puzzling parts of some of our products, here is another in a series of hints on System 2000.

Physical vs. Logical Order (Data Sets)

Data sets in a System 2000 data base reside in both a physical (or tree) order and a logical order. You have control over the logical order by using trace notation or BEFORE/AFTER conditions when you insert new trees. You cannot control the physical order upon input; in most cases it takes the form of the sequential order of data input. You should note that basic System 2000 com-

mands operate on either the physical or logical order of data. Printing data using the PRINT <RG no.> command prints data sets in a physical order (i.e., the order they were inserted into the data base), regardless of the logical order you specify.

If you issue the following commands:

```
INSERT TREE C23*1 EQ 24*B*END* WH ...:
"   "      "  "  C23*1 EQ 24*A*END* WH ...:
"   "      "  "  C23*0 EQ 24*D*END* WH ...:
"   "      "  "  C23*3 EQ 24*C*END* WH ...:
```

The order of data input is B, A, D, C (values of C24). Issuing the PRINT C23 WH ... command produces the following:

```
24*C
24*D
24*A
24*B
```

The last data item input (value "C") is the first data item printed. The logical order specified by the partial trace notation (positional numbers following C23) is different. "B" is inserted in the first position, "A" is inserted in the first position and "B" becomes second, "D" is inserted in last position, and "C" is inserted in the third position. To print this logical order, you must use the BY clause (to Level 0 for a Level 1 RG).

```
PRINT BY ENTRY,C23 WH SAME:
   24*A
   24*B
   24*C
   24*D
```

People have called our HELP-Line in the past and asked why a PRINT statement does not print data in the order they specified on input. The use of a BY clause will produce the output in logical order. The AT operator (EXISTS AT 1, EXISTS AT 3, etc.) also operates on the logical position of data sets.

SIR—VERSION 1 TO VERSION 2

As we mentioned in a previous *Newsletter*, SIR Version 2 is now available on the Cyber 730, 74, and MERITSS. You may access it with the following commands:

```
RFL(100000)
FETCH(SIR)
REDUCE(-)
SIR.
```

Version 1 data bases are not compatible with the new version. The following section describes the version 1 TRANSPORT utility, which provides a path from version 1 to version 2. We plan to make SIR version 2 the current version in fall quarter 1982.

TRANSPORT

The TRANSPORT FILE utility is now available for SIR users. It copies a SIR Version 1.1 data base into a temporary "export" file, which is then used to create a Version 2 data base. The export file divides the data base into three sections: the schema definition, the procedures, and the data.

The command format is:

```
TRANSPORT FILE FILENAME = lfn /
          ERRLIM = n /
          NEWFN = data base name /
          NEWPW = password /
          REJECT = ALL or
              MISSING, RANGE, VALID /
          NOPASSWORDS /
          NOREWIND /
```

To use this command, either prefix it with an "X" from the SIR editor, or create a batch job. You must enter all options on the same line if they are entered interactively. The TRANSPORT FILE utility is used with SIR Version 1.

The next step involves the creation of a Version 2 data base from the TRANSPORT file. You cannot create the new data base if the old data base (Version 1) exists. You must either purge the old data base, or rename it through the TRANSPORT FILE parameters. The commands used to create a new data base, then, are as follows:

```
RFL(100000) [field length - sample amount]
FETCH(SIR)
REDUCE(-)
SIR. IN = export filename
```

The control statement parameter "IN" follows the period and defines the input file. The import utility will process a large number of record types more efficiently if it is run with as large a field length as possible to keep the tables in core during data processing. The field length we give here is just an example; the field length appropriate for your application will depend on the size of your data base.

The option clauses available with the TRANSPORT FILE command are as follows: FILENAME specifes a new export file name. If this is omitted, the file name EXPORT will be used. ERRLIM selects an upper limit on the number of data errors that will be printed. NEWFN and NEWPW specify a new data base name and password. REJECT selects conditions upon which records will be rejected. The option NOPASSWORD results in no passwords (data base or security) written to the export file. NOREWIND specifies that the export file is not to be rewound before and after processing.

The REJECT options are available as a control over some of the changes that TRANSPORT FILE makes to the data base. SIR Version 1.1 allows some irregularities that are not permitted in Version 2. For example, missing values, variable ranges, and valid values could be redefined in a schema modification without affecting the existing data. Also, data entered in a RETRIEVAL UPDATE were not checked against the valid values. Through TRANSPORT FILE, any violation of VAR RANGES or VALID VALUES for a variable will set its values to "undefined" on the export file. The REJECT option rejects any records that violate either the RANGE or VALID values. If the missing values of a variable match its data value, the value will be set to the approriate value on the export file. The MISSING clause on the REJECT option rejects any records that contain missing value violations.

Another irregularity allowed the "key value" of a CASEID or SORTID variable to differ from the "data

value" with a RETRIEVAL UPDATE. The TRANSPORT FILE always uses the key value of a CASEID or SORTID, and the data value is ignored. String values for these variables in Version 1 were zero-filled and in Version 2 are blank-filled. This may cause two or more IDs to map into the same value. If Version 2 encounters more than one case or record with the same key, the first is accepted and the remainder are rejected.

Changes to the schema portion of the data base include the command NEW FILE instead of FILE NAME. The command CAT VARS is used instead of VALID VALUES. Date and time maps in the DATE VARS and TIME VARS commands are enclosed in quotes.

The procedures stored within the data base are transferred, but they are not converted to Version 2 formats. For example, FOR EACH REC is not a valid command in Version 2 and must be changed to PROCESS REC - with END PROCESS REC at the end of block. You may nest PROCESS REC blocks to allow access within hierarchies. And note the new PERFORM PROCS command, which transmits the summary record to the procedures. The MOVE VAR LIST command is changed to MOVE VARS. The FOR EACH CASE command is replaced by PROCESS CASES (with END PROCESS CASES at the end).

Call our data base HELP-Line (376-1761, 1-3 p.m. Monday through Friday) for further information.

(*Information Management Systems Group*)

Cray News

THE CRAY TIME SHARING SYSTEM

To provide more secure and productive service on the Cray, we are investigating the Cray Time Sharing System (CTSS). CTSS offers direct interactive access to the Cray without a need to learn the job control language of a front end machine. If our preliminary evaluation is positive, we will establish user CTSS test periods in August. If you have any CTSS experience or comments to offer, positive or negative, please send them to Bill Sackett at UCC.

CTSS is a descendant of LTSS, an operating system written by Lawrence Livermore Labs in 1969 for a CDC 7600. It was brought into production on a Cray in 1978. The conversion, done by the National Magnetic Fusion Energy Computer Center (MFE), was aided by the fact that it is written in a systems programming version of FORTRAN. CTSS is also running at Los Alamos National Labs (LANL) and at the Air Force Weapons Lab (AFWL). The AFWL system has added features such as ACQUIRE and DISPOSE to make the conversion from COS to CTSS a little easier. A preliminary (because of references to features at AFWL, MFE, and LANL that will have to be changed for UCC) writeup has been placed on the Cybers. See WRITEUP(CTSS) for the index. WRITE-UP(CTSS = WHY) offers some of the reasons we are considering CTSS, including some of the pros and cons involved. WRITEUP(CTSS = WHAT + PRIMER) is a good place to find information about the history and characteristics of CTSS. (*Bill Sackett, 612-376-5602*)

PASCAL ON THE CRAY

A version of Pascal that originated at Los Alamos National Laboratories is now available on the Cray-1. We will support this COS version of the compiler should we decide to run CTSS on the Cray. This Pascal implements nearly all the standard Pascal as defined in Jensen and Wirth's *Pascal User Manual and Report*, as well as several additional predeclared functions and procedures, including most of those provided in Pascal 6000-3.4. The compiler system is the "P2" compiler. It was implemented on the Cray-1 by John Montague of LANL for CTSS, and later modified by Dennis Ellis of Cray Research Incorporated to run under COS.

The user interface is:

PASCAL/H,INPUT = source,OUTPUT =
    listing,B = binary,LIST = on/off/l.

The default for INPUT is $IN, for OUTPUT it is $OUT, the default for B is $BLD, and the default list is ON. For a writeup on the Cybers with more information about Pascal, see: WRITEUP(CRAY = PASCAL). (*Bill Sackett, 612-376-5602*)

All Systems Bulletins

TELL-A-GRAF/DISSPLA HELP-LINE

A TELL-A-GRAF/DISSPLA HELP-line has now been installed to aid you in using these packages at UCC. Call 376-2663 from 1-3 p.m. on Tuesdays and Thursdays with your questions. At other times, call the main HELP-line, 376-5592.

FOR SALE OR TRADE

1. Documation RM-600L card reader (600 cpm) with 1000 card hopper. Low mileage, excellent condition.
2. MDB card reader interface and cable for LSI-11 to Documation RM-600L card reader.
3. DEC M8 291 controller.
4. IBM 029 keypunch with A22 universal ASCII character set; excellent condition.

Contact Alan R. Ek, 373-0843.

Graphics from 66

10. Ellen M. Leonard, "Visual Simulation of Power Plant Emissions," Tech. Report LASL-79-21, Los Alamos Scientific Laboratory, Los Alamos, NM, 1979.
11. Richard Weinberg, "Computer Graphics in Support of Space Shuttle Simulation," *Computer Graphics*, Vol. 12, No. 3, Aug. 1978, pp. 82-86.
12. John A. Roese and Lawrence E. McCleary, "Stereoscopic Computer Graphics for Simulation and Modeling," *Computer Graphics*, Vol. 13, No. 2, Aug. 1979, pp. 41-47.
13. Paul Kirby, "Desktop Graphics," *Datamation*, Vol. 25, No. 5, May 1, 1979, pp. 164-170.

For additional information about or assistance with TELL-A-GRAF and DISSPLA, call the UCC HELP-line, 376-5592.

UCC SUMMER SHORT COURSES

NOS (permanent files), July 1 (Th)
2:15-4 p.m., Arch 45
NOS (program execution), July 2 (F)
2:15-4 p.m., Arch 45
^Interactive System Commands, July 6-8 (TWTh)
3:15-5 p.m., Arch 60
SPSS (basics), July 6 (T)
2:15-3:30 p.m., Arch 45
SPSS (data manipulation), July 7 (W)
2:15-3:30 p.m., Arch 45
SPSS (SPSS files), July 8 (Th)
2:15-3:30 p.m., Arch 45
SPSS (on-line), July 9 (F)
2:15-3:30 p.m., Arch 45
CP/M Software and UCC Systems, July 20-22 (TWTh)
10:15 a.m.-Noon, MechE 221
Beginning FORTRAN, July 20-29 (TWTh)
3:15-5 p.m., MechE 221
Introduction to VAX/VMS, July 12-16 (MTWThF)
2:15-4 p.m., AkerH 21
Graphics, July 19-28 (MW)
2:15-4 p.m., MechE 102
^XEDIT, July 26-28 (MW)
10:15 a.m.-Noon, MechE 102
Text Editing on VAX/VMS (EDT), July 20-29 (TTh)
1:15-3 p.m., MechE 102
Intro to System 2000 (DBMS), July 13-29 (TTh)
3:15-5 p.m., Arch 30
Pascal for Programmers, June 28-July 9 (MWF)
3:15-5 p.m., MechE 221
Intermediate FORTRAN, Aug 3-12 (TWTh)
3:15-5 p.m., AkerH 21
^Introduction to the Cray 1A, Aug 5 (Th)
3:15-5 p.m., AkerH 211
^COS (Cray Operating System), Aug 9-13 (MWF)
3:15-5 p.m., AkerH 211

NOTE: Caret (^) indicates this course is a prerequisite introductory course for other, unmarked courses.

Courses with the same name (e.g., NOS, SPSS) are designed as a sequence.

HOLIDAY: July 5 is a University holiday. No classes will be held.

NEW COURSE: CP/M Software and UCC Systems

This course is designed to provide users of a CP/M based microcomputer, such as the Xerox 820, with information about fully utilizing their micro in cooperation with the University's large computers. It will cover, in detail, use of the following software: WordStar, MailMerge, Data-Star, Access-80, and UCC's COM program.

SHORT COURSE FEES BEGIN IN FALL '82

Short courses offered by the University Computer Center are intended for our user community, although they are open to the public. Through the current summer session, courses are free, no registration is necessary, and no credit is given. We will require a fee and registration for short courses beginning in fall quarter, 1982. The registration fees are still much lower than those charged for similar courses elsewhere.

Short courses are divided into two categories: "Introductory Courses" (Column A), and "Electives" (Column B). Courses in each category include those listed below.

Column A (Introductory Courses)	Column B (Electives)
Computing: What Is It?	FORTRAN
Introduction to Computers	Pascal
Introduction to UCC	SNOBOL
NOS (Network Operating System)	COBOL
Interactive System Commands	COS (CRAY Operating System)
Text Processing: An Overview	CRAY FORTRAN Features (CFT)
Introduction to VAX/VMS	CRAY Assembly Language (CAL)
EDT (VAX/VMS Editor)	SPSS
XEDIT	SCSS
Introduction to the CRAY 1-A	Introduction to System 2000
Introduction to DBMS	SIR
Introduction to Programming	RIM
Graphics I: An Overview	PROSE
Introduction to Batch Computing	Scribe
Microcomputing	Text Processing on Micros
	Graphics II, III

Course registrants are divided into three categories: University students, University faculty/staff, and non-University users. Introductory courses have a fixed fee for each registrant category. Elective classes have a range of fees for each registration category, depending on the length of the course and the resources used. Fee ranges for these categories are as follows:

	Column A	Column B
Student	$10	$20-30
Faculty/Staff	$20	$30-50
Non-Univ. User	$30	$50-100

Registration will be done through the UCC Computer Store in Experimental Engineering, beginning in September. If you have questions about our short courses, call Jerry Stearns, 373-4360.

ST. PAUL COMPUTER CENTER SHORT COURSES

The St. Paul Computer Center will offer two short courses this summer. One course covers the statistical analysis system SAS, a comprehensive statistical package available on SPCC's IBM 4341. The other covers MUSIC, an interactive system. The MUSIC operating system allows you to edit and save files, submit batch jobs, or run jobs interactively. For those who would like to access SAS remotely via an interactive terminal, MUSIC allows you to submit jobs to SAS and get the output back on a disk file. The course schedule is as follows (classes meet on the St. Paul campus):

SAS July 12-16 (MWF) 3:15-5 p.m. 35 COB
MUSIC July 19-23 (MWF) 3:15-5 p.m. 35 COB

If you would like to be added to SPCC's mailing list, please call our main office, 373-0987. SPCC hours are 7 a.m.-10 p.m. Monday through Friday, and 8 a.m.-4:30 p.m. Saturday. The user room is located in 90 Coffey Hall; the SPCC HELP-line phone number is 376-4602 (10 a.m.-4 p.m.). (Ron Schultz, 373-0987)

PHONE NUMBERS

Budgets	373-2521
Computer-Aided Instruction	376-2975
Computer Hours (recorded message)	373-4927
Computer Store	373-4877
Consulting	
HELP-line	376-5592
9 a.m.-5 p.m., Monday-Friday	
Business Data Products	376-1761
1-3 p.m., Monday-Friday	
Statistics Packages	376-5062
1-2 p.m., Monday-Friday	
Data Bases	376-1761
1-3 p.m., Monday-Friday	
Microcomputers	376-4276
10-12 a.m. and 2-4 p.m., Monday-Friday	
Humanities	373-5780
10:30-11:30 a.m., Monday, Wednesday, Friday	
Contract Programming	376-1764
Data Base Applications	376-1764
Educational Services	376-3963
EDUNET Liaison	373-7745
Equipment Purchase	376-8153
Experimental Engineering I/O	373-4596
Field Engineering	376-7584
Field Engineering—Service Contracts	376-1313
Graphics Software	376-1849
HELP-line	376-5592
9 a.m.-5 p.m., Monday-Friday	
HOURS-line (recorded message)	373-4927
Image Processing	376-2895
Information, Experimental Engineering	373-4360
Information, Lauderdale	373-4912
Information Systems	376-1764
Instructional Labs	376-3963
Job Status, ExpEng (recorded message)	373-4994
Lauderdale Computer Room	373-4940
Lauderdale Operations Manager	373-4920
Lauderdale Services	373-4995
Lauderdale Services Manager	373-7538
Lauderdale Users' Room	373-4921
MECC Liaison	373-4573
Newsletter Subscription	376-4668
Permanent File Restoration	376-5605
Professional Services Division (PSD)	376-1764
Project Assistance	376-1764
Program Librarian	376-1636
Programming Languages	376-7290
Reference Room	373-7744
Remote Batch (RJE) Services	376-3963
Short Courses	373-4360
Shuttle Bus Service	376-3068
System Status (recorded message)	373-4927
Tape Librarian: see Lauderdale Services	
Text Processing Services	376-2943
User Accounts	373-4548
User Services	376-3963

OPERATING HOURS

	Cyber 74/730	Cray	MERITSS (Cyber 172)	VAX
M-F	8 a.m. - 4 a.m.	8 a.m. - midnight	7:45 a.m. - 1:30 a.m.	8 a.m. - 6 a.m.
Sat	4 a.m. - 5:15 p.m.	8 a.m. - 5 p.m.	7:45 a.m. - 1:30 a.m.	24 hours
Sun	4 p.m. - 1 a.m.	4 p.m. - midnight	4 p.m. - midnight	24 hours

PUBLIC LABS—TWIN CITIES CAMPUS

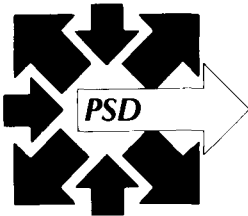| Location	Batch	Interactive	Micro	Location	Batch	Interactive	Micro
East Bank				*West Bank*			
Arch 160		X	X	BlegH 91T			X
CentH		X		BlegH 140		X	
ComH		X		MdbH		X	
DiehlH 270, 207		X		OMWL 2	X	X	
EltH 121, 125		X		SocSci 167		X*	
EltH N640	X						
ExpE 130	?	*		*St. Paul*			
FolH 14, 14a		X*	X				
KoltH S191	X			BaH		X	
LindH 25		X		BioSci 257	X?		
MasCan 39	X			ClaOff 125	X?	X	
MechE 308		X		McN	X?		
Physics 69		*		NorH 24	X?		
SanfH		X					
TerrH		X		*Lauderdale*			
VincH 4		X					
WaLib 204		X		Users Room	X		

* Research cluster; access to Cyber 730 and VAX/VMS
X in interactive column indicates access to MERITSS
? Unknown at the present time

University Computer Center Newsletter

User Services
227 Experimental Engineering
University of Minnesota
208 Union Street SE
Minneapolis, Minnesota 55455

July, 1982