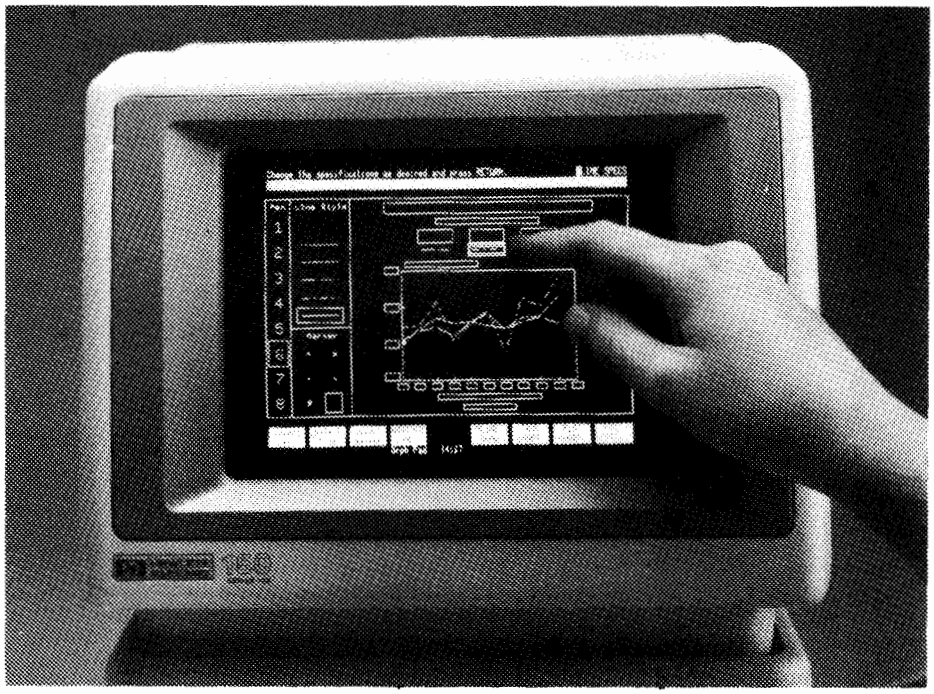
CROSSTALK Journal of Hewlett-Packard Technical Computer User Groups
OCT./NOV. 1983

The HP 150 Personal Computer



Touch makes applications programs like graphics easy to learn and use on the HP 150 personal computer.

Magic is the code name for Hewlett-Packard's personal computer project in Sunnyvale — and it fits. Something magical happens when you use the HP-150. The optical touch-screen trademarked as HPTouch goes beyond other pointing devices; it makes you feel that you have remarkable powers in your fingertips. It's almost as if the touchscreen turns your finger into a conductor between your mind and the computer.

What do you get when you take a powerful 16-bit personal computer, add an industry standard operating system, lots of integrated software packages, high resolution graphics, sophisticated data communications, built-in terminal capabilities, and a revolutionary touchscreen user interface.

You get HP's best personal computer ever! The HP 150 with HP Touch.

By using HP Touch, HP 150 users will be able to run computer programs with the touch of a finger or a pen. Instead of memorizing commands or typing in menu selection numbers, users can simply touch the display screen with the most familiar pointing tool available — the fingertip — to operate the HP 150 and its application programs.

The most unique feature of the HP 150 hardware is the touch sensitive display. Using infra red light beams, the display can detect any object down to the size of a pencil eraser (the resolution is 27 × 40 or every line by every other character).

The processor in the HP 150 is the Intel 8088-2, a 16-bit microprocessor with an 8-bit bus, running at 8 Megahertz. In general, 16-bit microprocessors allow more sophisticated programs to be written, run faster, and address a larger memory space than do the 8-bit microprocessors. This means that you get a more powerful computer, able to handle a greater part of your data processing needs.

The system comes standard with 256K of RAM memory and may be expanded to a maximum of 640K.

High resolution graphics is also standard with the HP 150. The green phosphor display has a resolution of 512 horizontal pixels by 390 vertical pixels, giving a 1:1 aspect ratio (that is, circles look like circles). Graphics software allows you to convert raw data to an easy-to-understand graph which may then

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HP Computer Museum
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be transferred to hardcopy via a plotter (7470A, 7475A) or graphics printer (82906A, 2674A).

The HP 150 keyboard is designed to provide a familiar interface to the system and minimize training time. The low profile keyboard shape, the sculptured keycaps, and the dished "home" keys help to make the keyboard comfortable to use. The Series 100 function keys are used by the system and by applications programs to increase the ease-of-use. With the HP 150, this capability is enhanced by the use of HP Touch. Each softkey can now be selected by pressing the key itself or by touching the key label on the screen.

The new integral thermal printer offers HP 150 users fast, quiet, high quality output. Text and graphics can be directed from the screen to the printer through the newly designed keyboard. The printer has been designed to be user installable in the HP 150 so that you can be running in about 5 minutes without sacrificing any desk space.

For the space conscious, the HP 150 is ideal. In the space of an open looseleaf notebook, you can get the system with its monitor, dual disc drives (either two 3½" floppies or a Winchester and 3½" floppy), and even the integral printer. In the race for space, the HP 150 is a clear winner compared to the competition. No other system on the market today offers this degree of power in such a small space.

We have provided all of this capability plus room to expand. There are two accessory slots on the back of the system which allow you to add accessories such as the extra memory, without the assistance of an HP representative or dealer. You can add accessories at the time of purchase, or start with a minimum system configuration and expand it as your needs change. Installation of accessories is a simple operation requiring an average of five minutes and can be performed by even the least technical users.

The ease-of-expansion extends beyond plug-in accessory boards. The 2647A integral thermal printer can also be installed by the customer in just a few minutes. Even the paper loads automatically. Two RS-232 ports and one HP-IB port are standard with the HP 150 so that when you want to add a new peripheral, it is simply a matter of plugging it in.

MORE ON THE TOUCHSCREEN

The HP Touch user interface will revolutionize the way people interact with computers. Touch is used heavily by the operating system and applications software. All of the HP applications will make use of it as well as many of the third party programs. And yet, if you don't want to use it, you don't have to. All commands and menu selections may also be performed through the keyboard. Also, if you want to point at the screen without invoking any action, you have the flexibility to turn off touchscreen with a single keystroke and turn it on again later when you are ready to use it.

. . . AND THE HP 150 IS AVAILABLE AS A TERMINAL TOO!

If you are a professional within a large organization you also have the benefit of the wide range of applications available for the HP 150. But, no doubt, you will also want to access the information stored on the mainframe within your organization. The HP 150 offers immediate access to the HP 3000 systems and other timesharing systems through built-in terminal capabilities. The HP 150 is completely compatible with HP 2623A Graphics terminal applications which make it a powerful graphics workstation to an HP 3000. Furthermore, accessories are available to let the HP 150 access information on an HP 3000 or IBM host system to be processed locally.

Whatever your computational needs — The HP 150 puts the answer at your fingertips!

HP 150 OPERATING SYSTEM AND UTILITIES

MS™-DOS 2.0 from Microsoft Corporation is the standard operating system for the HP 150. Perhaps the most popular operating system for 16-bit personal computers, MS-DOS has been adopted by many independent software suppliers as the operating system for their applications. This popularity assures that a large source of applications software will be available for the HP 150.

MS-DOS has been enhanced by HP to support the unique features of the HP 150. Access to the graphics facility, HP Touch and the system softkeys of the HP 150 is possible through MS-DOS.

PERSONAL APPLICATIONS MANAGER (PAM)

The Personal Applications Manager (PAM) is the standard user interface included with the HP 150. PAM provides a friendly interface to MS-DOS as well as the standard disc management activities. Once programs are installed into PAM, you need only touch the name of the application on the screen to run an application. In addition, PAM provides a File Manager which enables you to load data files by simply touching the screen.

PAM was designed to change the way people interact with computers. By taking full advantage of HP Touch, PAM enables you to operate the HP 150 without memorizing a single command or hitting a single key.

HP expects to have shipments of the first units in Australia in January with a wide range of packaged software available to go with them.

Dear Sir,

I received my company's copies of the July/August edition of CROSSTALK on the 6th September, 1983.

While a number of events in the "Coming Events" column might have proved interesting, there is little point in being told of their existence up to two months after the scheduled date.

Unless CROSSTALK can be delivered before, or at least during the period to which they refer, there would appear to be no point in receiving it or continuing with membership of the Users Group.

Additionally, if CROSSTALK contained an address for contributions or comments, correspondence would probably be more forthcoming.

Yours faithfully,
David Roper,
Account Manager

REPLY — Your points are well made, and there is a lot of room for improvement in the production of this newsletter. However, it should be understood that most of the preparation and collation of material is done by voluntary work and that the most time consuming part is obtaining material to include in CROSSTALK. Most issues of CROSSTALK have included the address for contributions. This address in most cases is also the address of your local Users Group.

— Editor

EDITORIAL

One of the frustrations of being President of a small group such as ours is the difficulty experienced in attempting to get people to contribute in any sense to the group's activities. People will always come along to meetings, or read newsletters, as long as someone else organises it.

Probably the most visible symptom of this laziness is the small number of user-written contributions in this newsletter. At a recent meeting in Melbourne between Corrado Di Qual, Bernie O'Shannassy and myself, we decided to appeal to everyone's better nature — that is, we are now offering bribes to write contributions.

Starting from the previous issue, contributors are eligible for the following prizes:-

(1) All published feature articles will attract a payment of **$25.00 per page** printed, irrespective of content. A feature article will be one which presents a major item of interest. Articles written by Hewlett-Packard personnel or extracted from other publications will be excluded.

(2) The best feature article for the year will **win** a HP16C calculator.

(3) Every other (i.e. non-feature) contributor will have his or her name placed in **a draw for another HP16C.** Each and every contribution will cause an entry in the draw. Thus, the more contributions you enter, the better your chances. Note that **all** non-feature contributions are eligible.

(4) All judging will be performed by Corrado, Bernie and myself.

(5) The winners will be selected in June 1984. They will have the option of the calculator or any other personal computer product to the same value.

So, go to it. Remember, everyone has the chance to win, and the more you write, the better your chances.

JOHN GWYTHER,
President,
Vic. HP1000 Users Group

PUZZLE PLACE

Thankyou again to those who have taken the time to submit solutions to our last puzzle. Published this issue is the solution to the last puzzle, submitted by Wayne Halls of Bundy Tubing.

PUZZLE SOLUTION

The relationships can be simplified by denoting, for example, truth as a positive variable and non-truth by a negative variable.

The relationships can then be set out thus:

A → B, -A → -B

C → -B, B → -C

C → D, C → -D , -C → D (but not -C → -D)

D → -B

Consider A, B telling truth.

AB → -C, → -D → -B But B cannot be both lying and telling the truth.

AC → B, → -C But C cannot be both lying and telling the truth.

AD → B, -C, D -B But B cannot be both lying and telling the truth.

BC → -B But B cannot be both lying and telling the truth.

BD → -C, → D → -B But B cannot be both lying and telling the truth.

CD → -B, → D → -B This is acceptable.

Hence C and D are both truthful.
B is lying and A is lying.

Note that the answer could have been found sooner by considering -A, -B.

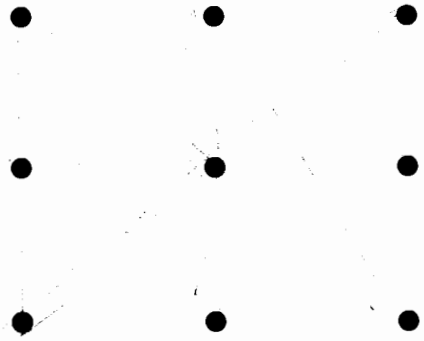
-A, -B → C → D → -B i.e., non-truth of A and B implies truth from C and D.

Wayne Halls,
Bundy Tubing Company (Australia) Pty. Ltd.

NEW PUZZLE:

For those who have seen it before, this issue's puzzle is a push-over. For those who have not, prepare yourself for a little mental, and pen and paper gymnastics. Below you will find three rows of three dots arranged in a square. The challenge is this:-

Drawing straight lines only and without lifting your pen off the paper, connect all of the dots using only four straight lines.



HP MASTERPLAN

OVERVIEW

HP Masterplan is a computer based management information system designed specifically for small to medium sized Australian manufacturers.

The HP Masterplan concept is the result of a joint venture between Hewlett-Packard Australia Limited, the Commonwealth Department of Science and Technology and the Royal Melbourne Institute of Technology (Technisearch Ltd.) to establish the needs of small to medium Australian manufacturers and to develop a system which satisfied those needs. The HP Masterplan system was developed by Management Aid — a South Australian software supplier and the HP-AAC.

HP Masterplan uses a fourth generation software system, based on the HP1000 A600 series microcomputer. The system varies from all other software currently available in that it is not a rigidly structured package which requires the client to conform to a pre-conceived organisational structure. HP Masterplan is a loosely structured collection of software processes and data bases which may be linked and interrelated to form an exact model of almost any manufacturing company.

The model for each company is developed during system implementation, by the company purchasing the system, in conjunction with Hewlett-Packard.

Once formed, the model is used to control and administer all aspects of the company manufacturing cycle. The model also provides up-to-the minute management information on any or all aspects of the manufacturing cycle, at any time.

HP MASTERPLAN FACILITIES

The HP Masterplan system provides management information and administrative support in the following manufacturing areas:

Goods Flow
Purchasing
Production Control
Assembly/Quality Control
Inventory Control
Sales

Contract Flow
Materials Planning
Scheduling
Estimation
Quotation
Marketing
Order Entry

Cash Flow
Creditors (Accounts Payable)
Monitoring
Costing
Debtors (Accounts Receivable)
Billing

General Ledger
Cost and Profit Centre Reporting
General Ledger Entries
Budgeting

FEATURES

- HP Masterplan controls, administers and balances the flow of cash into and from the company with the flow of goods from and into the company.
- HP Masterplan administers, schedules and monitors critical resources such as labour, materials or machine capacity to maximise the production of goods to contract, order or schedule.
- HP Masterplan monitors the production of goods to fulfil specific contracts, and administers the cash income and expenditure related to fulfilling the contract.
- HP Masterplan handles the day-to-day standard and repetitive administrative or clerical work within a company and produces the paperwork or machine control information required by clients, suppliers or internal production processes.
- HP Masterplan gathers information on all aspects of the company operation using the language of the company, via screen based electronic forms designed by the users or producers of the information.
- HP Masterplan produces reports and summaries in the language of the company, in a form determined by the readers of the reports, to be most easily interpreted.
- HP Masterplan monitors, administers and balances capital income from items such as share issues, insurance claims or sales of assets with capital expenditures such as payment of dividends, or major plant or equipment acquisitions.
- HP Masterplan may be changed or modified at any time by the system administrator (a company employee) to provide new or different information or administrative control.

HP Masterplan is a TOTAL Management Information System.

BENEFITS

HP Masterplan offers the following benefits:

- Up to an 80% reduction in the time taken in designing and implementing a custom-made computer system.
- Automated and continuous system analysis and design.
- Automated program documentation.
- Simplified system modification facilities.
- A more applicable, reliable end product, due to the nature of the design process (which continuously tests for appliability and accuracy).

These features not only offer major cost savings to the client, but also provide indicators of gaps or weaknesses in production control and administration systems AND offer cost effective solutions.

AN ALGORITHM FOR COMPUTING THE CENTROID OF AN ARBITRARY POLYGON

By Jeff Deakin and Giles Puckett,
Australian Coal Industry Research Laboratories Ltd.

1.0 INTRODUCTION

One of the functions of ACIRL Computing Services Group is to develop graphics-based software to present information pertaining to coal mining parameters and results of mathematical modelling of various kinds. Examples of ACIRL systems which produce graphical output are:

* Geotechnical Logging System (TEKLOG)
* Underground Mine Ventilation Simulation (MINVENT)
* Finite Element Analysis
* Displacement Discontinuity Method (THREED)
* Two-Dimensional Boundary Element Analysis (BE2D)
* Three-Dimensional Boundary Element Analysis (BE3D)
* In-Seam Long Hole Drilling
* Underground Mine Plan Drafting System (MINDRAFT), and
* Washability Performance Prediction (4CAST).

When developing software which provides graphical output, it is very useful to have at one's disposal a set of routines which perform polygon manipulation, in addition to the basic low-level graphics routines. Such polygon routines might include:

(i) clipping a polygon against some rectangular window, or perhaps even another polygon,

(ii) shading of an arbitrary polygon,

(iii) computing the area of a polygon,

(iv) determining whether a given point is inside a given polygon, and

(v) computing the centroid of a polygon.

Some of these functions, such as (i) and (ii), and perhaps even (iii) and (iv) could be expected to be performed by the low-level routines in the graphics package being used, or they might even be done by the hardware on some of the smarter devices which are becoming more and more common. We have tended to evolve a tradition of "growing our own" low-level and medium level routines, and as such have been forced to develop robust routines we could not collect at reasonable cost. While it is not our policy to re-invent the wheel, we have sometimes found it necessary in order to get high quality software without paying a huge outlay we simply cannot afford.

A number of algorithms have been proposed for the point inside polygon problem (iv). We use the one published by J. K. Hall in Mathematical Geology Vol. 7, No. 1, 1975, since it is robust and it works, although it does have a tendency to be tolerance-dependent. As an aside, beware of the algorithm which stretches an arbitrary line through the point to infinity in one direction, and counts the intersections of the line with the polygon edges (an odd number of intersections =>inside): it occasionally does not work since the line might intersect at a vertex, giving a double count. Modification to consider special cases would detract from any speed advantage of the algorithm, and it is speed one needs when performing these functions, particularly when they are performed anything up to several hundred thousand or even millions of times in a program run.

The polygon centroid is useful when one needs to plot information about the polygon inside the polygon. When the polygon is irregular and its shape is unpredictable, the information to be plotted is better communicated when its centre corresponds with the polygon centroid or centre of mass, which can be thought of as the "aesthetic centre". Of course, if the polygon is always going to be regular, the average of the vertices will do very nicely.

At ACIRL Computing Services we use all of these graphical tools, most of which are readily available to those users doing a lot of graphical software development. The purpose of this article is to propose a means of solving the less well-known problem of finding the centroid of an arbitrary polygon.

2.0 METHOD

An arbitrary polygon $\{(x_i,y_i),\ i=1,2,\ldots,n\}$ consists of the area bounded by the line elements connecting adjacent vertices (x_i,y_i) and (x_{i+1},y_{i+1}), for $i=1,2,\ldots,n-1$. The definition of the centroid or centre of mass

$$\bar{x} = \frac{\int x|f(x)|dx}{\int |f(x)|dx} \quad \text{and} \quad \bar{y} = \frac{0.5\int f(x)|f(x)|dx}{\int |f(x)|dx}$$

is difficult to express for programming purposes: thus a numerical procedure must be used to obtain $\bar{x}$ and $\bar{y}$.

To illustrate the differences that can exist between the average (✕) and the centroid (✱), consider the polygon in Figure 1.

													Centroid	Average
x	6	6	3	8	0	16	20	25	20	12	14		13.56	11.82
y	2	0	3	8	9	18	12	13	1	0	2		8.22	6.18

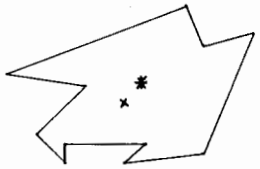


Figure 1

The polygon in Figure 2 is used to illustrate the method described below.

	A	B	C	D	E	Centroid	Average
x	5	2	1	1	2	2.56	2.2
y	2.5	4	3	2	1	2.5	2.5

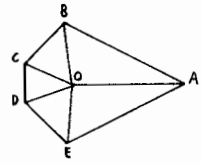


Figure 2

2.1 Algorithm

The algorithm for computing the centroid is as follows:

(a) Compute the average 0 (2.2, 2.5) of the vertices.

(b) Project rays OA, OB, OC, OD and OE connecting the average with each vertex, forming elemental triangles as shown in Figure 2.

(c) Proceeding counter-clockwise round the polygon, compute the component elemental triangle areas and centroids. These are set out in Table 1.

Elemental Triangle	Sides a	b	Angle°	Area	Centroid x	y	Weighted x	y
AOB	1.513	2.8	97.6	2.1	3.067	3.0	6.441	6.3
BOC	1.3	1.513	59.8	0.85	1.733	3.167	1.473	2.692
COD	1.3	1.3	45.2	0.6	1.4	2.5	0.84	1.5
DOE	1.513	1.3	59.8	0.85	1.733	1.833	1.473	1.558
EOA	2.8	1.513	97.6	2.1	3.067	2.0	6.441	4.2
				6.5			16.668	16.25

Table 1

NOTE: Step (c) uses the result that the centroid of any triangle occurs at the point of concurrency of the medians, which is actually the average of the 3 vertices.

(d) For each elemental triangle compute the weighted centroid by multiplying its centroid by its component area. Sum the weighted co-ordinates over the triangles, giving the co-ordinates (16.668, 16.25). Divide these co-ordinates by the total area (6.5), yielding the polygon centroid (2.56, 2.5).

3.0 PROGRAM

A Fortran function CENTRD to implement the algorithm is listed below. Since the polygon area is computed as part of the centroid calculation, it is also returned (as the function value). Some applications will not require the area, so the routine can be called using a normal subroutine call.

Function CENTRD is quite fast for the amount of calculation it performs, taking about 5.4 milliseconds on average to process a polygon with 11 vertices on a VAX 11/750.

The reader will note the use of a function called ATAN3. This function gives the arc tangent in positive radians in all quadrants, as distinct from the Fortran intrinsic function ATAN2 which returns negative angles in the third and fourth quadrants. ATAN3 is useful when one requires positive angles measured counter-clockwise from the x-axis as in this application, and it is also listed, for completeness.

Finally, observe that some polygons such as the one in Figure 1 contain one or more elemental triangles which make a negative contribution to the overall area, by virtue of the fact that their included angle is negative.

That is, as one proceeds counter-clockwise around the polygon, it "doubles back" on itself. In such cases, the areas cancel so that no area inside the polygon is counted more than once.

```
      function CENTRD(x,y,work,npts,xbar,ybar)
*             ------
*  Routine to compute the centroid of any polygon.
*  The polygon area is also returned (as function
*  value) since it is calculated as part of the
*  centroid computation.
*
*   Authors: Jeff Deakin & Giles Puckett
*      Date: 01/07/83
*
*   Argument   Type   Modif    Description
*   x          real   No       array of x co-ords
*   y          real   No       array of y co-ords
*   work       real   Yes      working array
*   npts       int    No       # vertices
*   xbar       real   Yes      centroid x co-ord
*   ybar       real   Yes      centroid y co-ord
*
*  The algorithm forms elemental triangles by
*  connecting the average of the polygonal
*  vertices with the vertices, and computing the
*  sum of the triangle centroids weighted by
*  their ratio of the total polygonal area. For
*  some non-convex polygons there will be some
*  negative component area(s), cancelling the
*  "exterior" area contribution to the total
*  area.
*
      parameter (pi=3.14159,twopi=2*pi)
      real x(npts),y(npts),work(npts)
*
*  assume polygon is not closed, but
*  allow for closed polygons if provided
*
      n=npts
      if(abs(x(1)-x(n)).lt.0.001.and.
     &   abs(y(1)-y(n)).lt.0.001) n=n-1
*
*  first approximate centroid with average
*
      xcen=0.
      ycen=0.
      do 10 i=1,n
         xcen=xcen+x(i)
         ycen=ycen+y(i)
   10 continue
      xcen=xcen/float(n)
      ycen=ycen/float(n)
*
*  determine predominant direction:
*  kount>0: data is clockwise
*  kount<0: data is counter-clockwise
*
      kount=0
      theta=ATAN3(y(n)-ycen,x(n)-xcen)
      do 20 i=1,n
         work(i)=ATAN3(y(i)-ycen,x(i)-xcen)
         if(work(i).gt.theta) then
            kount=kount+1
         else
            kount=kount-1
         end if
         theta=work(i)
   20 continue
*
*  backwards to move counter-clockwise
*
      if(kount.lt.0) then
         istart=n
         iend=1
         istep=-1
         theta=work(1)
         a=sqrt((x(1)-xcen)**2+(y(1)-ycen)**2)
         xold=x(1)
         yold=y(1)
*
*  forwards to move counter-clockwise
*
      else
         istart=1
         iend=n
         istep=1
         theta=work(n)
         a=sqrt((x(n)-xcen)**2+(y(n)-ycen)**2)
         xold=x(n)
         yold=y(n)
      end if
*
*  compute areas of elemental triangles and
*  centroid of polygon as sum of centroids of
*  elemental triangles, weighted by their areas
*
      area=0.
      xbar=0.
      ybar=0.
      do 30 i=istart,iend,istep
         ang=work(i)
         dt=ang-theta
         if(dt.lt.-pi) dt=ang+twopi-theta
         b=sqrt((x(i)-xcen)**2+(y(i)-ycen)**2)
         elarea=0.5*a*b*sin(dt)
         area=area+elarea
         xc=(xold+x(i)+xcen)/3.
         yc=(yold+y(i)+ycen)/3.
         xbar=xbar+xc*elarea
         ybar=ybar+yc*elarea
         theta=ang
         a=b
         xold=x(i)
         yold=y(i)
   30 continue
*
      xbar=xbar/area
      ybar=ybar/area
      centrd=area
      return
      end
*
*
      function ATAN3(y,x)
*             -----
*  This function returns the arc tan angle in
*  positive radians in the range from (0 to 2pi).
*
      if(abs(x).lt.0.00001.and.
     &   abs(y).lt.0.00001) then
         atan3=0.
      else if(y.ge.0.) then
         atan3=atan2(y,x)
      else
         atan3=6.283185307+atan2(y,x)
      end if
      return
      end
```

NEW PRODUCTS

NEW FAMILY OF WINCHESTERS AT REDUCED PRICES

Hewlett-Packard has strengthened its thrust into the Personal Computer market with the introduction of a new family of 5 and 15 megabyte Winchesters. These new Personal Computer peripheral products are modular mass storage systems designed to efficiently use your valuable desk space. By stacking them directly under HP's small footprint computer systems, the system looks like a totally integrated unit but allows you the flexibility to interchange mass storage products as requirements change.

The new mass storage systems are available in three different configurations. The HP 9133V and 9133XV are 5 and 15 megabyte Winchesters (4.8 and 14.5 formatted) combined with a 270 kilobyte 3½" microfloppy. The HP 9134XV is a 15 megabyte standalone Winchester. The 9133V is also available as a four volume Winchester, (four 1.15 megabyte volumes); order 9133XV Opt. 004.

SYSTEM COMPATIBILITY

These new systems are compatible with most of Hewlett-Packard's small computer families.

Hewlett-Packard's Personal Computer, the HP 150, is an ideal match for the new Winchester products.

The powerful Series 200, Model 16 Personal Technical Computer offers the same space advantages as the HP 150. The 68000 microprocessor combined with the 9133XV Winchester maximizes system performance in personal and technical functions such as graphics presentations, project management, forecasting, testing and engineering design. The 9816 supports all of the new Winchester products, as does the HP 150.

A lower cost, but powerful system solution is also available with the HP 86B. The HP 9133V 5Mb Winchester and HP 86B combination offers a personal computer that's optimized for scientific and technical applications. The HP 86B, HP 120 and HP 125 support only the 9133V.

The price of the new Mass Storage Systems have been reduced from the prices of the previous family of products.

HP TECHNICAL COMPUTER USERS GROUP N.S.W.

(Formerly HP 1000 Users Group N.S.W.)

Datacomm Workshop
December 7, 1983, commencing 1.30 pm.
at HP Office, Sydney. Attendance fee $15.00.

Annual General Meeting and election of office bearers.
December 7, 1983, commencing at 5 pm. Following this, at 6 pm., there will be a barbecue and Christmas Party.

NEW PRODUCTS

HP 2625A Dual System Display Terminal

FEATURES:

- **HP and IBM Compatibility**
  The HP 2625A can simultaneously be connected to an HP system and to an IBM compatible system.

  In HP mode, VPLUS 3000 applications are supported.

  The 2625A may also be connected to non HP systems supporting ASCII asynchronous point-to-point data-communications in character mode.

  In IBM emulation mode the IBM 3276/78 display terminal features are provided.
- **Optional Graphics**
  The optional graphics mode provides compatibility with the popular HP 2623A graphics terminal feature set. It also offers a TEKTRONIX 4014 compatibility mode.
- **Optional Word Processing**
  The optional Word Processing capability is supported by the HP 3000 system's HPWORD software.
- **High Performance Datacomm**
  2 Standard System Ports
  Optional HPIB Printer Control Port
  Wide choice of Datacomm Options
- **Complete Alphanumerics**
  Smooth Vertical Scrolling
  Edit Checking/Transmit Only Fields
  Display Enhancements
  Up to 6 Pages Display Memory
  HP Block Mode Transmission
  Forms/Format Mode
  Multiple Character Sets
- **Ease of Use**
  27th Line For Terminal Status
  Non Volatile User Definable Screen Labeled Keys
  Integral Printer Option
  11 National Language Options
- **Human Engineering**
  Choice of White, Green or Amber Display
  Optional Tilt and Swivel Base
  Focus/Brightness Controls
  Detachable Typewriter-Style Keyboard

* IBM is a trademark of International Business Machines Corporation.

HP 2625A
The HP 2625A brings HP and IBM compatibility together in a single terminal. With HP 2622A Data Entry features on Port 1, and IBM 3276 features on Port 2, it offers convenience and cost savings to multiple system users.

MULTIPLE MODES
The standard HP 2625A offers both the an HP 2622A data entry terminal mode, and an IBM 3276 display station mode.

Pressing a function key switches the terminal from one personality to the other, but both ports remain active at all times, allowing tasks to be run concurrently on both hosts, without losing data.

Option 523 adds HP 2623A graphics features and Tektronix 4014 graphics compatibility. Option 528 adds the HPWORD word processing personality.

HP DATA ENTRY MODE
In HP mode, the 2625A operates as an enhanced version of the popular HP 2622A block-mode data entry terminal. As such, it is supported by VPLUS software on the HP 3000 computer. It may also be used as a high performance character mode teletype compatible ASCII terminal on both HP and non-HP systems.

IBM TERMINAL MODE
In IBM mode, the 2625A emulates an IBM 3276/3278 Model 2 (24 lines), Model 3 (32 lines) or Model 4 (43 lines) display station, as selected by configuration. The 25th thru 43rd lines are viewed using the roll up/roll down keys from the keyboard. The 87-key typewriter keyboard (IBM 4627) is emulated through the use of keyboard overlays which provide PF, PA and other IBM key functions.

The following IBM 3276/3278 features are unsupported: selector light pen, magnetic readers, print key. However, screen copies may be made either on the optional integral printer, or on an external printer via the optional printer control port.

Connection to the IBM host is via modems using BISYNC protocol. If so desired, the modems may be replaced by an HP 13232U modem bypass cable, for local installations. Up to 32 HP 2625A terminals may be daisy-chained together, emulating a cluster formed by one IBM 3276, and several IBM 3278 display stations. Channel connection and SDLC protocol are not supported.

Note: When using the HP 13232U modem bypass cable, the maximum cable length between the system and the first HP 2625A is 50 feet.

GRAPHICS FEATURES
The Graphics option provides the HP 2625A terminal with an enhanced version of the powerful HP 2623A graphics terminal feature set, adding polygonal area fill, rubberband line, and Tektronix 4014 compatibility mode.

The HP 2625A with Graphics is supported by a wide variety of Hewlett-Packard software. Refer to appropriate HP 1000, HP 3000 and HP 9000 system software configuration guides for further information.

Furthermore, the HP 2625A with Graphics runs with Precision Visual's DI-3000™, and GRAFMAKER™, ISSCO's DISSPLA™, and TELL-A-GRAF™, and SAS's SAS/GRAPH™.

The TEKTRONIX® 4014 compatibility mode allows the HP 2625 to operate with TEKTRONIX Inc's PLOT 10® software.

Note: The Graphics features relate only to the HP and Tektronix personalities. No IBM graphics are supported.

HUMAN ENGINEERING
Like all HP terminals, the HP 2628A is designed for tireless comfortable use. Its optional tilt and swivel base and standard detachable keyboard allow people of different height and bone structure to work comfortably. The HP 92171R Palm Rest accessory provides hand support, relieving muscle strain. White, green and amber displays are available to suit individual taste. Brightness and focus controls adapt the image to varying light conditions, and the flicker free display, with its large 9 × 14 dot character cells and smooth scrolling, eliminates eye strain and fatigue.

NEW PRODUCTS

NEW INTERFACE BRINGS MORE POWER TO PORTABLE, BENCH-TOP APPLICATIONS

Do you sometimes wish you had a portable, battery powered, device for collecting data anywhere, and still have the processing power of your larger computer system? If so, then two new interfaces from HP will be of interest to you. The interfaces are a HP-IL/HP-IB translator and an HP-IL/RS-232C interface.

Through the use of these devices, products like the HP75C portable computer, and the HP41C hand-held computer, can now tap the power of high-end computers, peripherals, and test and measurement equipment.

The HP82169A HP-IL/HP-IB interface expands control and communication capabilities of Series 40 and Series 70 computers by linking their low-cost HP-IL interfacing system for battery-operable devices with high performance HP-IB computers and lab equipment.

This new interface lets HP-IL and HP-IB interface systems talk to each other and work together by correcting for a difference in protocol and data processing speed. The Hewlett-Packard Interface Loop (HP-IL) is a low-power bit-serial interface. It transmits data one bit at a time — perfect for small, battery-operable devices. The Hewlett-Packard Interface Bus (HP-IB, or IEEE 488), on the other hand, sends eight bits of data simultaneously. It's a high-performance solution but consumes more power than HP-IL.

Hooked up to the HP-IL/HP-IB Interface, portable computing products such as the HP-41 and the HP-75C put at your disposal a variety of peripherals, instruments, and computers which previously eluded you. You can operate HP-IB versions of the HP 82905B printer and the HP 7470A and HP9872B plotters; operate and control power supplies and instruments such as the HP 1980 oscilloscope; and talk directly with HP-IB computers such as the HP 3000, the HP 1000, HP 9816, and the HP 9845.

Above right is a sample of two programs which were used to transfer information from a HP-75 to a HP 9845. The programs run co-operatively;

```
HP-75 Program;
      10 PRINTER IS ":CO"
      20 ASSIGN #1 TO "DATFILE"
      30 FOR I 1 TO 50
      40 READ #1;I
      50 PRINT I
      60 NEXT I
      70 END

HP-9845 Program;
      10 DIM A$[80]
      20 ENTER 705;A$
      30 PRINT A$
      40 GOTO 20
      50 END
```

Obviously this is only a simple example of how to transfer one particular file (DATFILE) to the 9845. When running a HP-IB peripheral the procedure is even simplier, in that you simply assign the interface and its devices just like you would assign other HP-IL devices.

To sum up, these types of interfaces help you make the right connections. They allow you to utilise your investment in equipment and peripherals without the need to duplicate. They are friendly, flexible solutions for increasing benchtop system automation and expanding high-end system options.

DESKTOP FORUM

"HELP!" they cried

And Help was forthcoming! . . . at the meeting of H.P.D.C.U.G.V. at CSIRO Syndal on July 7th. Our meeting opened with an invitation for members to call for help on problems relating to their computers. Several members made pleas for help and in general received satisfying answers later in the meeting. All future meetings will begin with such a Help session.

Phil Greetham introduced two new H.P. staff members we will get to know well in the future. Chris Butchers, a technical sales representative, and Judi Wilkinson, who is a system engineer with the Personal Computer group. Chris led off with a short talk on Shared Resource Management and the new 3.5 inch floppy discs.

We were then treated to a demonstration of a word processor for the 9845/35 by Terry Locke of Underwater Inspection Services. Written in H.P. Basic it features a powerful and comprehensive set of commands for writing text then storing it and retrieving it from tape cartridge or disc. Terry uses this system for writing operations manuals for his undersea inspection work for which it seems ideal.

Then followed an open Forum on H.P.'s support — or lack of it — for desktop computer products. Criticisms abounded but most boiled down to the same underlying problem — users want to know more about their computers and their peripherals than they can find in their manuals. Generally they have had little success. They found it difficult to contact anyone at H.P. with the right product knowledge and in many cases had given up in disgust. There seems to be no reliable way for us here in Australia to get product information which must exist at H.P. in the U.S.A.

Judi Wilkinson rose to H.P.'s defence pointing out that her new role was to address just this problem. She will provide an Access Line service for Personal Computer users and is in the throes of setting this up right now. Phil Greetham and Chris Butchers said they would convey the mood and views of the meeting back to H.P. for attention. Let's hope for better things in the future.

During the meeting Tony Stevens, our librarian, distributed his newly completed package detailing our library's contents and a listing of members with their equipment and interests. This represents a great deal of work and we are indebted to Tony for it.

Finally we came to the answers to the pleas for Help. The response was excellent and discussion carried on well after we had broken off for coffee.

B. T. O'SHANNASSY

THE HP DESKTOP USERS GROUP OF N.S.W.

has been formed and meets bi-monthly. The secretary is:

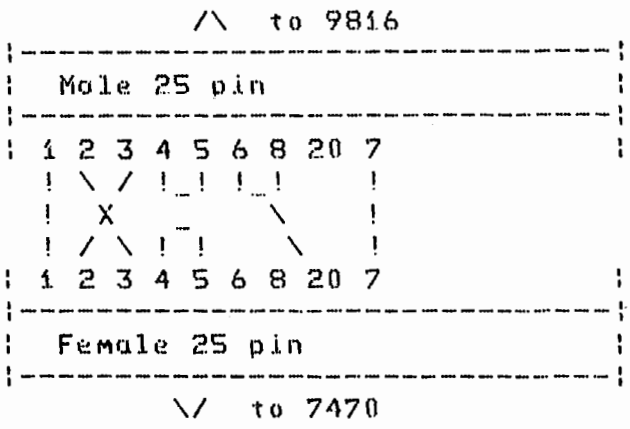
Dr. R. W. Harris,
CSIRO,
Division of Mineral Physics,
PMB 7,
Sutherland, N.S.W. 2232.
Tel. (02) 543 3460.

DESKTOP FORUM

Connecting a 7470 to a 9816

I recently needed to demo a 7470 on the 9816 . . . no problem you say, except the only interface on the 7470 was RS232. After a little messing around I found that the following allowed the plotter to work. Although it is not supported, you may find it useful when in a tight spot.

Cable — European modem cable 13222-60002 with jumpers from a male and female 25 pin connectors back to back as follows (a 'black box' would do, or possibly a proper modem eliminator cable).




```
Strapping on the 7470:      s1 s2 y us b4 b3 b2 b1
                            0  0  x x  1  0  1  0    x=don't care
....9600 baud (4800 is just as good, 2400 is perceptibly slower), add parity
, parity disabled.

On the 9816:    100 CONTROL 9,0;1     ! reset i/f
                110 CONTROL 9,3;9600  ! baud
                120 CONTROL 9,4;3     ! 8 bits/char, odd parity, parity disable
                130 OUTPUT 9;CHR$(27)&".M5;;;13;10"
                140 PLOTTER IS 9,"HPGL"
                  .
                  .
                  .
```

The plotter is then treated as usual.

Hope this is of interest!

BOB HEPPLE, Perth

Focus 1000

Driver writing for AGP/3

(PART 1)

This is the first of two articles. In the first I will talk about AGP structure and in the second some specific implementations of device drivers.

1.1 AGP STRUCTURE

AGP/3 is Hewlett-Packard's Core standard graphics package. It originates from the University of Colerado in Bolder, Colerado, and most of it can only be modified when permission has been obtain..d from the Regents of the university.

Hewlett-Packard sell these rights with respect to that part of the package which relates to communication to 'devices', i.e. a display or a digitizer. This gives the ability to a user or third party to connect non HP equipment to the package.

It should also be noted that the Core standard is not the international standard recently agreed to. This is the GKS (Graphic Kernal System) standard. The University of Colerado claim that they can easily modify the Core package to accommodate the GKS standard. This is yet to be seen. The most obvious difference between the systems is the ability to define multiple display devices within a defined work station.

1.1.1 THE AGP (ADVANCED GRAPHICS PACKAGE)

The Core graphics system is a three dimensional multi-colour graphics system defined around the following functional devices:

- Graphics Display
- Alphanumeric Display
- Locator
- Valuator
- Pick
- Keyboard
- Button

A "Work Station" may contain one or all of the above devices but only one of each function. The HP implementation of this is to load all of the ascribed device driver subroutines into a "work-station program" which runs in its own partition and communicates to the user program via two class numbers. The size impact on the user program is thus very small as the routines only require to send and receive small class buffers to and from the work station.

The system includes the ability to rotate and view your object from any perspective view point and view plane. This provides for the unique experience of being able to view your object from a point within it or do an

SPECIFICATIONS FOR SUBMISSION OF ARTICLES AND ADVERTISEMENTS

Crosstalk will be published each even numbered month. Articles and advertisements must be received by the appropriate group editor by the third week of the preceding month.

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PMB 7, Sutherland, N.S.W. 2232.

incremental walk through your object (say a building) looking at various spatial relationships as you go.

1.1.2 DGL (DEVICE-INDEPENDENT GRAPHICS LIBRARY)

This is a two-dimensional sub-set of AGP. It follows that many of the transformation routines are not relevant.

HP's implementation requires all routines are linked to the user's program.

The function of this article is not to go too deeply into what AGP/3 is in itself but to give you an idea of the way foreign devices are included in the package.

1.1.3 AGP SUBROUTINE INTERFACES

AGP is a good example of structured programming. The routines are divided into the following layers, each routine being able to call a routine from a layer below but not from a layer above.

- 'Z' layer — device layer. (Device dependent)
- 'T' layer — transformation layer. (Core)
- 'M' layer — machine layer. (Computer dependent)

Communications between the layers is done by careful use of labelled common and this is below the user level and hence unseen by the user.

1.1.4 DEVELOPMENT PROCEDURES

Before beginning development of a device handler, the user should perform the following:

1. Become familiar with the DGL system and concepts discussed in the DGL Programmer's Reference Manual. It is recommended that programs are developed while learning the DGL system rather than just reading the manual alone.
2. Understand the device that is to be interfaced. A thorough understanding of the functions that the device is capable of performing and how to direct the device to perform them is needed.

1.1.5 LIBRARY ORGANIZATION

The DGL system is divided into several different libraries. All of the libraries in the DGL system are structured so they may be loaded with a single-pass search when using the system loader. This results in only loading in the routines from a library which are necessary to perform the DGL functions invoked by the application program.

1.1.6 DEVICE LIBRARIES

Each one of the logical devices (e.g. button, keyboard, etc.) has a library associated with it. These libraries are referred to as the device handlers since they only contain the device dependent routines which control a specific device. It is important to note that all libraries for a certain class of devices (e.g. locators) contain routines with the same names. For example, the locator library for the HP 9111A Data Tablet ($L0004) and the locator library for the HP 2648A Graphics Terminal ($L0001) both contain a ZWLOC and ZSLOC routine. These routines have the same functionality but perform device dependent sequences to achieve the desired function.

1.1.7 DGL SYSTEM LIBRARY

The DGL system library ($DIDD), contains routines which are device independent (e.g. ZVIEW, ZIWS) and routines which are used by several different devices (e.g. routines shared by a device group). A very important fact to remember is that the $DIDD library also contains dummy routines for EVERY routine in the DGL system which is device dependent. For example, dummy routines exist for ZDRAW, ZBUTN, ZKINT, etc. These dummy routines allow programs which do not require all of the logical devices in a work station to load in a smaller amount of memory. The other advantage of this scheme is that if a graphics display device does not support a function, the dummy routine for that function does not have to be added to the graphics display library. This is because the $DIDD library is searched after all of the device handlers are searched when loading a DGL program. Therefore, any DGL routines which were referenced but were not in the handlers searched will be satisfied by the dummy routines in the $DIDD library. For example, if colour and linestyle are not supported by a graphics device and they are not simulated by the device handler, then the routines ZCOLR and ZLSTL do not have to be written or merged into the graphics display handler.

In the next chapter I shall deal with experiences with the Ramtek 9400, Summergraphic 2000 digitizer, Gerber photo-plotter and an Excellon drilling machine.

BILL FILSON

Experience with Driver Writing for AGP/3

(PART 2)

2.1 RAMTEK 9400

The Ramtek display system is a highly intelligent multi-microprocessor driven graphics display system capable of a great variety of post processing of display data including much of the transformation functions provided in AGP. Unfortunately AGP allows only the more simple.

2.1.1 HP HARDWARE

The interface used was a Ramtek modified HP general purpose parallel interface card and sold as Ramtek part number 503958.

The displays were Mitsubishi C-6912ELP. Resolution 1280 by 1024 pixels. Dimension 380mm by 280mm.

The driver was purchased separately by the customer from Technology U.S.A. inc. and was a driver in the simplest sense. It did not do all those nice things we come to expect of drivers. For example; if the Ramtek was not turned on the first call to it would hang the system until the time-out elapsed — other users were delighted by this feature. The driver executed a JMP *-1 (One instruction loop) until the Ramtek responded. This should have been implemented in the continuation section of the driver.

The Ramtek 9400 was implemented as a display device only. The following routines were implemented:

ZDINT	Initialize device
ZDEND	Terminate device
ZMOVE	Move cursor
ZDRAW	Draw single line
ZPOLY	Draw connected set of vectors
ZCOLR	Change colour
ZLSTL	Change linestyle

Other routines called at the "T" level but available to be changed by driver writers are those related to the echoing of the cursor position from a locator or a pick device (i.e. a digitizer). These are as follows:

TBEGE	Begin echo on display device
TECHO	Echo on display device
TENDE	End echo on display device

2.1.2 RAMTEK INITIALIZATION

The Ramtek 9400 when delivered was not installed by the supplier and hence some time was spent resolving hardware configuration jumpers, etc. etc. It was apparent that Ramtek expected its customers to have a substantial background in electronics. A side effect of these types of problems is that one gets to know the device very well very quickly.

The Ramtek 9400 can support up to 1024 colours if all memory planes are installed and only one monitor (1024 × 1024 pixels) is connected. In our installation we were only to use 4 memory planes for each monitor this means we were to write the driver to support 4 monitors each able to have 16 colours displayed at any one time.

The Ramtek 9400 selects its colours from a look-up table of 16 colours loaded down at the time the device is initialized. (It would be possible to load down a different set of colours at any time but only 16 can be displayed at once). These colours are hardcoded into the initialize call ZDINT routine. The other function this routine does is to check that a Ramtek device is connected. This can only be done by checking the driver type in the equipment table as the Ramtek has no command for it to send back some identification as does devices like the 26XX terminals.

The four displays were implemented as equipment table subchannels and the Ramtek op-codes were modified before each call.

2.1.3 MOVE & DRAW

These calls were implemented with appropriate Ramtek op-codes and the draw polygon call ZPOLY was implemented with the Ramtek linked vector op-code so to improve the display speed. It was a disappointment to see later that the Core software did not call ZPOLY to draw high quality text so we saw no speed advantage.

2.1.4 LINE STYLES

The Ramtek allows you to specify a vector texture pattern and we chose patterns similar to the ones supported on the HP2647/8 display devices.

2.1.5 CURSOR CONTROL

The cursor control for the Ramtek proves to be very illusive. Try as we may we could not get a cursor to show itself. Further deep research

into the manuals by the customer revealed a hardware strap was required and voila! a cursor appeared — on one display only. A new piece of hardware was required if we wanted cursors on each display — groan. (It arrived in due course).

2.1.6 TERMINATION
The DGL buffer was simply flushed and nothing else sent to the display.

2.1.7 GENERAL ROUTINES
It was necessary to modify some of the "M" level routines such as the routines to get the driver type and the routine to convert HP real numbers to something the Ramtek could understand.

HP had to be approached to get the source of the routine to write the DGL buffer to the Ramtek as the driver purchased for the interface did not understand HP's convention of a negative buffer length meaning bytes not words. Yes, we could have changed the driver but we took the simplest route.

2.2 SUMMAGRAPHICS DIGITIZER

2.2.1 HARDWARE & SYSTEM SOFTWARE
The Summagraphics 2000 digitizer was interfaced to the HP1000 F via the 8 channel asynchronous multiplexor using driver DVM00 only.

The only problem encountered here was the discovery that the Multiplexor required pin 3 (RS-232-c Transmit) electrically connected even though we were only reading and it-worked-that-way-on-the-HP9835.

The mux was set up for a "dumb" terminal with type-a-head and "program scheduling" disabled. Start and stop bits, BAUD rate, parity and character length were as specified by the Summagraphics serial communication interface.

The digitizer table was the larger 508mm by 508mm with a resolution of 10 points/mm in both directions.

2.2.2 SOFTWARE
The drivers required by the customer were for:
Pick device
Locator device
Valuator device

The AGP routines required were:
ZPINT Pick initialization
ZLINT Locator initialization
ZVINT Valuator initialization
ZPICK Wait for pick input
ZWLOC Wait for locator input
ZWVAL Wait for valuator input
ZSLOC Sample locator input
ZSVAL Sample valuator input
ZPEND Termination pick input
ZLEND Termination locator input
ZVEND Termination valuator input

2.2.3 INITIALISATION
In all drivers the initialisation was only to AGP tables.

2.2.4 SAMPLE WITH WAIT
This was implemented with all three device handler and required no special operator interactions.

2.2.5 SAMPLE WITHOUT WAIT
This was only able to be effective if the operator first switched the digitizer to "stream" mode, otherwise it would effectively be the same as the sample with wait.

2.2.6 TERMINATION
No special termination was required by the device only the AGP system tables were updated.

2.2.7 GENERAL ROUTINES
Again, as for the Ramtek, the routines which convered the X & Y co-ordinates as well as the routine to check the device type required modification.

2.3 GERBER PHOTOPLOTTER & EXCELLON DRILLING MACHINE
These devices were treated as if they were plotters. The final output as far as the HP machine was concerned, was a punched paper tape which was manually carried over to the respective machine.

The Gerber Photoplotter required the following routines to be implemented:

ZDINT Initialize
ZDEND Terminate
ZMOVE Move with light off
ZDRAW Move with light on
ZDWID Select new line width
ZMARK Draw special hole mark

The Excellon drilling machine required X & Y co-ordinates for hole positions and sizes. The following routines were implemented:

ZDINT Initialize
ZDEND Terminate
ZMOVE To move to next hole
ZCOLR To change drilling tool

The output was first placed in an ASCII file which would allow its modification in the editor before being converted by another program to EIA codes for the paper tape. Direct output to the tape was controlled by initializing the device without spooling.

BILL FILSON

SMARTER BACKUP FOR RTE-6 USERS

(or how not to get caught with your pants down)

DAVID TRIGGS, Hewlett-Packard, Sydney

If you have an RTE-6 system and either a tape drive or a CS-80 cartridge tape then backup just became a lot easier. The reason is that FC has been modified to allow MANAGER.SYS to copy an LU on the system, not just those mounted to the SYS group or MANAGER.SYS. There are many advantages to using FC for system backup, some of them are:

* The whole system, or any part of it, can be backed up in one operation. Even better the lus to be saved can be placed in a command file and the process automated.
* Because FC is a file based utility only existing files are saved, no space is taken up on tape saving unused disk space as with PSAVE.
* If the backup will not fit on the tape provided, FC simply prompts for the next reel and continues. There is no need to guess how big a tape is needed or to use too many tapes.
* FC saves data file by file so it is possible to retrieve just one file, several files or everything from a backup. This way when someone comes running to you with a sad story about the file that they just accidentally purged you can restore just what is required, adding it to their cartridge, without having to restore the whole system or even their whole lu. On the other hand if you lose the whole system it can all be restored with only a few operations.
* FC can verify what it is copying so you can be reasonably sure that you have a good backup.

There is nothing very hard about using this method to back up either. There are basically two steps needed.

The first is to get a physical save of the operating system. This is needed because FC saves only files, not the operating system. The easiest way to do this is with PSAVE. To make life easier for yourself it is a good idea to put together a transfer file to PSAVE your system. You must include lu 2 but it is a good idea to include a few of other system lus, particularly lu 3. Make sure that you include a copy of the object code (type 6 file) for FC! There is no need to do this as often as you back up the rest of your system. It really is only needed when you alter permanently loaded programs although if it is done every time then if you have to restore the whole system the cartridge list will be correct when the system is copied back to disk (this would be done with !BCKOF).

The second step is to save the files on the system. To do this you will need to be MANAGER.SYS, you will also need to have all the lus that you need to back up in your SST. Probably the best way to do the backup is to use a transfer file containing SL commands to put all the lus in your SST that are not normally there. This transfer file can then run FC with a commanding file using the TR command in FC. This command file can set a title with the TI command if you want and then use the CO command to copy all the required lus to tape. Remember that you will need to either fit all the lus on one line between braces or use the GR and EG commands to group all the lus to be copied at once. It will be easier if you also use the DE command to specify the destination and whether you plan to use verify (which you should always do). An example transfer file and command file are given below.

Finally label your tapes carefully. As long as the system time was correct you can always find out what a tape is with PRSTR and FC but it is a slow process!

I always recommend a rolling backup. This is where you keep a set of tapes just for backup and you always use the least recently used tape(s) for the current backup. How many tapes you need will depend on the size of your disk and the importance and regularity of your backups. You should have at least three complete backups at any time.

This strategy will protect you against sudden loss of files but there is another possibility to consider, that you lose a file without realizing it. On most systems there are so many files that one or two infrequently used

files may not be missed for a long while. To guard against that it is a good idea once in a while to put a backup away out of the regular cycle for the day when you realize that the source of your prize program is corrupt, and so are the last 3 backups of it!

How sophisticated you get will once again depend on how important your files are to you. Mostly a full backup will only be done once a week, with fast changing files being saved more frequently. In this case a good strategy would be to keep the full backups for say the last 4 or 5 weeks but to keep the backups for the first week of the month for the last 4 months and the backups for the first week in each quarter for a year. This would take about 12 sets of tapes, but stop for a moment and think about what would happen if you lost everything on your system. All your programs, data, . . . everything you have ever done. Is this amount of tape really going to cost you too much?

While on the subject of losing everything, there are two points that people often forget about tape. The first is that it doesn't last forever. If you want to put data on a tape and be reasonably sure that you can read it again in 18 months you need special tape. Much beyond a year on most tapes the magnetic image fades and those dreaded parity errors start to appear. The second thing is that tapes burn. Pretty obvious when you think of it but there are plenty of sites where all copies of the backups are kept in the one room on open shelves. A fire in that area could destroy the lot. The best solution is to keep some backups off site. Preferably a good distance away, not on the next floor. If you have another office or factory get someone there to keep a copy of your backup. Don't forget to send them a new one every once in a while. If this isn't possible there are companies who offer off site tape storage, they will even pick your tapes up for you. If your company won't go to this expense ask if you can take a copy of the backup home every once in a while.

I hope that these few ideas on backup have been helpful. Just remember, YOU HAVE BEEN WARNED!

Sample transfer file *BCKUP

```
:*
:* Transfer file to backup
:*                        system
:SL,20,20
:SL,21,21
:SL,22,22
:SL,23,23
:RU,FC,TR,@BCKUP
::
```

Sample Command file @BCKUP

```
*
* Command file to backup system.
*
ti,System Backup
de,,-8,v
gr
co,-20
co,-21
co,-22
co,-23
co,-24
co,-25
eg
ex
```

COMING EVENTS

14th November: RTE-A Programming and System Manager course, HP Melbourne

28th November: RTE-6/VM Session Monitor course, HP Melbourne

7th December: HP Technical Computer Users Group, N.S.W. Datacomm Workshop, 1.30 pm., HP Sydney

7th December: HP Technical Computer Users Group, N.S.W. Annual General Meeting and Christmas Party, 5 pm., HP Sydney

12th December: RTE-6/VM System Manager Course, HP Melbourne

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